BURNSIDE

127 First Line
Township of Centre Wellington (Elora)

Functional Servicing and Stormwater Management Report

Elora Greens Inc.
120 Matheson Boulevard East, Unit 3
Mississauga ON L4Z 1X1

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120 Matheson Boulevard East, Unit 3
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R.J. Burnside & Associates Limited
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Guelph ON N1H 1C4 CANADA

September 2026
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Distribution List

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0	September 9, 2026	Draft Report Issued for Review and Coordination
1	September 11, 2026	Issued for Approval

R.J. Burnside & Associates Limited

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1.0 Introduction

1.1 General

R.J. Burnside & Associates Limited (Burnside) has been retained by Elora Greens Inc. to prepare a Functional Servicing and Stormwater Management Report in support of the Official Plan Amendment (OPA), Zoning Bylaw Amendment (ZBA) and Draft Plan of Subdivision applications for the proposed residential development at 127 First Line in the Township of Centre Wellington (Elora).

This report demonstrates that the subject lands can be serviced in accordance with applicable regulatory requirements, the Township of Centre Wellington Water and Wastewater Servicing Master Plan (dated June 30, 2025) and the Township of Centre Wellington Development Manual (June 2024).

1.2 Site Description and Location

The Site is 21.581 ha in size and is located at 127 First Line in the Township of Centre Wellington (Elora). The Site is bound by First Line to the north, existing agricultural lands and future development lands to the east (159 First Line), and existing agricultural lands to the south and west.

The intent is to develop the land as a residential subdivision (296-677 units), complete with municipal rights-of-way, municipal services (sanitary sewer, storm sewer and watermain), a shared stormwater management facility, a sewage pumping station, as well as the associated park, trails and walkways.

Refer to Figure 1.

1.3 Background Studies

The servicing concepts presented within this report have been developed to comply with the information contained in the following reports. The following documents, studies, and reports have been incorporated unless otherwise noted:

Document Title	Prepared By	Date
Draft Plan of Subdivision	MHBC Planning Urban Design & Landscape Architecture	March 2026
Township of Centre Wellington Water and Wastewater Servicing Master Plan	R.V. Anderson Associates Limited	June 30, 2025
Township of Centre Wellington Development Manual	Township of Centre Wellington	June 2024

Document Title	Prepared By	Date
Township of Centre Wellington Development Charges Background Study – Consolidated Report	Watson & Associates Economists Ltd.	March 24, 2026
Soil Survey of Wellington County Ontario Report No. 35 of the Ontario Soil Survey	Canada Department of Agriculture and the Ontario Agriculture College	1963
Geotechnical Investigation Report for Proposed Development at 127 First Line, Elora, Township of Centre Wellington Ontario	Planet Engineering Inc.	September 11, 2026
Hydrogeological Investigation Proposed Development at 127 First Line, Elora, Township of Centre Wellington Ontario	Planet Engineering Inc.	August 5, 2026
Topographic Plan of Survey of Part of Lot 2, Concession 1 Geographic Township of Nichol Township of Centre Wellington	Van Harten Surveying Inc.	April 17, 2025
Stormwater Management Planning and Design Manual	Ministry of the Environment	March 2003
127 First Line, Elora ON Transportation Impact Study	Paradigm Transportation Solutions Limited	September 2026
127 First Line Elora Scoped Environmental Impact Study	R.J. Burnside & Associates Limited	July 2026
Environmental Noise Feasibility Assessment Proposed Residential Development 127 First Line, Elora	R.J. Burnside & Associates Limited	February 2026
Technical Memorandum – Overall Sanitary Servicing Strategy – 127 First Line and 159 First Line	R.J. Burnside & Associates Limited	September 2026
Technical Memorandum - Stafford Street Sewage Pumping Station (SPS) and Clyde Street Sewage Pumping Station (SPS) – Capacity Investigation and Assessment	R.J. Burnside & Associates Limited	September 2026
Technical Memorandum – Sanitary Sewer Capacity Assessment – 127 First Line and 159 First Line	R.J. Burnside & Associates Limited	September 2026
Water Distribution Memo	WalterFedy	September 2026

Document Title	Prepared By	Date
Stormwater Management Memo	WalterFedy	September 2026

2.0 Existing Site Conditions

2.1 Land Use

The Site is currently utilized for agricultural production (cash crops). The adjacent lands are also utilized for agricultural production.

2.2 Topography

Existing ground elevations across the site range from approximately 403.50 metres above sea level at the northwest corner of the site, to approximately 390.00 metres above sea level at the southwest corner of the site.

Under existing conditions, runoff generated from the Site sheetflows overland in a north to south direction, ultimately discharging to the existing Municipal Drain No. 8 located on the adjacent lands.

Please refer to Figure 2A and Figure 2B for the Existing Conditions and Removals Plan.

2.3 Soil

From the Soil Survey of Wellington County Ontario Report No. 35 of the Ontario Soil Survey (1963), the predominant surface soil type throughout the Site is categorized as follows:

- Harriston Loam (HI) – loam till with good drainage characteristics (Hydrologic Soil Group B)
- Listowel Loam (Lil) – loam till with imperfect drainage characteristics (Hydrologic Soil Group B)

Planet Engineering Inc. completed a geotechnical investigation for the Site in 2025 and 2026. Based on the Planet Engineering Inc. investigation, which included drilling ten boreholes on Site, the topsoil depth was found to range from 150 mm to 300 mm. Below the topsoil, a layer of fill / disturbed native material, consisting of sandy silt till, trace to some clay and gravel, was encountered with depths ranging from approximately 0.5 m to 1.1 m below the topsoil. A layer of native material was identified below the fill / disturbed native material. The native material is comprised of very loose to very dense sandy silt till to silty sand till with trace to some clay and gravel.

A copy of the Geotechnical Investigation Report (Planet Engineering Inc., dated September 11, 2026) is included in Appendix A.

2.4 Groundwater Conditions

In 2025 and 2026, Planet Engineering Inc. undertook a hydrogeological investigation for the Site. The hydrogeological investigation, which was completed simultaneously with the geotechnical investigation for the Site, included the installation of monitoring wells in five of the boreholes (MW1, MW4, MW6, MW 7 and MW10).

Based on the groundwater conditions monitored as part of the hydrogeological investigation, it was found that the groundwater depth ranged from approximately 0.10 m below ground surface to 5.77 m below ground surface. The overall direction of groundwater flow is primarily in a north-to-south / southwest direction.

A copy of the Hydrogeological Investigation Report (Planet Engineering Inc., dated August 5, 2026) is included in Appendix B.

2.5 Environmental Features

A detailed description of the natural features on the Site is presented in the Scoped Environmental Impact Study prepared by R.J. Burnside & Associates Limited (dated July 2025).

The following is a summary of the field studies completed in August of 2025, which included an ELC, botanical inventory, tree inventory, leaf off maternity roost assessment and incidental wildlife observations:

- No locally or provincially rare vegetation communities were identified within or adjacent to the Site.
- No locally or provincially rare plant species were identified within or adjacent to the Site.
- 144 trees are proposed for removal to accommodate the proposed development.
- There are no significant woodlands, wetlands, valleylands, ANSI’s or SWH on Site.
- Candidate habitat for SAR bats and two SAR birds were located within the mixed woodland community in the southwest corner of the subject lands and adjacent lands.
- A small number candidate bat habitat trees (snags and large diameter trees) will be removed from the Site and due to ample available habitat within the local vicinity it has been determined that SAR bat habitat function will not be impaired due to the proposed development.
- Meadow habitat and tree compensation (1:1 ratio) will be required to compensate for the removal of these existing communities within the Site.
- All mitigation measures outlined in the Scoped Environmental Impact Study must be followed to ensure no negative impact to the natural heritage features and to avoid contravention of applicable policies.

A copy of the Scoped Environmental Impact Study (R.J. Burnside & Associates Limited, dated July 2025) has been provided under separate cover.

3.0 Proposed Development

The proposed Draft Plan of Subdivision for the Site was prepared by MHBC Planning Urban Design & Landscape Architecture (dated March 2026).

The proposed Draft Plan of Subdivision for the site is illustrated on Figure 3.

The proposed residential development consists of the following:

- 18 Low-Density Residential Blocks (202-472 units)
- Two Multiple Residential Blocks (60-131 units)
- One Mixed-Use Block (34-74 units)
- Four Park Blocks
- One Trail Block
- Two Walkways Blocks
- One Pump Station Block
- One Stormwater Management Block

Access to the Site will be provided via one connection to First Line. As part of the development of the adjacent lands (159 First Line), three additional accesses will be provided.

3.1 Site Grading

The conceptual site grading design for the Site, including the rights-of-way, development blocks and stormwater management pond, are shown on Functional Grading Plans (Drawing No. GRD1 and GRD2).

The conceptual site grading matches the existing property line elevations along the north, south and westerly boundaries. The conceptual site grading along the easterly property line, including the three rights-of-way (Street D, Street E and Street F), have been coordinated with the adjacent development (159 First Line).

The rights-of-way have been grades with slopes ranging from 0.5% to 5%, to provide the required cover for the servicing (sanitary sewer, storm sewer and watermain), and to direct major overland flow to the stormwater management pond located at the south boundary of the site.

The lots have been graded with slopes ranging from 2% to 6%. Where necessary, 3:1 transition slope has been provided in the rear yard areas to match the existing property boundary elevations.

3.2 Streets

The internal roads (Street A, Street D and Street E) will be designed and constructed with a 20 m wide cross-section (as per the Township of Centre Wellington Standard R1), complete with concrete curb and gutter, concrete sidewalk (1.5 m wide) on both sides of the right-of-way. The remainder of the internal roads (Street B, Street C, Street F, Street G, Street H, and Street I) will be designed and constructed with an 18 m wide cross-section (as per the Township of Centre Wellington Standard R7), complete with concrete curb and gutter, concrete sidewalk (1.5 m wide) on both sides of the right-of-way.

To ensure that major overland flow from the development is adequately conveyed via the internal road network to the appropriate outlet, a minimum centreline road grade of 0.5% (as per the Township of Centre Wellington standards) is proposed.

3.3 Water Supply

Water supply for the Site will be provided by a connection to the existing 300 mm diameter watermain on First Line. A 250 mm diameter watermain will be extended from the existing 300 mm diameter watermain and routed through the Site along Street A (from First Line to the intersection of Street A / Street E). The remainder of the Site will be serviced via the extension of a 200 mm diameter watermain throughout the remainder of the site. To provide a looped watermain system, three connections to the 200 mm diameter watermain within in the adjacent development (159 First Line) is also proposed. The preliminary watermain layout is shown on the are shown on Functional Servicing Plans (Drawing No. SER1 and SER2). All watermain will be provided with a minimum of 2.0 m of cover.

Fire hydrants will also be provided in accordance with the Township of Centre Wellington Development Manual.

The conceptual design for watermain is shown on Functional Servicing Plans (Drawing No. SER1 and SER2).

Details of the joint water supply strategy for both 127 First Land and the adjacent lands (159 First Line) have been provided in Water Distribution Memo prepared by WalterFedy (dated September 2026). A copy of the Water Distribution Memo prepared by WalterFedy (dated September 2026) has been provided in Appendix C.

3.4 Sanitary Servicing

Sanitary servicing for the development of the Site will be provided by a gravity connection to the existing wastewater collection system and by a new sewage pumping station and forcemain.

The extension of gravity sanitary sewers within the Phase 1 development areas for 127-First Line (3.2 ha for Phase 1 only), will convey flows to the existing 200 mm diameter sanitary sewer on First Line and to both the Stafford Street and Clyde Street SPS, ultimately discharging to the Elora WWTP. The existing sanitary sewer system, as well as the Stafford Street and Clyde Street SPS's have sufficient capacity to accommodate and convey the Phase 1 flows without any upgrades to the existing infrastructure.

The remainder of the development area for 127 First Line will be serviced via the design and construction of sewage pumping station within Block 29 of the Draft Plan of Subdivision for 127 First Line. The sewage pumping station will be designed to accommodate residential sewage flows from 44.8 ha (18.3 ha from 127 First Line and 26.5 ha from 159 First Line).

The conceptual design for the sanitary sewer system is shown on Functional Servicing Plans (Drawing No. SER1 and SER2).

Details of the joint sanitary servicing strategy for both 127 First Land and the adjacent lands (159 First Line) have been provided in the following documents:

- Technical Memorandum – Overall Sanitary Servicing Strategy – 127 First Line and 159 First Line (R.J. Burnside & Associates Limited, dated September 2026)
- Technical Memorandum – Stafford Street Sewage Pumping Station (SPS) and Clyde Street Sewage Pumping Station (SPS) – Capacity Investigation and Assessment (R.J. Burnside & Associates Limited, dated September 2026)
- Technical Memorandum – Sanitary Sewer Capacity Assessment – 127 First Line and 159 First Line (R.J. Burnside & Associates Limited, dated September 2026)

Copies of each of the above-mentioned documents have been provided in Appendix D, Appendix E and Appendix F, respectively.

3.5 Storm Servicing

Under existing conditions, runoff generated from the Site sheetflows overland in a north to south direction, ultimately discharging to the existing Municipal Drain No. 8 located on the adjacent lands.

Upon development of the site, runoff generated from the Site will be captured and conveyed to the joint stormwater management facility located at the south limit of the site, prior to discharge to the existing Municipal Drain No. 8. The joint stormwater management facility will be providing stormwater management controls for both the Site and the adjacent development (159 First Line).

Minor storm flows (i.e. the 5-year design storm) for the majority of the Site will be captured and conveyed via the storm sewer system for the Site to joint stormwater management facility. Based on the conceptual site grading design, the storm sewer system will also be sized to capture and convey major storm flows (i.e. the 100-year design storm) from a 0.385 ha area (approximate) at the north boundary of the site to the joint stormwater management facility. Preliminary storm sewer sizing has been completed to size the inlet pipe into the joint stormwater management pond.

Major storm events will be conveyed overland via the municipal right of ways to the joint stormwater management facility. As the development of the Site will be constructed in phases, a temporary stormwater conveyance channel will be provided to convey both minor and major storm flows to the joint stormwater management facility. The joint stormwater management facility will outlet to the existing Municipal Drain No. 8.

As shown on the Functional Grading Plans (Drawing No. GRD1 and GRD2) for the Site, the stormwater management facility is to be a joint facility with the adjacent development (159 First Line). The joint stormwater management facility has been designed to provide the necessary quantity, quality and erosion control for both the Site (127 First Line) and the adjacent lands (159 First Line). Details of the joint stormwater management facility have been provided in Section 3.6 of this report.

150mm diameter subdrains are proposed to be installed along the full length of the proposed curb line on both sides of the road as per the Township of Centre Wellington Development Manual.

Foundation drainage for each unit will be provided via sump pumps discharging to grade.

The conceptual design for storm sewer is shown on Functional Servicing Plans (Drawing No. SER1 and SER2).

3.6 Stormwater Management

Stormwater management for the Site (127 First Line), as well as for the adjacent development lands (159 First Line), will be provided in the joint stormwater management facility. As shown on the Functional Grading Plans (Drawing No. GRD1 and GRD2) for the Site, the stormwater management facility is a joint facility with the adjacent development (159 First Line). The joint stormwater management facility has been

designed to provide the necessary quantity, quality and erosion control for both the Site (127 First Line) and the adjacent lands (159 First Line).

Details of the joint stormwater management facility have been provided in Stormwater Management Memo prepared by WalterFedy (dated September 2026). A copy of the Stormwater Management Memo prepared by WalterFedy (dated September 2026) has been provided in Appendix G.

3.7 Water Balance

A water balance analysis was completed to calculate the pre-development and unmitigated post-development annual average infiltration and runoff volumes for the Site (127 First Line). Based on the findings of the water balance analysis, infiltration across the entire site is anticipated to decrease by 69%.

Based on the native soil and the seasonally high groundwater elevations across the site, the opportunities to implement lot level infiltration structures will be limited. It is recommended that the implementation of lot level infiltration structures be further investigated and discussed with the Township as part of the planning and approval process. These discussions may also include the potential implementation of infiltration structures / low impact development measures within the Park Block or other public spaces.

Details of the water balance analysis have been provided in Appendix H.

3.8 Utilities

Utilities (hydro, gas, telecommunications / internet) will be provided for the Site. The design and extension of utility services will be completed by each of the respective utility providers in the Township of Centre Wellington (i.e. Centre Wellington Hydro Ltd., Enbridge Gas, Bell Canada / Rogers Communications / Wightman Telecom) will be coordinated as part of the detailed design of the Site.

4.0 Erosion and Sediment Control

The following general erosion and sediment control measures will be implemented as part of the Site development. The erosion and sediment control measures noted below are intended to mitigate the potential impacts to the surrounding environment as a result of the various construction activities on Site.

1. Erosion and sediment control measures will be implemented prior to, and maintained / adjusted during the various construction phases, to prevent the conveyance of silt and sediment from the Site to the adjacent lands and surrounding environment.

2. Sediment control fence consisting of non-woven material will be installed and maintained to prevent the discharge of silt and sediment from the Site and construction areas. The location of sediment control fence will be established based on the site works being completed and the phase of the work.

3. The Contractor will be responsible for maintaining a supply of sediment control fence, clear stone, straw bales, and filter fabric on-site for emergency use.

4. No sediment-laden water or deleterious substances is to be released to the adjacent lands at any time. Dewatering discharge containing sediment laden water must be discharged to a sediment bag positioned in a vegetated area and allowed to discharge into existing established vegetation at least 30 m from any watercourse or existing storm catchbasin.

5. The removal of vegetative cover will be planned and coordinated with the Contractor, so that cover material is only removed prior to the commencement of earth works / area grading works for each phase of construction on Site.

6. All disturbed areas will be temporarily or permanently stabilized or restored as the work progresses.

7. If site construction activities are interrupted, and / or inactivity exceeds 30 days, all stripped and/or bare soil areas are to be stabilized using either erosion control matting (e.g., jute), sodding / seeding / mulching or other approved methods to the satisfaction of the Owner, Engineer and Municipality.

8. All equipment, stockpiled material and/or construction material is to be stored outside of any natural environment features and the associated buffer areas, in a manner that prevents the conveyance of silt, sediment or deleterious substances from the Site.

9. Vehicular refueling and maintenance will be conducted a minimum of 30 m from the any natural features and the associated buffer areas.

10. All damaged erosion and sediment control measures will be inspected on a regular basis, and any measures identified as requiring repair and/or replacement will be addressed within 48 hours of the inspection.

11. After hours contact information will be posted on-site for emergencies.

The conceptual design for erosion and sediment control measures is shown on Erosion and Sediment Control Plans (Drawing No. ESC1 and ESC2).

5.0 Construction Phasing

Construction of the development Site is to be phased. It is anticipated that there will be a minimum of two phases of construction, with each phase having the appropriate access and servicing to accommodate that phase.

The initial phase of the development is to include the following:

1. Area grading for Block 1, Block 4, Block 5 and Block 6

2. Street A, Street B and Street C (granular B, granular A, base asphalt, surface asphalt, concrete curb and gutter, sidewalk)

3. Watermain, sanitary sewer and storm sewer on Street A, Street B and Street C, including the following connections:
   a) the existing 300 mm diameter watermain on First Line
   b) the proposed watermain at Street E from the adjacent development (159 First Line)
   c) the existing 200 mm diameter sanitary sewer on First Line

4. Stormwater management facility, including the temporary drainage channel for the conveyance of minor and major storm flows from Street A, Street B and Street C to the joint stormwater management facility

5. Erosion and sediment controls measures

Subsequent phases of the Site will include the following:

6. Area grading for Block 2, Block 3, Blocks 7 to 18, and the Park

7. Street D, Street E, Street F, Street G, Street H and Street I (granular B, granular A, base asphalt, surface asphalt, concrete curb and gutter, sidewalk)

8. Watermain, sanitary sewer and storm sewer on Street D, Street E, Street F, Street G, Street H and Street I, including the following connections:
   a) the proposed watermain at Street D and Street F from the adjacent development (159 First Line)
   b) the proposed 200 mm diameter sanitary sewer on Street from the adjacent development (159 First Line)

9. Erosion and sediment controls measures

10. Sewage Pumping Station (SPS) and forcemain

6.0 Conclusions and Recommendations

The report addressed the requirements for submission of a Functional Servicing and Stormwater Management Report to support an Official Plan Amendment (OPA), Zoning Bylaw Amendment (ZBA) and Draft Plan of Subdivision applications for the residential development of 127 First Line Development. This Functional Servicing and Stormwater Management Report demonstrates that the proposed development site can be developed and serviced as per the Township of Centre Wellington Development Manual.

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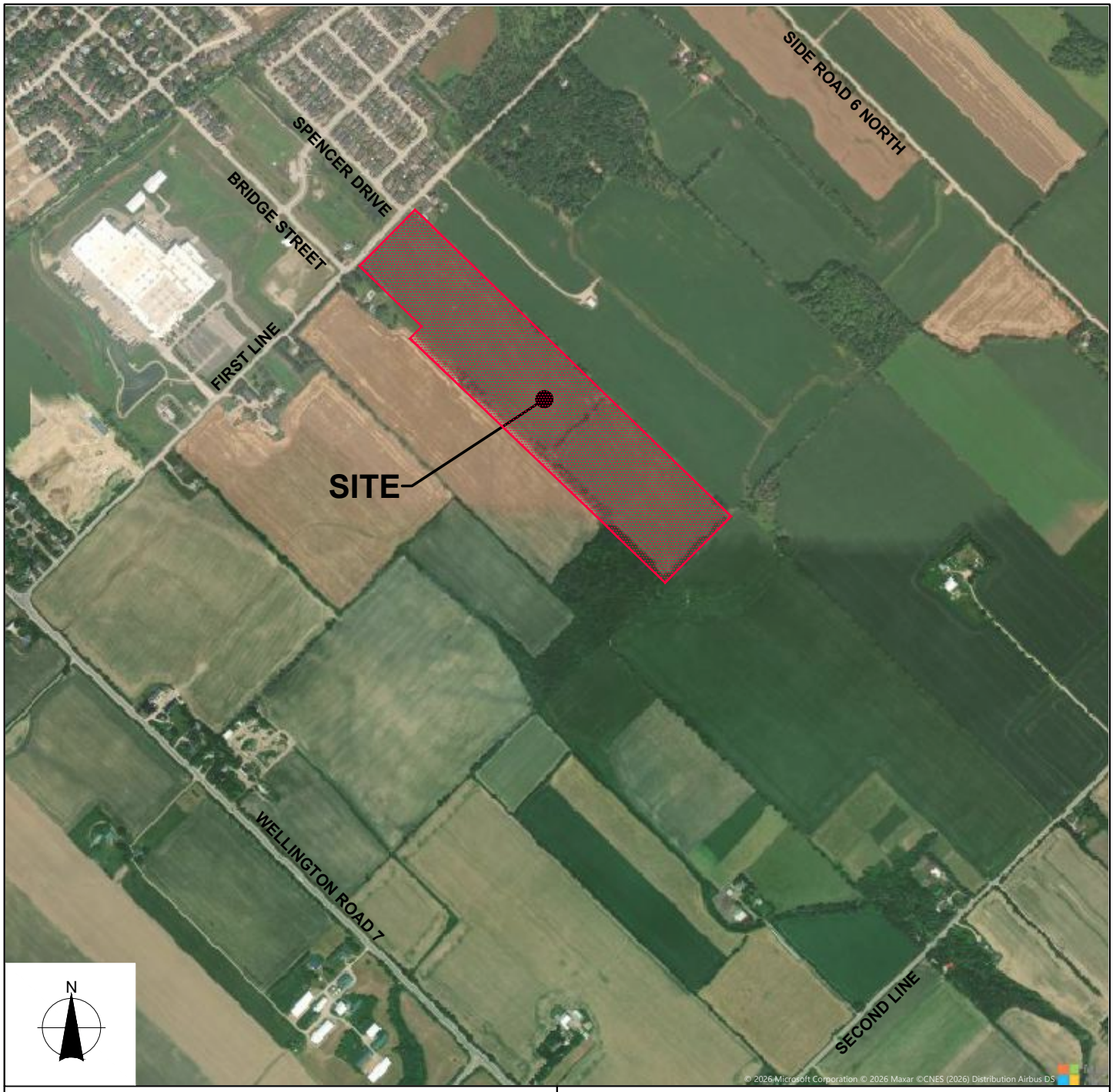
[THE DIFFERENCE IS OUR PEOPLE]

Figures

Figure 1: Site Location Plan
Figure 2A: Existing Conditions and Removals Plan 1 of 2
Figure 2B: Existing Conditions and Removals Plan 2 of 2
Figure 3: Proposed Draft Plan of Subdivision





KEY MAP OF ONTARIO

BURNSIDE

Client

ELORA GREENS INC.

Figure Title

127 FIRST LINE
TOWNSHIP OF CENTRE WELLINGTON
(ELORA)

SITE LOCATION PLAN

Drawn	Checked	Date	Figure No.
K.T.	A.K.	JULY 2026	**FIG1**
Scale		Project No.	
N.T.S.		060179	

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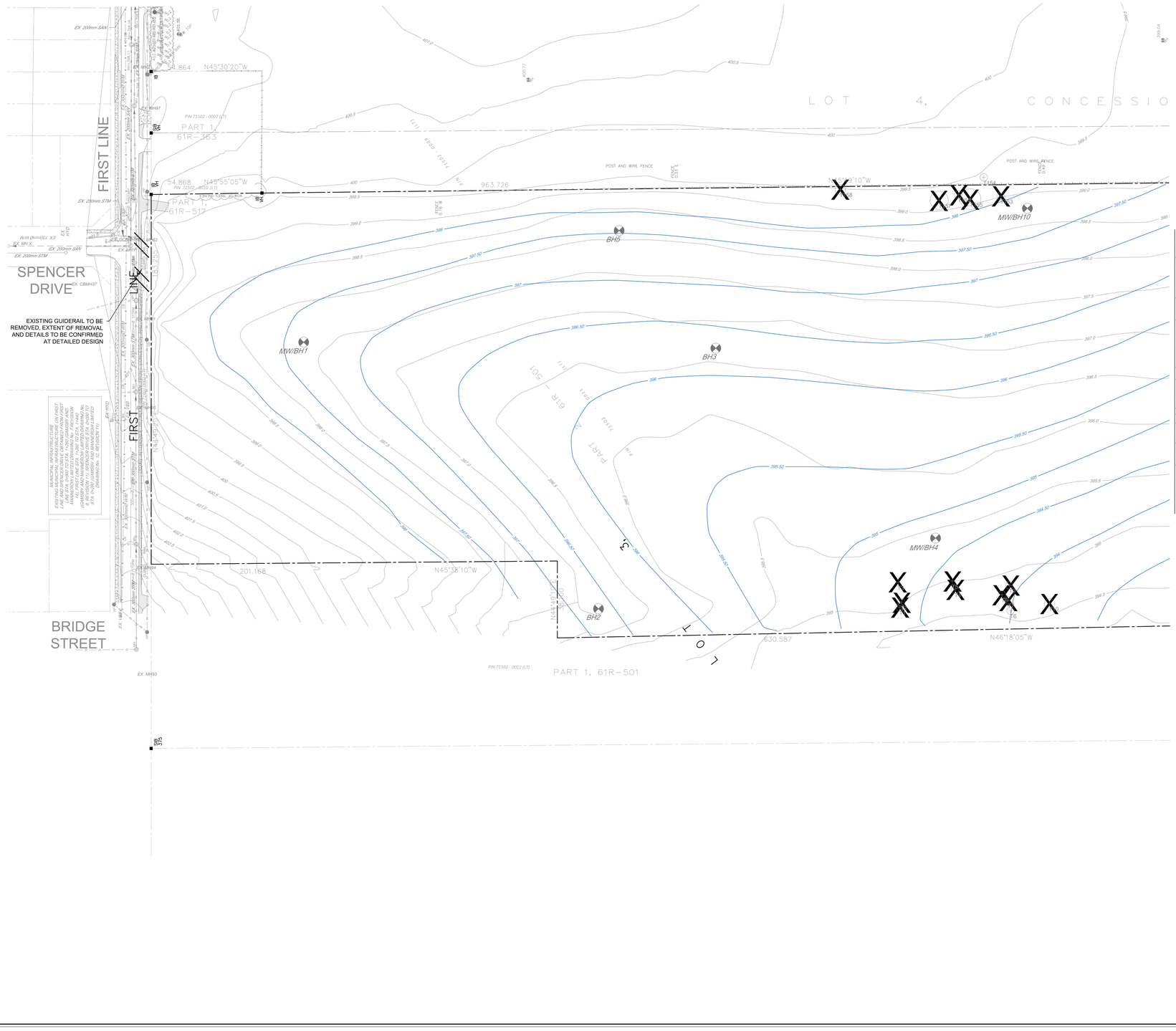

LEGEND

- SITE BOUNDARY LINE
- EXISTING CONTOURS
- ESTIMATED EXISTING SEASONALLY HIGH GROUNDWATER ELEVATION
- TREELINE
- EXISTING FENCE
- EXISTING TREE
- EXISTING SANITARY SEWER NETWORK
- EXISTING STORM SEWER NETWORK
- EXISTING SINGLE CATCH BASIN
- EXISTING WATERMAIN
- EXISTING WATER VALVE
- EXISTING FIRE HYDRANT
- EXISTING HYDRO POLE AND OVERHEAD WIRES
- MW/BH1 EXISTING MONITORING WELL / BOREHOLE
- REMOVALS

0 20 40 60 80
Metres

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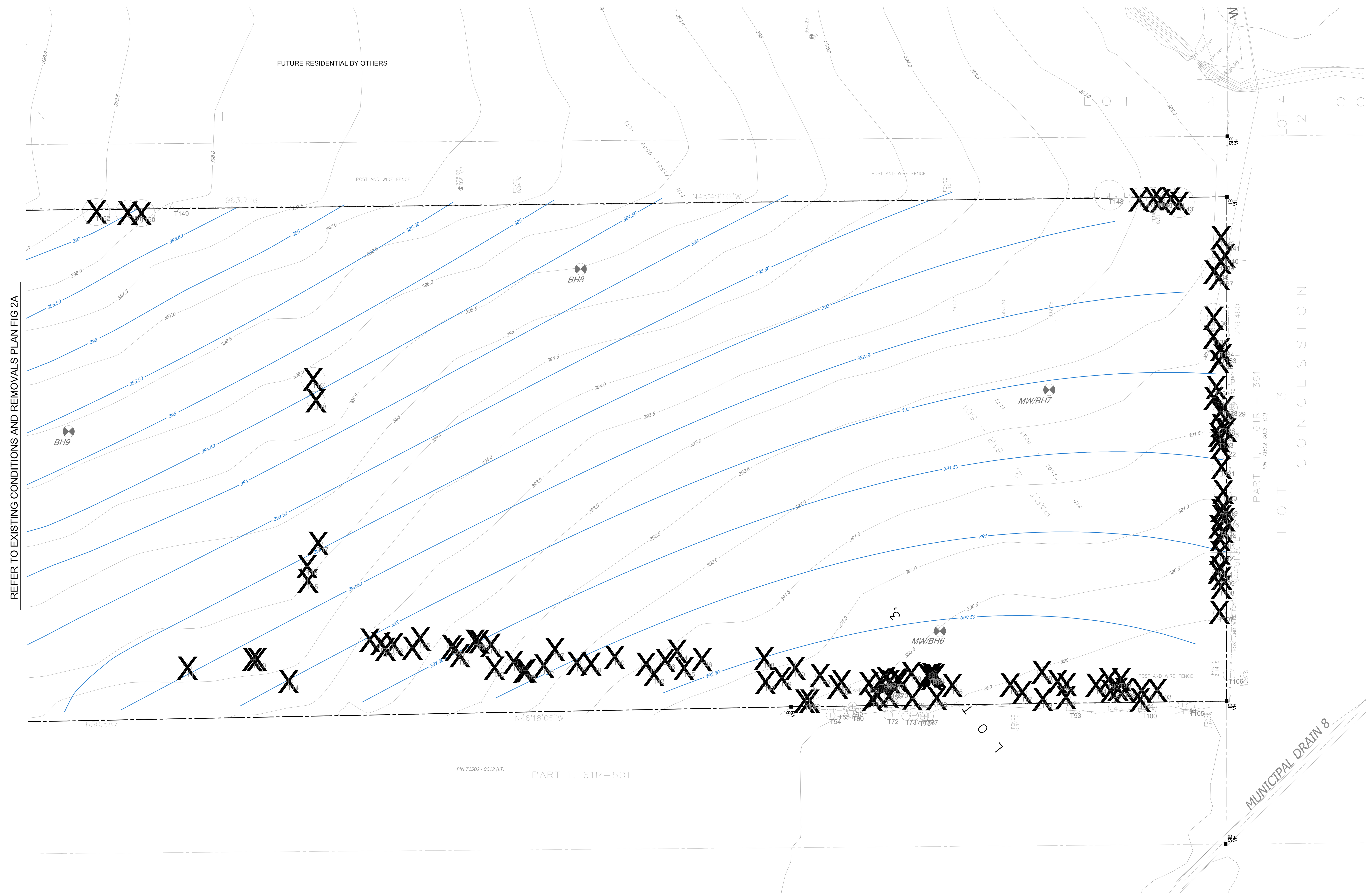
Client: ELORA GREENS INC.

Figure Title: 127 FIRST LINE
TOWNSHIP OF CENTRE WELLINGTON
(ELORA)
EXISTING CONDITIONS AND REMOVALS PLAN 1 OF 2

Drawn	Checked	Date	Figure No.
M.M.	M.B.	JULY 2026	FIG2A
Scale		Project No.	
1:1000		060179	

File: I:\2006\TH\00060179\DSD\FIG\PHOFSR FIGURES\060179 - EXISTING CONDITIONS AND REMOVALS PLAN FIG 2A.dwg, Date Plotted: September 2, 2026 - 8:57 AM



LEGEND

- SITE BOUNDARY LINE
- EXISTING CONTOURS
- ESTIMATED EXISTING SEASONALLY HIGH GROUNDWATER ELEVATION
- TREELINE
- EXISTING FENCE
- EXISTING TREE
- EXISTING SANITARY SEWER NETWORK
- EXISTING STORM SEWER NETWORK
- EXISTING SINGLE CATCH BASIN
- EXISTING WATERMAIN
- EXISTING WATER VALVE
- EXISTING FIRE HYDRANT
- EXISTING HYDRO POLE AND OVERHEAD WIRES
- EXISTING MONITORING WELL / BOREHOLE (MW/BH1)
- REMOVALS

0 20 40 60 80
Metres

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Figure Title
127 FIRST LINE
TOWNSHIP OF CENTRE WELLINGTON (ELORA)
EXISTING CONDITIONS AND REMOVALS PLAN 2 OF 2

Drawn	Checked	Date	Figure No.
M.M.	M.B.	JULY 2026	FIG2B
Scale		Project No.	
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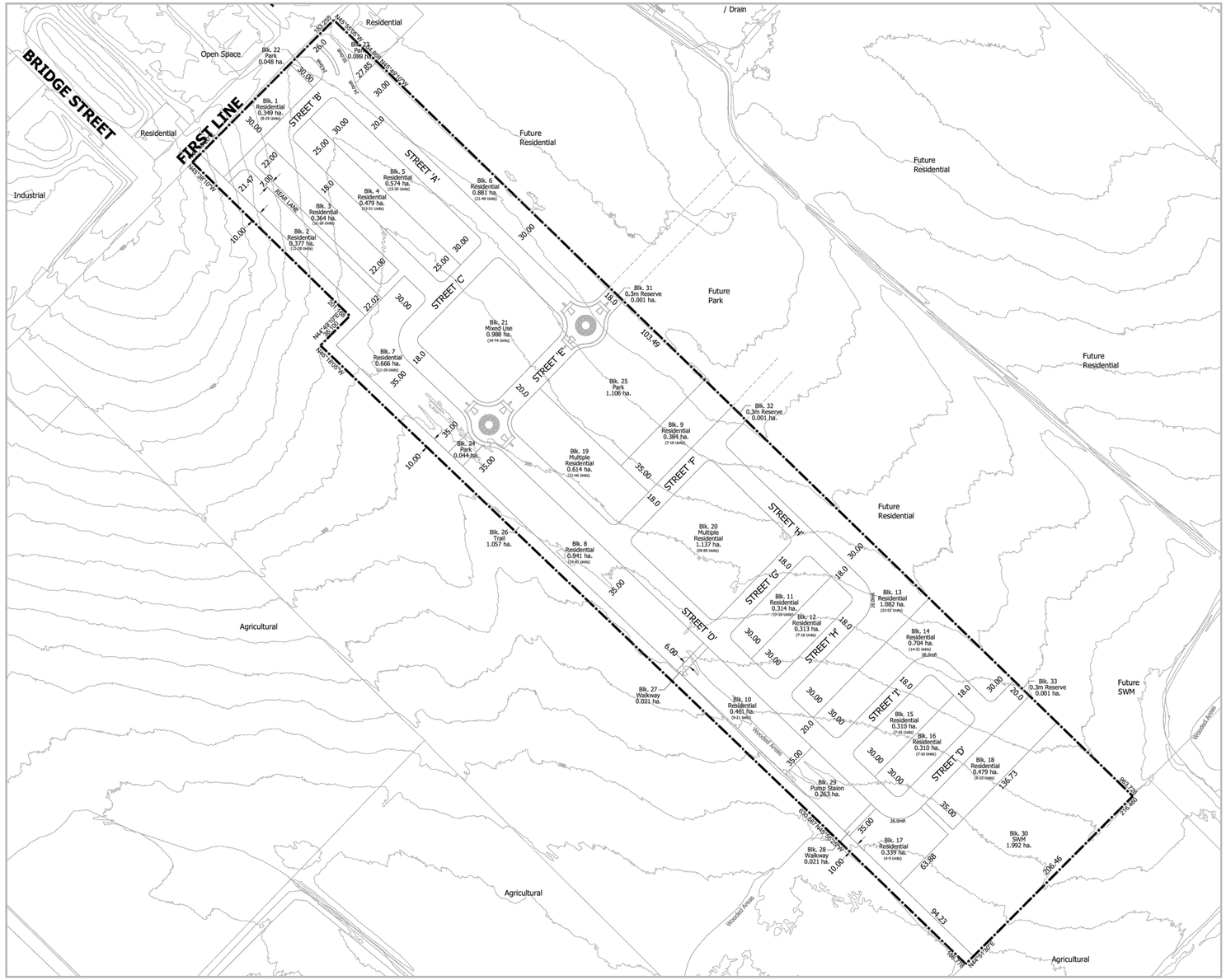

DRAFT PLAN OF SUBDIVISION

LEGAL DESCRIPTION

PT LT 3 CON 1 NICHOL PART 2 , 61R501;
TOWNSHIP OF CENTRE WELLINGTON
COUNTY OF WELLINGTON

OWNER'S CERTIFICATE

I HEREBY AUTHORIZE MACNAUGHTON HERMSEN BRITTON CLARKSON PLANNING LIMITED TO SUBMIT THIS PLAN FOR APPROVAL.

Date: _____ _____
Farhan Kamali Siddiqui
Elora Greens Inc.

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED ON THIS PLAN AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN.

Date: _____ _____
James M. Laws, Surveyor, O.L.S.
Van Harten Surveying Inc.

KEY PLAN



ADDITIONAL INFORMATION
Required Under Section 51 (17) of the Planning Act, R.S.O., 1990, c.P.13 as Amended

(a) As Shown (b) As Shown (c) As Shown
(d) Residential, Mixed Use, Park, Trail, Pump Station, Stormwater Management
(e) As Shown (f) As Shown (g) As Shown
(h) Municipal Water Supply (i) Clay/Sandy Loam (j) As Shown
(k) All Services As Required (l) As Shown

AREA SCHEDULE

DESCRIPTION	LOTS/BLOCKS	UNITS	AREA
Low Density Residential	1-18	202-472	9.327 ha
Multiple Residential	19,20	60-131	1.751 ha
Mixed Use	21	34-74	0.988 ha
Park	22-25		1.287 ha
Trail	26		1.057 ha
Walkways	27,28		0.042 ha
Pump Station	29		0.263 ha
Stormwater Management	30		1.992 ha
0.3m Reserve	31-33		0.003 ha
Roads			4.871 ha
Total	**33**	**296-677**	**21.581 ha**

NOTES
1. All dimensions are in metres unless otherwise shown.
2. Contains information licensed under the Open Government Licence - Ontario.

Revision No.	Date	Issued / Revision	By
1.	March 4, 2026	Preliminary Draft Plan;	PL

Stamp	Date: March 4, 2026
	File No.: 24277A
	Plan Scale: 1:1500 (Arch D)
	Drawn By: P.L.
	Checked By: P.S.
Project: Elora Green, 127 First Line, Township of Centre Wellington, County of Wellington.	
File Name: DRAFT PLAN OF SUBDIVISION	Dwg No.: 1 of 1
Scale Bar: 0 10 20 50 100 150m	

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MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE

BURNSIDE

Figure Title
127 FIRST LINE
TOWNSHIP OF CENTRE WELLINGTON (ELORA)
PROPOSED DRAFT PLAN OF SUBDIVISION

Client
ELORA GREENS INC.

Drawn	Checked	Date	Figure No.
N/A	N/A	JULY 2026	**FIG3**
Scale: N.T.S.		Project No.: 060179	

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BURNSIDE

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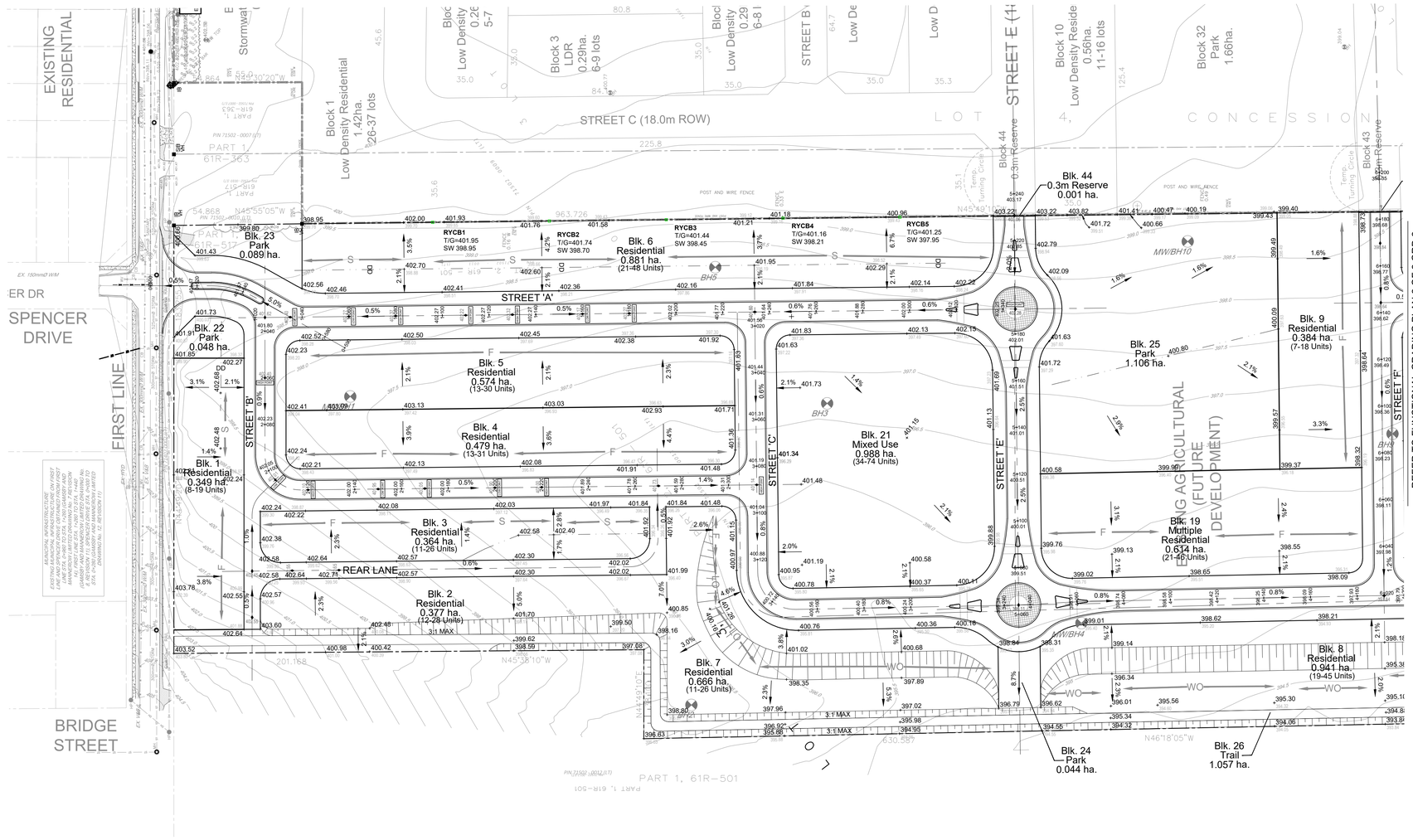
Drawings

Drawing GRD1: Functional Grading Plan 1 of 2
Drawing GRD2: Functional Grading Plan 2 of 2
Drawing SER1: Functional Servicing Plan 1 of 2
Drawing SER2: Functional Servicing Plan 2 of 2
Drawing ESC1: Erosion and Sediment Control Plan 1 of 2
Drawing ESC2: Erosion and Sediment Control Plan 2 of 2



LEGEND

- PROPERTY BOUNDARY
- EASEMENT
- EXISTING CONTOUR
- GROUND WATER CONTOUR
- EXISTING ELEVATION
- PROPOSED ELEVATION
- PROPOSED SLOPE
- PROPOSED OVERLAND FLOW DIRECTION
- MAX. 3:1 SIDE SLOPES
- DRAINAGE DIVIDE
- PROPOSED RETAINING WALL
- PROPOSED NOISE WALL (BY OTHERS)
- PROPOSED SWALE
- POTENTIAL LOT FOR INFILTRATION STRUCTURE

LOT TYPES:

- F — FRONT DRAINAGE
- S — SPLIT DRAINAGE
- WO — WALK OUT LOT
- LO — LOOK OUT LOT

NOTES:

1. ANY TOPSOIL, PEAT, ORGANIC SANDS OR EXISTING EARTH MATERIAL LOCATED IN AN AREA REQUIRING THE PLACEMENT AND COMPACTION OF ENGINEERED FILL MATERIAL IS TO BE FULLY REMOVED AS PER THE GEOTECHNICAL INVESTIGATION REPORT (PLANET ENGINEERING INC. DATED AUGUST 2026).
2. ANY UNSUITABLE AREAS MUST BE FURTHER SUB-EXCAVATED AND REPLACED WITH FILL COMPACTED TO TARGETED 100% STANDARD PROCTOR MAXIMUM DRY DENSITY (SPMDD) AND MINIMUM 98% SPMDD IN BUILDING AREAS AND 95% SPMCC IN ROAD AND SERVICING AREAS AS PER THE GEOTECHNICAL INVESTIGATION REPORT (PLANET ENGINEERING INC. DATED AUGUST 2026).

0 20 40 60 80
Metres

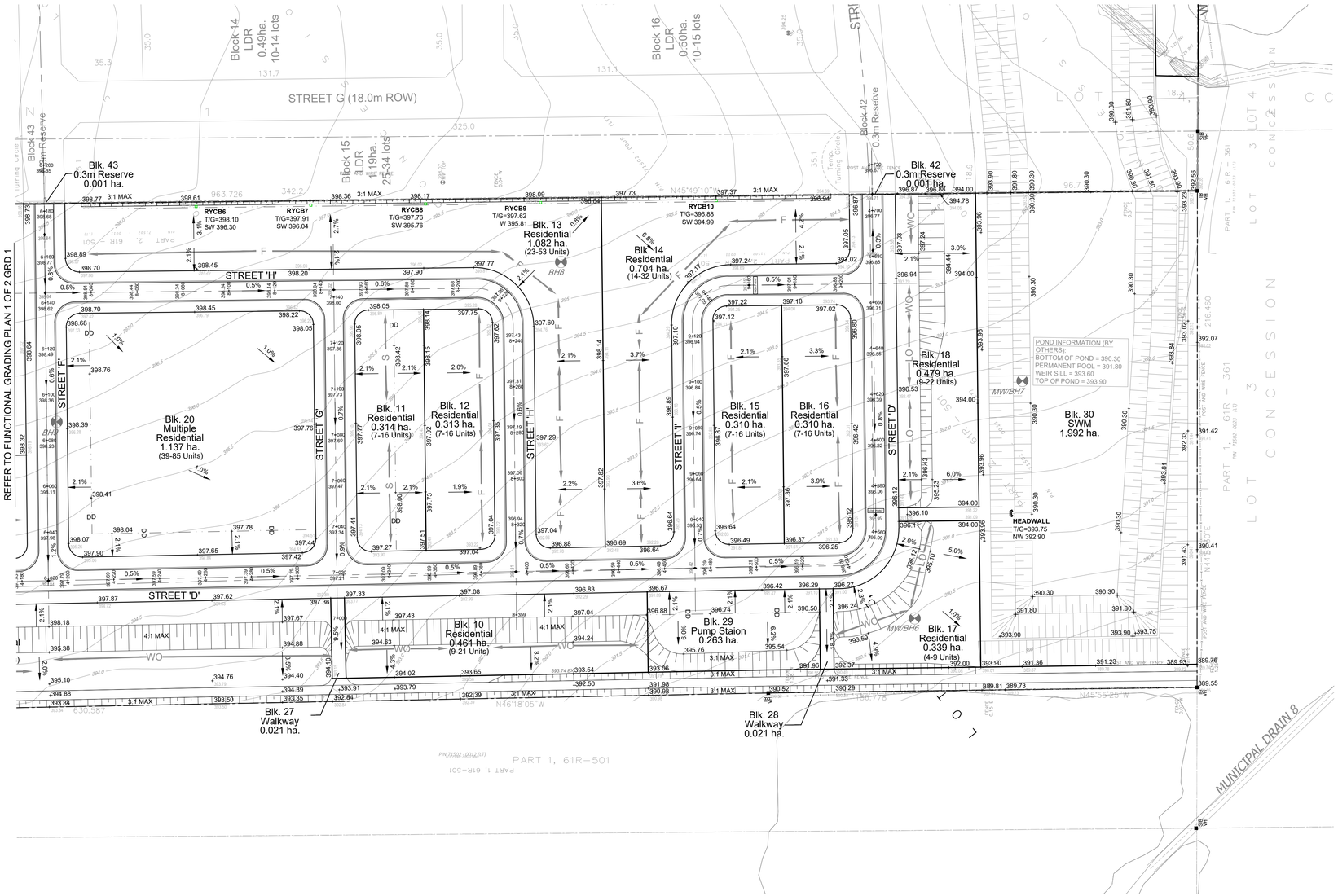
BURNSIDE

Client: ELORA GREENS INC.

Figure Title: 127 FIRST LINE
TOWNSHIP OF CENTRE WELLINGTON (ELORA)
FUNCTIONAL GRADING PLAN 1 OF 2 (NORTH)

Drawn	Checked	Date	Figure No.
M.M.	M.B.	JULY 2026	GRD1
Scale: 1:1000		Project No.: 060179	

File: I:\060179\DOCS\DWG\PRELIM\GRD1.dwg Layout: Functional Grading Plan 1 of 2 (North) September 2, 2026 - 2:37 PM



LEGEND

- PROPERTY BOUNDARY
- EASEMENT
- EXISTING CONTOUR
- GROUND WATER CONTOUR
- EXISTING ELEVATION
- PROPOSED ELEVATION
- PROPOSED SLOPE
- PROPOSED OVERLAND FLOW DIRECTION
- MAX. 3:1 SIDE SLOPES
- DRAINAGE DIVIDE
- PROPOSED RETAINING WALL
- PROPOSED NOISE WALL (BY OTHERS)
- PROPOSED SWALE
- POTENTIAL LOT FOR INFILTRATION STRUCTURE

LOT TYPES:

- F — FRONT DRAINAGE
- S — SPLIT DRAINAGE
- WO — WALK OUT LOT
- LO — LOOK OUT LOT

NOTES:

1. ANY TOPSOIL, PEAT, ORGANIC SANDS OR EXISTING EARTH MATERIAL LOCATED IN AN AREA REQUIRING THE PLACEMENT AND COMPACTION OF ENGINEERED FILL MATERIAL IS TO BE FULLY REMOVED AS PER THE GEOTECHNICAL INVESTIGATION REPORT (PLANET ENGINEERING INC. DATED AUGUST 2026).
2. ANY UNSUITABLE AREAS MUST BE FURTHER SUB-EXCAVATED AND REPLACED WITH FILL COMPACTED TO TARGETED 100% STANDARD PROCTOR MAXIMUM DRY DENSITY (SPMDD) AND MINIMUM 98% SPMDD IN BUILDING AREAS AND 95% SPMCC IN ROAD AND SERVICING AREAS AS PER THE GEOTECHNICAL INVESTIGATION REPORT (PLANET ENGINEERING INC. DATED AUGUST 2026).
3. THE STORMWATER MANAGEMENT POND BASE AND SIDE SLOPES ARE TO BE CONSTRUCTED WITH A WELL COMPACTED LOW PERMEABILITY LINER. THIS MAY BE A COMPACTED CLAY LINER (600mm THICKNESS) OR A SUITABLE SYNTHETIC MEMBRANE AS PER THE GEOTECHNICAL INVESTIGATION REPORT (PLANET ENGINEERING INC. DATED AUGUST 2026).

0 20 40 60 80
Metres

BURNSIDE

Client: ELORA GREENS INC.

Figure Title: 127 FIRST LINE
TOWNSHIP OF CENTRE WELLINGTON (ELORA)
FUNCTIONAL GRADING PLAN 2 OF 2 (SOUTH)

Drawn	Checked	Date	Figure No.
M.M.	M.B.	JULY 2026	GRD2
Scale		Project No.	
1:1000		060179	

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LEGEND

- PROPERTY BOUNDARY
- PROPOSED SANITARY FORCEMAIN
- PROPOSED SANITARY SEWER
- PROPOSED STORM BYPASS SEWER
- PROPOSED STORM SEWER
- PROPOSED FOUNDATION DRAIN COLLECTOR
- PROPOSED WATERMAIN
- EXISTING CONTOURS

REFER TO FUNCTIONAL SERVICING PLAN 2 OF 2 SER2

Metres

Client	ELORA GREENS INC.
Figure Title	127 FIRST LINE TOWNSHIP OF CENTRE WELLINGTON (ELORA) FUNCTIONAL SERVICING PLAN 1 OF 2 (NORTH)
Drawn / Checked / Date	M.M. / M.B. / JULY 2026
Figure No.	SER1
Scale	1:1000
Project No.	060179

LEGEND

- PROPERTY BOUNDARY
- PROPOSED SANITARY FORCEMAIN
- PROPOSED SANITARY SEWER
- PROPOSED STORM BYPASS SEWER
- PROPOSED STORM SEWER
- PROPOSED FOUNDATION DRAIN COLLECTOR
- PROPOSED WATERMAIN
- EXISTING CONTOURS (431.0)

REFER TO FUNCTIONAL SERVICING PLAN 1 OF 2 SER1

STREET 'G' (20.0m ROW)

Block 14 LDR 0.49ha. 10-14 lots

Block 16 LDR 0.50ha. 10-15 lots

Block 15 LDR 1.19ha. 25-34 lots

Block 13 Turning Circle

Block 12 0.3m Reserve

Blk. 43 0.3m Reserve 0.001 ha.

Blk. 42 0.3m Reserve 0.001 ha.

STREET 'H'

STREET 'F'

STREET 'G'

STREET 'I'

STREET 'D'

Blk. 20 Multiple Residential 1.137 ha. (39-85 Units)

Blk. 11 Residential 0.314 ha. (7-16 Units)

Blk. 12 Residential 0.313 ha. (7-16 Units)

Blk. 13 Residential 1.082 ha. (23-53 Units)

Blk. 14 Residential 0.704 ha. (14-32 Units)

Blk. 15 Residential 0.310 ha. (7-16 Units)

Blk. 16 Residential 0.310 ha. (7-16 Units)

Blk. 18 Residential 0.479 ha. (9-22 Units)

Blk. 30 SWM 1.992 ha.

Blk. 10 Residential 0.461 ha. (9-21 Units)

Blk. 29 Pump Staion 0.263 ha.

Blk. 17 Residential 0.339 ha. (4-9 Units)

Blk. 27 Walkway 0.021 ha.

Blk. 28 Walkway 0.021 ha.

MH126A T/G=398.68 SW 395.80

MH525 T/G=398.72 SW 396.00

MH526 T/G=398.58 NE 395.80 SE 395.80 SW 395.68

MH123A T/G=397.20 NW 394.37 SE 394.37 NE 394.37

MH515 T/G=397.84 SE 395.25 NW 395.25 NE 395.25

RYCB6 T/G=398.10 SW 396.30

RYCB7 T/G=397.91 SW 396.04

RYCB8 T/G=397.76 SW 395.76

RYCB9 T/G=397.62 W 395.81

MH128A T/G=398.02 NW 394.98 SE 394.98 SW 394.99

MH129A T/G=397.62 NW 394.63 S 394.63

MH527 T/G=397.92 NW 395.15 SE 395.15 SW 395.23

MH528 T/G=397.68 NW 394.81 SE 394.81

MH529 T/G=397.60 NW 394.76 SW 394.76

MH130A T/G=397.50 N 394.54 SW 394.54

MH530 T/G=397.51 NE 394.70 SW 394.70

MH124A T/G=396.81 NW 393.98 SE 393.98 NE 393.98

MH125A T/G=396.42 SW 389.07 NE 393.59 SE 389.13 NW 393.59

MH516 T/G=397.22 NE 394.60 NW 394.60 SE 394.60

MH517 T/G=396.87 NE 394.15 NW 394.15 SE 394.15

WET WELL T/G=390.39 NE 388.97

PROPOSED 300mm Ø SANITARY FORCEMAIN

RYCB10 T/G=396.85 SW 394.99

MH131A T/G=397.08 W 394.24 SE 394.90

MH134A T/G=396.78 NE 390.11 SW 390.11 NW 394.57

MH133A T/G=396.71 SW 390.30

MH524 T/G=508.89 SW 393.97

REQUIRES DROP STRUCTURE AS PER OPSD1003.033

MH523 T/G=396.78 NW 393.75 SW 393.75 NE 393.75

MH531 T/G=397.15 SE 394.09 W 394.09 NE 394.15

MH132A T/G=396.99 SW 394.14 E 394.14

MH532 T/G=397.01 SW 394.30 E 394.20

POND INFORMATION (BY OTHERS):
BOTTOM OF POND = 390.30
PERMANENT POOL = 391.80
WEIR SILL = 393.60
TOP OF POND = 393.90

MH522 T/G=395.99 SW 393.20 NE 393.20 SE 393.20

MH135A T/G=395.99 NE 389.54 W 389.54

MH136A T/G=396.06 E 389.47 NW 389.47

MH533 T/G=395.86 NW 393.15 SE 393.15

HEADWALL T/G=393.75 NW 392.80

MH520 T/G=396.10 NW 393.34 E 393.34

MH521 T/G=396.05 W 393.27 NE 393.27

MH519 T/G=396.14 NW 393.40 SE 393.40

MH518 T/G=396.44 NE 393.71 NW 393.71 SE 393.71

REQUIRES DROP STRUCTURE AS PER OPSD1003.033

REQUIRES DROP STRUCTURE AS PER OPSD1003.033

MUNICIPAL DRAIN 8

PART 1, 61R-501

Flooded Areas

0 20 40 60 80 Metres

BURNSIDE

Client: ELORA GREENS INC.

Figure Title: 127 FIRST LINE
TOWNSHIP OF CENTRE WELLINGTON (ELORA)
FUNCTIONAL SERVICING PLAN 2 OF 2 (SOUTH)

Drawn	Checked	Date	Figure No.
M.M.	M.B.	JULY 2026	SER2
Scale: 1:1000		Project No.: 060179	

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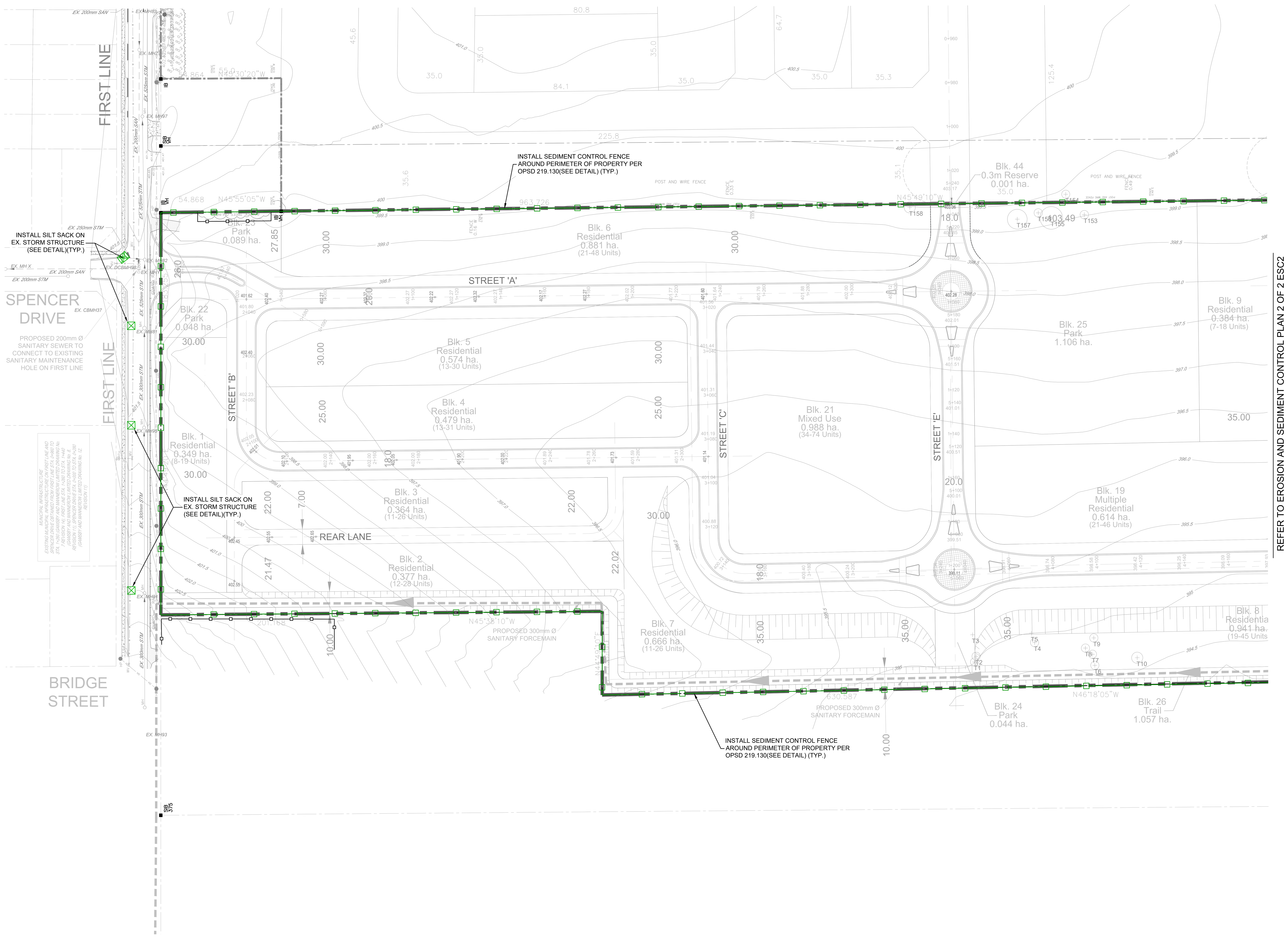

LEGEND

- SITE BOUNDARY LINE
- EXISTING CONTOURS
- TREELINE
- EXISTING FENCE
- EXISTING TREE
- EXISTING SANITARY SEWER NETWORK
- EXISTING STORM SEWER NETWORK
- EXISTING SINGLE CATCH BASIN
- EXISTING WATERMAIN
- EXISTING WATER VALVE
- EXISTING FIRE HYDRANT
- EXISTING HYDRO POLE AND OVERHEAD WIRES
- EXISTING MONITORING WELL / BOREHOLE (MW/BH1)
- PROPOSED SILT FENCE
- PROPOSED SILT SACK

BURNSIDE

Client

ELORA GREENS INC.

Figure Title

127 FIRST LINE
TOWNSHIP OF CENTRE WELLINGTON
(ELORA)

EROSION AND SEDIMENT CONTROL PLAN 1 OF 2

Drawn	Checked	Date	Figure No.
M.M.	M.B.	JULY 2026	**ESC1**
Scale		Project No.	
1:1000		060179	

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LEGEND

- SITE BOUNDARY LINE
- EXISTING CONTOURS
- TREELINE
- EXISTING FENCE
- EXISTING TREE
- EXISTING SANITARY SEWER NETWORK
- EXISTING STORM SEWER NETWORK
- EXISTING SINGLE CATCH BASIN
- EXISTING WATERMAIN
- EXISTING WATER VALVE
- EXISTING FIRE HYDRANT
- EXISTING HYDRO POLE AND OVERHEAD WIRES
- EXISTING MONITORING WELL / BOREHOLE
- PROPOSED SILT FENCE
- PROPOSED SILT SACK

REFER TO EROSION AND SEDIMENT CONTROL PLAN 1 OF 2 ESC1

INSTALL SEDIMENT CONTROL FENCE AROUND PERIMETER OF PROPERTY PER OPSD 219.130(SEE DETAIL) (TYP.)

INSTALL SEDIMENT CONTROL FENCE AROUND PERIMETER OF SWM FACILITY PER OPSD 219.130(SEE DETAIL) (TYP.)

INSTALL SEDIMENT CONTROL FENCE AROUND PERIMETER OF PROPERTY PER OPSD 219.130(SEE DETAIL) (TYP.)

POND INFORMATION (BY OTHERS)
BOTTOM OF POND = 390.30
PERMANENT POOL = 391.60
WEIR SILL = 393.60
TOP OF POND = 393.99

Blk. 43 (0.3m Reserve 0.001 ha.)
Blk. 42 (0.3m Reserve 0.001 ha.)
Blk. 13 Residential 1.082 ha. (23-53 Units)
Blk. 14 Residential 0.704 ha. (14-32 Units)
Blk. 18 Residential 0.179 ha. (2 Units)
Blk. 20 Multiple Residential 1.137 ha. (39-85 Units)
Blk. 11 Residential 0.314 ha. (7-16 Units)
Blk. 12 Residential 0.313 ha. (7-16 Units)
Blk. 15 Residential 0.310 ha. (7-16 Units)
Blk. 16 Residential 0.310 ha. (7-16 Units)
Blk. 30 SWM 1.992 ha.
Blk. 29 Pump Staion 0.263 ha.
Blk. 17 Residential 0.339 ha. (4-9 Units)
Blk. 27 Walkway 0.021 ha.
Blk. 28 Walkway 0.021 ha.

STREET 'H'
STREET 'F'
STREET 'G'
STREET 'I'
STREET 'D'

PROPOSED 300mm Ø SANITARY FORCEMAIN

MUNICIPAL DRAIN 8

N45°49'10"W
N46°18'05"W

0 20 40 60 80
Metres

BURNSIDE

Client: ELORA GREENS INC.

Figure Title: 127 FIRST LINE
TOWNSHIP OF CENTRE WELLINGTON (ELORA)
EROSION AND SEDIMENT CONTROL PLAN 2 OF 2

Drawn	Checked	Date	Figure No.
M.M.	M.B.	JULY 2026	ESC2
Scale: 1:1000		Project No.: 060179	

file: K:\060179\DGN\060179-EROSION AND SEDIMENT CONTROL.dwg Date Printed: September 2, 2026 - 11:11 AM

BURNSIDE

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Appendix A

Geotechnical Investigation Report
(Planet Engineering Inc., dated Sept 11, 2026)

Revised

GEOTECHNICAL INVESTIGATION REPORT

FOR PROPOSED DEVELOPMENT AT 127 1ST LINE, ELORA, TOWNSHIP OF CENTRE WELLINGTON, ONTARIO

Client

Elora Greens Inc.
120 Matheson Blvd. E., Unit 3
Mississauga, ON L4Z 1X1

Prepared by:

PLANET ENGINEERING Inc.
Consulting Engineers

2179 Dunwin Drive, Unit 4
Mississauga, ON L5L 1X2

Project No. 2501179BG

September 11, 2026

PLANET ENGINEERING Inc.
Consulting Engineers

September 11, 2026 Reference No.2501179BG

Elora Greens Inc.
120 Matheson Blvd. E., Unit 3
Mississauga, ON L4Z 1X1

Attention: Farhan Kamali Siddiqui
Email: farhan@eloragreens.com

Dear Mr. Siddiqui,

RE: Geotechnical Investigation Report for the Proposed Development
127 1st Line, Elora, Township of Centre Wellington, ON

Enclosed is a copy of geotechnical investigation report related to the above noted site.

For and on behalf of PLANET Engineering Inc

Irfan Ahmad Khokhar, Ph.D., P.Eng., Consulting Engineer
Principal Geotechnical Engineer

Executive Summary

Planet Engineering Inc (PLANET) was retained by Elora Greens Inc. (the Client) to complete a geotechnical investigation to evaluate the site conditions at proposed development area at 127 First Line, Township of Centre Wellington, Ontario. (The Site).

Based on the information and updated March 2026 conceptual plan provided by the Client, we understand that the proposed land uses for the Site include approximately 9.33 hectares of low-density residential development (single-detached, semi-detached, and street townhouse units); 1.75 hectares of multiple residential uses; 0.99 hectares of mixed-use development; 2.34 hectares designated for park and trail uses; and 1.99 hectares for a stormwater management (SWM) facility.

PLANET does not have any structural information regarding the proposed development.

The purpose of this investigation was to assess the subsurface conditions at the site and provide geotechnical engineering advice and recommendations.

PLANET Engineering Inc completed a geotechnical investigation for the proposed development at the site. This investigation was carried out by drilling ten (10) boreholes (BH1 to BH10) spread on the whole site to maximum depths of 6.4m to 7.6m below the existing ground surface. Based on the field investigation and laboratory testing, geotechnical findings and geotechnical engineering recommendations are provided in this report. The approximate locations of these boreholes (BH1 to BH10) are shown on Drawing 1A and the borehole logs from the investigation are attached in Appendix B.

A top layer of 150 to 300 mm thick topsoil was encountered at all borehole locations (BH1 to BH10). It should be noted that the topsoil thicknesses provided here were measured at the borehole locations only and may vary beyond the boreholes.

A layer of fill/disturbed native was encountered at all borehole locations below topsoil and extended in general to approximately from 0.5m to 1.1m below the existing ground surface. The fill/disturbed native consisted of sandy silt till, trace to some clay & gravel, was typically in very loose to compact state.

Native materials were encountered underlying the fill/disturbed native in all the boreholes and found to be very consistent. Native materials consisting of non cohesive materials i.e., very loose to very dense sandy silt till to silty sand till with trace to some clay & gravel, were encountered at all borehole locations and extended in general to full depth of exploration i.e., 7.6m below the existing ground surface.

Boreholes BH1 to BH10 were drilled and sampled within the approximate footprint of the proposed structures. The proposed structures can be supported by conventional spread and strip footings founded on undisturbed native deposits predominantly silty sand till to sandy silt till for a geotechnical reaction of 75kPa to 200kPa at the Serviceability Limit States (SLS), and for a factored geotechnical resistance of 110kPa to 300kPa at the Ultimate Limit States (ULS). The geotechnical reactions and factored geotechnical resistances including the corresponding highest founding elevations at the borehole locations are summarized in Table 4.1. The recommended founding levels and geotechnical reactions for the proposed structures would need to be confirmed by PLANET at the time of construction.

Alternatively, the proposed structures can be supported by conventional spread and strip footings founded on engineered fill for a geotechnical reaction of 100kPa at the Serviceability Limit States (SLS) and a factored geotechnical resistance of 150kPa ULS. The engineered fill supporting footings should be constructed in accordance with the guidelines presented in Appendix C. Other requirements of engineered fill are given in Section 4.1.1

The floor slab can be supported on grade, provided all topsoil, existing weathered/disturbed and surficially softened or loose materials are removed, and the subgrade thoroughly proof rolled. Any loose spots or areas revealed from proof rolling must be sub-excavated, backfilled and compacted.

Prior to the placement of the engineered fill, all of the existing weathered/disturbed and softened or loose native soils must be removed, and the exposed surface proof rolled. The depths of sub-excavation required for the construction of engineered fill at the borehole locations ranged from 0.9m to 1.1m.

During and upon completion of drilling, short-term groundwater was observed at borehole locations BH1 to BH8, ranging from 1.1 m to 2.4 m below the existing ground surface. Monitoring wells were installed at five borehole locations: BH1, BH4, BH6, BH7, and BH10. Groundwater level measurements were made at different times to observe water level fluctuations in the monitoring wells and presented in Table 3.2 of this report.

Based on water table readings obtained between June 19, 2025 & April 9, 2026, the groundwater level varied from 0.10m to 5.52m below the existing ground surface, corresponding to a geodetic elevation of 390.31m to 397.0m.

Groundwater is expected to be encountered during the excavation and installation of foundations below the existing ground surface. Dewatering will be required to deal with water problems during the construction. Details of dewatering requirement are provided in a hydrogeological investigation report prepared by Planet Engineering Inc.

Note that the groundwater level can vary and is subject to seasonal fluctuations and in response to major weather events. The depth of groundwater table can also be influenced by the presence of underground features such as utility trenches, and this may affect the construction procedures, costs and schedules. The possibility of groundwater level fluctuations at the site should be considered when designing and developing the construction plans for the project.

All excavations must be carried out in accordance with the most recent Occupational Health and Safety Act (OHSA). As a general rule, the excavations in Type 1 and 2 soils can be carried out without support using side slopes 1H:1V, while the bottom 1.2m of the excavation can be cut vertically and could retain the wall for a short period of time. The excavation in Type 3 soil can be carried out maintaining the side slopes not steeper than 1H:1V. The excavations in Type 4 soils will require minimum flatter side slopes of 3H to 1V. These slopes should be visually monitored for any movement especially if workers are present within the excavation. These temporary slopes should only be utilized for a short duration. If an excavation contains more than one type of soil, the soil shall be classified as the type with the highest number among the types present.

Based on the borehole information, the subject site for the proposed building can be classified as Class ‘D’ for seismic site response according to Table 4.1.8.4.A of OBC 2024 provided the footings will be supported on undisturbed native deposits. Consideration could be given to conduct an earthquake site assessment with the use of in-situ testing of the seismic characteristics (i.e. Geophysical testing – Multi-channel Analysis of Surface Waves-MASW) which can lead to an improved site classification (i.e. from Class D to Class C).

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Table 3.2: Summary of Groundwater Level Observations in Installed Monitoring Wells

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Appendices

Appendix A Limitations of Report

Appendix B Borehole Logs

Appendix C General Requirements for Engineered Fill

Appendix D Proposed Site Plan Provided by the Client

1 INTRODUCTION

PLANET Engineering Inc (PLANET) was retained by Elora Greens Inc. (the Client) to complete a geotechnical investigation to evaluate the site conditions at proposed development area at 127 First Line, Township of Centre Wellington, Ontario. (The Site). The site key plan and approximate locations of the boreholes are shown on Drawings 1 and 1A.

This work was conducted in accordance with our proposal 2501179BG dated, May 05, 2025. Authorization to Proceed (ATP) was issued to PLANET on May 14, 2025.

Based on the information and updated March 2026 conceptual plan provided by the Client, we understand that the proposed land uses for the Site include approximately 9.33 hectares of low-density residential development (single-detached, semi-detached, and street townhouse units); 1.75 hectares of multiple residential uses; 0.99 hectares of mixed-use development; 2.34 hectares designated for park and trail uses; and 1.99 hectares for a stormwater management (SWM) facility.

PLANET does not have any structural information regarding the proposed development.

The purpose of this investigation was to assess the subsurface conditions at ten borehole locations (BH1 to BH10) and from the findings in the boreholes make geotechnical engineering recommendations for the following:

- Design parameters required by the structural engineer/civil engineer
- Soil characteristics and drainage recommendations
- Comments related to earth pressures
- Frost susceptibility of all soils in the upper 1.2 metres
- Special precautions specific to this site
- The use of the excavated soil
- Drainage recommendations
- seismic considerations.
- Recommendations for Asphalt pavement structure designs for roads and parking lots.

This report is provided based on the terms of reference presented above and, in the text, and on the assumption that the design will be in accordance with the applicable codes and standards. If there is any change in the design features relevant to the geotechnical analyses, or if any question arises concerning the geotechnical aspects of the codes and standards, PLANET should be contacted to review the design. It may then be necessary to carry out additional borings and reporting before the recommendations of PLANET can be relied upon.

The site investigation and recommendations follow generally accepted practice for geotechnical consultants in Ontario. The format and contents are guided by client specific needs and economics and do not conform to generalized standards for services. Laboratory testing for most part follows ASTM or CSA Standards or modifications of these standards that have become standard practice.

This report has been prepared for the Elora Greens Inc. (the Client), and its architects, consultants, contractors, and designers. Third party use of this report without PLANET's consent is prohibited. The limitation conditions presented in Appendix A form an integral part of the report and they must be considered in conjunction with this report.

2 FIELD AND LABORATORY WORK

Borehole locations for this investigation were established in and marked on the ground by PLANET personnel in accordance with the client requirements. Prior to drilling operations, underground utilities were cleared at the borehole locations by the public utilities' companies. A private utility locate company was retained by PLANET to locate 'locatable' private underground utility lines and clear the borehole locations prior to the drilling.

For this geotechnical investigation, ten boreholes (BH1 to BH10) were drilled to the depths ranging from 6.4m to 7.6m on June 10,11 & 16 2025. The boreholes were advanced by a drilling sub-contractor, under the supervision of PLANET personnel. The boreholes were advanced by utilizing continuous flight solid stem augers. Samples were retrieved at regular intervals with a 50 mm O.D. split-barrel sampler driven with a hammer weighing 624 N (63.5 kg) and dropping 760 mm in accordance with the Standard Penetration Test (SPT) method (ASTM D1586). The number of blows of the hammer required to drive the sampler into the relatively undisturbed ground by a vertical distance of 300 mm (12 inches) was recorded as SPT 'N' value of the soil which indicated the consistency of cohesive soils or compactness of non-cohesive soils. The results of SPT are shown in the Record of Boreholes. The samples were logged in the field and returned to the PLANET laboratory for detailed examination by the project engineer and for laboratory testing. The approximate borehole locations are shown on Drawing 1A.

Water level observations were made during drilling and at the completion of the drilling operations. Upon completion of drilling, each borehole was backfilled in accordance with current regulations.

The locations of the boreholes were established in the field by PLANET. The borehole elevations and locations were surveyed and established by the PLANET staff. Note, these elevations are approximate only, for relating borehole soil stratigraphy and should not be used or relied on for other purposes.

As well as visual examination in the laboratory, soil samples were tested for water content determinations. Grain size analyses were carried out on selected soil samples as presented in Table 2.1. The results of the laboratory tests are presented on the borehole logs, and also on Drawing 2.

Table 2.1: Sample Details for Grain Size Analyses

Sample No.	Approximate Depth Below the Existing Ground Surface (m)	Approximate Local Elevation (m)	Type of Test	Lab Results
BH1-SS2	0.8 – 1.4	396.6 – 396.0	MH	Drawing 2
BH2-SS4	2.3 – 2.9	394.6 – 394.0	MH	Drawing 2
BH2-SS6	4.6 - 5.2	392.3 – 391.7	MH	Drawing 2
BH3-SS3	1.5 – 2.1	395.2 – 394.6	MH	Drawing 2
BH5-SS4	2.3 – 2.9	395.9 – 395.3	MH	Drawing 2
BH6-SS5	3.1 – 3.7	387.3 – 386.7	MH	Drawing 2
BH8-SS4	2.3 – 2.9	393.1 – 392.5	MH	Drawing 2
BH10-SS3	1.5 – 2.1	397.2 – 396.6	MH	Drawing 2

Notes: M stands for sieve analysis. MH stands for sieve and hydrometer grain size analyses. The results of grain size analyses are presented on subject referenced drawings.

3 RESULTS OF THE INVESTIGATION

The site is located at 127 First Line, Township of Centre Wellington, Ontario (the Site). The site key plan and the borehole locations are presented on Drawings 1 and 1A. Notes on sample descriptions and the general features of fill material and native soils are presented on Drawing 1B. Detailed subsurface conditions are presented on borehole log sheets, attached as Appendix B.

Details of the subsurface conditions encountered at the borehole locations are provided on the borehole logs following the text of this report. The borehole logs indicate the subsurface conditions only at the borehole locations. Note the material boundaries indicated on the attached sheets are approximate and based on visual observations. These boundaries typically represent a transition from one material type to another and should not be regarded as an exact plane of geological change. It should be pointed out that the subsurface conditions will vary across this site.

3.1 Subsurface Conditions

This investigation was carried out by drilling ten (10) boreholes (BH1 to BH10) spread on the whole site to maximum depths of 6.4m to 7.6m below the existing ground surface. The subsurface soil and groundwater conditions are summarized as follows.

3.1.1 Topsoil

A top layer of 150 to 300 mm thick topsoil was encountered at all borehole locations (BH1 to BH10). It should be noted that the topsoil thicknesses provided here were measured at the borehole locations only and may vary beyond the boreholes.

3.1.1 Fill/Disturbed Native Soil

A layer of fill/disturbed native was encountered at all borehole locations below topsoil and extended in general to approximately from 0.5m to 1.1m below the existing ground surface. The fill/disturbed native consisted of sandy silt till, trace to some clay & gravel, was typically in very loose to compact state.

Based on the visual observation in the field and our experience in the area, it appears that these SPT N values are not representative to determine the compactness. It also indicates that the fill did not receive systematic compaction. It should be noted that the thickness of fill could vary between and beyond boreholes and this should be considered when estimating.

3.1.2 Native Soils

Native materials were encountered underlying the fill/disturbed native in all the boreholes and found to be very consistent. Native materials consisting of non cohesive materials i.e. very loose to very dense sandy silt till to silty sand till with trace to some clay & gravel were encountered at all borehole locations and extended in general to full depth of exploration i.e., 7.6m below the existing ground surface.

The grain-size distribution of selected soil samples from native deposits is enclosed in Drawing 2, and results are summarized in Table 3.1.

Table 3.1: Summary of Grain-Size Distribution

Sample No.	Depth Below the Existing Ground Surface (m)	Sieve and Hydrometer Test Results			
		Gravel %	Sand %	Silt %	Clay %
BH1-SS2	0.8 – 1.4	10	39	42	9
BH2-SS4	2.3 – 2.9	22	37	34	7
BH2-SS6	4.6 - 5.2	18	36	36	10
BH3-SS3	1.5 – 2.1	16	34	41	9
BH5-SS4	2.3 – 2.9	7	36	46	11
BH6-SS5	3.1 – 3.7	6	34	46	14
BH8-SS4	2.3 – 2.9	3	39	47	11
BH10-SS3	1.5 – 2.1	11	30	49	10

It should be noted that the thickness of native deposit could vary between and beyond the borehole locations within the depth of investigation, and this should be taken into account when estimating.

The native deposit may contain larger particles (cobbles and boulders) that are not specifically identified in the boreholes. The size and distribution of such obstructions cannot be predicted with borings, because the borehole sampler size is insufficient to secure representative samples of the particles of this size. Provision should be made in excavation contracts to allocate risks associated with time spent and equipment utilized to remove or penetrate such obstructions when encountered.

3.2 Groundwater Conditions

During and upon completion of drilling, short-term groundwater was observed at borehole locations BH1 to BH8, ranging from 1.1 m to 2.4 m below the existing ground surface. Monitoring wells were installed at five borehole locations: BH1, BH4, BH6, BH7, and BH10. Groundwater level measurements were made at different times to observe water level fluctuations in the monitoring wells and presented in Table 3.2 of this report. Groundwater levels will continue to be monitored and reported in the Hydrogeological Investigation Report.

Table 3.2: Summary of Groundwater Level Observations in Installed Monitoring Wells

MW ID	Ground Surface Elevation (m)	Borehole Depth (mbgs)	19-June-25		15-Sep-25		15-Dec-25		9- Apr-2026	
			Depth (mbgs)	Elevation (m)	Depth (mbgs)	Elevation (m)	Depth (mbgs)	Elevation (m)	Depth (mbgs)	Elevation (m)
BH1	397.4	6.1	0.65	396.8	2.47	394.9	1.16	396.3	0.26	397.18
BH4	395.4	7.6	2.03	393.4	4.04	391.4	5.52	389.9	0.47	394.65
BH6	390.4	6.1	1.07	389.3	3.24	387.1	1.90	388.5	0.10	390.31
BH7	392.2	6.1	1.27	390.9	3.35	388.8	3.19	389.0	0.22	392.01
BH10	398.7	6.4	1.87	396.9	4.0	394.7	3.80	394.9	0.75	397.99

Based on water table readings obtained between June 19, 2025 & April 9, 2026, the groundwater level varied from 0.10m to 5.52m below the existing ground surface, corresponding to a geodetic elevation of 390.31m to 397.0m.

Groundwater is expected to be encountered during the excavation and installation of foundations below the existing ground surface. Dewatering system will be required to deal with water problems during the construction. Details of dewatering requirement are provided in a hydrogeological investigation report prepared by PLANET.

Perched water may be encountered in excavated areas during wet seasons. A perched water condition can occur due to the accumulation of infiltrated water in the more pervious fill overlying less pervious deposit, or at the interface of fill and native soils, especially during wet periods.

It must be noted that that the ground water levels may fluctuate seasonally based on the amount of precipitation and surface runoff, and wet soils may be encountered to about 0.6 m higher than the water levels noted due to capillary rise in fine cohesionless soils. It should be noted that excavations carried through and below the water bearing cohesionless soils (sand, silt), will experience loosening and sloughing of the sides and unstable excavation base thus requiring relatively flatter excavation slopes.

4 DISCUSSION AND RECOMMENDATIONS

The property is located southeast of 1st line Elora, ON. The subject site is a rectangular-shaped piece of land currently used for agricultural purposes. The land slopes from northwest to southeast, with an elevation difference of approximately 10 m.

Based on the information and updated March 2026 conceptual plan provided by the Client, we understand that the proposed land uses for the Site include approximately 9.33 hectares of low-density residential development (single-detached, semi-detached, and street townhouse units); 1.75 hectares of multiple residential uses; 0.99 hectares of mixed-use development; 2.34 hectares designated for park and trail uses; and 1.99 hectares for a stormwater management (SWM) facility.

PLANET does not have any structural information regarding the proposed development.

The following sections of the report provide our interpretation of the factual geotechnical data obtained during our field evaluation and are intended for the guidance of the design engineer only. Where comments are made on aspects of construction, they are provided only to highlight those aspects which could affect the design of the project. Contractors bidding on or undertaking the work should make their own interpretation of the subsurface information provided as it affects their proposed construction methods, equipment selection, scheduling, safety, and the like. Boreholes BH1 to BH10 were drilled and sampled within the boundary of the proposed development.

4.1 Site Grading

Based on the preliminary information provided by the design engineer, it is our understanding that placement of fill material approximately 2 m to 3m in depth may be required, subject to the final site layout and servicing methodology for the site.

4.1.1 Engineered Fill

PLANET EINGEERING defines “engineered fill” as material that will support foundations, and which is placed and compacted in a specified and controlled manner under full-time supervision of PLANETS geotechnical engineering staff.

In any location where engineered fill will be placed to raise grades or replace poor/weak soil, the topsoil, vegetation, peat, organic sands, or existing earth fill must be fully removed. Full removal of the existing topsoil will generally reveal the shallow dense surface, which is loose to dense, may require limited proof-rolling and should be inspected and approved by the Planet's geotechnical engineer. Exposed native subgrade soil must be proof-rolled and inspected by the geotechnical engineer to ensure all unsuitable material (e.g. organics, weak or soft soil, weathered / disturbed soil, deleterious materials, existing fill) was removed from the engineered fill footprint. Any unsuitable areas must be further sub-excavated and replaced with fill compacted to targeted 100% Standard Proctor Maximum Dry Density (SPMDD), minimum98% SPMDD in building areas and 95% SPMDD in road and servicing areas.

Once the subgrade is approved, engineered fill can be placed. Engineered fill must be placed under the full-time supervision of a geotechnical engineer as required in the Ontario Building Code. The engineered fill may consist of excavated on-site cohesionless soils provided they have been moisture conditioned to a moisture content within 2% of optimum moisture content and do not contain organics, topsoil or deleterious material. It is recommended that any imported soil consist of Granular B (OPSS.MUNI 1010) and be first used in construction areas, with suitable on-site soil used in landscaped or road areas. Excavated disturbed native from the site can be re-used as engineered fill.

In wet soil subgrade areas, the first lift of engineered fill shall consist of 400 mm of Granular B Type II (OPSS.MUNI 1010). This will help to bridge the weaker subgrade and improve the ability to achieve the compaction specifications for subsequent engineered fill lifts. The engineered fill must extend a minimum of 1 m out from all sides of the foundations and extend at a 1 horizontal to 1 vertical slope (1H:1V) down to the exposed subgrade. A typical detail for engineered fill pad dimensioning is included in Appendix C.

4.2 Foundations

Existing topsoil and fill/disturbed native are not suitable for the support of new foundations. The local undisturbed native soil consisted of very loose to very dense sandy silt till to silty sand till with trace to some clay & grave. Typically, the relatively dense native soils were encountered at greater depths below the ground surface.

4.2.1 Footings founded on Native Soils

The proposed structures can be supported by conventional spread and strip footings founded on undisturbed native deposits predominantly silty sand till to sandy silt till for a geotechnical reaction of 75kPa to 200kPa at the Serviceability Limit States (SLS), and for a factored geotechnical resistance of 110kPa to 300kPa at the Ultimate Limit States (ULS). The geotechnical reactions and factored geotechnical resistances including the corresponding highest founding elevations at the borehole locations are summarized on Table 4.1. The recommended founding levels and geotechnical reactions for the proposed structures would need to be confirmed by PLANET at the time of construction. The bearing pressures and the highest founding elevations are given in the following Table 4.1.

Table 4.1: Bearing Values & Founding Levels of Footings on Native Soils

BH No.	Material	Ground Elevation	Geotechnical Reaction at SLS (kPa)	Factored Geotechnical Resistance at ULS (kPa)	Minimum Depth below Existing Grade (m)	Elevation Corresponding to Proposed Footing Base (m)
BH1	Sandy Silt Till to Silty Sand Till	397.4	75	110	1.5	395.9
			200	300	2.5	394.9
BH2	Sandy Silt Till to Silty Sand Till	396.9	75	110	1.5	395.4
			200	300	3.5	393.4
BH3	Sandy Silt Till to Silty Sand Till	396.7	75	110	1.5	395.2
			200	300	2.5	394.2
BH4	Sandy Silt Till to Silty Sand Till	395.4	75	110	1.5	393.9
			200	300	2.5	392.9
BH5	Sandy Silt Till to Silty Sand Till	398.2	75	110	1.2	397.0
			200	300	2.5	395.7
BH6	Sandy Silt Till to Silty Sand Till	390.4	75	110	1.8	388.6
			200	300	2.5	387.9
BH7	Sandy Silt Till to Silty Sand Till	392.2	75	110	0.8	391.4
			200	300	2.5	389.7
BH8	Sandy Silt Till to Silty Sand Till	395.4	75	110	1.5	393.9
			100	150	2.5	392.9
BH9	Sandy Silt Till to Silty Sand Till	396.4	100	150	1.2	395.2
			200	300	2.5	393.9
BH10	Sandy Silt Till to Silty Sand Till	398.7	75	110	1.2	397.5
			200	300	2.5	396.2

4.2.2 Foundation on Engineered Fill

If the foundations are supported on an engineered fill pad as discussed above, the spread or strip footings can be designed using the same geotechnical reaction at SLS and factored geotechnical resistance at ULS as the underlying native soil to a maximum of 100 kPa at SLS and 150 kPa at ULS.

It is recommended that nominal reinforcing steel for stiffening of the foundation walls made on engineered fill be provided to help mitigate minor cracking due to minor differential settlement. The reinforcing steel in the poured concrete foundation walls may consist of 2-15Mbars continuous at the top of the foundation wall, and 2-15M bars continuous at the bottom of the foundation walls. Typically, these bars are placed 100 to 200 mm from the top or bottom of the foundation wall, respectively. The reinforcing steel should extend a minimum of 3 m past any transition zones between engineered fill and native soil. A typical reinforcing steel detail for foundation walls placed on engineered fill (refer to attached Drawing 6). The recommended nominal reinforcing steel should not be considered a structural design. The need for different or additional reinforcement should be reviewed by a structural engineer to ensure the original structural design intent of the structure is maintained.

To confirm the quality and uniformity of the engineered fill, it is recommended that Cone Penetration Testing (CPT) be performed at selected locations after fill placement. CPT will help identify any weak or poorly compacted zones that may affect future construction. For areas designated for proposed construction, CPT results will also ensure the compacted engineered fill is suitable for proposed construction. This verification will help minimize settlement risks and support long-term performance of the proposed development.

4.2.3 Other Comments on Foundations

Variations in the soil conditions are expected in between the borehole locations, and during construction, the soil bearing pressures should be confirmed by the Geotechnical Engineer.

To comply with the Township’s design standards (Section H.6), a minimum vertical separation of 0.30 m shall be maintained between the underside of footings and the seasonally high groundwater elevation.

Prior to pouring foundation concrete, the foundation subgrade should be cleaned of all deleterious materials such as topsoil, fill, wet, softened, disturbed or caved materials, as well as any standing water. If construction proceeds during freezing weather conditions, adequate temporary frost protection for the foundation subgrade and concrete must be provided.

It is noted that native soils tend to weather rapidly and deteriorate on exposure to the atmosphere or surface water. Hence, foundation bases which remain open for an extended period of time should be protected by a skim coat of lean concrete.

Footings designed to the specified bearing capacity at the serviceability limit states (SLS) are expected to settle less than 25 mm total and 19 mm differential.

In the vicinity of the existing buried utilities, footings must be lowered to undisturbed native soils, or alternatively the services must be structurally bridged.

Where it is necessary to place footings at different levels, the upper footing must be founded below an imaginary 10 horizontal to 7 vertical line drawn up from the base of the lower footing. The lower footing must be installed first to help minimize the risk of undermining the upper footing. Footings close to underground services should also be set back from the services based on this slope limitation as shown in the following Figure 1.

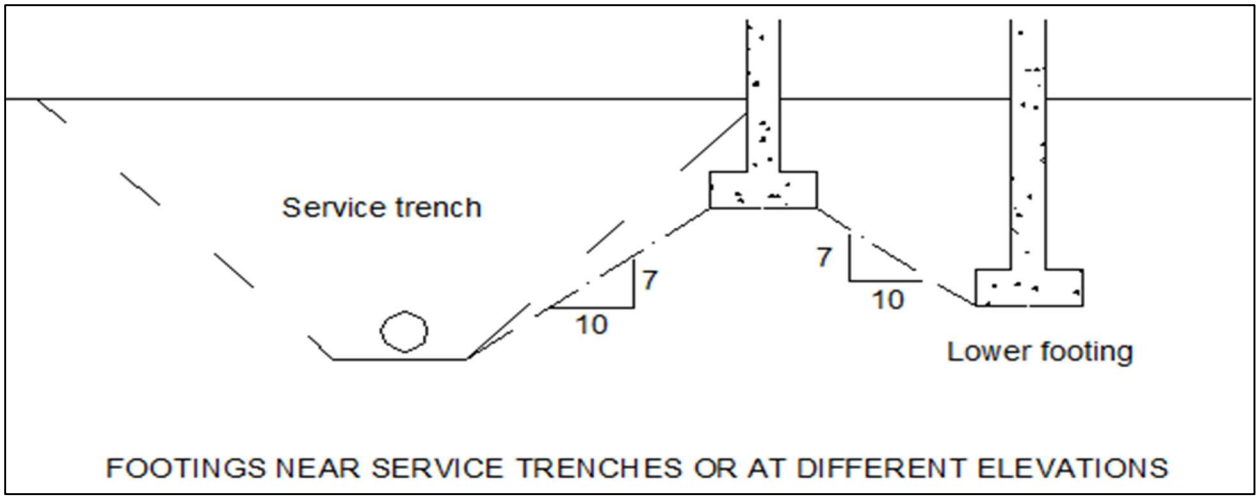


Figure 1: Footings near service trenches or at different elevations

During winter construction, foundations and slab (if applicable) on grade must not be poured on frozen soil. Foundations must be adequately protected at all times from cold weather and freezing conditions.

Design frost protection depth for the general area is 1.2m. Therefore, for frost protection, new footings should have a permanent earth cover of at least 1.2m or be provided with an equivalent thickness of extruded rigid exterior-grade polystyrene insulation. In case of rip-rap (rock fill), only one-half of the rock fill thickness should be assumed to be effective in providing frost protection.

The recommended bearing capacities and the corresponding founding elevations would need to be confirmed by the representative of PLANET during construction. It should be noted that the recommended bearing capacities have been calculated by PLANET from the borehole information for the design stage only. The investigation and comments are necessarily on-going as new information of the underground conditions becomes available. For example, more specific information is available with respect to conditions between boreholes when foundation construction is underway. The interpretation between boreholes and the recommendations of this report must therefore be checked through field inspections provided by PLANET to validate the information for use during the construction stage. In this regard, PLANET should be retained for a general review of the final design and specifications to verify that this report has been properly interpreted and implemented. If not accorded the privilege of making this review, PLANET will assume no responsibility for interpretation of the recommendations in the report.

4.3 Storm Water Management Pond Construction

For the proposed future storm water management pond construction, it is recommended that the pond base and side slopes be prepared with a well-compacted, low-permeability liner, such as compacted clay or a suitable synthetic membrane, to minimize seepage and protect groundwater resources. The subgrade should be inspected and approved by PLANET prior to liner installation to ensure it is smooth, uniformly compacted, and free of sharp objects or debris that could damage the liner. Where site soils are not naturally low in permeability, a constructed liner (approved compacted clay) of at least 600 mm thickness is advised. Continuous monitoring during construction is recommended to confirm that the liner meets the specified design criteria and provides long-term performance for the pond.

4.4 Floor Slab and Permanent Drainage

Based on the anticipated lowest basement level (2.5m below existing grade), the basement slab subgrade is expected to consist of generally dense to very dense non cohesive soils. The slab subgrade should be assessed by a geotechnical engineer and disturbed/soft/wet subgrade areas should be sub excavated and replaced with imported Granular A and/or Granular B Type 2. The imported granular material must meet the specifications defined in OPSS-1010-13. The existing fill free from topsoil and organics may be used to raise the grade, provided it is confirmed by a qualified geotechnical professional from PLANET Engineering inc at the time construction. The fill required to raise the grade must be placed in shallow lifts (each lift not more than 200 mm) and compacted to at least 98 percent of Standard Proctor Maximum Dry Density (SPMDD).

It is necessary that the basement floor slab be provided with a capillary moisture barrier and drainage layer. This is provided by placing the slab on a minimum layer of 19 mm clear stone (OPSS 1004) compacted by vibration to a compact state. Regardless of the approach to slab construction, the floor slabs that are to have bonded floor finishes (such as tiles with adhesives) should be provided with a capillary moisture and vapour barrier. The floor manufacturers have specific requirements for vapor barrier; therefore, the floor designer/architect must ensure that a provision of appropriate vapour barrier conforming to specific floor finish product requirements is incorporated in the project specifications. Adequate testing must be carried out to ensure acceptable levels of moisture/relative humidity in the concrete slab prior to the installation of floor finish(es). Studies indicate that a provision of 200 mm thick 19 mm clearstone base (OPSS 1004) under the slab helps provide a good capillary moisture break provided the granular base is positively drained. However, this provision does not replace the floor manufacturers' specific requirement(s) for a vapour barrier.

The estimated modulus of subgrade reaction (ks) equal to 20 MN/m^3 may be used for the design of slab-on-grade supported on native or structural fill soils, provided that the construction is in accordance with the recommendations provided herein. If structural fill (Granular A or B Type II) having minimum thickness of 300 mm, this value can be increased to 30 MN/m^3. The estimated value provided above may need to be adjusted based on the structure size and locations of detail design.

The floor slabs should not be tied to any load-bearing walls or columns unless they have been designed accordingly. Contraction/expansion joints should be provided for the slabs as required by the structural engineer.

To assist in maintaining a dry basement from seepage, it is recommended that exterior grades around the building be sloped away at a 2 percent gradient or more, for a distance of at least 1.2 m. A perimeter drainage system is provided by forming a drained cavity with prefabricated drain core material such as Miredrain 2000 (Mirafi) or Terradrain 20 (Terrafix). The composite drainage board then discharge to the drainage layer beneath the lowest floor slab through ports made in the foundation wall above the footing level. A conceptual perimeter drainage is shown on Drawing 3.

The perimeter should outlet to a suitable discharge point under gravity flow or connected to a sump pit(s) located in the lowest level of the basement, and the water be pumped up to a suitable discharge point. The size of the sump should be adequate to accommodate anticipated water seepage. A duplex pumping arrangement (main pump with a provision of a backup pump) on emergency backup power is recommended.

4.5 Frost Susceptibility of Soils

The frost depth penetration in this area is considered to be 1.2m. Based on the grain size analysis and using the Ministry of Transportation (MTO) category for frost susceptibility soils, the on-site fill/disturbed native soils would be classified as moderate susceptible to frost heaving.

4.6 Excavations and Backfill

It is anticipated that the existing grade will be raised by approximately 2 to 3 m across the site. Excavations within the engineered fill used to raise the grade can be carried out using a heavy hydraulic backhoe. Considering the footings to be placed at minimum frost level, it is anticipated that the excavation will be extended to about 1.2m below the existing grade. Based on the borehole information, Groundwater problems are anticipated for the installation of foundations below the existing ground surface. Any seepage, which may occur during wet periods through fill, can be removed by conventional pumping from sumps for excavation.

All excavations must be carried out in accordance with the most recent Occupational Health and Safety Act (OHSA). As a general rule, the excavations in Type 1 and 2 soils can be carried out without support using side slopes 1H:1V, while the bottom 1.2m of the excavation can be cut vertically and could retain the wall for a short period of time. The excavation in Type 3 soil can be carried out maintaining the side slopes not steeper than 1H:1V. The excavations in Type 4 soils will require minimum flatter side slopes of 3H to 1V. These slopes should be visually monitored for any movement especially if workers are present within the excavation. These temporary slopes should only be utilized for a short duration. If an excavation contains more than one type of soil, the soil shall be classified as the type with the highest number among the types present.

The existing native soil (free of topsoil) can be used as general construction backfill where it can be adequately compacted with suitable type compactors. Loose lifts of soil, which are to be compacted, should not exceed 200 mm. Noted that the excavated soils are subject to moisture content increase during wet weather which would make these materials too wet for adequate compaction. Stockpiles should therefore be compacted at the surface or be covered with tarpaulins to help minimize moisture intake.

Imported granular fill, which can be compacted with handheld equipment, should be used in confined areas. The excavated soils are not considered to be free draining. Where free draining backfill is required, imported granular fill such as OPSS Granular B should be used.

Stockpiles should be placed well away from the edge of excavation and their height should be controlled so that they do not surcharge the sides of the excavation. Surface drainage should be controlled to prevent flow of surface water into the excavations. Excavation safety and stability of temporary construction slopes and lateral support systems are the contractor’s responsibility.

During winter construction, concrete and/or fill must not be placed on frozen fill or soil. Subgrades and foundations must be placed adequately protected at all times from cold weather and freezing conditions. Consideration should be given to install a skim coat of lean concrete (mud-slab) to preserve the subgrade integrity, and to provide a working platform.

4.7 Earth Pressures

The lateral earth pressures acting on retaining walls or underground structures may be calculated from the following expression:

$$p = K(\gamma h + q)$$

where p	=	Lateral earth pressure in kPa acting at depth h
K	=	Earth pressure coefficient equal to 0.4 for vertical walls and horizontal Granular B backfill used for permanent construction. Water pressure must be considered, if continuous wall drains are not used.
γ	=	Unit weight of backfill, a value of 20.5 kN/m^3 may be assumed
h	=	Depth to point of interest in meters
q	=	Equivalent value of surcharge on the ground surface in kPa

The above expression assumes that the perimeter drainage system prevents the build up of any hydrostatic pressure behind the wall.

4.8 Earthquake Considerations

Based on the borehole information and according to Table 4.1.8.4.A of OBC 2024, the subject site for the proposed structure can be classified as Class 'D' for seismic site response. Consideration could be given to conduct an earthquake site assessment with the use of in-situ testing of the seismic characteristics (i.e., Geophysical testing – Multi-channel Analysis of Surface Waves-MASW) which can lead to an improved site classification (i.e., from Class D to Class C).

4.9 Underground Utility Trenches

As a part of the site development, a network of utility trenches may be required.

4.9.1 Trenching

It is expected that in most cases the trenches will be excavated through compacted engineered fill and/or loose to compact non cohesive native soils.

Groundwater is anticipated to be a major problem for excavating utility trenches. Any cut below the groundwater level will require dewatering. Otherwise, it will result in an unstable excavation base and flowing sides. The groundwater table must be lowered one meter below the lowest excavation level. The test pit should be carried out in this area before the excavation to further explore the groundwater and seepage conditions. In accordance with OHSA, on-site fill and the undisturbed native soils above the groundwater table can be classified as Type 3 soils. sandy silt below the groundwater table can be classified as Type 2.

4.9.2 Bedding

The undisturbed native deposits or engineered fill will provide adequate support for the utility pipes and allow the use of normal Class B type bedding.

The recommended minimum thickness of granular bedding below the invert of the pipes is 150 mm. The thickness of the bedding may, however, have to be increased depending on the pipe diameter or in accordance with local standards or if wet or weak subgrade conditions such are encountered, especially when the soil at the trench base level consists of wet, dilatant silts, sandy silts. The bedding material should consist of well graded granular material such as Granular 'A' or equivalent. After installing the pipe on the bedding, a granular surround of approved bedding material, which extends at least 300 mm above the obvert of the pipe, or as set out by the local authority, should be placed.

To avoid the loss of soil fines from the subgrade, uniformly graded clear stone should not be used unless, below the granular bedding material, a suitable, approved filter fabric (geotextile) is placed. The geotextile should extend along the sides of the trench and should be wrapped all around the poorly graded bedding material.

4.9.3 Thrust Blocks

Pressurized fluids in buried pipelines generate unbalanced, thrust forces at bends, junctions, valves pump starts or stops, valve closures, air vents and all restrictions to, and changes in direction of flows. Generally, the thrust forces depend on the internal pressure, the cross-sectional area of the pipe and the deflection angle. For pipes which are not anchored, the unbalanced thrust forces must be resisted either by thrust blocks and collars or by thrust restraint systems or a combination of both.

Thrust blocks are passive systems which prevent the pipe joint leaking by blocking the pipe movements and the separation of unrestrained joints. Depending on the source of the thrust force, their resistance comes either from the mobilization of soil bearing capacity or dead weight: the bearing type thrust blocks resist thrust forces corresponding to concave vertical and horizontal bends, while the gravity ones secure the convex vertical bends. Because they need to immobilize the pipes, the allowable soil stresses must be considerably smaller than those required to cause ultimate failure of the thrust block itself. The thrust block design is satisfactory if the design force, F_d, is less than the ultimate resistance R_{ult}, reduced by a suitable reduction (safety) factor which will ensure that the displacements will be relatively small.

Values for thrust reduction factors for thrust blocks are given in Table 4.3 for different soil and rock types.

If these lead to unacceptably large thrust blocks, the reduction factor may be re-assessed by determining he actual relationship between thrust reduction factor and displacement under defined load and ground conditions.

Table 4.2: Reduction Factors for Thrust Blocks

Soil or Rock Type	Reduction Factor (T_r)
Dense sandy deposit/stiff to very stiff clayey silt	2 to 3
Compact sandy deposit/firm clayey silt	3 to 4
Very loose to loose sandy deposit/soft clayey silt	4 to 5

Thrust blocks normally consist of a volume of concrete, usually of nominal strength (20-40 MPa), which may be lightly reinforced. The size and shape of the block is decided on the basis of the forces to be restrained, the size and style of the pipe fitting or component, and local ground conditions. The effectiveness of any thrust block is determined by its mass, shape, position relative to the pipeline, the soil reactions on the block, and friction between the pipeline and the surrounding ground.

Thrust blocks for the underground services under pressure may be constructed in native soils in areas here there is no risk of future excavations. The back of the thrust blocks should be vertical and should be cast directly against undisturbed natural soils. The ultimate lateral resistance of thrust blocks can be calculated in accordance with Drawing 5.

Thrust restraint systems are alternative to thrust blocks. They are active systems in the sense that they rely on the mobilization of pipe/soil friction and/or passive resistance in the soil for a sufficient length away from the junction. The length of pipeline required to develop the resisting force crucially depends on the type of junction, pipeline material, type and compaction/consistency of the backfill, etc.

4.9.4 Backfilling of Trenches

The existing fill (free of topsoil) and native soils can be used as general construction backfill where it can be adequately compacted with suitable type compactors.

The backfill material should be placed in maximum 200 mm thick layers at or near (±2%) of the optimum water content and each layer should be compacted to at least 95% SPMDD to within 1.5 m to final subgrade. In the upper 1 m, the degree of compaction should be minimum 98% SPMDD, except for landscape area. Unsuitable materials such as organic soils, boulders, cobbles, frozen soils, etc. should not be used for backfilling.

The on-site excavated soils should not be used in confined areas (e.g. around catch basins and laterals under roadways) where heavy compaction equipment cannot be operated. The use of imported granular fill together with an appropriate frost taper would be preferable in confined areas and around structures, such as catch basins.

4.10 Pavements

The pavement structures presented in Table 4.3 can be used for the design of proposed parking areas and access roadways during construction under ideal or non-ideal subgrade conditions.

The explored fill/disturbed native generally extended not more than 1.1 m in the boreholes. The subgrade is expected to consist of organic materials and/or native soils depending upon the proposed grades of parking structure. The zone of influence of the pavement subgrade is generally estimated within 1 m below the underside of the granular sub-base.

4.10.1 Ideal Conditions

Under ideal conditions, the zone of the pavement subgrade within 1 m below the underside of the granular sub-base must be compacted to at least 95% of its Standard Proctor Maximum Dry Density (SPMDD) with moisture content 2 to 3% drier than its optimum and then the compaction should be increased to 98% of SPMDD in the upper 0.6 m of the subgrade.

4.10.2 Non-Ideal Conditions

If the roads are to be constructed during the wet seasons and if the subgrade is unsuitable then either the top 1.1m of the subgrade should be replaced with drier, compacted, select subgrade material meeting as OPSS 1010 or the top 0.8 m of the subgrade should be replaced with granular material meeting the specifications defined in OPSS-1010-13. This will be assessed at the time of access roadways construction and parking area.

The existing fill/disturbed native within 1.1 m from the underside of sub-base must be excavated and assessed its stability and suitability according to ideal/non-ideal conditions criteria stipulated by the local authority having jurisdiction over the project site. Depending upon evaluation either the excavated material will be re-used or if found to be unsuitable replaced with select subgrade/granular materials.

In preparation of the subgrade, prior to placement of the granular sub-base and base materials, the subgrade must be proof-rolled to determine its stability and suitability for access road construction and parking area by a qualified geotechnical professional.

The recommended pavement structures provided in Table 4.3 are based upon an estimate of the subgrade soil properties determined from visual examination and textural classification of the soil samples. Consequently, the recommended pavement structures should be considered for preliminary design

purposes only. A functional design life of eight to ten years has been used to establish the pavement recommendations. This represents the number of years to the first rehabilitation, assuming regular maintenance is carried out. If required, a more refined pavement structure design can be performed based on specific traffic data and design life requirements and will involve specific laboratory tests to determine frost susceptibility and strength characteristics of the subgrade soils, as well as specific data input from the client.

Table 4.3: Recommended Pavement Structure Thickness

Pavement Layer	Compaction Requirements	Light Duty Parking (Cars)	Heavy Duty Parking (Delivery Trucks)
Asphaltic Concrete	92 to 96.5% Maximum Relative Density	40 mm OPSS HL 3 40 mm OPSS HL 8	50 mm OPSS HL 3 75 mm OPSS HL 8
OPSS/TS 1010 Granular A Base** (or 20mm Crushed Limestone)	100% SPMDD*	150 mm	150 mm
OPSS/TS 1010 Granular B Type I or approved equivalent***	100% SPMDD	200 mm	350 mm

* Denotes Standard Proctor Maximum Dry Density, ASTM-D698

** As per TS1010 recycled concrete materials are not acceptable for base material as replacement of granular A.

***An additional thickness of 50mm will be added for sub-base, if recycled concrete materials will be used as granular B.

The subgrade must be compacted to 98% SPMDD for at least the upper 300 mm unless accepted by PLANET.

The long-term performance of the pavement structure is highly dependent upon the subgrade support conditions. Stringent construction control procedures should be maintained to ensure uniform subgrade moisture and density conditions are achieved.

Alternatively, consideration should be given to the use of rigid Portland Cement Concrete pavement where there is intense truck use, parking and turning of vehicles. The following Table 4.4 provides the minimum recommended rigid pavement structure.

Table 4.4: Minimum Rigid Concrete Pavement Structure

Pavement Layer	Compaction Requirements	Heavy Duty Pavement
Portland Cement Concrete (CAN3-CSA A23.1) - Class C-2	CAN3-CSA A23.1	225 mm
Base Course: Granular A (OPSS 1010) or 19 mm Crusher Run Limestone	100% Standard Proctor Maximum Dry Density (ASTM-D698)	150 mm

It must be noted that this structure does not provide full protection of the subgrade from frost penetration; therefore, the pavement slabs must be separated from the building structure.

Control of surface water is an important factor in achieving a good pavement life. The need for adequate subgrade drainage cannot be over-emphasized. The subgrade must be free of depressions and sloped (preferably at a minimum grade of two percent) to provide effective drainage toward subgrade drains. Grading adjacent to the pavement areas should be designed to ensure that water is not allowed to pond adjacent to the outside edges of the pavement. Continuous pavement subdrains should be provided along

both sides of the driveway/access routes and drained into respective catch basins to facilitate drainage of the subgrade and granular materials. The subdrain invert should be maintained at least 0.3 m below subgrade level. Subdrains should also be provided at all catch basins within the parking area.

Concrete should be proportioned, mixed, placed and cured in accordance with the requirements of CSA Standard CAN/CSA-A23.1-14 for class C-2 exposure, with the following key requirements:

minimum 28-day compressive strength:	32 MPa
air entrainment:	5 to 8 %
maximum water/cementing material ratio:	0.45

Concrete should be placed and spread in a manner which avoids segregation. It should be consolidated with a vibratory screed or internal vibrators. Consolidation close to form edges must be given special consideration.

Concrete should be finished to a thickness tolerance of 0 to plus 10 mm. Concrete must be cured adequately to provide durability and strength. Curing can be accomplished by wet blankets, sprinkling, plastic sheets and curing compounds. Curing should begin immediately after loss of bleed water.

Concrete pavement should be provided with joints to control stresses and prevent the formation of irregular cracks. Recommended joint spacing is 24 to 30 times slab thickness to a maximum dimension of about 4.0m. We would also recommend that load transfer dowels be placed at 50 mm spacing at the joints.

Sawed joints should be cut before random cracking occurs in the slab, usually within 6 to 18 hours after concrete placement. The maximum thickness (aperture) of control joints should be 6 mm, while the depth of control joints should be about 1/4th of the slab thickness.

The pavement should be closed to traffic until a minimum flexural strength of 2 MPa is attained or an approximate compressive strength of 20 MPa. This minimum strength is generally reached when the concrete can be saw cut without ravelling.

Additional comments on the construction of parking areas and access roadways are as follows:

1. Removal of all fill for pavement is not necessary. As part of the subgrade preparation, proposed parking areas and access roadways should be stripped fill at least in the upper 0.8 m below subgrade and surficially softened native soils and the base then should be thoroughly proof rolled by using a loaded truck. Unstable areas or areas with excessive organic materials should be further sub-excavated. The fill required to raise the grade can consist of inorganic soil, placed in shallow lifts and compacted to minimum 98 percent of Standard Proctor Maximum Dry Density (SPMDD).

2. The locations and extent of sub-drainage required within the paved areas should be reviewed by this office in conjunction with the proposed lot grading. Assuming that satisfactory crossfalls in the order of two percent have been provided, subdrains extending from and between catch basins may be satisfactory. In the event that shallower crossfalls are considered, a more extensive system of sub-drainage may be necessary and should be reviewed by PLANET.

3. The above pavement structure considers that construction will be carried out during the dry period of the year. If the subgrade becomes excessively wet or rutted during construction activities, additional sub-base material or placement of geogrids may be required. The need for additional sub-base material and/or placement of geogrids including filter fabric to stabilize the base is best determined during construction. It is recommended that the existing subgrade be heavily proof-

rolled prior to placement and any areas showing excessive deflection be replaced prior to placing the granular sub-base material.

4. It is recommended that PLANET be retained to review the final pavement structure designs and drainage plans prior to construction to ensure that they are consistent with the recommendations.

4.10.3 Stripping, Sub-excavation and Grading

The final subgrade should be cambered or otherwise shaped properly to facilitate rapid drainage and to prevent the formation of local depressions in which water could accumulate.

Owing to the clayey (i.e. impervious) nature of the subsoil at some locations of the site, proper cambering and allowing the water to escape towards the sides (where it can be removed by means of subdrains) is considered to be beneficial for this project. Otherwise, any water collected in the granular sub-base materials could be trapped thus causing problems due to softened subgrade, differential frost heave, etc. For the same reason damaging the subgrade during and after placement of the granular materials by heavy construction traffic should be avoided. If the moisture content of the local material cannot be maintained at ±2% of the optimum moisture content, imported granular material may need to be used.

Any fill required for regarding the site or backfill should be select, clean material, free of topsoil, organic or other foreign and unsuitable matter. The fill should be placed in thin layers and compacted to at least 95% of its SPMDD. The degree of compaction should be increased to 98% within the top 1.0 m of the subgrade, or as per Region Standards. The compaction of the new fill should be checked by frequent field density tests.

4.10.4 Construction

Once the subgrade has been inspected and approved, the granular base and sub-base course materials should be placed in layers not exceeding 200 mm (uncompacted thickness) and should be compacted to at least 100% of their respective SPMDD. The grading of the material should conform to current OPS Specifications.

The placing, spreading and rolling of the asphalt should be in accordance with OPS Specifications or, as required by the local authorities.

Frequent field density tests should be carried out on both the asphalt and granular base and sub-base materials to ensure that the required degree of compaction is achieved.

4.10.5 Drainage

All paved surfaces should be sloped to provide satisfactory drainage towards catch basins. Installation of full-length subdrains on all roads is recommended. The subdrains should be properly filtered to prevent the loss of (and clogging by) soil fines.

4.11 Engineered Fill and Sub-Excavation

Detailed site grading plans for the proposed development were not available to us at the time of preparation of this report. However, based on the existing topography at the site, cut and fill operations are expected to require as part of the proposed development.

In the areas where earth fill is required for site grading purposes, engineered fill can be used and similarly, if the area under consideration need to be raised, engineered fill can be used.

Prior to the placement of the engineered fill, all of the existing fill, the loose possible fill/disturbed soil, and surficial softened native soils must be removed, and the exposed surface proof rolled. Any soft spots revealed during proof rolling must be sub-excavated and re-engineered. The depths of sub-excavation required for the construction of engineered fill will be assessed by a geotechnical professional at the time of excavation.

General guidelines for the placement and preparation of engineered fill are presented on Appendix C. A geotechnical reaction of 100 kPa (2000 psf) at the Serviceability Limit States (SLS) and factored geotechnical resistances of 150 kPa at the Ultimate Limit States (ULS) can be used on engineered fill, provided that all requirements on Appendix “C” are adhered to. To reduce the risk of improperly placed engineered compacted fill, full-time supervision of the contractor is essential. Despite full time supervision, it has been found that contractors frequently bulldoze loose fill into areas and compact only the surface. The inspector, either busy on other portions of the site or absent during “off hours” will be unaware of this condition. For this reason, we cannot guarantee the performance of the engineered fill, and this guarantee must be the responsibility of the contractor. The owner and his representatives must accept the risk involved in the use of engineered fill and offset this risk with the monetary savings of avoiding deep foundations/soil improvement. This potential problem must be recognized and discussed at a pre-construction meeting. Procedures can then be instigated to reduce the risk of settlement resulting from un-compacted fill.

The following is a recommended procedure for engineered fill:

1. Prior to site work involving engineered fill, a site meeting to discuss all aspects must be convened. The surveyor, contractor, design engineer and geotechnical engineer must attend the meeting. At this meeting, the limits of the engineered fill will be defined. The contractor must make known where all fill material will be obtained, and samples must be provided to the geotechnical engineer for review, and approval before filling begins.
2. Detailed drawings indicating the lower boundaries as well as the upper boundaries of the engineered fill must be available at the site meeting and be approved by the geotechnical engineer.
3. The building footprint and base of the pad, including basements, garages (if applicable), etc. must be defined by offset stakes that remain in place until the footings and service connections are all constructed. Confirmation that the footings are within the pad, service lines are in place, and that the grade conforms to drawings, must be obtained by the owner in writing from the surveyor and PLANET Engineering Inc. Without this confirmation no responsibility for the performance of the structure can be accepted by PLANET Engineering Inc. Survey drawing of the pre and post fill location and elevations will also be required.
4. The area must be stripped of all topsoil and fill materials. Subgrade must be proof rolled. Soft spots must be dug out. The stripped native subgrade must be examined and approved by PLANET Engineering Inc engineer prior to placement of fill.
5. The approved engineered fill must be compacted to 100% Standard Proctor Maximum Dry Density throughout. Granular Fill preferred. Engineered fill should not be placed (where it will support footings) during the winter months. Engineered fill compacted to 100% SPMDD will settle under its own weight approximately 0.5% of the fill height and the structural engineer must be aware of this settlement. In addition to the settlement of the fill, additional settlement due to consolidation of the underlying soils from the structural and fill loads will occur.
6. Full-time geotechnical inspection by PLANET Engineering Inc during placement of engineered fill is required. Work cannot commence or continue without the presence of the PLANET representative.
7. The fill must be placed such that the specified geometry is achieved. Refer to sketches for minimum requirements. Take careful note that the projection of the compacted pad beyond the footing at

footing level is a minimum of 2 m. The base of the compacted pad extends 2 m plus the depth of excavation beyond the edge of the footing.

8. A geotechnical reaction of 100 kPa (2000) may be used provided that all conditions outlined above are adhered to. A minimum footing width of 500 mm (20 inches) is suggested, and footings should be provided with nominal steel reinforcement.

9. All excavations must be done in accordance with the Occupational Health and Safety Regulations of Ontario.

10. After completion of the pad a second contractor may be selected to install footings. All excavations must be backfilled under full time supervision by PLANET to the same degree as the engineered fill pad. Surface water cannot be allowed to pond in excavations or to be trapped in clear stone backfill. Clear stone backfill can only be used with the approval of PLANET.

11. After completion of compaction, the surface of the pad must be protected from disturbance from traffic, rain and frost.

12. If there is a delay in construction, the engineered fill pad must be inspected and accepted by the geotechnical engineer. The location of the structure must be reconfirmed that it remains within the pad.

4.12 Geotechnical Review

It is recommended that the project design drawings be submitted to PLANET for review for compatibility with site subsurface conditions and the recommendations contained in this report.

5 GENERAL COMMENTS

The recommended bearing capacities (Geotechnical Reaction) and the corresponding founding elevations would need to be confirmed by the representative of PLANET during construction. It should be noted that the recommended bearing capacities have been calculated by PLANET from the borehole information for the design stage only. The investigation and comments are necessarily on-going as new information of the underground conditions becomes available. For example, more specific information is available with respect to conditions between boreholes when foundation construction is underway. The interpretation between boreholes and the recommendations of this report must therefore be checked through field inspections provided by PLANET to validate the information for use during the construction.

In this regard, PLANET should be retained for a general review of the final design and specifications to verify that this report has been properly interpreted and implemented. If not accorded the privilege of making this review, PLANET will assume no responsibility for interpretation of the recommendations in the report.

The comments given in this report are intended only for the guidance of design engineers. The number of boreholes required to determine the localized underground conditions between boreholes affecting construction costs, techniques, sequencing, equipment, scheduling, etc., would be much greater than has been carried out for design purposes. Contractors bidding on or undertaking the works should, in this light, decide on their own investigations, as well as their own interpretations of the factual borehole results, so that they may draw their own conclusions as to how the subsurface conditions may affect them.

The information in this report in no way reflects on any of the environmental aspects of the soil condition at the site and has not been specifically addressed in this report, since this aspect was beyond the scope and terms of reference.

We trust that the information contained in this report is satisfactory. Should you have any questions, please do not hesitate to contact this office.

For and on behalf of PLANET Engineering Inc

Haseeb Hasan, M.Eng., PMP
Project Manager



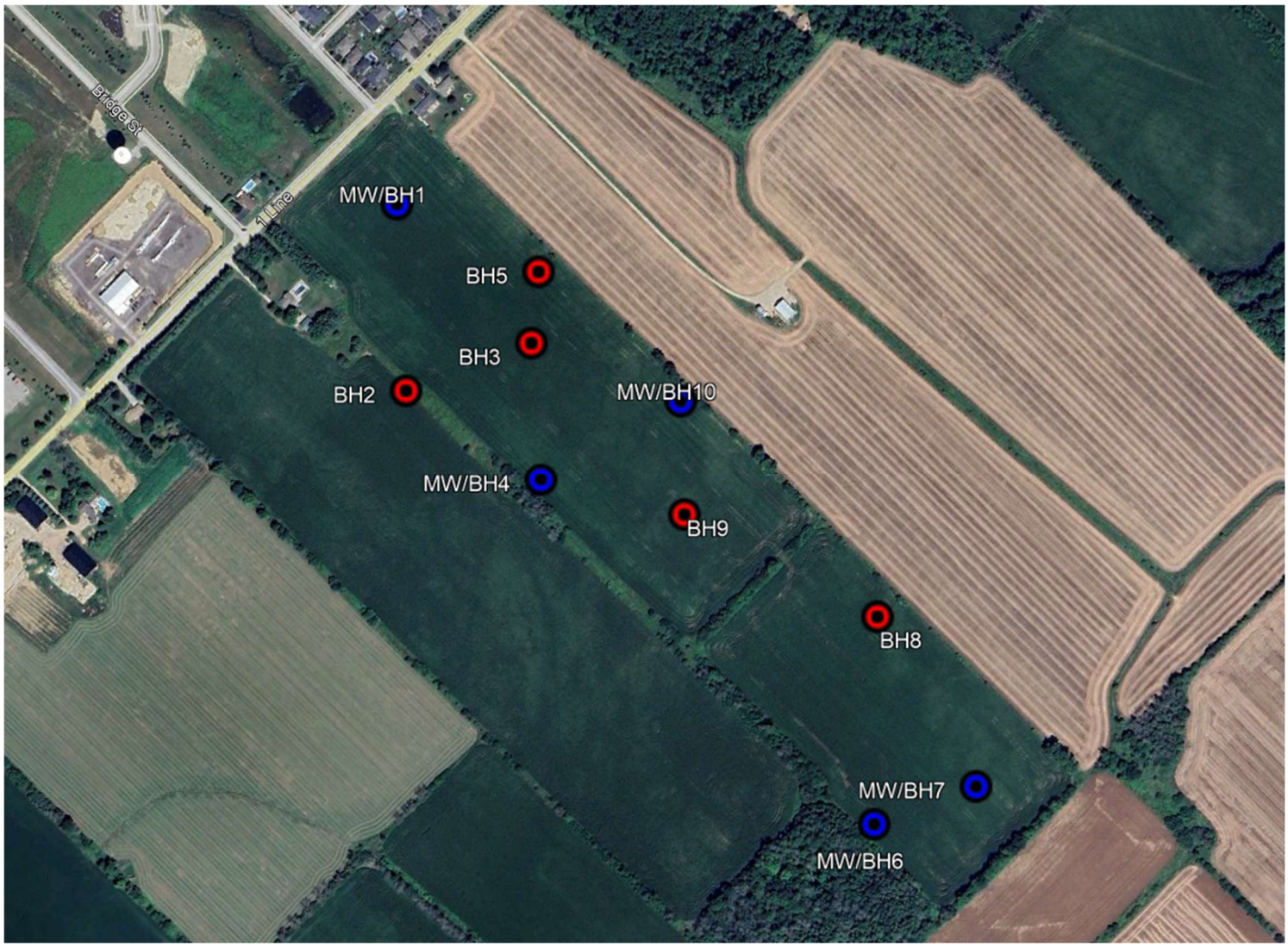
Irfan Ahmad Khokhar, Ph.D., P.Eng., Consulting Engineer
Principal Geotechnical Engineer

DRAWINGS



SITE LOCATION PLAN

Drawn By: HH	Project: **GEOTECHNICAL INVESTIGATION REPORT FOR PROPOSED DEVELOPMENT AT 127 1ST LINE, ELORA, TOWNSHIP OF CENTRAL WELLINGTON, ONTARIO**	Date: June 23, 2025
Approved By: IK		Project No: 2501179BG
PLANET ENGINEERING Inc. Consulting Engineers	Client: **Elora Greens Inc.**	Drawing No 1



BOREHOLE LOCATION PLAN

Drawn By: HH	Project: **GEOTECHNICAL INVESTIGATION REPORT** **FOR PROPOSED DEVELOPMENT AT 127 1ST LINE, ELORA,** **TOWNSHIP OF CENTRAL WELLINGTON, ONTARIO**	Date: June 23, 2025
Approved By: IK		Project No: 2501179BG
PLANET ENGINEERING Inc. Consulting Engineers	Client: **Elora Greens Inc.**	Drawing No 1A

Drawing 1B: Notes on Sample Descriptions

1. All sample descriptions included in this report follow the Canadian Foundations Engineering Manual soil classification system. This system follows the standard proposed by the International Society for Soil Mechanics and Foundation Engineering. Laboratory grain size analyses provided by PLANET Engineering Inc also follow the same system. Different classification systems may be used by others; one such system is the Unified Soil Classification. Please note that, with the exception of those samples where a grain size analysis has been made, all samples are classified visually. Visual classification is not sufficiently accurate to provide exact grain sizing or precise differentiation between size classification systems.

ISSMFE SOIL CLASSIFICATION

CLAY	SILT			SAND			GRAVEL			COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE		

0.002 0.006 0.02 0.06 0.2 0.6 2.0 6.0 20 60 200

EQUIVALENT GRAIN DIAMETER IN MILLIMETRES

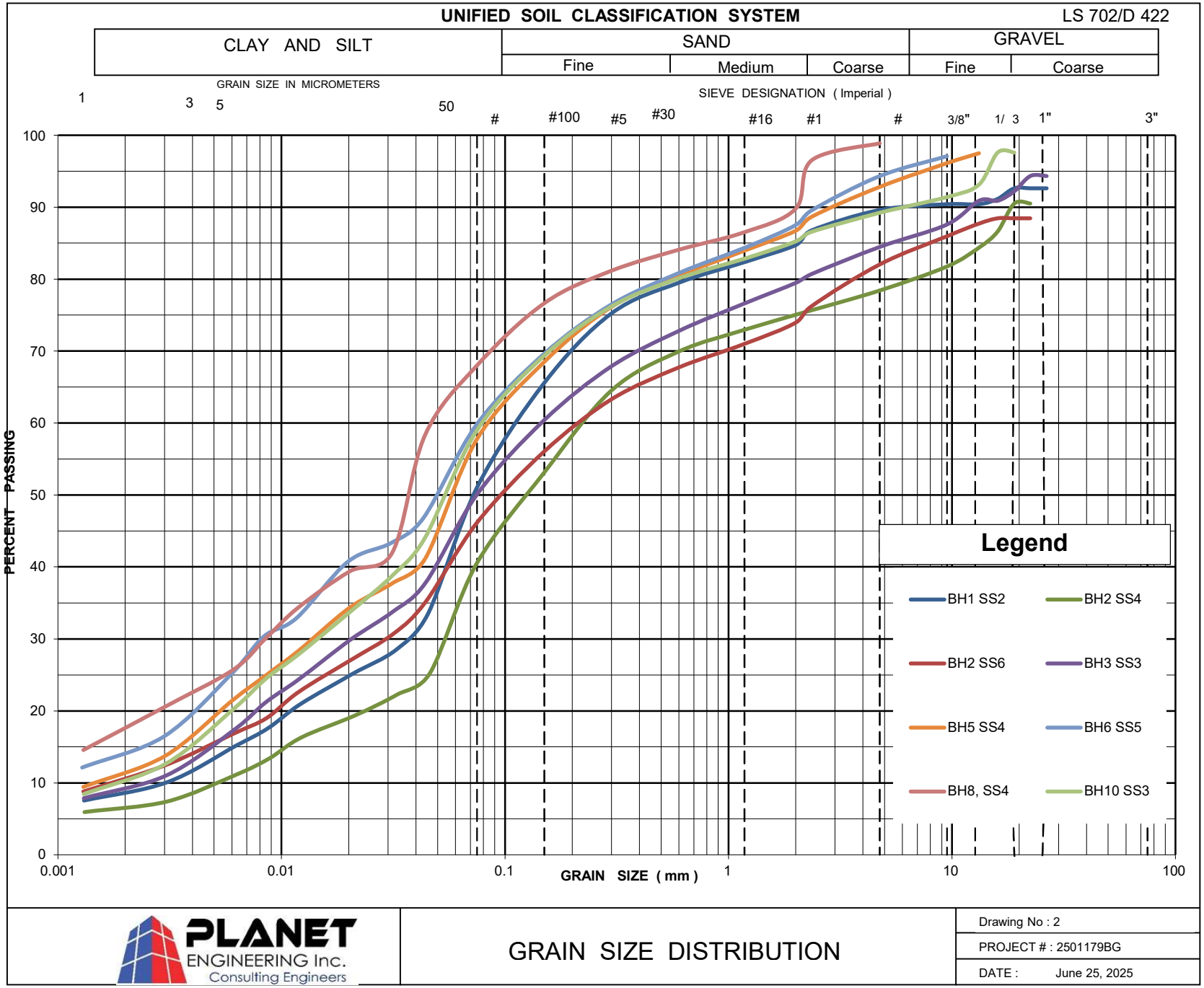
CLAY (PLASTIC) TO	FINE	MEDIUM	CRS.	FINE	COARSE
SILT (NONPLASTIC)	SAND			GRAVEL	

UNIFIED SOIL CLASSIFICATION

2. Fill: Where fill is designated on the borehole log it is defined as indicated by the sample recovered during the boring process. The reader is cautioned that fills are heterogeneous in nature and variable in density or degree of compaction. The borehole description may therefore not be applicable as a general description of site fill materials. All fills should be expected to contain obstruction such as wood, large concrete pieces or subsurface basements, floors, tanks, etc.; none of these may have been encountered in the boreholes. Since boreholes cannot accurately define the contents of the fill, test pits are recommended to provide supplementary information. Despite the use of test pits, the heterogeneous nature of fill will leave some ambiguity as to the exact composition of the fill. Most fills contain pockets, seams, or layers of organically contaminated soil. This organic material can result in the generation of methane gas and/or significant ongoing and future settlements. Fill at this site may have been monitored for the presence of methane gas and, if so, the results are given on the borehole logs. The monitoring process does not indicate the volume of gas that can be potentially generated nor does it pinpoint the source of the gas. These readings are to advice of the presence of gas only, and a detailed study is recommended for sites where any explosive gas/methane is detected. Some fill material may be contaminated by toxic/hazardous waste that renders it unacceptable for deposition in any but designated land fill sites; unless specifically stated the fill on this site has not been tested for contaminants that may be considered toxic or hazardous. This testing and a potential hazard study can be undertaken if requested. In most residential/commercial areas undergoing reconstruction, buried oil tanks are common and are generally not detected in a conventional geotechnical site investigation.

3. Till: The term till on the borehole logs indicates that the material originates from a geological process associated with glaciation. Because of this geological process the till must be considered heterogeneous in composition and as such may contain pockets and/or seams of material such as sand, gravel, silt or clay. Till often contains cobbles (60 to 200 mm) or boulders (over 200 mm). Contractors may therefore encounter cobbles and boulders during excavation, even if they are not indicated by the borings. It should be appreciated that normal sampling equipment cannot differentiate the size or type of any obstruction. Because of the horizontal and vertical variability of till, the sample description may be applicable to a very limited zone; caution is therefore essential when dealing with sensitive excavations or dewatering programs in till materials.

UNIFIED SOIL CLASSIFICATION SYSTEM LS 702/D 422



PLANET ENGINEERING Inc. Consulting Engineers

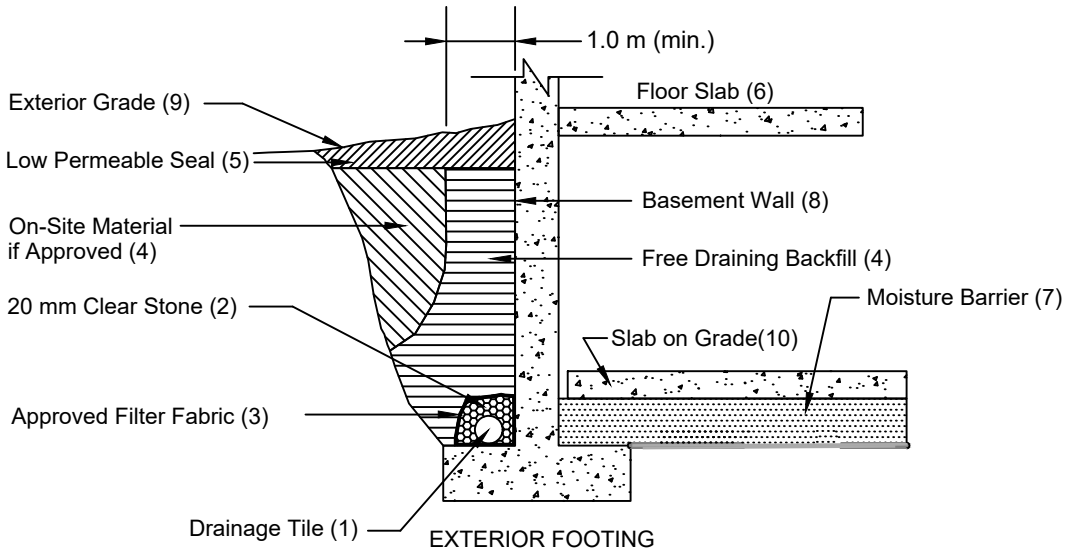
GRAIN SIZE DISTRIBUTION

Drawing No : 2

PROJECT # : 2501179BG

DATE : June 25, 2025

Drawing No. 3



Notes

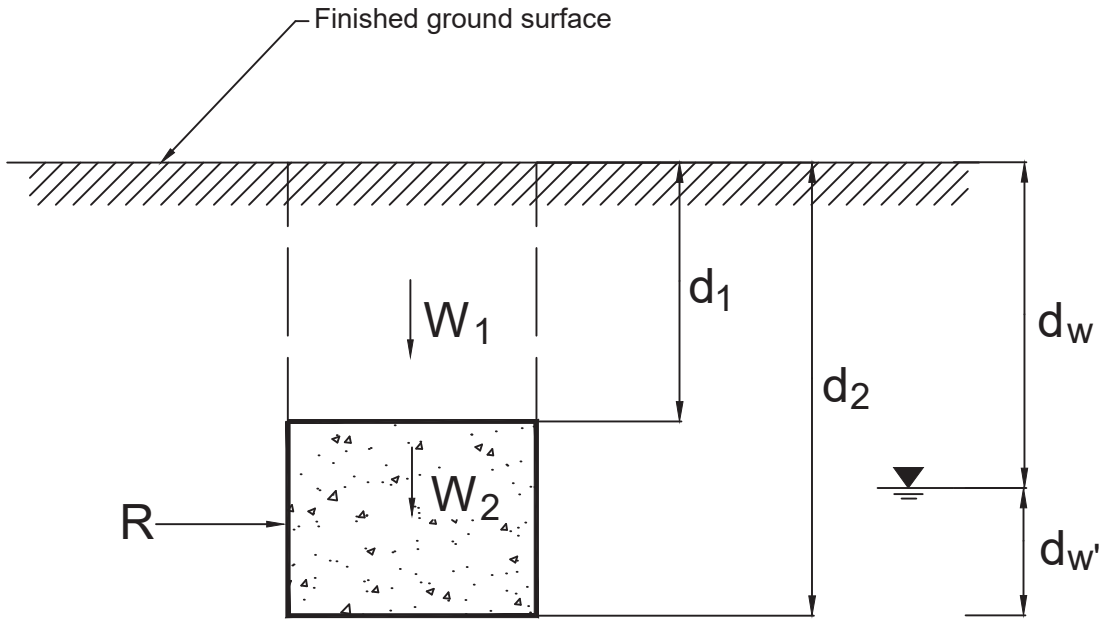
1. Drainage tile to consist of 100 mm (4") diameter weeping tile or equivalent perforated pipe leading to a positive sump or outlet.
2. 20 mm (3/4") clear stone - 150 mm (6") top and side of drain. If drain is not on footing, place100 mm (4 inches) of stone below drain .
3. Wrap the clear stone with an approved filter fabric (Terrafix 270R or equivalent).
4. Free Draining backfill - OPSS Granular B or equivalent compacted to the specified density. Do not use heavy compaction equipment within 450 mm (18") of the wall. Use hand controlled light compaction equipment within 1.8 m (6') of wall. The minimum width of the Granular 'B' backfill must be 1.0 m.
5. Low permeable backfill seal - compacted clay, clayey silt or paved with concrete/asphalt or equivalent. If original soil is free-draining, seal may be omitted. Maximum thickness of seal to be 0.5 m.
6. Do not backfill until wall is supported by basement and floor slabs or adequate bracing.
7. Moisture barrier to be at least 200 mm (8") of compacted clear 20 mm (3/4") stone or equivalent free draining material. A vapour barrier may be required for specialty floors.
8. Basement wall to be damp proofed for parking garage and water proofed for finished basement.
9. Exterior grade to slope away from building.
10. Typically slab on grade is not structurally connected to the wall or footing. However, if it is connected to the wall, it should be designed accordingly.
11. Drainage tile placed in parallel rows 6 to 8 m (20 to 25') centers one way. Place drain on 100 mm (4") clear stone with 150 mm (6") of clear stone on top and sides. Enclose stone with filter fabric as noted in (3).
12. The entire subgrade to be sealed with approved filter fabric (Terrafix 270R or equivalent) if non-cohesive (sandy) soils below ground water table encountered.
13. Review the geotechnical report for specific details. Final detail must be approved before system is considered acceptable.

DRAINAGE AND BACKFILL RECOMMENDATIONS
Basement with Underfloor Drainage
(not to scale)

PLANET ENGINEERING Inc.
Consulting Engineers

Title:

BACKFILL-BASEMENT-OPENCUT-WITHOUT GEOTEXTILE-MODEL DRAINAGE



R = ultimate lateral resistance of thrust block

Case 1 dw < d1

$R = B[1/2\ Kp\gamma'(d2^2 - d1^2) + Kp\ \gamma w\ dw\ (d2 - d1)] + (W1 + W2)f$

Case 2 d1 < dw < d2

$R = B[1/2\ Kp\gamma(d2^2 - d1^2) - 1/2\ Kp\gamma w\ (dw')^2] + (W1 + W2)f$

Case 3 d2 < dw

$R = B[1/2\ Kp\gamma(d2^2 - d1^2)] + (W1 + W2)f$

R = Ultimate earth resistance, kN.

B = width of block, m.

Kp = coefficient of passive earth pressure = 2.5

γ = total unit weight of soil = 19 kN/m^3

γ' = submerged unit weight of soil = 9 kN/m^3

γw = unit weight of water = 10 kN/m^3

W1 = weight of soil above thrust block

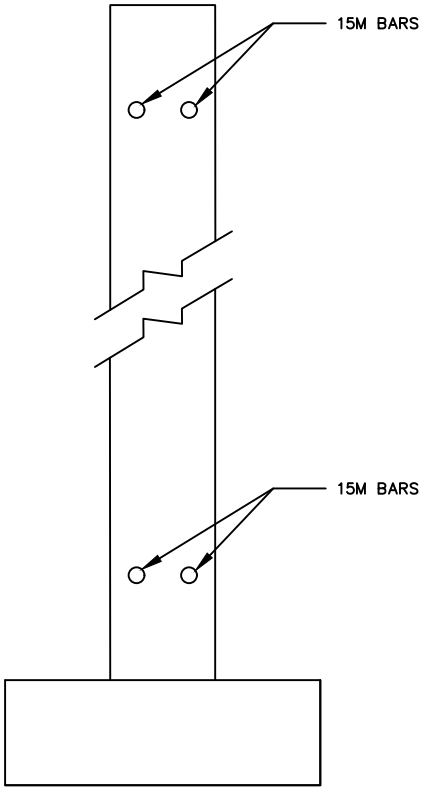
W2 = weight of thrust block

f = coefficient of friction between block and soil = 0.3

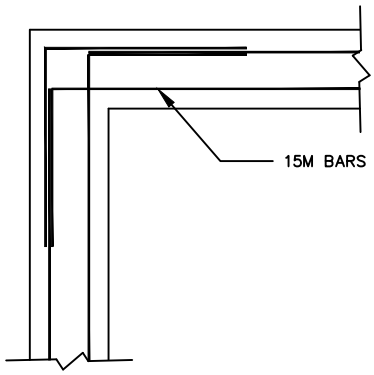
Thrust Block Analysis

Drawing No. 5

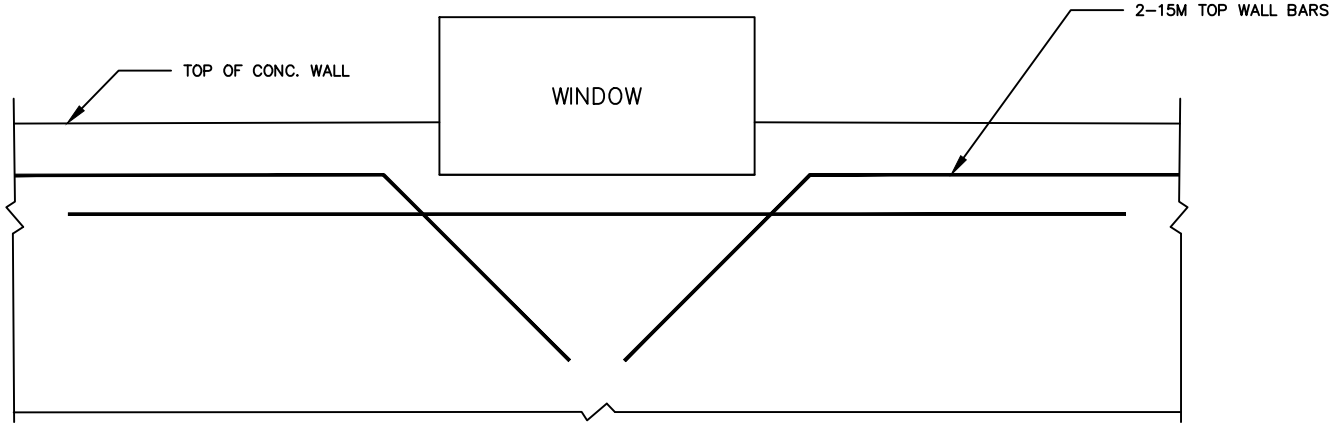
Drawing 6



TYPICAL REINFORCED WALL



TYPICAL SPLICING AT CORNERS



TYPICAL WINDOW REINFORCING

PLANET ENGINEERING Inc.
Consulting Engineers

FOUNDATION WALL REINFORCING ON ENGINEERED FILL
TYPICAL DETAIL

APPENDICES

Appendix A:
Limitations of Report

Limitations of Report

This report is intended solely for the Client named. The material in it reflects our best judgment in light of the information available to PLANET Engineering Inc. at the time of preparation. Unless otherwise agreed in writing by PLANET Engineering Inc, it shall not be used to express or imply warranty as to the fitness of the property for a particular purpose. No portion of this report may be used as a separate entity, it is written to be read in its entirety.

The conclusions and recommendations given in this report are based on information determined at the testhole locations. The information contained herein in no way reflects on the environment aspects of the project, unless otherwise stated. Subsurface and groundwater conditions between and beyond the testholes may differ from those encountered at the testhole locations, and conditions may become apparent during construction, which could not be detected or anticipated at the time of the site investigation. The benchmark and elevations used in this report are primarily to establish relative elevation differences between the testhole locations and should not be used for other purposes, such as grading, excavating, planning, development, etc.

The design recommendations given in this report are applicable only to the project described in the text and then only if constructed substantially in accordance with the details stated in this report.

The comments made in this report on potential construction problems and possible methods are intended only for the guidance of the designer. The number of testholes may not be sufficient to determine all the factors that may affect construction methods and costs. For example, the thickness of surficial topsoil or fill layers may vary markedly and unpredictably. The contractors bidding on this project or undertaking the construction should, therefore, make their own interpretation of the factual information presented and draw their own conclusions as to how the subsurface conditions may affect their work. This work has been undertaken in accordance with normally accepted geotechnical engineering practices.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. PLANET Engineering Inc accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

We accept no responsibility for any decisions made or actions taken as a result of this report unless we are specifically advised of and participate in such action, in which case our responsibility will be as agreed to at that time. Any user of this report specifically denies any right to claims against the Consultant, Sub-Consultants, their officers, agents and employees in excess of the fee paid for professional services.

Appendix B:
Borehole Logs

PLANET ENGINEERING Inc. Consulting Engineers

RECORD OF BOREHOLE BH1

PROJECT: 2501179BG

LOCATION: 127 1st Line, Elora, Township of Centre Wellington, ON

CLIENT: Elora Greens Inc.

BH LOCATION: E 547648.964 N 4836223.994

DRILLING DATA

METHOD: Solid Stem Auger

DIAMETER: 150 mm

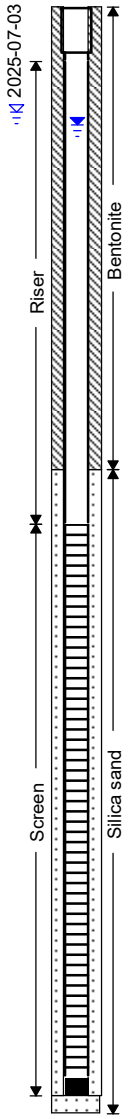
DATE: 2025-06-10

Ground Elevation: 397.4 m

SHEET 1 of 1

DATUM: Geodetic

DEPTH (m)	DESCRIPTION	STRATA PLOT	ELEV. (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS	Grain size Distribution (%) GR SA	Grain size Distribution (%) SI CL	SHEAR STRENGTH kPa 20 40 60 80	WATER CONTENT (%) 10 20 30 40	WELL INSTALLATION
0	**Groundsurface:**		397.44								
	Topsoil: 150 mm		397.29								
	Disturbed natve / Fill: sandy silt till, trace to some gravel, trace to some clay, brown to grey, oxidized, very moist, loose to very loose			1		5					
			396.54								
1	**Silty Sand Till to Sandy Silt Till:** trace to some gravel, trace to some clay, brown to grey, oxidized, very moist to moist, very loose to very dense			2		2	10 39	42 9			
				3		7					
2				4		59					
3				5		60					
4											
5				6		39					
6				7		49					
			390.73								
7	**Upon completion:** borehole terminated at 6.7 m. Monitoring well installed upon completion.										



Upon completion:

1) Cave-in : Open

2) Water : 1.7 m

WATER LEVEL (1st) : 0.65 m (2025-06-19)

WATER LEVEL (2nd) : 0.58 m (2025-07-03)

LOGGED BY: A.P

REVIEWED BY : H.H

PLANET ENGINEERING Inc. Consulting Engineers

RECORD OF BOREHOLE BH2

PROJECT: 2501179BG

LOCATION: 127 1st Line, Elora, Township of Centre Wellington, ON

CLIENT: Elora Greens Inc.

BH LOCATION: E 547659.437 N 4836027.374

DRILLING DATA

METHOD: Solid Stem Auger

DIAMETER: 150 mm

DATE: 2025-06-10

Ground Elevation: 396.9 m

SHEET 1 of 1

DATUM: Geodetic

DEPTH (m)	DESCRIPTION	STRATA PLOT	ELEV. (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS	Grain size Distribution (%) GR SA	Grain size Distribution (%) SI CL	SHEAR STRENGTH kPa (20 40 60 80)	WATER CONTENT (%) (10 20 30 40)	WELL INSTALLATION
0	**Groundsurface:**		396.94								
	Topsoil: 150 mm		396.79								
	Disturbed Native / Fill: silty sand till, trace to some gravel, trace to some clay, brown to grey, wet, loose to very loose			1		5				○	
1			395.84	2		3				○	
	Silty Sand Till to Sandy Silt Till: trace to some gravel, trace to some clay, oxidized, brown to grey, wet to moist, very loose to very dense			3		19				○	
2				4		2	22 37	34 7		○	
3				5		30				○	
4											
				6		50 / 100 mm	18 36	36 10		○	
5											
6				7		61				○	
			390.23								
	Upon completion: borehole terminated at 6.7 m.										
7											

Upon completion:

1) Cave-in : Open

2) Water : 1.1 m

WATER LEVEL (1st) : N/A

WATER LEVEL (2nd) : N/A

LOGGED BY: A.P

REVIEWED BY : H.H

PLANET ENGINEERING Inc. Consulting Engineers

RECORD OF BOREHOLE BH3

PROJECT: 2501179BG

LOCATION: 127 1st Line, Elora, Township of Centre Wellington, ON

CLIENT: Elora Greens Inc.

BH LOCATION: E 547791.666 N 4836078.004

DRILLING DATA

METHOD: Solid Stem Auger

DIAMETER: 150 mm

DATE: 2025-06-10

Ground Elevation: 396.7 m

SHEET 1 of 1

DATUM: Geodetic

DEPTH (m)	DESCRIPTION	STRATA PLOT	ELEV. (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS	Grain size Distribution (%) GR SA	Grain size Distribution (%) SI CL	SHEAR STRENGTH kPa (20 40 60 80)	WATER CONTENT (%) (10 20 30 40)	WELL INSTALLATION
0	**Groundsurface:**		396.66								
	Topsoil: 300 mm		396.36	1		9					
	Disturbed Native / Fill : silty sand till, trace to some gravel, trace to some clay, brown to grey, oxidized, wet to very moist, loose		395.59	2		5					
1	**Silty Sand Till to Sandy Silt Till:** trace to some gravel, trace to some clay, brown to grey, oxidized, very moist to wet, loose to very dense			3		7	16 34	41 9			
2				4		87					
3				5		50 / 150 mm					
4				6		50 / 125 mm					
5				7		36					
6			389.95								
	Upon completion: borehole terminated at 6.7 m.										
7											

Upon completion:

1) Cave-in : Open

2) Water : 2.4 m

WATER LEVEL (1st) : N/A

WATER LEVEL (2nd) : N/A

LOGGED BY: A.P

REVIEWED BY : H.H

PLANET ENGINEERING Inc. Consulting Engineers

RECORD OF BOREHOLE BH4

PROJECT: 2501179BG

LOCATION: 127 1st Line, Elora, Township of Centre Wellington, ON

CLIENT: Elora Greens Inc.

BH LOCATION: E 547802.539 N 4835934.566

DRILLING DATA

METHOD: Solid Stem Auger

DIAMETER: 150 mm

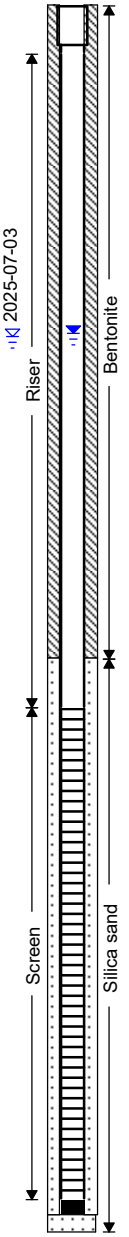
DATE: 2025-06-10

Ground Elevation: 395.4 m

SHEET 1 of 1

DATUM: Geodetic

DEPTH (m)	DESCRIPTION	STRATA PLOT	ELEV. (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS	Grain size Distribution (%) GR SA	Grain size Distribution (%) SI CL	SHEAR STRENGTH kPa (20 40 60 80)	WATER CONTENT (%) (10 20 30 40)	WELL INSTALLATION
0	**Groundsurface:**		395.39								
	Topsoil: 200 mm		395.19								
	Disturbed native / Fill: silty sand till, trace to some gravel, trace to some clay, brown to grey, wet to very moist, loose			1		5					
			394.39								
1	**Silty Sand Till to Sandy Silt Till:** trace to some gravel, trace to some clay, oxidized, brown to grey, very moist to moist, loose to very dense			2		7					
				3		19					
2				4		59					
3				5		50 / 150 mm					
4											
				6		50 / 150 mm					
5											
6				7		50 / 150 mm					
			388.98								
7											
			387.77								
8	**Upon completion**: borehole terminated at 7.6 m. Monitoring well installed upon completion.										



Upon completion:

1) Cave-in : Open

2) Water : 2.4 m

WATER LEVEL (1st) : 2.03 m (2025-06-19)

WATER LEVEL (2nd) : 2.05 m (2025-07-03)

LOGGED BY: A.P

REVIEWED BY : H.H

PLANET ENGINEERING Inc. Consulting Engineers

RECORD OF BOREHOLE BH5

PROJECT: 2501179BG

LOCATION: 127 1st Line, Elora, Township of Centre Wellington, ON

CLIENT: Elora Greens Inc.

BH LOCATION: E 547798.781 N 4836153.102

DRILLING DATA

METHOD: Solid Stem Auger

DIAMETER: 150 mm

DATE: 2025-06-10

Ground Elevation: 398.2 m

SHEET 1 of 1

DATUM: Geodetic

DEPTH (m)	DESCRIPTION	STRATA PLOT	ELEV. (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS	Grain size Distribution (%) GR SA	Grain size Distribution (%) SI CL	SHEAR STRENGTH kPa (20 40 60 80)	WATER CONTENT (%) (10 20 30 40)	WELL INSTALLATION
0	**Groundsurface:**		398.16								
	Topsoil: 150 mm		398.01								
	Disturbed Native / Fill: silty sand till, trace to some gravel, trace to some clay, oxidized, brown to grey, very moist to moist, loose to compact			1		6				○	
			397.16	2		11				○	
1	**Silty Sand Till to Sandy Silt Till:** trace to some gravel, trace to some clay, oxidized, brown to grey, moist to very moist, loose to very dense			3		9				○	
				4		70	7 36	46 11		○	
2				5		91				○	
3											
				6		50 / 150 mm				○	
4											
				7		71				○	
5			391.45								
	Upon completion: borehole terminated at 6.7 m.										
6											
7											

Upon completion:

1) Cave-in : Open

2) Water : 2.4 m

WATER LEVEL (1st) : N/A

WATER LEVEL (2nd) : N/A

LOGGED BY: A.P

REVIEWED BY : H.H

PLANET ENGINEERING Inc. Consulting Engineers

RECORD OF BOREHOLE BH6

PROJECT: 2501179BG

LOCATION: 127 1st Line, Elora, Township of Centre Wellington, ON

CLIENT: Elora Greens Inc.

BH LOCATION: E 548158.856 N 4835573.928

DRILLING DATA

METHOD: Solid Stem Auger

DIAMETER: 150 mm

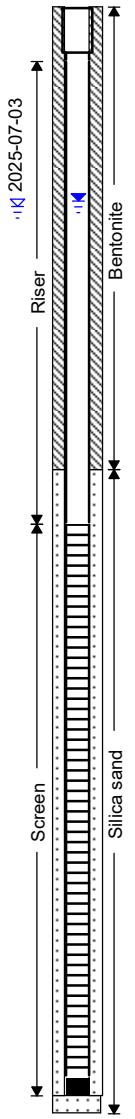
DATE: 2025-06-11

Ground Elevation: 390.4 m

SHEET 1 of 1

DATUM: Geodetic

DEPTH (m)	DESCRIPTION	STRATA PLOT	ELEV. (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS	Grain size Distribution (%) GR SA	Grain size Distribution (%) SI CL	SHEAR STRENGTH kPa (20 40 60 80)	WATER CONTENT (%) (10 20 30 40)	WELL INSTALLATION
0	**Groundsurface:**		390.41								
	Topsoil: 250 mm		390.16								
	Fill / Disturbed natve: silty sand till, trace to some gravel, trace to some clay, brown to grey, very moist, loose to very loose		389.51	1		5					
1	**Silty Sand Till to Sandy Silt Till:** trace to some gravel, trace to some clay, oxidized, brown to grey, very moist to moist, very loose to very dense			2		1					
				3		15					
2				4		50					
3				5		50 / 150 mm	6 34	46 14			
4				6		50 / 150 mm					
5				7		50 / 150 mm					
6			384.01								
	Upon completion: borehole terminated at 6.4 m. Monitoring well installed upon completion.										
7											



Upon completion:

1) Cave-in : Open

2) Water : 2.4 m

WATER LEVEL (1st) : 1.07 m (2025-06-19)

WATER LEVEL (2nd) : 1.10 m (2025-07-03)

LOGGED BY: A.P

REVIEWED BY : H.H

PLANET ENGINEERING Inc. Consulting Engineers

RECORD OF BOREHOLE BH7

PROJECT: 2501179BG

LOCATION: 127 1st Line, Elora, Township of Centre Wellington, ON

CLIENT: Elora Greens Inc.

BH LOCATION: E 548265.109 N 4835614.314

DRILLING DATA

METHOD: Solid Stem Auger

DIAMETER: 150 mm

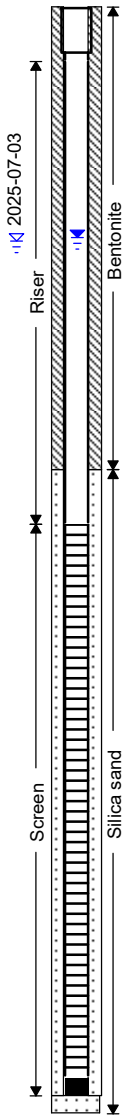
DATE: 2025-06-16

Ground Elevation: 392.2 m

SHEET 1 of 1

DATUM: Geodetic

DEPTH (m)	DESCRIPTION	STRATA PLOT	ELEV. (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS	Grain size Distribution (%) GR SA	Grain size Distribution (%) SI CL	SHEAR STRENGTH kPa (20 40 60 80)	WATER CONTENT (%) (10 20 30 40)	WELL INSTALLATION
0	**Groundsurface:**		392.23								
	Topsoil: 150 mm		392.08								
	Disturbed Native / Fill: silty sand till, trace to some gravel, trace to some clay, brown to grey, very moist, loose		391.77	1		9					
1	**Silty Sand Till to Sandy Silt Till:** trace to some gravel, trace to some clay, brown to grey, very moist to moist, loose to very dense			2		13					
2				3		9					
				4		34					
3				5		36					
4											
				6		50 / 150 mm					
5											
6				7		50 / 150 mm					
			385.83								
7	**Upon completion:** borehole terminated at 6.4 m. Monitoring well installed upon completion.										



Upon completion:

1) Cave-in : Open

2) Water : 2.4 m

WATER LEVEL (1st) : 1.27 m (2025-06-19)

WATER LEVEL (2nd) : 1.29 m (2025-07-03)

LOGGED BY: A.P

REVIEWED BY : H.H

PLANET ENGINEERING Inc. Consulting Engineers

RECORD OF BOREHOLE BH8

PROJECT: 2501179BG

LOCATION: 127 1st Line, Elora, Township of Centre Wellington, ON

CLIENT: Elora Greens Inc.

BH LOCATION: E 548159.068 N 4835792.755

DRILLING DATA

METHOD: Solid Stem Auger

DIAMETER: 150 mm

DATE: 2025-06-10

Ground Elevation: 395.4 m

SHEET 1 of 1

DATUM: Geodetic

DEPTH (m)	DESCRIPTION	STRATA PLOT	ELEV. (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS	Grain size Distribution (%) GR SA	Grain size Distribution (%) SI CL	SHEAR STRENGTH kPa (20 40 60 80)	WATER CONTENT (%) (10 20 30 40)	WELL INSTALLATION
0	**Groundsurface:**		395.44								
	Topsoil: 200 mm		395.24								
	Disturbed Native / Fill: silty sand till, trace to some gravel, trace to some clay, brown to grey, wet to very moist, loose			1		5				○	
			394.53								
1	**Silty Sand Till to Sandy Silt Till:** trace to some gravel, trace to some clay, brown to dark grey, very moist to moist, loose to very dense			2		4				○	
				3		9				○	
2				4		10	3 39	47 11		○	
3				5		68				○	
4				6		50 / 150 mm				○	
5				7		50 / 150mm				○	
6			389.04								
	Upon completion: borehole terminated at 6.4 m.										
7											

Upon completion:

1) Cave-in : Open

2) Water : 1.8 m

WATER LEVEL (1st) : N/A

WATER LEVEL (2nd) : N/A

LOGGED BY: A.P

REVIEWED BY : H.H

PLANET ENGINEERING Inc. Consulting Engineers

RECORD OF BOREHOLE BH9

PROJECT: 2501179BG

LOCATION: 127 1st Line, Elora, Township of Centre Wellington, ON

CLIENT: Elora Greens Inc.

BH LOCATION: E 547954.136 N 4835898.164

DRILLING DATA

METHOD: Solid Stem Auger

DIAMETER: 150 mm

DATE: 2025-06-16

Ground Elevation: 396.4 m

SHEET 1 of 1

DATUM: Geodetic

DEPTH (m)	DESCRIPTION	STRATA PLOT	ELEV. (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS	Grain size Distribution (%) GR SA	Grain size Distribution (%) SI CL	SHEAR STRENGTH kPa (20 40 60 80)	WATER CONTENT (%) (10 20 30 40)	WELL INSTALLATION
0	**Groundsurface:**		396.40								
	Topsoil: 150 mm		396.25								
	Disturbed Native / Fill: silty sand till, trace to some gravel, trace to some clay, brown to blackish grey, very moist, loose to compact			1		6				○	
			395.40	2		29				○	
1	**Silty Sand Till to Sandy Silt Till:** trace to some gravel, trace to some clay, oxidized, brown to grey, very moist to moist, compact to very dense			3		20				○	
2				4		33				○	
3				5		86				○	
4				6		90				○	
5				7		50 150mm				○	
6			389.85								
	Upon completion: borehole terminated at 6.6 m.										
7											

Upon completion:

1) Cave-in : Open

2) Water : N/A

WATER LEVEL (1st) : N/A

WATER LEVEL (2nd) : N/A

LOGGED BY: A.P

REVIEWED BY : H.H

PLANET ENGINEERING Inc. Consulting Engineers

RECORD OF BOREHOLE BH10

PROJECT: 2501179BG

LOCATION: 127 1st Line, Elora, Township of Centre Wellington, ON

CLIENT: Elora Greens Inc.

BH LOCATION: E 547949.989 N 4836018.364

DRILLING DATA

METHOD: Solid Stem Auger

DIAMETER: 150 mm

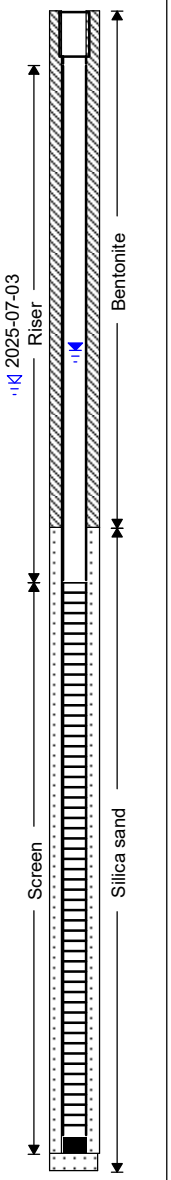
DATE: 2025-06-16

Ground Elevation: 398.7 m

SHEET 1 of 1

DATUM: Geodetic

DEPTH (m)	DESCRIPTION	STRATA PLOT	ELEV. (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS	Grain size Distribution (%) GR SA	Grain size Distribution (%) SI CL	SHEAR STRENGTH kPa (20 40 60 80)	WATER CONTENT (%) (10 20 30 40)	WELL INSTALLATION
0	**Groundsurface:**		398.74								
	Topsoil: 200 mm		398.54								
	Disturbed natve / Fill: silty sand till, trace to some gravel, trace to some clay, brown to grey, very moist, loose			1		5					
1			397.67	2		8					
	Silty Sand Till to Sandy Silt Till: trace to some gravel, trace to some clay, brown to grey, very moist to moist, loose to very dense			3		12	11 30	49 10			
2				4		75					
3				5		50 / 150 mm					
4											
				6		50 / 150 mm					
5											
6				7		50 / 150 mm					
			392.34								
7	**Upon completion:** borehole terminated at 6.4 m. Monitoring well installed upon completion.										



Upon completion:

1) Cave-in : Open

2) Water : N/A

WATER LEVEL (1st) : 1.87 m (2025-06-19)

WATER LEVEL (2nd) : 2.05 m (2025-07-03)

LOGGED BY: A.P

REVIEWED BY : H.H

Appendix C:

General Requirements for Engineered Fill

GENERAL REQUIREMENTS FOR ENGINEERED FILL

Compacted imported soil that meets specific engineering requirements and is free of organics and debris and that has been continually monitored on a full-time basis by a qualified geotechnical representative is classified as engineered fill. Engineered fill that meets these requirements and is bearing on suitable native subsoil can be used for the support of foundations.

Imported soil used as engineered fill can be removed from other portions of a site or can be brought in from other sites if suitable. In general, most of Ontario soils are too wet to achieve the 100% Standard Proctor Maximum Dry Density (SPMDD) and will require drying and careful site management if they are to be considered for engineered fill. Imported non-cohesive granular soil is preferred for all engineered fill. For engineered fill, Planet Engineering Inc (PLANET) recommends use of OPSS Granular 'B' sand and gravel fill material only.

Adverse weather conditions such as rain make the placement of engineered fill to the required degree of density difficult or impossible; engineered fill should not be placed during freezing conditions, i.e. normally not between December 15 and April 1 of each year. If the project demands placement of engineered fill in winter (December 15- April1) it can be placed only under the following conditions:

- All frozen material and or snow must be removed before placement of engineered fill on a daily basis
- Only Granular B Type 2 or Granular A (including crushed concrete or crushed limestone)
- The fill placement must be supervised on a full time basis by a geotechnical consultant

The location of the foundations on the engineered soil pad is critical and certification by a qualified surveyor that the foundations are within the stipulated boundaries is mandatory. Since layout stakes are often damaged or removed during fill placement, offset stakes must be installed and maintained by the surveyors during the course of fill placement so that the contractor and engineering staff are continually aware of where the engineered fill limits lie. Foundations placed within the engineered soil pad must be backfilled with the same conditions and quality control as the original pad.

To perform satisfactorily, engineered fill requires the cooperation of the designers, engineers, contractors and all parties must be aware of the requirements. The minimum requirements are as follows, however, the geotechnical report must be reviewed for specific information and requirements.

1. Prior to site work involving engineered fill, a site meeting to discuss all aspects must be convened. The surveyor, contractor, design engineer and geotechnical engineer must attend the meeting. At this meeting, the limits of the engineered fill will be defined. The contractor must make known where all fill material will be obtained and samples must be provided to the geotechnical engineer for review, and approval before filling begins.

2. Detailed drawings indicating the lower boundaries as well as the upper boundaries of the engineered fill must be available at the site meeting and be approved by the geotechnical engineer.

3. The building footprint and base of the pad, including basements, garages, etc. must be defined by offset stakes that remain in place until the footings and service connections are all constructed. Confirmation that the footings are within the pad, service lines are in place, and that the grade conforms to drawings, must be obtained by the owner in writing from the surveyor and Planet Engineering Inc. Without this confirmation no responsibility for the performance of the structure can be accepted by Planet Engineering Inc. Survey drawing of the pre and post fill location and elevations will also be required.

4. The area must be stripped of all topsoil and fill materials. Subgrade must be proof rolled. Soft spots must be dug out. The stripped native subgrade must be examined and approved by an engineer from Planet Engineering Inc. prior to placement of fill.

5. The approved engineered fill must be compacted to 100% Standard Proctor Maximum Dry Density throughout. Granular Fill preferred. Engineered fill should not be placed (where it will support footings) during the winter months. Engineered fill compacted to 100% SPMDD will settle under its own weight approximately 0.5% of the fill height and the structural engineer must be aware of this settlement. In addition to the settlement of the fill, additional settlement due to consolidation of the underlying soils from the structural and fill loads will occur and should be evaluated prior to placing the fill.

6. Full-time geotechnical inspection by Planet Engineering during placement of engineered fill is required. Work cannot commence or continue without the presence of Planet Engineering representative.

7. The fill must be placed such that the specified geometry is achieved. Refer to sketches for minimum requirements. Take careful note that the projection of the compacted pad beyond the footing at footing level is a minimum of 2 m. The base of the compacted pad extends 2 m plus the depth of excavation beyond the edge of the footing.

8. The allowable bearing pressure provided in the accompanying report may be used provided that all conditions outlined above are adhered to. A minimum footing width of 500 mm (20 inches) is suggested and footings must be provided with nominal steel reinforcement.

9. All excavations must be done in accordance with the Occupational Health and Safety Regulations of Ontario.

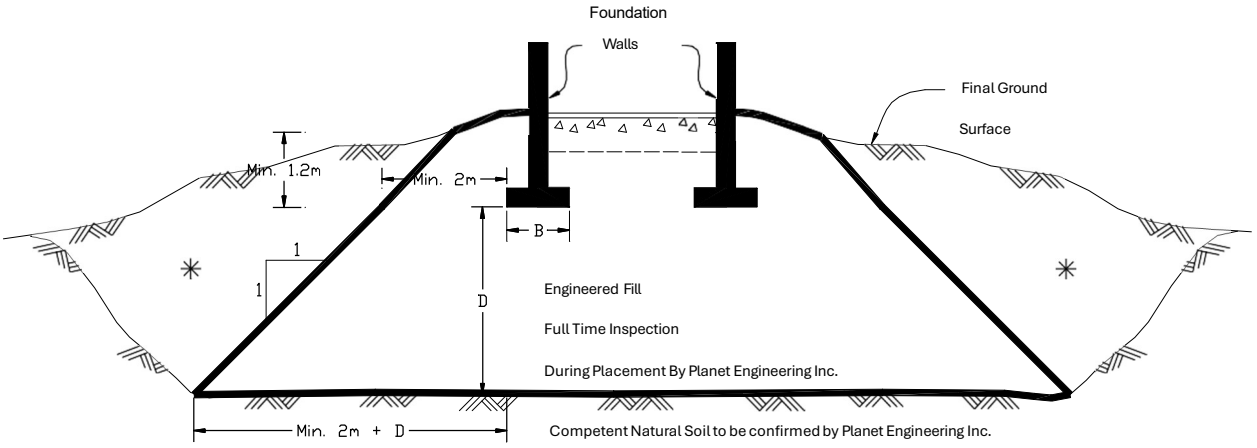
10. After completion of the pad a second contractor may be selected to install footings. The prepared footing bases must be evaluated by engineering staff from Planet Engineering Inc. prior to footing concrete placements. All excavations must be backfilled under full time supervision by Planet Engineering Inc. representative to the same degree as the engineered fill pad. Surface water cannot be allowed to pond in excavations or to be trapped in clear stone backfill. Clear stone backfill can only be used with the approval of Planet Engineering Inc.

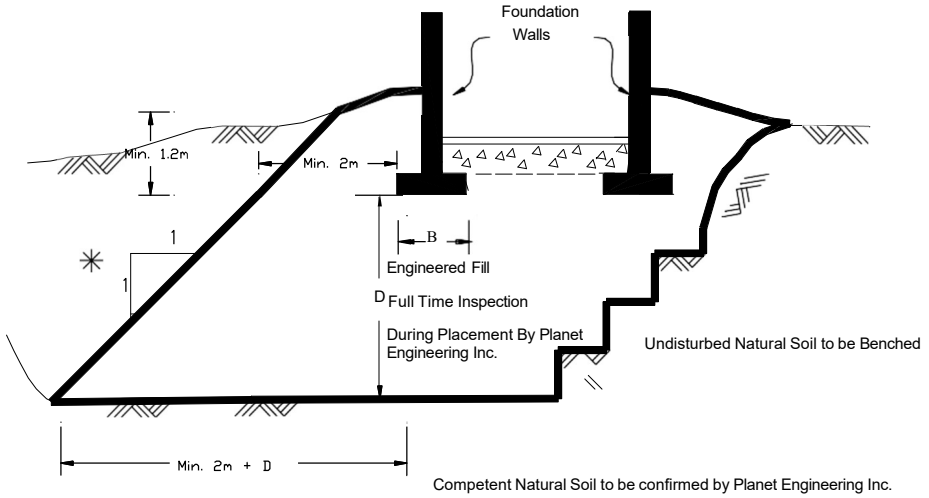
11. After completion of compaction, the surface of the pad must be protected from disturbance from traffic, rain and frost. During the course of fill placement, the engineered fill must be smooth-graded, proof rolled and sloped/crowned at the end of each day, prior to weekends and any stoppage in work in order to promote rapid runoff of rainwater and to avoid any ponding surface water. Any stockpiles of fill intended for use as engineered fill must also be smooth-bladed to promote runoff and/or protected from excessive moisture take up.

12. If there is a delay in construction, the engineered fill pad must be inspected and accepted by the geotechnical engineer. The location of the structure must be reconfirmed that it remains within the pad.

13. The geometry of the engineered fill as illustrated in these General Requirements is general in nature. Each project will have its own unique requirements. For example, if perimeter sidewalks are to be constructed around the building, then the projection of the engineered fill beyond the foundation wall may need to be greater.

14. These guidelines are to be read in conjunction with Planet Engineering Inc. report attached.





✳ Backfill in this area to be as per the Planet Engineering Inc. report

Appendix D:

Proposed Site Plan Provided by the Client

DRAFT PLAN OF SUBDIVISION

LEGAL DESCRIPTION

PT LT 3 CON 1 NICHOL PART 2 , 61R501;
TOWNSHIP OF CENTRE WELLINGTON
COUNTY OF WELLINGTON

OWNER'S CERTIFICATE

I HEREBY AUTHORIZE MACNAUGHTON HERMSEN BRITTON CLARKSON PLANNING LIMITED TO SUBMIT THIS PLAN FOR APPROVAL.

Date: _____

_____
Farhan Kamali Siddiqui
Elora Greens Inc.

Date: _____

_____
Mohammad Tahir

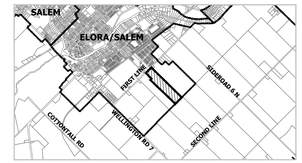
SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED ON THIS PLAN AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN.

Date: _____

_____
James M. Laws, Surveyor, O.L.S.
Van Harten Surveying Inc.

KEY PLAN



Scale: N.T.S

ADDITIONAL INFORMATION
Required Under Section 51 (17) of the Planning Act, R.S.O., 1990, c.P.13 as Amended

(a) As Shown	(b) As Shown	(c) As Shown
(d) Residential, Mixed Use, Park, Trail, Pump Station, Stormwater Management		
(e) As Shown	(f) As Shown	(g) As Shown
(h) Municipal Water Supply	(i) Clay/Sandy Loam	(j) As Shown
(k) All Services As Required	(l) As Shown	

AREA SCHEDULE

DESCRIPTION	LOTS/BLOCKS	UNITS	AREA
Low Density Residential	1-18	202-472	9.327 ha
Multiple Residential	19,20	60-131	1.751 ha
Mixed Use	21	34-74	0.988 ha
Park	22-25		1.287 ha
Trail	26		1.057 ha
Walkways	27,28		0.042 ha
Pump Station	29		0.263 ha
Stormwater Management	30		1.992 ha
0.3m Reserve	31-33		0.003 ha
Roads			4.871 ha
Total	**33**	**296-677**	**21.581 ha**

NOTES

1. All dimensions are in metres unless otherwise shown.
2. Contains information licensed under the Open Government Licence - Ontario.

Revision No.	Date	Issued / Revision	By
1.	March 6, 2026	Preliminary Draft Plan;	PL

Stamp	**Date** March 6, 2026
	File No. 24277A
	Plan Scale 1:1500 (Arch D)
	Drawn By P.L.
	Checked By P.S.
Project Elora Green 127 First Line, Township of Centre Wellington, County of Wellington.	
File Name DRAFT PLAN OF SUBDIVISION	**Dwg No.** 1 of 1
Scale Bar 0 10 25 50 100 150m	

K:\24277A-127 First Line-Centre Wellington\DP\DP_SPlan2026.dwg

MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix B

Hydrogeological Investigation Report (Planet Engineering Inc., dated Aug 5, 2026)

HYDROGEOLOGICAL INVESTIGATION
PROPOSED DEVELOPMENT AT 127 1ST LINE, ELORA
TOWNSHIP OF CENTRE WELLINGTON, ONTARIO

Client

Elora Greens Inc.
120 Matheson Blvd. E., Unit 3
Mississauga, ON L4Z 1X1

Prepared by:

PLANET ENGINEERING Inc.
Consulting Engineers

2179 Dunwin Drive, Unit 4
Mississauga, ON L5L 1X2

Project No. 2501179DH

August 5, 2026

PLANET ENGINEERING Inc.
Consulting Engineers

August 5, 2026 Reference No.: 2501179DH

Elora Greens Inc.
120 Matheson Blvd. E., Unit 3
Mississauga, ON L4Z 1X1

Attention: Farhan Kamali Siddiqui
Email: farhan@eloragreens.com

RE: Hydrogeological Investigation for the Proposed Development
127 1st Line, Elora, Township of Centre Wellington, ON

Dear Mr. Siddiqui,

Planet Engineering Inc. (PLANET) is pleased to provide the Hydrogeological Investigation Report for the above-mentioned project. The report presents PLANET's understanding of the hydrogeological setting of the study area based on exploratory drilling, data collection, analyses, and review.

We trust that this information meets your present requirements. If we can be of additional assistance in this regard, please contact this office.

For and on behalf of Planet Engineering Inc.,

Kourosh Mohammadi, Ph.D., P.Eng.
President and Principal Engineer

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LIST OF ACRONYMS AND DEFINITIONS

BH	Borehole
EASR	Environmental Activity and Sector Registry
K	Hydraulic Conductivity
GPM	Gallon per Minute
mbgs	Metres Below Ground Surface
MECP	Ontario Ministry of the Environment, Conservation and Parks
O.Reg.903	Ontario's Wells Regulation
PTTW	Permit To Take Water
PHCs	Petroleum Hydrocarbons
VOCs	Volatile Organic Compounds
PAHs	Polycyclic Aromatic Hydrocarbons
WWIS	Water Well Information System
WWR	Water Well Record

1 INTRODUCTION

1.1 General

PLANET Engineering Inc. (PLANET) was retained by Elora Greens Inc. (the Client) to complete a hydrogeological investigation for the proposed development at 127 1st Line, Elora, Township of Centre Wellington, Ontario (the Site). The Site location is shown on **Figure 1**. Based on information provided by the Client, the proposed land uses for the Site are understood to include approximately:

- 8.53 hectares for single-detached, semi-detached, and street townhouse units;
- 3.19 hectares for multiple residential uses, including apartments, cluster townhouses, and stacked townhouses;
- 3.10 hectares for mixed-use development incorporating similar residential forms;
- 1.25 hectares for park and trail purposes; and
- 1.50 hectares for a stormwater management (SWM) facility.

It is assumed that the houses will have one level of basement.

1.2 Purpose

The purpose of the hydrogeological investigation was to characterize the existing hydrogeological conditions at and in the vicinity of the Site, assess the need for, and options for, groundwater control in association with the proposed construction, evaluate potential impacts to the local groundwater regime resulting from the proposed construction, and identify appropriate mitigative measures, as warranted.

1.3 Applicable Legislation

Groundwater extraction and management are governed provincially by the Environmental Protection Act (EPA), the Ontario Water Resources Act (OWRA), and Ontario Regulation 387/04 (O. Reg. 387/04, as amended), the Water Taking Regulation. This legislation is intended to protect and manage the quality and quantity of surface water and groundwater resources in Ontario. This hydrogeological assessment was prepared in accordance with the OWRA and O. Reg. 387/04, as amended.

This hydrogeological study may be used to support registration on the Environmental Activity and Sector Registry (EASR) or an application for a Permit to Take Water (PTTW), as applicable. Construction dewatering exceeding 50,000 L/day and not exceeding 400,000 L/day under normal conditions may be eligible for EASR registration. A PTTW is generally required for construction water taking exceeding 400 m³/day and for non-construction groundwater taking exceeding 50 m³/day. Regulatory requirements should be confirmed with the Ministry of the Environment, Conservation and Parks (MECP) based on the final design, construction phasing, and anticipated combined pumping rates.

The Township of Centre Wellington Sewer By-law (By-law 2022-66) requires a discharge permit before establishing any temporary or permanent connection to a municipal sanitary and/or storm sewer system for construction or post-construction operations.

2 METHOD OF INVESTIGATION

2.1 General

This hydrogeological investigation was based on review of previously completed and published information for the study area, including previously published regional physiographic and geologic mapping and watershed planning reports. Many of these documents are referred to throughout various sections of this report and the relevant details can be found in the References section following the text of the report.

In particular, the work completed in association with this hydrogeological study consisted of the following tasks:

- Reviewing and interpreting available reports and published data;
- Developing Health & Safety and Sampling and Analysis Plans for work at the Site;
- Assessing the current Site conditions, areas of interest and to confirm the previous borehole locations;
- Drilling ten (10) boreholes and installing five (5) monitoring wells;
- Developing the monitoring wells by removing at least three well volumes of groundwater, or purging the wells to dryness twice, whichever occurred first;
- Collecting groundwater samples from selected monitoring wells;
- Measuring groundwater levels in each of the monitoring wells located at the Site;
- Conducting in-situ hydraulic conductivity tests in monitoring wells containing sufficient water;
- Reviewing water well records available from the Ministry of the Environment, Conservation and Parks (MECP);
- Evaluating proposed construction dewatering requirements;
- Estimation of the underfloor and perimeter drainage flow for permanent dewatering; and
- Preparing a report documenting the findings of the investigation.

2.2 Boreholes and Monitoring Wells

As part of the geotechnical investigation conducted by PLANET, ten (10) boreholes were advanced to depths ranging from approximately 6.1 m to 7.6 m below ground surface (mbgs) on June 10, 11, and 16, 2025. Monitoring wells were installed in BH1, BH4, BH6, BH7, and BH10. Well construction details and borehole logs are provided in Appendix A and summarized in **Table 1**.

Geodetic ground-surface elevations for the monitoring wells were obtained by PLANET's survey crew using a Trimble Catalyst DA2 GNSS Receiver and TDC600 Model 2 Data Collector. The results are provided on the borehole logs. Borehole and monitoring-well coordinates are referenced to Universal Transverse Mercator (UTM) Zone 17, North American Datum 1983 (NAD83). Approximate borehole locations are shown on **Figure 2**.

The ground-surface elevations shown on the borehole logs are approximate and were used to relate the encountered soil stratigraphy to elevation. They should not be relied upon for other design or construction purposes.

Table 1: Information on Groundwater Monitoring Wells

Verification note: Table 1 reports a BH10 borehole bottom depth of 6.4 mbgs and a screen interval extending to 6.8 mbgs. The BH10 borehole log and field installation record should be checked, and Table 1 and Table 3 should be reconciled before the report is finalized.

MW ID	Estimated Ground Surface Elevation (m)	Borehole Bottom		Well Screen Interval Depth (mbgs)		Well Screen Interval Elevation (mASL)	
		Depth (mbgs)	Elevation (m)	from	to	from	To
BH1	397.44	6.1	391.3	2.9	6.0	394.5	391.5
BH4	395.39	7.6	387.8	4.5	7.5	390.9	387.9
BH6	390.41	6.1	384.3	2.9	6.0	387.5	384.5
BH7	392.23	6.1	386.1	2.9	6.0	389.3	386.3
BH10	398.74	6.4	392.3	3.7	6.8	395.0	392.0

2.3 Groundwater Monitoring and Sampling

On June 23, 2025, PLANET collected an unfiltered groundwater sample from monitoring well BH7. The analytical results were compared with the sanitary and storm sewer discharge limits in the Township of Centre Wellington Sewer By-law (By-law 2022-66). PLANET also collected an unfiltered groundwater sample from BH4 for analysis of general chemical parameters; those results were compared with the Provincial Water Quality Objectives (PWQOs).

Prior to sampling, the well was developed. The development of the monitoring well was conducted by purging and surging the well water to stress the formation around the well screen so that mobile particulates were removed. The purpose of the well development is to improve the hydraulic connection between the well and the geologic materials in the vicinity of the well, and to subsequently obtain a groundwater sample representative of the in-situ conditions. The groundwater level was measured in the monitoring wells and wells were developed by removing at least three well volumes of groundwater.

The collected samples were submitted to ALS Environmental Laboratories in Mississauga, a member of the Canadian Association for Laboratory Accreditation (CALA), for chemical analysis. Copies of the laboratory certificates of analysis and the chain of custody form are provided in **Appendix B**.

2.4 In-Situ Hydraulic Conductivity Testing

Rising-head hydraulic conductivity (slug) tests were conducted in five (5) monitoring wells (BH1, BH4, BH6, BH7, and BH10) to assess the hydraulic conductivity of the screened subsurface materials.

A summary of the hydraulic conductivity test (slug test) methodology is as follows:

The static groundwater level in each monitoring well was initially measured and recorded;

For the rising head test, a known volume of water was removed from each tested well using an inertial pump and low density tubing; and,

The water level in each well was then measured and recorded at regular time intervals until the water level had recovered to a level close to the static water level measured before the start of the test;

The water level data from the monitoring wells were analysed by PLANET using AQTESOLV Professional V4.5 and the Bouwer-Rice equation to estimate the hydraulic conductivity (K) of the soil adjacent to the screened portion of the well.

3 SITE CONDITIONS

3.1 Physical Setting

The site is predominantly undeveloped agricultural land with a few nearby residential, commercial, and industrial properties. The Site is bordered by scattered trees and adjacent cornfields. The Grand River is located approximately 2.2 km to the north-northeast of the Site and flows west and southward. Swan Creek is approximately 1.8 km south-southwest of the Site and flows westward.

According to the Oak Ridges Moraine Atlas which is available online at (https://www.ontario.ca/page/oak-ridges-moraine-maps) and the Niagara Escarpment Plan (NEP) Maps available online at (https://escarpment.org/planning/interactivemap), the Site is not located within an area where either the Oak Ridges Moraine Conservation Plan or the Niagara Escarpment Plan would be applicable.

3.2 Climatic Conditions

Average monthly climate data from an Environment Canada climate station located at the FERGUS SHAND DAM (Station ID 6142400), approximately 9.0 km northeast of the Site, for the period between 1981 and 2010 is provided in **Table 2**, below (Environment Canada, 2024). The data indicates that the climate in the study area is typical continental with cold winters and warm summers and precipitation records showing local seasonal variation. As shown in **Table 2** below, the mean annual precipitation is 945.7 mm/year, with annual mean rainfall of 797.8 mm/year (84.4% of total precipitation). Average monthly precipitation ranged from 55.9 mm in February to 96.6 mm in August. The mean annual daily temperature is 6.7 degrees Celsius (°C), ranging from -7.4 °C in January to 20.0 °C in July.

Table 2: Climate Data Summary (1981 – 2010) – FERGUS SHAND DAM (Station ID 6142400)

MONTH	Daily Average Temperature (°C)	Average Rainfall (mm)	Average Snow (cm)	Average Precipitation (mm)
January	-7.4	27.8	40.1	67.9
February	-6.3	25.3	30.6	55.9
March	-1.9	36.7	22.9	59.6
April	5.7	67.9	6.2	74.1
May	12.2	86.8	0.1	86.9
June	17.5	83.8	0.0	83.8
July	20.0	89.2	0.0	89.2
August	19.0	96.6	0.0	96.6
September	14.9	93.1	0.0	93.1

October	8.3	75.6	1.6	77.2
November	2.1	80.5	12.5	93.0
December	-3.9	34.7	33.9	68.6
Year	**6.7**	**797.8**	**147.8**	**945.7**

3.3 Physiography and Drainage

A review of the topographic map provided online by Natural Resources Canada depicts the Site located within an area that is generally at an approximate elevation of 390 m to 400 m.

The Site is located within Grand River watershed. This watershed covers approximately 6,800 square kilometers of land and drains into Lake Erie. Surface elevation in the watershed ranges from 173 m geodetic at the mouth of the Grand River on Lake Erie to 535 m in the northern headwaters (LESPR, 2008). The physiographic region of the site is Guelph Drumlin Field consisting of drumlinized till plains. (Chapman and Putnam, 2007). The Guelph Drumlin Field is a physiographic region characterized by numerous oval-shaped hills called drumlins, aligned with the direction of past glacial ice flow. These drumlins are composed of glacial till and were formed beneath a glacier.

3.4 Surficial Geology

A regional description of the Quaternary geology of the project area can be found in the Surficial Geology of Southern Ontario Map 2153 (OGS, 2010). A section of this map showing surficial geology of the study site and the surrounding areas is presented in **Figure 3**.

As shown on **Figure 3**, the Site is located within Wentworth Till deposits consisting of buff to pink sandy diamicton. The overburden consists mainly of sandy silt till to silty sand till. Regional glacial sediments, including till, glaciolacustrine deposits, and glaciofluvial deposits, were formed during successive glacial advances and retreats.

The bedrock geology in the Elora area is primarily characterized by dolostone of the Guelph Formation, which is well exposed in the Elora Gorge. Older dolostone of the Amabel Formation underlies the Guelph Formation. Bedrock was not encountered in the boreholes advanced at the Site; based on nearby MECP water well records, it is expected at an approximate depth of 25 mbgs.

3.5 Subsurface Soil Conditions

The subsurface soil conditions encountered during boreholes advanced at the Site are shown on the borehole logs in **Appendix A**. A summary of the soil conditions is provided below. Reference should be made to the geotechnical report (PLANET, 2025) for a detailed description of the soil conditions at the Site.

In general, the Site is underlain by topsoil and localized fill or disturbed native material over native silty sand till to sandy silt till. Topsoil was encountered at all borehole locations and extended to a maximum depth of approximately 0.30 mbgs. Fill or disturbed native material beneath the topsoil ranged in thickness from approximately 0.30 m to 0.95 m. Native silty sand till to sandy silt till was encountered beneath these materials and extended to the maximum explored depth.

It should be noted that the inferred soil layer thicknesses are approximate and were identified at the borehole locations only and may vary between and beyond the boreholes.

4 GROUNDWATER CONDITIONS

4.1 Regional Groundwater Recharge

Groundwater recharge is the process through which water infiltrates vertically from the surface through soil and geologic layers, eventually reaching the saturated zone. The rate and volume of recharge in a given area are influenced by factors such as surface geology, topography, and the degree of land development. Regionally, groundwater recharge tends to vary both spatially and seasonally, depending on local climate conditions, geological characteristics, and land use. The Site is currently used for agricultural purposes, with primary recharge sources in the study area being precipitation and seasonal freshet events. Following construction, groundwater recharge is expected to occur primarily through open and unpaved areas. It is recommended that a groundwater balance assessment be conducted to evaluate post-development recharge conditions and compare them with pre-development recharge volumes.

4.2 Groundwater Level Fluctuations

Groundwater level data obtained from the monitoring wells are summarized in **Table 3**. Monitoring-well screen elevations are presented in **Table 1**, and construction details are illustrated on the borehole logs provided in **Appendix A**.

PLANET monitored groundwater levels from June 19, 2025 to July 31, 2026 to characterize seasonal fluctuations and identify the seasonal high groundwater condition at the Site. Across the monitoring network, recorded depths to groundwater ranged from approximately 0.10 mbgs in BH6 on April 9, 2026 to 5.77 mbgs in BH6 on December 5, 2025. The corresponding minimum groundwater elevation was approximately 384.64 m in BH6 on December 5, 2025, while the maximum groundwater elevation was approximately 397.99 m in BH10 on April 9, 2026. The shallowest groundwater condition and the highest groundwater elevation therefore occurred in different wells because ground-surface elevations vary across the Site.

Figure 4 shows the groundwater elevation contours measured on April 9, 2026. Based on observed declining groundwater levels following April 9, 2026, this event likely represents the seasonal groundwater high for the monitoring period. Groundwater elevations ranged from approximately 398 m in the northern portion of the site to 390.5 m in the southern portion, indicating that groundwater flow is generally directed from north toward the south-southwest.

It is important to note that groundwater conditions are subject to change due to various factors, including temperature, seasonal variation, precipitation, and nearby construction activity. These conditions may differ from those observed during the monitoring period. Therefore, potential groundwater level fluctuations should be considered during the design and development phases of the proposed construction.

Regional groundwater flow in the area generally follows the natural topography, moving from higher to lower elevations. Based on the site topography and groundwater elevations observed in the monitoring wells, the groundwater flow direction is inferred to be from north to south-southwest, toward Swan Creek.

Table 3. Summary of Groundwater Level Observations in Monitoring Wells

BH ID	BH1		BH4		BH6		BH7		BH10	
X Coordinate	547648.964		547802.539		548158.856		548265.109		547949.989	
Y Coordinate	4836223.994		4835934.566		4835573.928		4835614.314		4836018.364	
Well Depth (m bgs)	6.1		7.6		6.1		6.1		6.4	
Ground Elevation (m)	397.44		395.39		390.41		392.23		398.74	
	Depth (mbgs)	Elevation (m)	Depth (mbgs)	Elevation (m)	Depth (mbgs)	Elevation (m)	Depth (mbgs)	Elevation (m)	Depth (mbgs)	Elevation (m)
19-Jun-25	0.65	396.79	2.03	393.36	1.07	389.34	1.27	390.96	1.87	396.87
20-Jun-25	0.94	396.50	2.10	393.29	1.11	389.30	1.30	390.93	1.85	396.89
23-Jun-25	0.73	396.71	2.03	393.36	1.16	389.25	1.35	390.88	2.02	396.72
3-Jul-25	0.58	396.86	2.05	393.34	1.14	389.27	1.25	390.98	2.05	396.69
15-Aug-25	1.59	395.85	-	-	2.00	388.41	2.11	390.12	2.81	395.93
2-Sep-25	2.19	395.25	-	-	2.65	387.76	2.77	389.46	3.45	395.29
15-Sep-25	2.47	394.97	4.04	391.35	3.24	387.17	3.35	388.88	4.02	394.72
1-Oct-25	2.38	395.06	4.74	390.65	3.45	386.96	3.57	388.66	4.55	394.19
15-Oct-25	2.23	395.21	4.90	390.49	4.10	386.31	3.78	388.45	4.82	393.92
31-Oct-25	2.18	395.26	5.08	390.31	4.83	385.58	3.97	388.26	5.03	393.71
13-Nov-25	2.17	395.27	5.25	390.14	5.27	385.14	4.24	387.99	5.25	393.49
5-Dec-25	1.82	395.62	5.44	389.95	5.77	384.64	4.62	387.61	5.60	393.14
15-Dec-25	1.16	396.28	5.52	389.87	1.90	388.51	3.19	389.04	3.80	394.94
5-Jan-26	0.38	397.06	5.48	389.91	0.81	389.60	2.21	390.02	2.28	396.46

BH ID	BH1		BH4		BH6		BH7		BH10	
X Coordinate	547648.964		547802.539		548158.856		548265.109		547949.989	
Y Coordinate	4836223.994		4835934.566		4835573.928		4835614.314		4836018.364	
Well Depth (m bgs)	6.1		7.6		6.1		6.1		6.4	
Ground Elevation (m)	397.44		395.39		390.41		392.23		398.74	
	Depth (mbgs)	Elevation (m)	Depth (mbgs)	Elevation (m)	Depth (mbgs)	Elevation (m)	Depth (mbgs)	Elevation (m)	Depth (mbgs)	Elevation (m)
19-Jan-26	0.26	397.18	4.90	390.49	0.71	389.70	1.33	390.90	1.11	397.63
4-Feb-26	0.65	396.79	4.45	390.94	0.56	389.85	0.99	391.24	1.34	397.40
13-Feb-26	0.63	396.81	4.49	390.90	0.78	389.63	1.13	391.10	1.54	397.20
5-Mar-26	0.38	397.06	3.25	392.14	0.46	389.95	0.97	391.26	1.36	397.38
9-Apr-26	0.26	397.18	0.74	394.65	0.10	390.31	0.22	392.01	0.75	397.99
29-Apr-26	0.32	397.12	0.82	394.57	0.27	390.14	0.33	391.90	1.01	397.74
15-May-26	0.57	396.87	1.20	394.20	0.75	389.66	0.51	391.72	1.11	397.63
29-May-26	0.48	396.96	1.33	394.06	0.73	389.68	1.22	391.01	1.31	397.44
15-Jun-26	0.68	396.76	2.10	393.29	1.15	389.26	1.56	390.67	2.17	396.57
30-Jun-26	0.43	397.01	1.88	393.51	1.02	389.39	1.46	390.77	2.00	396.74
16-Jul-26	0.88	396.56	2.16	393.23	1.31	389.10	1.49	390.74	2.31	396.43
31-Jul-26	1.21	396.23	2.77	392.62	1.55	388.86	1.74	390.49	2.66	396.08

4.3 Inferred Hydrostratigraphy

Based on the findings of the subsurface investigation, the stratigraphy beneath the site generally consists of surficial topsoil or fill material underlain by native glacial deposits, predominantly composed of Silty Sand Till to Sandy Silt Till. These glacial tills are typical of the region and are characterized by low to moderate permeability due to their compact nature and fine-grained matrix.

Bedrock was not encountered in any of the boreholes drilled as part of this study, indicating that the overburden thickness exceeds the depth of investigation. The absence of shallow bedrock suggests a significant thickness of unconsolidated deposits, which plays an important role in controlling groundwater storage and movement in the area.

The saturated zone was encountered within the Sandy Silt Till unit, indicating that this layer serves as the primary water-bearing formation at the site. Given the composition and structure of the material, groundwater within this unit is likely stored in the pore spaces between silt and fine sand particles, with limited transmissivity due to the fine-grained nature of the till.

Groundwater level measurements and lithologic observations suggest that the groundwater system in the vicinity of the Site is unconfined, meaning it is directly recharged by infiltration from the surface and is not confined by an overlying impermeable layer. This unconfined condition allows groundwater levels to fluctuate in response to precipitation events, seasonal variation, and nearby surface or subsurface activities.

Groundwater flow is interpreted to be predominantly horizontal, consistent with the stratified nature of the till units and the relatively flat-lying geologic setting. Vertical groundwater movement is expected to be limited due to the low vertical permeability of the fine-grained till. The direction of groundwater flow is discussed in Section 4.2 and aligns with the regional gradient, generally moving from higher elevations in the north toward lower elevations to the south-southwest, in the direction of Swan Creek.

The hydrostratigraphic interpretation is based on soil descriptions from borehole logs, groundwater elevation data, and stratigraphic correlations between monitoring well locations. This interpretation should be revisited and refined as additional subsurface or hydrogeological data become available during future phases of the project.

4.4 Results of In-Situ Hydraulic Conductivity Tests

Table 4 below summarizes the results of the hydraulic conductivity testing conducted in the monitoring wells along with the corresponding hydrostratigraphic units in which these wells are screened. Detailed hydraulic conductivity data and analysis sheets are provided in **Appendix C**.

Table 4: Summary of In-Situ Hydraulic Conductivity Test Results

MW ID	Hydraulic Conductivity (cm/s)	Hydraulic Conductivity (m/day)	Stratigraphic Unit
BH1	8.3×10^{-6}	7.1×10^{-3}	Sandy Silt Till
BH4	2.9×10^{-4}	2.5×10^{-1}	Sandy Silt Till
BH6	4.7×10^{-4}	4.0×10^{-1}	Sandy Silt Till
BH7	6.5×10^{-4}	5.6×10^{-1}	Sandy Silt Till
BH10	1.4×10^{-5}	1.2×10^{-2}	Sandy Silt Till

4.5 Groundwater Quality for Temporary Dewatering

A groundwater sample collected from monitoring well BH7 was analyzed, and the results were compared to the sanitary and storm sewer discharge limits outlined in the Township of Centre Wellington Sewer By-law (By-law 2022-66). The laboratory certificate of analysis is provided in **Appendix B**. Analytical results indicated that the concentration of Total Suspended Solids (TSS) in the groundwater sample was 117 mg/L, exceeding the discharge limit of 15 mg/L for storm sewers.

Based on these findings, groundwater removed during dewatering may be discharged into the municipal sanitary or storm sewer system, provided that:

- A discharge permit is obtained from the Township of Centre Wellington;
- Appropriate filtration or treatment measures are implemented to reduce TSS concentrations to levels below the by-law limit prior to discharge.

Additionally, a groundwater sample was collected from BH4 and analyzed for general water quality parameters. The results were compared to the Provincial Water Quality Objectives (PWQOs). The detection limit for total phosphorus in the laboratory analysis was 0.05 mg/L, whereas the PWQO limit for total phosphorus in surface water discharge is 0.01 mg/L. Due to the detection limit exceeding the regulatory guideline, it remains unclear whether phosphorus concentrations in the sample meet the required standard.

If discharge to surface water bodies (e.g., creeks or stormwater outlets) is considered during construction, it is recommended that additional sampling and laboratory analysis be conducted with a lower detection limit for total phosphorus to confirm compliance with PWQO criteria.

Careful consideration should be given to the final discharge location and applicable regulatory requirements to ensure compliance and avoid potential environmental impacts during dewatering activities.

4.6 Groundwater Use in the Study Area

As part of this hydrogeological assessment, PLANET conducted a search of the MECP Water Well Information System (WWIS) to identify known water wells located within a 500-metre radius of the Site. The search yielded records for 26 wells in the surrounding area.

Figure 5 illustrates the locations and identified water use categories of these wells relative to the Site. A detailed summary of each well record is provided in **Appendix D**. The classification of the wells is as follows:

- 4 wells were not identified;
- 17 wells are identified as water supply wells;
- 5 wells were classified as monitoring and test hole;

Among the 17 identified domestic water supply wells, drilling dates range from 1947 to 2005, with well depths ranging from 16.8 metres to 56.4 metres. All of these wells are reported to be completed in bedrock formations.

The proposed development includes the construction of a single basement level. Based on the depth of excavation and the separation from the bedrock aquifer, it is unlikely that the proposed excavation or associated dewatering activities will impact these water supply wells.

5 SOURCE PROTECTION AREA

The Clean Water Act, 2006 requires municipalities, businesses, and residents to work together to protect municipal drinking-water sources through local Source Protection Plans. Vulnerable areas include Wellhead Protection Areas (WHPAs) around municipal wells and Intake Protection Zones near surface water intakes. WHPAs are delineated partly on the basis of groundwater travel time to a municipal well. The principal WHPA categories are summarized below:

WHPA – A: 100 m radius circle around the municipal well

WHPA – B: 2-year time of travel

WHPA – C: 5-year time of travel

WHPA – D: 25 year time of travel

WHPA – E: Municipal wells that are under the direct influence of surface water.

WHPA-Q: Significant Groundwater Quantity Threat Areas

Figure 6 shows the Site and nearby WHPAs. The Site is located within WHPA-A, WHPA-B, and WHPA-C but is not mapped within a Significant Groundwater Recharge Area (SGRA). Reference should be made to the current Grand River Source Protection Plan, Volume II, Chapter 7 (LESPR, 2025), and the applicable municipal screening process.

WHPA-A is the area closest to the municipal well, where water takes the shortest time to reach the well, making it the most vulnerable to contamination.

If a proposed residential development falls within a Wellhead Protection Area A (WHPA-A) – the most vulnerable zone around a municipal well – it will likely require a Restricted Land Use (RLU) Notice or a Section 59 Notice under the Clean Water Act. These notices indicate whether the development complies with the local Source Water Protection Plan and may require a Risk Management Plan to mitigate potential threats to the drinking water supply. Depending on the nature of the development and the potential threats identified, a Risk Management Plan (RMP) may be required to outline measures to minimize the risk to the drinking water source.

6 GROUNDWATER DEWATERING ESTIMATES

6.1 Introduction

At the time of this investigation, the engineering drawings were not available. However, it is understood that the proposed development includes one level of basement for each residential unit, with an approximate depth of 3 mbgs. It is anticipated that the base of the footings will extend approximately 2 metres below the basement floor, resulting in an estimated total excavation depth of 5 mbgs.

The existing ground surface elevation across the Site ranges from approximately 400 m in the north to 390 m in the south. Assuming that site grading will not significantly alter existing elevations, the base of excavation is expected to be at approximately 395 m in the north and 385 m in the south.

For the purposes of this assessment, a rectangular excavation footprint of 15 metres in length and 6 metres in width was assumed for each house.

Groundwater level monitoring conducted on-site recorded the highest groundwater levels at 0.6 mbgs (elevation 397.2 m) in borehole BH1 (north); and 0.1 mbgs (elevation 390.3 m) in the southern part of the Site.

6.2 Short-Term Dewatering (During Construction)

To estimate dewatering requirements, the excavation was modeled as an open excavation with steady-state flow conditions, using equations from "*Construction Dewatering and Groundwater Control: New Methods and Applications – Third Edition*" by Powers et al. (2007), which are applicable to a rectangular system of closely spaced wells. The groundwater inflow rate (QR) was calculated using the following equation:

$$Q_R = \frac{\pi K (H^2 - h^2)}{ln\left(\frac{R}{r_e}\right)}$$

Where,

K – Hydraulic conductivity [m/d]

H – Distance from static water level to bottom of aquifer [m];

h – Distance from lowered water level to bottom of the aquifer [m];

R – Radius of the cone of depression [m];

R = r_e + 3000 * (H – h) * $K^{0.5}$ (K must be in [m/s]);

r_e – equivalent radius [m]

r_e=((w *l)/π)$^{0.5}$

w – excavation width and l – excavation length

Hydraulic conductivity values measured at the Site ranged from 8.3 × 10^{-6} to 6.5 × 10^{-4} cm/s. The maximum value of 6.5 × 10^{-4} cm/s is equivalent to approximately 0.56 m/day. The previously used conversion of 0.056 m/day was understated by a factor of 10; consequently, the construction dewatering rates and zone of

influence presented below are preliminary and must be recalculated using the verified hydraulic conductivity and final excavation geometry before they are used for permitting or design.

Based on these parameters, the estimated daily dewatering requirements are:

- Approximately 16 m³/day for an excavation at the north end of the Site; and
- Approximately 45 m³/day for an excavation at the south end of the Site.

To account for variability in hydraulic conductivity, potential rainfall, and site conditions, a 100% contingency (Safety factor = 2) was applied. This results in an estimated maximum dewatering rate of **90 m³/day** for a single excavation.

The zone of influence (R) was calculated to extend up to 60 metres from the edge of the excavation.

The preliminary estimated maximum dewatering rate of 90 m³/day exceeds the MECP threshold of 50 m³/day. EASR registration is therefore anticipated for an individual excavation, subject to confirmation using revised calculations. If multiple excavations are dewatered simultaneously, combined pumping rates must be evaluated against applicable EASR and PTTW limits, and the appropriate authorization must be obtained before dewatering begins.

6.3 Estimating Long-Term Drainage Requirement

If the below-grade structures are not designed and constructed as watertight systems, perimeter and underfloor drainage may be required to maintain groundwater below the subgrade. The preliminary long-term drainage estimate is approximately 46 m³/day for each house with 50% contingency and assuming the average dewatering rate. A minimum pump-system capacity of 57 L/min (approximately 15 GPM or 82 m³/day) was proposed to allow intermittent operation; this design capacity is not equivalent to the estimated average drainage rate. The final long-term discharge rate and applicable MECP approval requirements must be confirmed during detailed design, particularly where combined or continuous post-construction groundwater taking may exceed 50 m³/day.

Analytical results indicated that the concentration of Total Suspended Solids (TSS) in the groundwater sample was 117 mg/L, exceeding the discharge limit of 15 mg/L for storm sewers.

Based on these findings, groundwater removed during dewatering may be discharged into the municipal sanitary or storm sewer system, provided that a discharge permit is obtained from the Township of Centre Wellington and appropriate filtration or treatment measures are implemented to reduce TSS concentrations to levels below the by-law limit prior to discharge.

If discharge to surface water bodies (e.g., creeks or stormwater outlets) is considered during construction, it is recommended that additional sampling and laboratory analysis be conducted with a lower detection limit for total phosphorus to confirm compliance with PWQO criteria.

Careful consideration should be given to the final discharge location and applicable regulatory requirements to ensure compliance and avoid potential environmental impacts during dewatering activities.

7 PREDICTED EFFECTS

Based on the hydrogeological information and analyses presented in this report, the potential effects of excavation dewatering for the proposed residential development on nearby groundwater and surface water resources are discussed below.

7.1 Groundwater Use

As noted in Section 4.6, a review of the MECP Water Well Information System identified a total of 17 domestic water wells within a 500-metre radius of the Site. According to the available records, these wells are reportedly completed in the bedrock aquifer, with drilling depths ranging from approximately 16.8 to 56.4 metres. Given the depth of these wells and the hydrostratigraphic conditions observed during the investigation, it is anticipated that they draw water from a deeper, confined groundwater zone.

The proposed development may involve shallow dewatering during the excavation of foundations and utility services (e.g., sewers), particularly in areas where the groundwater table is intersected. However, since the planned excavation depths are significantly shallower than the depth of the identified bedrock wells, no measurable impact on these private water wells is expected under typical construction and dewatering conditions.

Nevertheless, in recognition of the Site's location within a Wellhead Protection Area (WHPA) and the importance of protecting local groundwater resources, it is recommended that a door-to-door well survey be conducted. This proactive measure will help ensure that any unforeseen issues related to dewatering impacts on private wells are identified early and addressed appropriately. If warranted, follow-up actions such as water level monitoring or mitigation measures (e.g., temporary water supply) can be implemented to minimize risks to existing groundwater users.

7.2 Surface Water Resources

The only surface water features in the vicinity of the Site are the Grand River, located approximately 2.2 kilometres to the north, and Swan Creek, situated approximately 1.8 kilometres to the south. These watercourses represent the closest potential surface water receptors to the Site.

The preliminary dewatering assessment indicates that the zone of influence may extend up to approximately 60 m from an excavation. This value must be confirmed when the dewatering estimate is recalculated using the verified hydraulic conductivity and final excavation geometry. Even at the preliminary extent, the nearest surface water features are well beyond the anticipated zone of influence; therefore, adverse effects on the Grand River or Swan Creek are not expected.

As such, construction dewatering at the Site is not anticipated to influence the hydrology or water quality of nearby surface water bodies. No additional mitigation measures specific to surface water protection are deemed necessary at this time. However, as a precaution, standard erosion and sediment control (ESC) practices should be implemented during construction to prevent any off-site migration of suspended solids via overland flow pathways.

7.3 Impact on Municipal Wells

The Site is located within Wellhead Protection Areas (WHPA) A, B, and C, indicating a high to moderate vulnerability to potential contaminants that could affect municipal groundwater sources. As such, specific measures must be implemented throughout the planning, design, and construction phases of the proposed development to protect both groundwater and surface water quality and quantity.

The following mitigation strategies are recommended to support source water protection objectives:

- All contractors, consultants, and site personnel involved in development activities should be informed of the Site's location within the WHPA and the proximity to municipal water supply wells.

- A comprehensive Spill Prevention and Response Plan should be developed and implemented. This plan should designate specific areas for the safe storage and handling of fuels, lubricants, and chemicals to minimize the risk of spills or leaks.

- Any fill material imported to the Site must comply with applicable provincial standards, regulations, and guidelines, such as the MECP's "Management of Excess Soil – A Guide for Best Management Practices (2014)" and Ontario Regulation 153/04 and 406/19. This ensures that the imported soil does not pose a risk to groundwater or surface water quality.

- Site grading should be designed to maintain or enhance pre-development groundwater recharge. Infill soils, whether existing or imported, should have similar grain size distribution and permeability characteristics to native soils to maintain infiltration capacity. A soil sampling and analysis program led by a qualified Geotechnical Engineer is recommended to ensure compatibility and effectiveness.

- Stormwater management systems should address both quantity control and water-quality protection and may incorporate oil/grit separators, infiltration basins, and vegetated swales where feasible. Sanitary sewer and stormwater management design should comply with the applicable policies in the current Grand River Source Protection Plan, including policies WC-CW-3.1 to WC-CW-3.8, as applicable.

- All existing water wells and monitoring wells not intended for future use must be properly decommissioned by a licensed water well contractor, in accordance with O. Reg. 903 (as amended), under the Ontario Water Resources Act.

- Future residents should be informed that the Site is located within WHPA-A, WHPA-B, and WHPA-C and is near municipal supply wells. Educational materials should encourage responsible practices, including minimizing fertilizer and pesticide use and preventing releases of fuels or chemicals.

These measures are essential to ensure the long-term protection of drinking water sources and the sustainable management of local hydrogeological conditions.

8 DEWATERING MONITORING AND MITIGATION PLAN

Based on site groundwater conditions and the proposed excavation depths, dewatering will likely be required during construction to maintain dry and stable working conditions. Dewatering activities must be carefully planned and executed to ensure regulatory compliance and avoid adverse environmental or infrastructure impacts.

Discharge Options and Permitting:

Pumped groundwater may be discharged into the Township's sanitary or storm sewer systems, provided that these systems are accessible from the Site and that appropriate discharge permits are obtained from the local municipality or applicable regulatory authority. In the absence of suitable municipal infrastructure, the water may need to be contained, treated, and managed on-site through approved practices such as temporary storage tanks, infiltration galleries, or surface dispersion areas, depending on site-specific constraints.

Prior to any discharge, the contractor must obtain all necessary authorizations, including:

- A discharge permit or agreement from the Township of Centre Wellington or other relevant jurisdiction, outlining discharge locations, quality parameters, and allowable flow rates;
- MECP registration through the Environmental Activity and Sector Registry (EASR) if the total dewatering volume exceeds 50 m³/day;
- Water Quality Considerations

Analytical results from groundwater sampling indicate elevated concentrations of total suspended solids (TSS), exceeding the discharge limits set by applicable municipal sewer-use by-laws. Therefore, pre-treatment is required to meet discharge criteria. At a minimum, the following water quality control measures are recommended:

- Sediment tanks (e.g., settling basins or weir tanks) to allow for gravity settling of suspended solids;
- Filtration systems, such as filter bags or geotextile socks, particularly in areas with fine-grained soils;
- In cases of high turbidity or fine particulates, use of cartridge filters, flocculants, or multi-stage filtration systems may be necessary.
- Selection of Dewatering Methods

The required dewatering approach and discharge volume will depend on several factors, including:

- Excavation dimensions (length, width, depth);
- Local hydrostratigraphy, especially hydraulic conductivity and soil grain size;
- Groundwater level fluctuations (seasonal and short-term);
- Construction phasing and duration of dewatering;
- Soil and groundwater contaminant risks, if applicable.

Dewatering options may include:

- Sump pumping for shallow, low-flow conditions;
- Wellpoints or eductor systems for moderate depths and confined layers;

- Deep wells for deeper excavations or high-volume scenarios.

A site-specific dewatering plan should be prepared by the contractor in consultation with qualified hydrogeological and geotechnical professionals, and it should incorporate:

- Detailed methodology;
- Estimated flow volumes and duration;
- Filtration/treatment design;
- Discharge routing and monitoring protocols.
- Monitoring and Adaptive Management

Effective monitoring during dewatering is critical to ensure system performance, regulatory compliance, and environmental protection. The following measures are recommended:

- Daily visual inspections of discharge locations to identify signs of erosion, sedimentation, or water quality issues;
- Flow monitoring using a calibrated digital in-line flow meter, capable of recording real-time discharge volumes;
- Water quality sampling, if required by permit conditions, to verify that discharge parameters (e.g., TSS, pH, temperature, hydrocarbons) remain within acceptable limits;
- If adverse effects (e.g., increased turbidity, off-site flooding, drawdown effects) are observed, immediate corrective actions must be implemented. These may include:
    - Increasing filtration capacity;
    - Rerouting discharge;
    - Adjusting pumping rates;
    - Implementing erosion control measures (e.g., check dams, straw bales).

Protection of Sensitive Receptors:

Given the Site's location within WHPA-A, -B, and -C, and the presence of nearby private domestic wells and municipal water supply wells, dewatering must be conducted in a manner that avoids potential drawdown impacts on surrounding wells or natural features. If multiple dewatering systems are operated simultaneously or for extended periods, groundwater levels in nearby areas should be monitored to identify and mitigate potential interference with existing groundwater users.

9 SUMMARY AND CONCLUSION

A hydrogeological assessment was completed in support of the proposed residential development. The investigation included review of borehole information, groundwater monitoring from June 2025 to July 2026, groundwater-quality sampling, hydraulic conductivity testing, a preliminary dewatering assessment, review of nearby water well records, and consideration of source-water protection requirements. Key findings and recommendations are summarized below:

- The Site is currently used for agricultural purposes, and groundwater recharge occurs primarily through precipitation and seasonal snowmelt. Post-development recharge will occur mainly through landscaped and other pervious areas. A pre- and post-development water-balance assessment is recommended to quantify potential recharge losses and identify appropriate mitigation measures. Groundwater flow is inferred to be generally from north to south-southwest toward Swan Creek, following the local topographic gradient.
- Groundwater monitoring between June 19, 2025 and July 31, 2026 recorded depths ranging from approximately 0.10 to 5.77 mbgs. Groundwater elevations ranged from approximately 384.64 to 397.99 m. The shallowest depth to groundwater was recorded in BH6 on April 9, 2026, while the highest groundwater elevation was recorded in BH10 on the same date. Groundwater occurs primarily within the sandy silt till to silty sand till and is interpreted as an unconfined system. Bedrock was not encountered during the investigation.
- The monitoring period captured substantial seasonal fluctuation, including shallow groundwater conditions in April 2026. These data should be considered in grading, basement, foundation-drainage, and utility design. Additional monitoring may be warranted if the grading plan, excavation depths, or construction phasing changes materially from the assumptions used in this report.
- Measured hydraulic conductivity values ranged from 8.3×10^{-6} to 6.5×10^{-4} cm/s (approximately 7.1×10^{-3} to 5.6×10^{-1} m/day). The BH10 conversion has been corrected to approximately 1.2×10^{-2} m/day. The maximum conductivity is approximately 0.56 m/day, rather than 0.056 m/day as previously used in the dewatering assessment.
- Dewatering is anticipated for excavations that extend below the groundwater table. The report's preliminary estimates of approximately 16 m³/day in the north, 45 m³/day in the south, and 90 m³/day with contingency. The dewatering rates and zone of influence must therefore be verified by a qualified engineer and performed by a licensed dewatering contractor using the verified conductivity, final excavation geometry, grading, and construction phasing before regulatory authorization or dewatering-system design. EASR registration is anticipated where pumping exceeds 50 m³/day.
- Groundwater may be discharged to the sanitary or storm sewer system, if available, only after the necessary municipal approvals are obtained. The BH7 sample contained TSS at 117 mg/L, exceeding the reported storm sewer limit of 15 mg/L; sedimentation, filtration, or other treatment will therefore be required before storm sewer discharge. If discharge to surface water is proposed, additional analysis using a sufficiently low total-phosphorus detection limit is required to assess compliance with the applicable PWQO. Discharge flow and quality should be monitored throughout dewatering.

- The MECP WWIS review identified 26 well records within 500 m of the Site, including 17 water-supply wells reported to be completed in bedrock. Because the proposed excavations and dewatering are shallow relative to these wells, measurable impacts are not anticipated under typical conditions. A door-to-door well survey is nevertheless recommended to confirm the location, use, and condition of nearby private wells and to establish baseline information before dewatering.
- The Site is located within WHPA-A, WHPA-B, and WHPA-C. Development and construction should therefore comply with the current Source Protection Plan and municipal screening requirements. Recommended measures include obtaining any required Section 59/RLU clearance, implementing spill-prevention and response procedures, controlling imported fill, protecting infiltration and groundwater quality through stormwater design, and properly decommissioning unused wells.
- The nearest surface water features are the Grand River, approximately 2.2 km north-northeast of the Site, and Swan Creek, approximately 1.8 km south-southwest. The preliminary zone of influence is reported as up to approximately 60 m and requires confirmation through revised dewatering calculations. Even at this preliminary extent, adverse effects on these surface water features are not expected. Standard erosion and sediment controls should be implemented during construction.
- Monitoring wells that are no longer required should be decommissioned by a licensed well contractor in accordance with O. Reg. 903 under the Ontario Water Resources Act. Any monitoring well that may be damaged or destroyed by construction should be properly decommissioned before that work begins.

In conclusion, the proposed development is considered hydrogeologically feasible in principle, provided that the dewatering assessment is recalculated using the corrected hydraulic conductivity and final design information, applicable EASR/PTTW and municipal discharge approvals are obtained, and the recommended groundwater, source-protection, water-quality, erosion and sediment control, and nearby-well mitigation measures are implemented. The final water-balance assessment should also demonstrate how post-development recharge will be maintained or mitigated to the extent practical.

10 STATEMENT OF LIMITATIONS

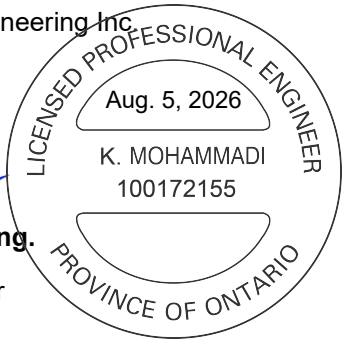
The contents of this report are subject to the attached '***Statement of Limitation***' sheet. The reader's attention is specifically drawn to these conditions as it is considered essential that they be followed for proper use and interpretation of this report. The Statement of Limitations is not intended to reduce the level of responsibility accepted by PLANET, but rather to ensure that all parties who have been given reliance for this report are aware of the responsibilities each assumes in so doing.

This report was prepared by PLANET for the account of Elora Greens Inc. (the CLIENT). Other than the CLIENT and its employees, any copying or distribution of this report, or use of or reliance on the information contained herein, in whole or in part, is the sole responsibility of the other party.

11 CLOSURE

We trust that this information is satisfactory for your present requirements. Should you have any questions or require additional information, please do not hesitate to contact this office.

For and on behalf of PLANET Engineering Inc.



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Planet Engineering Inc.

STATEMENT OF LIMITATIONS

Your report has been developed based on your unique project specific requirements as understood by PLANET Engineering Inc. (PLANET) and applies only to the site investigated. Project criteria typically include the general nature of the project; its size and configuration; the location of any structures on the site; other site improvements; the presence of underground utilities; and the additional risk imposed by scope-of-service limitations imposed by the client. Your report should not be used if there are any changes to the project without first asking PLANET to assess how factors that changed subsequent to the date of the report affect the report's recommendations. PLANET cannot accept responsibility for problems that may occur due to changed factors if they are not consulted.

Subsurface conditions are created by natural processes and the activity of man. For example, water levels can vary with time, fill may be placed on a site and pollutants may migrate with time. Because a report is based on conditions, which existed at the time of subsurface exploration, decisions should not be based on a report whose adequacy may have been affected by time. Consult PLANET to be advised how time may have impacted on the project.

The findings derived from this investigation were based on information collected and/or provided by the Client. It may become apparent that soil and groundwater conditions differ between and beyond the testing locations examined during future investigations or other work that could not be detected or anticipated at the time of this study. As such, PLANET cannot be held liable for environmental conditions that were not apparent from the available information. The conclusions presented represent the best judgment of the assessors based on limited investigations.

Site assessment identifies actual subsurface conditions only at those points where samples are taken and when they are taken. Data derived from literature, external data source review, sampling, and subsequent laboratory testing are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist, because no professional, no matter how qualified, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions, which exist, but steps can be taken to reduce the impact of unexpected conditions. For this reason, owners should retain the services of PLANET through the development stage, to identify variances, conduct additional tests if required, and recommend solutions to problems encountered on site.

Your report is based on the assumption that he site conditions as revealed through selective point sampling are indicative of actual conditions throughout an area. This assumption cannot be substantiated until project implementation has commenced and therefore your report recommendations can only be regarded as preliminary. Only PLANET, who prepared the report, is fully familiar with the background information needed to assess whether or not the report's recommendations are valid and whether or not changes should be considered as the project develops. If another party undertakes the implementation of the recommendations of this report there is a risk that the report will be misinterpreted and PLANET cannot be held responsible for such misinterpretation.

To avoid misuse of the information contained in your report it is recommended that you confer with PLANET before passing your report on to another party who may not be familiar with the background and the purpose of the report. Your report should not be applied to any project other than that originally specified at the time the report was issued.

Planet Engineering Inc.

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, retain PLANET to work with other project design professionals who are affected by the report. Have PLANET explain the report implications to design professionals affected by them and then review plans and specifications produced to see how they incorporate the report findings.

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way.

Logs, figures, drawings, etc. are customarily included in our reports and are developed by scientists, engineers or geologists based on their interpretation of field logs (assembled by field personnel) and laboratory evaluation of field samples. These logs etc. should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

Your report is not likely to relate any findings, conclusions, or recommendations about the potential for hazardous materials existing at the site unless specifically required to do so by the client. Specialist equipment, techniques, and personnel are used to perform a geoenvironmental assessment.

Contamination can create major health, safety and environmental risks. If you have no information about the potential for your site to be contaminated or create an environmental hazard, you are advised to contact PLANET for information relating to geoenvironmental issues.

PLANET is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to a project, from design to construction. It is common that not all approaches will be necessarily dealt with in your site assessment report due to concepts proposed at that time. As the project progresses through design towards construction, speak with PLANET to develop alternative approaches to problems that may be of genuine benefit both in time and in cost.

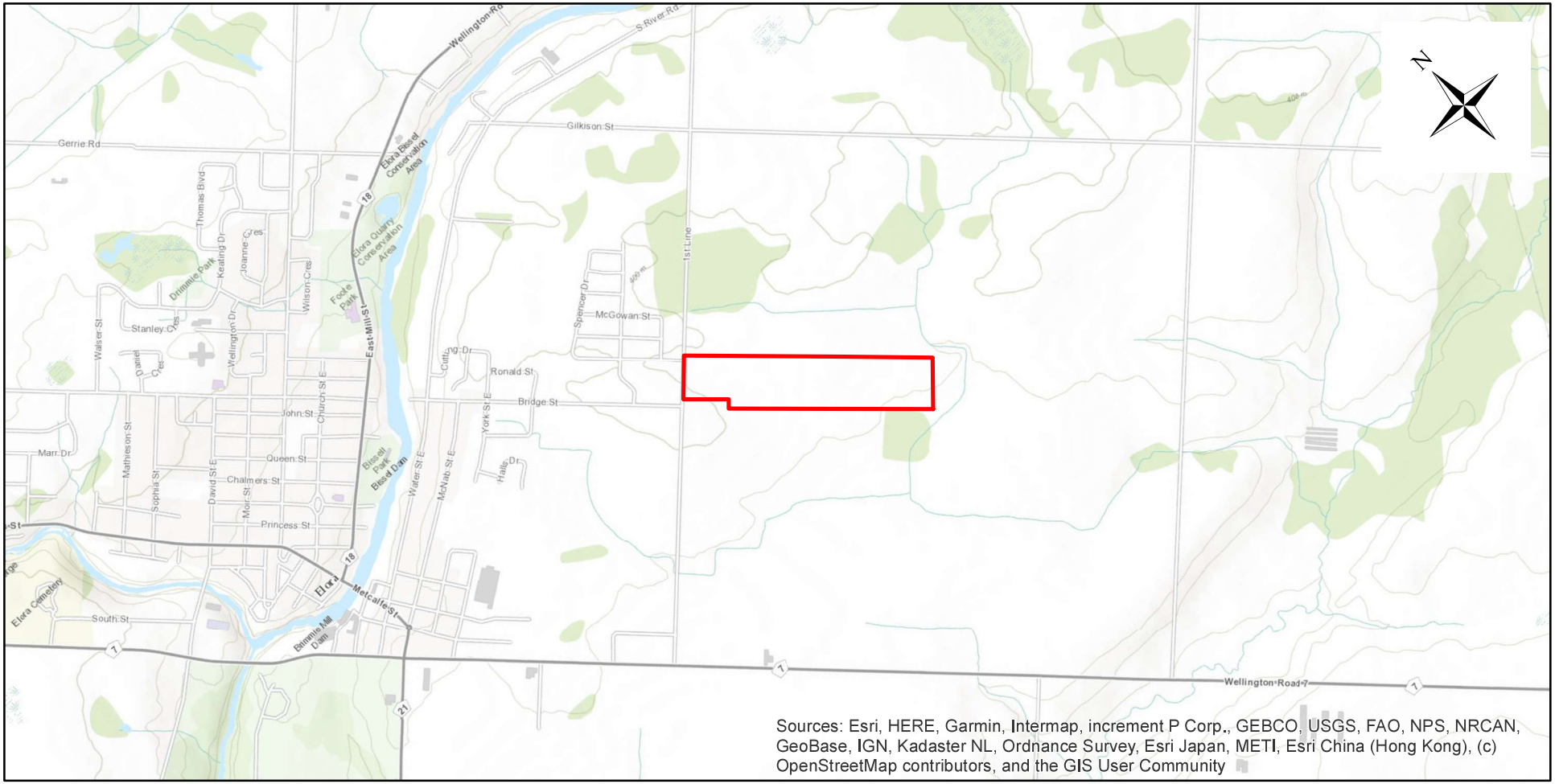
Reporting relies on interpretation of factual information based on judgement and opinion and has a level of uncertainty attached to it, which is far less exact than the design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. To help prevent this problem, a number of clauses have been developed for use in contracts, reports and other documents. Responsibility clauses do not transfer appropriate liabilities from PLANET to other parties but are included to identify where PLANET's responsibilities begin and end. Their use is intended to help all parties involved to recognise their individual responsibilities. Read all documents from PLANET closely and do not hesitate to ask any questions you may have.

Third party information reviewed and used to formulate this report is assumed to be complete and correct. PLANET used this information in good faith and will not accept any responsibility for deficiencies, misinterpretation or incompleteness of the information contained in documents prepared by third parties.

Nothing in this report is intended to constitute or provide a legal opinion.

Should additional information become available, PLANET requests that this information be brought to our attention so that we may re-assess the conclusions presented herein.

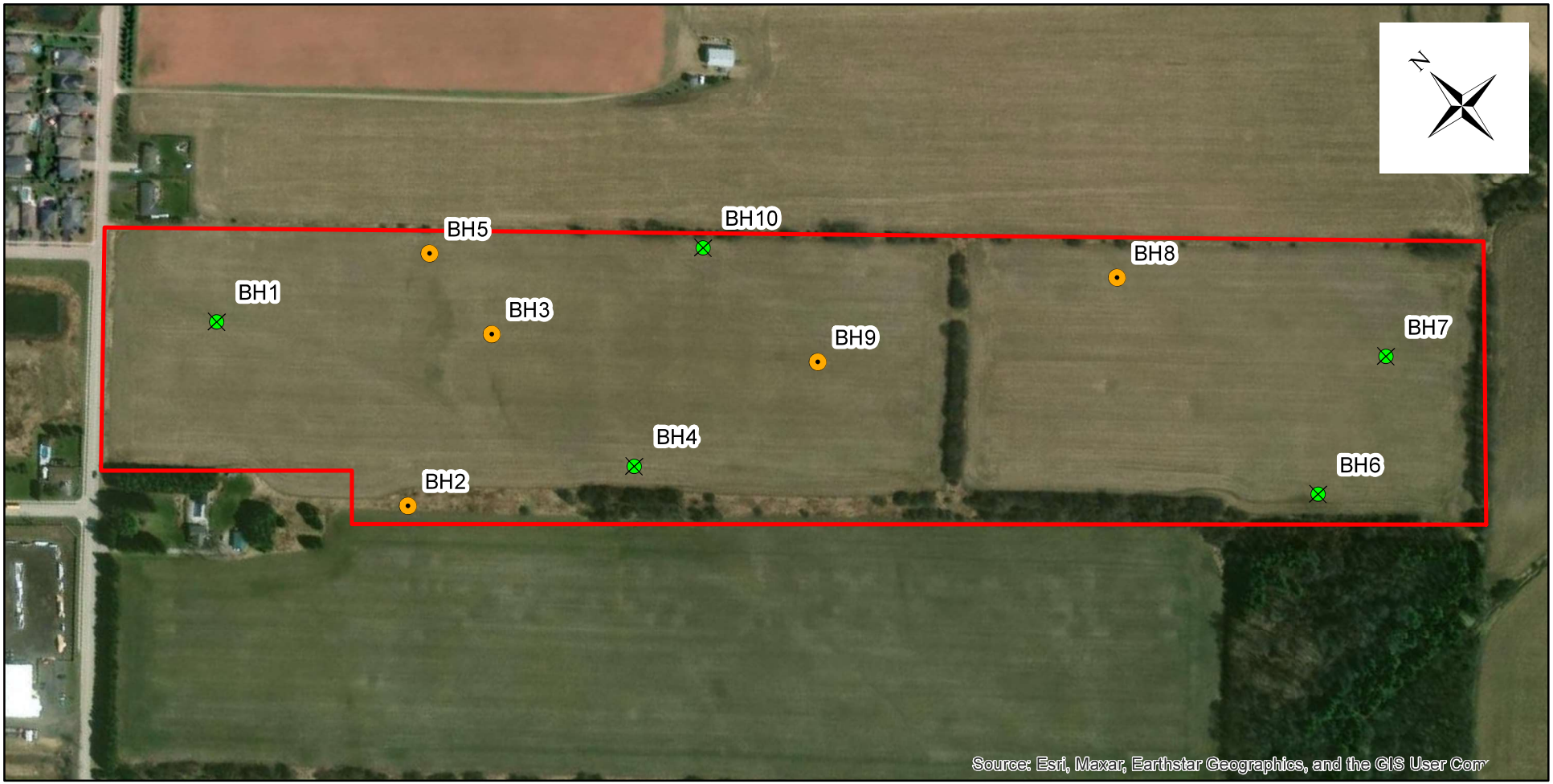
FIGURES



Legend

Approx. Site Boundary

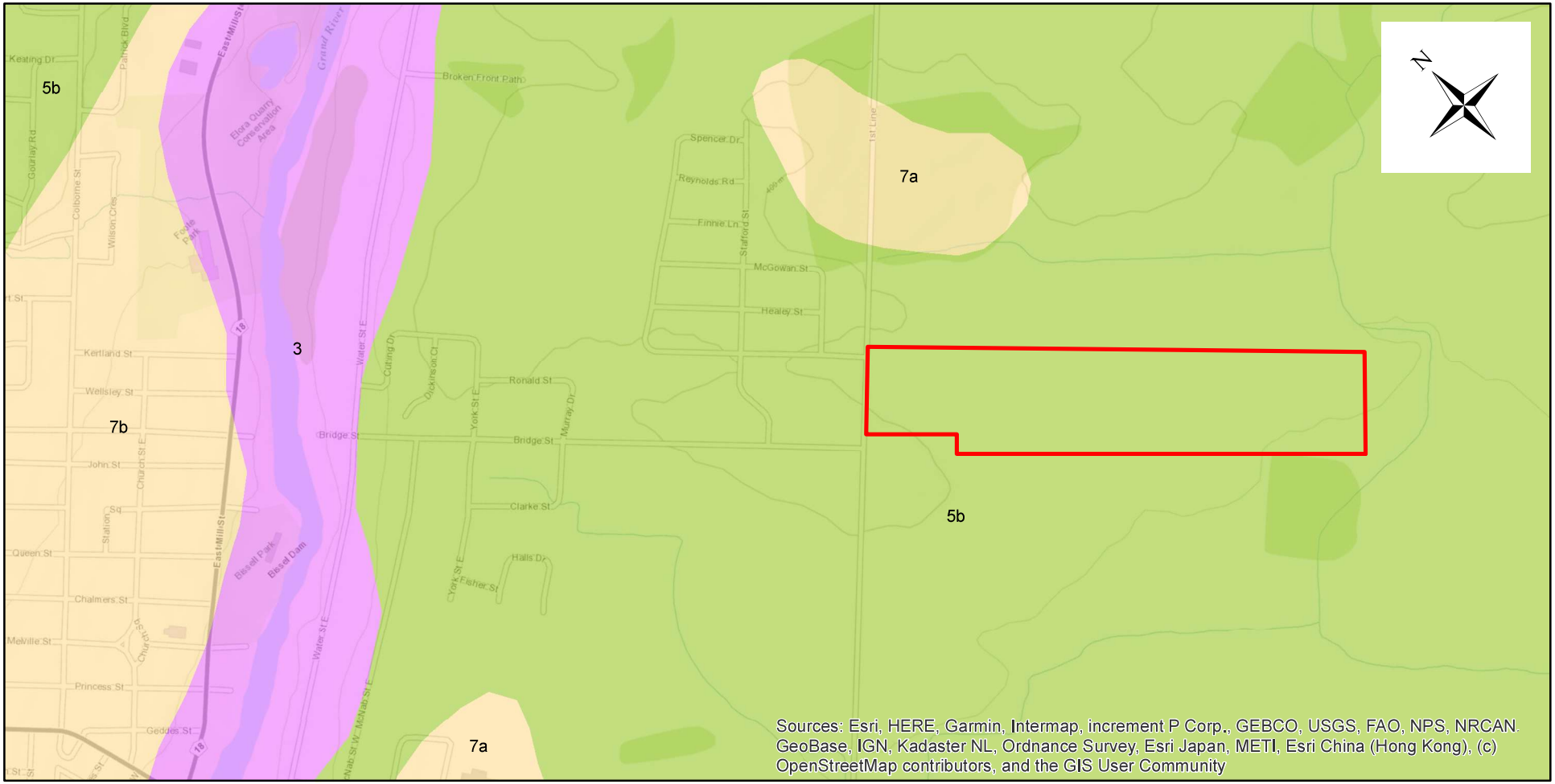
Drawn: AP	Title: **Site Location and Topographic Map**
Approved: KM	Project: **HYDROGEOLOGICAL INVESTIGATION** **127 1st Line, Elora, Ontario**
Date: JUL. 2025	
Project No.: 2501179DH	
	Client: ELORA GREENS INC.
PLANET ENGINEERING Inc. Consulting Engineers	0 250 500 1,000 Meters
	FIGURE 1



Legend

- Approx. Site Boundary
- Borehole
- Monitoring Well

Drawn: AP	Title: **Borehole/Monitoring Well Location Plan**
Approved: KM	Project: **HYDROGEOLOGICAL INVESTIGATION** **127 1st Line, Elora, Ontario**
Date: JUL. 2025	
Project No.: 2501179DH	
	Client: ELORA GREENS INC.
PLANET ENGINEERING Inc. Consulting Engineers	0 45 90 180 Meters
	FIGURE 2

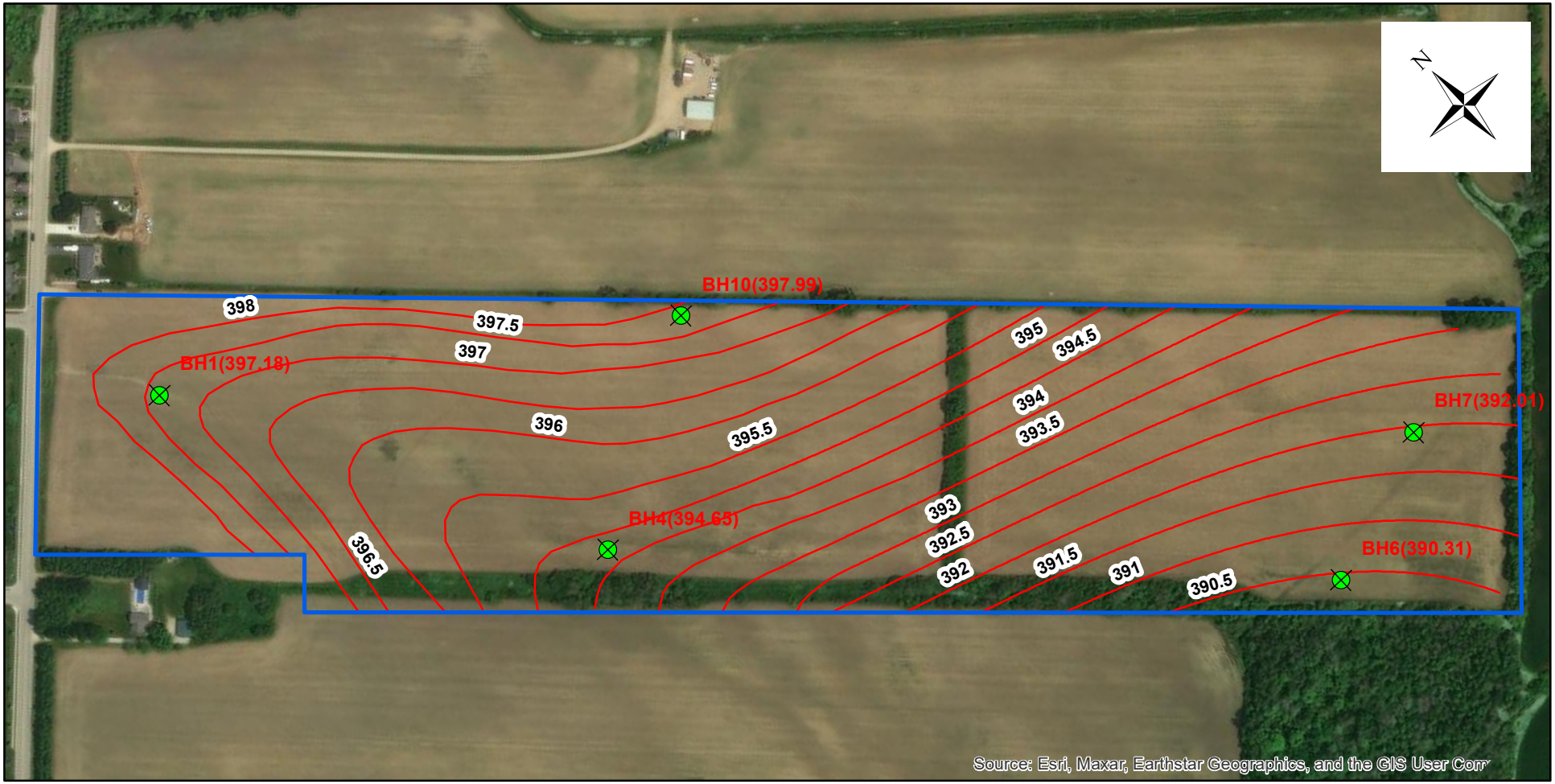


Legend

- Approx. Site Boundary
- 3: Paleozoic bedrock
- 5b: Stone-poor, carbonate-derived silty to sandy till
- 7a: Sandy deposits
- 7b: Gravelly deposits

Drawn: AP	Title: **Surficial Geology**
Approved: KM	Project: **HYDROGEOLOGICAL INVESTIGATION** **127 1st Line, Elora, Ontario**
Date: JUL. 2025	
Project No.: 2501179DH	
	Client: ELORA GREENS INC.
PLANET ENGINEERING Inc. Consulting Engineers	0 125 250 500 Meters

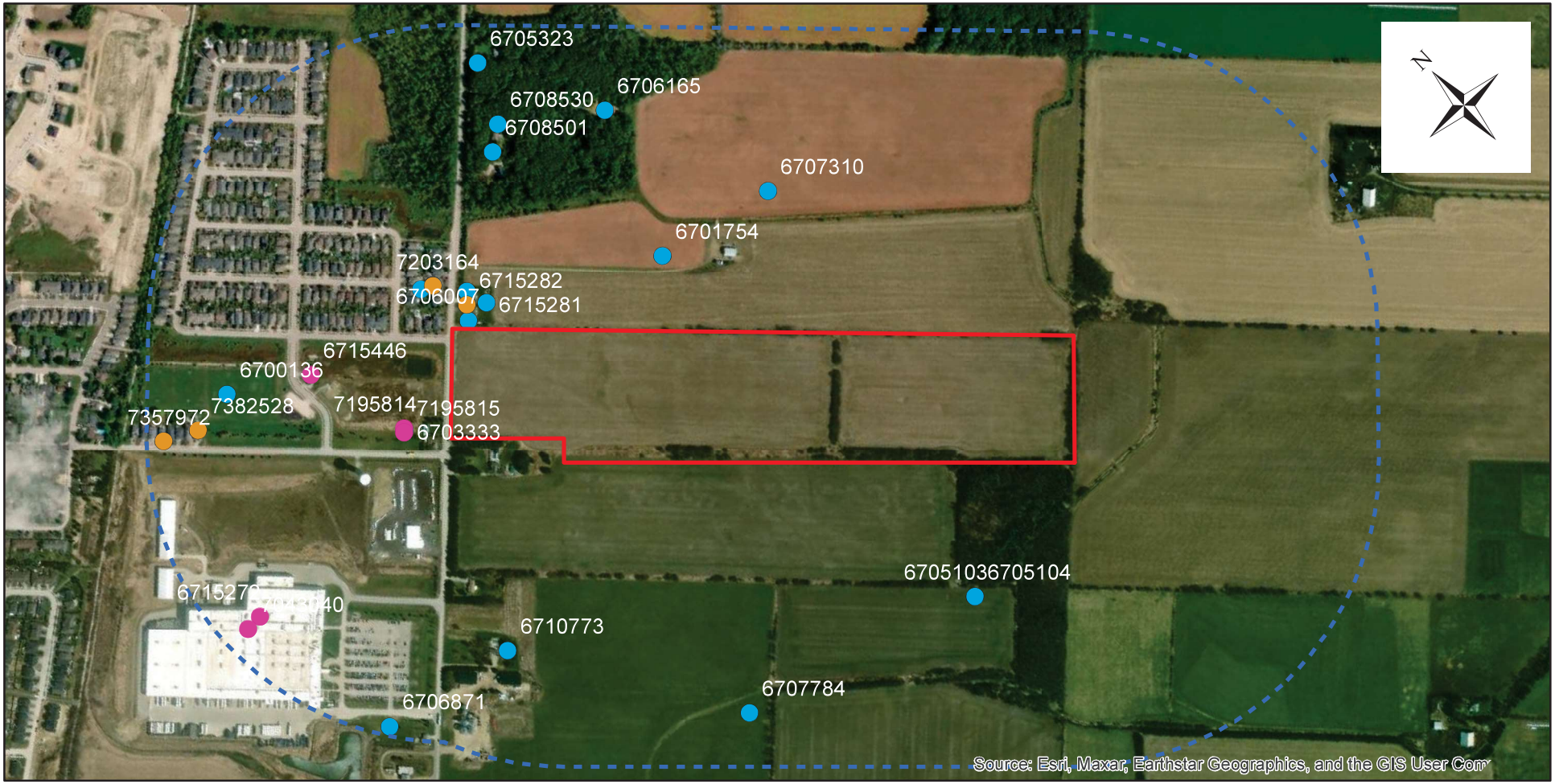
FIGURE 3



Legend

- Approx. Site Boundary
- Monitoring Well
- Groundwater Contours (April 9, 2026)

Drawn: AP	Title: **Groundwater Elevation Contours**
Approved: KM	Project: **HYDROGEOLOGICAL INVESTIGATION** **127 1st Line, Elora, Ontario**
Date: JUL. 2026	
Project No.: 2501179DH	
	Client: ELORA GREENS INC.
PLANET ENGINEERING Inc. Consulting Engineers	0 40 80 160 Meters
	FIGURE 4



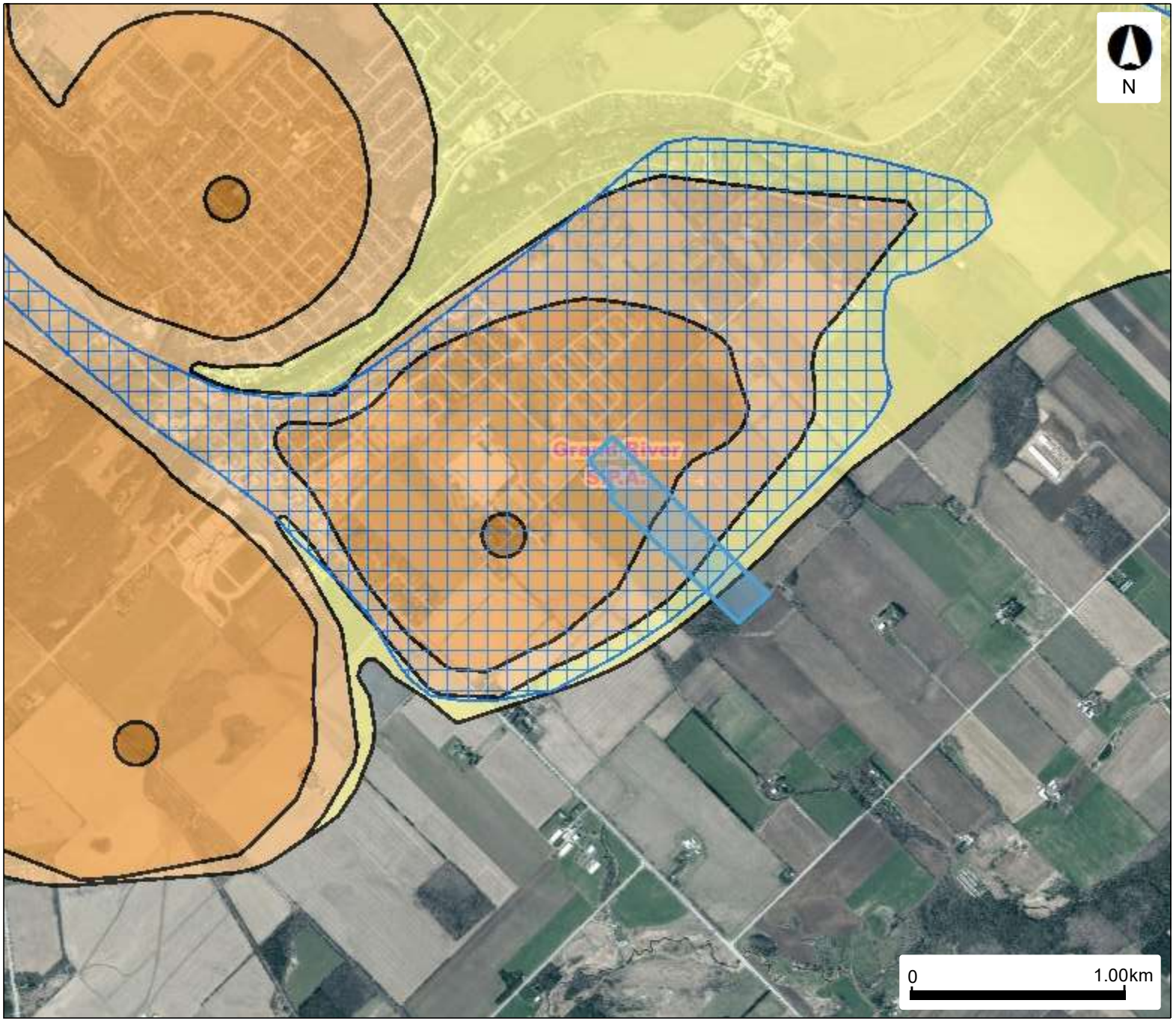
Legend

- 500m Radius
- Approx. Site Boundary
- Abandoned-Other
- Monitoring and Test Hole
- Water Supply

6710773 Well ID

Drawn: AP	Title: **Water Well Records within 500 m Radius**
Approved: KM	Project: **HYDROGEOLOGICAL INVESTIGATION** **127 1st Line, Elora, Ontario**
Date: JUL. 2025	
Project No.: 2501179DH	
	Client: ELORA GREENS INC.
PLANET ENGINEERING Inc. Consulting Engineers	0 100 200 400 Meters
	FIGURE 5

Figure 6 - Source Protection Area



Legend

- Issue Contributing Areas
- WHPA-E
- Wellhead Protection Area
  - A
  - B
  - C
  - C1
  - D
  - F
- Intake Protection Zone 1
- Event Based Areas
- Intake Protection Zone 2
- Source Protection Areas

This map should not be relied on as a precise indicator of routes or locations, nor as a guide to navigation. The Ontario Ministry of Environment, Conservation and Parks (MECP) shall not be liable in any way for the use or any information on this map. of, or reliance upon, this map.

Ontario

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THIS IS NOT A PLAN OF SURVEY.

Map Created: 7/10/2025
Map Center: 43.67535 N, -80.41043 W

APPENDIX A

Borehole Logs

PLANET ENGINEERING Inc. Consulting Engineers

RECORD OF BOREHOLE BH1

PROJECT: 2501179BG

LOCATION: 127 1st Line, Elora, Township of Centre Wellington, ON

CLIENT: Elora Greens Inc.

BH LOCATION: E 547648.964 N 4836223.994

DRILLING DATA

METHOD: Solid Stem Auger

DIAMETER: 150 mm

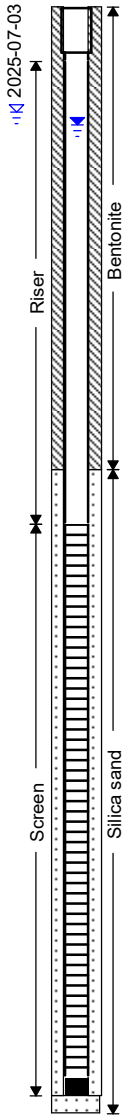
DATE: 2025-06-10

Ground Elevation: 397.4 m

SHEET 1 of 1

DATUM: Geodetic

DEPTH (m)	DESCRIPTION	STRATA PLOT	ELEV. (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS	Grain size Distribution (%) GR SA	Grain size Distribution (%) SI CL	SHEAR STRENGTH kPa 20 40 60 80	WATER CONTENT (%) 10 20 30 40	WELL INSTALLATION
0	**Groundsurface:**		397.44								
	Topsoil: 150 mm		397.29								
	Disturbed natve / Fill: sandy silt till, trace to some gravel, trace to some clay, brown to grey, oxidized, very moist, loose to very loose			1		5					
			396.54								
1	**Silty Sand Till to Sandy Silt Till:** trace to some gravel, trace to some clay, brown to grey, oxidized, very moist to moist, very loose to very dense			2		2	10 39	42 9			
				3		7					
2				4		59					
3				5		60					
4											
				6		39					
5											
6				7		49					
			390.73								
7	**Upon completion:** borehole terminated at 6.7 m. Monitoring well installed upon completion.										



Upon completion:

1) Cave-in : Open

2) Water : 1.7 m

WATER LEVEL (1st) : 0.65 m (2025-06-19)

WATER LEVEL (2nd) : 0.58 m (2025-07-03)

LOGGED BY: A.P

REVIEWED BY : H.H

PLANET ENGINEERING Inc. Consulting Engineers

RECORD OF BOREHOLE BH2

PROJECT: 2501179BG

LOCATION: 127 1st Line, Elora, Township of Centre Wellington, ON

CLIENT: Elora Greens Inc.

BH LOCATION: E 547659.437 N 4836027.374

DRILLING DATA

METHOD: Solid Stem Auger

DIAMETER: 150 mm

DATE: 2025-06-10

Ground Elevation: 396.9 m

SHEET 1 of 1

DATUM: Geodetic

DEPTH (m)	DESCRIPTION	STRATA PLOT	ELEV. (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS	Grain size Distribution (%) GR SA	Grain size Distribution (%) SI CL	SHEAR STRENGTH kPa (20 40 60 80)	WATER CONTENT (%) (10 20 30 40)	WELL INSTALLATION
0	**Groundsurface:**		396.94								
	Topsoil: 150 mm		396.79								
	Disturbed Native / Fill: silty sand till, trace to some gravel, trace to some clay, brown to grey, wet, loose to very loose			1		5				○	
1			395.84	2		3				○	
	Silty Sand Till to Sandy Silt Till: trace to some gravel, trace to some clay, oxidized, brown to grey, wet to moist, very loose to very dense			3		19				○	
2				4		2	22 37	34 7		○	
3				5		30				○	
4											
				6		50 / 100 mm	18 36	36 10		○	
5											
6				7		61				○	
			390.23								
	Upon completion: borehole terminated at 6.7 m.										
7											

Upon completion:

1) Cave-in : Open

2) Water : 1.1 m

WATER LEVEL (1st) : N/A

WATER LEVEL (2nd) : N/A

LOGGED BY: A.P

REVIEWED BY : H.H

PLANET ENGINEERING Inc. Consulting Engineers

RECORD OF BOREHOLE BH3

PROJECT: 2501179BG

LOCATION: 127 1st Line, Elora, Township of Centre Wellington, ON

CLIENT: Elora Greens Inc.

BH LOCATION: E 547791.666 N 4836078.004

DRILLING DATA

METHOD: Solid Stem Auger

DIAMETER: 150 mm

DATE: 2025-06-10

Ground Elevation: 396.7 m

SHEET 1 of 1

DATUM: Geodetic

DEPTH (m)	DESCRIPTION	STRATA PLOT	ELEV. (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS	Grain size Distribution (%) GR SA	Grain size Distribution (%) SI CL	SHEAR STRENGTH kPa (20 40 60 80)	WATER CONTENT (%) (10 20 30 40)	WELL INSTALLATION
0	**Groundsurface:**		396.66								
	Topsoil: 300 mm		396.36	1		9					
	Disturbed Native / Fill : silty sand till, trace to some gravel, trace to some clay, brown to grey, oxidized, wet to very moist, loose		395.59	2		5					
1	**Silty Sand Till to Sandy Silt Till:** trace to some gravel, trace to some clay, brown to grey, oxidized, very moist to wet, loose to very dense			3		7	16 34	41 9			
2				4		87					
3				5		50 / 150 mm					
4				6		50 / 125 mm					
5				7		36					
6			389.95								
7	**Upon completion:** borehole terminated at 6.7 m.										

Upon completion:

1) Cave-in : Open

2) Water : 2.4 m

WATER LEVEL (1st) : N/A

WATER LEVEL (2nd) : N/A

LOGGED BY: A.P

REVIEWED BY : H.H

PLANET ENGINEERING Inc. Consulting Engineers

RECORD OF BOREHOLE BH4

PROJECT: 2501179BG

LOCATION: 127 1st Line, Elora, Township of Centre Wellington, ON

CLIENT: Elora Greens Inc.

BH LOCATION: E 547802.539 N 4835934.566

DRILLING DATA

METHOD: Solid Stem Auger

DIAMETER: 150 mm

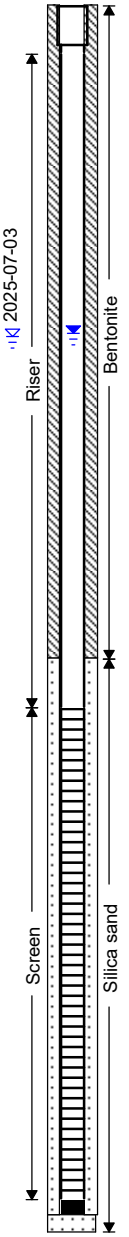
DATE: 2025-06-10

Ground Elevation: 395.4 m

SHEET 1 of 1

DATUM: Geodetic

DEPTH (m)	DESCRIPTION	STRATA PLOT	ELEV. (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS	Grain size Distribution (%) GR SA	Grain size Distribution (%) SI CL	SHEAR STRENGTH kPa (20 40 60 80)	WATER CONTENT (%) (10 20 30 40)	WELL INSTALLATION
0	**Groundsurface:**		395.39								
	Topsoil: 200 mm		395.19								
	Disturbed native / Fill: silty sand till, trace to some gravel, trace to some clay, brown to grey, wet to very moist, loose			1		5					
			394.39								
1	**Silty Sand Till to Sandy Silt Till:** trace to some gravel, trace to some clay, oxidized, brown to grey, very moist to moist, loose to very dense			2		7					
				3		19					
2				4		59					
3				5		50 / 150 mm					
4											
				6		50 / 150 mm					
5											
6				7		50 / 150 mm					
			388.98								
7											
			387.77								
8	**Upon completion**: borehole terminated at 7.6 m. Monitoring well installed upon completion.										



Upon completion:

1) Cave-in : Open

2) Water : 2.4 m

WATER LEVEL (1st) : 2.03 m (2025-06-19)

WATER LEVEL (2nd) : 2.05 m (2025-07-03)

LOGGED BY: A.P

REVIEWED BY : H.H

PLANET ENGINEERING Inc. Consulting Engineers

RECORD OF BOREHOLE BH5

PROJECT: 2501179BG

LOCATION: 127 1st Line, Elora, Township of Centre Wellington, ON

CLIENT: Elora Greens Inc.

BH LOCATION: E 547798.781 N 4836153.102

DRILLING DATA

METHOD: Solid Stem Auger

DIAMETER: 150 mm

DATE: 2025-06-10

Ground Elevation: 398.2 m

SHEET 1 of 1

DATUM: Geodetic

DEPTH (m)	DESCRIPTION	STRATA PLOT	ELEV. (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS	Grain size Distribution (%) GR SA	Grain size Distribution (%) SI CL	SHEAR STRENGTH kPa (20 40 60 80)	WATER CONTENT (%) (10 20 30 40)	WELL INSTALLATION
0	**Groundsurface:**		398.16								
	Topsoil: 150 mm		398.01								
	Disturbed Native / Fill: silty sand till, trace to some gravel, trace to some clay, oxidized, brown to grey, very moist to moist, loose to compact			1		6				○	
			397.16	2		11				○	
1	**Silty Sand Till to Sandy Silt Till:** trace to some gravel, trace to some clay, oxidized, brown to grey, moist to very moist, loose to very dense			3		9				○	
2				4		70	7 36	46 11		○	
3				5		91				○	
4				6		50 / 150 mm				○	
5				7		71				○	
6			391.45								
	Upon completion: borehole terminated at 6.7 m.										
7											

Upon completion:

1) Cave-in : Open

2) Water : 2.4 m

WATER LEVEL (1st) : N/A

WATER LEVEL (2nd) : N/A

LOGGED BY: A.P

REVIEWED BY : H.H

PLANET ENGINEERING Inc. Consulting Engineers

RECORD OF BOREHOLE BH6

PROJECT: 2501179BG

LOCATION: 127 1st Line, Elora, Township of Centre Wellington, ON

CLIENT: Elora Greens Inc.

BH LOCATION: E 548158.856 N 4835573.928

DRILLING DATA

METHOD: Solid Stem Auger

DIAMETER: 150 mm

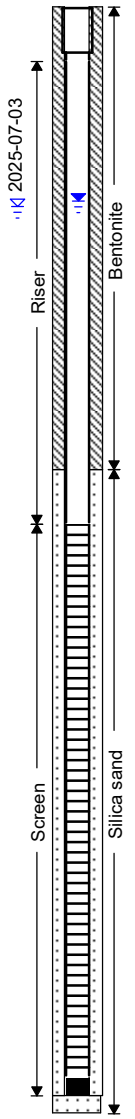
DATE: 2025-06-11

Ground Elevation: 390.4 m

SHEET 1 of 1

DATUM: Geodetic

DEPTH (m)	DESCRIPTION	STRATA PLOT	ELEV. (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS	Grain size Distribution (%) GR SA	Grain size Distribution (%) SI CL	SHEAR STRENGTH kPa 20 40 60 80	WATER CONTENT (%) 10 20 30 40	WELL INSTALLATION
0	**Groundsurface:**		390.41								
	Topsoil: 250 mm		390.16								
	Fill / Disturbed natve: silty sand till, trace to some gravel, trace to some clay, brown to grey, very moist, loose to very loose		389.51	1		5					
1	**Silty Sand Till to Sandy Silt Till:** trace to some gravel, trace to some clay, oxidized, brown to grey, very moist to moist, very loose to very dense			2		1					
				3		15					
2				4		50					
3				5		50 150 mm	6 34	46 14			
4				6		50 150 mm					
5				7		50 150 mm					
6			384.01								
	Upon completion: borehole terminated at 6.4 m. Monitoring well installed upon completion.										
7											



Upon completion:

1) Cave-in : Open

2) Water : 2.4 m

WATER LEVEL (1st) : 1.07 m (2025-06-19)

WATER LEVEL (2nd) : 1.10 m (2025-07-03)

LOGGED BY: A.P

REVIEWED BY : H.H

PLANET ENGINEERING Inc. Consulting Engineers

RECORD OF BOREHOLE BH7

PROJECT: 2501179BG

LOCATION: 127 1st Line, Elora, Township of Centre Wellington, ON

CLIENT: Elora Greens Inc.

BH LOCATION: E 548265.109 N 4835614.314

DRILLING DATA

METHOD: Solid Stem Auger

DIAMETER: 150 mm

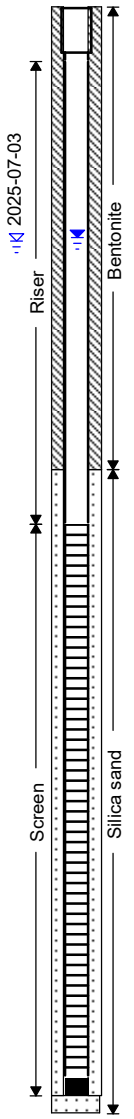
DATE: 2025-06-16

Ground Elevation: 392.2 m

SHEET 1 of 1

DATUM: Geodetic

DEPTH (m)	DESCRIPTION	STRATA PLOT	ELEV. (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS	Grain size Distribution (%) GR SA	Grain size Distribution (%) SI CL	SHEAR STRENGTH kPa (20 40 60 80)	WATER CONTENT (%) (10 20 30 40)	WELL INSTALLATION
0	**Groundsurface:**		392.23								
	Topsoil: 150 mm		392.08								
	Disturbed Native / Fill: silty sand till, trace to some gravel, trace to some clay, brown to grey, very moist, loose		391.77	1		9					
1	**Silty Sand Till to Sandy Silt Till:** trace to some gravel, trace to some clay, brown to grey, very moist to moist, loose to very dense			2		13					
2				3		9					
				4		34					
3				5		36					
4											
				6		50 / 150 mm					
5											
6				7		50 / 150 mm					
			385.83								
7	**Upon completion:** borehole terminated at 6.4 m. Monitoring well installed upon completion.										



Upon completion:

1) Cave-in : Open

2) Water : 2.4 m

WATER LEVEL (1st) : 1.27 m (2025-06-19)

WATER LEVEL (2nd) : 1.29 m (2025-07-03)

LOGGED BY: A.P

REVIEWED BY : H.H

PLANET ENGINEERING Inc. Consulting Engineers

RECORD OF BOREHOLE BH8

PROJECT: 2501179BG

LOCATION: 127 1st Line, Elora, Township of Centre Wellington, ON

CLIENT: Elora Greens Inc.

BH LOCATION: E 548159.068 N 4835792.755

DRILLING DATA

METHOD: Solid Stem Auger

DIAMETER: 150 mm

DATE: 2025-06-10

Ground Elevation: 395.4 m

SHEET 1 of 1

DATUM: Geodetic

DEPTH (m)	DESCRIPTION	STRATA PLOT	ELEV. (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS	Grain size Distribution (%) GR SA	Grain size Distribution (%) SI CL	SHEAR STRENGTH kPa (20 40 60 80)	WATER CONTENT (%) (10 20 30 40)	WELL INSTALLATION
0	**Groundsurface:**		395.44								
	Topsoil: 200 mm		395.24								
	Disturbed Native / Fill: silty sand till, trace to some gravel, trace to some clay, brown to grey, wet to very moist, loose			1		5				○	
			394.53								
1	**Silty Sand Till to Sandy Silt Till:** trace to some gravel, trace to some clay, brown to dark grey, very moist to moist, loose to very dense			2		4				○	
				3		9				○	
2				4		10	3 39	47 11		○	
3				5		68				○	
4											
				6		50 / 150 mm				○	
5											
6				7		50 / 150mm				○	
			389.04								
	Upon completion: borehole terminated at 6.4 m.										
7											

Upon completion:

1) Cave-in : Open

2) Water : 1.8 m

WATER LEVEL (1st) : N/A

WATER LEVEL (2nd) : N/A

LOGGED BY: A.P

REVIEWED BY : H.H

PLANET ENGINEERING Inc. Consulting Engineers

RECORD OF BOREHOLE BH9

PROJECT: 2501179BG

LOCATION: 127 1st Line, Elora, Township of Centre Wellington, ON

CLIENT: Elora Greens Inc.

BH LOCATION: E 547954.136 N 4835898.164

DRILLING DATA

METHOD: Solid Stem Auger

DIAMETER: 150 mm

DATE: 2025-06-16

Ground Elevation: 396.4 m

SHEET 1 of 1

DATUM: Geodetic

DEPTH (m)	DESCRIPTION	STRATA PLOT	ELEV. (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS	Grain size Distribution (%) GR SA	Grain size Distribution (%) SI CL	SHEAR STRENGTH kPa (20 40 60 80)	WATER CONTENT (%) (10 20 30 40)	WELL INSTALLATION
0	**Groundsurface:**		396.40								
	Topsoil: 150 mm		396.25								
	Disturbed Native / Fill: silty sand till, trace to some gravel, trace to some clay, brown to blackish grey, very moist, loose to compact			1		6				○	
			395.40	2		29				○	
1	**Silty Sand Till to Sandy Silt Till:** trace to some gravel, trace to some clay, oxidized, brown to grey, very moist to moist, compact to very dense			3		20				○	
2				4		33				○	
3				5		86				○	
4				6		90				○	
5				7		50 150mm				○	
6			389.85								
	Upon completion: borehole terminated at 6.6 m.										
7											

Upon completion:

1) Cave-in : Open

2) Water : N/A

WATER LEVEL (1st) : N/A

WATER LEVEL (2nd) : N/A

LOGGED BY: A.P

REVIEWED BY : H.H

PLANET ENGINEERING Inc. Consulting Engineers

RECORD OF BOREHOLE BH10

PROJECT: 2501179BG

LOCATION: 127 1st Line, Elora, Township of Centre Wellington, ON

CLIENT: Elora Greens Inc.

BH LOCATION: E 547949.989 N 4836018.364

DRILLING DATA

METHOD: Solid Stem Auger

DIAMETER: 150 mm

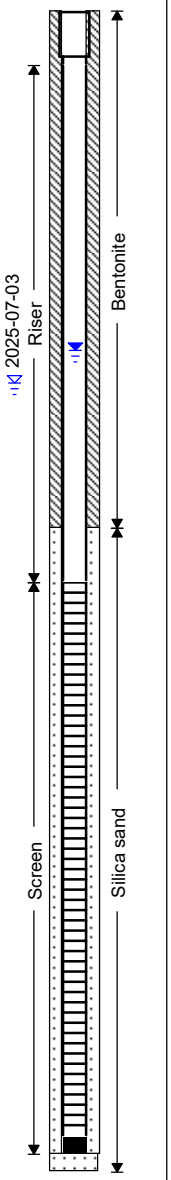
DATE: 2025-06-16

Ground Elevation: 398.7 m

SHEET 1 of 1

DATUM: Geodetic

DEPTH (m)	DESCRIPTION	STRATA PLOT	ELEV. (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS	Grain size Distribution (%) GR SA	Grain size Distribution (%) SI CL	SHEAR STRENGTH kPa 20 40 60 80	WATER CONTENT (%) 10 20 30 40	WELL INSTALLATION
0	**Groundsurface:**		398.74								
	Topsoil: 200 mm		398.54								
	Disturbed natve / Fill: silty sand till, trace to some gravel, trace to some clay, brown to grey, very moist, loose			1		5					
1			397.67	2		8					
	Silty Sand Till to Sandy Silt Till: trace to some gravel, trace to some clay, brown to grey, very moist to moist, loose to very dense			3		12	11 30	49 10			
2				4		75					
3				5		50 / 150 mm					
4											
				6		50 / 150 mm					
5											
6				7		50 / 150 mm					
			392.34								
7	**Upon completion:** borehole terminated at 6.4 m. Monitoring well installed upon completion.										



Upon completion:

1) Cave-in : Open

2) Water : N/A

WATER LEVEL (1st) : 1.87 m (2025-06-19)

WATER LEVEL (2nd) : 2.05 m (2025-07-03)

LOGGED BY: A.P

REVIEWED BY : H.H

APPENDIX B

Water Quality Certificates of Analysis

CERTIFICATE OF ANALYSIS (GUIDELINE EVALUATION)

Work Order	:	**WT2516476**		
Client	:	**Planet Engineering Inc.**	Laboratory	: ALS Environmental - Waterloo
Contact	:	Aayush Panchal	Account Manager	: Amanda Overholster
Address	:	2179 Dunwin Drive Unit 4 Mississauga Ontario Canada L5L 1X2	Address	: 60 Northland Road, Unit 1 Waterloo ON Canada N2V 2B8
Telephone	:	----	Telephone	: 1 416 817 2944
Project	:	2501179DH	Date Samples Received	: 24-Jun-2025 10:45
PO	:	----	Date Analysis Commenced	: 25-Jun-2025
C-O-C number	:	23-1124447	Issue Date	: 30-Jun-2025 21:40
Sampler	:	AP		
Site	:	----		
Quote number	:	2025 SOA		
No. of samples received	:	1		
No. of samples analysed	:	1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Guideline Comparison

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Amaninder Dhillon		Organics, Waterloo, Ontario
Anthony Calero		Inorganics, Calgary, Alberta
David Tremblett		VOC, Waterloo, Ontario
Nik Perkio		Metals, Waterloo, Ontario
Nik Perkio		Inorganics, Waterloo, Ontario
Rachel Cameron		Organics, Waterloo, Ontario

Summary of Guideline Breaches by Sample

SampleID/Client ID	Matrix	Analyte	Analyte Summary	Guideline	Category	Result	Limit
BH7	Water	Solids, total suspended [TSS]		OCWSUB	STM	117 mg/L	15 mg/L

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guidelines are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.

Key: LOR: Limit of Reporting (detection limit).

Unit	*Description*
mg/L	milligrams per litre
pH units	pH units
µg/L	micrograms per litre

>: greater than.

<: less than.

Red shading is applied where the result or the LOR is greater than the Guideline Upper Limit (or lower than the Guideline Lower Limit, if applicable).
For drinking water samples, Red shading is applied where the result for E.coli, fecal or total coliforms is greater than or equal to the Guideline Upper Limit.

Qualifiers

Qualifier	Description
BODL	Limit of Reporting for BOD was increased to account for the largest volume of sample tested.
SFPR	Suspected False Positive Result, based on detection in Lab Blanks and/or Field Blanks, or other known issues.

Analytical Results Evaluation

Matrix: Water			Client sample ID	BH7	----	----	----	----	----	----
			Client sampling date / time	23-Jun-2025 16:50	----	----	----	----	----	----
			Sub-Matrix	Groundwater	----	----	----	----	----	----
Analyte	CAS Number	Method/Lab	Unit	WT2516476-001	----	----	----	----	----	----
				Result	----	----	----	----	----	----
Physical Tests										
pH	----	E108/WT	pH units	8.16	----	----	----	----	----	----
Solids, total suspended [TSS]	----	E160/WT	mg/L	117	----	----	----	----	----	----
Anions and Nutrients										
Chloride	16887-00-6	E235.Cl/WT	mg/L	25.3	----	----	----	----	----	----
Fluoride	16984-48-8	E235.F/WT	mg/L	0.096	----	----	----	----	----	----
Kjeldahl nitrogen, total [TKN]	----	E318/WT	mg/L	0.568	----	----	----	----	----	----
Phosphorus, total	7723-14-0	E372-U/WT	mg/L	0.0050	----	----	----	----	----	----
Sulfate (as SO4)	14808-79-8	E235.SO4/WT	mg/L	5.17	----	----	----	----	----	----
Cyanides										
Cyanide, strong acid dissociable (Total)	----	E333/WT	mg/L	<0.0020	----	----	----	----	----	----
Total Sulfides										
Sulfide, total (as S)	18496-25-8	E395/CG	mg/L	<0.0015	----	----	----	----	----	----
Sulfide, total (as H2S)	7783-06-4	E395/CG	mg/L	<0.0016	----	----	----	----	----	----
Total Metals										
Aluminum, total	7429-90-5	E420/WT	mg/L	0.0050	----	----	----	----	----	----
Antimony, total	7440-36-0	E420/WT	mg/L	<0.00010	----	----	----	----	----	----
Arsenic, total	7440-38-2	E420/WT	mg/L	0.00017	----	----	----	----	----	----
Bismuth, total	7440-69-9	E420/WT	mg/L	<0.000050	----	----	----	----	----	----
Cadmium, total	7440-43-9	E420/WT	mg/L	<0.0000050	----	----	----	----	----	----
Chromium, total	7440-47-3	E420/WT	mg/L	<0.00050	----	----	----	----	----	----

Matrix: Water				Client sample ID	BH7	----	----	----	----	----	----
				Client sampling date / time	23-Jun-2025 16:50	----	----	----	----	----	----
				Sub-Matrix	Groundwater	----	----	----	----	----	----
Analyte	CAS Number	Method/Lab	Unit		WT2516476-001	----	----	----	----	----	----
					Result	----	----	----	----	----	----
Total Metals											
Cobalt, total	7440-48-4	E420/WT	mg/L		0.00013	----	----	----	----	----	----
Copper, total	7440-50-8	E420/WT	mg/L		<0.00050	----	----	----	----	----	----
Iron, total	7439-89-6	E420/WT	mg/L		<0.010	----	----	----	----	----	----
Lead, total	7439-92-1	E420/WT	mg/L		<0.000050	----	----	----	----	----	----
Manganese, total	7439-96-5	E420/WT	mg/L		0.00928	----	----	----	----	----	----
Mercury, total	7439-97-6	E508/WT	mg/L		<0.0000050	----	----	----	----	----	----
Molybdenum, total	7439-98-7	E420/WT	mg/L		0.000882	----	----	----	----	----	----
Nickel, total	7440-02-0	E420/WT	mg/L		0.00077	----	----	----	----	----	----
Selenium, total	7782-49-2	E420/WT	mg/L		0.000299	----	----	----	----	----	----
Silver, total	7440-22-4	E420/WT	mg/L		<0.000010	----	----	----	----	----	----
Tin, total	7440-31-5	E420/WT	mg/L		<0.00010	----	----	----	----	----	----
Titanium, total	7440-32-6	E420/WT	mg/L		<0.00030	----	----	----	----	----	----
Vanadium, total	7440-62-2	E420/WT	mg/L		<0.00050	----	----	----	----	----	----
Zinc, total	7440-66-6	E420/WT	mg/L		<0.0030	----	----	----	----	----	----
Aggregate Organics											
Biochemical oxygen demand [BOD]	----	E550/WT	mg/L		<3.0 BODL	----	----	----	----	----	----
Chemical oxygen demand [COD]	----	E559-L/WT	mg/L		<10	----	----	----	----	----	----
Oil & grease (gravimetric)	----	E567/WT	mg/L		<5.0	----	----	----	----	----	----
Oil & grease, animal/vegetable (gravimetric)	----	EC567A.SG/WT	mg/L		<5.0	----	----	----	----	----	----
Oil & grease, mineral (gravimetric)	----	E567SG/WT	mg/L		<5.0	----	----	----	----	----	----

Matrix: Water				Client sample ID	BH7	----	----	----	----	----	----
				Client sampling date / time	23-Jun-2025 16:50	----	----	----	----	----	----
				Sub-Matrix	Groundwater	----	----	----	----	----	----
Analyte	CAS Number	Method/Lab	Unit		WT2516476-001	----	----	----	----	----	----
					Result	----	----	----	----	----	----
Aggregate Organics											
Phenols, total (4AAP)	----	E562/WT	mg/L		0.0023	----	----	----	----	----	----
Volatile Organic Compounds											
Benzene	71-43-2	E611D/WT	µg/L		<0.50	----	----	----	----	----	----
Chloroform	67-66-3	E611D/WT	µg/L		<0.50	----	----	----	----	----	----
Dichlorobenzene, 1,2-	95-50-1	E611D/WT	µg/L		<0.50	----	----	----	----	----	----
Dichlorobenzene, 1,4-	106-46-7	E611D/WT	µg/L		<0.50	----	----	----	----	----	----
Dichloromethane	75-09-2	E611D/WT	µg/L		<3.0 SFPR	----	----	----	----	----	----
Ethylbenzene	100-41-4	E611D/WT	µg/L		<0.50	----	----	----	----	----	----
Tetrachloroethane, 1,1,2,2-	79-34-5	E611D/WT	µg/L		<0.50	----	----	----	----	----	----
Tetrachloroethylene	127-18-4	E611D/WT	µg/L		<0.50	----	----	----	----	----	----
Toluene	108-88-3	E611D/WT	µg/L		2.64	----	----	----	----	----	----
Trichloroethylene	79-01-6	E611D/WT	µg/L		<0.50	----	----	----	----	----	----
Xylene, m+p-	179601-23-1	E611D/WT	µg/L		<0.40	----	----	----	----	----	----
Xylene, o-	95-47-6	E611D/WT	µg/L		<0.30	----	----	----	----	----	----
Xylenes, total	1330-20-7	E611D/WT	µg/L		<0.50	----	----	----	----	----	----
Volatile Organic Compounds Surrogates											
Bromofluorobenzene, 4-	460-00-4	E611D/WT	%		105	----	----	----	----	----	----
Difluorobenzene, 1,4-	540-36-3	E611D/WT	%		98.6	----	----	----	----	----	----
Polychlorinated Biphenyls											
Aroclor 1016	12674-11-2	E687/WT	µg/L		<0.020	----	----	----	----	----	----

Matrix: Water

Analyte	CAS Number	Method/Lab	Unit	Client sample ID	BH7	----	----	----	----	----	----
				Client sampling date / time	23-Jun-2025 16:50	----	----	----	----	----	----
				Sub-Matrix	Groundwater	----	----	----	----	----	----
					WT2516476-001	----	----	----	----	----	----
					Result	----	----	----	----	----	----
Polychlorinated Biphenyls											
Aroclor 1221	11104-28-2	E687/WT	µg/L		<0.020	----	----	----	----	----	----
Aroclor 1232	11141-16-5	E687/WT	µg/L		<0.020	----	----	----	----	----	----
Aroclor 1242	53469-21-9	E687/WT	µg/L		<0.020	----	----	----	----	----	----
Aroclor 1248	12672-29-6	E687/WT	µg/L		<0.020	----	----	----	----	----	----
Aroclor 1254	11097-69-1	E687/WT	µg/L		<0.020	----	----	----	----	----	----
Aroclor 1260	11096-82-5	E687/WT	µg/L		<0.020	----	----	----	----	----	----
Aroclor 1262	37324-23-5	E687/WT	µg/L		<0.020	----	----	----	----	----	----
Aroclor 1268	11100-14-4	E687/WT	µg/L		<0.020	----	----	----	----	----	----
Polychlorinated biphenyls [PCBs], total	n/a	E687/WT	µg/L		<0.060	----	----	----	----	----	----
Polychlorinated Biphenyls Surrogates											
Decachlorobiphenyl	2051-24-3	E687/WT	%		105	----	----	----	----	----	----
Tetrachloro-m-xylene	877-09-8	E687/WT	%		105	----	----	----	----	----	----
Organochlorine Pesticides											
Hexachlorobenzene	118-74-1	E660F/WT	µg/L		<0.0080	----	----	----	----	----	----
Organochlorine Pesticides Surrogates											
Decachlorobiphenyl	2051-24-3	E660F/WT	%		111	----	----	----	----	----	----
Tetrachloro-m-xylene	877-09-8	E660F/WT	%		100	----	----	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Summary of Guideline Limits

Analyte	CAS Number	Unit	OCWSUB STM	OCWSUB SAN					
Physical Tests									
pH	----	pH units	**6.5 - 8.5 pH units**	**6 - 8.49999 pH units**	----	----	----	----	----
Solids, total suspended [TSS]		mg/L	**15 mg/L**	**350 mg/L**	----	----	----	----	----
Anions and Nutrients									
Chloride	16887-00-6	mg/L	----	**1500 mg/L**	----	----	----	----	----
Fluoride	16984-48-8	mg/L	----	**10 mg/L**	----	----	----	----	----
Kjeldahl nitrogen, total [TKN]		mg/L	----	**50 mg/L**	----	----	----	----	----
Phosphorus, total	7723-14-0	mg/L	----	**10 mg/L**	----	----	----	----	----
Sulfate (as SO4)	14808-79-8	mg/L	----	**1500 mg/L**	----	----	----	----	----
Cyanides									
Cyanide, strong acid dissociable (Total)	----	mg/L	----	**1.2 mg/L**	----	----	----	----	----
Total Sulfides									
Sulfide, total (as S)	18496-25-8	mg/L	----	----	----	----	----	----	----
Sulfide, total (as H2S)	7783-06-4	mg/L	----	**1 mg/L**	----	----	----	----	----
Total Metals									
Aluminum, total	7429-90-5	mg/L	----	**50 mg/L**	----	----	----	----	----
Antimony, total	7440-36-0	mg/L	----	**5 mg/L**	----	----	----	----	----
Arsenic, total	7440-38-2	mg/L	----	**1 mg/L**	----	----	----	----	----
Bismuth, total	7440-69-9	mg/L	----	**5 mg/L**	----	----	----	----	----
Cadmium, total	7440-43-9	mg/L	**0.001 mg/L**	**0.7 mg/L**	----	----	----	----	----
Chromium, total	7440-47-3	mg/L	**0.08 mg/L**	**3 mg/L**	----	----	----	----	----
Cobalt, total	7440-48-4	mg/L	----	**5 mg/L**	----	----	----	----	----
Copper, total	7440-50-8	mg/L	**0.005 mg/L**	**2 mg/L**	----	----	----	----	----
Iron, total	7439-89-6	mg/L	----	**50 mg/L**	----	----	----	----	----
Lead, total	7439-92-1	mg/L	**0.03 mg/L**	**0.7 mg/L**	----	----	----	----	----

Manganese, total	7439-96-5	mg/L	----	**5 mg/L**	----	----	----	----	----
Mercury, total	7439-97-6	mg/L	----	**0.1 mg/L**	----	----	----	----	----
Molybdenum, total	7439-98-7	mg/L	----	**5 mg/L**	----	----	----	----	----
Nickel, total	7440-02-0	mg/L	**0.03 mg/L**	**2 mg/L**	----	----	----	----	----
Selenium, total	7782-49-2	mg/L	----	**2 mg/L**	----	----	----	----	----
Silver, total	7440-22-4	mg/L	----	**1 mg/L**	----	----	----	----	----
Tin, total	7440-31-5	mg/L	----	**5 mg/L**	----	----	----	----	----
Titanium, total	7440-32-6	mg/L	----	**5 mg/L**	----	----	----	----	----
Vanadium, total	7440-62-2	mg/L	----	**5 mg/L**	----	----	----	----	----
Zinc, total	7440-66-6	mg/L	**0.03 mg/L**	**2 mg/L**	----	----	----	----	----
Aggregate Organics									
Biochemical oxygen demand [BOD]		mg/L	**15 mg/L**	**300 mg/L**	----	----	----	----	----
Chemical oxygen demand [COD]		mg/L	----	**600 mg/L**	----	----	----	----	----
Oil & grease (gravimetric)		mg/L	----	----	----	----	----	----	----
Oil & grease, animal/vegetable (gravimetric)		mg/L	----	**150 mg/L**	----	----	----	----	----
Oil & grease, mineral (gravimetric)		mg/L	----	**15 mg/L**	----	----	----	----	----
Phenols, total (4AAP)		mg/L	----	**0.1 mg/L**	----	----	----	----	----
Volatile Organic Compounds									
Benzene	71-43-2	µg/L	----	**10 µg/L**	----	----	----	----	----
Chloroform	67-66-3	µg/L	----	**40 µg/L**	----	----	----	----	----
Dichlorobenzene, 1,2-	95-50-1	µg/L	----	**50 µg/L**	----	----	----	----	----
Dichlorobenzene, 1,4-	106-46-7	µg/L	----	**80 µg/L**	----	----	----	----	----
Dichloromethane	75-09-2	µg/L	----	**90 µg/L**	----	----	----	----	----
Ethylbenzene	100-41-4	µg/L	----	**60 µg/L**	----	----	----	----	----
Tetrachloroethane, 1,1,2,2-	79-34-5	µg/L	----	**60 µg/L**	----	----	----	----	----
Tetrachloroethylene	127-18-4	µg/L	----	**60 µg/L**	----	----	----	----	----
Toluene	108-88-3	µg/L	----	**20 µg/L**	----	----	----	----	----

Trichloroethylene	79-01-6	µg/L	----	**50 µg/L**	----	----	----	----	----
Xylene, m+p-	179601-23-1	µg/L	----	----	----	----	----	----	----
Xylene, o-	95-47-6	µg/L	----	----	----	----	----	----	----
Xylenes, total	1330-20-7	µg/L	----	**300 µg/L**	----	----	----	----	----
Volatile Organic Compounds Surrogates									
Bromofluorobenzene, 4-	460-00-4	%	----	----	----	----	----	----	----
Difluorobenzene, 1,4-	540-36-3	%	----	----	----	----	----	----	----
Polychlorinated Biphenyls									
Aroclor 1016	12674-11-2	µg/L	----	----	----	----	----	----	----
Aroclor 1221	11104-28-2	µg/L	----	----	----	----	----	----	----
Aroclor 1232	11141-16-5	µg/L	----	----	----	----	----	----	----
Aroclor 1242	53469-21-9	µg/L	----	----	----	----	----	----	----
Aroclor 1248	12672-29-6	µg/L	----	----	----	----	----	----	----
Aroclor 1254	11097-69-1	µg/L	----	----	----	----	----	----	----
Aroclor 1260	11096-82-5	µg/L	----	----	----	----	----	----	----
Aroclor 1262	37324-23-5	µg/L	----	----	----	----	----	----	----
Aroclor 1268	11100-14-4	µg/L	----	----	----	----	----	----	----
Polychlorinated biphenyls [PCBs], total	n/a	µg/L	----	**4 µg/L**	----	----	----	----	----
Decachlorobiphenyl	2051-24-3	%	----	----	----	----	----	----	----
Tetrachloro-m-xylene	877-09-8	%	----	----	----	----	----	----	----
Organochlorine Pesticides									
Hexachlorobenzene	118-74-1	µg/L	----	**0.1 µg/L**	----	----	----	----	----
Decachlorobiphenyl	2051-24-3	%	----	----	----	----	----	----	----
Tetrachloro-m-xylene	877-09-8	%	----	----	----	----	----	----	----

Key:

OCWSUB		Ontario Center Wellington Wastewater and Storm Sewer By-Law (2022-66)
	SAN	Centre Wellington Sanitary Sewer By-Law (2022-66)
	STM	Center Wellington Storm Sewer By-Law (2022-66)

ALS Canada Ltd.

right solutions.
right partner.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **WT2516476**	Page	: 1 of 11
Client	: **Planet Engineering Inc.**	Laboratory	: ALS Environmental - Waterloo
Contact	: Aayush Panchal	Account Manager	: Amanda Overholster
Address	: 2179 Dunwin Drive Unit 4 Mississauga ON Canada L5L 1X2	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: ----	Telephone	: 1 416 817 2944
Project	: 2501179DH	Date Samples Received	: 24-Jun-2025 10:45
PO	: ----	Issue Date	: 30-Jun-2025 21:39
C-O-C number	: 23-1124447		
Sampler	: AP		
Site	: ----		
Quote number	: 2025 SOA		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- Method Blank value outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Method Blank (MB) Values								
Anions and Nutrients	QC-2077021-001	----	Kjeldahl nitrogen, total [TKN]	----	E318	0.203 B mg/L	0.05 mg/L	Blank result exceeds permitted value

Result Qualifiers

Qualifier	Description
B	*Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.*

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT-4d]										
BH7	E550	23-Jun-2025	----	----	----		25-Jun-2025	4 days	1 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) [ON MECP]										
BH7	E559-L	23-Jun-2025	----	----	----		26-Jun-2025	28 days	3 days	✓
Aggregate Organics : Mineral Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid)										
BH7	E567SG	23-Jun-2025	25-Jun-2025	28 days	2 days	✓	25-Jun-2025	28 days	2 days	✓
Aggregate Organics : Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid)										
BH7	E567	23-Jun-2025	25-Jun-2025	28 days	2 days	✓	25-Jun-2025	28 days	2 days	✓
Aggregate Organics : Phenols (4AAP) in Water by Colorimetry										
Amber glass total (sulfuric acid) [ON MECP]										
BH7	E562	23-Jun-2025	27-Jun-2025	28 days	4 days	✓	27-Jun-2025	28 days	4 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE [ON MECP]										
BH7	E235.Cl	23-Jun-2025	26-Jun-2025	28 days	3 days	✓	27-Jun-2025	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE [ON MECP]										
BH7	E235.F	23-Jun-2025	26-Jun-2025	28 days	3 days	✓	27-Jun-2025	28 days	3 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE [ON MECP]										
BH7	E235.SO4	23-Jun-2025	26-Jun-2025	28 days	3 days	✓	27-Jun-2025	28 days	3 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) [ON MECP]										
BH7	E318	23-Jun-2025	27-Jun-2025	28 days	4 days	✓	27-Jun-2025	28 days	4 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) [ON MECP]										
BH7	E372-U	23-Jun-2025	27-Jun-2025	28 days	4 days	✓	30-Jun-2025	28 days	4 days	✓
Cyanides : Total Cyanide										
Opaque HDPE - total (sodium hydroxide)										
BH7	E333	23-Jun-2025	25-Jun-2025	14 days	2 days	✓	25-Jun-2025	14 days	2 days	✓
Organochlorine Pesticides : OCP Analysis by GC-MS-MS										
Amber glass/Teflon lined cap [ON MECP]										
BH7	E660F	23-Jun-2025	26-Jun-2025	14 days	2 days	✓	30-Jun-2025	40 days	5 days	✓
Physical Tests : pH by Meter										
HDPE [ON MECP]										
BH7	E108	23-Jun-2025	26-Jun-2025	14 days	3 days	✓	27-Jun-2025	14 days	3 days	✓
Physical Tests : TSS by Gravimetry										
HDPE [ON MECP]										
BH7	E160	23-Jun-2025	----	----	----		26-Jun-2025	7 days	3 days	✓
Polychlorinated Biphenyls : PCB Aroclors by GC-MS										
Amber glass/Teflon lined cap [ON MECP]										
BH7	E687	23-Jun-2025	26-Jun-2025	14 days	2 days	✓	26-Jun-2025	40 days	0 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) [ON MECP]										
BH7	E508	23-Jun-2025	27-Jun-2025	28 days	4 days	✓	30-Jun-2025	28 days	4 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	*Method*	*Sampling Date*	*Extraction / Preparation*				*Analysis*			
			Preparation Date	*Holding Times*		*Eval*	*Analysis Date*	*Holding Times*		*Eval*
				Rec	*Actual*			*Rec*	*Actual*	
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
BH7	E420	23-Jun-2025	25-Jun-2025	180 days	2 days	✓	25-Jun-2025	180 days	2 days	✓
Total Sulfides : Total Sulfide by Colourimetry (Automated Flow)										
HDPE total (zinc acetate+sodium hydroxide)										
BH7	E395	23-Jun-2025	----	----	----		26-Jun-2025	7 days	3 days	✓
Volatile Organic Compounds : VOCs (Eastern Canada List) by Headspace GC-MS										
Glass vial (sodium bisulfate)										
BH7	E611D	23-Jun-2025	25-Jun-2025	14 days	2 days	✓	25-Jun-2025	14 days	2 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
pH by Meter	E108	2076658	1	12	8.3	5.0	✓
TSS by Gravimetry	E160	2076810	1	20	5.0	4.7	✓
Chloride in Water by IC	E235.Cl	2076651	1	17	5.8	5.0	✓
Fluoride in Water by IC	E235.F	2076656	1	6	16.6	5.0	✓
Sulfate in Water by IC	E235.SO4	2076653	1	14	7.1	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	2077021	1	16	6.2	5.0	✓
Total Cyanide	E333	2073086	1	11	9.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	2077022	1	19	5.2	5.0	✓
Total Sulfide by Colourimetry (Automated Flow)	E395	2076734	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	2072728	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	2078265	1	20	5.0	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	2073881	1	20	5.0	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	2075681	1	19	5.2	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	2078380	1	19	5.2	5.0	✓
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	2073985	1	18	5.5	5.0	✓
Laboratory Control Samples (LCS)							
pH by Meter	E108	2076658	1	12	8.3	5.0	✓
TSS by Gravimetry	E160	2076810	1	20	5.0	4.7	✓
Chloride in Water by IC	E235.Cl	2076651	1	17	5.8	5.0	✓
Fluoride in Water by IC	E235.F	2076656	1	6	16.6	5.0	✓
Sulfate in Water by IC	E235.SO4	2076653	1	14	7.1	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	2077021	1	16	6.2	5.0	✓
Total Cyanide	E333	2073086	1	11	9.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	2077022	1	19	5.2	5.0	✓
Total Sulfide by Colourimetry (Automated Flow)	E395	2076734	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	2072728	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	2078265	1	20	5.0	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	2073881	1	20	5.0	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	2075681	1	19	5.2	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	2078380	1	19	5.2	5.0	✓
Oil & Grease by Gravimetry	E567	2072743	1	16	6.2	5.0	✓
Mineral Oil & Grease by Gravimetry	E567SG	2072744	1	11	9.0	5.0	✓
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	2073985	1	18	5.5	5.0	✓
OCP Analysis by GC-MS-MS	E660F	2075349	1	2	50.0	5.0	✓
PCB Aroclors by GC-MS	E687	2075348	1	10	10.0	4.7	✓

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Method Blanks (MB)							
TSS by Gravimetry	E160	2076810	1	20	5.0	4.7	✓
Chloride in Water by IC	E235.Cl	2076651	1	17	5.8	5.0	✓
Fluoride in Water by IC	E235.F	2076656	1	6	16.6	5.0	✓
Sulfate in Water by IC	E235.SO4	2076653	1	14	7.1	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	2077021	1	16	6.2	5.0	✓
Total Cyanide	E333	2073086	1	11	9.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	2077022	1	19	5.2	5.0	✓
Total Sulfide by Colourimetry (Automated Flow)	E395	2076734	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	2072728	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	2078265	1	20	5.0	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	2073881	1	20	5.0	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	2075681	1	19	5.2	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	2078380	1	19	5.2	5.0	✓
Oil & Grease by Gravimetry	E567	2072743	1	16	6.2	5.0	✓
Mineral Oil & Grease by Gravimetry	E567SG	2072744	1	11	9.0	5.0	✓
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	2073985	1	18	5.5	5.0	✓
OCP Analysis by GC-MS-MS	E660F	2075349	1	2	50.0	5.0	✓
PCB Aroclors by GC-MS	E687	2075348	1	10	10.0	4.7	✓
Matrix Spikes (MS)							
Chloride in Water by IC	E235.Cl	2076651	1	17	5.8	5.0	✓
Fluoride in Water by IC	E235.F	2076656	1	6	16.6	5.0	✓
Sulfate in Water by IC	E235.SO4	2076653	1	14	7.1	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	2077021	1	16	6.2	5.0	✓
Total Cyanide	E333	2073086	1	11	9.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	2077022	1	19	5.2	5.0	✓
Total Sulfide by Colourimetry (Automated Flow)	E395	2076734	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	2072728	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	2078265	1	20	5.0	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	2075681	1	19	5.2	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	2078380	1	19	5.2	5.0	✓
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	2073985	1	18	5.5	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter	E108 ALS Environmental - Waterloo	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
TSS by Gravimetry	E160 ALS Environmental - Waterloo	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Chloride in Water by IC	E235.Cl ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 ALS Environmental - Waterloo	Water	Method Fialab 100, 2018	TKN in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021).
Total Cyanide	E333 ALS Environmental - Waterloo	Water	ISO 14403 (mod)	Total or Strong Acid Dissociable (SAD) Cyanide is determined by Continuous Flow Analyzer (CFA) with in-line UV digestion followed by colourmetric analysis. Method Limitation: High levels of thiocyanate (SCN) may cause positive interference (up to 0.5% of SCN concentration).
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U ALS Environmental - Waterloo	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Sulfide by Colourimetry (Automated Flow)	E395 ALS Environmental - Calgary	Water	APHA 4500 -S E-Auto-Colorimetry	Sulfide is determined using the gas dialysis automated methylene blue colourimetric method. Results expressed "as H2S" if reported represent the maximum possible H_2S concentration based on the total sulfide concentration in the sample. The H_2S calculation converts Total Sulfide as (S2-) and reports it as Total Sulfide as (H2S).

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Metals in Water by CRC ICPMS	E420 ALS Environmental - Waterloo	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Mercury in Water by CVAAS	E508 ALS Environmental - Waterloo	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Biochemical Oxygen Demand - 5 day	E550 ALS Environmental - Waterloo	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L ALS Environmental - Waterloo	Water	APHA 5220 D (mod)	Samples are analyzed using the closed reflux colourimetric method.
Phenols (4AAP) in Water by Colorimetry	E562 ALS Environmental - Waterloo	Water	EPA 9066	This automated method is based on the distillation of phenol and subsequent reaction of the distillate with alkaline ferricyanide ($K_3Fe(CN)_6$) and 4-amino-antipyrine (4-AAP) to form a red complex which is measured colorimetrically.
Oil & Grease by Gravimetry	E567 ALS Environmental - Waterloo	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane and the extract is evaporated to dryness. The residue is then weighed to determine Oil and Grease.
Mineral Oil & Grease by Gravimetry	E567SG ALS Environmental - Waterloo	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane, followed by silica gel treatment after which the extract is evaporated to dryness. The residue is then weighed to determine Mineral Oil and Grease.
VOCs (Eastern Canada List) by Headspace GC-MS	E611D ALS Environmental - Waterloo	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
OCP Analysis by GC-MS-MS	E660F ALS Environmental - Waterloo	Water	EPA 8270E (mod)	Pesticides are analyzed by GC-MS-MS
PCB Aroclors by GC-MS	E687 ALS Environmental - Waterloo	Water	EPA 8270E (mod)	PCB Aroclors are analyzed by GC-MS

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Animal & Vegetable Oil & Grease by Gravimetry	EC567A.SG ALS Environmental - Waterloo	Water	APHA 5520 (mod)	Animal & vegetable oil and grease is calculated as follows: Oil & Grease (gravimetric) minus Mineral Oil & Grease (gravimetric)

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Digestion for TKN in water	EP318 ALS Environmental - Waterloo	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.
Digestion for Total Phosphorus in water	EP372 ALS Environmental - Waterloo	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Oil & Grease Extraction for Gravimetry	EP567 ALS Environmental - Waterloo	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane by liquid-liquid extraction.
VOCs Preparation for Headspace Analysis	EP581 ALS Environmental - Waterloo	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into a GC-MS-FID.
Pesticides, PCB, and Neutral Extractable Chlorinated Hydrocarbons Extraction	EP660 ALS Environmental - Waterloo	Water	EPA 3511 (mod)	Samples are extracted from aqueous sample using an organic solvent liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: **WT2516476**	Page	: 1 of 12
Client	: Planet Engineering Inc.	Laboratory	: ALS Environmental - Waterloo
Contact	: Aayush Panchal	Account Manager	: Amanda Overholster
Address	: 2179 Dunwin Drive Unit 4 Mississauga ON Canada L5L 1X2	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: ----	Telephone	: 1 416 817 2944
Project	: 2501179DH	Date Samples Received	: 24-Jun-2025 10:45
PO	: ----	Date Analysis Commenced	: 25-Jun-2025
C-O-C number	: 23-1124447	Issue Date	: 30-Jun-2025 21:39
Sampler	: AP		
Site	: ----		
Quote number	: 2025 SOA		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Amaninder Dhillon	Team Lead - Semi-Volatile Instrumentation	Waterloo Organics, Waterloo, Ontario
Anthony Calero	Supervisor - Inorganic	Calgary Inorganics, Calgary, Alberta
David Tremblett	VOC Section Supervisor	Waterloo VOC, Waterloo, Ontario
Nik Perkio	Senior Analyst	Waterloo Inorganics, Waterloo, Ontario
Nik Perkio	Senior Analyst	Waterloo Metals, Waterloo, Ontario
Rachel Cameron	Supervisor - Semi-Volatile Extractions	Waterloo Organics, Waterloo, Ontario

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 2076658)											
WT2516435-001	Anonymous	pH	----	E108	0.10	pH units	7.71	7.74	0.388%	4%	----
Physical Tests (QC Lot: 2076810)											
WT2516368-001	Anonymous	Solids, total suspended [TSS]	----	E160	3.0	mg/L	20.2	20.4	0.2	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 2076651)											
WT2516582-001	Anonymous	Chloride	16887-00-6	E235.Cl	2.50	mg/L	247	246	0.246%	20%	----
Anions and Nutrients (QC Lot: 2076653)											
WT2516582-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	1.50	mg/L	19.4	19.2	0.971%	20%	----
Anions and Nutrients (QC Lot: 2076656)											
WT2516582-001	Anonymous	Fluoride	16984-48-8	E235.F	0.100	mg/L	<0.100	<0.100	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 2077021)											
BF2500085-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.191	0.102	0.089	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 2077022)											
BF2500084-001	Anonymous	Phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.122	0.121	0.156%	20%	----
Cyanides (QC Lot: 2073086)											
WT2516466-001	Anonymous	Cyanide, strong acid dissociable (Total)	----	E333	0.0020	mg/L	<0.0020	<0.0020	0	Diff <2x LOR	----
Total Sulfides (QC Lot: 2076734)											
EO2505276-008	Anonymous	Sulfide, total (as S)	18496-25-8	E395	0.0015	mg/L	<0.0015	<0.0015	0	Diff <2x LOR	----
Total Metals (QC Lot: 2072728)											
WT2516362-001	Anonymous	Aluminum, total	7429-90-5	E420	0.0300	mg/L	0.0958	0.0935	0.0023	Diff <2x LOR	----
		Antimony, total	7440-36-0	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Arsenic, total	7440-38-2	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Bismuth, total	7440-69-9	E420	0.000500	mg/L	<0.000500	<0.000500	0	Diff <2x LOR	----
		Cadmium, total	7440-43-9	E420	0.0000500	mg/L	<0.0000500	<0.0000500	0	Diff <2x LOR	----
		Chromium, total	7440-47-3	E420	0.00500	mg/L	<0.00500	<0.00500	0	Diff <2x LOR	----
		Cobalt, total	7440-48-4	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Copper, total	7440-50-8	E420	0.00500	mg/L	<0.00500	<0.00500	0	Diff <2x LOR	----
		Iron, total	7439-89-6	E420	0.100	mg/L	<0.100	<0.100	0	Diff <2x LOR	----
		Lead, total	7439-92-1	E420	0.000500	mg/L	<0.000500	<0.000500	0	Diff <2x LOR	----
		Manganese, total	7439-96-5	E420	0.00100	mg/L	0.0832	0.0822	1.30%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 2072728) - continued											
WT2516362-001	Anonymous	Molybdenum, total	7439-98-7	E420	0.000500	mg/L	0.00295	0.00270	0.000253	Diff <2x LOR	----
		Nickel, total	7440-02-0	E420	0.00500	mg/L	<0.00500	<0.00500	0	Diff <2x LOR	----
		Selenium, total	7782-49-2	E420	0.000500	mg/L	<0.000500	<0.000500	0	Diff <2x LOR	----
		Silver, total	7440-22-4	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Tin, total	7440-31-5	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Titanium, total	7440-32-6	E420	0.00300	mg/L	<0.00300	<0.00300	0	Diff <2x LOR	----
		Vanadium, total	7440-62-2	E420	0.00500	mg/L	<0.00500	<0.00500	0	Diff <2x LOR	----
		Zinc, total	7440-66-6	E420	0.0300	mg/L	<0.0300	<0.0300	0	Diff <2x LOR	----
Total Metals (QC Lot: 2078265)											
HA2501964-001	Anonymous	Mercury, total	7439-97-6	E508	0.0000050	mg/L	0.0000076	0.0000080	0.0000004	Diff <2x LOR	----
Aggregate Organics (QC Lot: 2073881)											
WT2516450-001	Anonymous	Biochemical oxygen demand [BOD]	----	E550	3.0	mg/L	<3.0	<3.0	0.0%	30%	----
Aggregate Organics (QC Lot: 2075681)											
HA2501964-001	Anonymous	Chemical oxygen demand [COD]	----	E559-L	10	mg/L	50	51	1	Diff <2x LOR	----
Aggregate Organics (QC Lot: 2078380)											
TY2506761-001	Anonymous	Phenols, total (4AAP)	----	E562	0.0500	mg/L	0.479	0.497	0.0175	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 2073985)											
TY2506487-002	Anonymous	Benzene	71-43-2	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Chloroform	67-66-3	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichlorobenzene, 1,2-	95-50-1	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichlorobenzene, 1,4-	106-46-7	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichloromethane	75-09-2	E611D	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Tetrachloroethane, 1,1,2,2-	79-34-5	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Tetrachloroethylene	127-18-4	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Trichloroethylene	79-01-6	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611D	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611D	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 2076810)						
Solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Anions and Nutrients (QCLot: 2076651)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 2076653)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 2076656)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 2077021)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	# 0.203	B
Anions and Nutrients (QCLot: 2077022)						
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Cyanides (QCLot: 2073086)						
Cyanide, strong acid dissociable (Total)	----	E333	0.002	mg/L	<0.0020	----
Total Sulfides (QCLot: 2076734)						
Sulfide, total (as S)	18496-25-8	E395	0.0015	mg/L	<0.0015	----
Total Metals (QCLot: 2072728)						
Aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
Copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
Iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
Lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
Tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 2072728) - continued						
Titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
Zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Total Metals (QCLot: 2078265)						
Mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Aggregate Organics (QCLot: 2072743)						
Oil & grease (gravimetric)	----	E567	5	mg/L	<5.0	----
Aggregate Organics (QCLot: 2072744)						
Oil & grease, mineral (gravimetric)	----	E567SG	5	mg/L	<5.0	----
Aggregate Organics (QCLot: 2073881)						
Biochemical oxygen demand [BOD]	----	E550	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 2075681)						
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	<10	----
Aggregate Organics (QCLot: 2078380)						
Phenols, total (4AAP)	----	E562	0.001	mg/L	<0.0010	----
Volatile Organic Compounds (QCLot: 2073985)						
Benzene	71-43-2	E611D	0.5	µg/L	<0.50	----
Chloroform	67-66-3	E611D	0.5	µg/L	<0.50	----
Dichlorobenzene, 1,2-	95-50-1	E611D	0.5	µg/L	<0.50	----
Dichlorobenzene, 1,4-	106-46-7	E611D	0.5	µg/L	<0.50	----
Dichloromethane	75-09-2	E611D	1	µg/L	<1.0	----
Ethylbenzene	100-41-4	E611D	0.5	µg/L	<0.50	----
Tetrachloroethane, 1,1,2,2-	79-34-5	E611D	0.5	µg/L	<0.50	----
Tetrachloroethylene	127-18-4	E611D	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611D	0.5	µg/L	<0.50	----
Trichloroethylene	79-01-6	E611D	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611D	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611D	0.3	µg/L	<0.30	----
Polychlorinated Biphenyls (QCLot: 2075348)						
Aroclor 1016	12674-11-2	E687	0.02	µg/L	<0.020	----
Aroclor 1221	11104-28-2	E687	0.02	µg/L	<0.020	----
Aroclor 1232	11141-16-5	E687	0.02	µg/L	<0.020	----
Aroclor 1242	53469-21-9	E687	0.02	µg/L	<0.020	----
Aroclor 1248	12672-29-6	E687	0.02	µg/L	<0.020	----
Aroclor 1254	11097-69-1	E687	0.02	µg/L	<0.020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polychlorinated Biphenyls (QCLot: 2075348) - continued						
Aroclor 1260	11096-82-5	E687	0.02	µg/L	<0.020	----
Aroclor 1262	37324-23-5	E687	0.02	µg/L	<0.020	----
Aroclor 1268	11100-14-4	E687	0.02	µg/L	<0.020	----
Organochlorine Pesticides (QCLot: 2075349)						
Hexachlorobenzene	118-74-1	E660F	0.008	µg/L	<0.0080	----

Qualifiers

Qualifier	Description
B	*Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.*

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 2076658)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 2076810)									
Solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	101	85.0	115	----
Anions and Nutrients (QCLot: 2076651)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 2076653)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	96.4	90.0	110	----
Anions and Nutrients (QCLot: 2076656)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	99.3	90.0	110	----
Anions and Nutrients (QCLot: 2077021)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	115	75.0	125	----
Anions and Nutrients (QCLot: 2077022)									
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.333 mg/L	100	80.0	120	----
Cyanides (QCLot: 2073086)									
Cyanide, strong acid dissociable (Total)	----	E333	0.002	mg/L	0.25 mg/L	93.0	80.0	120	----
Total Sulfides (QCLot: 2076734)									
Sulfide, total (as S)	18496-25-8	E395	0.0015	mg/L	0.08 mg/L	93.1	80.0	120	----
Total Metals (QCLot: 2072728)									
Aluminum, total	7429-90-5	E420	0.003	mg/L	0.1 mg/L	103	80.0	120	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	0.05 mg/L	106	80.0	120	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	0.05 mg/L	108	80.0	120	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	0.05 mg/L	103	80.0	120	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	0.005 mg/L	102	80.0	120	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	0.012 mg/L	103	80.0	120	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	0.012 mg/L	101	80.0	120	----
Copper, total	7440-50-8	E420	0.0005	mg/L	0.012 mg/L	99.7	80.0	120	----
Iron, total	7439-89-6	E420	0.01	mg/L	0.05 mg/L	101	80.0	120	----
Lead, total	7439-92-1	E420	0.00005	mg/L	0.025 mg/L	104	80.0	120	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	0.012 mg/L	102	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Target Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 2072728) - continued									
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.012 mg/L	104	80.0	120	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	0.025 mg/L	101	80.0	120	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	0.05 mg/L	102	80.0	120	----
Silver, total	7440-22-4	E420	0.00001	mg/L	0.005 mg/L	102	80.0	120	----
Tin, total	7440-31-5	E420	0.0001	mg/L	0.025 mg/L	104	80.0	120	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	0.012 mg/L	102	80.0	120	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	0.025 mg/L	103	80.0	120	----
Zinc, total	7440-66-6	E420	0.003	mg/L	0.025 mg/L	104	80.0	120	----
Total Metals (QCLot: 2078265)									
Mercury, total	7439-97-6	E508	0.000005	mg/L	0 mg/L	95.2	80.0	120	----
Aggregate Organics (QCLot: 2072743)									
Oil & grease (gravimetric)	----	E567	5	mg/L	200 mg/L	90.9	70.0	130	----
Aggregate Organics (QCLot: 2072744)									
Oil & grease, mineral (gravimetric)	----	E567SG	5	mg/L	100 mg/L	93.0	70.0	130	----
Aggregate Organics (QCLot: 2073881)									
Biochemical oxygen demand [BOD]	----	E550	2	mg/L	198 mg/L	97.1	85.0	115	----
Aggregate Organics (QCLot: 2075681)									
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	100 mg/L	107	85.0	115	----
Aggregate Organics (QCLot: 2078380)									
Phenols, total (4AAP)	----	E562	0.001	mg/L	0.02 mg/L	102	85.0	115	----
Volatile Organic Compounds (QCLot: 2073985)									
Benzene	71-43-2	E611D	0.5	µg/L	100 µg/L	96.7	70.0	130	----
Chloroform	67-66-3	E611D	0.5	µg/L	100 µg/L	108	70.0	130	----
Dichlorobenzene, 1,2-	95-50-1	E611D	0.5	µg/L	100 µg/L	103	70.0	130	----
Dichlorobenzene, 1,4-	106-46-7	E611D	0.5	µg/L	100 µg/L	106	70.0	130	----
Dichloromethane	75-09-2	E611D	1	µg/L	100 µg/L	109	70.0	130	----
Ethylbenzene	100-41-4	E611D	0.5	µg/L	100 µg/L	93.7	70.0	130	----
Tetrachloroethane, 1,1,2,2-	79-34-5	E611D	0.5	µg/L	100 µg/L	98.0	70.0	130	----
Tetrachloroethylene	127-18-4	E611D	0.5	µg/L	100 µg/L	93.6	70.0	130	----
Toluene	108-88-3	E611D	0.5	µg/L	100 µg/L	96.3	70.0	130	----
Trichloroethylene	79-01-6	E611D	0.5	µg/L	100 µg/L	105	70.0	130	----
Xylene, m+p-	179601-23-1	E611D	0.4	µg/L	200 µg/L	94.7	70.0	130	----
Xylene, o-	95-47-6	E611D	0.3	µg/L	100 µg/L	94.1	70.0	130	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Target Concentration	LCS	Low	High	Qualifier
Polychlorinated Biphenyls (QCLot: 2075348)									
Aroclor 1016	12674-11-2	E687	0.02	µg/L	0.2 µg/L	99.5	60.0	140	----
Aroclor 1221	11104-28-2	E687	0.02	µg/L	0.2 µg/L	99.5	60.0	140	----
Aroclor 1232	11141-16-5	E687	0.02	µg/L	0.2 µg/L	99.5	60.0	140	----
Aroclor 1242	53469-21-9	E687	0.02	µg/L	0.2 µg/L	99.5	60.0	140	----
Aroclor 1248	12672-29-6	E687	0.02	µg/L	0.2 µg/L	86.0	60.0	140	----
Aroclor 1254	11097-69-1	E687	0.02	µg/L	0.2 µg/L	97.7	60.0	140	----
Aroclor 1260	11096-82-5	E687	0.02	µg/L	0.2 µg/L	111	60.0	140	----
Aroclor 1262	37324-23-5	E687	0.02	µg/L	0.2 µg/L	111	60.0	140	----
Aroclor 1268	11100-14-4	E687	0.02	µg/L	0.2 µg/L	111	60.0	140	----
Organochlorine Pesticides (QCLot: 2075349)									
Hexachlorobenzene	118-74-1	E660F	0.008	µg/L	0.2 µg/L	75.3	50.0	150	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 2076651)										
WT2516582-001	Anonymous	Chloride	16887-00-6	E235.Cl	496 mg/L	500 mg/L	99.3	75.0	125	----
Anions and Nutrients (QCLot: 2076653)										
WT2516582-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	475 mg/L	500 mg/L	94.9	75.0	125	----
Anions and Nutrients (QCLot: 2076656)										
WT2516582-001	Anonymous	Fluoride	16984-48-8	E235.F	4.91 mg/L	5 mg/L	98.2	75.0	125	----
Anions and Nutrients (QCLot: 2077021)										
BF2500085-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	2.98 mg/L	2.5 mg/L	119	70.0	130	----
Anions and Nutrients (QCLot: 2077022)										
BF2500084-001	Anonymous	Phosphorus, total	7723-14-0	E372-U	ND mg/L	----	ND	70.0	130	----
Cyanides (QCLot: 2073086)										
WT2516466-001	Anonymous	Cyanide, strong acid dissociable (Total)	----	E333	0.233 mg/L	0.25 mg/L	93.2	75.0	125	----
Total Sulfides (QCLot: 2076734)										
EO2505276-012	Anonymous	Sulfide, total (as S)	18496-25-8	E395	0.110 mg/L	0.1 mg/L	110	75.0	125	----
Total Metals (QCLot: 2072728)										
WT2516365-001	Anonymous	Aluminum, total	7429-90-5	E420	ND mg/L	----	ND	70.0	130	----
		Antimony, total	7440-36-0	E420	0.0524 mg/L	0.05 mg/L	105	70.0	130	----
		Arsenic, total	7440-38-2	E420	0.0559 mg/L	0.05 mg/L	112	70.0	130	----
		Bismuth, total	7440-69-9	E420	0.0461 mg/L	0.05 mg/L	92.3	70.0	130	----
		Cadmium, total	7440-43-9	E420	0.00481 mg/L	0.005 mg/L	96.1	70.0	130	----
		Chromium, total	7440-47-3	E420	0.0127 mg/L	0.012 mg/L	102	70.0	130	----
		Cobalt, total	7440-48-4	E420	0.0124 mg/L	0.012 mg/L	99.3	70.0	130	----
		Copper, total	7440-50-8	E420	ND mg/L	----	ND	70.0	130	----
		Iron, total	7439-89-6	E420	ND mg/L	----	ND	70.0	130	----
		Lead, total	7439-92-1	E420	0.0238 mg/L	0.025 mg/L	95.4	70.0	130	----
		Manganese, total	7439-96-5	E420	ND mg/L	----	ND	70.0	130	----
		Molybdenum, total	7439-98-7	E420	0.0133 mg/L	0.012 mg/L	106	70.0	130	----
		Nickel, total	7440-02-0	E420	0.0241 mg/L	0.025 mg/L	96.4	70.0	130	----
		Selenium, total	7782-49-2	E420	0.0508 mg/L	0.05 mg/L	102	70.0	130	----
		Silver, total	7440-22-4	E420	0.00476 mg/L	0.005 mg/L	95.3	70.0	130	----
		Tin, total	7440-31-5	E420	0.0255 mg/L	0.025 mg/L	102	70.0	130	----
		Titanium, total	7440-32-6	E420	ND mg/L	----	ND	70.0	130	----
		Vanadium, total	7440-62-2	E420	0.0270 mg/L	0.025 mg/L	108	70.0	130	----
		Zinc, total	7440-66-6	E420	0.0239 mg/L	0.025 mg/L	95.8	70.0	130	----
Total Metals (QCLot: 2078265)										
HA2501964-002	Anonymous	Mercury, total	7439-97-6	E508	0.0000983 mg/L	0 mg/L	98.3	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Aggregate Organics (QCLot: 2075681)										
HA2501964-001	Anonymous	Chemical oxygen demand [COD]	----	E559-L	100 mg/L	100 mg/L	100	75.0	125	----
Aggregate Organics (QCLot: 2078380)										
TY2506761-001	Anonymous	Phenols, total (4AAP)	----	E562	ND mg/L	----	ND	75.0	125	----
Volatile Organic Compounds (QCLot: 2073985)										
TY2506487-002	Anonymous	Benzene	71-43-2	E611D	102 µg/L	100 µg/L	102	60.0	140	----
		Chloroform	67-66-3	E611D	114 µg/L	100 µg/L	114	60.0	140	----
		Dichlorobenzene, 1,2-	95-50-1	E611D	105 µg/L	100 µg/L	105	60.0	140	----
		Dichlorobenzene, 1,4-	106-46-7	E611D	107 µg/L	100 µg/L	107	60.0	140	----
		Dichloromethane	75-09-2	E611D	116 µg/L	100 µg/L	116	60.0	140	----
		Ethylbenzene	100-41-4	E611D	96.0 µg/L	100 µg/L	96.0	60.0	140	----
		Tetrachloroethane, 1,1,2,2-	79-34-5	E611D	103 µg/L	100 µg/L	103	60.0	140	----
		Tetrachloroethylene	127-18-4	E611D	94.8 µg/L	100 µg/L	94.8	60.0	140	----
		Toluene	108-88-3	E611D	98.9 µg/L	100 µg/L	98.9	60.0	140	----
		Trichloroethylene	79-01-6	E611D	110 µg/L	100 µg/L	110	60.0	140	----
		Xylene, m+p-	179601-23-1	E611D	194 µg/L	200 µg/L	97.3	60.0	140	----
		Xylene, o-	95-47-6	E611D	97.3 µg/L	100 µg/L	97.3	60.0	140	----

GC-306 OGG-573
MM-120 VW-052
CN-073
N-951

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 - 11?

Page of

Environmental Division Waterloo

Work Order Reference WT2516476

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Telephone : +1 519 886 6910

Report To	Contact and company name below will appear on the final report
Company:	Planet Eng Inc
Contact:	Kayush Panchali
Phone:	289-600-2791
Company address below will appear on the final report	
Street:	
City/Province:	
Postal Code:	
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	

Project Information	
ALS Client Code / QUOTE #:	
Job / Project #:	2501179 DH
PO / AFE:	
LSD:	
ALS Lab Work Order # (ALS use only):	JD

Reports / Recipients	
Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Merge QC/QCI Reports with COA	☑ YES ☐ NO ☐ N/A
☑ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	lab COA@planeteng.ca
Email 2	kourosh.mahdi.monabi@planeteng.ca
Email 3	kayush.panchali@planeteng.ca

Invoice Recipients	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	Invoice@planeteng.ca
Email 2	

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Contact:	Sampler: AP

Turnaround Time (TAT) Requested

- ☐ Routine [R] if received by 3pm M-F - no surcharges apply
- ☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
- ☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
- ☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
- ☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
- ☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.

Additional fees may apply to rush requests on weekends, st

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

Analysis Request

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	Centre Welling ton	Storm + San Sewer	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	BH 7	23-6-25	4:50pm	G.W.	1	✓				

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

Drinking Water (DW) Samples[1] (client use)	Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)
Are samples taken from a Regulated DW System? ☐ YES ☑ NO	Centre welling ton Storm + San sewer by law,
Are samples for human consumption/ use? ☐ YES ☑ NO	

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☑ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C				
				3.5				

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: AP	Date: 23/6/2025	Time: 8:20	Received by:	Date:	Time:	Received by: AP	Date: 24-Jun-25	Time: 10:45

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

JAN 2023 FRONT

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

CERTIFICATE OF ANALYSIS (GUIDELINE EVALUATION)

Work Order	:	**WT2516470**			
Client	:	**Planet Engineering Inc.**	Laboratory	:	ALS Environmental - Waterloo
Contact	:	Aayush Panchal	Account Manager	:	Amanda Overholster
Address	:	2179 Dunwin Drive Unit 4 Mississauga Ontario Canada L5L 1X2	Address	:	60 Northland Road, Unit 1 Waterloo ON Canada N2V 2B8
Telephone	:	----	Telephone	:	1 416 817 2944
Project	:	2501179DH	Date Samples Received	:	24-Jun-2025 11:45
PO	:	----	Date Analysis Commenced	:	25-Jun-2025
C-O-C number	:	23-1124445	Issue Date	:	02-Jul-2025 16:45
Sampler	:	AP			
Site	:	127 Line 1, Elora			
Quote number	:	2025 SOA			
No. of samples received	:	1			
No. of samples analysed	:	1			

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Guideline Comparison

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Nik Perkio		Metals, Waterloo, Ontario
Nik Perkio		Inorganics, Waterloo, Ontario
Nik Perkio		Centralized Prep, Waterloo, Ontario
Walt Kippenhuck		Inorganics, Waterloo, Ontario

Summary of Guideline Breaches by Sample

SampleID/Client ID	Matrix	Analyte	Analyte Summary	Guideline	Category	Result	Limit
BH4	Water	Phosphorus, total		ONPWQO	IPWQOT2<100	<0.050 mg/L	0.01 mg/L
	Water	Phosphorus, total		ONPWQO	IPWQOT2>100	<0.050 mg/L	0.01 mg/L

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guidelines are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.

Key: LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
%	percent
CU	colour units (1 cu = 1 mg/l pt)
meq/L	milliequivalents per litre
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units
µS/cm	microsiemens per centimetre

>: greater than.
<: less than.

Red shading is applied where the result or the LOR is greater than the Guideline Upper Limit (or lower than the Guideline Lower Limit, if applicable).
For drinking water samples, Red shading is applied where the result for E.coli, fecal or total coliforms is greater than or equal to the Guideline Upper Limit.

Lavender shading is applied where the LOR itself is greater than the Guideline Upper Limit (or Lower than the Guideline Lower Limit, if applicable).

Qualifiers

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.

Analytical Results Evaluation

Matrix: Water				Client sample ID	BH4	----	----	----	----	----	----
				Client sampling date / time	23-Jun-2025 16:00	----	----	----	----	----	----
				Sub-Matrix	Groundwater	----	----	----	----	----	----
Analyte	CAS Number	Method/Lab	Unit		WT2516470-001	----	----	----	----	----	----
					Result	----	----	----	----	----	----
Sample Preparation											
Dissolved carbon filtration location	----	EP358/WT	-		lab	----	----	----	----	----	----
Physical Tests											
Alkalinity, bicarbonate (as HCO3)	71-52-3	E290/WT	mg/L		302	----	----	----	----	----	----
Alkalinity, carbonate (as CO3)	3812-32-6	E290/WT	mg/L		<0.6	----	----	----	----	----	----
Alkalinity, hydroxide (as OH)	14280-30-9	E290/WT	mg/L		<0.3	----	----	----	----	----	----
Alkalinity, total (as CaCO3)	----	E290/WT	mg/L		248	----	----	----	----	----	----
Colour, apparent	----	E330/WT	CU		3.3	----	----	----	----	----	----
Conductivity	----	E100/WT	µS/cm		608	----	----	----	----	----	----
Hardness (as CaCO3), from total Ca/Mg	----	EC100A/WT	mg/L		332	----	----	----	----	----	----
pH	----	E108/WT	pH units		8.17	----	----	----	----	----	----
Solids, total dissolved [TDS]	----	E162/WT	mg/L		367 DLDS	----	----	----	----	----	----
Solids, total dissolved [TDS], calculated	----	EC103A/WT	mg/L		395	----	----	----	----	----	----
Turbidity	----	E121/WT	NTU		0.78	----	----	----	----	----	----
Langelier index (@ 20°C)	----	EC105A/WT	-		0.970	----	----	----	----	----	----
Langelier index (@ 4°C)	----	EC105A/WT	-		0.723	----	----	----	----	----	----
pH, saturation (@ 20°C)	----	EC105A/WT	pH units		7.20	----	----	----	----	----	----
pH, saturation (@ 4°C)	----	EC105A/WT	pH units		7.45	----	----	----	----	----	----
Anions and Nutrients											
Ammonia, total (as N)	7664-41-7	E298/WT	mg/L		0.0212	----	----	----	----	----	----

Matrix: Water				Client sample ID	BH4	----	----	----	----	----	----
				Client sampling date / time	23-Jun-2025 16:00	----	----	----	----	----	----
				Sub-Matrix	Groundwater	----	----	----	----	----	----
Analyte	CAS Number	Method/Lab	Unit		WT2516470-001	----	----	----	----	----	----
					Result	----	----	----	----	----	----
Anions and Nutrients											
Bromide	24959-67-9	E235.Br/WT	mg/L		<0.10	----	----	----	----	----	----
Chloride	16887-00-6	E235.Cl/WT	mg/L		18.6	----	----	----	----	----	----
Fluoride	16984-48-8	E235.F/WT	mg/L		0.103	----	----	----	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3/WT	mg/L		9.40	----	----	----	----	----	----
Nitrate + Nitrite (as N)	----	EC235.N+N/WT	mg/L		9.43	----	----	----	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2/WT	mg/L		0.034	----	----	----	----	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/WT	mg/L		0.0026	----	----	----	----	----	----
Sulfate (as SO4)	14808-79-8	E235.SO4/WT	mg/L		23.0	----	----	----	----	----	----
Organic / Inorganic Carbon											
Carbon, dissolved organic [DOC]	----	E358-L/WT	mg/L		1.53	----	----	----	----	----	----
Metals											
Sodium adsorption ratio [SAR]	----	EC102/WT	-		0.16	----	----	----	----	----	----
Ion Balance											
Anion sum	----	EC101A/WT	meq/L		6.64	----	----	----	----	----	----
Cation sum (total)	----	EC101A/WT	meq/L		7.02	----	----	----	----	----	----
Ion balance (APHA)	----	EC101A/WT	%		2.78	----	----	----	----	----	----
Ion balance (cations/anions)	----	EC101A/WT	%		106	----	----	----	----	----	----
Total Metals											
Aluminum, total	7429-90-5	E420/WT	mg/L		0.0067	----	----	----	----	----	----
Antimony, total	7440-36-0	E420/WT	mg/L		0.00013	----	----	----	----	----	----

Matrix: Water				Client sample ID	BH4	----	----	----	----	----	----
				Client sampling date / time	23-Jun-2025 16:00	----	----	----	----	----	----
				Sub-Matrix	Groundwater	----	----	----	----	----	----
Analyte	CAS Number	Method/Lab	Unit		WT2516470-001	----	----	----	----	----	----
					Result	----	----	----	----	----	----
Total Metals											
Arsenic, total	7440-38-2	E420/WT	mg/L		0.00048	----	----	----	----	----	----
Barium, total	7440-39-3	E420/WT	mg/L		0.0475	----	----	----	----	----	----
Beryllium, total	7440-41-7	E420/WT	mg/L		<0.000020	----	----	----	----	----	----
Bismuth, total	7440-69-9	E420/WT	mg/L		<0.000050	----	----	----	----	----	----
Boron, total	7440-42-8	E420/WT	mg/L		0.026	----	----	----	----	----	----
Cadmium, total	7440-43-9	E420/WT	mg/L		<0.0000050	----	----	----	----	----	----
Calcium, total	7440-70-2	E420/WT	mg/L		71.0	----	----	----	----	----	----
Cesium, total	7440-46-2	E420/WT	mg/L		<0.000010	----	----	----	----	----	----
Chromium, total	7440-47-3	E420/WT	mg/L		<0.00050	----	----	----	----	----	----
Cobalt, total	7440-48-4	E420/WT	mg/L		0.00010	----	----	----	----	----	----
Copper, total	7440-50-8	E420/WT	mg/L		0.00063	----	----	----	----	----	----
Iron, total	7439-89-6	E420/WT	mg/L		<0.010	----	----	----	----	----	----
Lead, total	7439-92-1	E420/WT	mg/L		<0.000050	----	----	----	----	----	----
Lithium, total	7439-93-2	E420/WT	mg/L		0.0047	----	----	----	----	----	----
Magnesium, total	7439-95-4	E420/WT	mg/L		37.5	----	----	----	----	----	----
Manganese, total	7439-96-5	E420/WT	mg/L		0.0193	----	----	----	----	----	----
Molybdenum, total	7439-98-7	E420/WT	mg/L		0.00268	----	----	----	----	----	----
Nickel, total	7440-02-0	E420/WT	mg/L		0.00060	----	----	----	----	----	----
Phosphorus, total	7723-14-0	E420/WT	mg/L		<0.050	----	----	----	----	----	----
Potassium, total	7440-09-7	E420/WT	mg/L		3.82	----	----	----	----	----	----

Matrix: Water

Analyte	CAS Number	Method/Lab	Unit	Client sample ID: BH4	----	----	----	----	----	----
				Client sampling date / time: 23-Jun-2025 16:00	----	----	----	----	----	----
				Sub-Matrix: Groundwater	----	----	----	----	----	----
				WT2516470-001	----	----	----	----	----	----
				Result	----	----	----	----	----	----
Total Metals										
Rubidium, total	7440-17-7	E420/WT	mg/L	0.00090	----	----	----	----	----	----
Selenium, total	7782-49-2	E420/WT	mg/L	0.000351	----	----	----	----	----	----
Silicon (as SiO2), total	7631-86-9	EC420.SiO2/WT	mg/L	16.4	----	----	----	----	----	----
Silicon, total	7440-21-3	E420/WT	mg/L	7.69	----	----	----	----	----	----
Silver, total	7440-22-4	E420/WT	mg/L	<0.000010	----	----	----	----	----	----
Sodium, total	7440-23-5	E420/WT	mg/L	6.86	----	----	----	----	----	----
Strontium, total	7440-24-6	E420/WT	mg/L	0.199	----	----	----	----	----	----
Sulfur, total	7704-34-9	E420/WT	mg/L	9.48	----	----	----	----	----	----
Tellurium, total	13494-80-9	E420/WT	mg/L	<0.00020	----	----	----	----	----	----
Thallium, total	7440-28-0	E420/WT	mg/L	<0.000010	----	----	----	----	----	----
Thorium, total	7440-29-1	E420/WT	mg/L	<0.00010	----	----	----	----	----	----
Tin, total	7440-31-5	E420/WT	mg/L	<0.00010	----	----	----	----	----	----
Titanium, total	7440-32-6	E420/WT	mg/L	<0.00030	----	----	----	----	----	----
Tungsten, total	7440-33-7	E420/WT	mg/L	<0.00010	----	----	----	----	----	----
Uranium, total	7440-61-1	E420/WT	mg/L	0.000940	----	----	----	----	----	----
Vanadium, total	7440-62-2	E420/WT	mg/L	0.00073	----	----	----	----	----	----
Zinc, total	7440-66-6	E420/WT	mg/L	<0.0030	----	----	----	----	----	----
Zirconium, total	7440-67-7	E420/WT	mg/L	<0.00020	----	----	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Summary of Guideline Limits

Analyte	CAS Number	Unit	ONPWQO IPWQOT2<100	ONPWQO IPWQOT2>100	ONPWQO PWQOT2<100	ONPWQO PWQOT2>100			
Sample Preparation									
Dissolved carbon filtration location	----	-	----	----	----	----	----	----	----
Physical Tests									
Alkalinity, bicarbonate (as HCO3)	71-52-3	mg/L	----	----	----	----	----	----	----
Alkalinity, carbonate (as CO3)	3812-32-6	mg/L	----	----	----	----	----	----	----
Alkalinity, hydroxide (as OH)	14280-30-9	mg/L	----	----	----	----	----	----	----
Alkalinity, total (as CaCO3)		mg/L	----	----	----	----	----	----	----
Colour, apparent		CU	----	----	----	----	----	----	----
Conductivity	----	µS/cm	----	----	----	----	----	----	----
Hardness (as CaCO3), from total Ca/Mg		mg/L	----	----	----	----	----	----	----
pH	----	pH units	----	----	**6.5 - 8.5 pH units**	**6.5 - 8.5 pH units**	----	----	----
Solids, total dissolved [TDS]		mg/L	----	----	----	----	----	----	----
Solids, total dissolved [TDS], calculated		mg/L	----	----	----	----	----	----	----
Turbidity	----	NTU	----	----	----	----	----	----	----
Langelier index (@ 20°C)		-	----	----	----	----	----	----	----
Langelier index (@ 4°C)		-	----	----	----	----	----	----	----
pH, saturation (@ 20°C)	----	pH units	----	----	----	----	----	----	----
pH, saturation (@ 4°C)	----	pH units	----	----	----	----	----	----	----
Anions and Nutrients									
Ammonia, total (as N)	7664-41-7	mg/L	----	----	----	----	----	----	----
Bromide	24959-67-9	mg/L	----	----	----	----	----	----	----
Chloride	16887-00-6	mg/L	----	----	----	----	----	----	----
Fluoride	16984-48-8	mg/L	----	----	----	----	----	----	----
Nitrate (as N)	14797-55-8	mg/L	----	----	----	----	----	----	----

Nitrate + Nitrite (as N)		mg/L	----	----	----	----	----	----	----
Nitrite (as N)	14797-65-0	mg/L	----	----	----	----	----	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	mg/L	----	----	----	----	----	----	----
Sulfate (as SO4)	14808-79-8	mg/L	----	----	----	----	----	----	----
Organic / Inorganic Carbon									
Carbon, dissolved organic [DOC]		mg/L	----	----	----	----	----	----	----
Metals									
Sodium adsorption ratio [SAR]		-	----	----	----	----	----	----	----
Ion Balance									
Anion sum		meq/L	----	----	----	----	----	----	----
Cation sum (total)	----	meq/L	----	----	----	----	----	----	----
Ion balance (APHA)	----	%	----	----	----	----	----	----	----
Ion balance (cations/anions)	----	%	----	----	----	----	----	----	----
Total Metals									
Aluminum, total	7429-90-5	mg/L	**0.075 mg/L**	**0.075 mg/L**	----	----	----	----	----
Antimony, total	7440-36-0	mg/L	**0.02 mg/L**	**0.02 mg/L**	----	----	----	----	----
Arsenic, total	7440-38-2	mg/L	**0.005 mg/L**	**0.005 mg/L**	**0.1 mg/L**	**0.1 mg/L**	----	----	----
Barium, total	7440-39-3	mg/L	----	----	----	----	----	----	----
Beryllium, total	7440-41-7	mg/L	----	----	**1.1 mg/L**	**0.011 mg/L**	----	----	----
Bismuth, total	7440-69-9	mg/L	----	----	----	----	----	----	----
Boron, total	7440-42-8	mg/L	----	----	----	----	----	----	----
Cadmium, total	7440-43-9	mg/L	**0.0001 mg/L**	**0.0005 mg/L**	**0.0002 mg/L**	**0.0002 mg/L**	----	----	----
Calcium, total	7440-70-2	mg/L	----	----	----	----	----	----	----
Cesium, total	7440-46-2	mg/L	----	----	----	----	----	----	----
Chromium, total	7440-47-3	mg/L	----	----	----	----	----	----	----
Cobalt, total	7440-48-4	mg/L	**0.0009 mg/L**	**0.0009 mg/L**	----	----	----	----	----
Copper, total	7440-50-8	mg/L	**0.001 mg/L**	**0.005 mg/L**	**0.005 mg/L**	**0.005 mg/L**	----	----	----
Iron, total	7439-89-6	mg/L	----	----	**0.3 mg/L**	**0.3 mg/L**	----	----	----

Lead, total	7439-92-1	mg/L	**0.001 mg/L**	**0.005 mg/L**	**0.005 mg/L**	**0.025 mg/L**	----	----	----
Lithium, total	7439-93-2	mg/L	----	----	----	----	----	----	----
Magnesium, total	7439-95-4	mg/L	----	----	----	----	----	----	----
Manganese, total	7439-96-5	mg/L	----	----	----	----	----	----	----
Molybdenum, total	7439-98-7	mg/L	**0.04 mg/L**	**0.04 mg/L**	----	----	----	----	----
Nickel, total	7440-02-0	mg/L	**0.025 mg/L**	**0.025 mg/L**	**0.025 mg/L**	**0.025 mg/L**	----	----	----
Phosphorus, total	7723-14-0	mg/L	**0.01 mg/L**	**0.01 mg/L**	----	----	----	----	----
Potassium, total	7440-09-7	mg/L	----	----	----	----	----	----	----
Rubidium, total	7440-17-7	mg/L	----	----	----	----	----	----	----
Selenium, total	7782-49-2	mg/L	**0.1 mg/L**	----	**0.1 mg/L**	**0.1 mg/L**	----	----	----
Silicon (as SiO2), total	7631-86-9	mg/L	----	----	----	----	----	----	----
Silicon, total	7440-21-3	mg/L	----	----	----	----	----	----	----
Silver, total	7440-22-4	mg/L	**0.0001 mg/L**	**0.0001 mg/L**	**0.0001 mg/L**	**0.0001 mg/L**	----	----	----
Sodium, total	7440-23-5	mg/L	----	----	----	----	----	----	----
Strontium, total	7440-24-6	mg/L	----	----	----	----	----	----	----
Sulfur, total	7704-34-9	mg/L	----	----	----	----	----	----	----
Tellurium, total	13494-80-9	mg/L	----	----	----	----	----	----	----
Thallium, total	7440-28-0	mg/L	**0.0003 mg/L**	**0.0003 mg/L**	----	----	----	----	----
Thorium, total	7440-29-1	mg/L	----	----	----	----	----	----	----
Tin, total	7440-31-5	mg/L	----	----	----	----	----	----	----
Titanium, total	7440-32-6	mg/L	----	----	----	----	----	----	----
Tungsten, total	7440-33-7	mg/L	**0.03 mg/L**	**0.03 mg/L**	----	----	----	----	----
Uranium, total	7440-61-1	mg/L	**0.005 mg/L**	**0.005 mg/L**	----	----	----	----	----
Vanadium, total	7440-62-2	mg/L	**0.006 mg/L**	**0.006 mg/L**	----	----	----	----	----
Zinc, total	7440-66-6	mg/L	**0.02 mg/L**	**0.02 mg/L**	**0.03 mg/L**	**0.03 mg/L**	----	----	----
Zirconium, total	7440-67-7	mg/L	**0.004 mg/L**	**0.004 mg/L**	----	----	----	----	----

Key:

ONPWQO		Ontario PWQO (Provincial Water Quality Objectives, JULY, 1994)
	IPWQOT2<100	Surface Water T2 Interim PWQOs (Hardness < 100 mg/L)
	IPWQOT2>100	Surface Water T2 Interim PWQOs (Hardness > 100 mg/L)
	PWQOT2<100	Surface Water T2 PWQOs (Hardness < 100 mg/L)
	PWQOT2>100	Surface Water T2 PWQOs (Hardness > 100 mg/L)

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **WT2516470**	Page	: 1 of 10
Client	: **Planet Engineering Inc.**	Laboratory	: ALS Environmental - Waterloo
Contact	: Aayush Panchal	Account Manager	: Amanda Overholster
Address	: 2179 Dunwin Drive Unit 4 Mississauga ON Canada L5L 1X2	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: ----	Telephone	: 1 416 817 2944
Project	: 2501179DH	Date Samples Received	: 24-Jun-2025 11:45
PO	: ----	Issue Date	: 02-Jul-2025 16:41
C-O-C number	: 23-1124445		
Sampler	: AP		
Site	: 127 Line 1, Elora		
Quote number	: 2025 SOA		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	*Method*	*Sampling Date*	*Extraction / Preparation*				*Analysis*			
			Preparation Date	*Holding Times* Rec	*Holding Times* Actual	*Eval*	*Analysis Date*	*Holding Times* Rec	*Holding Times* Actual	*Eval*
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) [ON MECP]										
BH4	E298	23-Jun-2025	26-Jun-2025	28 days	3 days	✓	27-Jun-2025	28 days	3 days	✓
Anions and Nutrients : Bromide in Water by IC										
HDPE [ON MECP]										
BH4	E235.Br	23-Jun-2025	30-Jun-2025	28 days	7 days	✓	30-Jun-2025	28 days	7 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE [ON MECP]										
BH4	E235.Cl	23-Jun-2025	30-Jun-2025	28 days	7 days	✓	30-Jun-2025	28 days	7 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE [ON MECP]										
BH4	E378-U	23-Jun-2025	26-Jun-2025	7 days	3 days	✓	27-Jun-2025	7 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE [ON MECP]										
BH4	E235.F	23-Jun-2025	30-Jun-2025	28 days	7 days	✓	30-Jun-2025	28 days	7 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE [ON MECP]										
BH4	E235.NO3	23-Jun-2025	30-Jun-2025	7 days	7 days	✓	30-Jun-2025	7 days	7 days	✓
Anions and Nutrients : Nitrite in Water by IC										
HDPE [ON MECP]										
BH4	E235.NO2	23-Jun-2025	30-Jun-2025	7 days	7 days	✓	30-Jun-2025	7 days	7 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE [ON MECP]										
BH4	E235.SO4	23-Jun-2025	30-Jun-2025	28 days	7 days	✓	30-Jun-2025	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
HDPE [ON MECP]										
BH4	E358-L	23-Jun-2025	26-Jun-2025	3 days	3 days	✓	27-Jun-2025	28 days	1 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE [ON MECP]										
BH4	E290	23-Jun-2025	26-Jun-2025	14 days	3 days	✓	27-Jun-2025	14 days	3 days	✓
Physical Tests : Colour (Apparent) by Spectrometer										
HDPE [ON MECP]										
BH4	E330	23-Jun-2025	----	----	----		02-Jul-2025	48 hrs	211 hrs	× EHT
Physical Tests : Conductivity in Water										
HDPE [ON MECP]										
BH4	E100	23-Jun-2025	26-Jun-2025	28 days	3 days	✓	27-Jun-2025	28 days	3 days	✓
Physical Tests : pH by Meter										
HDPE [ON MECP]										
BH4	E108	23-Jun-2025	26-Jun-2025	14 days	3 days	✓	27-Jun-2025	14 days	3 days	✓
Physical Tests : TDS by Gravimetry										
HDPE [ON MECP]										
BH4	E162	23-Jun-2025	----	----	----		27-Jun-2025	7 days	4 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE [ON MECP]										
BH4	E121	23-Jun-2025	----	----	----		25-Jun-2025	48 hrs	48 hrs	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
BH4	E420	23-Jun-2025	25-Jun-2025	180 days	2 days	✓	25-Jun-2025	180 days	2 days	✓

Legend & Qualifier Definitions

EHT: Exceeded ALS recommended hold time prior to analysis.

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Conductivity in Water	E100	2075606	1	11	9.0	5.0	✓
pH by Meter	E108	2075605	1	17	5.8	5.0	✓
Turbidity by Nephelometry	E121	2074622	1	1	100.0	5.0	✓
TDS by Gravimetry	E162	2078372	1	18	5.5	5.0	✓
Bromide in Water by IC	E235.Br	2075603	1	3	33.3	5.0	✓
Chloride in Water by IC	E235.Cl	2075599	1	12	8.3	5.0	✓
Fluoride in Water by IC	E235.F	2075600	1	7	14.2	5.0	✓
Nitrite in Water by IC	E235.NO2	2075601	1	16	6.2	5.0	✓
Nitrate in Water by IC	E235.NO3	2075598	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	2075602	1	9	11.1	5.0	✓
Alkalinity Species by Titration	E290	2075607	1	13	7.6	5.0	✓
Ammonia by Fluorescence	E298	2077023	1	20	5.0	5.0	✓
Colour (Apparent) by Spectrometer	E330	2084849	1	17	5.8	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	2076766	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	2075604	1	13	7.6	5.0	✓
Total Metals in Water by CRC ICPMS	E420	2072728	1	20	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Conductivity in Water	E100	2075606	1	11	9.0	5.0	✓
pH by Meter	E108	2075605	1	17	5.8	5.0	✓
Turbidity by Nephelometry	E121	2074622	1	1	100.0	5.0	✓
TDS by Gravimetry	E162	2078372	1	18	5.5	5.0	✓
Bromide in Water by IC	E235.Br	2075603	1	3	33.3	5.0	✓
Chloride in Water by IC	E235.Cl	2075599	1	12	8.3	5.0	✓
Fluoride in Water by IC	E235.F	2075600	1	7	14.2	5.0	✓
Nitrite in Water by IC	E235.NO2	2075601	1	16	6.2	5.0	✓
Nitrate in Water by IC	E235.NO3	2075598	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	2075602	1	9	11.1	5.0	✓
Alkalinity Species by Titration	E290	2075607	1	13	7.6	5.0	✓
Ammonia by Fluorescence	E298	2077023	1	20	5.0	5.0	✓
Colour (Apparent) by Spectrometer	E330	2084849	1	17	5.8	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	2076766	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	2075604	1	13	7.6	5.0	✓
Total Metals in Water by CRC ICPMS	E420	2072728	1	20	5.0	5.0	✓
Method Blanks (MB)							
Conductivity in Water	E100	2075606	1	11	9.0	5.0	✓

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Method Blanks (MB) - Continued							
Turbidity by Nephelometry	E121	2074622	1	1	100.0	5.0	✓
TDS by Gravimetry	E162	2078372	1	18	5.5	5.0	✓
Bromide in Water by IC	E235.Br	2075603	1	3	33.3	5.0	✓
Chloride in Water by IC	E235.Cl	2075599	1	12	8.3	5.0	✓
Fluoride in Water by IC	E235.F	2075600	1	7	14.2	5.0	✓
Nitrite in Water by IC	E235.NO2	2075601	1	16	6.2	5.0	✓
Nitrate in Water by IC	E235.NO3	2075598	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	2075602	1	9	11.1	5.0	✓
Alkalinity Species by Titration	E290	2075607	1	13	7.6	5.0	✓
Ammonia by Fluorescence	E298	2077023	1	20	5.0	5.0	✓
Colour (Apparent) by Spectrometer	E330	2084849	1	17	5.8	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	2076766	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	2075604	1	13	7.6	5.0	✓
Total Metals in Water by CRC ICPMS	E420	2072728	1	20	5.0	5.0	✓
Matrix Spikes (MS)							
Bromide in Water by IC	E235.Br	2075603	1	3	33.3	5.0	✓
Chloride in Water by IC	E235.Cl	2075599	1	12	8.3	5.0	✓
Fluoride in Water by IC	E235.F	2075600	1	7	14.2	5.0	✓
Nitrite in Water by IC	E235.NO2	2075601	1	16	6.2	5.0	✓
Nitrate in Water by IC	E235.NO3	2075598	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	2075602	1	9	11.1	5.0	✓
Ammonia by Fluorescence	E298	2077023	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	2076766	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	2075604	1	13	7.6	5.0	✓
Total Metals in Water by CRC ICPMS	E420	2072728	1	20	5.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 ALS Environmental - Waterloo	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 ALS Environmental - Waterloo	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 ALS Environmental - Waterloo	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TDS by Gravimetry	E162 ALS Environmental - Waterloo	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC	E235.Br ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC	E235.Cl ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC	E235.NO2 ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC	E235.NO3 ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 ALS Environmental - Waterloo	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 ALS Environmental - Waterloo	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Colour (Apparent) by Spectrometer	E330 ALS Environmental - Waterloo	Water	APHA 2120 C (mod)	Colour (Apparent) is measured in an unfiltered sample spectrophotometrically using the single wavelength method. The colour contribution of settleable solids are not included in the result. This method is intended for potable waters. Colour measurements can be highly pH dependent, and apply to the pH of the sample as received (at time of testing), without pH adjustment.
Dissolved Organic Carbon by Combustion (Low Level)	E358-L ALS Environmental - Waterloo	Water	APHA 5310 B (mod)	Dissolved Organic Carbon (Non-Purgeable), also known as NPOC (dissolved), is a direct measurement of DOC after a filtered (0.45 micron) sample has been acidified and purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of DC (dissolved carbon) is comprised of IC (which is common), this method is more accurate and more reliable than the DOC by subtraction method (i.e. DC minus DIC).
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U ALS Environmental - Waterloo	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total Metals in Water by CRC ICPMS	E420 ALS Environmental - Waterloo	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Hardness (Calculated) from Total Ca/Mg	EC100A ALS Environmental - Waterloo	Water	APHA 2340B	“Hardness (as CaCO3), from total Ca/Mg” is calculated from the sum of total Calcium and Magnesium concentrations, expressed as CaCO3 equivalents. “Total Hardness” refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because hardness is a property of water due to dissolved divalent cations. In non-turbid waters, Hardness from total Ca/Mg is normally comparable to Dissolved Hardness, but may be biased high if particulate forms of Ca or Mg are present.
Ion Balance using Total Metals	EC101A ALS Environmental - Waterloo	Water	APHA 1030E	Cation Sum (using total metals), Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Sodium Adsorption Ratio [SAR] from Total Metals	EC102 ALS Environmental - Waterloo	Water	CCME Sodium Adsorption Ratio (SAR)	The Sodium Adsorption Ratio (SAR) for a water sample is calculated from the Sodium, Calcium, and Magnesium concentrations of the water, using the same calculations as would be used for a sediment paste extract.
TDS calculated from conductivity	EC103A ALS Environmental - Waterloo	Water	APHA 1030 E	Total dissolved solids (as mg/L) can be estimated by multiplying electrical conductance (in umhos/cm) by 0.65.
Saturation Index using Laboratory pH (Ca-T)	EC105A ALS Environmental - Waterloo	Water	APHA 2330B	Langelier Index provides an indication of scale formation potential at a given pH and temperature, and is calculated as per APHA 2330B Saturation Index. Positive values indicate oversaturation with respect to CaCO3. Negative values indicate undersaturation of CaCO3. This calculation uses laboratory pH measurements and provides estimates of Langelier Index at temperatures of 4, 15, 20, 25, 66, and 77°C. Ryznar Stability Index is an alternative index used for scale formation and corrosion potential.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N ALS Environmental - Waterloo	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).
Total Silicon as Silica (Calculation)	EC420.SiO2 ALS Environmental - Waterloo	Water	N/A	Total Silicon (as SiO2) is a calculated parameter. Total Silicon (as SiO2 mg/L) = 2.139 x Total Silicon (mg/L).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 ALS Environmental - Waterloo	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Preparation for Dissolved Organic Carbon for Combustion	EP358 ALS Environmental - Waterloo	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon

QUALITY CONTROL REPORT

Work Order	: **WT2516470**	Page	: 1 of 13
Client	: Planet Engineering Inc.	Laboratory	: ALS Environmental - Waterloo
Contact	: Aayush Panchal	Account Manager	: Amanda Overholster
Address	: 2179 Dunwin Drive Unit 4 Mississauga ON Canada L5L 1X2	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: ----	Telephone	: 1 416 817 2944
Project	: 2501179DH	Date Samples Received	: 24-Jun-2025 11:45
PO	: ----	Date Analysis Commenced	: 25-Jun-2025
C-O-C number	: 23-1124445	Issue Date	: 02-Jul-2025 16:41
Sampler	: AP		
Site	: 127 Line 1, Elora		
Quote number	: 2025 SOA		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Nik Perkio	Senior Analyst	Waterloo Centralized Prep, Waterloo, Ontario
Nik Perkio	Senior Analyst	Waterloo Inorganics, Waterloo, Ontario
Nik Perkio	Senior Analyst	Waterloo Metals, Waterloo, Ontario
Walt Kippenhuck	Supervisor - Inorganic	Waterloo Inorganics, Waterloo, Ontario

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 2074622)											
WT2516470-001	BH4	Turbidity	----	E121	0.10	NTU	0.78	0.77	0.007	Diff <2x LOR	----
Physical Tests (QC Lot: 2075605)											
WT2516447-001	Anonymous	pH	----	E108	0.10	pH units	7.61	7.64	0.393%	4%	----
Physical Tests (QC Lot: 2075606)											
WT2516447-001	Anonymous	Conductivity	----	E100	1.0	µS/cm	729	715	1.94%	10%	----
Physical Tests (QC Lot: 2075607)											
WT2516447-001	Anonymous	Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	396	396	0.101%	20%	----
Physical Tests (QC Lot: 2078372)											
WT2516723-001	Anonymous	Solids, total dissolved [TDS]	----	E162	20	mg/L	268	261	2.46%	20%	----
Physical Tests (QC Lot: 2084849)											
CG2508558-001	Anonymous	Colour, apparent	----	E330	2.0	CU	5.8	5.4	0.4	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 2075598)											
WT2516470-001	BH4	Nitrate (as N)	14797-55-8	E235.NO3	0.020	mg/L	9.40	9.41	0.126%	20%	----
Anions and Nutrients (QC Lot: 2075599)											
WT2516470-001	BH4	Chloride	16887-00-6	E235.Cl	0.50	mg/L	18.6	18.6	0.0207%	20%	----
Anions and Nutrients (QC Lot: 2075600)											
WT2516470-001	BH4	Fluoride	16984-48-8	E235.F	0.020	mg/L	0.103	0.101	0.002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 2075601)											
WT2516470-001	BH4	Nitrite (as N)	14797-65-0	E235.NO2	0.010	mg/L	0.034	0.035	0.0002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 2075602)											
WT2516470-001	BH4	Sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	23.0	23.1	0.275%	20%	----
Anions and Nutrients (QC Lot: 2075603)											
WT2516470-001	BH4	Bromide	24959-67-9	E235.Br	0.10	mg/L	<0.10	<0.10	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 2075604)											
HA2501829-001	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0105	0.0096	9.06%	20%	----
Anions and Nutrients (QC Lot: 2077023)											
BF2500084-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.116	0.116	0.516%	20%	----
Organic / Inorganic Carbon (QC Lot: 2076766)											
TY2506613-008	Anonymous	Carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Total Metals (QC Lot: 2072728)											

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 2072728) - continued											
WT2516362-001	Anonymous	Aluminum, total	7429-90-5	E420	0.0300	mg/L	0.0958	0.0935	0.0023	Diff <2x LOR	----
		Antimony, total	7440-36-0	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Arsenic, total	7440-38-2	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Barium, total	7440-39-3	E420	0.00100	mg/L	0.0250	0.0253	1.24%	20%	----
		Beryllium, total	7440-41-7	E420	0.000200	mg/L	<0.000200	<0.000200	0	Diff <2x LOR	----
		Bismuth, total	7440-69-9	E420	0.000500	mg/L	<0.000500	<0.000500	0	Diff <2x LOR	----
		Boron, total	7440-42-8	E420	0.100	mg/L	<0.100	<0.100	0	Diff <2x LOR	----
		Cadmium, total	7440-43-9	E420	0.0000500	mg/L	<0.0000500	<0.0000500	0	Diff <2x LOR	----
		Calcium, total	7440-70-2	E420	0.500	mg/L	41.7	41.9	0.562%	20%	----
		Cesium, total	7440-46-2	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Chromium, total	7440-47-3	E420	0.00500	mg/L	<0.00500	<0.00500	0	Diff <2x LOR	----
		Cobalt, total	7440-48-4	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Copper, total	7440-50-8	E420	0.00500	mg/L	<0.00500	<0.00500	0	Diff <2x LOR	----
		Iron, total	7439-89-6	E420	0.100	mg/L	<0.100	<0.100	0	Diff <2x LOR	----
		Lead, total	7439-92-1	E420	0.000500	mg/L	<0.000500	<0.000500	0	Diff <2x LOR	----
		Lithium, total	7439-93-2	E420	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
		Magnesium, total	7439-95-4	E420	0.0500	mg/L	11.6	11.5	0.0492%	20%	----
		Manganese, total	7439-96-5	E420	0.00100	mg/L	0.0832	0.0822	1.30%	20%	----
		Molybdenum, total	7439-98-7	E420	0.000500	mg/L	0.00295	0.00270	0.000253	Diff <2x LOR	----
		Nickel, total	7440-02-0	E420	0.00500	mg/L	<0.00500	<0.00500	0	Diff <2x LOR	----
		Phosphorus, total	7723-14-0	E420	0.500	mg/L	<0.500	<0.500	0	Diff <2x LOR	----
		Potassium, total	7440-09-7	E420	0.500	mg/L	17.2	17.4	0.791%	20%	----
		Rubidium, total	7440-17-7	E420	0.00200	mg/L	0.00703	0.00657	0.00046	Diff <2x LOR	----
		Selenium, total	7782-49-2	E420	0.000500	mg/L	<0.000500	<0.000500	0	Diff <2x LOR	----
		Silicon, total	7440-21-3	E420	1.00	mg/L	1.78	1.81	0.03	Diff <2x LOR	----
		Silver, total	7440-22-4	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Sodium, total	7440-23-5	E420	0.500	mg/L	302	304	0.615%	20%	----
		Strontium, total	7440-24-6	E420	0.00200	mg/L	0.408	0.407	0.336%	20%	----
		Sulfur, total	7704-34-9	E420	5.00	mg/L	20.0	19.7	0.29	Diff <2x LOR	----
		Tellurium, total	13494-80-9	E420	0.00200	mg/L	<0.00200	<0.00200	0	Diff <2x LOR	----
		Thallium, total	7440-28-0	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Thorium, total	7440-29-1	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Tin, total	7440-31-5	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Titanium, total	7440-32-6	E420	0.00300	mg/L	<0.00300	<0.00300	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 2072728) - continued											
WT2516362-001	Anonymous	Tungsten, total	7440-33-7	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Uranium, total	7440-61-1	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Vanadium, total	7440-62-2	E420	0.00500	mg/L	<0.00500	<0.00500	0	Diff <2x LOR	----
		Zinc, total	7440-66-6	E420	0.0300	mg/L	<0.0300	<0.0300	0	Diff <2x LOR	----
		Zirconium, total	7440-67-7	E420	0.00200	mg/L	<0.00200	<0.00200	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 2074622)						
Turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 2075606)						
Conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 2075607)						
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 2078372)						
Solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 2084849)						
Colour, apparent	----	E330	2	CU	<2.0	----
Anions and Nutrients (QCLot: 2075598)						
Nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 2075599)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 2075600)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 2075601)						
Nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	<0.010	----
Anions and Nutrients (QCLot: 2075602)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 2075603)						
Bromide	24959-67-9	E235.Br	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 2075604)						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 2077023)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Organic / Inorganic Carbon (QCLot: 2076766)						
Carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 2072728)						
Aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
Barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 2072728) - continued						
Beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
Boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
Calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
Cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
Copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
Iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
Lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
Lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
Phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
Potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
Rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
Silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
Sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
Sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
Tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
Thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
Tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
Tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
Zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 2074622)									
Turbidity	----	E121	0.1	NTU	200 NTU	101	85.0	115	----
Physical Tests (QCLot: 2075605)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 2075606)									
Conductivity	----	E100	1	µS/cm	1410 µS/cm	96.9	90.0	110	----
Physical Tests (QCLot: 2075607)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	150 mg/L	99.6	85.0	115	----
Physical Tests (QCLot: 2078372)									
Solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	100	85.0	115	----
Physical Tests (QCLot: 2084849)									
Colour, apparent	----	E330	2	CU	25 CU	97.0	85.0	115	----
Anions and Nutrients (QCLot: 2075598)									
Nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	2.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 2075599)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 2075600)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 2075601)									
Nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	0.5 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 2075602)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 2075603)									
Bromide	24959-67-9	E235.Br	0.1	mg/L	0.5 mg/L	103	85.0	115	----
Anions and Nutrients (QCLot: 2075604)									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.05 mg/L	98.9	80.0	120	----
Anions and Nutrients (QCLot: 2077023)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	100	85.0	115	----
Organic / Inorganic Carbon (QCLot: 2076766)									
Carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	96.2	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 2072728)									
Aluminum, total	7429-90-5	E420	0.003	mg/L	0.1 mg/L	103	80.0	120	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	0.05 mg/L	106	80.0	120	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	0.05 mg/L	108	80.0	120	----
Barium, total	7440-39-3	E420	0.0001	mg/L	0.012 mg/L	108	80.0	120	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	0.005 mg/L	101	80.0	120	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	0.05 mg/L	103	80.0	120	----
Boron, total	7440-42-8	E420	0.01	mg/L	0.05 mg/L	96.7	80.0	120	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	0.005 mg/L	102	80.0	120	----
Calcium, total	7440-70-2	E420	0.05	mg/L	2.5 mg/L	102	80.0	120	----
Cesium, total	7440-46-2	E420	0.00001	mg/L	0.002 mg/L	104	80.0	120	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	0.012 mg/L	103	80.0	120	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	0.012 mg/L	101	80.0	120	----
Copper, total	7440-50-8	E420	0.0005	mg/L	0.012 mg/L	99.7	80.0	120	----
Iron, total	7439-89-6	E420	0.01	mg/L	0.05 mg/L	101	80.0	120	----
Lead, total	7439-92-1	E420	0.00005	mg/L	0.025 mg/L	104	80.0	120	----
Lithium, total	7439-93-2	E420	0.001	mg/L	0.012 mg/L	97.6	80.0	120	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	2.5 mg/L	104	80.0	120	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	0.012 mg/L	102	80.0	120	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.012 mg/L	104	80.0	120	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	0.025 mg/L	101	80.0	120	----
Phosphorus, total	7723-14-0	E420	0.05	mg/L	0.5 mg/L	106	80.0	120	----
Potassium, total	7440-09-7	E420	0.05	mg/L	2.5 mg/L	104	80.0	120	----
Rubidium, total	7440-17-7	E420	0.0002	mg/L	0.005 mg/L	108	80.0	120	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	0.05 mg/L	102	80.0	120	----
Silicon, total	7440-21-3	E420	0.1	mg/L	0.5 mg/L	107	80.0	120	----
Silver, total	7440-22-4	E420	0.00001	mg/L	0.005 mg/L	102	80.0	120	----
Sodium, total	7440-23-5	E420	0.05	mg/L	2.5 mg/L	101	80.0	120	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	0.012 mg/L	104	80.0	120	----
Sulfur, total	7704-34-9	E420	0.5	mg/L	2.5 mg/L	105	80.0	120	----
Tellurium, total	13494-80-9	E420	0.0002	mg/L	0.005 mg/L	102	80.0	120	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	0.05 mg/L	104	80.0	120	----
Thorium, total	7440-29-1	E420	0.0001	mg/L	0.005 mg/L	102	80.0	120	----
Tin, total	7440-31-5	E420	0.0001	mg/L	0.025 mg/L	104	80.0	120	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	0.012 mg/L	102	80.0	120	----
Tungsten, total	7440-33-7	E420	0.0001	mg/L	0.005 mg/L	105	80.0	120	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	0 mg/L	104	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Target Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 2072728) - continued									
Vanadium, total	7440-62-2	E420	0.0005	mg/L	0.025 mg/L	103	80.0	120	----
Zinc, total	7440-66-6	E420	0.003	mg/L	0.025 mg/L	104	80.0	120	----
Zirconium, total	7440-67-7	E420	0.0002	mg/L	0.005 mg/L	103	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 2075598)										
WT2516470-001	BH4	Nitrate (as N)	14797-55-8	E235.NO3	ND mg/L	----	ND	75.0	125	----
Anions and Nutrients (QCLot: 2075599)										
WT2516470-001	BH4	Chloride	16887-00-6	E235.Cl	97.2 mg/L	100 mg/L	97.2	75.0	125	----
Anions and Nutrients (QCLot: 2075600)										
WT2516470-001	BH4	Fluoride	16984-48-8	E235.F	0.919 mg/L	1 mg/L	91.9	75.0	125	----
Anions and Nutrients (QCLot: 2075601)										
WT2516470-001	BH4	Nitrite (as N)	14797-65-0	E235.NO2	0.491 mg/L	0.5 mg/L	98.1	75.0	125	----
Anions and Nutrients (QCLot: 2075602)										
WT2516470-001	BH4	Sulfate (as SO4)	14808-79-8	E235.SO4	97.0 mg/L	100 mg/L	97.0	75.0	125	----
Anions and Nutrients (QCLot: 2075603)										
WT2516470-001	BH4	Bromide	24959-67-9	E235.Br	0.52 mg/L	0.5 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 2075604)										
HA2501829-001	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0183 mg/L	0.02 mg/L	93.5	70.0	130	----
Anions and Nutrients (QCLot: 2077023)										
BF2500084-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	ND mg/L	----	ND	75.0	125	----
Organic / Inorganic Carbon (QCLot: 2076766)										
TY2506613-008	Anonymous	Carbon, dissolved organic [DOC]	----	E358-L	4.69 mg/L	5 mg/L	93.8	70.0	130	----
Total Metals (QCLot: 2072728)										
WT2516365-001	Anonymous	Aluminum, total	7429-90-5	E420	ND mg/L	----	ND	70.0	130	----
		Antimony, total	7440-36-0	E420	0.0524 mg/L	0.05 mg/L	105	70.0	130	----
		Arsenic, total	7440-38-2	E420	0.0559 mg/L	0.05 mg/L	112	70.0	130	----
		Barium, total	7440-39-3	E420	ND mg/L	----	ND	70.0	130	----
		Beryllium, total	7440-41-7	E420	0.00496 mg/L	0.005 mg/L	99.3	70.0	130	----
		Bismuth, total	7440-69-9	E420	0.0461 mg/L	0.05 mg/L	92.3	70.0	130	----
		Boron, total	7440-42-8	E420	ND mg/L	----	ND	70.0	130	----
		Cadmium, total	7440-43-9	E420	0.00481 mg/L	0.005 mg/L	96.1	70.0	130	----
		Calcium, total	7440-70-2	E420	ND mg/L	----	ND	70.0	130	----
		Cesium, total	7440-46-2	E420	0.00259 mg/L	0.002 mg/L	104	70.0	130	----
		Chromium, total	7440-47-3	E420	0.0127 mg/L	0.012 mg/L	102	70.0	130	----
		Cobalt, total	7440-48-4	E420	0.0124 mg/L	0.012 mg/L	99.3	70.0	130	----
		Copper, total	7440-50-8	E420	ND mg/L	----	ND	70.0	130	----
		Iron, total	7439-89-6	E420	ND mg/L	----	ND	70.0	130	----
		Lead, total	7439-92-1	E420	0.0238 mg/L	0.025 mg/L	95.4	70.0	130	----
		Lithium, total	7439-93-2	E420	0.0120 mg/L	0.012 mg/L	96.2	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 2072728) - continued										
WT2516365-001	Anonymous	Magnesium, total	7439-95-4	E420	ND mg/L	----	ND	70.0	130	----
		Manganese, total	7439-96-5	E420	ND mg/L	----	ND	70.0	130	----
		Molybdenum, total	7439-98-7	E420	0.0133 mg/L	0.012 mg/L	106	70.0	130	----
		Nickel, total	7440-02-0	E420	0.0241 mg/L	0.025 mg/L	96.4	70.0	130	----
		Phosphorus, total	7723-14-0	E420	0.628 mg/L	0.5 mg/L	126	70.0	130	----
		Potassium, total	7440-09-7	E420	ND mg/L	----	ND	70.0	130	----
		Rubidium, total	7440-17-7	E420	ND mg/L	----	ND	70.0	130	----
		Selenium, total	7782-49-2	E420	0.0508 mg/L	0.05 mg/L	102	70.0	130	----
		Silicon, total	7440-21-3	E420	ND mg/L	----	ND	70.0	130	----
		Silver, total	7440-22-4	E420	0.00476 mg/L	0.005 mg/L	95.3	70.0	130	----
		Sodium, total	7440-23-5	E420	ND mg/L	----	ND	70.0	130	----
		Strontium, total	7440-24-6	E420	ND mg/L	----	ND	70.0	130	----
		Sulfur, total	7704-34-9	E420	ND mg/L	----	ND	70.0	130	----
		Tellurium, total	13494-80-9	E420	0.00460 mg/L	0.005 mg/L	92.0	70.0	130	----
		Thallium, total	7440-28-0	E420	0.0474 mg/L	0.05 mg/L	94.8	70.0	130	----
		Thorium, total	7440-29-1	E420	0.00403 mg/L	0.005 mg/L	80.5	70.0	130	----
		Tin, total	7440-31-5	E420	0.0255 mg/L	0.025 mg/L	102	70.0	130	----
		Titanium, total	7440-32-6	E420	ND mg/L	----	ND	70.0	130	----
		Tungsten, total	7440-33-7	E420	0.00520 mg/L	0.005 mg/L	104	70.0	130	----
		Uranium, total	7440-61-1	E420	ND mg/L	----	ND	70.0	130	----
		Vanadium, total	7440-62-2	E420	0.0270 mg/L	0.025 mg/L	108	70.0	130	----
		Zinc, total	7440-66-6	E420	0.0239 mg/L	0.025 mg/L	95.8	70.0	130	----
		Zirconium, total	7440-67-7	E420	0.00459 mg/L	0.005 mg/L	91.9	70.0	130	----

GC-306
MM-120
N-951

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 - 1124445

Page 1 of 1

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

Environmental Division
Waterloo
Work Order Reference
WT2516470

Telephone : +1 519 886 6910

Report To	Contact and company name below will appear on the final report
Company:	Planet eng. Inc
Contact:	Aayush Panchal
Phone:	289-600-2791
Company address below will appear on the final report	
Street:	
City/Province:	
Postal Code:	
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A
☑ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: lab COA@planeteng.ca
Email 2: Kavosh.mohammadi@planeteng.ca
Email 3: aayush.panchal@planeteng.ca

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: Invoice@planeteng.ca
Email 2: Pouriatoo.mohammadi@planeteng.ca

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minin
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minir
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minin
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minin
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge
Additional fees may apply to rush requests on weeke
Date and Time Required for all E&P TATs:
For all tests with rush TATs requested, please

Project Information

ALS Client Code / QUOTE #:
Job / Project #: 2501179 DH
PO / AFE:
LSD: 12-7 Line 1, Elora

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#
Major/Minor Code: Routing Code:
Requisitioner:
Location:

ALS Lab Work Order # (ALS use only): JO
ALS Contact: Sampler: AP

Analysis Re

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	GEM CHEM 3	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	~~ALGREEN DUP~~ BH4	23-6-25	4:05pm	GW		✓			

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO
Are samples for human consumption/ use? ☐ YES ☑ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

PWQOs
Provincial water quality objectives

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☑ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED
Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				4.8			

SHIPMENT RELEASE (client use)

Released by: AP Date: 23/6/2025 Time: 8:20

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by: Date: Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by: AP Date: 24-Jun-25 Time: 11:45

JAN 2023 FRONT

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

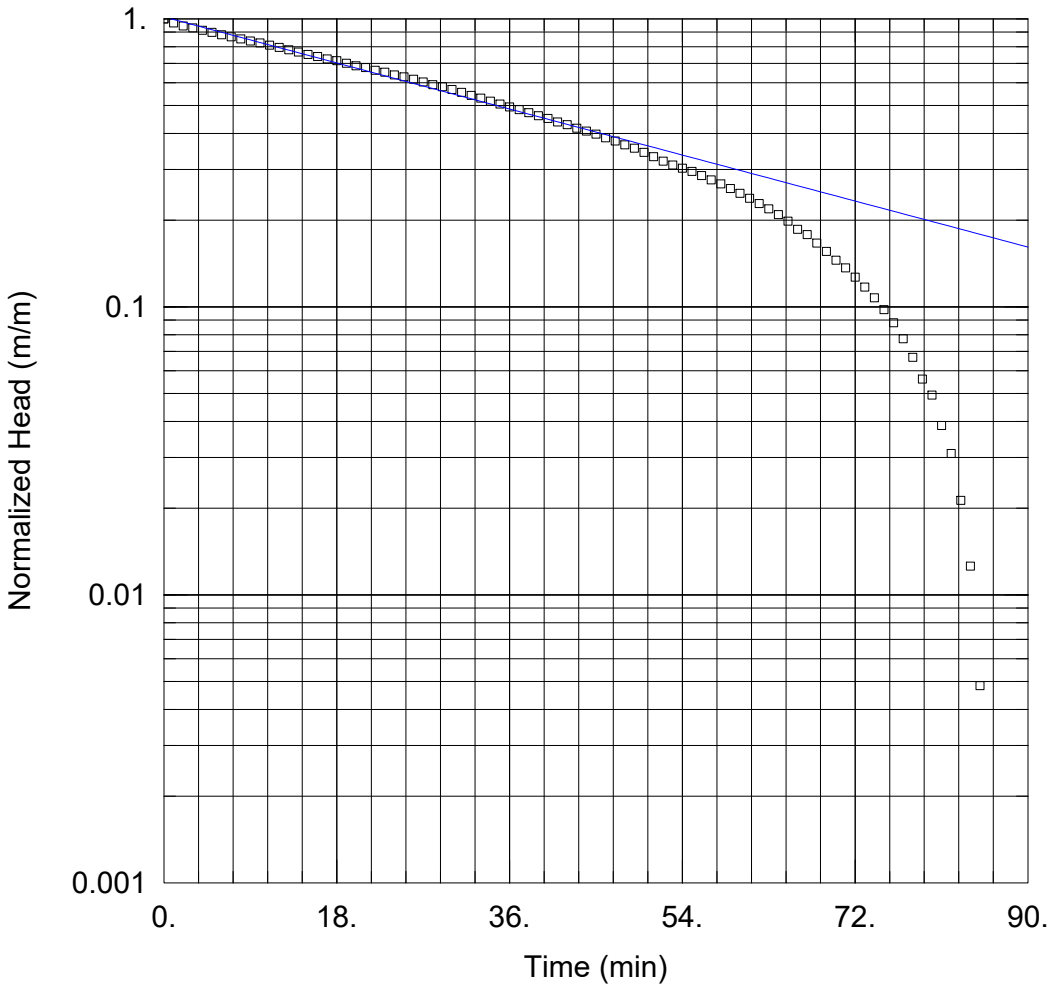
1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form.**

APPENDIX C

In-Situ Hydraulic Conductivity Testing Results

In-Situ Hydraulic Conductivity Test (Rising Head) - BH1 (Trial-1)

Prepared By:	Prepared For:
Planet Engineering Inc.	Elora Greens Inc.
Project:	**Location:**
2501179DH	Elora, ON.



SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 8.655E-6 cm/sec y0 = 1.049 m

AQUIFER DATA

Saturated Thickness: 6. m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH1)

Initial Displacement: 1.033 m
Static Water Column Height: 4.57 m
Total Well Penetration Depth: 4.57 m
Screen Length: 3.05 m
Casing Radius: 0.025 m
Well Radius: 0.1 m

PLANET ENGINEERING Inc.
Consulting Engineers

Data Set: C:\01_HLV2K\Projects\2501179DH\K-tests\BH1-1.aqt
Title: In-Situ Hydraulic Conductivity Test (Rising Head) - BH1 (Trial-1)
Date: 07/09/25
Time: 11:42:06

PROJECT INFORMATION

Company: Planet Engineering Inc.
Client: Elora Greens Inc.
Project: 2501179DH
Location: Elora, ON.
Test Date: 20/06/2025
Test Well: BH1

AQUIFER DATA

Saturated Thickness: 6. m
Anisotropy Ratio (Kz/Kr): 1.

SOLUTION

Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 2.479

VISUAL ESTIMATION RESULTS

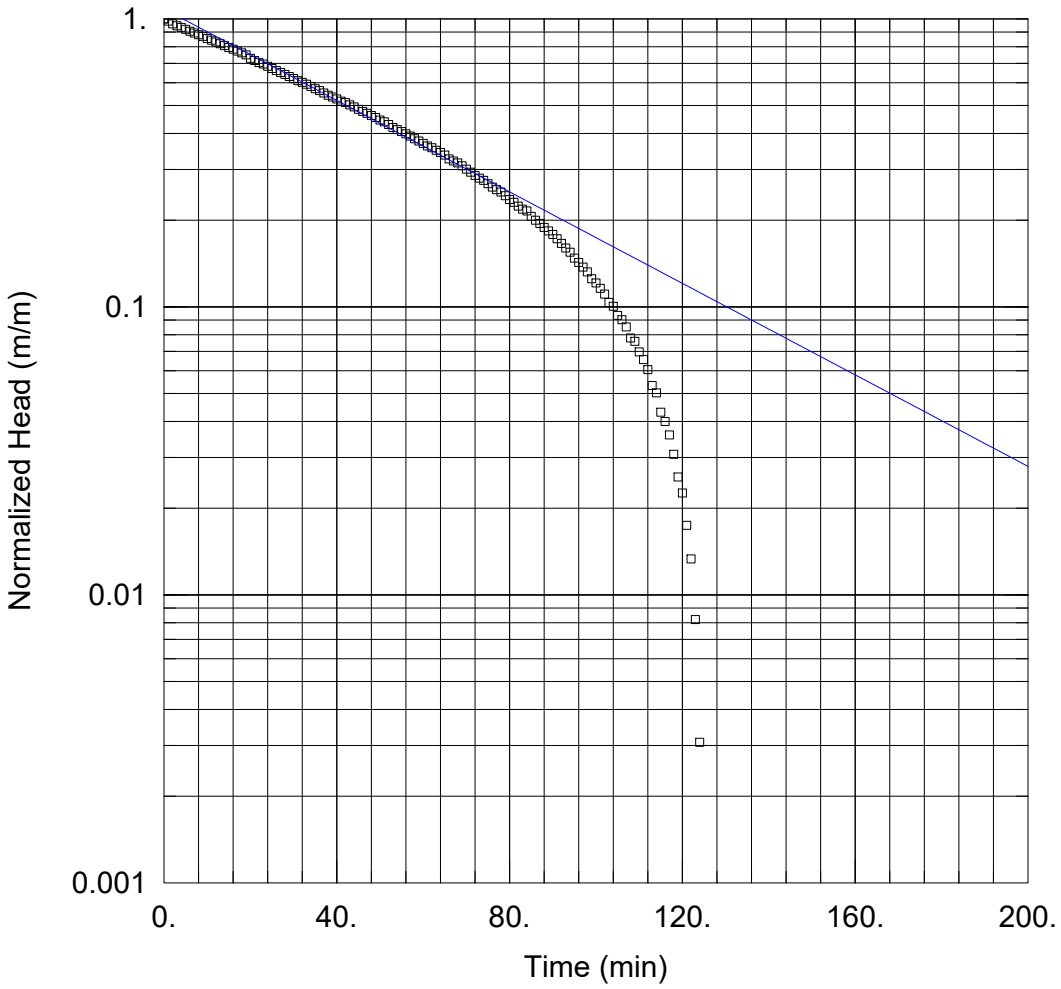
Estimated Parameters

Parameter	Estimate	
K	8.655E-6	cm/sec
y0	1.049	m

T = K*b = 0.005193 cm²/sec

In-Situ Hydraulic Conductivity Test (Rising Head) - BH1(Trial-2)

Prepared By:	Prepared For:
Planet Engineering Inc.	Elora Greens Inc.
Project:	**Location:**
2501179DH	Elora, ON.



SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 7.873E-6 cm/sec y0 = 1.056 m

AQUIFER DATA

Saturated Thickness: 6.45 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH1)

Initial Displacement: 0.975 m
Static Water Column Height: 5.01 m
Total Well Penetration Depth: 5.01 m
Screen Length: 3.05 m
Casing Radius: 0.025 m
Well Radius: 0.1 m

PLANET ENGINEERING Inc.
Consulting Engineers

Data Set: C:\01_HLV2K\Projects\2501179DH\K-tests\BH1-2.aqt
Title: In-Situ Hydraulic Conductivity Test (Rising Head) - BH1(Trial-2)
Date: 07/09/25
Time: 11:44:31

PROJECT INFORMATION

Company: Planet Engineering Inc.
Client: Elora Greens Inc.
Project: 2501179DH
Location: Elora, ON.
Test Date: 20/06/2025
Test Well: BH1

AQUIFER DATA

Saturated Thickness: 6.45 m
Anisotropy Ratio (Kz/Kr): 1.

SOLUTION

Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 2.521

VISUAL ESTIMATION RESULTS

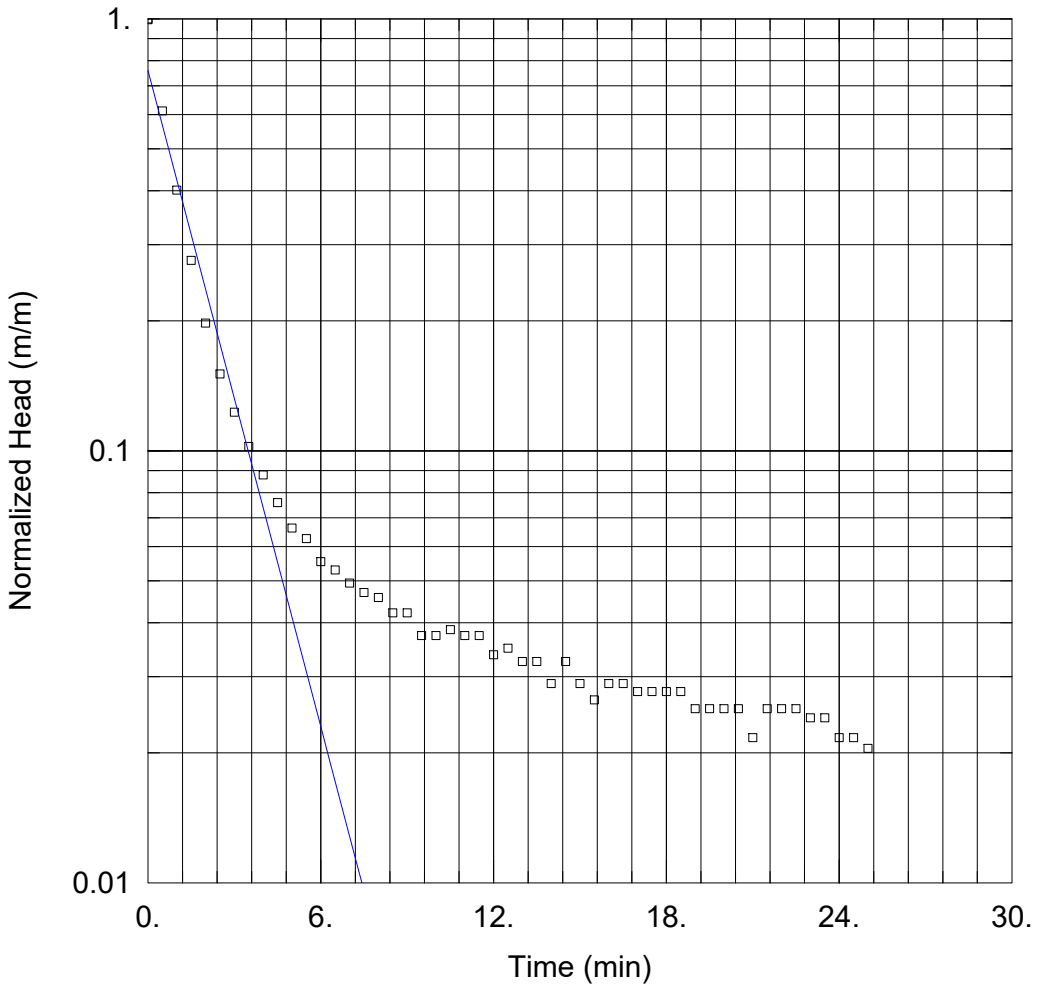
Estimated Parameters

Parameter	Estimate	
K	7.873E-6	cm/sec
y0	1.056	m

T = K*b = 0.005078 cm²/sec

In-Situ Hydraulic Conductivity Test (Rising Head) - BH4 (Trial-1)

Prepared By:	Prepared For:
Planet Engineering Inc.	Elora Greens Inc.
Project:	**Location:**
2501179DH	Elora, ON.



SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0002584 cm/sec y0 = 0.6298 m

AQUIFER DATA

Saturated Thickness: 6.29 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH4)

Initial Displacement: 0.83 m
Static Water Column Height: 5.4 m
Total Well Penetration Depth: 5.4 m
Screen Length: 3.05 m
Casing Radius: 0.025 m
Well Radius: 0.1 m

PLANET ENGINEERING Inc.
Consulting Engineers

Data Set: C:\01_HLV2K\Projects\2501179DH\K-tests\BH4-1.aqt
Title: In-Situ Hydraulic Conductivity Test (Rising Head) - BH4 (Trial-1)
Date: 07/09/25
Time: 11:50:14

PROJECT INFORMATION

Company: Planet Engineering Inc.
Client: Elora Greens Inc.
Project: 2501179DH
Location: Elora, ON.
Test Date: 20/06/2025
Test Well: BH4

AQUIFER DATA

Saturated Thickness: 6.29 m
Anisotropy Ratio (Kz/Kr): 1.

SOLUTION

Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 2.597

VISUAL ESTIMATION RESULTS

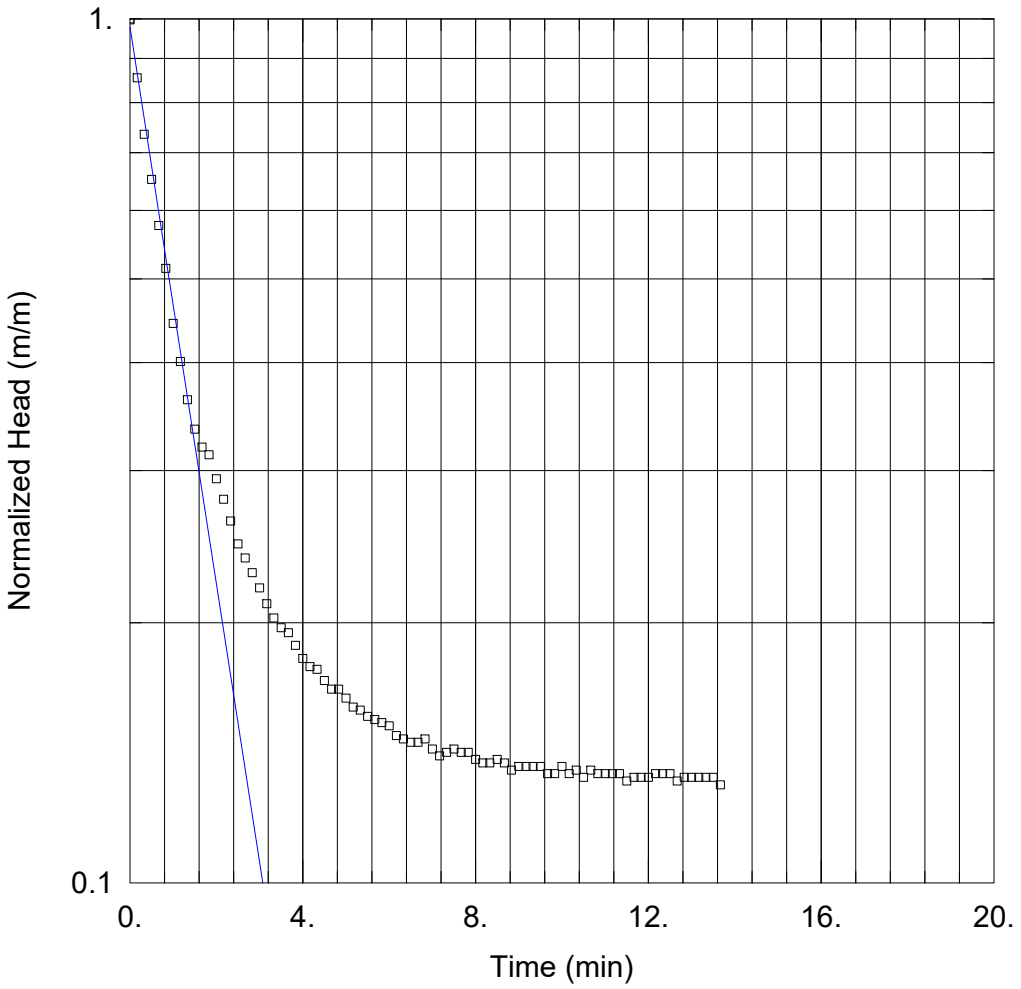
Estimated Parameters

Parameter	Estimate	
K	0.0002584	cm/sec
y0	0.6298	m

T = K*b = 0.1625 cm²/sec

In-Situ Hydraulic Conductivity Test (Rising Head) - BH4 (Trial-2)

Prepared By:	Prepared For:
Planet Engineering Inc.	Elora Greens Inc.
Project:	**Location:**
2501179DH	Elora, ON.



SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0003298 cm/sec y0 = 0.7538 m

AQUIFER DATA

Saturated Thickness: 6.36 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH4)

Initial Displacement: 0.77 m
Static Water Column Height: 5.47 m
Total Well Penetration Depth: 5.47 m
Screen Length: 3.05 m
Casing Radius: 0.025 m
Well Radius: 0.1 m

PLANET ENGINEERING Inc.
Consulting Engineers

Data Set: C:\01_HLV2K\Projects\2501179DH\K-tests\BH4-2.aqt
Title: In-Situ Hydraulic Conductivity Test (Rising Head) - BH4 (Trial-2)
Date: 07/09/25
Time: 11:51:59

PROJECT INFORMATION

Company: Planet Engineering Inc.
Client: Elora Greens Inc.
Project: 2501179DH
Location: Elora, ON.
Test Date: 23/06/2025
Test Well: BH4

AQUIFER DATA

Saturated Thickness: 6.36 m
Anisotropy Ratio (Kz/Kr): 1.

SOLUTION

Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 2.603

VISUAL ESTIMATION RESULTS

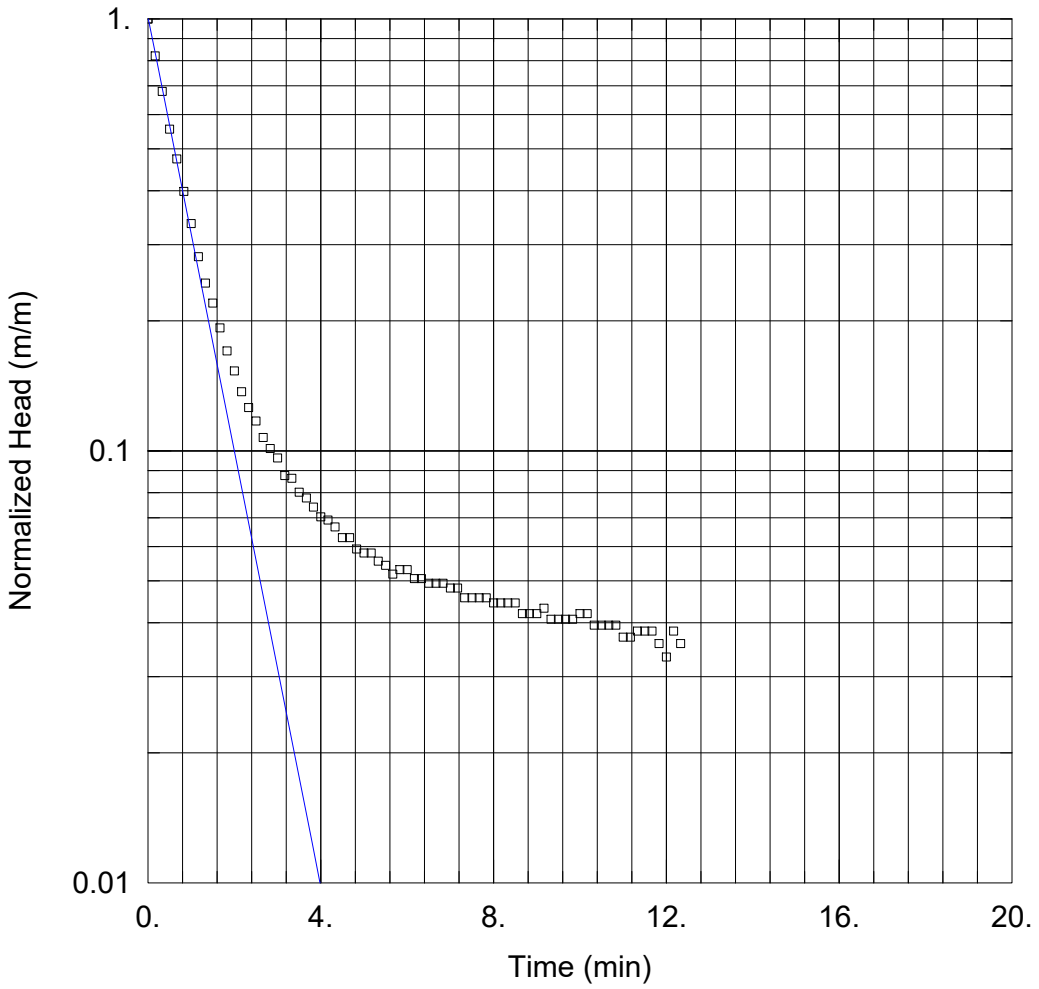
Estimated Parameters

Parameter	Estimate	
K	0.0003298	cm/sec
y0	0.7538	m

T = K*b = 0.2098 cm²/sec

In-Situ Hydraulic Conductivity Test (Rising Head) - BH6 (Trial-1)

Prepared By:	Prepared For:
Planet Engineering Inc.	Elora Greens Inc.
Project:	**Location:**
2501179DH	Elora, ON.



SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0005181 cm/sec y0 = 0.8204 m

AQUIFER DATA

Saturated Thickness: 5.3 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH6)

Initial Displacement: 0.81 m
Static Water Column Height: 4.89 m
Total Well Penetration Depth: 4.89 m
Screen Length: 3.05 m
Casing Radius: 0.025 m
Well Radius: 0.1 m

PLANET ENGINEERING Inc.
Consulting Engineers

Data Set: C:\01_HLV2K\Projects\2501179DH\K-tests\BH6-1.aqt
Title: In-Situ Hydraulic Conductivity Test (Rising Head) - BH6 (Trial-1)
Date: 07/09/25
Time: 12:01:54

PROJECT INFORMATION

Company: Planet Engineering Inc.
Client: Elora Greens Inc.
Project: 2501179DH
Location: Elora, ON.
Test Date: 20/06/2025
Test Well: BH6

AQUIFER DATA

Saturated Thickness: 5.3 m
Anisotropy Ratio (Kz/Kr): 1.

SOLUTION

Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 2.618

VISUAL ESTIMATION RESULTS

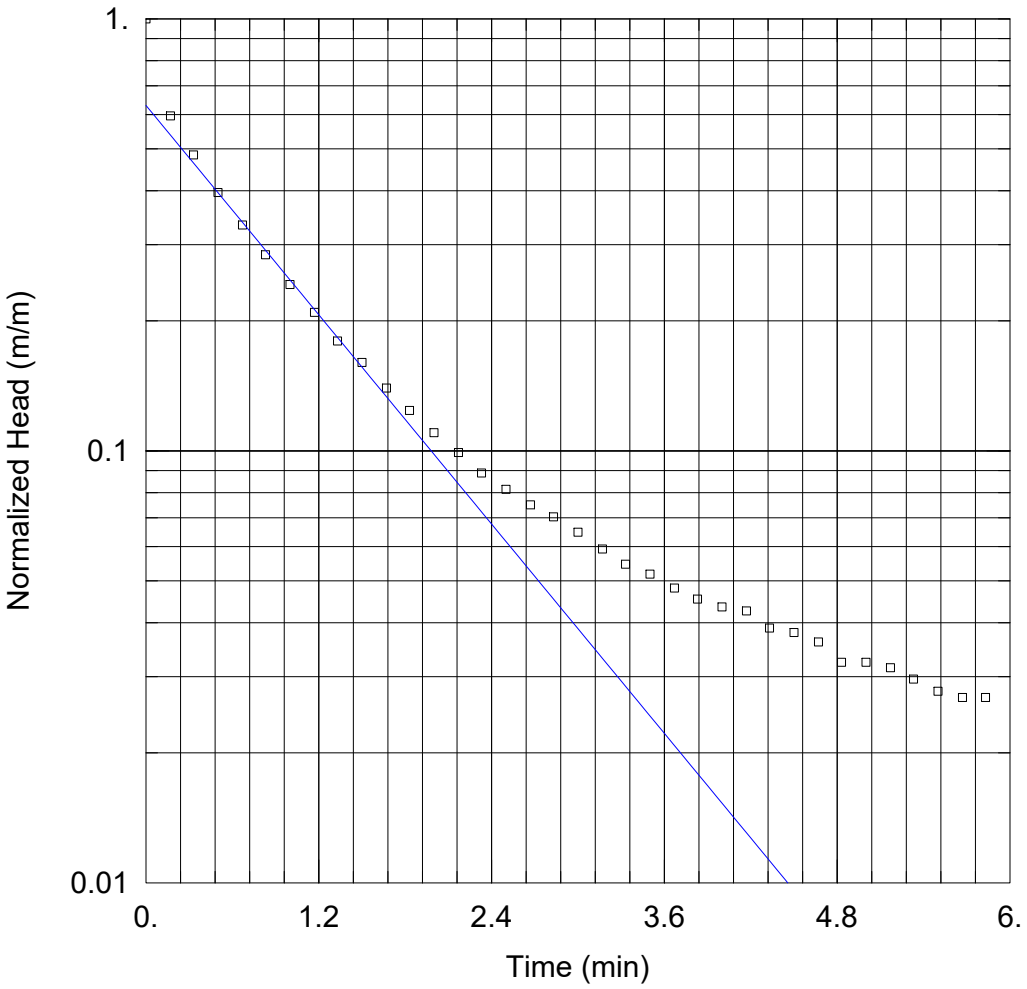
Estimated Parameters

Parameter	Estimate	
K	0.0005181	cm/sec
y0	0.8204	m

T = K*b = 0.2746 cm²/sec

In-Situ Hydraulic Conductivity Test (Rising Head) - BH6 (Trial-2)

Prepared By:	Prepared For:
Planet Engineering Inc.	Elora Greens Inc.
Project:	**Location:**
2501179DH	Elora, ON.



SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0004156 cm/sec y0 = 0.6806 m

AQUIFER DATA

Saturated Thickness: 5.3 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH6)

Initial Displacement: 1.08 m
Static Water Column Height: 4.89 m
Total Well Penetration Depth: 4.89 m
Screen Length: 3.05 m
Casing Radius: 0.025 m
Well Radius: 0.1 m

PLANET ENGINEERING Inc.
Consulting Engineers

Data Set: C:\01_HLV2K\Projects\2501179DH\K-tests\BH6-2.aqt
Title: In-Situ Hydraulic Conductivity Test (Rising Head) - BH6 (Trial-2)
Date: 07/09/25
Time: 12:08:54

PROJECT INFORMATION

Company: Planet Engineering Inc.
Client: Elora Greens Inc.
Project: 2501179DH
Location: Elora, ON.
Test Date: 20/06/2025
Test Well: BH6

AQUIFER DATA

Saturated Thickness: 5.3 m
Anisotropy Ratio (Kz/Kr): 1.

SOLUTION

Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 2.618

VISUAL ESTIMATION RESULTS

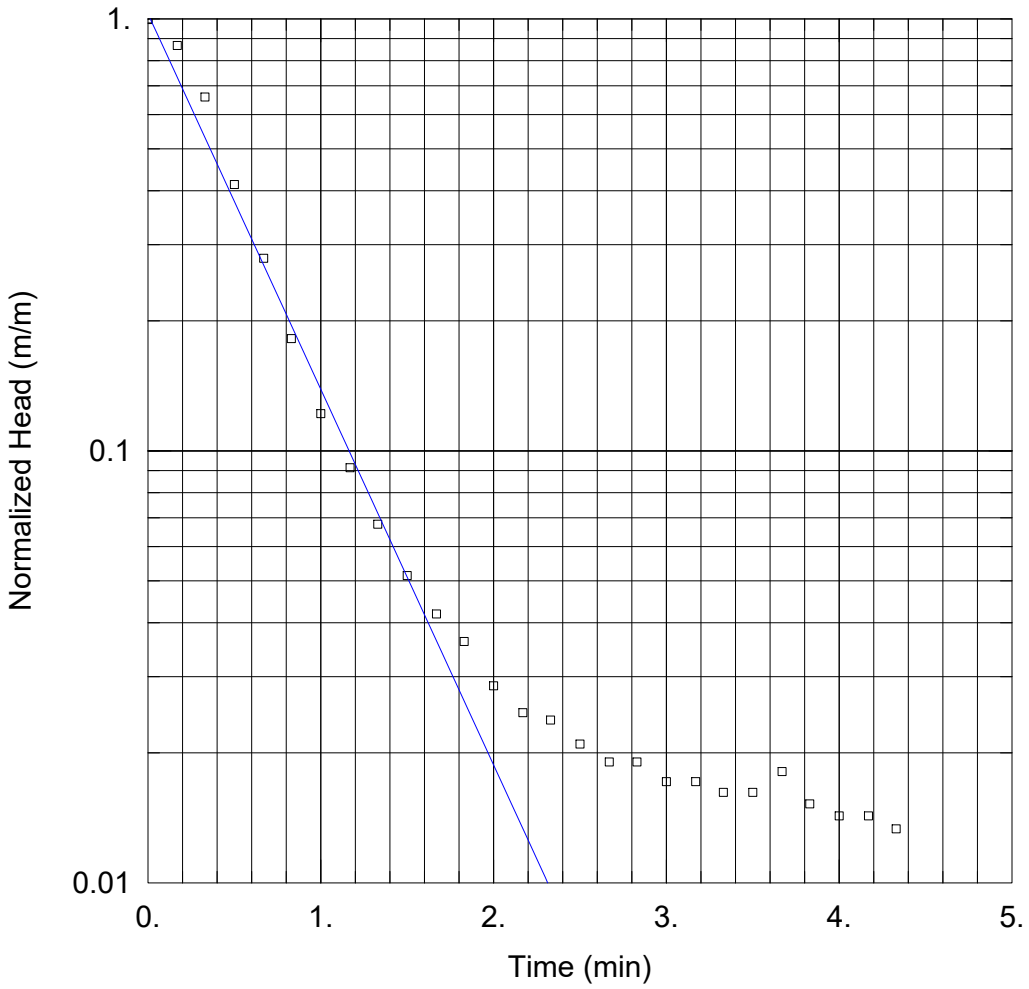
Estimated Parameters

Parameter	Estimate	
K	0.0004156	cm/sec
y0	0.6806	m

T = K*b = 0.2203 cm²/sec

In-Situ Hydraulic Conductivity Test (Rising Head) - BH7 (Trial-1)

Prepared By:	Prepared For:
Planet Engineering Inc.	Elora Greens Inc.
Project:	**Location:**
2501179DH	Elora, ON.



SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0008563 cm/sec y0 = 1.079 m

AQUIFER DATA

Saturated Thickness: 5.93 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH7)

Initial Displacement: 1.05 m
Static Water Column Height: 4.7 m
Total Well Penetration Depth: 4.7 m
Screen Length: 3.05 m
Casing Radius: 0.025 m
Well Radius: 0.1 m

PLANET ENGINEERING Inc.
Consulting Engineers

Data Set: C:\01_HLV2K\Projects\2501179DH\K-tests\BH7-1.aqt
Title: In-Situ Hydraulic Conductivity Test (Rising Head) - BH7 (Trial-1)
Date: 07/09/25
Time: 12:21:34

PROJECT INFORMATION

Company: Planet Engineering Inc.
Client: Elora Greens Inc.
Project: 2501179DH
Location: Elora, ON.
Test Date: 20/06/2025
Test Well: BH7

AQUIFER DATA

Saturated Thickness: 5.93 m
Anisotropy Ratio (Kz/Kr): 1.

SOLUTION

Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 2.505

VISUAL ESTIMATION RESULTS

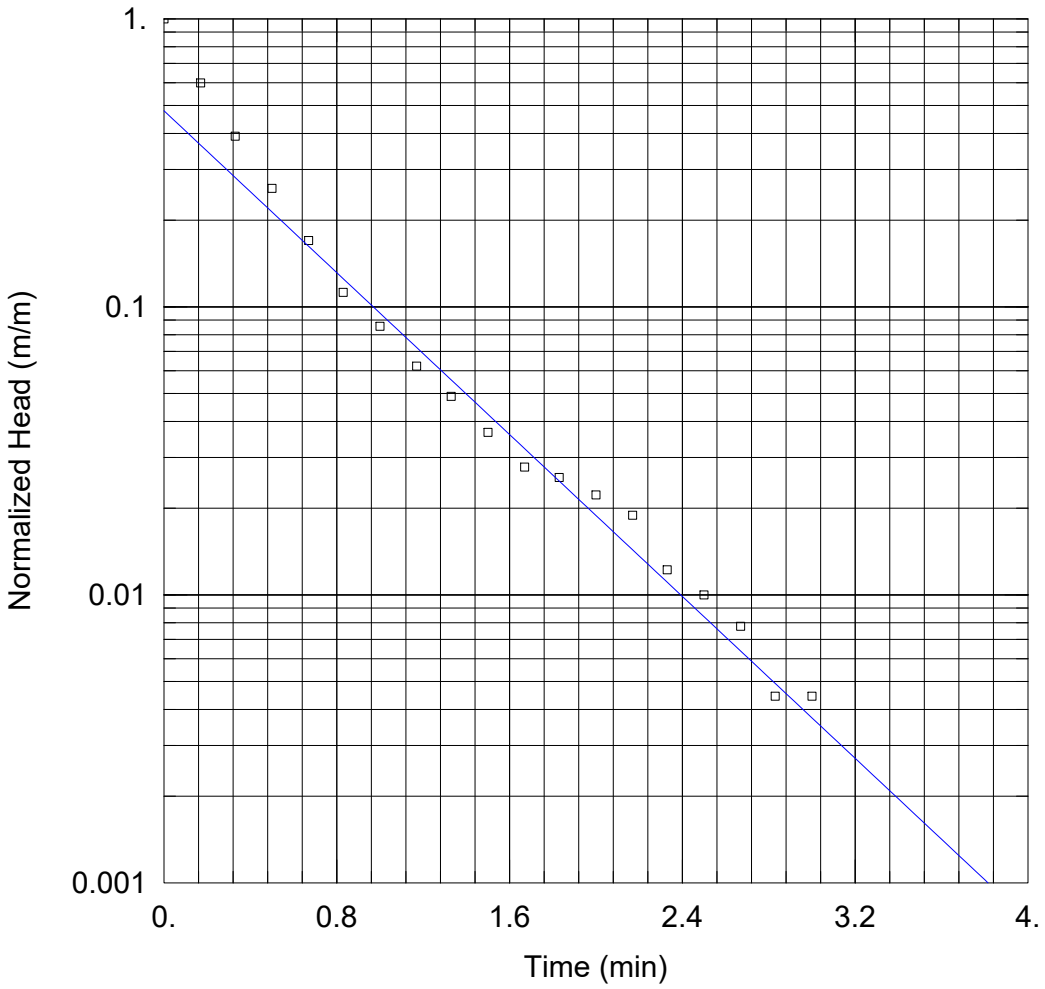
Estimated Parameters

Parameter	Estimate	
K	0.0008563	cm/sec
y0	1.079	m

T = K*b = 0.5078 cm²/sec

In-Situ Hydraulic Conductivity Test (Rising Head) - BH 7 (Trial-2)

Prepared By:	Prepared For:
Planet Engineering Inc.	Elora Greens Inc.
Project:	**Location:**
2501179DH	Elora, ON.



SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.000692 cm/sec y0 = 0.4315 m

AQUIFER DATA

Saturated Thickness: 5.93 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH7)

Initial Displacement: 0.9 m
Static Water Column Height: 4.7 m
Total Well Penetration Depth: 4.7 m
Screen Length: 3.05 m
Casing Radius: 0.025 m
Well Radius: 0.1 m

PLANET ENGINEERING Inc.
Consulting Engineers

Data Set: C:\01_HLV2K\Projects\2501179DH\K-tests\BH7-2.aqt
Title: In-Situ Hydraulic Conductivity Test (Rising Head) - BH 7 (Trial-2)
Date: 07/09/25
Time: 12:23:33

PROJECT INFORMATION

Company: Planet Engineering Inc.
Client: Elora Greens Inc.
Project: 2501179DH
Location: Elora, ON.
Test Date: 20/06/2025
Test Well: BH7

AQUIFER DATA

Saturated Thickness: 5.93 m
Anisotropy Ratio (Kz/Kr): 1.

SOLUTION

Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 2.505

VISUAL ESTIMATION RESULTS

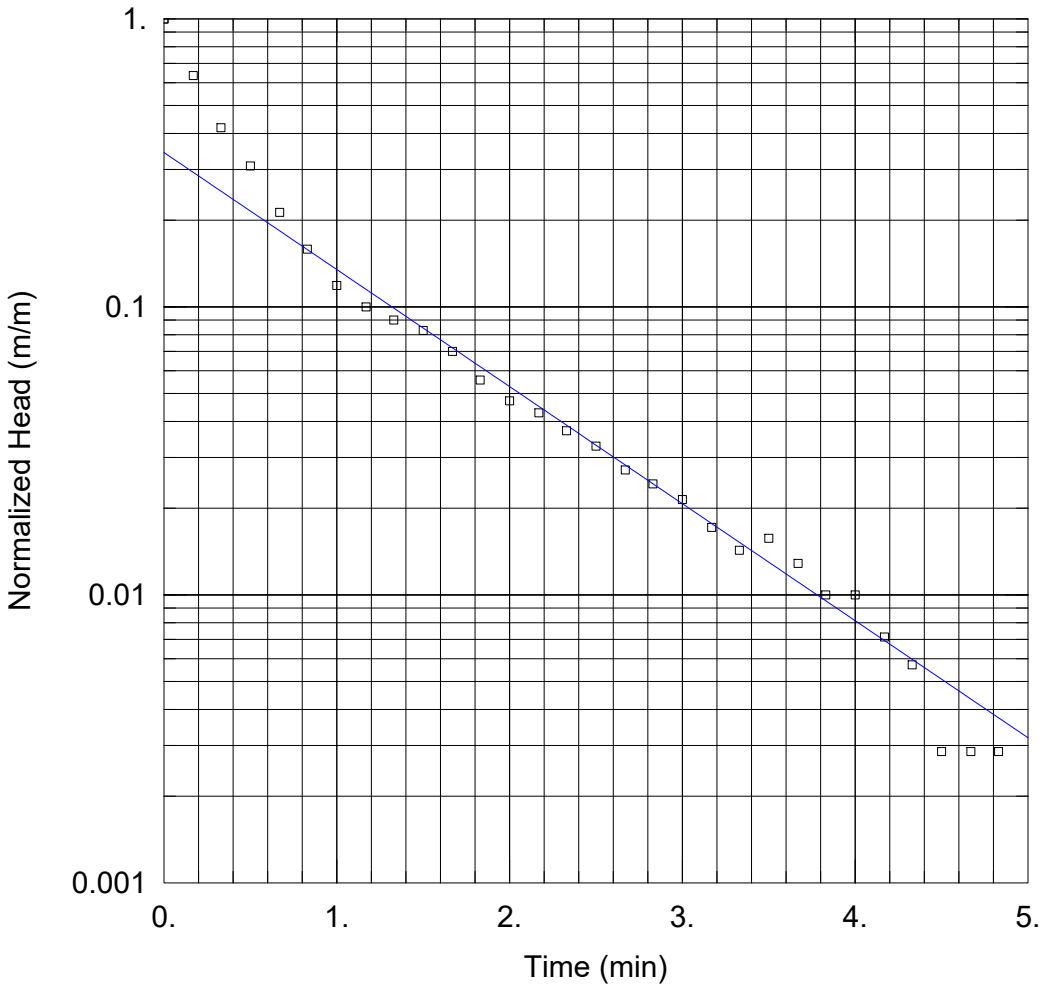
Estimated Parameters

Parameter	Estimate	
K	0.000692	cm/sec
y0	0.4315	m

T = K*b = 0.4104 cm²/sec

In-Situ Hydraulic Conductivity Test (Rising Head) - BH7 (Trial-3)

Prepared By:	Prepared For:
Planet Engineering Inc.	Elora Greens Inc.
Project:	**Location:**
2501179DH	Elora, ON.



SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0004002 cm/sec y0 = 0.2404 m

AQUIFER DATA

Saturated Thickness: 5.93 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH7)

Initial Displacement: 0.7 m
Static Water Column Height: 4.7 m
Total Well Penetration Depth: 4.7 m
Screen Length: 3.05 m
Casing Radius: 0.025 m
Well Radius: 0.1 m

PLANET ENGINEERING Inc.
Consulting Engineers

Data Set: C:\01_HLV2K\Projects\2501179DH\K-tests\BH7-3.aqt
Title: In-Situ Hydraulic Conductivity Test (Rising Head) - BH7 (Trial-3)
Date: 07/09/25
Time: 12:25:45

PROJECT INFORMATION

Company: Planet Engineering Inc.
Client: Elora Greens Inc.
Project: 2501179DH
Location: Elora, ON.
Test Date: 20/06/2025
Test Well: BH7

AQUIFER DATA

Saturated Thickness: 5.93 m
Anisotropy Ratio (Kz/Kr): 1.

SOLUTION

Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 2.505

VISUAL ESTIMATION RESULTS

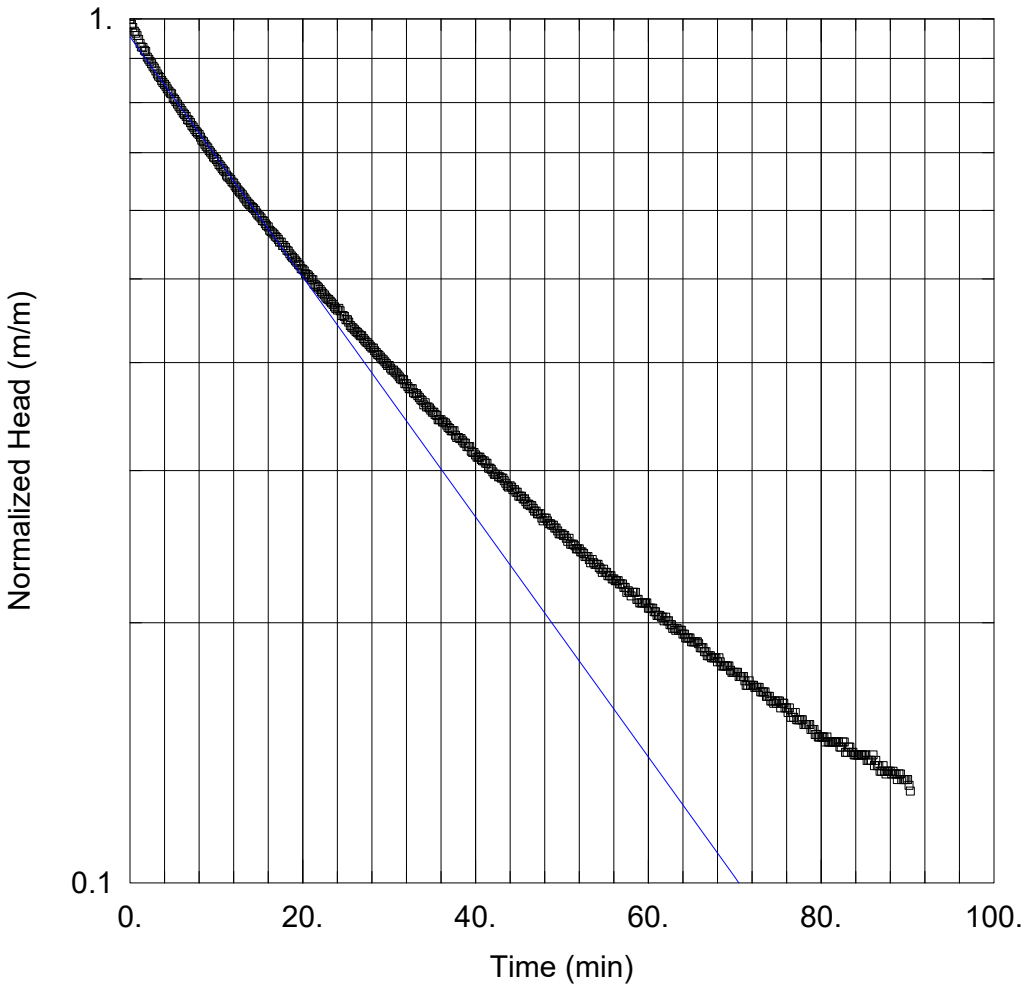
Estimated Parameters

Parameter	Estimate	
K	0.0004002	cm/sec
y0	0.2404	m

T = K*b = 0.2373 cm²/sec

In-Situ Hydraulic Conductivity Test (Rising Head) - BH10 (Trial-1)

Prepared By:	Prepared For:
Planet Engineering Inc.	Elora Greens Inc.
Project:	**Location:**
2501179DH	Elora, ON.



SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 1.401E-5 cm/sec y0 = 0.9625 m

AQUIFER DATA

Saturated Thickness: 4.89 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH10)

Initial Displacement: 1.01 m
Static Water Column Height: 4.45 m
Total Well Penetration Depth: 4.45 m
Screen Length: 3.05 m
Casing Radius: 0.025 m
Well Radius: 0.1 m

PLANET ENGINEERING Inc.
Consulting Engineers

Data Set: C:\01_HLV2K\Projects\2501179DH\K-tests\BH10-1.aqt
Title: In-Situ Hydraulic Conductivity Test (Rising Head) - BH10 (Trial-1)
Date: 07/11/25
Time: 15:07:41

PROJECT INFORMATION

Company: Planet Engineering Inc.
Client: Elora Greens Inc.
Project: 2501179DH
Location: Elora, ON.
Test Date: 20/06/2025
Test Well: BH10

AQUIFER DATA

Saturated Thickness: 4.89 m
Anisotropy Ratio (Kz/Kr): 1.

SOLUTION

Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 2.565

VISUAL ESTIMATION RESULTS

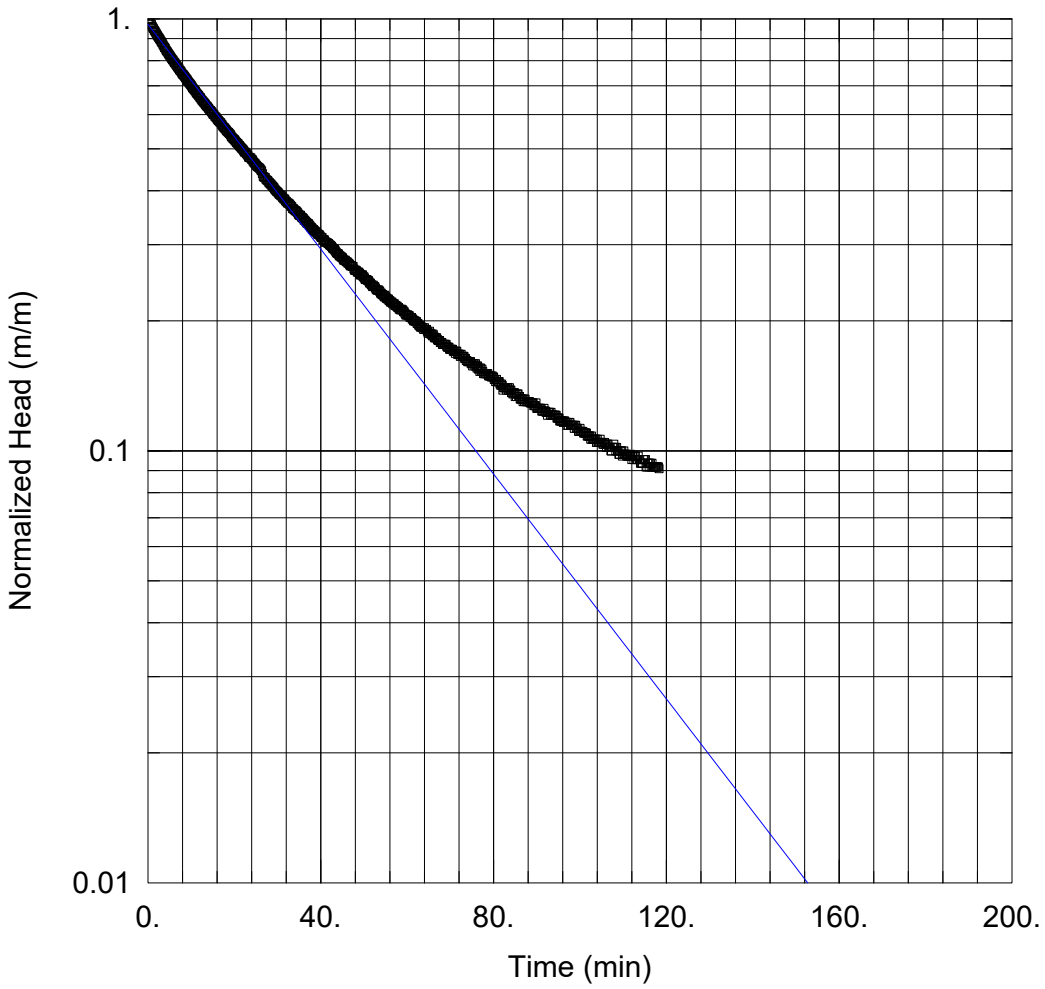
Estimated Parameters

Parameter	Estimate	
K	1.401E-5	cm/sec
y0	0.9625	m

T = K*b = 0.006851 cm²/sec

In-Situ Hydraulic Conductivity Test (Rising Head) - BH 10 (Trial-2)

Prepared By:	Prepared For:
Planet Engineering Inc.	Elora Greens Inc.
Project:	**Location:**
2501179DH	Elora, ON.



SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 1.312E-5 cm/sec y0 = 1.069 m

AQUIFER DATA

Saturated Thickness: 4.89 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH10)

Initial Displacement: 1.1 m
Static Water Column Height: 4.45 m
Total Well Penetration Depth: 4.45 m
Screen Length: 3.05 m
Casing Radius: 0.025 m
Well Radius: 0.1 m

PLANET ENGINEERING Inc.
Consulting Engineers

Data Set: C:\01_HLV2K\Projects\2501179DH\K-tests\BH10-2.aqt
Title: In-Situ Hydraulic Conductivity Test (Rising Head) - BH 10 (Trial-2)
Date: 07/11/25
Time: 15:09:34

PROJECT INFORMATION

Company: Planet Engineering Inc.
Client: Elora Greens Inc.
Project: 2501179DH
Location: Elora, ON.
Test Date: 20/06/2025
Test Well: BH10

AQUIFER DATA

Saturated Thickness: 4.89 m
Anisotropy Ratio (Kz/Kr): 1.

SOLUTION

Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 2.565

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	1.312E-5	cm/sec
y0	1.069	m

T = K*b = 0.006418 cm²/sec

APPENDIX D

Information on Water Well Records

Water Well Record

WELL_ID	BOREHOLE ID	Zone	Easting	Northing	Well Depth (m)	Water Depth (m)	Bedrock Depth	Date Completed	Final Status
6700136	10464284	17	547291	4836505	56.4	8.2	12.5	24-Jan-61	Water Supply
6700138	10464286	17	547642	4836414	33.5	5.5	14.3	16-Jul-65	Water Supply
6701754	10465899	17	547970	4836183	42.4	10.7	18.3	11-Aug-47	Water Supply
6703333	10467475	17	547464	4836263	48.5	12.2	20.1	19-Apr-69	Water Supply
6704815	10468922	17	547695	4836360	30.8	5.2	12.8	15-Sep-73	Water Supply
6705103	10469202	17	547964	4835423	43.6	13.7	18.9	11-Jun-74	Water Supply
6705104	10469203	17	547964	4835423	39.0	11.6	18.9	03-Jun-74	Water Supply
6705323	10469417	17	547964	4836623	25.9	4.6	14.3	19-Jul-74	Water Supply
6706007	10470089	17	547664	4836323	29.0	2.7	12.8	17-May-76	Water Supply
6706165	10470245	17	548064	4836423	35.7	10.1	16.5	30-Aug-76	Water Supply
6706871	10470941	17	547114	4835923	34.7	3.7	14.3	06-Oct-78	Water Supply
6707310	10471363	17	548170	4836143	43.0	3.7	1.2	16-Aug-80	Water Supply
6707784	10471794	17	547562	4835536	41.1	4.3	19.8	04-Mar-83	Water Supply
6708501	10472397	17	547882	4836499	16.8	4.6	15.5	03-Aug-86	Water Supply
6708530	10472425	17	547920	4836527	21.3	3.0	14.9	29-Aug-86	Water Supply
6710773	10474614	17	547341	4835882	36.6	16.8	17.4	14-Nov-91	Water Supply
6715272	11327058	17	547081	4836201	10.6			17-Feb-05	Monitoring and Test Hole
6715281	11327067	17	547706	4836325	36.6	10.1	13.4	07-Feb-05	Water Supply
6715282	11327068	17	547680	4836344				07-Feb-05	Abandoned-Other
6715446	11327232	17	547414	4836435	31.0		10.7	04-Aug-05	Monitoring and Test Hole
7043040	11765488	17	547053	4836199	11.3			05-Apr-07	Monitoring and Test Hole
7195814	1004242536	17	547466	4836266	17.1			15-Jul-12	Monitoring and Test Hole
7195815	1004242539	17	547461	4836261	179.8			20-Jun-12	Monitoring and Test Hole
7203164	1004344391	17	547660	4836405				29-Apr-13	Abandoned-Other
7357972	1008271701	17	547162	4836520		14.0		05-Feb-20	Abandoned-Other
7382528	1008638581	17	547216	4836494		3.7		19-Feb-21	Abandoned-Other

Geo Log of Selected Wells

WELL_ID	Thickness	Material Color	Material	Material2	Material3	Depth_m
6700136	7.92		PREVIOUSLY DUG			7.92
	4.57		GRAVEL	STONES		12.50
	43.89	GREY	LIMESTONE			56.39
6700138	12.19		CLAY			12.19
	2.13		GRAVEL			14.33
	19.20	GREY	LIMESTONE			33.53
6701754	1.22		TOPSOIL			1.22
	17.07		HARDPAN	BOULDERS		18.29
	24.08		LIMESTONE			42.37
6703333	7.62		CLAY	MEDIUM SAND		7.62
	6.10		CLAY			13.72
	6.40		HARDPAN			20.12
	28.35	GREY	LIMESTONE			48.46
6704815	6.10		CLAY	SAND		6.10
	6.71		HARDPAN	GRAVEL		12.80
	17.98	GREY	LIMESTONE			30.78
6705103	12.19		CLAY	SOFT		12.19
	6.71		GRAVEL			18.90
	24.69	GREY	LIMESTONE			43.59
6705104	3.05		CLAY			3.05
	12.19		CLAY	GRAVEL	SOFT	15.24
	3.66		GRAVEL	CEMENTED		18.90
	20.12	GREY	LIMESTONE			39.01
6705323	0.91	BROWN	FILL			0.91
	2.13	GREY	CLAY			3.05
	3.05	GREY	STONES	CLAY		6.10
	3.05	BLUE	HARDPAN			9.14
	5.18	BLUE	HARDPAN	GRAVEL		14.33
	11.58	GREY	LIMESTONE			25.91
6706007	1.52		PREV. DRILLED			1.52
	11.28	BROWN	CLAY			12.80
	16.15	GREY	LIMESTONE			28.96
6706165	12.19	BROWN	CLAY	BOULDERS		12.19
	4.27		GRAVEL	CEMENTED		16.46
	19.20	GREY	LIMESTONE			35.66
6706871	1.52		PREVIOUSLY DUG			1.52
	4.57		CLAY	SOFT		6.10
	8.23		CLAY	GRAVEL	LAYERED	14.33
	20.42	GREY	LIMESTONE			34.75
6707310	1.22	BROWN	CLAY	STONES		1.22
	41.76	BROWN	LIMESTONE			42.98
6707784	0.61	BROWN	TOPSOIL			0.61
	1.83	BROWN	CLAY			2.44
	3.66	BROWN	SAND			6.10
	6.10	BROWN	CLAY	STONES		12.19
	6.10	BROWN	HARDPAN			18.29
	1.52	BROWN	HARDPAN			19.81
	21.34	GREY	LIMESTONE			41.15
6708501	0.91	BROWN	CLAY	SANDY	LOOSE	0.91
	1.52	BROWN	CLAY	GRAVEL	SANDY	2.44
	4.27	GREY	CLAY	HARD		6.71
	0.61	GREY	CLAY	BOULDERS	LOOSE	7.32
	1.83	GREY	CLAY	GRAVEL	HARD	9.14
	1.52	GREY	CLAY	BOULDERS	LOOSE	10.67
	2.44	GREY	GRAVEL	FINE SAND	LOOSE	13.11
	0.91	GREY	CLAY	LOOSE		14.02
	1.52	GREY	GRAVEL	SAND	LOOSE	15.54
	1.22	GREY	LIMESTONE	HARD		16.76

Geo Log of Selected Wells

WELL_ID	Thickness	Material Color	Material	Material2	Material3	Depth_m
6708530	1.52	BROWN	SAND	GRAVEL	LOOSE	1.52
	3.96	GREY	CLAY	SANDY	LOOSE	5.49
	3.35	GREY	CLAY	GRAVEL	LOOSE	8.84
	1.83	BROWN	CLAY	SANDY	LOOSE	10.67
	1.83	GREY	CLAY	GRAVEL	LOOSE	12.50
	2.44	GREY	SAND	GRAVEL	LOOSE	14.94
	6.40	GREY	LIMESTONE	HARD		21.34
6710773	7.62	BROWN	CLAY	STONES		7.62
	9.75	GREY	CLAY	STONES		17.37
	17.68	BROWN	ROCK			35.05
	1.50	GREY	ROCK			36.58
6715272	0.20	GREY				0.20
	0.40	BROWN	SAND	GRAVEL	LOOSE	0.60
	0.50	BROWN	SILT	CLAY	LOOSE	1.10
	4.30	BROWN	SILT	CLAY	SAND	5.40
	5.20	GREY	SILT	SAND	CLAY	10.60
6715281	0.61	BLACK	TOPSOIL			0.61
	12.80	BROWN	CLAY	STONES		13.41
	0.92	BROWN	LIMESTONE	FRACTURED		14.33
	22.25	BROWN	LIMESTONE			36.58
6715446	0.15	BROWN	SILT	TOPSOIL		0.15
	6.85	BROWN	SILT	SAND	CLAY	7.00
	3.70	GREY	SILT			10.70
	20.30		ROCK			31.00
7043040	0.90	BROWN	FILL	SAND	GRAVEL	0.90
	0.30	BLACK	TOPSOIL			1.20
	10.10	BROWN	SILT	CLAY	GRAVEL	11.30
7195814	3.65	BROWN	CLAY	STONES		3.65
	13.41	GREY	CLAY	STONES		17.06
7195815	2.43		FILL			2.43
	2.75	BROWN	CLAY	STONES		5.18
	15.85	GREY	CLAY	STONES		21.03
	9.14	BROWN	LIMESTONE			30.17
	8.23	WHITE	LIMESTONE			38.40
	3.96	BROWN	LIMESTONE			42.36
	11.58	WHITE	LIMESTONE			53.94
	16.16	GREY	LIMESTONE			70.10
	40.84	WHITE	LIMESTONE			110.94
	68.86					179.80

APPENDIX E

Drawings Provided by the Client

DRAFT PLAN OF SUBDIVISION

LEGAL DESCRIPTION

PT LT 3 CON 1 NICHOL PART 2 , 61R501;
TOWNSHIP OF CENTRE WELLINGTON
COUNTY OF WELLINGTON

OWNER'S CERTIFICATE

I HEREBY AUTHORIZE MACNAUGHTON HERMSEN BRITTON CLARKSON PLANNING LIMITED TO SUBMIT THIS PLAN FOR APPROVAL.

Date: _____

_____
Farhan Kamali Siddiqui
Elora Greens Inc.

Date: _____

_____
Mohammad Tahir

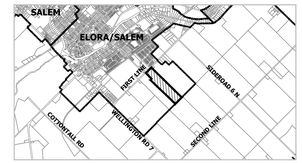
SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED ON THIS PLAN AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN.

Date: _____

_____
James M. Laws, Surveyor, O.L.S.
Van Harten Surveying Inc.

KEY PLAN



Scale: N.T.S

ADDITIONAL INFORMATION
Required Under Section 51 (17) of the Planning Act, R.S.O., 1990, c.P.13 as Amended

(a) As Shown	(b) As Shown	(c) As Shown
(d) Residential, Mixed Use, Park, Trail, Pump Station, Stormwater Management		
(e) As Shown	(f) As Shown	(g) As Shown
(h) Municipal Water Supply	(i) Clay/Sandy Loam	(j) As Shown
(k) All Services As Required	(l) As Shown	

AREA SCHEDULE

DESCRIPTION	LOTS/BLOCKS	UNITS	AREA
Low Density Residential	1-18	202-472	9.327 ha
Multiple Residential	19,20	60-131	1.751 ha
Mixed Use	21	34-74	0.988 ha
Park	22-25		1.287 ha
Trail	26		1.057 ha
Walkways	27,28		0.042 ha
Pump Station	29		0.263 ha
Stormwater Management	30		1.992 ha
0.3m Reserve	31-33		0.003 ha
Roads			4.871 ha
Total	**33**	**296-677**	**21.581 ha**

NOTES

1. All dimensions are in metres unless otherwise shown.
2. Contains information licensed under the Open Government Licence - Ontario.

Revision No.	Date	Issued / Revision	By
1.	March 6, 2026	Preliminary Draft Plan;	PL

Stamp	**Date** March 6, 2026
	File No. 24277A
	Plan Scale 1:1500 (Arch D)
	Drawn By P.L.
	Checked By P.S.
Project Elora Green 127 First Line, Township of Centre Wellington, County of Wellington.	
File Name DRAFT PLAN OF SUBDIVISION	**Dwg No.** 1 of 1
Scale Bar 0 10 25 50 100 150m	

K:\24277A-127 First Line-Centre Wellington\DP\DP_SPlan2026.dwg

MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix C

Water Distribution Memo
(WalterFedy, dated Sept 2026)

WALTERFEDY

TECHNICAL MEMORANDUM

To:	WrightHaven Homes Elora Greens Inc.	Project No.:	2025-0082-10	Date:	September 11, 2026
Attn:	Mr. Steven Wright (WrightHaven) Mr. Farhan Kamali Siddiqui (Elora Greens)	Project:	127 First Line and 159 First Line, Elora		
Subject:	Water Distribution Memo	From:	S. Fischer, EIT, J. Oreskovic, P.Eng.		

1.1 Background

WalterFedy has been retained by WrightHaven Homes to provide consulting engineering services in support of future development of the lands located at 159 First Line in Elora, Township of Centre Wellington, herein referred to as the Site. The adjacent lands located at 127 First Line are slated to be developed by Elora Greens Inc. (Elora Greens), with consulting engineering services provided by R.J. Burnside & Associates Limited (Burnside). Due to the similar nature and timeline of the two developments, WalterFedy has coordinated with Burnside to develop a preferred joint servicing strategy including water, sanitary and stormwater management considerations for the two parcels.

WalterFedy has undertaken the watermain portion of the joint servicing strategy. This memo summarizes the proposed combined domestic and fire main designed to service 127 First Line and 159 First Line, jointly referred to herein as the Development Lands.

1.2 Reference Documents

In the preparation of this report, the following documents were referenced:

1. *Design Guidelines for Drinking Water Systems*, Ministry of the Environment, Conservation and Parks (MECP), last updated May 2023.
2. *Township of Centre Wellington Development Charges Background Study – Consolidated Report*, Watson & Associates Economists Ltd., March 24, 2026.
3. *Township of Centre Wellington Development Manual,* Township of Centre Wellington, June 2024.
4. *Water Supply for Public Fire Protection*, Fire Underwriters Survey, 2020.
5. *Water and Wastewater Servicing Master Plan,* Township of Centre Wellington, May 16, 2025.

1.3 Design Criteria

The water distribution network was designed based on criteria outlined in the *Township of Centre Wellington Development Manual* (June 2024) and MECP's *Design Guidelines for Drinking Water Systems*. The following represents the design criteria applicable to the Development Lands:

- The system must have capacity to convey the larger of Maximum Day plus Fire Flow or Peak Hour demand.
- Preferred pressure ranges are between 350 kPa (50 psi) and 550 kPa (80 psi) for Average Day and Maximum Day, and between 275 kPa (40 psi) and 700 kPa (100 psi) for Peak Hourly.
- Under Maximum Day plus Fire Flow conditions, the pressure shall not be less than 140 kPa (20 psi) at any location.

- Maximum pressure in the watermain shall not exceed 700 kPa (100 psi) in any scenario.
- Maximum velocity in the watermain under all flow conditions shall not exceed 5.0 m/s.

Additionally, the minimum watermain diameter is 150 mm, and 2.0 m of cover should be provided between the finished grade and the top of pipe. Fire hydrants shall be provided along the network with a maximum spacing of 150 m.

1.4 Domestic Demand

The *Township of Centre Wellington Development Manual* recommends that historical data, if available, shall be used to estimate unit consumption rates and establish Peaking Factors. However, since this is a new development, historical data was not available. Instead, MECP guidelines and information provided in the Township of Centre Wellington's *Water and Wastewater Servicing Master Plan* (2025) were used to estimate domestic demands.

Domestic water demand was based on the estimated number of residential units for the Development Lands. Based on the current year forecast from the Township's *Development Charges Background Study – Consolidated Report* (March 2026), a persons per unit (PPU) count of 3.278 was used for single & semi-detached units and 2.351 for townhouse units, resulting in total estimated population between 2200 and 3818 for the two properties, given the land use projections at the time of writing this report.

A unit consumption rate of 280 L/cap/day was used, in accordance with future projections used in the Township of Centre Wellington's *Water and Wastewater Servicing Master Plan* (2025).

Peak factors were determined using Table 3-1 of MECP's *Design Guidelines for Drinking Water Systems*, which estimates the Maximum Day and Peak Hourly factors based on population. For a population of 2001-3000 people, the Maximum Day factor is 2.25 and the Peak Hourly factor is 3.38, and for a population of 3001-10000 people, the Maximum Day factor is 2.0 and the Peak Hourly factor is 3.0.

Detailed water demand calculations are attached and summarized in Table 1.

Table 1: Domestic Water Demand (L/s)

Property	Low End (Population ~ 2220)			High End (Population ~3818)		
	ADD	MDD	PHD	ADD	MDD	PHD
159 First Line	4.33	9.75	14.64	5.80	11.60	17.40
127 First Line	2.86	6.44	9.67	6.58	13.15	19.73
Total	**7.19**	**16.19**	**24.32**	**12.37**	**24.75**	**37.12**

1.5 Fire Demand

The Township of Centre Wellington specifies that all fire flow requirements shall be determined in accordance with the current issue of *Water Supply for Public Fire Protection* published by the Fire Underwriters Survey (FUS). At no time shall the available fire flow be less than that required under the Ontario Building Code (OBC).

At this stage in design, sufficient information to calculate FUS fire flows is unavailable (i.e. building floor areas, construction material, building spacing, etc.). Therefore, a fire demand of 150 L/s, which is a typical upper limit for large residential developments, is assumed to be the controlling demand. Future design phases should implement firewalls as necessary to reduce fire flow demands to a maximum of 150 L/s.

Table 2: Fire Flow Demands

Type of Construction	Ordinary Construction (C = 1.0)
Occupancy Charge	Limited Combustible Contents (-15%)
Automated Sprinkler Protection	None
Maximum Fire Demand	**150 L/s (2,378 gpm)**

1.6 Hydraulic Modelling

A water distribution model was developed using EPANET2, which simulates hydraulic and water quality behavior within pressurized pipe network consisting of pipes, nodes, valves, and pumps. The model uses estimated demands and the assigned network properties to calculate pressures and velocities throughout the system.

PVC was used as the assumed pipe material and assigned a Hazen-Williams friction factor "C" of 150, per Township guidelines. Minor losses were ignored in this phase of the design, as specific placement of nodes and valves is unknown. Watermain invert elevations were set assuming a minimum 2 m of cover between the top of pipe and finished grade (*City of Centre Wellington Development Manual*, 2024).

Boundary conditions were modeled based on hydrant flow tests conducted by Spira Fire Protection Ltd. on June 3, 2026. The results of the testing are attached to this memo. A pump curve was generated based on the results and used to simulate the available flows to the site coming from the watermain on First Line.

1.6.1 Proposed Network

The proposed water network will be a combined domestic and fire protection looped system spanning both properties. To meet the required domestic and fire demands within the specified criteria, a 250-mm diameter water main was selected for trunks connecting to the First Line watermain, with 200-mm distribution line through the remainder of the system. The proposed watermain layout and pipe diameters is shown in Figure 1.

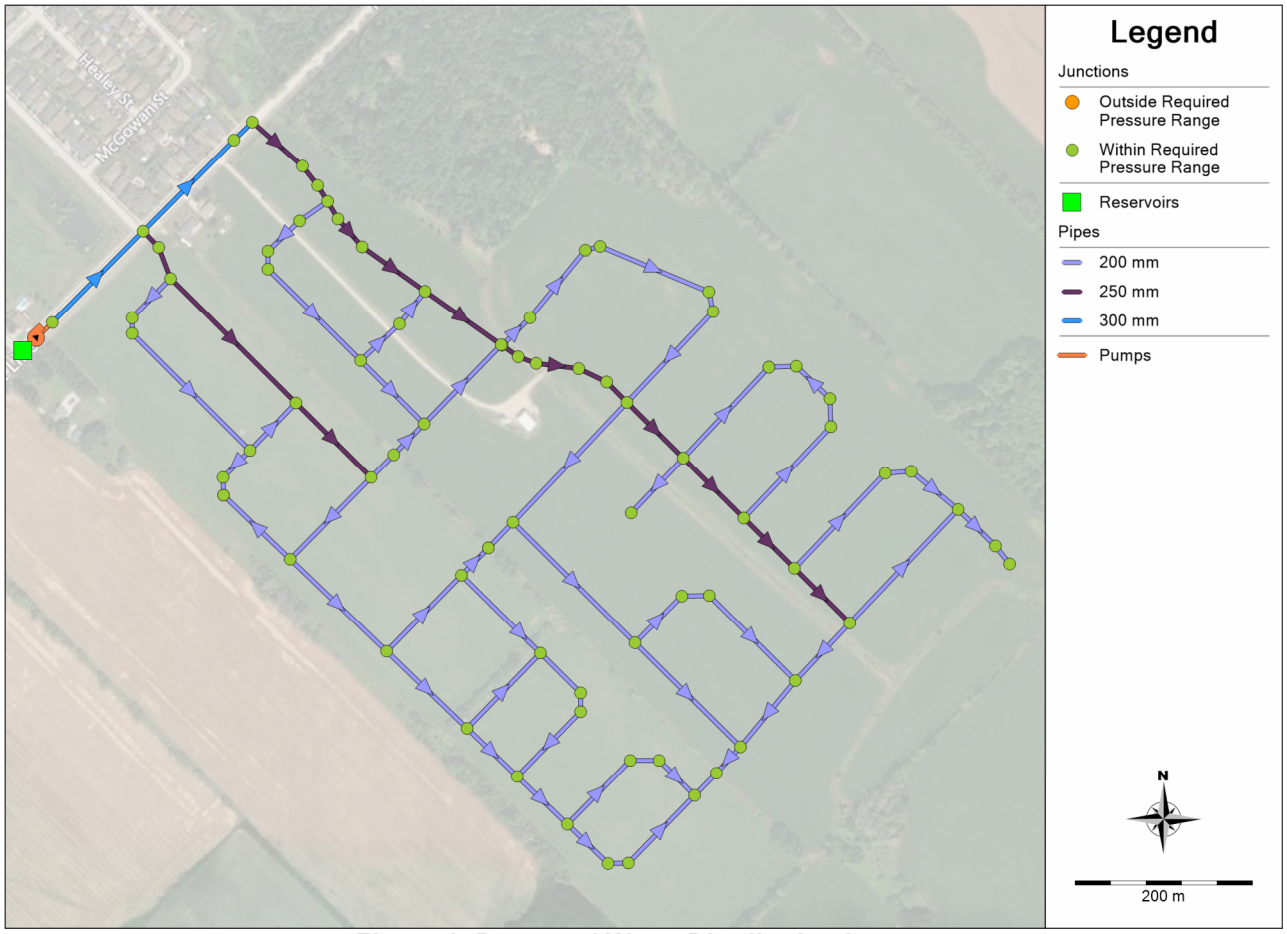


Figure 1: Proposed Water Distribution Layout

1.6.2 Maximum Day + Fire Flow Analysis

For conservative design, the proposed distribution system was assessed using the upper demands as discussed in Section 1.4. The maximum daily demand was distributed evenly across all nodes in the system for a preliminary analysis, as per-building demand analysis has not been assessed at this point in design.

In addition to the maximum daily demand, the Fire Flow Analysis tool in EPAnet was used to simulate the maximum Available Fire Flow at each junction such that the pressure meets the specified residual pressure of 20 psi (140 kPa).

The results show that the proposed distribution system provides the maximum daily plus fire flow demands for the tested range while maintaining desired pressures and velocities throughout the system. In the fire flow analysis, the available fire flow exceeds 150 L/s at all locations. Detailed model results are attached, showing pressures and available fire flows at all nodes.

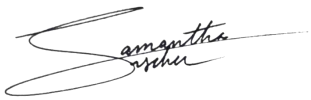
1.7 Conclusions

Based on the analysis presented in this report, it is concluded that the existing 300-mm watermain off First Line is sufficient to service the proposed development(s) while meeting relevant criteria. A distribution network with pipes ranging from 200 mm to 250 mm shall service the site while maintaining target pressures for the maximum day + fire flow scenario.

All of which is respectfully submitted,

WALTERFEDY





John Oreskovic, P.Eng.
Senior Water Resources Engineer, Civil

joreskovic@walterfedy.com
289.799.3547, Ext. 364

Sami Fischer, EIT
Water Resources Engineering Intern, Civil

sfischer@walterfedy.com
519.576.2150, Ext. 412

cc: Angela Kroetsch, P.Eng., R.J. Burnside & Associates Limited

TABLE 1
DOEMSTIC WATER DEMAND CALCULATIONS - LOW END

WRIGHTHAVEN HOMES AND ELORA GREENS
159 AND 127 FIRST LINE
ELORA, ON

REQUIRED DOMESTIC FLOW

ONTARIO BUILDING CODE

WALTERFEDY

Project	127 & 159 1st Line, Elora
Project #	2025-0082-10
Designer	SF
Description	Residential Domestic Flow - Low End

Description	Units	Persons/Unit[1]	Population	Demand[2] (L/cap/day)	Average Daily Demand (L/s)	Max Daily Peak Factor[3]	Max Hourly Peak Factor[3]	Max Daily Demand (L/s)	Max Hourly Demand (L/s)	
159 First Line										
Single Detatched	344	3.28	1128	280	3.65	2.25	3.38	8.222	12.352	
Multiples	89	2.35	209	280	0.68	2.25	3.38	1.526	2.292	
Apartments	0	1.84	0	280	0.00	2.25	3.38	0.000	0.000	
127 First Line										
Single Detatched	202	3.28	662	280	2.15	2.25	3.38	4.828	7.253	
Multiples	94	2.35	221	280	0.72	2.25	3.38	1.611	2.421	
Apartments	0	1.84	0	280	0.00	2.25	3.38	0.000	0.000	
Full Site Total	**729**		**2220**		**7.19**			**16.19**	**24.32**	

Notes:

[1] Persons/Unit counts from *Development Charges Background Study - Consolidated Report* , Township of Centre Wellington (March 2026)

[2] Demand was taken from the Township of Centre Wellington Final Draft Master Plan, May 16, 2025, Table 6.1.

[3] Peaking Factors were taken from Table 3-1: Peaking Factors from MECP's Design Guidelines for Drinking-Water Systems.

TABLE 2
DOEMSTIC WATER DEMAND CALCULATIONS - HIGH END

WRIGHTHAVEN HOMES AND ELORA GREENS
159 AND 127 FIRST LINE
ELORA, ON

REQUIRED DOMESTIC FLOW

ONTARIO BUILDING CODE

WALTERFEDY

Project	127 & 159 1st Line, Elora
Project #	2025-0082-10
Designer	SF
Description	Residential Domestic Flow - High End

Description	Units	Persons/Unit[1]	Population	Demand[2] (L/cap/day)	Average Daily Demand (L/s)	Max Daily Peak Factor[3]	Max Hourly Peak Factor[3]	Max Daily Demand (L/s)	Max Hourly Demand (L/s)	
159 First Line										
Single Detatched	482	3.28	1580	280	5.12	2.00	3.00	10.241	15.361	
Multiples	89	2.35	209	280	0.68	2.00	3.00	1.356	2.034	
Apartments	0	1.84	0	280	0.00	2.00	3.00	0.000	0.000	
127 First Line										
Single Detatched	472	3.28	1547	280	5.01	2.00	3.00	10.028	15.042	
Multiples	205	2.35	482	280	1.56	2.00	3.00	3.124	4.686	
Apartments	0	1.84	0	280	0.00	2.00	3.00	0.000	0.000	
Full Site Total	**1248**		**3818**		**12.37**			**24.75**	**37.12**	

Notes:

[1] Persons/Unit counts from *Development Charges Background Study - Consolidated Report* , Township of Centre Wellington (March 2026)

[2] Demand was taken from the Township of Centre Wellington Final Draft Master Plan, May 16, 2025, Table 6.1.

[3] Peaking Factors were taken from Table 3-1: Peaking Factors from MECP's Design Guidelines for Drinking-Water Systems.

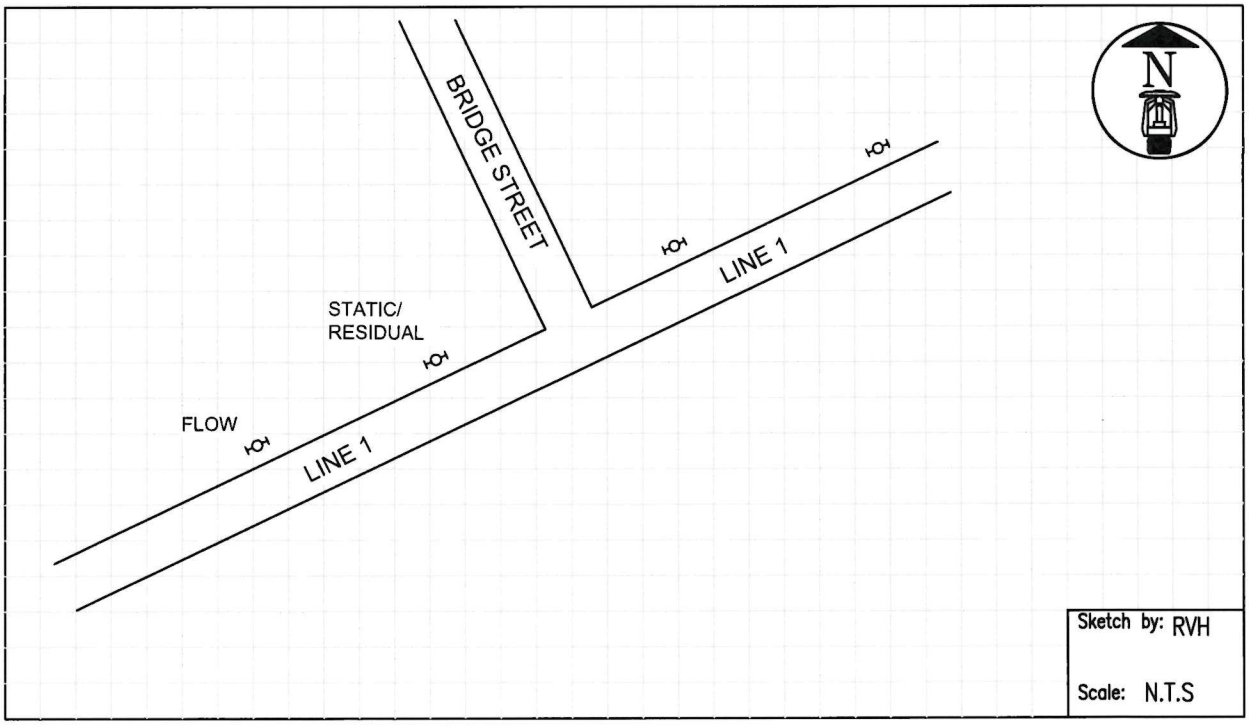
SPIRA FIRE PROTECTION LTD.
31 HAYES AVE., GUELPH, ONTARIO N1E 5V6 Phone: (519) 823-1150 Fax: (519) 822-7752 www.spira.ca

WATER SUPPLY TEST

Facility Name: Proposed Development (Flow Test No.1)	File/Project #: 60564
Facility Address: Line 1 At Bridge Street, Elora, On	
Tested by: Ron Van Hulst / Vic Walser	Witnessed by: Center Wellington Waterwork
Size of Main: ø12"	Comments:
☐ Dead End ☐ Two Ways ☒ Loop	
Flow Hydrant Location: Second Hydrant Located On North Side Of Line 1 West Of Bridge Street	
Residual Hydrant Location: First Hydrant Located On North Side Of Line 1 West Of Bridge Street	
Static Pressure: 53.5 psi	Date: June 3, 2026
Time: 9:00 ☒ AM ☐ PM	

Test No.	No. of Outlets	Orifice Size (in.)	Pitot Reading (psi)	Equivalent Flow gpm (U.S.)	Total Flow gpm (U.S.)	Residual Pressure (psi)	Comments
1	1	2½"	38	1150	1150	52.5	
2	2	2½"	28	2(987)	1974	51.5	
3							
4							

Site Map:



Name and Address of authority who should recieve a copy.

Township Of Centre Wellington Waterworks Dept. Att: Rick Chilton

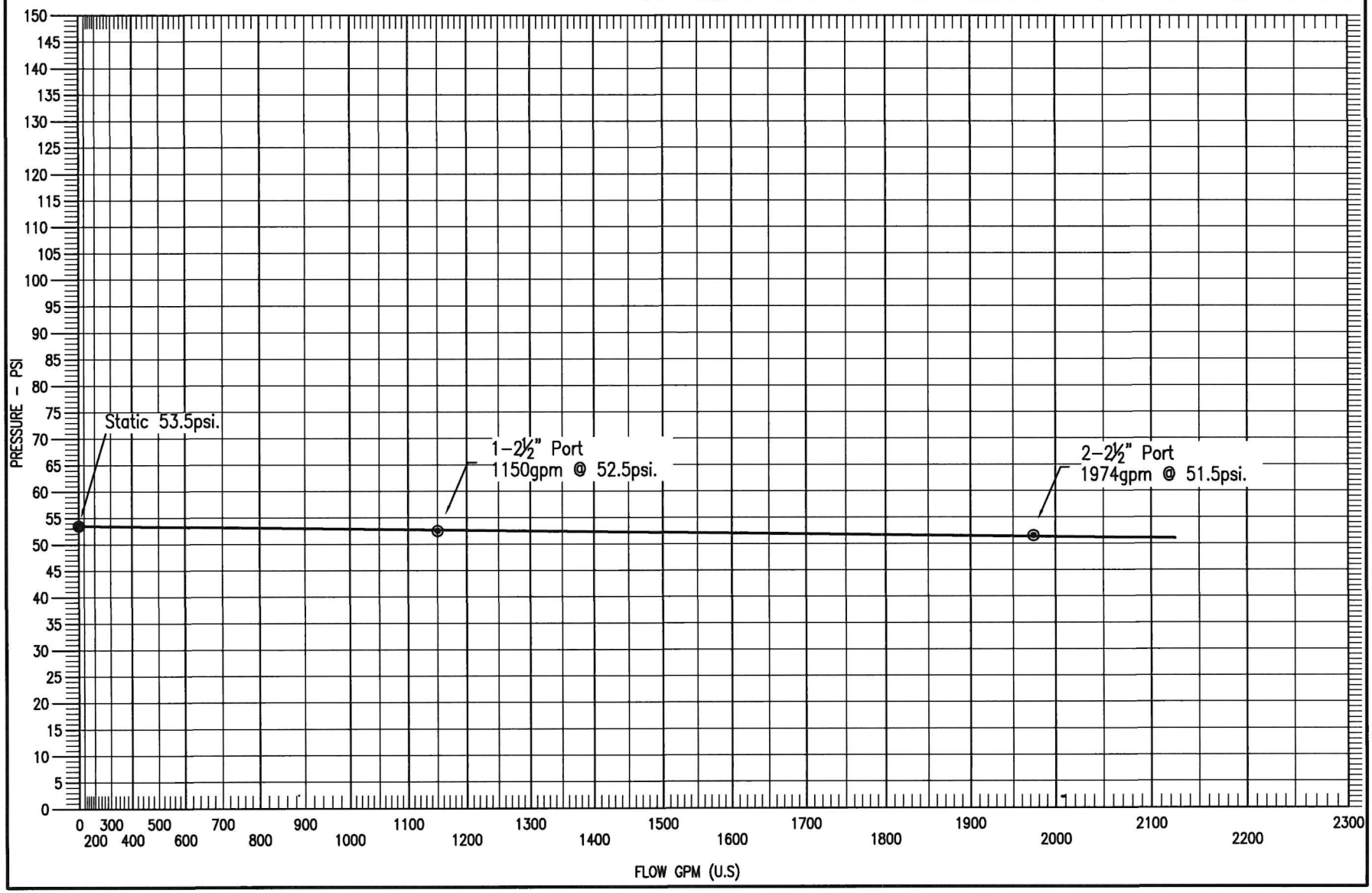
SPIRA FIRE PROTECTION LTD.

31 HAYES AVE., GUELPH, ONTARIO N1E 5V6 Phone: (519) 823-1150 Fax: (519) 822-7752

Facility Name: Proposed Development (Flow Test No.1) File/Project # 60564

Facility Address: Line 1 At Bridge Street, Elora, On

Tested by: Ron Van Hulst / Vic Walser Date: June 3, 2026



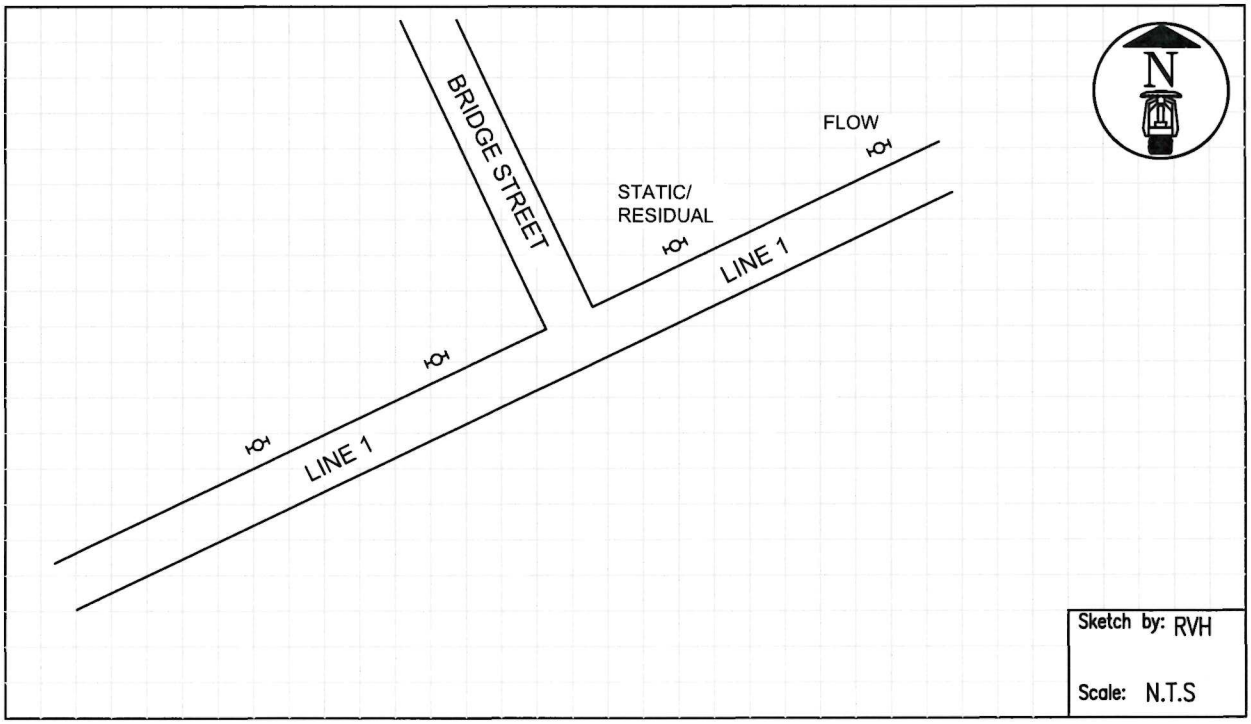
SPIRA FIRE PROTECTION LTD.
31 HAYES AVE., GUELPH, ONTARIO N1E 5V6 Phone: (519) 823-1150 Fax: (519) 822-7752 www.spira.ca

WATER SUPPLY TEST

Facility Name: Proposed Development (Flow Test No.2)	File/Project #: 60564
Facility Address: Line 1 At Bridge Street, Elora, On	
Tested by: Ron Van Hulst / Vic Walser	Witnessed by: Center Wellington Waterwork
Size of Main: ø12"	Comments:
☐ Dead End ☐ Two Ways ☒ Loop	
Flow Hydrant Location: Second Hydrant Located On North Side Of Line 1 West Of Bridge Street	
Residual Hydrant Location: First Hydrant Located On North Side Of Line 1 West Of Bridge Street	
Static Pressure: 59 psi	Date: June 3, 2026 / Time: 9:30 ☒ AM ☐ PM

Test No.	No. of Outlets	Orifice Size (in.)	Pitot Reading (psi)	Equivalent Flow gpm (U.S.)	Total Flow gpm (U.S.)	Residual Pressure (psi)	Comments
1	1	2½"	44	1237	1237	58	
2	2	2½"	26	2(951)	1902	56.5	
3							
4							

Site Map:



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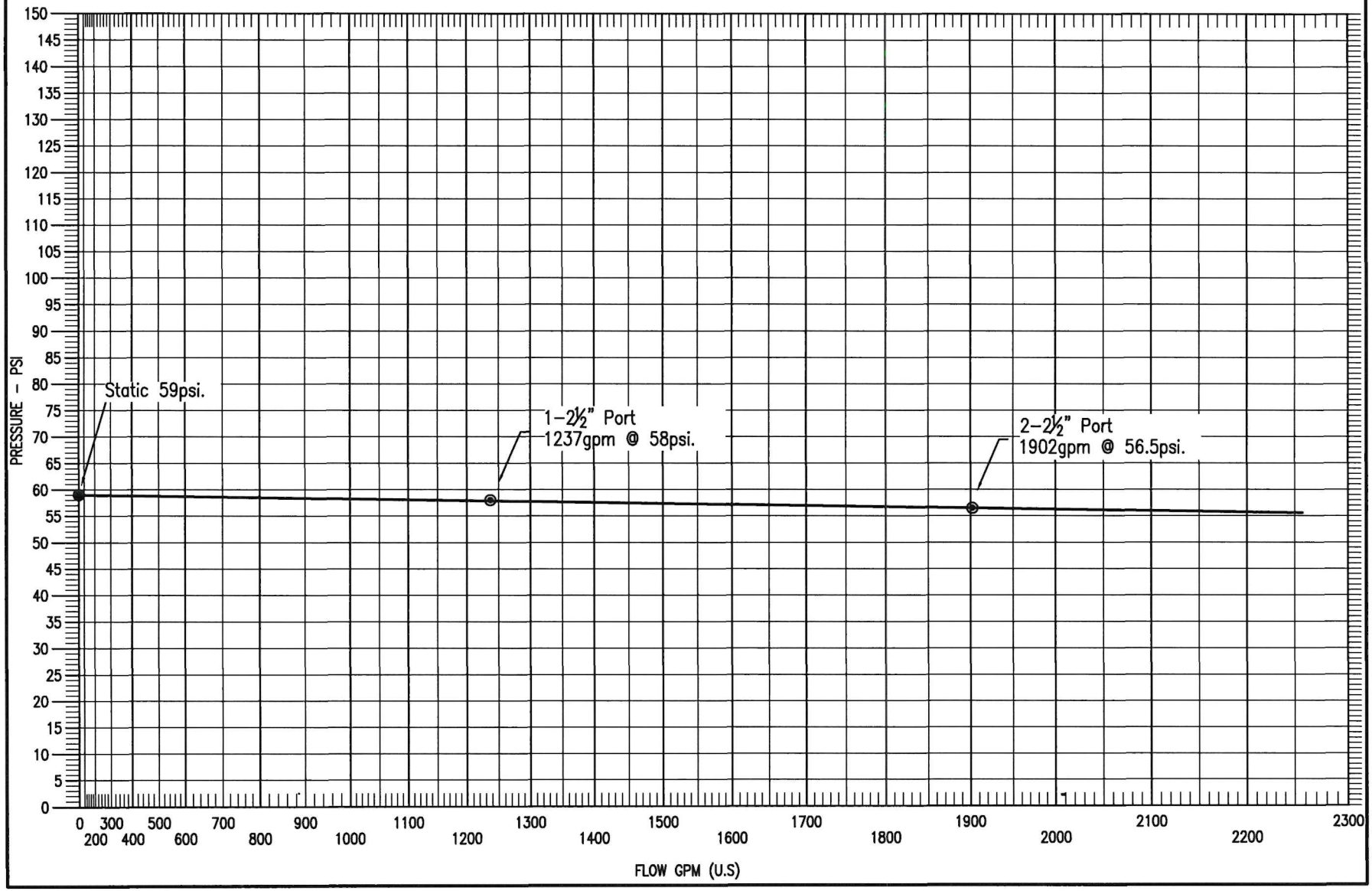
Facility Address: Line 1 At Bridge Street, Elora, On

Tested by: Ron Van Hulst / Vic Walser Date: June 3, 2026



MDD and MDD + FF Results

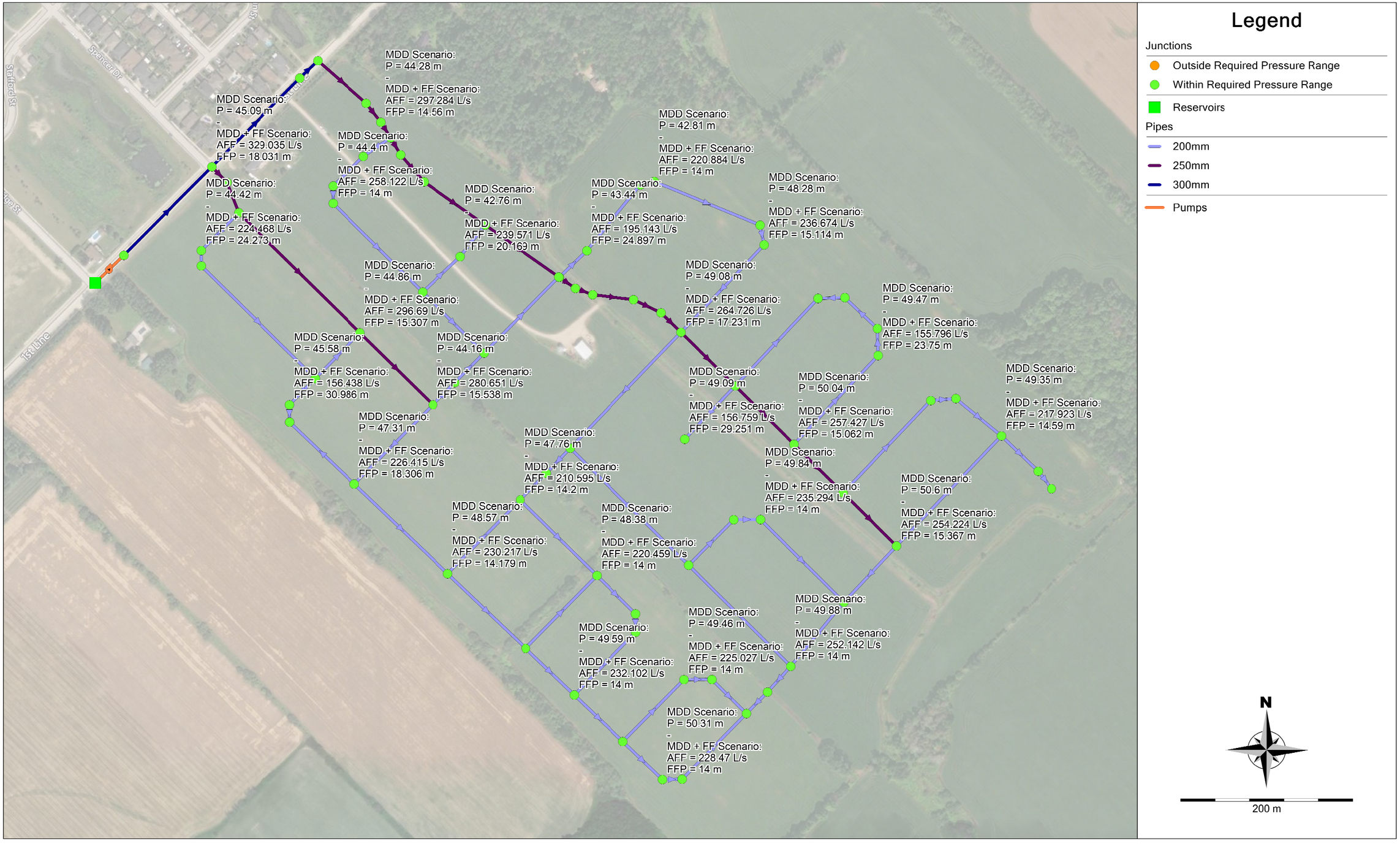


TABLE B.1.
EPANET WATERMAIN MODELLING RESULTS

ELORA LANDS
129 AND 159 FIRST LINE, ELORA, ON

Junction Results

Name	Elevation (m)	Base Demand (L/s)	Pressure (m)	Specified Fire Flow (L/s)	Target Res. Pressure (m)	Available Fire Flow (L/s)	Avail. Fire Flow Pressure (m)
n1	393.79	0.321	50.31	150	14	228.47	14
n2	393.65	0.321	50.45	150	14	228.139	14
n3	394.22	0.321	49.88	150	14	252.142	14
n6	393.77	0.321	50.33	150	14	256.539	14.468
n7	394.75	0.321	49.35	150	14	217.923	14.59
n8	394.4	0.321	49.7	150	14	221.147	14
n10	399.87	0.321	44.28	150	14	297.284	14.56
n11	399.5	0.321	44.656	150	14	302.344	14.83
n12	400.17	0.321	43.974	150	14	291.586	14.213
n13	400.37	0.321	43.77	150	14	286.5	14
n14	394.63	0.321	49.47	150	14	155.796	23.75
n15	394.83	0.321	49.27	150	14	155.796	21.002
n17	400.68	0.321	43.441	150	14	195.143	24.897
n18	401.37	0.321	42.763	150	14	239.571	20.169
n21	394.85	0.321	49.25	150	14	226.224	14
n22	394.64	0.321	49.46	150	14	225.027	14
n23	395.13	0.321	48.972	150	14	215.949	14
n25	399.75	0.321	44.42	150	14	224.468	24.273
n26	399.8	0.321	44.369	150	14	236.649	21.229
n27	394.26	0.321	49.84	150	14	235.294	14
n28	394.47	0.321	49.63	150	14	235.239	14
n29	399.53	0.321	44.61	150	14	260.206	14.287
n30	399.74	0.321	44.399	150	14	258.122	14
n31	395.83	0.321	48.282	150	14	236.674	15.114
n32	397.76	0.321	46.352	150	14	231.881	14
n33	401.31	0.321	42.806	150	14	220.884	14
n34	401.11	0.321	43.007	150	14	223.71	14
n35	395.03	0.321	49.07	150	14	155.796	16.572
n36	395.12	0.321	48.98	150	14	155.713	14
n37	395.73	0.321	48.382	150	14	265.704	16.796
n38	396.52	0.321	47.595	150	14	266.78	16.465
n39	399.51	0.321	44.611	150	14	269.017	15.081
n40	398.51	0.321	45.609	150	14	268.302	15.458
n41	398.58	0.321	45.578	150	14	156.438	30.986
n42	397.75	0.321	46.408	150	14	156.438	30.173
n43	394.09	0.321	50.011	150	14	235.952	14
n44	394.48	0.321	49.62	150	14	239.097	14
n45	395.38	0.321	48.723	150	14	214.975	14
n46	396.34	0.321	47.765	150	14	210.595	14.2
n47	394.51	0.321	49.592	150	14	232.102	14
n48	396.54	0.321	47.564	150	14	156.759	24.359
n49	395.54	0.321	48.567	150	14	230.217	14.179
n50	399.98	0.321	44.16	150	14	280.651	15.538
n51	396.81	0.321	47.312	150	14	226.415	18.306
n52	399.3	0.321	44.856	150	14	296.69	15.307
n53	399.17	0.321	45.012	150	14	273.065	24.589
WTM_EX2	399.1	0.321	45.088	150	14	329.035	18.031
n56	399.5	0.321	44.675	150	14	298.017	18.651
n57	398.84	0.321	45.318	150	14	248.339	19.305
n58	395	0.321	49.1	150	14	156.438	26.068
n59	395.34	0.321	48.76	150	14	156.438	23.625
n60	394.83	0.321	49.271	150	14	243.269	14
n61	395.7	0.321	48.404	150	14	226.523	14.89
n62	396.59	0.321	47.514	150	14	156.759	27.016
n63	401.34	0.321	42.793	150	14	279.046	14
n64	401.32	0.321	42.814	150	14	270.009	14
n65	402.49	0.321	41.647	150	14	266.52	14
n66	401.06	0.321	43.074	150	14	274.662	14
n67	399.77	0.321	44.373	150	14	216.466	24.701
n68	400.06	0.321	44.086	150	14	293.614	14.503
n69	395.03	0.321	49.08	150	14	264.726	17.231
n72	400.65	0.321	43.473	150	14	269.542	14.619
n74	395.02	0.321	49.085	150	14	156.759	29.251
n75	394.53	0.321	49.575	150	14	265.022	14.54
n76	395.07	0.321	49.035	150	14	156.759	24.069
n77	394.06	0.321	50.042	150	14	257.427	15.062
n78	393.63	0.321	50.471	150	14	255.283	15.233
n79	393.5	0.321	50.6	150	14	254.224	15.367
n81	400.65	0.321	43.473	150	14	269.787	14.618
n84	398.67	0.321	45.503	150	14	317.272	16.069
n86	394.2	0.321	49.9	150	14	223.406	14
n87	394.8	0.321	49.3	150	14	242.537	14
n88	394.91	0.321	49.193	150	14	228.358	14
n91	398.26	0.321	45.862	150	14	156.759	24.177
n92	395.72	0.321	48.383	150	14	220.459	14
WTM_EX3	398.7	0.321	45.474	150	14	318.128	16.135
WTM_EX1	402.55	0.321	41.694	150	14	392.832	14.047

Pipe Results

Name	Length (m)	Diameter (mm)	Roughness, C	Flow (L/s)	Velocity (m/s)
C2	21.23	200	150	0.890337	0.028
C3	29.293	200	150	-0.599874	0.019
p1	22.59	200	150	0.49131	0.016
p10	15.73	200	150	1.000489	0.032
p12	32.53	200	150	-0.352558	0.011
p14	17.67	200	150	3.384911	0.108
p15	31.03	200	150	-0.428555	0.014
p16	20.03	200	150	2.753239	0.088
p17	23.11	200	150	-1.787598	0.057
p18	16.66	200	150	-2.429598	0.077
p19	31.03	200	150	0.321	0.01
p20	35.15	250	150	-6.677535	0.136
p21	21.28	250	150	7.319535	0.149
p22	20.11	200	150	0.321	0.01
p23	100.4	200	150	-0.673558	0.021
p24	56.1	200	150	-0.031558	0.001
p25_1	78.25	200	150	-1.211337	0.039
p25_2	109.35	200	150	-1.229139	0.039
p26	101.6	200	150	-0.569337	0.018
p27	43.02	200	150	0.321	0.01
p28	119.7	200	150	1.871139	0.06
p29	129.1	200	150	5.016868	0.16
p3	11.7	200	150	0.425755	0.014
p30	118.6	250	150	9.060248	0.185
p31	25.16	250	150	-11.628248	0.237
p32	33.9	250	150	-11.307248	0.23
p34	61.48	200	150	-3.705911	0.118
p35	185.2	200	150	-3.06391	0.098
p36	47.86	200	150	-0.642	0.02
p37	25.74	200	150	-0.321	0.01
p38	135.8	200	150	0.107555	0.003
p39	74.12	200	150	0.749555	0.024
p4	67.95	200	150	-0.278874	0.009
p40	184.824	200	150	1.619377	0.052
p40_2	173.776	200	150	0.548822	0.017
p41	40.02	200	150	-0.321	0.01
p43	59.97	200	150	1.321489	0.042
p44	36.14	200	150	-3.722381	0.118
p45	48.08	200	150	-3.401381	0.108
p46	100.1	200	150	0.789749	0.025
p47	145.8	200	150	2.432239	0.077
p48	49.14	200	150	3.074239	0.098
p49	38.06	200	150	3.395239	0.108
p50	185.1	200	150	2.261377	0.072
p51	139.6	200	150	1.466598	0.047
p52	132.2	200	150	2.108598	0.067
p53	98.13	200	150	2.750598	0.088
p54	32	200	150	3.071598	0.098
p55	76.71	200	150	0.321	0.01
p57	139.3	200	150	-0.321	0.01
p59	51.98	200	150	0.642	0.02
p6	27.59	250	150	-11.483752	0.234
p60	141.5	200	150	1.284	0.041
p61	87.24	250	150	1.430881	0.029
p62	79.88	250	150	2.672755	0.054
p63	95.79	250	150	4.277755	0.087
p64	88.24	250	150	5.240755	0.107
p65	32.17	250	150	6.356534	0.129
p66	47.97	250	150	6.998534	0.143
p68	16.88	250	150	7.640534	0.156
p69	0.953	250	150	11.033133	0.225
p7	41.21	250	150	7.125513	0.145
p70	104.2	250	150	7.484002	0.152
p71	86.72	250	150	6.804513	0.139
p73	15.5	250	150	7.446513	0.152
p74	21.39	250	150	11.162751	0.227
p75	72.62	250	150	11.804751	0.24
p78	147.2	200	150	-0.920874	0.029
p79	175.7	200	150	0.684126	0.022
p8	31.2	200	150	0.963	0.031
p81	89.94	200	150	0.21231	0.007
p82	40.14	200	150	-0.440132	0.014
p83	34.72	200	150	-0.119132	0.004
p84	106.3	200	150	0.17031	0.005
p85	63.26	200	150	0.81231	0.026
p86	78.01	200	150	1.806868	0.058
p87	78.01	200	150	1.55853	0.05
p88	124.7	200	150	2.182729	0.069
p89	135.2	200	150	4.374868	0.139
p92	82.85	200	150	-0.321	0.01
p93	42.55	200	150	0.642	0.02
p94	74	200	150	-2.100911	0.067
p95	197.4	250	150	7.280338	0.148
p96	117.8	200	150	-0.303198	0.01
p97	123.4	200	150	3.87013	0.123
WTM_CONNECTION	10.74	300	150	12.125751	0.172
WTM_EX_1	154.822	300	150	24.396	0.345
WTM_EX2	133.778	300	150	12.446752	0.176

Summary - MDD

Max pressure	50.60	m
Min pressure	41.65	m
Max Velocity	0.345	m/s

Summary - MDD + FF

Max pressure	30.99	m
Min pressure	14	m
Max AFF	392.832	L/s
Min AFF	155.713	L/s
Max Velocity	5	L/s

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Appendix D

Tech Memo – Overall Sanitary Servicing Strategy – 127 First Line and 159 First Line (Burnside, dated Sept 2026)

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Technical Memorandum

Date: September 11, 2026 **Project No.:** 300060179.0000

Project Name: Overall Sanitary Servicing Strategy - 127 First Line and 159 First Line

Client Name: Elora Greens Inc. and WrightHaven Homes

Submitted To: Mr. Farhan Kamali Siddiqui and Mr. Steven Wright

Submitted By: Angela Kroetsch, P.Eng.

1.0 Introduction

Elora Greens Inc. (Elora Greens) has retained R.J. Burnside & Associates Limited (Burnside) to complete the preliminary engineering design necessary to support a Draft Plan of Subdivision application for the residential development of 127 First Line located on the south side of First Line in Elora, between Bridge Street and Spencer Drive. The site is approximately 21.6 ha (53.4 ac) in size and is located within the jurisdiction of the Township of Centre Wellington (Township), County of Wellington (County) and the Grand River Conservation Authority (GRCA). Elora Greens is intending to develop between 299-684 residential units, including the associated municipal roads / rights-of-way, parkland / trails, and stormwater management facility at the site.

The lands immediately adjacent to the subject lands (located to the east), known as 159 First Line (42.3 ha or 104.5 ac) and owned by WrightHaven Homes (WrightHaven), are also planned for residential development. It is understood that WrightHaven Homes is also planning to development between 455-602 residential units, including the associated municipal roads / rights-of-way, parkland / trails and stormwater management facilities.

Based on pre-consultation comments received from the Township of Centre Wellington for both the 127 First Line and 159 First Line lands, as well as subsequent follow up discussions with the Township, both Elora Greens and WrightHaven Homes have been actively collaborating and coordinating during the preparation of a joint sanitary servicing strategy for the development of both parcels.

In response to the pre-consultation comments received from the Township (dated September 19, 2025), Burnside has undertaken the overall sanitary servicing portion of the joint servicing strategy to identify the following:

- The recommended preferred servicing strategy from the Township of Centre Wellington Water and Wastewater Servicing Master Plan (R.V. Anderson Associates Limited, dated June 30,2025) for the ER1 lands located to the south of First Line, which includes both 127 First Line and 159 First Line
- The available unused capacity in both the Stafford Street Sewage Pumping Station (SPS) and the Clyde Street Sewage Pumping Station (SPS)
- The available unused capacity in the existing gravity sanitary sewer system that could potentially be utilized to service the proposed development of both 127 First Line and 159 First Line
- The anticipated peak sanitary sewer flows generated from the Phase 1 development areas for both 127 First Line and 159 First Line
- The ability of the existing gravity sanitary sewer system to convey the anticipated peak sanitary sewer flows generated from the Phase 1 development areas for both 127 First Line and 159 First Line
- The anticipated peak sanitary sewer flows generated from the remainder of the development areas for both 127 First Line and 159 First Line
- The proposed approach for the sanitary servicing of the remainder of the development areas for both 127 First Line and 159 First Line

This technical memorandum summarizes the overall sanitary servicing strategy for the 127 First Line and 159 First Line development areas.

2.0 Preferred Wastewater Servicing Strategy from the Township of Centre Wellington Water and Wastewater Servicing Master Plan (R.V. Anderson Associates Limited, dated June 30, 2025)

As part of the Township's Water and Wastewater Servicing Master Plan, the ability of both the existing Elora Wastewater Treatment Plant (WWTP) and the existing wastewater collection system was investigated and analyzed to identify if the existing facilities had sufficient capacity to accommodate the additional flow generated from the projected population growth (to the year 2051). This investigation and analysis included for the anticipated flows generated from the ER1 lands located to the south of First Line. The ER1 lands include both 127 First Line (21.6 ha) and 159 First Line (42.3 ha), as well as the approximately 110.1 ha of future employment lands.

This investigation and analysis identified that the existing Elora WWTP has sufficient capacity to accommodate the anticipated growth to the year 2051 and that based on this anticipated growth that the Elora WWTP will be operating at approximately 73% of the rated capacity of 5,000 m^3/day.

Upgrades to the existing wastewater collection system for Elora were also identified as being required to service the anticipated population growth (to the year 2051), as well as the lands brought into the Township of Centre Wellington boundary. The lands brought into the Township of Centre Wellington boundary are identified in the Township's Water and Wastewater Servicing Master Plan as the ER1 lands (127 First Line, 159 First Line and the future employment lands located between 127 First Line and Wellington County Road 7). The approximate area of the entire ER1 lands is 174 ha.

The upgrades to the wastewater collection system for the servicing of the entire ER1 lands includes the following:

- Design and construction of a new South Elora Sewage Pumping Station (SPS), along the west boundary of the ER1 lands and south of First Line
- Design and construction of a new sanitary forcemain along Wellington County Road 7, from the new South Elora SPS to First Line
- Design and construction of a new gravity sanitary sewer along Wellington County Road 7, from First Line to the Elora WWTP

The schedule for the design and construction of the wastewater collection system upgrades to support development within the ER1 lands has been identified as a long-term project in the Township's Water and Wastewater Servicing Master Plan. This schedule recommends that design of the wastewater collection system, including the new South Elora Sewage Pumping Station (SPS), the sanitary forcemain along Wellington County Road 7, and the gravity sanitary sewer along Wellington County Road 7, would commence in 2034, with the works being complete and in service by the year 2036.

As this timeline does not take into account the desired development schedules for both 127 First Line and 159 First Line, both Elora Greens and WrightHaven Homes have been actively collaborating on a joint sanitary servicing strategy that will expedite this timeline, which respects the preferred servicing strategy for the long-term development of the ER1 lands and utilizes the available unused capacity in the existing wastewater collection system.

3.0 Stafford Street Sewage Pumping Station (SPS) and the Clyde Street Sewage Pumping Station (SPS) – Capacity Investigation and Assessment

In response to the pre-consultation comments received from the Township (dated September 19, 2025), an investigation into the available wastewater servicing infrastructure and outlet locations that are available to service the subject lands, as well as the adjacent development lands (WrightHaven Homes) located at 159 First Line was completed.

This included an investigation and assessment of the existing Stafford Street Sewage Pumping Station (SPS) and existing Clyde Street SPS to identify:

- The theoretical capacity of each SPS (Stafford Street and Clyde Street)
- The peak flows that are currently discharging to each of the SPS's
- The available unused capacity in each SPS (Stafford Street and Clyde Street) that could potentially be utilized to service the proposed development of both 127 First Line and 159 First Line

As detailed in the Stafford Street Sewage Pumping Station (SPS) and Clyde Street Sewage Pumping Station (SPS) – Capacity Investigation and Assessment Memo prepared by Burnside (dated September 2026), there is unused capacity available at both SPS's to accommodate a portion of the anticipated sanitary flows from the development of 127 First Line and 159 First Line. The Stafford Street SPS has approximately 38.5 L/s of available unused capacity, and the Clyde Street SPS has approximately 92.0 L/s of available unused capacity.

Since the available unused capacity in both the Stafford Street and Clyde Street SPS's is not sufficient to accommodate all of the anticipated sewage flows from the development of the entire 127 First Line and 159 First Line, it is proposed that the wastewater flows generated from only the Phase 1 development areas for both 127 First Line and 159 First Line, be directed to the existing SPS's. The projected wastewater flows for the Phase 1 development areas are summarized in Table 1.

Table 1: Wastewater Flow Projections for Phase 1 of 127 First Line and 159 First Line

Development	Data	Projection
127 First Line (Elora Greens)	Units	108
	Population	257
	Peak Flow (L/s)	4.16
	Infiltration (0.15 L/s/ha)	0.39
	Total Elora Greens Peak Flow (L/s)	**4.55**
159 First Line (WrightHaven Homes)	Units	147
	Population	458
	Peak Flow (L/s)	7.41
	Infiltration (0.15 L/s/ha)	0.81
	Total WrightHaven Homes Peak Flow (L/s)	**8.22**
	Total Development Peak Flow (L/s)	**12.77**

Based on the historical data available for both SPS's and the wastewater flow projections for the Phase 1 development areas for 127 First Line (4.55 L/s) and 159 First Line (8.22 L/s), both the Stafford Street SPS and the Clyde Street SPS have sufficient capacity available to accommodate the existing flows discharging to each SPS and the flows generated by the development of 127 First Line and 159 First Line (Phase 1 only).

Figure 1 illustrates the limits of the Phase 1 sanitary sewer servicing area for both 127 First Line and 159 First Line.

A copy of Stafford Street Sewage Pumping Station (SPS) and Clyde Street Sewage Pumping Station (SPS) – Capacity Investigation and Assessment Memo prepared by Burnside (dated September 2026) has been provided in Appendix A.

4.0 Sanitary Sewer Capacity Assessment

As part of the investigation and analysis into the capacity of the existing Stafford Street and Clyde Street SPS's, an investigation into the existing gravity sanitary sewer system was also completed to identify the theoretical capacity of existing gravity sanitary sewer system, the available unused capacity in the existing gravity sanitary sewer system that could potentially be utilized to service the proposed development of both 127 First Line and 159 First Line, and the ability of the existing gravity sanitary sewer system to convey the anticipated peak sanitary sewer flows generated from the Phase 1 development areas for both 127 First Line and 159 First Line.

Figure 1 illustrates the limits of the Phase 1 sanitary sewer servicing area for both 127 First Line and 159 First Line.

Based on a comparison of the existing condition peak design flow rates against the maximum capacity in the existing gravity sanitary sewer system, the available unused capacity in the existing gravity sanitary sewer system was determined to be 16.4 L/s. This represents 80% of the available unused capacity in the existing 200 mm diameter gravity sanitary sewer on Spencer Drive (between First Line and Stafford Street).

As outlined above (see Table 1), the anticipated peak sanitary sewer flow rate for Phase 1 of the 127 First Line and 159 First Line developments has been calculated to be 4.55 L/s and 8.22 L/s, respectively. Therefore, the total anticipated peak sanitary sewer flow rate to be conveyed by the existing gravity sanitary sewer system is 12.77 L/s, which is less than the maximum available unused capacity in the existing gravity sanitary sewer system of 16.4 L/s.

Therefore, the existing gravity sanitary sewer system has sufficient capacity to convey the anticipated peak sanitary sewer flow rates generated from the Phase 1 development areas for both 127 First Line and 159 First Line.

A copy of Sanitary Sewer Capacity Assessment Memo prepared by R.J. Burnside & Associates Limited (dated September 2026) has been provided in Appendix B.

5.0 Overall Sanitary Servicing Strategy for both 127 First Line and 159 First Line

To support the residential development of both 127 First Line and 159 First Line in advance of the timeline outlined in the Township's Water and Wastewater Servicing Master Plan (dated June 2025), and based on the investigations and analysis completed for the existing wastewater system consisting of both the Stafford Street and Clyde Street SPS's and the existing gravity sanitary sewer system from First Line to the Elora WWTP, the joint sanitary servicing strategy for 127 First Line and 159 First Line consists of the following:

1. The extension of gravity sanitary sewers within the Phase 1 development areas for 127 First Line (3.2 ha for Phase 1 only) and 159 First Line (8.5 ha for Phase 1 only), that will convey flows to the existing 200 mm diameter sanitary sewer on First Line and to both the Stafford Street and Clyde Street SPS, ultimately discharging to the Elora WWTP. The existing sanitary sewer system, as well as the Stafford Street and Clyde Street SPS's have sufficient capacity to accommodate and convey the Phase 1 flows without any upgrades to the existing infrastructure.

2. The design and construction of sewage pumping station within Block 29 of the Draft Plan of Subdivision for 127 First Line, to service the remainder of the 127 First Line lands and the remainder of the 159 First Line lands. The sewage pumping station will be designed to accommodate residential sewage flows from 44.8 ha (18.3 ha from 127 First Line and 15.84 ha from 159 First Line).

   Figure 2 illustrates the limits of both 127 First Line and 159 First Line that will be serviced by the sewage pumping station.

   The projected wastewater flows for the lands discharging to the sewage pumping station areas are summarized in Table 2.

Table 2: Wastewater Flow Projections for 127 First Line and 159 First Line to the sewage pumping station

Development	Data	Projection
127 First Line (18.3 ha) (Elora Greens)	Units	569
	Population	1,449
	Peak Flow (L/s)	21.66
	Infiltration (0.15 L/s/ha)	1.54
	Total Elora Greens Peak Flow (L/s)	**23.20**
159 First Line (15.84 ha) (WrightHaven Homes)	Units	455
	Population	1,348
	Peak Flow (L/s)	20.28
	Infiltration (0.15 L/s/ha)	2.38
	Total WrightHaven Homes Peak Flow (L/s)	**22.66**
	Total Development Peak Flow (L/s)	**45.86**

The total anticipated peak flow rate discharging to the sewage pumping station is estimated to be 45.86 L/s. This represents 23.20 L/s from 127 First Line and 22.66 L/s from 159 First Line. A copy of the preliminary sanitary sewer calculations for the flows to be conveyed to the sewage pumping station within Block 29 of the Draft Plan of Subdivision for 127 First Line is provided in Appendix C.

As the timeline and demand for the development of the remainder of the ER1 lands (i.e. the future employment lands to the west of 127 First Line) is unknown, the sewage pumping station has been located within the 127 First Line development to permit the future expansion of the sewage pumping station.

3. The design and construction of a 300 mm diameter sanitary forcemain, including the associated vacuum and drain chambers, from the sewage pumping station (Block 29) located within the limits of the 127 First Line development boundary, to convey residential flows from 127 First Line and 159 First Line to the existing Elora WWTP. The 300 mm diameter sanitary forcemain is proposed to be routed from the sewage pumping station to First Line, westerly along First Line to Wellington County Road 7, and then northerly along Wellington County Road 7 to the Elora WWTP.

As the timeline and demand for the development of the remainder of the ER1 lands (i.e. the future employment lands to the west of 127 First Line) is unknown, the sewage pumping station block has been located such that the 300 mm diameter forcemain can be twinned with another 300 mm diameter forcemain in the future to service the remainder of the lands within the ER1 area.

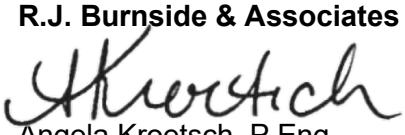
Figure 3A and Figure 3B illustrate the proposed 300 mm diameter sanitary forcemain alignment from the sewage pumping station to the Elora WWTP.

6.0 Conclusion

Due to the development schedules for 127 First Line and 159 First Line, both Elora Greens and WrightHaven Homes have actively collaborated in the preparation of this joint sanitary servicing strategy. The joint sanitary servicing strategy which includes the following, has been prepared to utilize the available unused capacity in the existing sanitary sewer collection system, while also recognizing the recommendation servicing strategy (i.e. sewage pumping station and forcemain) from the Township's Water and Wastewater Servicing Master Plan (June 2025):

- A gravity sanitary sewer connection to the existing 200 mm diameter sanitary sewer on First Line for the Phase 1 development areas from 127 First Line and 159 First Line
- A sewage pumping station within the 127 First Line development, which will service the remainder of the 127 First Line and 159 First Line lands, and that can be expanded in the future to service the remainder of the ER1 lands
- A 300 mm diameter sanitary forcemain extended from the sewage pumping station to First Line, and then along First Line and Wellington County Road 7 to the Elora WWTP, which can also be twinned in the future to service the remainder of the ER1 lands

R.J. Burnside & Associates Limited



Angela Kroetsch, P.Eng.
Project Engineer

AK:af

Enclosure(s) Appendix A: Stafford Street Sewage Pumping Station (SPS) and Clyde Street Sewage Pumping Station (SPS) – Capacity Investigation and Assessment Memo
Appendix B: Sanitary Sewer Capacity Assessment Memo
Appendix C: Proposed Condition Sanitary Sewer Flows to Sewage Pumping Station
Figure 1: Phase 1 Gravity Sanitary Servicing Area
Figure 2: Sewage Pumping Station Service Area
Figure 3A: Proposed 300 mm diameter Sanitary Forcemain Alignment
Figure 3B: Proposed 300 mm diameter Sanitary Forcemain Alignment

cc: Angela Kroetsch, P.Eng., R.J. Burnside & Associates Limited
Dan Ferguson, MBA, P.Eng., PMP, WalterFedy
Ashley Klashoff, CET, WalterFedy

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Appendix A

Stafford Street Sewage Pumping Station (SPS) and Clyde Street Sewage Pumping Station (SPS) – Capacity Investigation and Assessment Memo

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Technical Memorandum

Date: September 11, 2026 **Project No.:** 300060179.0000

Project Name: Stafford Street Sewage Pumping Station (SPS) and Clyde Street Sewage Pumping Station (SPS) - Capacity Investigation and Assessment

Client Name: Elora Greens Inc. and WrightHaven Homes

Submitted To: Mr. Farhan Kamali Siddiqui and Mr. Steven Wright

Submitted By: Gary Voorthuyzen, P.Eng.

1.0 Introduction

Elora Greens Inc. (Elora Greens) has retained R.J. Burnside & Associates Limited (Burnside) to complete the background investigation and preliminary engineering necessary to support a Draft Plan of Subdivision application for the residential development of the subject lands located on the south side of First Line in Elora, between Bridge Street and Spencer Drive. The site is approximately 21.6 ha (53.4 ac) in size and is located within the jurisdiction of the Township of Centre Wellington (Township), County of Wellington (County) and the Grand River Conservation Authority (GRCA). Elora Greens is intending to develop between 299-684 residential units, including the associated municipal roads / rights-of-way, parkland / trails and stormwater management facility at the site.

In response to the pre-consultation comments received from the Township (dated September 19, 2025), Burnside has undertaken an investigation into the available wastewater servicing infrastructure and outlet locations that are available to service the subject lands, as well as the adjacent development lands (WrightHaven Homes located at 159 First Line). As part of this investigation, Burnside has completed an investigation and assessment of the Township's existing Stafford Street Sewage Pumping Station (SPS) and existing Clyde Street SPS.

The purpose of this investigation and assessment is to identify and confirm the following:

- The theoretical capacity of each SPS (Stafford Street and Clyde Street)
- The peak flows that are currently discharging to each of the SPS's
- The available unused capacity in each SPS (Stafford Street and Clyde Street) that could potentially be utilized to service the proposed development of both 127 First Line and 159 First Line.

This technical memorandum summarizes the results of the capacity review.

2.0 Stafford Street SPS

The Stafford Street SPS (19 Stafford Street) was constructed in 2008 and is located on the south side of Stafford Street, between Spencer Drive and Bridge Street, across the street from South Ridge Park in Elora. Wastewater from the SPS is pumped through a 150 mm diameter polyvinyl chloride (PVC) forcemain approximately 200 m in length, ultimately outlets to a manhole and gravity sanitary sewer at the intersection of Stafford Street and Bridge Street. The Certificate of Approval (C of A) for the SPS is included in Attachment A.

The SPS consists of a rectangular pre-cast concrete wet well (approximately 3.7 m x 2.4 m) with a total depth of approximately 8.3 m below grade. The wet well is equipped with an inlet basket screen. The SPS also includes a precast concrete valve chamber, control building with an indoor standby diesel generator, and an overflow manhole. The wet well contains two submersible pumps which operate in a lead / lag configuration. The pumps are equipped with variable frequency drives (VFDs). The wastewater level in the wet well is measured by an ultrasonic level transmitter, and backup floats are provided.

The Stafford Street SPS was originally designed to service a contributing drainage area of 21.1 ha consisting of 274 residential units and future external development lands consisting of 48 additional residential units, as well as 25.4 ha of future development land located on the south side of First Line. From the South Ridge Subdivision Sewage Pumping Station Final Design Brief (Gamsby and Mannerow Limited, dated April 2008), the Stafford Street SPS has been designed to accommodate a flow of 21.4 L/s from the 21.1 ha of contributing drainage area and 20.3 L/s from the 25.4 ha of future development land, for a total design capacity of 41.7 L/s. The original developments have been completed, and the remaining capacity can be utilized at these proposed development areas south of First Line.

The VFDs allow the pumps at the Stafford Street SPS to operate at lower speeds to pump the initial lower flows, and the speeds can be increased in the future with additional development. The 2008 Design Brief indicates that the SPS has been designed to pump an ultimate peak flow of 41.7 L/s (3,603 m^3/d) at 15.5 m total dynamic head (TDH). The design brief also notes that the pumps will initially be designed to pump at 21.4 L/s at 9.0 m TDH (based on a frequency of 43 Hz) to meet the interim design point.

The pump information provided in the 2008 Design Brief provides is summarized in Table 1.

Table 1: Stafford Street SPS Pump Specifications

	Pump 1	Pump 2
Pump Type	Submersible	Submersible
Manufacturer	Flygt	Flygt
Pump Model	NP3153.181 HT	NP3153.181 HT
Capacity	34.9 L/s @ 16.4 m TDH	34.9 L/s @ 16.4 m TDH
Impeller Dia.	239 mm	239 mm
Motor Size	11 kW (15 hp)	11 kW (15 hp)
Incoming Power	600 V / 3 PH / 60 Hz	600 V / 3 PH / 60 Hz

The pumping system was designed to operate in a lead / lag configuration. When the wet well level reaches the lead pump start setpoint, the pump will run until the level reaches the lower stop setpoint. However, if the lead pump cannot keep up with the incoming flows and the wet well level continues to rise until it reaches the lag pump start level, the second pump will turn on such that both pumps are running simultaneously.

2.1 Historical Flow Analysis

To review the station's ability to handle the sewage flows generated by the current catchment area during peak flow events, historical operational data was analyzed. Burnside requested data from the Township to review the highest daily flow rates that were recorded during a three-year period (January 2023 to September 2025) on the SPS's magnetic flowmeter. Based on the past three years of data, the highest daily flow of 180 m^3/day was recorded on April 3, 2025.

The flow and wet well level data is recorded on the Supervisory Control and Data Acquisition (SCADA) system on a minute-by-minute basis. This data was requested for the dates of the highest daily flows, as it was assumed the peak hour flow would also occur on these dates.

There is no flow measurement on the incoming sewage flow into the wet well. As a result, the flow rate discharging to the Stafford Street SPS (i.e., the incoming flow rate) was calculated per minute based on the approximated pumped volume each minute (instantaneous flow is recorded at each minute by the flow meter at the SPS outlet) and the change in wet well level (using an internal wet well area of approximately 8.79 m^2) to determine the volume. Based on the incoming flow rate calculated for each minute, this data was used to determine the peak flow rate over each 60-minute period throughout the day. The result of this analysis is summarized in Table 2, which identifies the highest peak hour flow calculated for the maximum day flow event.

Table 2: Current Stafford Street SPS Peak Hour Flow Rate

Date	Calculated Peak Hour Flow	
	L/s	m^3/hr
April 3, 2025	3.2	11.5

Based on the current peak flow analysis described above (3.2 L/s) and the ultimate peak design capacity of 41.7 L/s for the SPS, the current available unused capacity in the Stafford Street SPS is approximately 38.5 L/s. While the design report notes that the station was designed to initially pump at 21.4 L/s (based on a VFD frequency of 43 Hz), the historical data analyzed shows that the station is currently pumping at approximately 29 L/s.

2.2 Capacity for Additional Flow from Developments

In order to review whether the current excess capacity at the Stafford Street SPS would be able to accommodate the additional flows associated with the proposed residential developments in the area, projected wastewater flows have been calculated for the Phase 1 development area and are summarized in Table 3. The calculations utilized an average day wastewater flow of 350 L/p/d as outlined in the Township's Development Manual (dated June 2024). Detailed calculations are provided in Attachment B.

The projections in Table 3 are conservative given that new developments typically have lower flows compared to existing infrastructure and that the projections incorporate infiltration allowances into the total peak flow calculations.

Table 3: Wastewater Flow Projections for Future Developments

Development	Data	Projection
127 First Line (Elora Greens)	Units	108
	Population	257
	Peak Flow (L/s)	4.16
	Infiltration (0.15 L/s/ha)	0.39
	Total Elora Greens Peak Flow (L/s)	**4.55**
159 First Line (WrightHaven Homes)	Units	147
	Population	458
	Peak Flow (L/s)	7.41
	Infiltration (0.15 L/s/ha)	0.81
	Total WrightHaven Homes Peak Flow (L/s)	**8.22**
	Total Development Peak Flow (L/s)	**12.77**

As shown in Table 3, the anticipated peak flows from the first phase of construction of each development area (127 First Line and 159 First Line) are projected to be approximately 12.8 L/s. Based on the available unused capacity of 38.5 L/s, the Stafford Street SPS would be able to service the current catchment area as well as the anticipated first phase of construction for the development lands located on the south side of First Line. Furthermore, based on the historical peak flow of 3.2 L/s plus the additional 12.8 L/s projected from these developments, the projected inflow (15 L/s total) is still less than the current pumping rate and the pumped flow rate being discharged from the Stafford St SPS would not need to increase.

3.0 Clyde Street SPS

All of the wastewater generated in Elora drains or discharges to the Clyde Street SPS which pumps the sewage through a 300 mm ductile iron forcemain to the Elora Wastewater Treatment Plant (WWTP). This includes the flow pumped from the Stafford SPS, which discharges to the sanitary sewer system and then eventually directed to the Clyde Street SPS.

The Clyde Street SPS (10 Clyde Street) is located on the east side of Clyde Street, between Metcalfe Street and Water Street East, adjacent to the Grand River. It is a wet well / dry well type SPS with a pump room, a screen room, a below grade flow meter chamber, and a standby diesel generator. The Clyde Street SPS was upgraded by the Township between 2012 and 2015.

The Clyde Street SPS has an inlet trough which flows into an equalization cell that drains into a dual cell concrete wet well. The Clyde Street SPS is equipped with three dry pit sewage pumps located in the pump room (dry well). The Environmental Compliance Approval (ECA) issued by the Ministry of the Environment (ECA No. 4030-8SNJ59, dated May 11, 2012) is included in Attachment C and indicates that one pump rated at 60.0 L/s at 13.4 m TDH accommodates dry weather flows. The ECA also indicates that there are two pumps (duty / standby) each rated at 173.6 L/s (15,000 m^3/d) at 25.4 m TDH which provide backup pumping capacity during wet weather flows. Based on the information provided with the duty / standby peak pumps, the design capacity of the station is 173.6 L/s with one peak pump operating. The pumps are equipped with VFDs to minimize hydraulic surges and provide energy efficiency. The wastewater level in the wet well is measured by an ultrasonic level transmitter, and backup floats are provided.

The pump capacities listed in the ECA (as amended in 2012) are summarized in Table 4.

Table 4: Clyde Street SPS Pump Capacities

	Jockey Pump	Duty Peak Pump	Standby Peak Pump
Capacity	60.0 L/s @ 13.4 m TDH	173.6 L/s @ 25.4 m TDH	173.6 L/s @ 25.4 m TDH

3.1 Historical Flow Analysis

Historical operational data was also analyzed for the Clyde Street SPS. Burnside requested data from the Township to review the highest daily flow rates that were recorded during the past three years (January 2023 to September 2025) on the SPS's magnetic flowmeter to evaluate the SPS's performance during the peak flow event. Similarly to the Stafford Street SPS, the highest daily flow rate at the Clyde Street SPS in the three years analyzed was recorded on April 3, 2025. The total flows from the three highest days over this period are summarized in Table 5.

Table 5: Clyde Street SPS Maximum Day Flows (Jan 2023 – Sep 2025)

Date	Flow (m^3/d)
April 3, 2025	10,421
April 4, 2025	6,093
April 1, 2023	5,932

As displayed in Table 5, the flow on April 3, 2025, was significantly higher (52%) than the second highest day which occurred on the following day (April 4, 2025).

The flow and wet well level data is recorded on the SCADA system. The Township was able to provide minute by minute data for the selected maximum day flows over the past three years, as the peak hour flow was also assumed to occur during these maximum day flows.

There is no flow measurement on the incoming sewage flow into the wet well. As a result, the incoming flow rate was calculated based on the approximated pumped volume (totalized flow measured by the flow meter on the outlet) and the change in the level recorded in each wet well cell. The area utilized in the calculation varies depending on the level, as the sewage level starts to fill the equalization cell, backs up into the inlet trough, and eventually into the lower screen room.

Based on the incoming flow rate calculated for each minute, this data was used to determine the peak flow rate over each 60-minute period throughout the day. The result of this analysis is summarized in Table 6, which identifies the highest peak hour flow rates calculated for the maximum day flow event and the second highest day flow event.

Table 6: Current Clyde Street SPS Peak Hour Flow Rates

Date	Calculated Peak Hour Flow	
	L/s	m^3/hr
April 3, 2025	197.3	710.3
April 4, 2025	81.6	293.8

As noted in Section 3.0, the design capacity of the SPS is 173.6 L/s. On April 3, 2025, the peak inflow into the station was calculated to be approximately 197.3 L/s which exceeds the SPS design capacity. This is consistent with the fact that the Township also reported that the SPS overflowed into the Grand River on April 3, 2025.

The flows experienced on this date could potentially be considered an anomaly given that the peak flow on the second highest date over the past three years was significantly (83%) lower. Multiple other municipalities in southern Ontario also experienced sewage overflows on this date given the extreme rainfall and snowmelt that occurred. If this highest flow (which appears to be an abnormal extreme value) were to be excluded, utilizing the peak hour flow on second highest day as the governing scenario would indicate an excess capacity of 92.0 L/s at the Clyde Street SPS.

3.2 Capacity for Additional Flow from Developments

As shown in Table 3 in Section 2.2, the peak flows associated with the first phase of construction from the 127 and 159 First Line development areas are projected to be approximately 12.8 L/s. Based on the peak hour flow from the second highest day flow event discussed in Section 3.2, there would be ample capacity (92 L/s) at the Clyde Street SPS to accommodate the first phase of construction from these developments.

It is important to note that the Clyde Street SPS should currently have capacity allocated for the peak flows from the Stafford Street SPS. As Elora's entire wastewater collection system drains or discharges to the Clyde Street SPS, the SPS should have theoretical capacity allocated for the peak flow from each upstream SPS plus the catchment area that drains by gravity sewers to the Clyde Street SPS. The data shows that the peak flows at the Stafford Street SPS remained very low during the extreme flow event on April 3, 2025, indicating that the excess flows experienced at the Clyde Street SPS would be related to infiltration and inflow issues in the system outside of the Stafford Street SPS catchment area which these developments will impact.

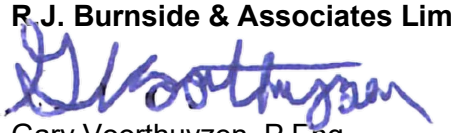
The Stafford Street SPS data shown in Sections 2.1 and 2.2 indicates that there is available capacity in the Stafford Street SPS to handle these developments. The pumps at the Stafford Street SPS do not need to be upsized to handle the ultimate demand, therefore the capacity allocated for the Stafford SPS at the Clyde Street SPS does not need to be changed. Additionally, while the existing peak hour inflow to the Stafford Street SPS is very low (3.2 L/s), the sewage collects in the wet well and the pumps need to pump at a higher flow rate to ensure scouring velocities in the forcemain are maintained. The historical data analyzed shows that the Stafford Street SPS pumps were pumping at approximately 29 L/s during the peak flow event. Based on this, the VFD speed (pumping rate) at the Stafford SPS would not need to be adjusted and the Clyde Street SPS would receive the same peak instantaneous flow from the Stafford Street SPS that it does currently, just for a longer period. Therefore, the peak instantaneous flow at the Clyde SPS would therefore not be affected by this development.

4.0 Conclusion

Based on the historical data available from the past three years, there are no concerns with regards to the Stafford Street SPS's capacity and its ability to handle the flows generated by the catchment area's existing population. The SPS would also be able to handle the projected flows from the first phase of construction for the 127 and 159 First Line developments in addition to the existing flows.

Additionally, the Clyde Street SPS also has the capacity to handle the ultimate flows associated with the Stafford Street SPS. Based on the projected flows, the pumping rate at the Stafford Street SPS would not need to increase based on the additional flows. Therefore, the current peak instantaneous inflow to the Clyde Street SPS should not be affected by this development.

R.J. Burnside & Associates Limited



Gary Voorthuyzen, P.Eng.
Project Engineer

GV:af

Enclosure(s) Attachment A: Stafford Street SPS Certificate of Approval
Attachment B: Wastewater Flow Projection Calculations
Attachment C: Clyde Street SPS Environmental Compliance Approval

cc: Angela Kroetsch, P.Eng., R.J. Burnside & Associates Limited
Dan Ferguson, MBA, P.Eng., PMP, WalterFedy
Ashley Klashoff, CET, WalterFedy

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In the preparation of the various instruments of service contained herein, R.J. Burnside & Associates Limited was required to use and rely upon various sources of information (including but not limited to reports, data, drawings, observations) produced by parties other than R.J. Burnside & Associates Limited. For its part R.J. Burnside & Associates Limited has proceeded based on the belief that the third party/parties in question produced this documentation using accepted industry standards and best practices and that all information was therefore accurate, correct and free of errors at the time of consultation. As such, the comments, recommendations and materials presented in this instrument of service reflect our best judgment in light of the information available at the time of preparation. R.J. Burnside & Associates Limited, its employees, affiliates and subcontractors accept no liability for inaccuracies or errors in the instruments of service provided to the client, arising from deficiencies in the aforementioned third party materials and documents.

R.J. Burnside & Associates Limited makes no warranties, either express or implied, of merchantability and fitness of the documents and other instruments of service for any purpose other than that specified by the contract.

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Attachment A

Stafford Street SPS Certificate of Approval

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Ontario

Ministry of the Environment
Ministère de l'Environnement

AMENDED CERTIFICATE OF APPROVAL
MUNICIPAL AND PRIVATE SEWAGE WORKS

NUMBER 9839-7GDGQ2
Issue Date: July 23, 2008

Elora Ridge Developments Limited
100 MacQueen Blvd, No. Unit 3
Centre Wellington, Ontario
N1M 3T8

Site Location: South Ridge Subdivision
Southeastern side of Stafford Street, near intersection with Spencer Drive.
Centre Wellington Township, County of Wellington, Ontario

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

- one (1) ***sanitary sewage pumping station*** to be constructed on the southeastern side of Stafford Street, in the Township of Centre Wellington, designed to be capable of handling a future peak flow of 41.7 L/s, consisting of a 3.6 m x 2.4 m rectangular wet well equipped with two (2) submersible pumps, one for duty and one for standby, each pump equipped with a variable frequency drive (VFD) with a rated flow of 21.6 L/s at a total dynamic head of 8.9 m when the frequency is rated at 43 Hz, complete with electrical and electronic control systems, an ultrasonic transducer with back-up level sensor probe connected to the Township SCADA system, basket screen, ventilation pipes, access ladders and platform, 3.6 m x 2.4 m rectangular valve chamber containing discharge piping and valves, a 40 kW generator set, overflow pipe and all other appurtenances necessary to have a complete and operable pumping station, discharging via a 150 mm diameter PVC forcemain to an existing sanitary sewer on Bridge Street;

all in accordance with:

1. Application for Municipal and Private Sewage Works, dated April 5, 2006, and received on April 21, 2006, and all supporting documentation and information including a design brief, final plans and specifications prepared by Gamsby and Mannerow Limited.

2. Application for Municipal and Private Sewage Works, dated ???, 2008, and received on ???, 2008, and all supporting documentation and information including a design brief, final plans and specifications prepared by Gamsby and Mannerow Limited.

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

1. "*Act*" means the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended;

2. "*Certificate*" means this entire certificate of approval document, issued in accordance with Section 53 of the *Act*, and includes any schedules;

3. "*Director*" means any *Ministry* employee appointed by the Minister pursuant to section 5 of the *Act*;

4. "*District Manager*" means the District Manager of the Guelph District Office of the Ministry;

5. "*Ministry*" means the Ontario Ministry of the Environment;

6. "*Owner*" means Elora Ridge Developments Limited and includes its successors and assignees;

7. "*Regional Director*" means the Regional Director of the West-Central Region of the Ministry;

8. "*Substantial Completion*" has the same meaning as *"substantial performance*" in the Construction Lien Act; and

9. "*Works*" means the sewage works described in the *Owner*'s application, this *Certificate* and in the supporting documentation referred to herein, to the extent approved by this *Certificate*.

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL PROVISIONS

1.1 The *Owner* shall ensure that any person authorized to carry out work on or operate any aspect of the *Works* is notified of this *Certificate* and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

1.2 Except as otherwise provided by these Conditions, the *Owner* shall design, build, install, operate and maintain the *Works* in accordance with the description given in this *Certificate*, the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this *Certificate*.

1.3 Where there is a conflict between a provision of any submitted document referred to in this *Certificate* and the Conditions of this *Certificate*, the Conditions in this *Certificate* shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

1.4 Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

1.5 The requirements of this *Certificate* are severable. If any requirement of this *Certificate*, or the application of any requirement of this *Certificate* to any circumstance, is held invalid or unenforceable, the application of such requirement to other circumstances and the remainder of this *Certificate* shall not be affected thereby.

2. EXPIRY OF APPROVAL

2.1 The approval issued by this *Certificate* will cease to apply to those parts of the *Works* which have not been constructed within five (5) years of the date of this *Certificate*.

3. UPON THE SUBSTANTIAL COMPLETION OF THE WORKS

3.1 Upon the *Substantial Completion* of the *Works*, the Owner shall prepare a statement, certified by a Professional Engineer, that the works are constructed in accordance with this *Certificate*, and upon request, shall make the written statement available for inspection by Ministry personnel.

3.2 Within one year of the *Substantial Completion* of the *Works*, a set of as-built drawings showing the works "as constructed" shall be prepared. These drawings shall be kept up to date through revisions undertaken from time to time and a copy shall be retained at the *Works* for the operational life of the *Works*.

4. OPERATION AND MAINTENANCE

4.1 The *Owner* shall exercise due diligence in ensuring that, at all times, the *Works* and the related equipment and appurtenances used to achieve compliance with this *Certificate* are properly operated and maintained. Proper operation and maintenance shall include effective performance, adequate funding, adequate operator staffing and training, including training in all procedures and other requirements of this *Certificate* and the *Act* and regulations, adequate laboratory facilities, process controls and alarms and the use of process chemicals and other substances used in the *Works*.

4.2 The *Owner* shall prepare an operations manual within six (6) months of *Substantial Completion* of the *Works*, that includes, but not necessarily limited to, the following information:

(a) operating procedures for routine operation of the *Works*;

(b) inspection programs, including frequency of inspection, for the *Works* and the methods or tests employed to detect when maintenance is necessary;

(c) repair and maintenance programs, including the frequency of repair and maintenance for the *Works*;

(d) procedures for the inspection and calibration of monitoring equipment;

(e) a spill prevention control and countermeasures plan, consisting of contingency plans and procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations, including notification of the *District Manager*; and

(f) procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.

4.3 The *Owner* shall maintain the operations manual current and retain a copy at the location of the *Works* for the operational life of the *Works*. Upon request, the *Owner* shall make the manual available to *Ministry* staff.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the *Works* are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the *Certificate* and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. The condition also advises the *Owners* their responsibility to notify any person they authorized to carry out work pursuant to this *Certificate* the existence of this *Certificate*.

2. Condition 2 is included to ensure that, when the *Works* are constructed, the *Works* will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.

3. Condition 3 is included to ensure that the *Works* are constructed in accordance with the approval and that record drawings of the *Works* "as constructed" are maintained for future references.

4. Condition 4 is included to require that the *Works* be properly operated, maintained, funded, staffed and equipped such that the environment is protected and deterioration, loss, injury or damage to any person or property is prevented. As well, the inclusion of a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the *Owner* and made available to the *Ministry*. Such a manual is an integral part of the operation of the *Works*. Its compilation and use should assist the *Owner* in staff training, in proper plant operation and in identifying and planning for contingencies during possible abnormal conditions. The manual will also act as a benchmark for *Ministry* staff when reviewing the *Owner*'s operation of the *Works.*

This Certificate of Approval revokes and replaces Certificate(s) of Approval No. 1975-6R9JKE issued on June 30, 2006

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;

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5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, 15th Floor
Toronto, Ontario
M5G 1E5

AND

The Director
Section 53, *Ontario Water Resources Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 23rd day of July, 2008

Mansoor Mahmood, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

RS/
c: District Manager, MOE Guelph District Office
Township Clerk, Township of Centre Wellington
County Clerk, County of Wellington
Matthew Ballaban, Gamsby and Mannerow Limited

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Attachment B

Wastewater Flow Projection Calculations

q = average daily per capita flow (350 L/cap/d
i = unit of peak extraneous flow (0.15 L/ha/s)
A = Tributary area in gross hectares
F = Peaking factor
Qp = peak population flow (L/s)
Qi = peak extraneous flow (L/s)
Qd = peak design flow (m^3/s)

Persons per Unit (PPU) as per Schedule 3 from the Township of Centre Wellington Development Charges Background Study - Consolidated Report (Watson & Associates Economists Ltd. dated March 24, 2026)

Unit Type	People Per Unit (PPU)
Low Density - Singles	3.278
Low Density - Semis	3.278
Low Density - Towns	2.351
Apartments	1.837

SANITARY SEWER DESIGN

Proposed Conditions - 127 First Line (Phase 1 ONLY) and 159 First Line (Phase 1 ONLY)

Township of Centre Wellington (Elora)

$F = 1 + \frac{14}{4 + (P)^{1/2}}$ where P is population in 1000's

$Q(p) = \frac{PqM}{86.4}$ (L/s)

$Qi = iA$

$Qd = Qp + Qi + Qc + Qin$ (m^3/s)

Location					Residential									Commercial (28 m^3/ha/d)			Industrial (0.50 L/s/ha)				Proposed Sewer						
Street	Upstream MH	Downstream MH	Unit Type	# of Units	Indiv. Pop'n	Cumul. Pop'n	Area (ha)	Cumul. Area	Calculated Peaking Factor (F)	Actual Peaking Factor (F)	Pop. Flow Qp (L/s)	Res. Infilt. Flow Qi (L/s)	Comm. Area (ha)	Cumul. Area	Comm. Flow Qc (L/s)	Inst. Area (ha)	Cumul. Area	Inst. Flow Qin (L/s)	Peak Design Flow Q (m^3/s)	Length (m)	Pipe Size (mm)	Type of Pipe	Grade %	Capacity (m^3/s)	Full Flow Velocity (m/s)	Actual velocity at Q(d)
Block 1 159 First Line		**MH.AA**	**Low Density - Singles**	**37**	**121**	**121**	**1.42**	**1.42**	**4.220**	**4.0**	**1.97**	**0.21**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.002**	20.0	200	0.013	0.50	0.023	0.738	0.465
Block 2 159 First Line		**MH.AA**	**Low Density - Singles**	**7**	**23**	**144**	**0.26**	**1.68**	**4.197**	**4.0**	**2.34**	**0.25**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.003**	20.0	200	0.013	0.50	0.023	0.738	0.472
Block 3 159 First Line		**MH.AA**	**Low Density - Singles**	**9**	**30**	**174**	**0.29**	**1.97**	**4.170**	**4.0**	**2.82**	**0.30**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.003**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 4 159 First Line		**MH.AA**	**Low Density - Singles**	**9**	**30**	**203**	**0.33**	**2.30**	**4.145**	**4.0**	**3.29**	**0.35**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.004**	20.0	200	0.013	0.50	0.023	0.738	0.539
Block 5 159 First Line		**MH.AA**	**Low Density - Singles**	**20**	**66**	**269**	**0.80**	**3.10**	**4.098**	**4.0**	**4.36**	**0.47**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.005**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 6 159 First Line		**MH.AA**	**Low Density - Semis**	**8**	**26**	**295**	**0.29**	**3.39**	**4.082**	**4.0**	**4.78**	**0.51**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.005**	20.0	200	0.013	0.50	0.023	0.738	0.591
Block 7 159 First Line		**MH.AA**	**Low Density - Semis**	**9**	**30**	**325**	**0.32**	**3.71**	**4.064**	**4.0**	**5.26**	**0.56**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.006**	20.0	200	0.013	0.50	0.023	0.738	0.613
Block 8 159 First Line		**MH.AA**	**Low Density - Towns**	**10**	**24**	**348**	**0.34**	**4.05**	**4.050**	**4.0**	**5.64**	**0.61**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.006**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 9 159 First Line		**MH.AA**	**Low Density - Singles**	**22**	**72**	**420**	**0.78**	**4.83**	**4.012**	**4.0**	**6.81**	**0.72**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.008**	20.0	200	0.013	0.50	0.023	0.738	0.657
Block 10 159 First Line		**MH.AA**	**Low Density - Towns**	**16**	**38**	**458**	**0.56**	**5.39**	**3.994**	**3.994**	**7.41**	**0.81**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.008**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 1 127 First Line		**MH.Y**	**Low Density - Singles**	**3**	**10**	**10**	**0.35**	**0.35**	**4.415**	**4.0**	**0.16**	**0.05**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.0002**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 1 127 First Line		**MH.Y**	**Low Density - Towns**	**16**	**38**	**47**	**0.35**	**0.70**	**4.319**	**4.0**	**0.77**	**0.10**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.0009**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 4 127 First Line		**MH.Y**	**Low Density - Towns**	**11**	**26**	**73**	**0.48**	**1.18**	**4.278**	**4.0**	**1.19**	**0.18**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.0014**	20.0	200	0.013	0.50	0.023	0.738	0.428
Block 5 127 First Line		**MH.Y**	**Low Density - Towns**	**30**	**71**	**144**	**0.57**	**1.75**	**4.197**	**4.0**	**2.33**	**0.26**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.0026**	20.0	200	0.013	0.50	0.023	0.738	0.472
Block 6 127 First Line		**MH.Y**	**Low Density - Towns**	**48**	**113**	**257**	**0.88**	**2.63**	**4.107**	**4.0**	**4.16**	**0.39**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.0046**	20.0	200	0.013	0.50	0.023	0.738	0.576

Minimum diameter = 200 mm
Minimum acceptable velocity = 0.6 m/s
Maximum acceptable velocity = 3.0 m/s
Roughness Coefficient for PVC pipe = 0.013

Date:	August 2026
Designed By:	AEK
Checked By:	AEK

Project:	Proposed Conditions - 127 First Line (Phase 1 ONLY) and 159 First Line (Phase 1 ONLY)
File:	300060179.0000

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Attachment C

Clyde Street SPS Environmental Compliance Approval

Content Copy Of Original

Ontario

Ministry of the Environment
Ministère de l'Environnement

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER 4030-8SNJ59
Issue Date: May 11, 2012

The Corporation of the Township of Centre Wellington
1 MacDonald Sq
Post Office Box, No. 10
Elora, Ontario
N0B 1S0

Site Location: Elora Wastewater Treatment Plant
49 Guelph Rd Elora
Centre Wellington Township, County of Wellington

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

Upgrading and expansion of the existing Elora Wastewater Treatment Plant (WWTP), located at the above site location, for the treatment and disposal of sewage and rated at the capacities mentioned below and consisting of the following *Works;*

Stage	***Rated Capacity***
Current (*Existing Works* and partial completion of *Proposed Works*)	3,066 m 3 /d
Expanded (*Substantial Completion* of all *Proposed Works*)	5,000 m 3 /d

PROPOSED WORKS

Clyde Street Sewage Pumping Station (off-site)

- expansion of existing pumping station located approximately 85 m northeast of Metcalfe Street in Elora to provide new lower and upper screen rooms and generator room;
- removal of existing manual bar screen and installation of a basket screen in lower screen room, including diversion of influent channel through the lower screen room;
- removal of existing sewage pumps and installation of three (3) dry pit sewage pumps, two pumps (one standby) each rated at 173.6 L/s (15,000 m 3 /d) at 25.4 m TDH to provide 100% backup during wet weather flows and one pump rated at 60 L/s at 13.4 m TDH to accommodate dry weather flows, all equipped with VFDs;
- realignment of pump discharge pipe to the existing forcemain;
- one (1) magnetic flowmeter in a outside inground chamber;
- removal of the existing generator and installation of one (1) 200 kW diesel generator set, complete with a 1136.5 L fuel oil tank and all related ancillary equipment;

Elora Sewage Treatment Plant

Influent Sewers

- realignment of existing 300 mm diameter Clyde Street Sewage Pumping Station forcemain to the influent complex;
- realignment of existing 100 mm diameter Elora George Conservation Area Park forcemain to the influent complex;
- construction of a 300 mm diameter forcemain for future connection of the forcemain from the David Street Sewage Pumping Station to the influent complex;

Influent Complex

- one (1) self-cleaning automatic bar screen with a bar spacing of 12.7 mm, having a *Peak Flow Rate* of 173.6 L/s, together with a screenings washer/compactor;
- a bypass manually cleaned bar screen with a bar spacing of 50 mm;
- one (1) vortex grit chamber having a *Peak Flow Rate* of 173.6 L/s, together with airlift pumps, blowers and a grit dewatering screw/conveyor;
- screenings and grit disposal bin;
- a Parshall flume for influent flow measurement;

Aeration Tanks

- two (2) 19.0 m x 22.1 m x 5.1 m SWD three-pass plug-flow extended aeration tanks equipped with fine bubble diffusion systems;
- four (4) blowers (two standby), each duty blower has a capacity of 600 L/s at 57.1 kPa discharge pressure and each standby blower has a capacity of 1,200 L/s at 67.5 kPa discharge pressure;

Secondary Clarifiers

- one (1) clarifier distribution box to distribute mixed liquor from the aeration tanks at a ratio of approximately 50% to the existing clarifiers and 50% to the new clarifier;
- one (1) 17.2 m x 17.2 m x 4.25 m SWD clarifier, with collector mechanism and Stamford baffles and scum collection box;
- modification and retrofitting of existing clarifiers with new collector mechanism and Stamford baffles and scum collection box and removal of corner sweeps;

Return Activated Sludge System

- two (2) return activated sludge pumps (one standby) for the new clarifier, each rated at 58 L/s at 9.3 m TDH and equipped with timers and VFDs;
- one (1) magnetic flowmeter for the common pump discharge line;
- replacement of the existing RAS pumps for the existing clarifiers with three (3) return activated sludge pumps (one standby), each rated at 29 L/s at 4.9 m TDH and equipped with timers and VFDs;

Waste Activated Sludge System

- two (2) waste activated sludge and scum pumps (one standby) for the new clarifier, each rated at 13.6 L/s at 5.5 m TDH;
- one (1) magnetic flowmeter for the common pump discharge line;
- replacement of the existing waste activated sludge and scum pumps for the existing clarifiers with two (2) waste activated sludge and scum pumps (one standby), each rated at 14.1 L/s at 8.4 m TDH;

Tertiary Filters

- two (2) 8.53 m x 4.88 m shallow bed automatic backwash filters, each having a *Peak Flow Rate* of 86.8 L/s and equipped with travelling bridge, wash water pump and backwash pump;

- two (2) filter reject pumps (one standby), each rated at 32.3 L/s at 10.3 m TDH and return line to the influent complex;

Disinfection System

- a UV disinfection channel equipped with two (2) UV banks (one standby), each with a *Peak Flow Rate* of 173.6 L/s and having 65% of the radiation output at the wave length of 253.7 nm and a nominal average intensity of radiation of 30,000 watt.sec/cm 2 ;
- one (1) Parshall flume for plant effluent flow measurement;

Outfall Sewer

- a 600 mm diameter sewer from the plant effluent channel to stormwater MH5 on Wellington Road 7;
- a 600 mm diameter plant effluent overflow pipe to the existing 400 mm diameter effluent sewer;

Phosphorus Removal

- one (1) 30,000 L capacity chemical storage tank;
- three (3) chemical metering pumps (one standby) each with a maximum capacity of 1.5 L/min to inject phosphorus removing chemical downstream of the aeration tanks and prior to the clarifiers;

Sludge Stabilization

- one (1) 200 m 3 aerated waste activated sludge holding/batching tank together with one (1) blower with a capacity of 130 L/s at 64 kPa and two (2) transfer pumps (one standby), each rated at 7.4 L/s at 17.6 m TDH to the Lystek system or the aerated biosolids storage tanks;
- one (1) inline grinder;
- one (1) magnetic flowmeter on the centrifuge feed piping;
- one (1) centrifuge for dewatering waste activated sludge, having a capacity of 5.5 L/s;
- one (1) 5,000 L capacity dewatered sludge storage/transfer tank;
- one (1) dewatered sludge feed pump, rated at 6.1 L/s at 58 m TDH;
- one (1) 5,000 L capacity Lystek reactor with high speed mixer and direct steam injection ports;
- polymer system consisting of a storage tank, two feed pumps, polymer mixing chamber and a polymer metering pump;
- two (2) Lystek transfer pumps;
- one (1) magnetic flowmeter on the common discharge piping for the Lystek transfer pumps;
- one (1) steam boiler complete with water pretreatment system;
- one (1) waste collection drainage pump rated at 24 L/s at 9.2 m TDH;

Biosolids Management

- two (2) 500 m 3 biosolids storage tanks each equipped with fine bubble aeration system, together with two (2) air blowers, each with a capacity of 350 L/s at 64 kPa;
- two (2) 1,000 m 3 biosolids storage tanks;
- supernatant hoppers and one (1) supernatant return pump to the influent complex, rated at 10 L/s at 6.3 m TDH;
- two (2) biosolids loading pumps (one standby), each rated at 35 L/s at 92.4 m differential pressure, for mixing, recirculation or transferring to the sludge loading pad;
- one (1) sludge loading drain pump to the influent complex rated at 8.0 L/s at 27.3 m differential pressure;
- utilize the spare biosolids storage capacity at the Elora WWTP to store excess biosolids generated at the Fergus WWTP as needed when unforeseen circumstances occur;

Standby Power

- one (1) 1,200 kW diesel generator set and 6,818 L capacity fuel storage tank;

Odour Control

- one (1) odour control system serving the influent and sludge dewatering complexes;
- one (1) odour control system serving the biosolids storage complex;

PREVIOUS WORKS

Sanitary Sewers (off-site)

- sanitary sewers on municipal property, Carlton Place, Guelph Road, Ross Street, Victoria Street, Water Street, Bridge Street, McNab Street, High Street, Nichol Street, Waterloo Street, York Street, Hamilton Street, David Street, Easement and Metcalf Street South and a two-barrel sanitary sewage syphon crossing the Grand River, in the Town of Elora;

Clyde Street Sewage Pumping Station (off-site) (to be modified)

- a drywell/wetwell type pumping station located adjacent to Clyde Street approx. 85 m northeast of Metcalf Street South consisting of: a dual chamber wet well, with each chamber measuring approx. 3.75 m x 3.6 m x 3.25 m, complete with bar screen, slide gates and sluice gates for cross connection;
- two (2) dry-put, centrifugal, variable speed vertical raw sewage pumps, each with a minimum continuous capacity of 50 L/s, and a high speed capacity of 73.5 L/s at 12.8 m T.D.H., with provisions for future modifications to the impellers and motor to provide a future capacity of 113 L/s at 15.4 m T.D.H.;
- one (1) 70 kW diesel generator set for purpose of emergency standby power, complete with a 900 L fuel oil tank and all related ancillary equipment;
- pump seal water system, forced positive ventilation for wet well, forced positive ventilation for dry well and all related valves and appurtenances;

Elora Sewage Treatment Plant

- a sewage treatment plant located in the Township of Central Wellington on Broken Front Lot, Concession I, east of the Grand River, approx. 100 m southwest of Guelph Street at Ross Street and consisting of:

Influent Sewers (to be realigned and extended)

- a 300 mm diameter sewage forcemain from Clyde Street Sewage Pumping Station to the inlet works;
- a 100 mm diameter sewage forcemain from Elora George Conservation Area Park to the inlet works;

Inlet Works (to be decommissioned)

- one (1) mechanically cleaned bar screen with a bypass channel and manually cleaned bar screen;

Grit Removal (to be decommissioned)

- one (1) aerated grit tank measuring 4.0 m x 3.0 m x 2.66 m SWD;
- one (1) submerged "swing out" type air diffusion header assembly;
- two (2) air lift pump assemblies for the removal of grit to the grit decanting channels;
- two (2) grit decanting channels;
- two (2) air blowers each rated at 100 L/s at 41 kPa to provide air for grit removal air diffusers, air lift

pumps and channel aeration; each equipped with air intake filter silencers and inlet snubbers, and located beneath the inlet works in a room designated Blower Room No. 2 measuring approx. 4.8 m x 5.9 m;

Aeration Tanks (to be decommissioned)

- four (4) aeration tanks capable of either plug flow or complete mix configuration by means of adjustable weirs, each tank measuring approx. 7.2 m x 7.2 m x 4.34 m SWD with a total volume of 899 m 3 ;
- four (4) single speed mechanical aerations with adjustable blade tips each with an oxygen transfer capability of 2.12 kg O 2 /h/kW (elec.);

Secondary Clarifiers (to be modified)

- two (2) square clarifiers, each measuring approx. 12.2 m x 12.2 m x 3.8 m (avg. depth) with a total volume of 1,120 m 3 ;
- each clarifier equipped with a circular sludge collector mechanism complete with corner sweep mechanisms, rapid sludge removal system and scum skimmers;

Return Activated Sludge System (to be modified)

- three (3) variable speed return sludge pumps each rated at 95.8 m 3 /h at 7.62 m T.D.H.; two pumps to be duty pumps feeding from two separate sludge hoppers each measuring 1.5 m x 1.2 m x 2.85 m SWD with the third pump to act as standby and feeding from either hopper; return sludge to be obtained from the rapid sludge removal system;
- two (2) 75 mm magnetic type flow meters capable of measuring between 15.9 m 3 /h and 95.8 m 3 /h;

Waste Activated Sludge System (to be modified)

- two (2) variable speed waste sludge pumps each rated at 34 m 3 /h at 9.14 m T.D.H. feeding from a common waste sludge hopper measuring 1.5 m x 1.2 m x 2.85 m SWD; waste sludge to be obtained from the clarifier scraper sump and scum hopper;
- one (1) 50 mm magnetic type flow meters capable of measuring between 3.6 m 3 /h and 34 m 3 /h;

Total Effluent Flow Metering (to be decommissioned)

- one (1) Parshall Flume located prior to chlorination and capable of measuring a maximum of 552 m 3 /h; the flume to measure all plant bypass flows in addition to the treated effluent;

Chlorination System (to be decommissioned)

- two (2) chlorine contact chambers, each consisting of a two pass tank measuring approx. 4.6 m x 3.6 m x 3.13 (avg. depth) for a total volume of 103 m 3 ;
- a sodium hypochlorite system consisting of a 1,800 L capacity storage tank and one (1) metering pump rated at 100 L/d including a standby gravity feed system;

Outfall Sewer

- a 400 mm diameter effluent sewer from the chlorine contact chamber to MH81A where plant effluent is combined with stormwater;
- a 750 mm diameter combined plant effluent and stormwater sewer from MH81A to the outfall to Grand River near the Elora Mill Dam;

Phosphorus Removal (to be decommissioned)

- one (1) 27,300 L capacity fibreglass reinforced plastic chemical storage tank;
- two (2) positive displacement, hydraulically operated diaphragm chemical metering pumps each capable of having it output manually varied over a 20:1 range of 75.7 L/h at 375 kPa to 3.785 L/h; each located in the control building;
- one (1) emergency chemical dewatering pump rated at 1.2 L/s at 15 m for emptying the chemical storage tank and discharging to a fitting on the wall of the control building;

Aerobic Digesters (to be decommissioned)

- two (2) aerobic digesters each measuring approx. 13.4 m x 6.1 m x 3.34 m SWD having a total volume of 547 m 3 ;
- two (2) rotary positive displacement type air blowers each rated at 1,494 m 3 /h at 55 kPa;
- eight (8) air diffusion header assemblies arranged for crossroll aeration within the digesters;
- two (2) submersible digested sludge pumps each rated at 34 m 3 /h at 6.09 m and discharging to the sludge thickening tank influent trough;

Sludge Thickening (to be decommissioned)

- two (2) sludge thickening tanks each measuring approx. 7.91 m x 1.8 m x 2.36 m (avg. depth) having a total volume of 67.1 m 3 ;
- two (2) wet pit sludge pumps each rated at 34 m 3 /h at 3 m T.D.H. to be used for transfer of thickened sludge to holding tank;

Digested Sludge Holding Tank (to be decommissioned)

- one (1) digested sludge holding tank located beneath the control building and measuring approx. 8.23 m x 6.3 m x 3.58 m SWD having a total volume of 17.4 m 3 ;
- one (1) duplex plunger sludge disposal pump rated at 45 m 3 /h at 13.4 m T.D.H. with discharge to the truck sludge loading facilities;

Supernatant Transfer Facilities (to be decommissioned)

- one (1) submersible supernatant return pump rated at 34 m 3 /h at 7.62 m and discharging to the aeration tanks;

MISCELLANEOUS

- all other controls, electrical equipment, instrumentation, piping, pumps, valves and appurtenances essential for the proper operation of the aforementioned sewage works;

all in accordance with the submitted supporting documents listed in Schedule A.

For the purpose of this environmental compliance approval, the following definitions apply:

"Act" means the Ontario Water Resources Act , R.S.O. 1990, Chapter 0.40, as amended;

"Annual Average Concentration" means the arithmetic mean of the *Monthly Average Concentrations* of a contaminant in the effluent calculated for any particular calendar year;

"Annual Average Loading" means the value obtained by multiplying the *Annual Average Concentration* of a contaminant by the *Average Daily Flow* over the same calendar year;

"Approval" means this entire document and any schedules attached to it, and the application;

" *Average Daily Flow* " means the cumulative total sewage flow to the sewage works during a calendar year divided by the number of days during which sewage was flowing to the sewage works that year;

" *BOD5* " (also known as TBOD 5) means five day biochemical oxygen demand measured in an unfiltered sample and includes carbonaceous and nitrogenous oxygen demand;

" *By-pass"* means any discharge from the *Works* that does not undergo any treatment or receives only partial treatment before it is discharged to the environment;

" *CBOD5* " means five day carbonaceous (nitrification inhibited) biochemical oxygen demand measured in an unfiltered sample;

" *Daily Concentration* " means the concentration of a contaminant in the effluent discharged over any single day, as measured by a composite or grab sample, whichever is required;

"Director" means a person appointed by the Minister pursuant to section 5 of the *EPA* for the purposes of Part II.1 of the *EPA;*

" *District Manager* " means the District Manager of the Guelph Office of the Ministry;

" *E. Coli* " refers to the thermally tolerant forms of Escherichia that can survive at 44.5 degrees Celsius;

"EPA" means the Environmental Protection Act , R.S.O. 1990, c.E.19, as amended;

" *Geometric Mean Density* " is the nth root of the product of multiplication of the results of n number of samples over the period specified;

"Ministry" means the ministry of the government of Ontario responsible for the *EPA* and *OWRA* and includes all officials, employees or other persons acting on its behalf;

" *Monthly Average Concentration* " means the arithmetic mean of all *Daily Concentrations* of a contaminant in the effluent sampled or measured, or both, during a calendar month;

" *Monthly Average Daily Flow* " means the cumulative total sewage flow to the sewage works during a calendar month divided by the number of days during which sewage was flowing to the sewage works that month;

" *Monthly Average Loading* " means the value obtained by multiplying the *Monthly Average Concentration* of a contaminant by the *Monthly Average Daily Flow* over the same calendar month:

" *Owner* " means The Corporation of the Township of Centre Wellington and includes its successors and assignees;

"OWRA" means the Ontario Water Resources Act , R.S.O. 1990, c. O.40, as amended;

" *Peak Flow Rate* " means the maximum rate of sewage flow for which the plant or process unit was designed;

"Previous Works" means those portions of the sewage works previously constructed and approved under an *Approval* ;

"Proposed Works" means the sewage works described in the Owner's application, this Approval, to the extent approved by this *Approval;*

" *Rated Capacity* " means the *Average Daily Flow* for which the *Works* are approved to handle;

" *Regional Director* " means the Regional Director of the West Central Region of the Ministry;

"Substantial Completion" has the same meaning as *"substantial performance* " in the Construction Lien Act ; and

"Works" means the sewage works described in the *Owner* 's application, and this *Approval* , and includes both *Proposed Works* and *Previous Works.*

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL PROVISION S

(1) The *Owner* shall ensure that any person authorized to carry out work on or operate any aspect of the *Works* is notified of this *Approval* and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

(2) Except as otherwise provided by these conditions, the *Owner* shall design, build, install, operate and maintain the *Works* in accordance with the description given in this *Approval* , and the application for approval of the *Works.*

(3) Where there is a conflict between a provision of any document in the schedule referred to in this *Approval* and the conditions of this *Approval* , the Conditions in this *Approval* shall take precedence, and where there is a conflict between the documents in the schedule, the document bearing the most recent date shall prevail.

(4) Where there is a conflict between the documents listed in the Schedule submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

(5) The Conditions of this *Approval* are severable. If any Condition of this *Approval* , or the application of any requirement of this *Approval* to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this *Approval* shall not be affected thereby.

(6) The approval granted by this *Approval* is based upon a review of the *Works* in the context of its effect on the environment, its process performance and general principles of wastewater engineering. The review did not include a consideration of the architectural, mechanical, electrical or structural components and minor details of the *Works* except to the extent necessary to review the *Works* .

2. EXPIRY OF APPROVAL

This *Approval* will cease to apply to those parts of the *Works* which have not been constructed within five (5) years of the date of this *Approval.*

3. CHANGE OF OWNER

(1) The *Owner* shall notify the *District Manager* and the *Director,* in writing, of any of the following changes within 30 days of the change occurring:

(a) change of *Owner* ;

(b) change of address of the *Owner* ;

(c) change of partners where the *Owner* is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act , R.S.O. 1990, c.B17 shall be included in the notification to the *District Manager* ;

(d) change of name of the corporation where the *Owner* is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act , R.S.O. 1990, c. C39 shall be included in the notification to the *District Manager* ;

(2) In the event of any change in ownership of the *Works* , other than a change to a successor municipality, the *Owner* shall notify in writing the succeeding owner of the existence of this *Approval,* and a copy of such notice shall be forwarded to the *District Manager* and the *Director* .

4. UPON THE SUBSTANTIAL COMPLETION OF THE WORKS

(1) Upon the *Substantial Completion* of the *Proposed Works,* the Owner shall prepare a statement, certified by a Professional Engineer, that the works are constructed in accordance with this *Approval* , and upon request, shall make the written statement available for inspection by Ministry personnel.

(2) Within six months of the *Substantial Completion* of the *Proposed Works,* a set of as-built drawings showing the works “as constructed” shall be prepared. These drawings shall be kept up to date through revisions undertaken from time to time and a copy shall be retained at the *Works* for the operational life of the *Works* .

5. BY-PASSES

(1) Any *By-pass* of sewage from any portion of the *Works* is prohibited, except where:

(a) it is necessary to avoid loss of life, personal injury, danger to public health or severe property damage;

(b) the *District Manager* agrees that it is necessary for the purpose of carrying out essential maintenance and the *District Manager* has given prior written acknowledgment of the *by-pass* ; or

(c) the *Regional Director* has given prior written acknowledgment of the *By-pass* .

(2) The *Owner* shall collect at least one (1) grab sample of the *By-pass* and have it analyzed for the parameters outlined in Condition 7, using the protocols in Condition 9.

(3) The *Owner* shall maintain a logbook of all *By-pass* events which shall include, at a minimum, the

time, location, duration, quantity of *By-pass* , the authority for *By-pass* pursuant to subsection (1), and the reasons for the occurrence.

(4) The *Owner* shall, in the event of a *By-pass* event pursuant to subsection (1), disinfect the by-passed effluent prior to it reaching the receiver such that the receiver is not negatively impacted.

6. EFFLUENT OBJECTIVES

(1) The *Owner* shall use best efforts to design, construct and operate the *Works* with the objective that the concentrations of the materials named below as effluent parameters are not exceeded in the effluent from the *Works* .

Table 1A - Effluent Objectives - until six months after commissioning of *Proposed Works*

Effluent Parameter	**Average Concentration** (milligrams per litre unless otherwise indicated)
CBOD5	15.0
Total Suspended Solids	15.0
Total Phosphorus	0.8

Table 1B - Effluent Objectives - six months after commissioning of *Proposed Works*

Effluent Parameter	**Average Concentration** (milligrams per litre unless otherwise indicated)	**Average Loading** (kilograms per day unless otherwise indicated)
CBOD5	8.0	40.0
Total Suspended Solids	8.0	40.0
Total Phosphorus	0.2	1.0
Total Ammonia Nitrogen	0.6 (May 1 to Nov 30) 3.0 (Dec 1 to Apr 30)	3.0 15.0
E. Coli	100 organisms per 100 mL Monthly *Geometric Mean Density*	-

(2) The *Owner* shall use best efforts to:

(a) maintain the pH of the effluent from the *Works* within the range of 6.5 - 9.0, inclusive, at all times;

(b) operate the works within the *Rated Capacity* of the *Works* ;

(c) ensure that the effluent from the *Works* is essentially free of floating and settleable solids and does not contain oil or any other substance in amounts sufficient to create a visible film or sheen or foam or discolouration on the receiving waters.

(3) The *Owner* shall include in all reports submitted in accordance with Condition 10 a summary of the efforts made and results achieved under this Condition.

7. EFFLUENT LIMITS

(1) The *Owner* shall design and construct the *Works* and operate and maintain the *Works* such that the concentrations of the materials named below as effluent parameters are not exceeded in the effluent from the *Works:*

Table 2A - Effluent Limits - until six months after commissioning of *Proposed Works*		
Effluent Parameter	**Average Concentration** (milligrams per litre unless otherwise indicated)	**Average Loading** (kilograms per day unless otherwise indicated)
CBOD5	25.0	76.65
Total Suspended Solids	25.0	76.65
Total Phosphorus	1.0	3.07
E. Coli	200 organisms per 100 mL Monthly *Geometric Mean Density*	-

Table 2B - Effluent Limits - six months after commissioning of *Proposed Works*		
Effluent Parameter	**Average Concentration** (milligrams per litre unless otherwise indicated)	**Average Loading** (kilograms per day unless otherwise indicated)
CBOD5	15.0	75.0
Total Suspended Solids	15.0	75.0
Total Phosphorus	0.3	1.5
Total Ammonia Nitrogen	2.0 (May 1 to Nov 30) 5.0 (Dec 1 to Apr 30)	10.0 25.0
E. Coli	200 organisms per 100 mL Monthly *Geometric Mean Density*	-

(2) For the purposes of determining compliance with and enforcing subsection (1):

Until six months after commissioning of *Proposed Works:*

(a) The *Annual Average Concentration* of *CBOD5* and Total Suspended Solids in Column 1 of Table 2A shall not exceed the corresponding maximum concentration set out in Column 2 of Table 2A.

(b) The *Monthly Average Concentration* of Total Phosphorus in Column 1 of Table 2A shall not exceed the corresponding maximum concentration set out in Column 2 of Table 2A.

(c) The *Annual Average Loading* of a parameter in Column 1 of Table 2A shall not exceed the corresponding maximum concentration set out in Column 3 of Table 2A.

Six months after commissioning of *Proposed Works:*

(a) The *Monthly Average Concentration* of a parameter named in Column 1 of Table 2B shall not exceed the corresponding maximum concentration set out in Column 2 of Table 2B.

(b) The *Monthly Average Loading* of a parameter named in Column 1 of Table 2B shall not exceed the corresponding maximum concentration set out in Column 3 of Table 2B.

(3) The pH of the effluent shall be maintained between 6.0 to 9.5, inclusive, at all times.

(4) Notwithstanding the subsections above, the *Owner* shall operate and maintain the *Works* such that the effluent is continuously disinfected so that the monthly *Geometric Mean Density* of *E. Coli* does not exceed 200 organisms per 100 millilitres of effluent discharged from the *Works.*

8. OPERATION AND MAINTENANCE

(1) The *Owner* shall exercise due diligence in ensuring that, at all times, the *Works* and the related equipment and appurtenances used to achieve compliance with this *Approval* are properly operated and maintained. Proper operation and maintenance shall include effective performance, adequate funding, adequate operator staffing and training, including training in all procedures and other requirements of this *Approval* and the *Act* and regulations, adequate laboratory facilities, process controls and alarms and the use of process chemicals and other substances used in the *Works* .

(2) The *Owner* shall prepare or update the operations manual within six (6) months of *Substantial Completion* of the *Proposed Works* , that includes, but not necessarily limited to, the following information:

(a) operating procedures for routine operation of the *Works* ;

(b) inspection programs, including frequency of inspection, for the *Works* and the methods or tests employed to detect when maintenance is necessary;

(c) repair and maintenance programs, including the frequency of repair and maintenance for the *Works* ;

(d) procedures for the inspection and calibration of monitoring equipment;

(e) a spill prevention control and countermeasures plan, consisting of contingency plans and procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations, including notification of the *District Manager* ; and

(f) procedures for receiving, responding and recording public complaints, including recording any followup actions taken.

(3) The *Owner* shall maintain the operations manual current and retain a copy at the location of the *Works* for the operational life of the *Works* . Upon request, the *Owner* shall make the manual available to *Ministry* staff.

(4) The *Owner* shall provide for the overall operation of the *Works* with an operator who holds a

licence that is applicable to that type of facility and that is of the same class as or higher than the class of the facility in accordance with Ontario Regulation 129/04.

9. MONITORING AND RECORDING

The *Owner* shall, upon commencement of operation of the *Works* , carry out the following monitoring program:

(1) All samples and measurements taken for the purposes of this *Approval* are to be taken at a time and in a location characteristic of the quality and quantity of the effluent stream over the time period being monitored.

(2) For the purposes of this condition, the following definitions apply:

(a) Weekly means once each week;
(b) Monthly means once each month;
(c) Quarterly means once every three months;

(3) Samples shall be collected at the following sampling points, at the frequency specified, by means of the specified sample type and analyzed for each parameter listed and all results recorded:

Table 3A - Raw Sewage Monitoring - prior to commissioning of *Proposed Works*		
Parameters	**Sample Type**	**Frequency**
CBOD5	Composite	Quarterly
Total Suspended Solids	Composite	Quarterly
Total Kjeldahl Nitrogen	Composite	Quarterly
Total Phosphorus	Composite	Quarterly

Table 3B - Raw Sewage Monitoring - upon commissioning of *Proposed Works*		
Parameters	**Sample Type**	**Frequency**
BOD5	Composite	Weekly
Total Suspended Solids	Composite	Weekly
Total Kjeldahl Nitrogen	Composite	Weekly
Total Phosphorus	Composite	Weekly

Table 4A - Effluent Monitoring - prior to commissioning of *Proposed Works*		
Parameters	**Sample Type**	**Frequency**
CBOD5	Composite	Monthly
Total Suspended Solids	Composite	Monthly
Total Phosphorus	Composite	Weekly
Total Ammonia Nitrogen	Composite	Weekly
E. Coli	Grab	Weekly
pH	Grab	Weekly
Temperature	Grab	Weekly

Table 4B - Effluent Monitoring - upon commissioning of *Proposed Works*		
Parameters	**Sample Type**	**Frequency**
CBOD5	Composite	Weekly
Total Suspended Solids	Composite	Weekly
Total Ammonia Nitrogen	Composite	Weekly
Total Phosphorus	Composite	Weekly
E. Coli	Grab	Weekly
pH	Grab	Weekly
Temperature	Grab	Weekly

Unionized Ammonia	Calculated	Weekly

(4) The methods and protocols for sampling, analysis and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

(a) the Ministry's Procedure F-10-1, “Procedures for Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works (Liquid Waste Streams Only), as amended from time to time by more recently published editions;

(b) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (January 1999), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions;

(c) the publication "Standard Methods for the Examination of Water and Wastewater" (21st edition), as amended from time to time by more recently published editions; and,

(5) The temperature and pH of the effluent from the *Works* shall be determined in the field at the time of sampling for Total Ammonia Nitrogen. The concentration of un-ionized ammonia shall be calculated using the total ammonia concentration, pH and temperature using the methodology stipulated in "Ontario's Provincial Water Quality Objectives" dated July 1994, as amended, for ammonia (un-ionized).

(6) The *Owner* shall install and maintain (a) continuous flow measuring device(s), to measure the flowrate of the influent to or effluent from the *Works* with an accuracy to within plus or minus 15 per cent (+/- 15%) of the actual flowrate for the entire design range of the flow measuring device, and record the flowrate at a daily frequency.

10. REPORTING

(1) One week prior to the start up of the operation of the *Proposed Works* , the *Owner* shall notify the *District Manager* (in writing) of the pending start up date.

(2) Ten (10) days prior to the date of a planned *By-pass* being conducted pursuant to Condition 5 and as soon as possible for an unplanned *By-pass* , the *Owner* shall notify the *District Manager* (in writing) of the pending start date, in addition to an assessment of the potential adverse effects on the environment and the duration of the *By-pass* .

(3) The *Owner* shall report to the *District Manager* or designate, any exceedence of any parameter specified in Condition 7 orally, as soon as reasonably possible, and in writing within seven (7) of the exceedance.

(4) In addition to the obligations under Part X of the Environmental Protection Act , the *Owner* shall, within 10 working days of the occurrence of any reportable spill as defined in Ontario Regulation 675/98, bypass or loss of any product, by-product, intermediate product, oil, solvent, waste material or any other polluting substance into the environment, submit a full written report of the occurrence to the *District Manager* describing the cause and discovery of the spill or loss, clean-up and recovery measures taken, preventative measures to be taken and schedule of implementation.

(5) The *Owner* shall, upon request, make all manuals, plans, records, data, procedures and supporting documentation available to *Ministry* staff.

(6) The *Owner* shall prepare, and submit to the *District Manager* a performance report, on an annual

basis, within ninety (90) days following the end of the period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the *Works* and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:

(a) a summary and interpretation of all monitoring data and a comparison to the effluent limits outlined in Condition 7, including an overview of the success and adequacy of the *Works* ;

(b) a description of any operating problems encountered and corrective actions taken;

(c) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the *Works* ;

(d) a summary of any effluent quality assurance or control measures undertaken in the reporting period;

(e) a summary of the calibration and maintenance carried out on all effluent monitoring equipment; and

(f) a description of efforts made and results achieved in meeting the Effluent Objectives of Condition 6.

(g) a tabulation of the volume of sludge generated in the reporting period, an outline of anticipated volumes to be generated in the next reporting period and a summary of the locations to where the sludge was disposed;

(h) a summary of any complaints received during the reporting period and any steps taken to address the complaints; and

(i) a summary of all *By-pass* , spill or abnormal discharge events.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the *Works* are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the *Approval* and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. The condition also advises the Owners their responsibility to notify any person they authorized to carry out work pursuant to this *Approval* the existence of this *Approval* .

2. Condition 2 is included to ensure that the *Works* are constructed in a timely manner so that standards applicable at the time of Approval of the *Works* are still applicable at the time of construction, to ensure the ongoing protection of the environment.

3. Condition 3 is included to ensure that the *Ministry* records are kept accurate and current with respect to the approved works and to ensure that subsequent owners of the *Works* are made aware of the *Approval* and continue to operate the *Works* in compliance with it.

4. Condition 4 is included to ensure that the *Works* are constructed in accordance with the approval and that record drawings of the *Works* "as constructed" are maintained for future references.

5. Condition 5 is included to indicate that by-passes of untreated sewage to the receiving watercourse is prohibited, save in certain limited circumstances where the failure to *By-pass* could result in greater injury to the public interest than the *By-pass* itself where a *By-pass* will not violate the approved effluent requirements, or where the *By-pass* can be limited or otherwise mitigated by handling it in accordance with an approved contingency plan. The notification and documentation requirements allow the *Ministry* to take action in an informed manner and will ensure the *Owner* is aware of the extent and frequency of *By-pass* events.

6. Condition 6 is imposed to establish non-enforceable effluent quality objectives which the *Owner* is obligated to use best efforts to strive towards on an ongoing basis. These objectives are to be used as a mechanism to trigger corrective action proactively and voluntarily before environmental impairment occurs and before the compliance limits of Condition 7 are exceeded.

7. Condition 7 is imposed to ensure that the effluent discharged from the *Works* to the Grand River meets the *Ministry* 's effluent quality requirements thus minimizing environmental impact on the receiver and to protect water quality, fish and other aquatic life in the receiving water body.

8. Condition 8 is included to require that the *Works* be properly operated, maintained, funded, staffed and equipped such that the environment is protected and deterioration, loss, injury or damage to any person or property is prevented. As well, the inclusion of a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the owner and made available to the *Ministry* . Such a manual is an integral part of the operation of the *Works* . Its compilation and use should assist the *Owner* in staff training, in proper plant operation and in identifying and planning for contingencies during possible abnormal conditions. The manual will also act as a benchmark for *Ministry* staff when reviewing the *Owner'* s operation of the work.

9. Condition 9 is included to enable the *Owner* to evaluate and demonstrate the performance of the *Works* , on a continual basis, so that the *Works* are properly operated and maintained at a level which is consistent with the design objectives and effluent limits specified in the *Approval* and that the *Works* does not cause any impairment to the receiving watercourse.

10. Condition 10 is included to provide a performance record for future references, to ensure that the *Ministry* is made aware of problems as they arise, and to provide a compliance record for all the terms and conditions outlined in this *Approval,* so that the *Ministry* can work with the *Owner* in resolving any problems in a timely manner.

Schedule A

1. Final plans and specifications prepared by R.V. Anderson Associates Limited;
2. Application for amendment submitted by Marc Ethier of the Ontario Clean Water Agency dated June 20, 1996;
3. Application for Approval of Sewage Works submitted by Christine Furlong of Triton Engineering Services Limited received on December 30, 2011, for the proposed expansion and upgrades to a rated capacity of 5,000 m 3 /d, including Design Report and engineering drawings.

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). 9418-5NMH5J issued on August 8, 2003.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

1. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The environmental compliance approval number;
6. The date of the environmental compliance approval;
7. The name of the Director, and;
8. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal 's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 11th day of May, 2012

Mansoor Mahmood, P.Eng.
Director
appointed for the purposes of Part II.1 of the *Environmental Protection Act*

FL/
c: District Manager, MOE Guelph
Water Standards Section, MOE Standards Development Branch
Christine Furlong, P. Eng., Triton Engineering Services Limited

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Appendix B

Sanitary Sewer Capacity Assessment Memo

R.J. Burnside & Associates Limited 292 Speedvale Avenue West Unit 20 Guelph ON N1H 1C4 CANADA
telephone (519) 823-4995 **fax** (226) 526-9660 **web** www.rjburnside.com

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Technical Memorandum

Date: September 11, 2026 **Project No.:** 300060179.0000

Project Name: Sanitary Sewer Capacity Assessment - 127 First Line and 159 First Line

Client Name: Elora Greens Inc. and WrightHaven Homes

Submitted To: Mr. Farhan Kamali Siddiqui & Mr. Steven Wright

Submitted By: Angela Kroetsch, P.Eng.

1.0 Introduction

Elora Greens Inc. (Elora Greens) has retained R.J. Burnside & Associates Limited (Burnside) to complete the preliminary engineering design necessary to support a Draft Plan of Subdivision application for the residential development of 127 First Line located on the south side of First Line in Elora, between Bridge Street and Spencer Drive. The site is approximately 21.6 ha (53.4 ac) in size and is located within the jurisdiction of the Township of Centre Wellington (Township), County of Wellington (County) and the Grand River Conservation Authority (GRCA). Elora Greens is intending to develop between 299-684 residential units, including the associated municipal roads / rights-of-way, parkland / trails and stormwater management facility at the site.

The lands immediately adjacent to the subject lands (located to the east), known as 159 First Line (42.3 ha or 104.5 ac) and owned by WrightHaven Homes, are also planned for residential development. It is understood that WrightHaven Homes is also planning to development between 455-602 residential units, including the associated municipal roads / rights-of-way, parkland / trails and stormwater management facilities.

Based on pre-consultation comments received from the Township of Centre Wellington for both the 127 First Line and 159 First Line lands, as well as subsequent follow up discussions with the Township, both Elora Greens and WrightHaven Homes have been actively collaborating and coordinating the sanitary servicing strategy for the development of both parcels.

In response to the pre-consultation comments received from the Township (dated September 19, 2025), Burnside has undertaken an investigation into the existing gravity sanitary sewer system to identify the following:

- The theoretical capacity of existing gravity sanitary sewer system from First Line to both the Stafford Street Sewage Pumping Station (SPS) and the Clyde Street Sewage Pumping Station (SPS) and ultimately to the Township of Centre Wellington (Elora) Wastewater Treatment Plant (WWTP)
- The available unused capacity in the existing gravity sanitary sewer system that could potentially be utilized to service the proposed development of both 127 First Line and 159 First Line
- The anticipated peak sanitary sewer flows generated from the Phase 1 development areas for both 127 First Line and 159 First Line
- The ability of the existing gravity sanitary sewer system to convey the anticipated peak sanitary sewer flows generated from the Phase 1 development areas for both 127 First Line and 159 First Line

This technical memorandum summarizes the results of the investigation, including the calculations for the theoretical capacity of the existing gravity sanitary sewer system, the available unused capacity in the existing gravity sanitary sewer system, the anticipated peak sanitary sewer flow rates for the 127 First Line and 159 First Line Phase 1 development areas and the ability of the existing gravity sanitary sewer system to convey both the existing peak flow rates and the anticipated flow rates resulting from the Phase 1 development.

2.0 Existing Gravity Sanitary Sewer System

The existing gravity sanitary sewer system, from First Line to the Stafford Street SPS, Clyde Street SPS and ultimately to the Township of Centre Wellington (Elora) WWTP, consists of the following sanitary sewers:

- 200 mm diameter sanitary sewer on First Line
- 200 mm diameter and 250 mm diameter sanitary sewer on Spencer Drive (from First Line to the intersection of Stafford Street and Spencer Drive)
- 300 mm diameter sanitary sewer on Stafford Street (from the intersection of Stafford Street and Spencer Drive to the Stafford Street SPS)
- 150 mm diameter forcemain on Strafford Street (from the Stafford Street SPS to the intersection of Stafford Street and Bridge Street)
- 300 mm diameter sanitary sewer on Bridge Street (from the intersection of Stafford Street and Bridge Street to the intersection of Water Street and Bridge Street)
- 375 mm and 400 mm diameter sanitary sewers on Water Street (from the intersection of Water Street and Bridge Street to the intersection of Water Street and Clyde Street)
- 375 mm and 525 mm diameter sanitary sewers on Clyde Street (from the intersection of Water Street and Clyde Street to the Clyde Street SPS)

A copy of the Township’s record drawings illustrating the existing gravity sanitary sewer system have been included in Appendix A.

From the Township's record drawings for First Line, Spencer Drive, Stafford Street, Bridge Street, Water Street and Clyde Street, the existing condition peak flow rates and pipe capacity in the existing sanitary sewer system were calculated. The existing condition peak flow rates were calculated completed using an average daily per capita flow of 350 L/cap/d and an infiltration flow of 0.15 L/ha/s. The estimated population was calculated based on the number of existing residential units in the catchment area for each reach of existing sanitary sewer and the persons per unit (ppu) identified in Schedule 3 of the Township of Centre Wellington Development Charges Background Study – Consolidated Report (Watson & Associates Economists Ltd. dated March 24, 2026).

The calculated peak flow rate and minimum pipe capacity for each section of sanitary sewer are as follows:

- The existing 200 mm diameter gravity sanitary sewer on First Line has a peak design flow rate of 1 L/s and a maximum capacity of 22 L/s.
- The existing 200 mm diameter gravity sanitary sewer on Spencer Drive has a peak design flow rate of 1 L/s and a maximum capacity of 23 L/s.
- The existing 250 mm diameter gravity sanitary sewer on Spencer Drive has a peak design flow rate of 2 L/s and a maximum capacity of 41 L/s.
- The existing 300 mm diameter gravity sanitary sewer on Stafford Street has a peak design flow rate of 14 L/s and a maximum capacity that ranges from 59 L/s to 68 L/s.
- The existing 300 mm diameter gravity sanitary sewer on Bridge Street has a peak design flow rate of 34 L/s. The maximum capacity in the existing 300 mm diameter gravity sanitary sewer on Bridge Street ranges from 63 L/s to 118 L/s.
- The existing 375 mm diameter gravity sanitary sewer on Water Street has a peak design flow rate of 54 L/s. The maximum capacity in the existing 375 mm diameter gravity sanitary sewer on Water Street ranges from 124 L/s to 136 L/s.
- The exiting 400 mm diameter gravity sanitary sewer on Water Street has a peak design flow rate of 56 L/s. The maximum capacity in the existing 400 mm diameter gravity sanitary sewer on Water Street ranges from 85 L/s to 102 L/s.
- The existing 375 mm diameter gravity sanitary sewer on Clyde Street has a peak design flow rate of 73 L/s. The maximum capacity in the existing 375 mm diameter gravity sanitary sewer on Clyde Street is 124 L/s.
- The existing 525 mm diameter gravity sanitary sewer on Clyde Street has a peak design flow rate of 159 L/s. The maximum capacity in the existing 525 mm diameter gravity sanitary sewer on Clyde Street is 471 L/s.

A copy of the existing conditions sanitary sewer design calculation sheet, which identifies the theoretical capacity of existing gravity sanitary sewer system from First Line to both the Stafford Street Sewage Pumping Station (SPS) and the Clyde Street Sewage Pumping Station (SPS) and ultimately to the Township of Centre Wellington (Elora) Wastewater Treatment Plant (WWTP), has been included in Appendix B.

Based on a comparison of the existing condition peak design flow rates against the maximum capacity in the existing gravity sanitary sewer system, the available unused capacity in the existing gravity sanitary sewer system was determined to be 16.4 L/s. This represents 80% of the available unused capacity in the existing 200 mm diameter gravity sanitary sewer on Spencer Drive (between First Line and Stafford Street).

3.0 Peak Sanitary Sewer Flow Rates From the Phase 1 Development Areas For Both 127 First Line and 159 First Line

In support of Draft Plan approval, the anticipated sanitary sewer flow rates generated from the Phase 1 development area for both 127 First Line and 159 First Line have been calculated. As outlined in the Township of Centre Wellington Development Charges Background Study - Consolidated Report (dated March 24, 2026), the anticipated sanitary sewer flow rates have been calculated based on the following criteria:

- Average daily per capita flow of 350 L/cap/d
- An infiltration flow of 0.15 L/ha/s
- 3.278 people per unit for low density development (singles)
- 3.278 people per unit for low density development (semis)
- 2.351 people per unit for low density development (townhouses)
- 1.837 people per unit for apartments

The anticipated peak sanitary sewer flow rates generated for 127 First Line and 159 First Line, respectively, are summarized in Table 1 and Table 2 as follows:

Table 1: Peak Sanitary Sewer Flow Rate for 127 First Line – Phase 1 ONLY

	Unit Type	# of Units	Population	Area (ha)	Peaking Factor	Peak Flow Rate (L/s)	Infiltration Flow Rate (L/s)	TOTAL Peak Flow Rate (L/s)
Block 1	Low Density (Singles)	3	10	0.35	-	-	-	-
Block 1	Low Density (Townhouses)	16	38	0.35	-	-	-	-
Block 4	Low Density (Townhouses)	11	26	0.48	-	-	-	-
Block 5	Low Density (Townhouses)	30	71	0.57	-	-	-	-
Block 6	Low Density (Townhouses)	48	113	0.88	-	-	-	-
TOTAL			**257**	**2.63**	**4.0**	**4.16**	**0.39**	**4.55**

Table 2: Peak Sanitary Sewer Flow Rate for 159 First Line – Phase 1 ONLY

	Unit Type	# of Units	Population	Area (ha)	Peaking Factor	Peak Flow Rate (L/s)	Infiltration Flow Rate (L/s)	TOTAL Peak Flow Rate (L/s)
Block 1	Low Density (Singles)	37	121	1.42	-	-	-	-
Block 2	Low Density (Singles)	7	23	0.26	-	-	-	-
Block 3	Low Density (Singles)	9	30	0.29	-	-	-	-
Block 4	Low Density (Singles)	9	30	0.33	-	-	-	-
Block 5	Low Density (Singles)	20	66	0.80	-	-	-	-
Block 6	Low Density (Semis)	8	26	0.29	-	-	-	-
Block 7	Low Density (Semis)	9	30	0.32	-	-	-	-
Block 8	Low Density (Townhouses)	10	24	0.34	-	-	-	-
Block 9	Low Density (Singles)	22	72	0.78	-	-	-	-
Block 10	Low Density (Townhouses)	16	38	0.56	-	-	-	-
TOTAL			**458**	**5.39**	**3.994**	**7.41**	**0.81**	**8.22**

Figure 1 illustrates the limits of the Phase 1 sanitary sewer servicing area for both 127 First Line and 159 First Line.

As outlined above, the anticipated peak sanitary sewer flow rate for Phase 1 of the 127 First Line and 159 First Line developments has been calculated to be 4.55 L/s and 8.22 L/s, respectively. Therefore, the total anticipated peak sanitary sewer flow rate to be conveyed by the existing gravity sanitary sewer system is 12.77 L/s, which is less than the maximum available unused capacity in the existing gravity sanitary sewer system of 16.4 L/s.

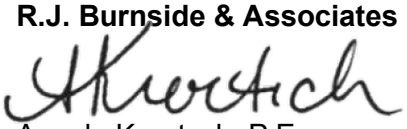
A copy of the sanitary sewer design calculation sheet utilized to calculate the anticipated peak sanitary sewer flow rates for 127 First Line and 159 First Line has been appended (see Appendix C).

Therefore, the existing gravity sanitary sewer system has sufficient capacity to convey the anticipated peak sanitary sewer flow rates generated from the Phase 1 development areas for both 127 First Line and 159 First Line.

4.0 Conclusion

Based on the data available from the existing gravity sanitary sewer system, existing gravity sanitary sewer system, from First Line to the Stafford Street SPS, Clyde Street SPS and ultimately to the Township of Centre Wellington (Elora) WWTP, has sufficient unused capacity to adequately convey the anticipated peak flows generated from the Phase 1 development of 127 First Line and 159 First Line.

R.J. Burnside & Associates Limited



Angela Kroetsch, P.Eng.
Project Engineer

AK:js/af

Enclosure(s) Appendix A: Plan and Profile Drawings
Appendix B: Existing Condition Sanitary Sewer Calculations
Appendix C: Proposed Condition Sanitary Sewer Calculations

cc: Angela Kroetsch, P.Eng., R.J. Burnside & Associates Limited
Dan Ferguson, MBA, P.Eng., PMP, WalterFedy
Ashley Klashoff, CET, WalterFedy

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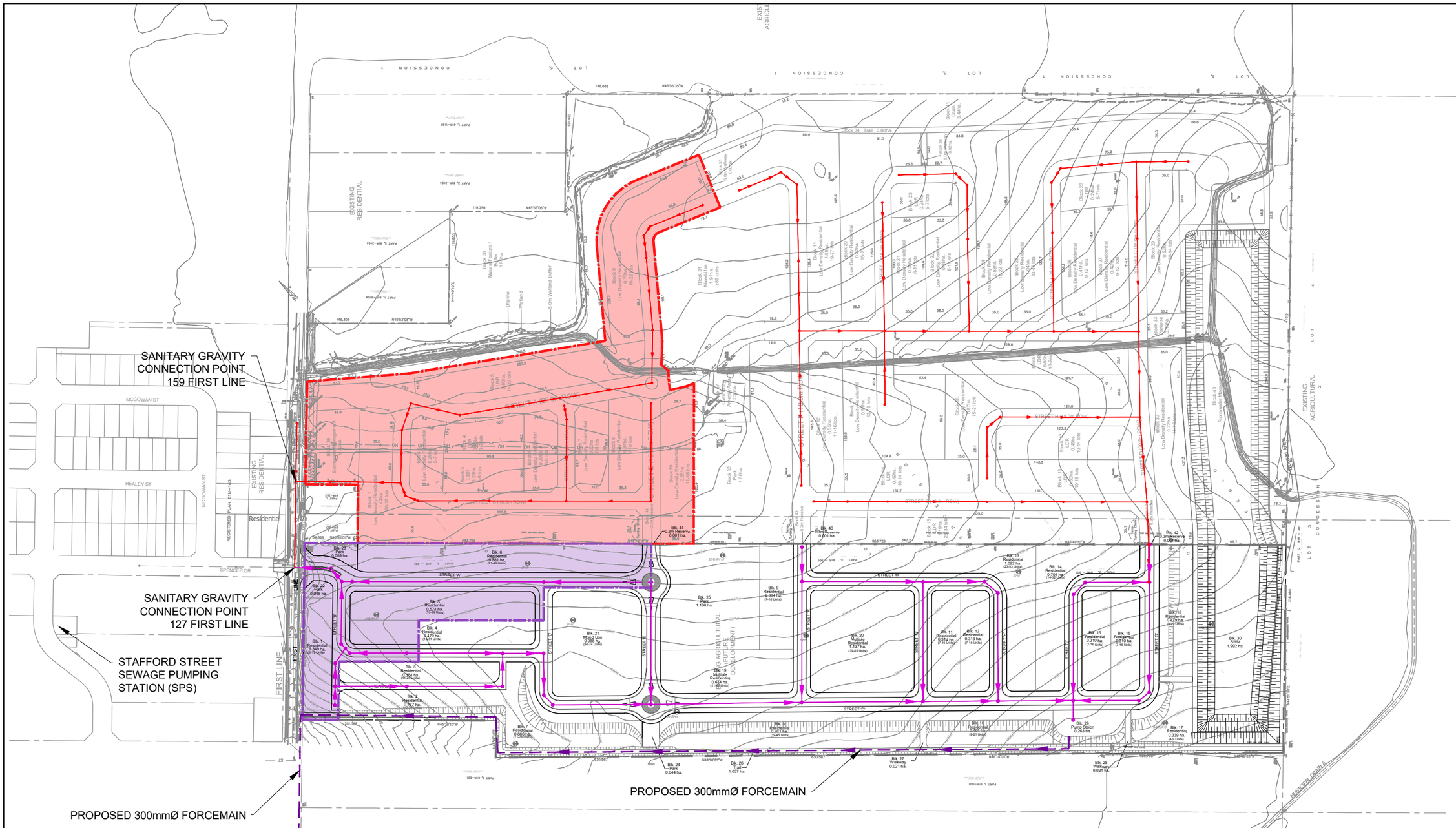


LEGEND

- PROPERTY LINE
- 401.5 EXISTING GROUND CONTOUR
- SWM SAN EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- PROPOSED SANITARY SEWER
- 127 1ST LINE PHASE 1 SANITARY SEWER AREA (TOTAL OF 3.2ha AND 108 UNITS)
- 159 1ST LINE PHASE 1 SANITARY SEWER AREA (TOTAL OF 8.5ha AND147 UNITS)
- 159 1ST LINE PHASE 1 SANITARY SEWER

BURNSIDE

Client: **ELORA GREENS INC.**

Figure Title: **127 & 159 FIRST LINE TOWNSHIP OF CENTRE WELLINGTON (ELORA)**

PHASE 1 - GRAVITY SANITARY SERVICING AREA

Drawn	Checked	Date	Figure No.
M.M.	M.B.	AUGUST 2026	FIG1
Scale		Project No.	
1:4000		060179	

File: u:\060179\0000\03-PRD\FSR FIGURES\060179 - PH1 - SSWR AREA.dwg Date Plotted: September 4, 2026 - 12:55 PM

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

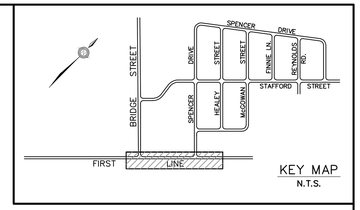
e

Appendix A

Plan and Profile Drawings

CONSTRUCTION

NOTE:
SEE DRAWINGS SL-1 TO SL-5 FOR HYDRO ROAD CROSSING DETAILS



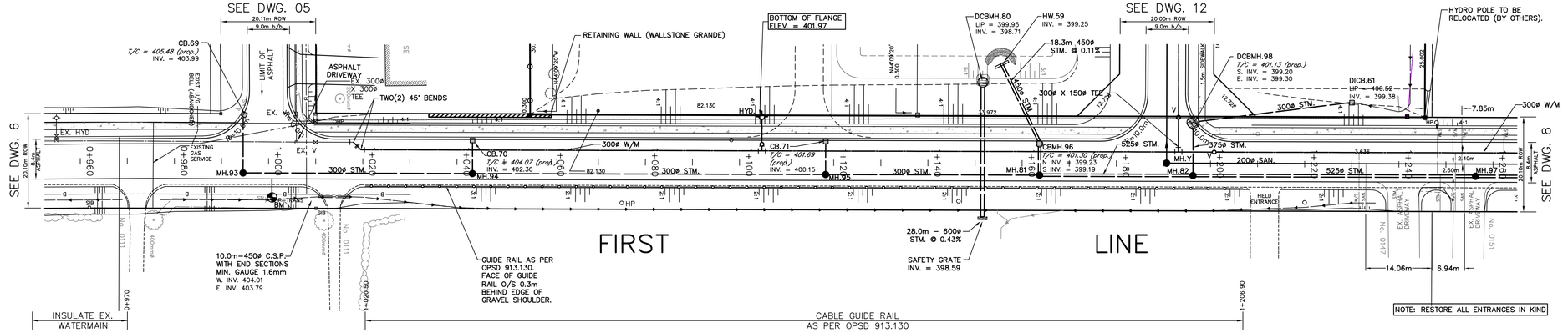
KEY MAP
N.T.S.

BRIDGE STREET

SEE DWG. 05

SPENCER DRIVE

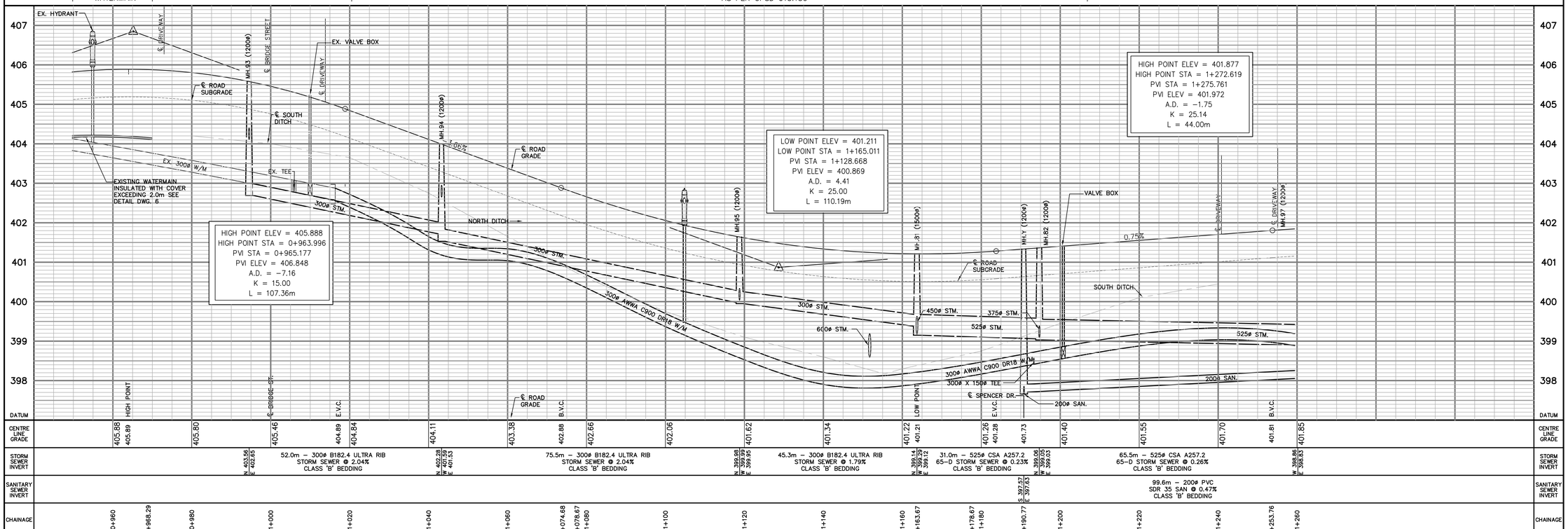
SEE DWG. 12



NOTE: RESTORE ALL ENTRANCES IN KIND

LEGEND:

- PROPERTY LINE
- EX. STORM SEWER
- PROP. STORM SEWER
- PROP. CATCH BASIN
- PROP. CATCH BASIN MANHOLE
- EX. FIRE HYDRANT
- PROP. FIRE HYDRANT
- DRAINAGE FLOW
- T/G = 337.33 — TOP OF GRADE (REAR YARD CB'S)
- T/C = 337.74 — TOP OF CURB (CB'S & DCB'S)
- SWALE
- REMOVE AND DISPOSE TREES



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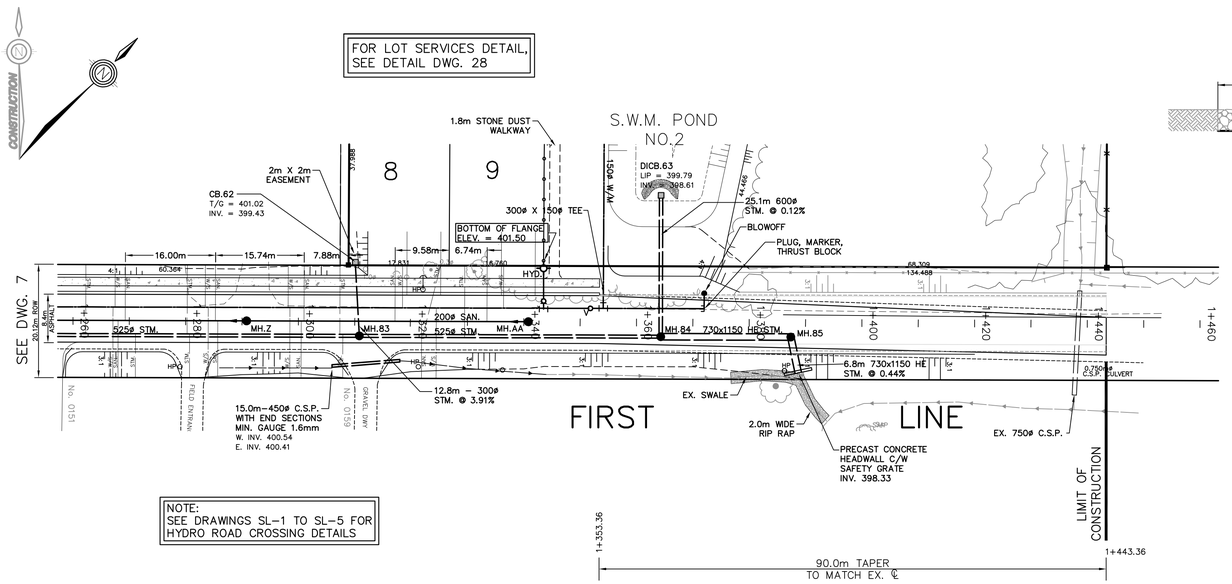
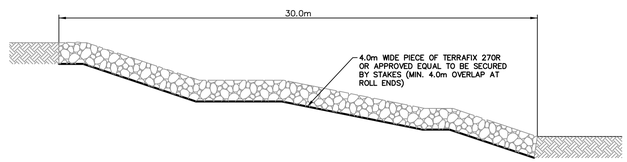
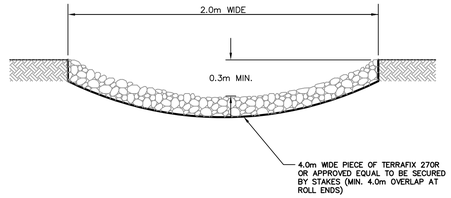
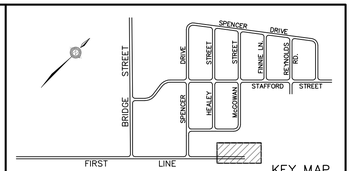






FILTER FABRIC MAT DETAILS
N.T.S.

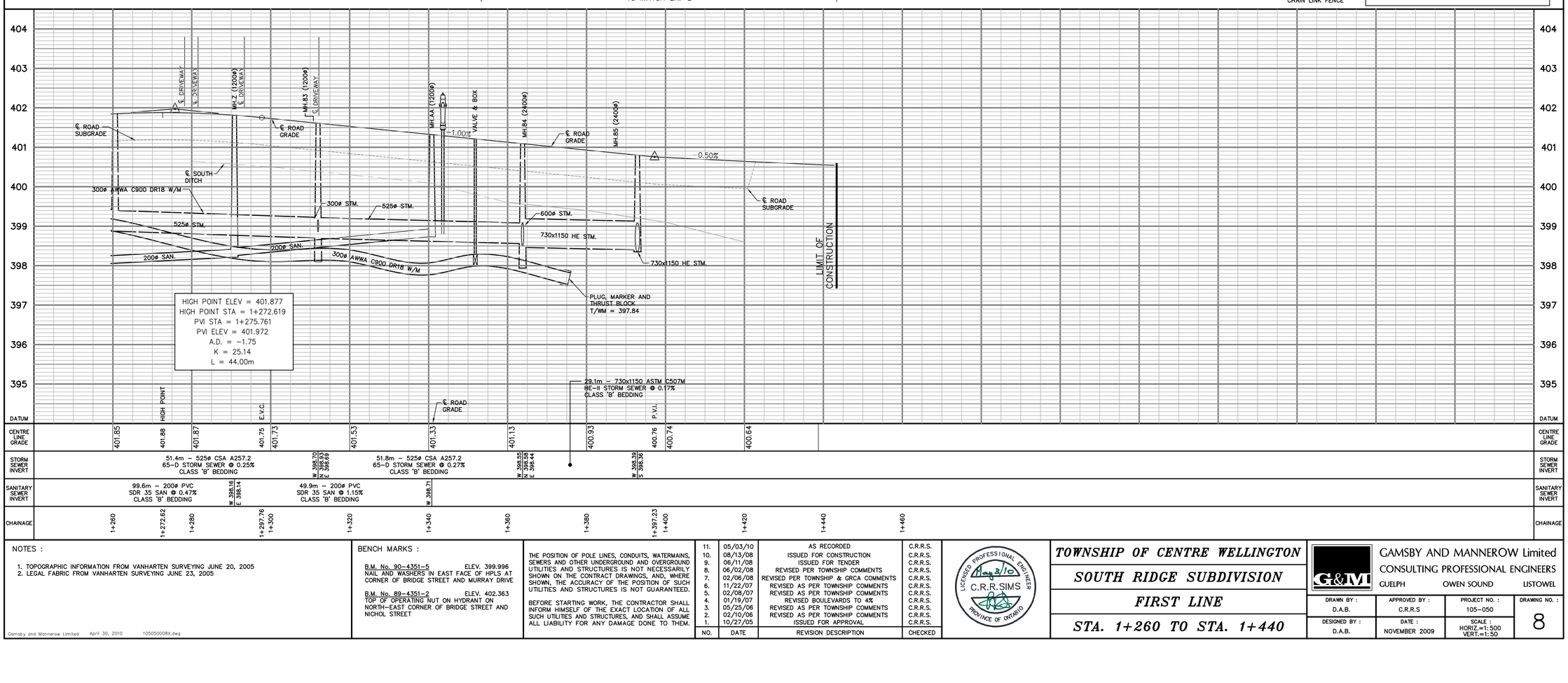


KEY MAP
N.T.S.

1.5m HIGH BLACK VINYL COATED, HEAVY DUTY CHAIN LINK FENCE

LEGEND:

- PROPERTY LINE
- EX. STORM SEWER
- PROP. STORM SEWER
- PROP. CATCH BASIN
- PROP. CATCH BASIN MANHOLE
- EX. FIRE HYDRANT
- PROP. FIRE HYDRANT
- DRAINAGE FLOW
- T/G = 337.33 — TOP OF GRATE (REAR YARD CB'S)
- T/C = 337.74 — TOP OF CURB (CB'S & DCB'S)
- SWALE
- SAN — 100ø PVC SDR–28 SANITARY LATERAL SERVICE IN CLASS "B" BEDDING
- W/S — 19ø TYPE "K" SOFT COPPER WATER SERVICE LATERAL
- STM. — 100ø PVC SDR–28 STORM LATERAL SERVICE IN CLASS "B" BEDDING



NOTES :

1. TOPOGRAPHIC INFORMATION FROM VANHARTEN SURVEYING JUNE 20, 2005
2. LEGAL FABRIC FROM VANHARTEN SURVEYING JUNE 23, 2005

BENCH MARKS :

B.M. No. 90–4351–5 ELEV. 399.996
NAIL AND WASHERS IN EAST FACE OF HPLS AT CORNER OF BRIDGE STREET AND MURRAY DRIVE

B.M. No. 89–4351–2 ELEV. 402.363
TOP OF OPERATING NUT ON HYDRANT ON NORTH–EAST CORNER OF BRIDGE STREET AND NICHOL STREET

THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED.

BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES, AND SHALL ASSUME ALL LIABILITY FOR ANY DAMAGE DONE TO THEM.

NO.	DATE	REVISION DESCRIPTION	CHECKED
11.	05/03/10	AS RECORDED	C.R.R.S.
10.	08/13/08	ISSUED FOR CONSTRUCTION	C.R.R.S.
9.	06/11/08	ISSUED FOR TENDER	C.R.R.S.
8.	06/02/08	REVISED PER TOWNSHIP COMMENTS	C.R.R.S.
7.	02/06/08	REVISED PER TOWNSHIP & GRCA COMMENTS	C.R.R.S.
6.	11/22/07	REVISED AS PER TOWNSHIP COMMENTS	C.R.R.S.
5.	02/08/07	REVISED AS PER TOWNSHIP COMMENTS	C.R.R.S.
4.	01/19/07	REVISED BOULEVARDS TO 4%	C.R.R.S.
3.	05/25/06	REVISED AS PER TOWNSHIP COMMENTS	C.R.R.S.
2.	02/10/06	REVISED AS PER TOWNSHIP COMMENTS	C.R.R.S.
1.	10/27/05	ISSUED FOR APPROVAL	C.R.R.S.

LICENSED PROFESSIONAL ENGINEER C.R.R.SIMS PROVINCE OF ONTARIO

TOWNSHIP OF CENTRE WELLINGTON
SOUTH RIDGE SUBDIVISION
FIRST LINE
STA. 1+260 TO STA. 1+440

GAMSBY AND MANNEROW Limited
CONSULTING PROFESSIONAL ENGINEERS
GUELPH OWEN SOUND LISTOWEL

DRAWN BY :	APPROVED BY :	PROJECT NO. :	DRAWING NO. :
D.A.B.	C.R.R.S	105–050	8
DESIGNED BY :	DATE :	SCALE :	
D.A.B.	NOVEMBER 2009	HORIZ.=1:500 VERT.=1:50	

CONSTRUCTION

SEE DWG. 07

FIRST LINE

SEE DWG. 07

NOTE:
SEE DRAWINGS SL-1 TO SL-5 FOR HYDRO ROAD CROSSING DETAILS

SEE DWG. 20

McGOWAN STREET

FOR LOT SERVICES DETAIL, SEE DETAIL DWG. 28

SEE DWG. 10

STAFFORD STREET

SEE DWG. 09

STAFFORD STREET

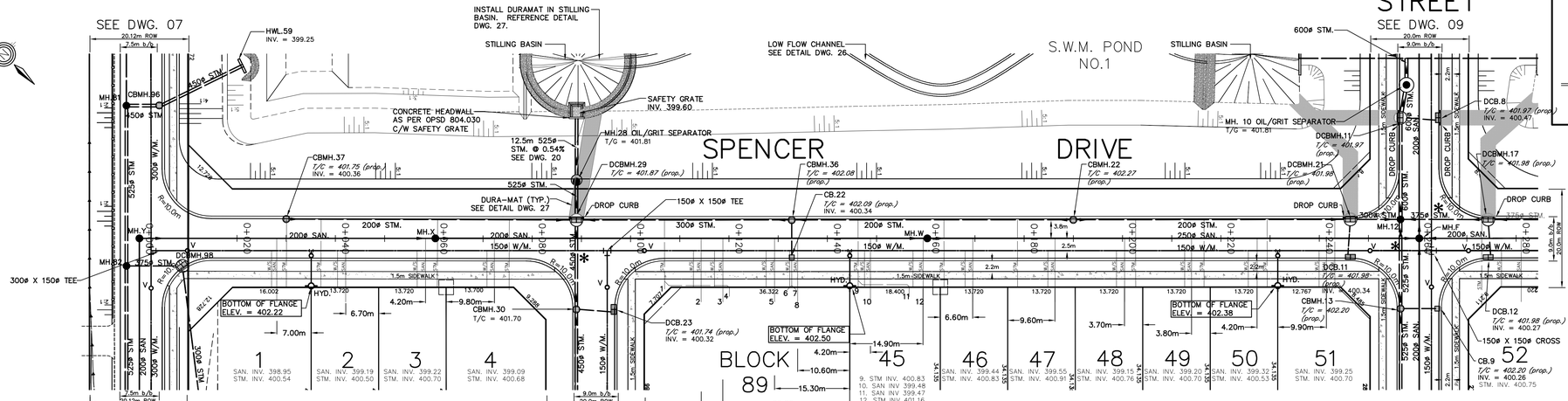
SEE DWG. 13

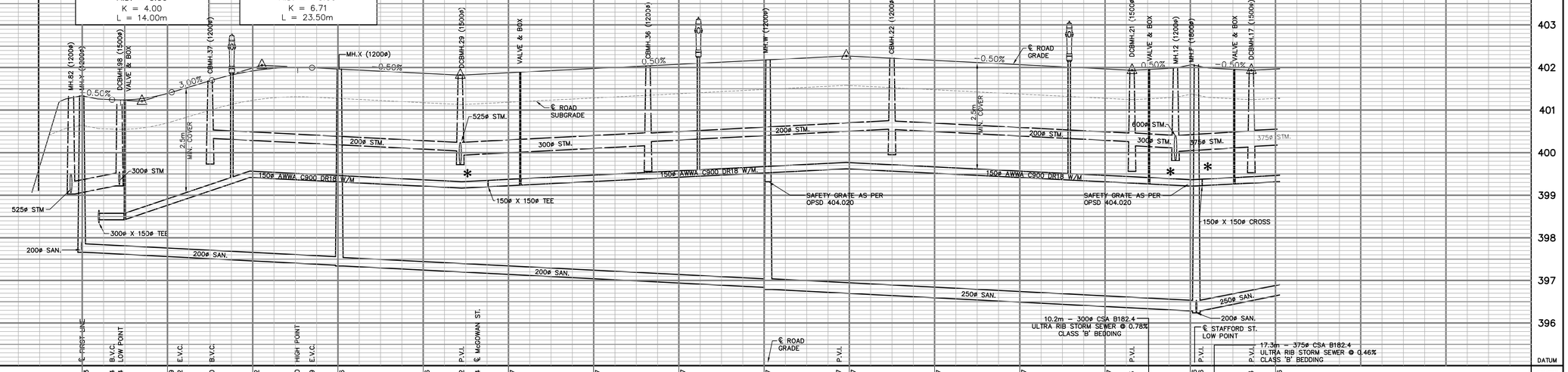
DEPRESSED CURB FOR EMERGENCY OVERFLOW

KEY MAP
N.T.S.

LEGEND:

- PROPERTY LINE
- EX. STORM SEWER
- PROP. STORM SEWER
- PROP. CATCH BASIN
- PROP. CATCH BASIN MANHOLE
- EX. FIRE HYDRANT
- PROP. FIRE HYDRANT
- DRAINAGE FLOW
- T/G = 337.33 — TOP OF GRATE (REAR YARD CB'S)
- T/C = 337.74 — TOP OF CURB (CB'S & DCB'S)
- SWALE
- * — DEFLECT WATERMAIN UNDER SEWER MINIMUM CLEARANCE TO BE 0.5m
- SAN — 100ø PVC SDR-28 SANITARY LATERAL SERVICE IN CLASS "B" BEDDING
- W/S — 19ø TYPE "K" SOFT COPPER WATER SERVICE LATERAL
- STM — 100ø PVC SDR-28 STORM LATERAL SERVICE IN CLASS "B" BEDDING





NOTES :

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2. LEGAL FABRIC FROM VANHARTEN SURVEYING JUNE 23, 2005

BENCH MARKS :

B.M. No. 90-4351-5 ELEV. 399.996
NAIL AND WASHERS IN EAST FACE OF HPLS AT CORNER OF BRIDGE STREET AND MURRAY DRIVE

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3.	05/25/06	REVISED AS PER TOWNSHIP COMMENTS	C.R.R.S.
2.	02/10/06	REVISED AS PER TOWNSHIP COMMENTS	C.R.R.S.
1.	10/27/05	ISSUED FOR APPROVAL	C.R.R.S.

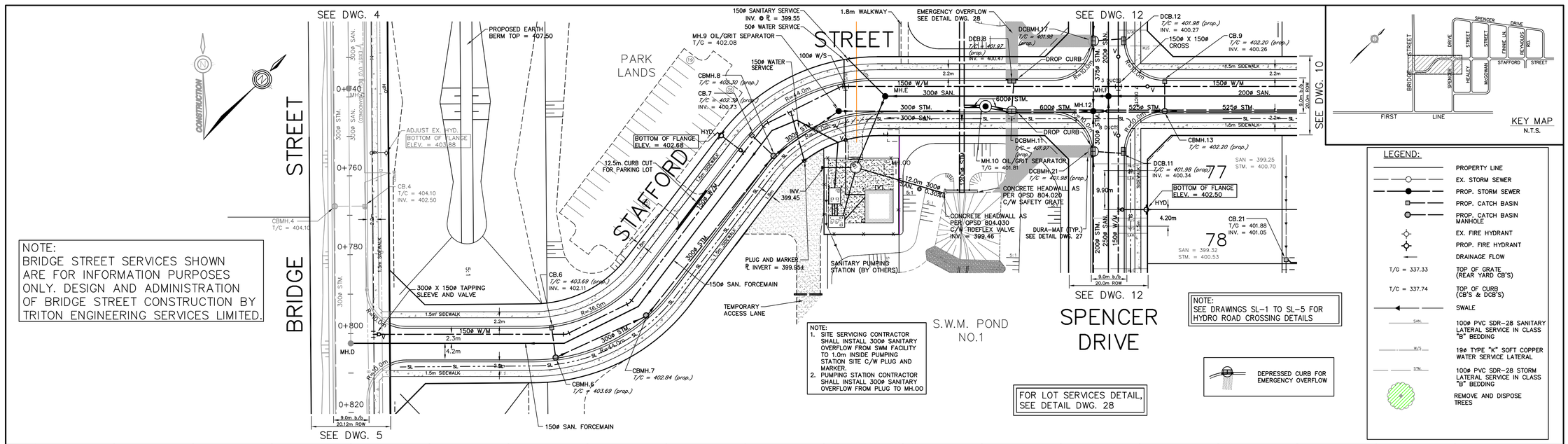
LICENSED PROFESSIONAL ENGINEERS C.R.R.SIMS PROVINCE OF ONTARIO

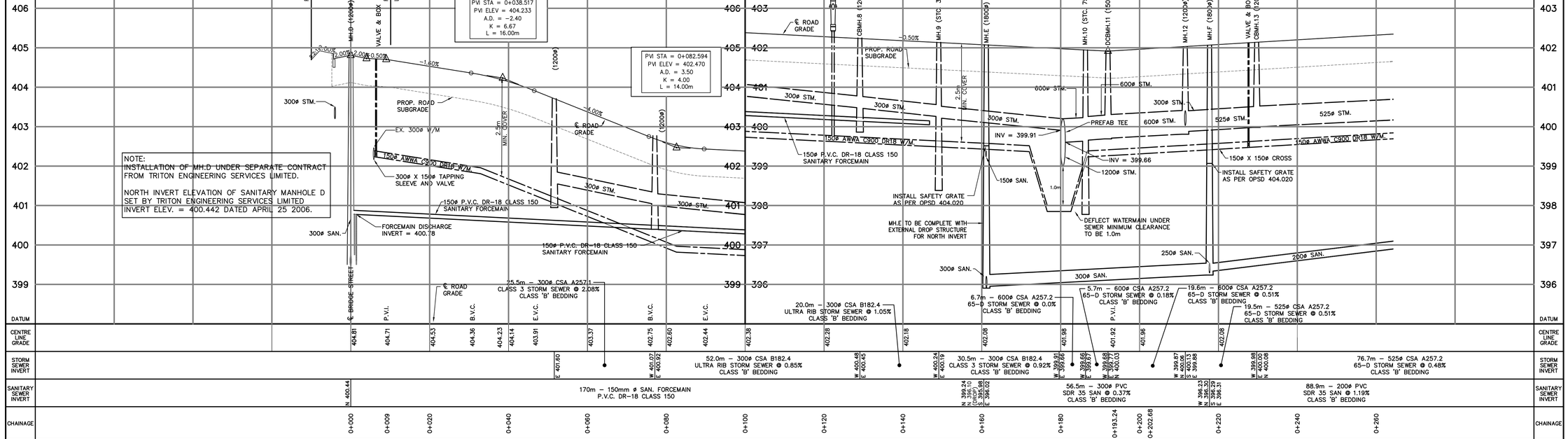
TOWNSHIP OF CENTRE WELLINGTON
SOUTH RIDGE SUBDIVISION
SPENCER DRIVE
STA. 0+000 TO STA. 0+280

GAMSBY AND MANNEROW Limited
CONSULTING PROFESSIONAL ENGINEERS
GUELPH OWEN SOUND LISTOWEL

DRAWN BY :	APPROVED BY :	PROJECT NO. :	DRAWING NO. :
D.A.B.	C.R.R.S	105-050	12
DESIGNED BY :	DATE :	SCALE :	
D.A.B.	NOVEMBER 2009	HORIZ.=1:500 VERT.=1:50	

Gamsby and Mannerow Limited April 30, 2010 105050012X.dwg





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LICENSED PROFESSIONAL ENGINEER C.R.R.SIMS PROVINCE OF ONTARIO

TOWNSHIP OF CENTRE WELLINGTON
SOUTH RIDGE SUBDIVISION
STAFFORD STREET
STA. 0+000 TO STA. 0+260

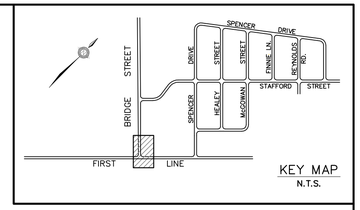
GAMSBY AND MANNEROW Limited
CONSULTING PROFESSIONAL ENGINEERS
GUELPH OWEN SOUND LISTOWEL

DRAWN BY :	APPROVED BY :	PROJECT NO. :	DRAWING NO. :
D.A.B.	C.R.R.S	105-050	9
DESIGNED BY :	DATE :	SCALE :	
D.A.B.	NOVEMBER 2009	HORIZ.=1:500 VERT.=1:50	

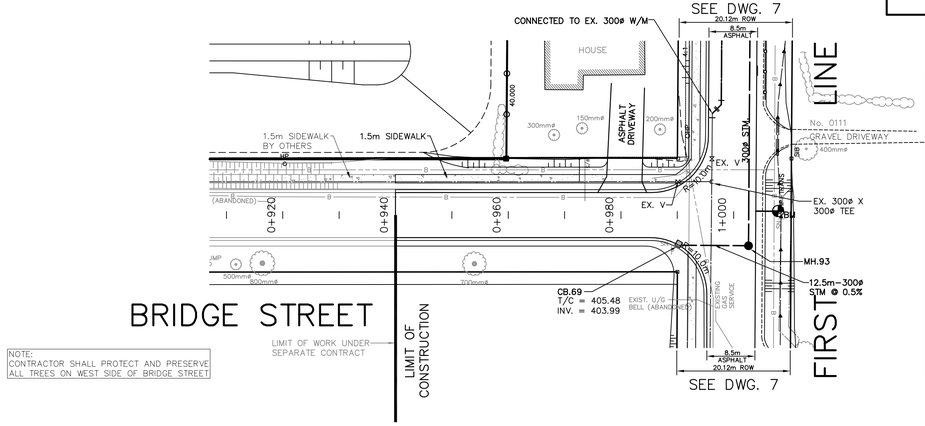
CONSTRUCTION

NOTE:
THIS DRAWING IS FOR INFORMATION PURPOSES ONLY. DESIGN AND ADMINISTRATION OF BRIDGE STREET CONSTRUCTION BY TRITON ENGINEERING SERVICES LIMITED.

NOTE:
SEE DRAWINGS SL-1 TO SL-5 FOR HYDRO ROAD CROSSING DETAILS



KEY MAP
N.T.S.

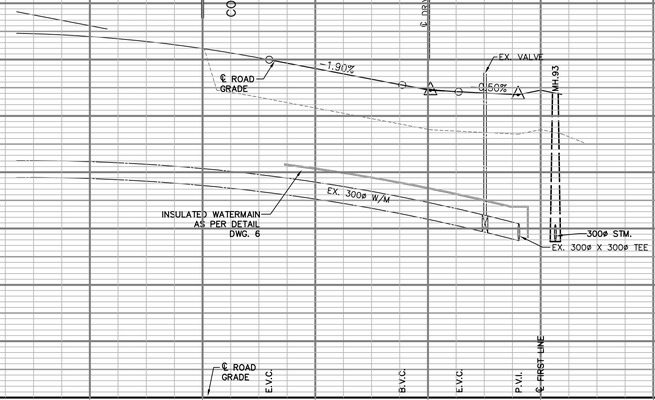


NOTE:
CONTRACTOR SHALL PROTECT AND PRESERVE ALL TREES ON WEST SIDE OF BRIDGE STREET

LEGEND:
- PROPERTY LINE
- EX. STORM SEWER
- PROP. STORM SEWER
- PROP. CATCH BASIN
- PROP. CATCH BASIN MANHOLE
- EX. FIRE HYDRANT
- PROP. FIRE HYDRANT
- DRAINAGE FLOW
- T/G = 337.33 — TOP OF GRATE (REAR YARD CB'S)
- T/C = 337.74 — TOP OF CURB (CB'S & DCB'S)
- SWALE
- REMOVE AND DISPOSE TREES

HIGH POINT ELEV = 406.471
HIGH POINT STA = 0+901.954
PVI STA = 0+894.340
PVI ELEV = 407.090
A.D. = -4.38
K = 26.26
L = 115.00m

PVI STA = 0+980.442
PVI ELEV = 405.454
A.D. = 1.40
K = 7.14
L = 10.00m



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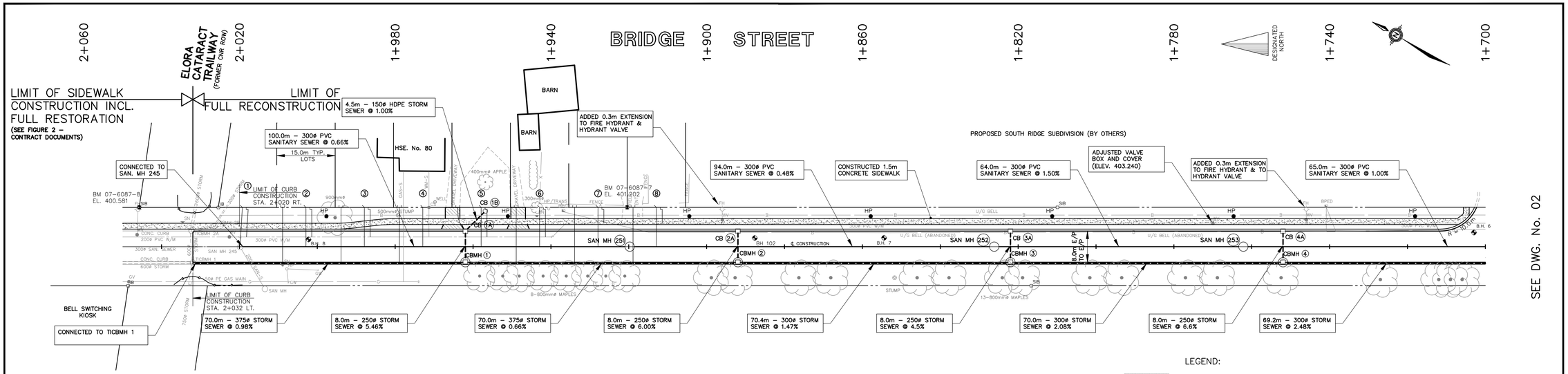


B.M. No. 07–6087–7 Elev. 401.202
IRON BAR ON EAST SIDE OF BRIDGE STREET AT STA. 1+904.7.

B.M. No. 07–6087–8 Elev. 400.581
TOP OPERATING NUT OF FIRE HYDRANT ON EAST SIDE OF BRIDGE STREET, NORTH OF ELORA CATARACT TRAILWAY

NOTES:

1. INSTALLED 90ø BELL DUCT FROM STA. 2+045 TO 1+705 TO SERVICE PROPOSED SUBDIVISION (SEE TYPICAL ROAD SECTION FOR LOCATIONS)
2. FOR DETAILS REGARDING UNDERGROUND ELECTRICAL SERVICING OF PROPOSED LOTS 1–8, REFER TO DRAWING SK–1 IN CONTRACT DOCUMENTS.

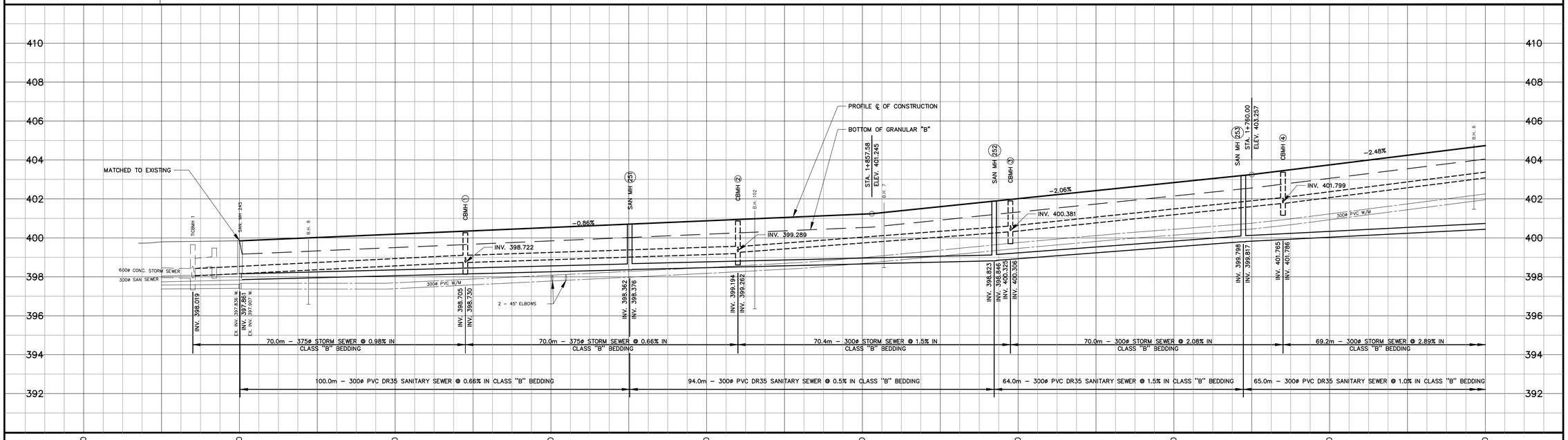
LEGEND:

50mm HL3C, 150mm GRAN."A", 150mm GRAN."B"

BH 8 BOREHOLE LOCATIONS TAKEN FROM GEOTECHNICAL INVESTIGATION PREPARED BY ENGLAND NAYLOR ENGINEERING LTD. DATED APRIL 21, 1995, PROJECT No. 1095G1.R01

BH 102 BOREHOLE LOCATIONS TAKEN FROM GEOTECHNICAL INVESTIGATION PREPARED BY NAYLOR ENGINEERING ASSOCIATES LTD. DATED SEPTEMBER 14, 2005, PROJECT No. 3244G2.R01

NEW STORM SEWER SERVICE
NEW SANITARY SERVICE
NEW WATER SERVICE
HP NEW HYDRO POLE BY OTHERS



NOTES

THE LOCATION OF UTILITIES IS APPROXIMATE ONLY AND SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED. THE CONTRACTOR SHALL PROVE THE LOCATION OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION AGAINST DAMAGE.

No	DATE	REVISION	INITIAL
3.	APR. 2010	RECORD INFORMATION	d.g.d.
2.	JUL. 2008	ISSUED FOR TENDER	d.g.d.
1.	FEB. 2007	ISSUED FOR M.O.E. APPROVAL	d.g.d.

RECONSTRUCTION OF
BRIDGE STREET
(ELORA)

TOWNSHIP OF CENTRE WELLINGTON
P.O. BOX 10, 1 MACDONALD SQUARE
ELORA, ONTARIO N0B 1S0

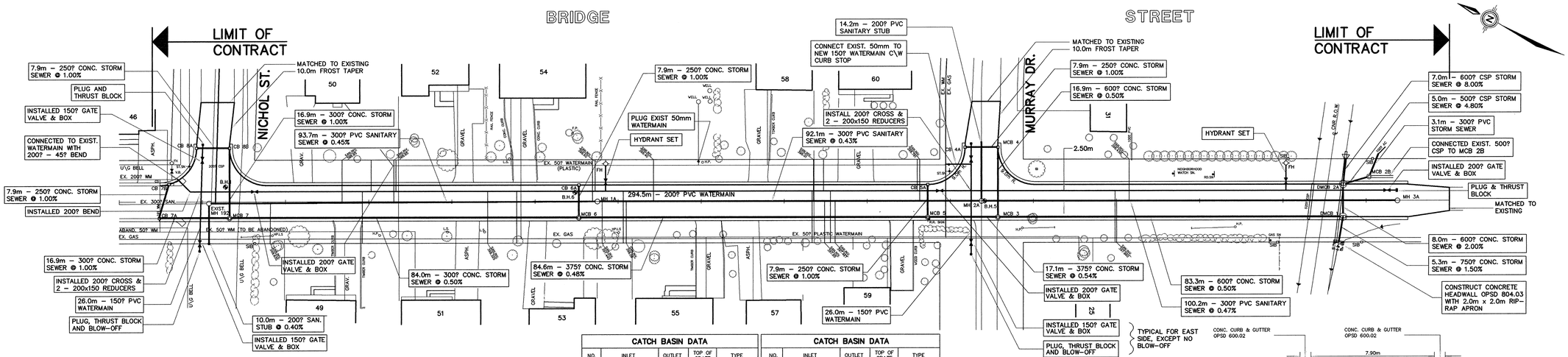
PLAN AND PROFILE
STATION 1+700 TO STATION 2+020

CONTRACT No	T–06–08
PROJECT No	M6087
DRAWN BY:	A.S.B. (AutoCAD)
CHECKED BY:	D.G.D.
APPROVED BY:	D.B.M.
DATE:	JUNE, 2006

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

SCALES
1:500 HORIZONTAL
1:100 VERTICAL

DRAWING NUMBER **01**



B.M. No. 90–4351–5 Elev. 399.996
NAIL AND WASHERS IN EAST FACE OF HPLS @ STA. 0+435.5 O\S RT. ON BRIDGE STREET AT MURRAY DRIVE.

B.M. No. 89–4351–2 Elev. 402.363
TOP OF OPERATING NUT ON HYDRANT ON NORTH–EAST CORNER OF BRIDGE STREET AND NICHOL STREET.

NOTES:

1. INSTALLED 20mm WATER SERVICES FROM 200? WATERMAIN TO PROPERTY LINE AT HSE No.s 49, 50, 52, 53, 54, 55, 57, 58, 59, 60, 25 AND STA. 0+350 Lt. INCLUDING 50x75 MARKER AT PROPERTY LINE
2. INSTALL 20mm WATER SERVICE FROM 200? WATERMAIN AND RECONNECT TO EXIST. SERVICE AT PROPERTY LINE, HSE No.51
3. EXISTING 50mm WATERMAIN ON BRIDGE ST. CONNECTED TO 150? WATERMAIN AND REMAIN IN SERVICE.
4. INSTALLED 150mm PVC SANITARY SERVICE FROM NEW SAN. SEWER TO PROPERTY LINE AT HSE. No.s 49, 50, 51, 52, 53, 54, 55, 57, 58, 59, 60, 31, 25 AND STA. 0+348.5 Lt. INCLUDING 50x75 MARKER AT PROPERTY LINE.
5. EXTENDED EXIST. 19mm WATER SERVICE @ STA. 0+229.8 TO WEST PROPERTY LINE TO SERVICE VACANT LOT.

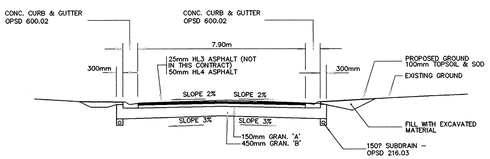
CATCH BASIN DATA

NO.	INLET	OUTLET	TOP OF GRATE	TYPE
CB 8A CB 8B	-------- FROM 8A – 399.819	399.898 399.769	401.150 401.150	OPSD 705.02 TYPE 'A'
CB 7A CB 7B MCB 7	-------- FROM 7A – 399.819 FROM 8B – 399.600 FROM 7B – 399.600	399.898 399.769 399.393	401.409 401.409 401.260	OPSD 705.02 TYPE 'A' OPSD 701.01
CB 6A MCB 6	-------- FROM 6A – 399.155 FROM 7 – 399.005	399.234 398.922	400.550 400.500	705.02 TYP. 'A' OPSD 701.01
CB 5A MCB 5	-------- FROM 5A – 398.660 FROM 6 – 398.514	398.739 398.468	400.150 400.150	705.02 TYP. 'A' OPSD 701.01
CB 4A MCB 4	-------- FROM 4A – 398.660	398.739 398.635	400.280 400.280	705.02 TYP. 'A' OPSD 701.01

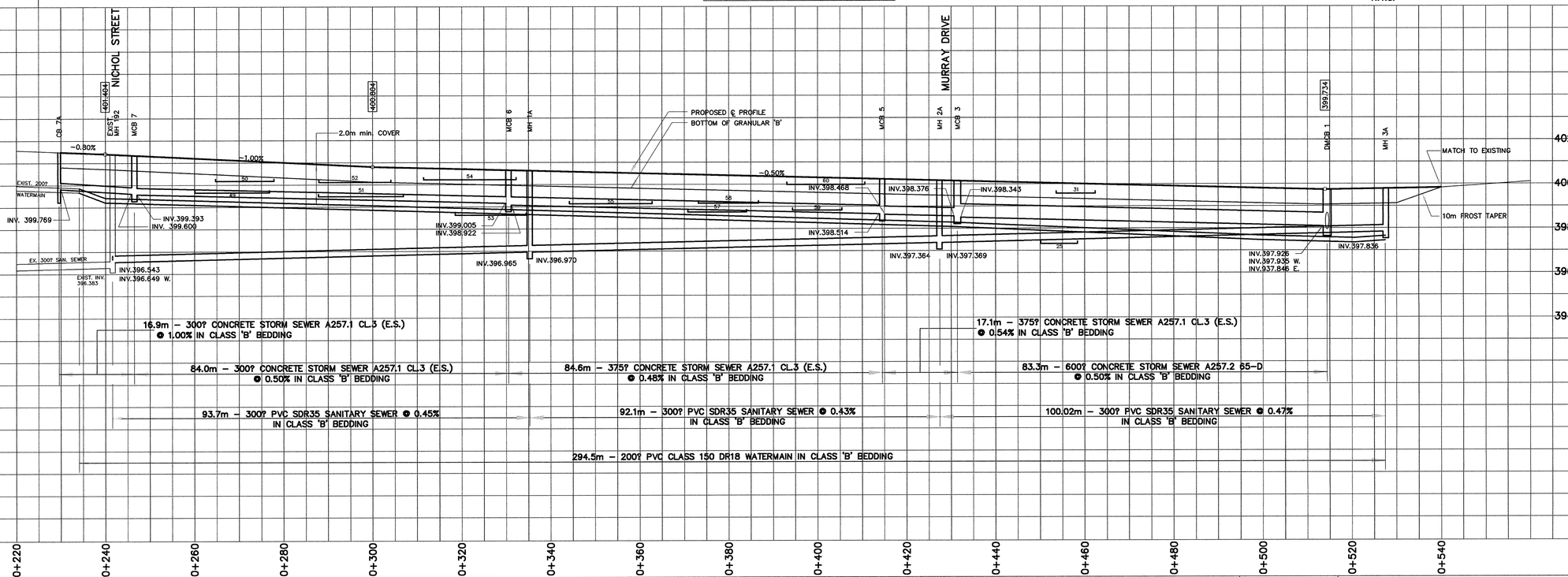
NOTE: CB & MCB TO HAVE 600mm SUMPS

CATCH BASIN DATA

NO.	INLET	OUTLET	TOP OF GRATE	TYPE
MCB 3	FROM 5 – 398.376 FROM 4 – 398.550	398.343	400.070	OPSD 701.02
DMCB 2A	FROM 400? & 600? – 398.391 FROM 2B – 398.436	398.341	399.655	OPSD 703.02
MCB 2B	FROM 500? – 398.531	398.531	399.480	OPSD 701.02
DMCB 1	FROM 2A – 397.846 FROM 3 – 397.926	397.935	399.655	OPSD 703.02
OUTLET H'WALL	--------	397.731	-----	OPSD 804.03
400? INLET	398.825	-----	-----	OPSD 801.02
600? INLET	398.655	-----	-----	OPSD 801.02



TYPICAL ROAD SECTION
N.T.S.



1. THE LOCATION OF UTILITIES IS APPROXIMATE ONLY AND SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED. THE CONTRACTOR SHALL PROVE THE LOCATION OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION AGAINST DAMAGE.

1	MAR.,1992	"AS RECORDED"	g.m.

RECONSTRUCTION OF
BRIDGE STREET

VILLAGE OF ELORA
BOX 508 – 136 METCALFE STREET
ELORA, ONTARIO N0B 1S0

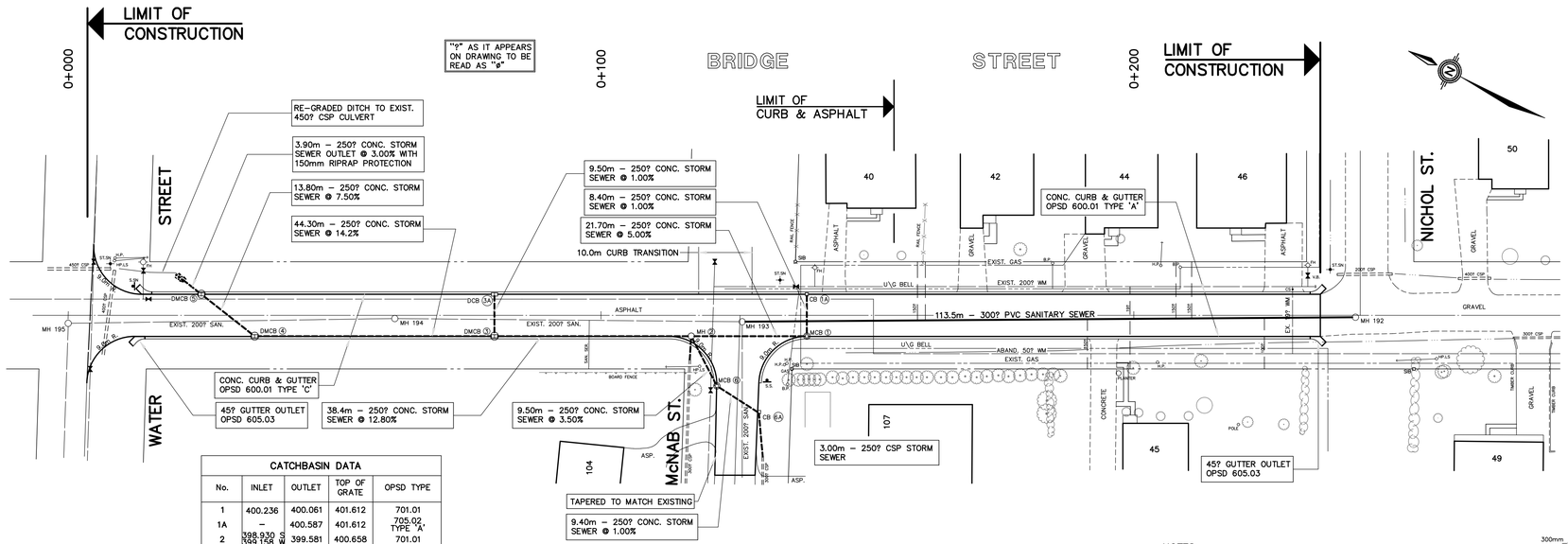
M4351

PLAN AND PROFILE
STATION 0+220 TO STATION 0+540

g.m.
D.A.H.
D.B.M.
MAY, 1991

1 : 500
1 : 100

2



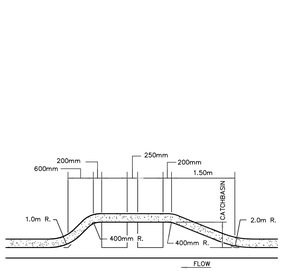
CATCHBASIN DATA				
No.	INLET	OUTLET	TOP OF GRATE	OPSD TYPE
1	400.236	400.061	401.612	701.01
1A	–	400.587	401.612	705.02 TYPE 'A'
2	398.930 S 399.158 W	399.581	400.658	701.01
3	394.169 S & E	398.881	395.526	705.01
3A	–	394.065	395.526	705.01
4	387.642	387.615	388.936	703.01
5	386.573	386.537	387.861	703.01
OUTLET	–	386.422	–	–
6	399.720	399.688	401.190	701.01
6A	399.825	399.956	401.174	705.02 TYPE 'A'
INLET	399.831	–	–	–

B.M. No.89–4351–3 Elev. 387.992
TOP OF OPERATING NUT ON HYDRANT, SOUTH–EAST CORNER OF BRIDGE ST. AND WATER STREET.

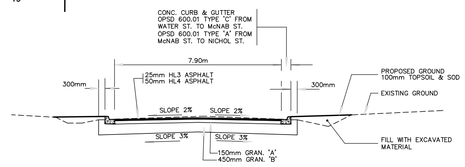
B.M. No.89–4351–1 Elev. 402.596
TOP OF OPERATING NUT ON HYDRANT IN FRONT OF HOUSE No.40, CORNER OF BRIDGE ST. AND McNAB ST

NOTES:

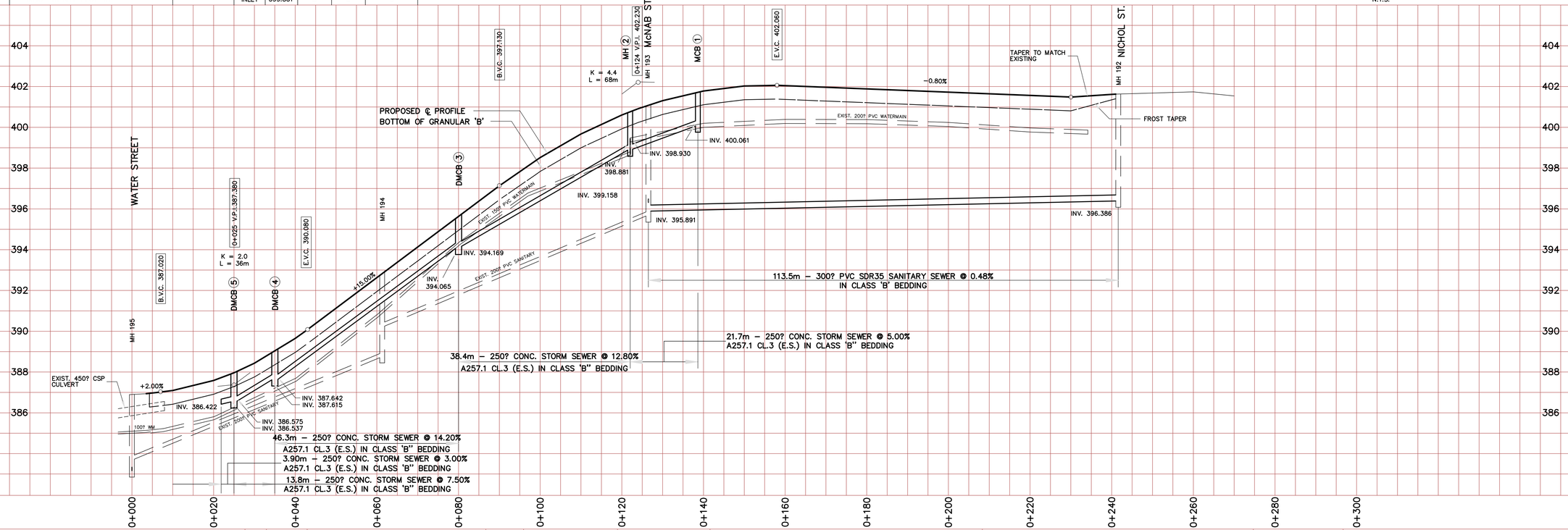
1. CURB SETBACK REQUIRED FOR DMCB 3, DCB 3A, DMCB 4 AND DMCB 5. FOR DETAIL SEE THIS DRAWING.
2. RECONNECT SANITARY SERVICES FROM HOUSE No.40, 42, 44, 45 AND 46 TO NEW 300ø SANITARY SEWER.



DETAIL OF TYPICAL CURB SETBACK
N.T.S.



TYPICAL ROAD SECTION
N.T.S.



1. THE LOCATION OF UTILITIES IS APPROXIMATE ONLY AND SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED. THE CONTRACTOR SHALL PROVE THE LOCATION OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION AGAINST DAMAGE.

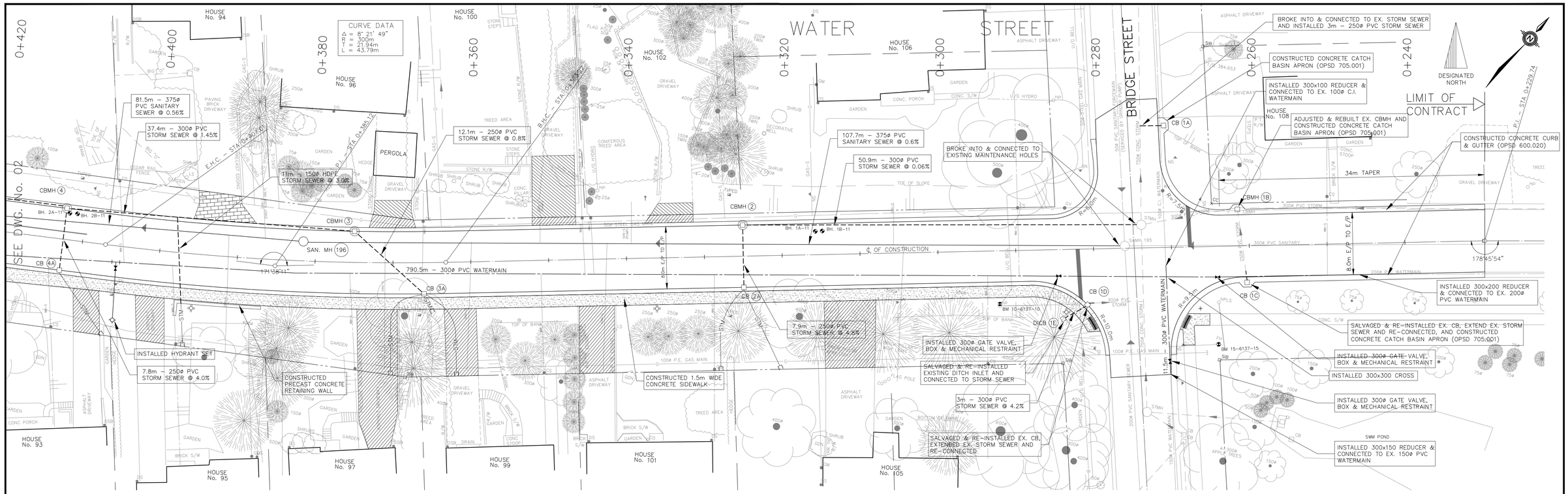
1	JULY'90	"AS RECORDED"	g.m.

RECONSTRUCTION OF
BRIDGE STREET

VILLAGE OF ELORA
BOX 508 – 136 METCALFE STREET
ELORA, ONTARIO N0B 1S0

PLAN AND PROFILE
WATER STREET TO STATION 0+300

M4351
g.m. (AutoCAD)
D.A.H.
D.B.M.
AUGUST, 1989
1 : 500
1 : 100
1



NOTES:

1. INSTALLED NEW 25mm WATER SERVICE FROM NEW 300mm WATERMAIN TO PROPERTY LINE AND CONNECTED TO EXISTING FOR HOUSE No. 94, 95, 96, 97, 99, 100, 101, 102, 105, AND 106
2. CONNECTED EXISTING 100mm SANITARY SERVICE TO NEW 375mm SANITARY SEWER FOR HOUSE No. 94, 95, 96, 97, 99, 100, 101, 102, 105, AND 106
3. INSTALLED NEW 100mm STORM SERVICE AND PROPERTY MARKER FROM STORM SEWER TO PROPERTY LINE AT No. 95, 97, 99, 101, AND 105

LEGEND:

- 50mm HL3F, 100mm GRAN."A", 200mm GRAN."B"
- BRICK PAVERS, 30mm SAND BASE, 200mm GRAN."A"
- 100mm GRAN."A", 200mm GRAN."B"
- BH. 1–11 BOREHOLE LOCATIONS TAKEN FROM GEOTECHNICAL INVESTIGATION PREPARED BY L.V.M. DATED FEB. 22, 2011, REF. No. 160–P038136–0100–GE–0001–00
- STM PROPOSED STORM SERVICE
- TACTILE PLATE
- 381.76 BOR TOP OF BEDROCK

B.M. 15–6137–15 Elev. 388.429
TOP NUT OF FIRE HYDRANT ON SOUTH EAST CORNER OF WATER STREET AND BRIDGE STREET

NOTES

THE LOCATION OF UTILITIES IS APPROXIMATE ONLY AND SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED. THE CONTRACTOR SHALL PROVE THE LOCATION OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION AGAINST DAMAGE.

No	DATE	REVISION	INITIAL
4.	FEB. 2017	RECORD INFORMATION	d.g.d.
3.	APR. 2015	ISSUED FOR TENDER	d.g.d.
2.	DEC. 2014	ISSUED FOR G.R.C.A. APPROVAL	d.g.d.
1.	DEC. 2014	ISSUED FOR M.O.E. APPROVAL	d.g.d.

RECONSTRUCTION OF
WATER STREET
(ELORA)

TOWNSHIP OF CENTRE WELLINGTON
1 MACDONALD SQUARE
ELORA, ONTARIO N0B 1S0

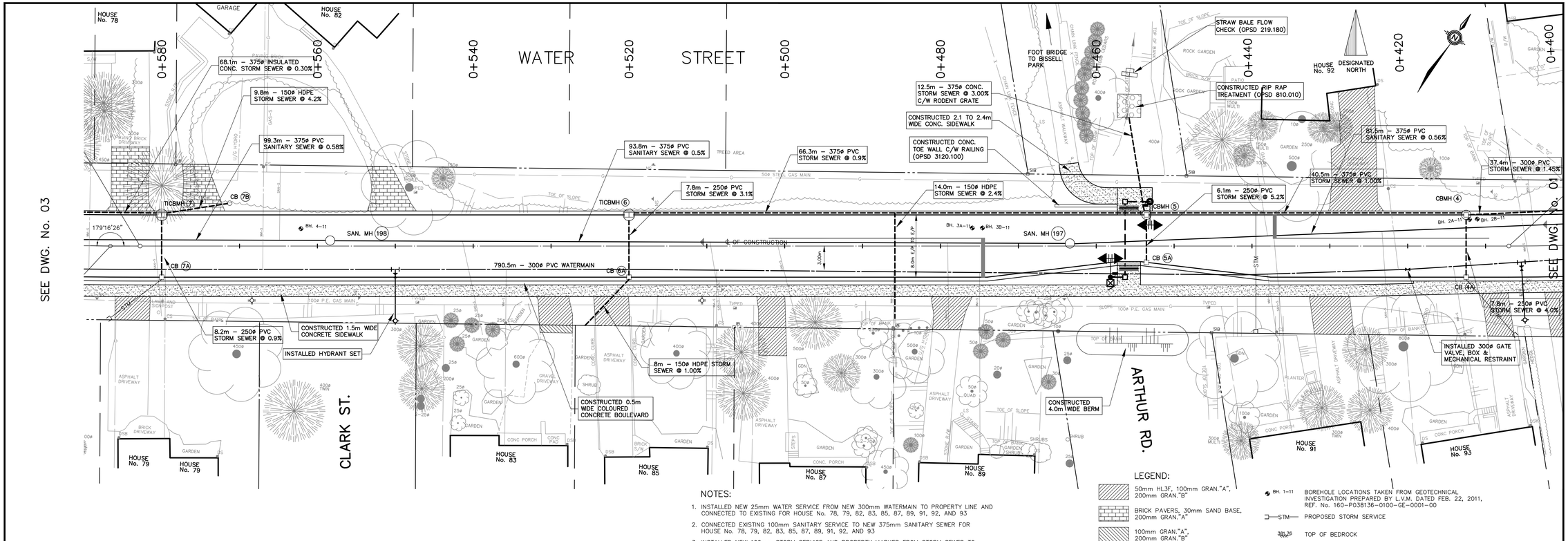
PLAN AND PROFILE
BRIDGE STREET TO STA. 0+420

CONTRACT No	T–11–15
PROJECT No	M6137
DRAWN BY:	A.S.B. (MACAD)
CHECKED BY:	P.F.Z.
APPROVED BY:	D.G.D.
DATE:	AUGUST, 2014

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

SCALES
1:250 HORIZONTAL
1:50 VERTICAL

DRAWING NUMBER **01**

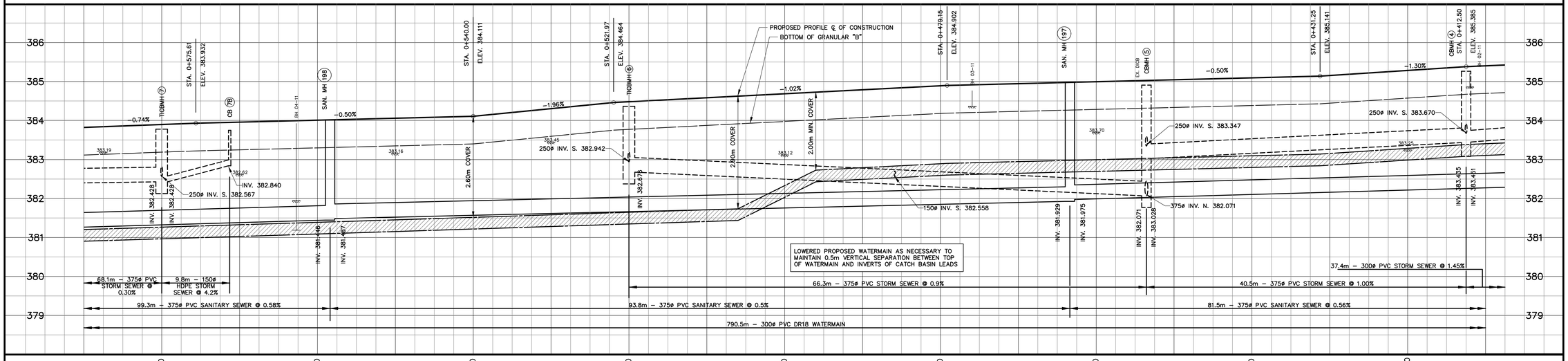


NOTES:

1. INSTALLED NEW 25mm WATER SERVICE FROM NEW 300mm WATERMAIN TO PROPERTY LINE AND CONNECTED TO EXISTING FOR HOUSE No. 78, 79, 82, 83, 85, 87, 89, 91, 92, AND 93
2. CONNECTED EXISTING 100mm SANITARY SERVICE TO NEW 375mm SANITARY SEWER FOR HOUSE No. 78, 79, 82, 83, 85, 87, 89, 91, 92, AND 93
3. INSTALLED NEW 100mm STORM SERVICE AND PROPERTY MARKER FROM STORM SEWER TO PROPERTY LINE AT No. 79, 91, AND 93

LEGEND:

- 50mm HL3F, 100mm GRAN."A", 200mm GRAN."B"
- BRICK PAVERS, 30mm SAND BASE, 200mm GRAN."A"
- 100mm GRAN."A", 200mm GRAN."B"
- TACTILE PLATE
- BH. 1–11 BOREHOLE LOCATIONS TAKEN FROM GEOTECHNICAL INVESTIGATION PREPARED BY L.V.M. DATED FEB. 22, 2011, REF. No. 160–P038136–0100–GE–0001–00
- STM PROPOSED STORM SERVICE
- 383.76 ROCK TOP OF BEDROCK
- E 386.750 PROPOSED TOP OF BERM ELEVATION



NOTES

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No	DATE	REVISION	INITIAL
4.	FEB. 2017	RECORD INFORMATION	d.g.d.
3.	APR. 2015	ISSUED FOR TENDER	d.g.d.
2.	DEC. 2014	ISSUED FOR G.R.C.A. APPROVAL	d.g.d.
1.	DEC. 2014	ISSUED FOR M.O.E. APPROVAL	d.g.d.

RECONSTRUCTION OF

WATER STREET

(ELORA)

TOWNSHIP OF CENTRE WELLINGTON
1 MACDONALD SQUARE
ELORA, ONTARIO N0B 1S0

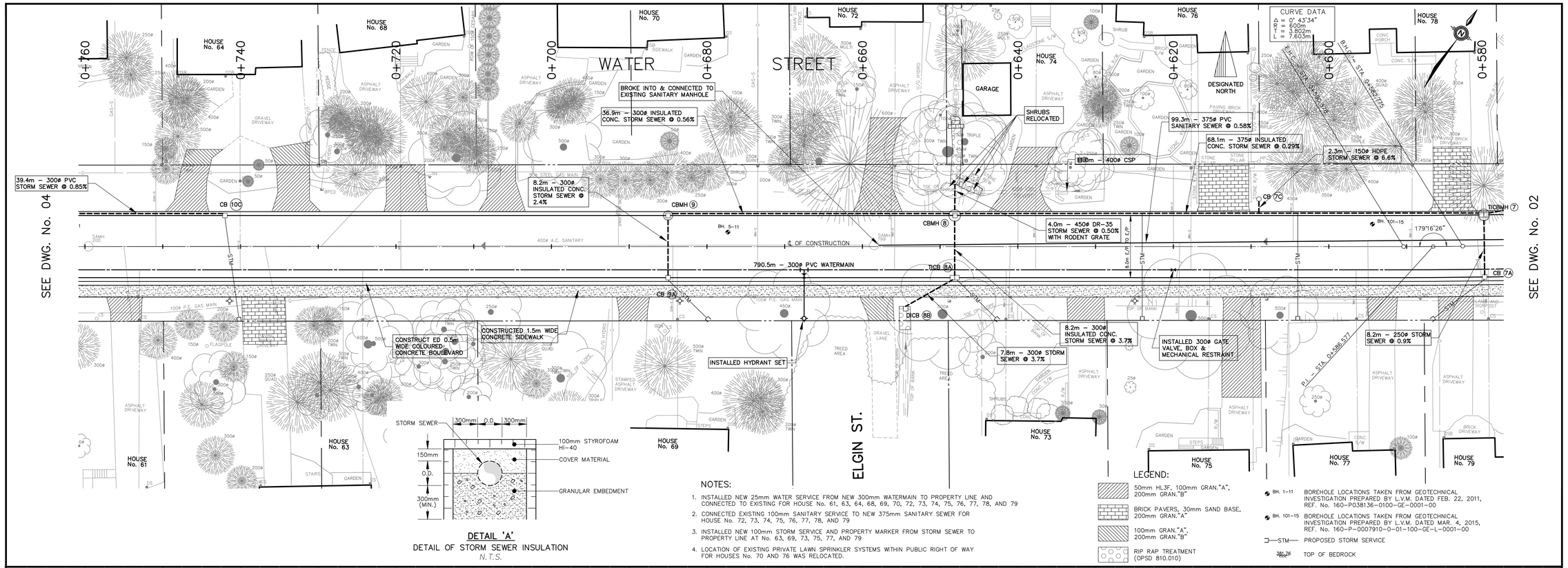
PLAN AND PROFILE
STA. 0+420 TO STA. 0+580

CONTRACT No	T–11–15
PROJECT No	M6137
DRAWN BY:	A.S.B. (AutoCAD)
CHECKED BY:	P.F.Z.
APPROVED BY:	D.G.D.
DATE:	AUGUST, 2014

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

SCALES
1:250 HORIZONTAL
1:50 VERTICAL

DRAWING NUMBER **02**



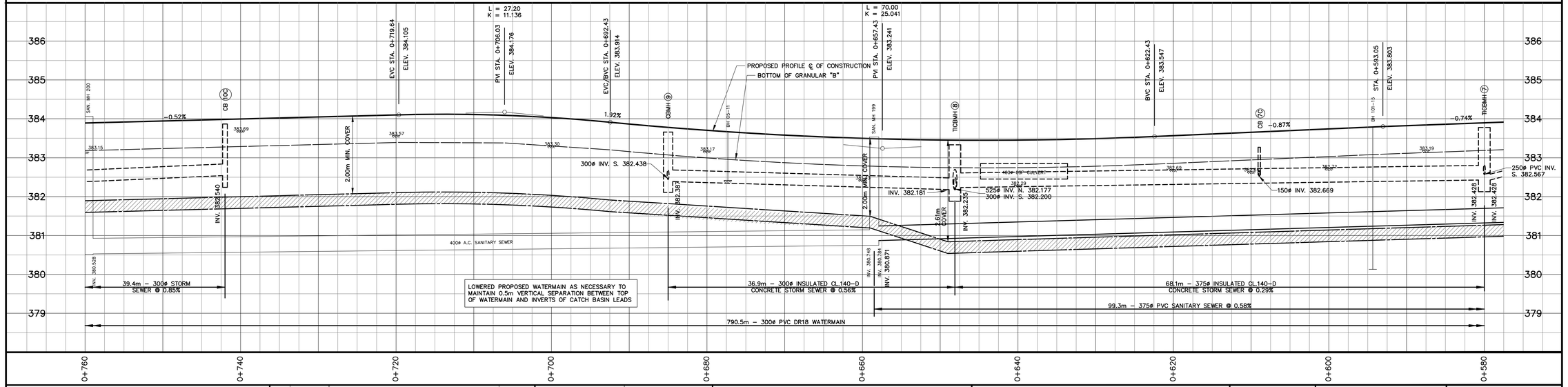
DETAIL 'A'
DETAIL OF STORM SEWER INSULATION
N.T.S.

NOTES:

1. INSTALLED NEW 25mm WATER SERVICE FROM NEW 300mm WATERMAIN TO PROPERTY LINE AND CONNECTED TO EXISTING FOR HOUSE No. 61, 63, 64, 68, 69, 70, 72, 73, 74, 75, 76, 77, 78, AND 79
2. CONNECTED EXISTING 100mm SANITARY SERVICE TO NEW 375mm SANITARY SEWER FOR HOUSE No. 72, 73, 74, 75, 76, 77, 78, AND 79
3. INSTALLED NEW 100mm STORM SERVICE AND PROPERTY MARKER FROM STORM SEWER TO PROPERTY LINE AT No. 63, 69, 73, 75, 77, AND 79
4. LOCATION OF EXISTING PRIVATE LAWN SPRINKLER SYSTEMS WITHIN PUBLIC RIGHT OF WAY FOR HOUSES No. 70 AND 76 WAS RELOCATED.

LEGEND:

- 50mm HL3F, 100mm GRAN."A", 200mm GRAN."B"
- BRICK PAVERS, 30mm SAND BASE, 200mm GRAN."A"
- 100mm GRAN."A", 200mm GRAN."B"
- RIP RAP TREATMENT (OPSD 810.010)
- BH. 1-11 BOREHOLE LOCATIONS TAKEN FROM GEOTECHNICAL INVESTIGATION PREPARED BY L.V.M. DATED FEB. 22, 2011, REF. No. 160-P03813G-0100-GE-0001-00
- BH. 101-15 BOREHOLE LOCATIONS TAKEN FROM GEOTECHNICAL INVESTIGATION PREPARED BY L.V.M. DATED MAR. 4, 2015, REF. No. 160-P-0007910-0-01-100-GE-L-0001-00
- STM PROPOSED STORM SERVICE
- 381.26 TOP OF BEDROCK



NOTES

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No	DATE	REVISION	INITIAL
4.	FEB. 2017	RECORD INFORMATION	d.g.d.
3.	APR. 2015	ISSUED FOR TENDER	d.g.d.
2.	DEC. 2014	ISSUED FOR G.R.C.A. APPROVAL	d.g.d.
1.	DEC. 2014	ISSUED FOR M.O.E. APPROVAL	d.g.d.

RECONSTRUCTION OF

WATER STREET

(ELORA)

TOWNSHIP OF CENTRE WELLINGTON
1 MACDONALD SQUARE
ELORA, ONTARIO N0B 1S0

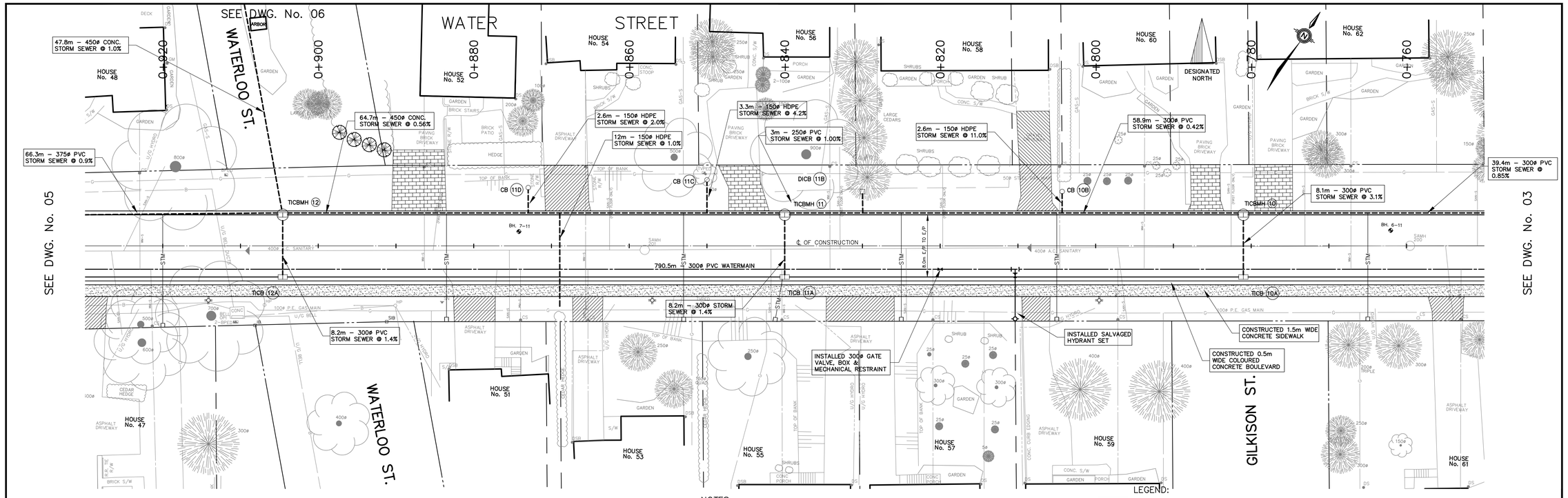
PLAN AND PROFILE
STA. 0+580 TO STA. 0+760

CONTRACT No	T-11-15
PROJECT No	M6137
DRAWN BY:	A.S.B. (AutoCAD)
CHECKED BY:	P.F.Z.
APPROVED BY:	D.G.D.
DATE:	AUGUST, 2014

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

SCALES
1:250 HORIZONTAL
1:50 VERTICAL

DRAWING NUMBER **03**

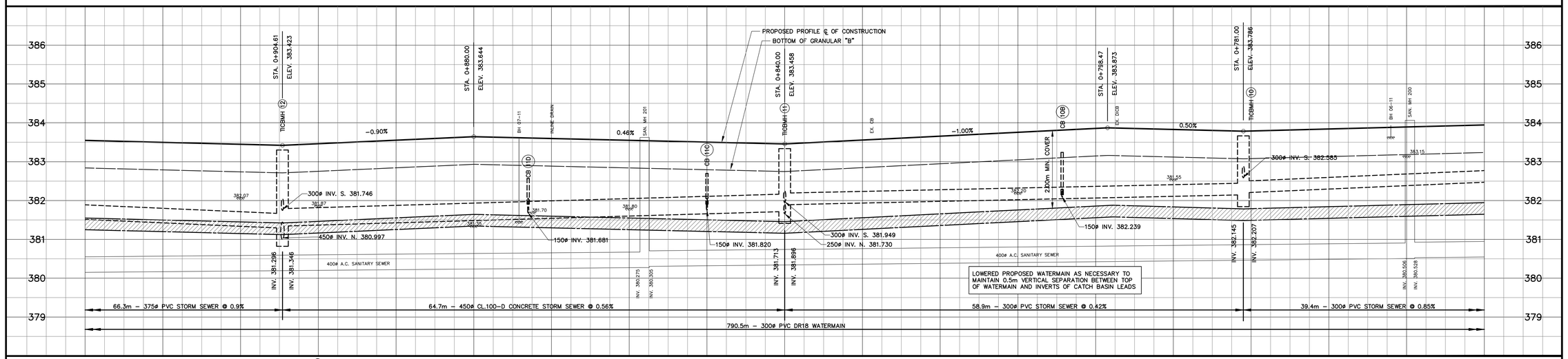


NOTES:

1. INSTALLED NEW 25mm WATER SERVICE FROM NEW 300mm WATERMAIN TO PROPERTY LINE AND CONNECTED TO EXISTING FOR HOUSE No. 47, 48, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, AND 62
2. INSTALLED NEW 100mm STORM SERVICE AND PROPERTY MARKER FROM STORM SEWER TO PROPERTY LINE AT No. 47, 51, 53, 55, 57, 59, AND 61

LEGEND:

- 50mm HL3F, 100mm GRAN."A", 200mm GRAN."B"
- BRICK PAVERS, 30mm SAND BASE, 200mm GRAN."A"
- 100mm GRAN."A", 200mm GRAN."B"
- BH. 1–11 BOREHOLE LOCATIONS TAKEN FROM GEOTECHNICAL INVESTIGATION PREPARED BY L.V.M. DATED FEB. 22, 2011, REF. No. 160–P038136–0100–GE–0001–00
- STM PROPOSED STORM SERVICE
- 381.76 / 00.0 TOP OF BEDROCK
- EASTERN WHITE CEDAR (250mm–WB)



NOTES

THE LOCATION OF UTILITIES IS APPROXIMATE ONLY AND SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED. THE CONTRACTOR SHALL PROVE THE LOCATION OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION AGAINST DAMAGE.

No	DATE	REVISION	INITIAL
4.	FEB. 2017	RECORD INFORMATION	d.g.d.
3.	APR. 2015	ISSUED FOR TENDER	d.g.d.
2.	DEC. 2014	ISSUED FOR G.R.C.A. APPROVAL	d.g.d.
1.	DEC. 2014	ISSUED FOR M.O.E. APPROVAL	d.g.d.

RECONSTRUCTION OF

WATER STREET

(ELORA)

TOWNSHIP OF CENTRE WELLINGTON
1 MACDONALD SQUARE
ELORA, ONTARIO N0B 1S0

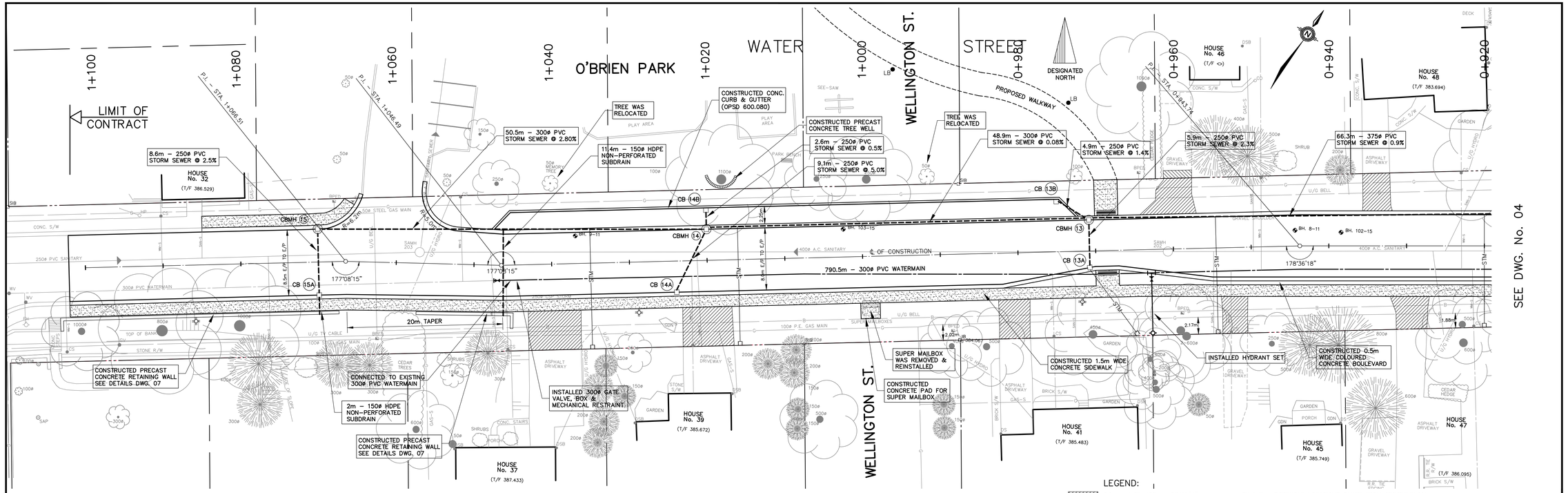
PLAN AND PROFILE
STA. 0+760 TO STA. 0+920

CONTRACT No	T–11–15
PROJECT No	M6137
DRAWN BY:	A.S.B. (AutoCAD)
CHECKED BY:	P.F.Z.
APPROVED BY:	D.G.D.
DATE:	AUGUST, 2014

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

SCALES
1:250 HORIZONTAL
1:50 VERTICAL

DRAWING NUMBER **04**

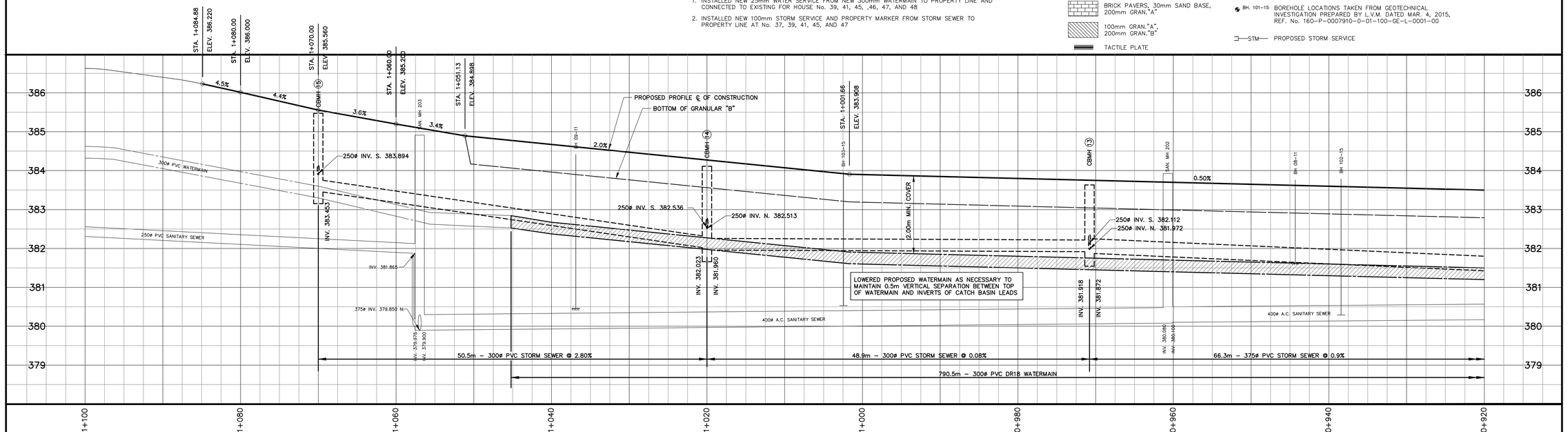


NOTES:

1. INSTALLED NEW 25mm WATER SERVICE FROM NEW 300mm WATERMAIN TO PROPERTY LINE AND CONNECTED TO EXISTING FOR HOUSE No. 39, 41, 45, ,46, 47, AND 48
2. INSTALLED NEW 100mm STORM SERVICE AND PROPERTY MARKER FROM STORM SEWER TO PROPERTY LINE AT No. 37, 39, 41, 45, AND 47

LEGEND:

- 50mm HL3F, 100mm GRAN."A", 200mm GRAN."B"
- BRICK PAVERS, 30mm SAND BASE, 200mm GRAN."A"
- 100mm GRAN."A", 200mm GRAN."B"
- TACTILE PLATE
- BH. 1–11 BOREHOLE LOCATIONS TAKEN FROM GEOTECHNICAL INVESTIGATION PREPARED BY L.V.M. DATED FEB. 22, 2011, REF. No. 160–P038136–0100–GE–0001–00
- BH. 101–15 BOREHOLE LOCATIONS TAKEN FROM GEOTECHNICAL INVESTIGATION PREPARED BY L.V.M. DATED MAR. 4, 2015, REF. No. 160–P–0007910–0–01–100–GE–L–0001–00
- STM PROPOSED STORM SERVICE



NOTES

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No	DATE	REVISION	INITIAL
4.	FEB. 2017	RECORD INFORMATION	d.g.d.
3.	APR. 2015	ISSUED FOR TENDER	d.g.d.
2.	DEC. 2014	ISSUED FOR GRCA APPROVAL	d.g.d.
1.	DEC. 2014	ISSUED FOR M.O.E. APPROVAL	d.g.d.

RECONSTRUCTION OF

WATER STREET

(ELORA)

TOWNSHIP OF CENTRE WELLINGTON
1 MACDONALD SQUARE
ELORA, ONTARIO N0B 1S0

PLAN AND PROFILE

STA. 0+920 TO CLYDE STREET

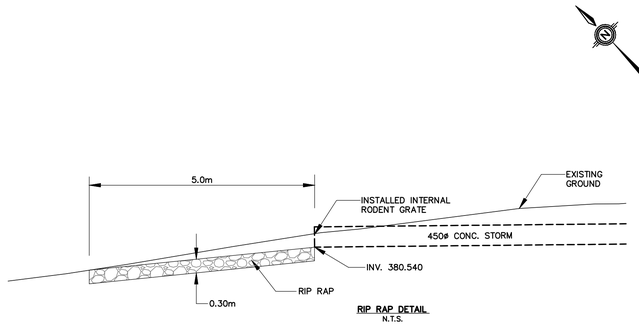
CONTRACT No	T–11–15
PROJECT No	M6137
DRAWN BY:	A.S.B. (AutoCAD)
CHECKED BY:	P.F.Z.
APPROVED BY:	D.G.D.
DATE:	AUGUST, 2014

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

SCALES

1:250 HORIZONTAL — 1:50 VERTICAL

DRAWING NUMBER **05**



RIP RAP DETAIL
N.T.S.

SEE DWG. No. 04

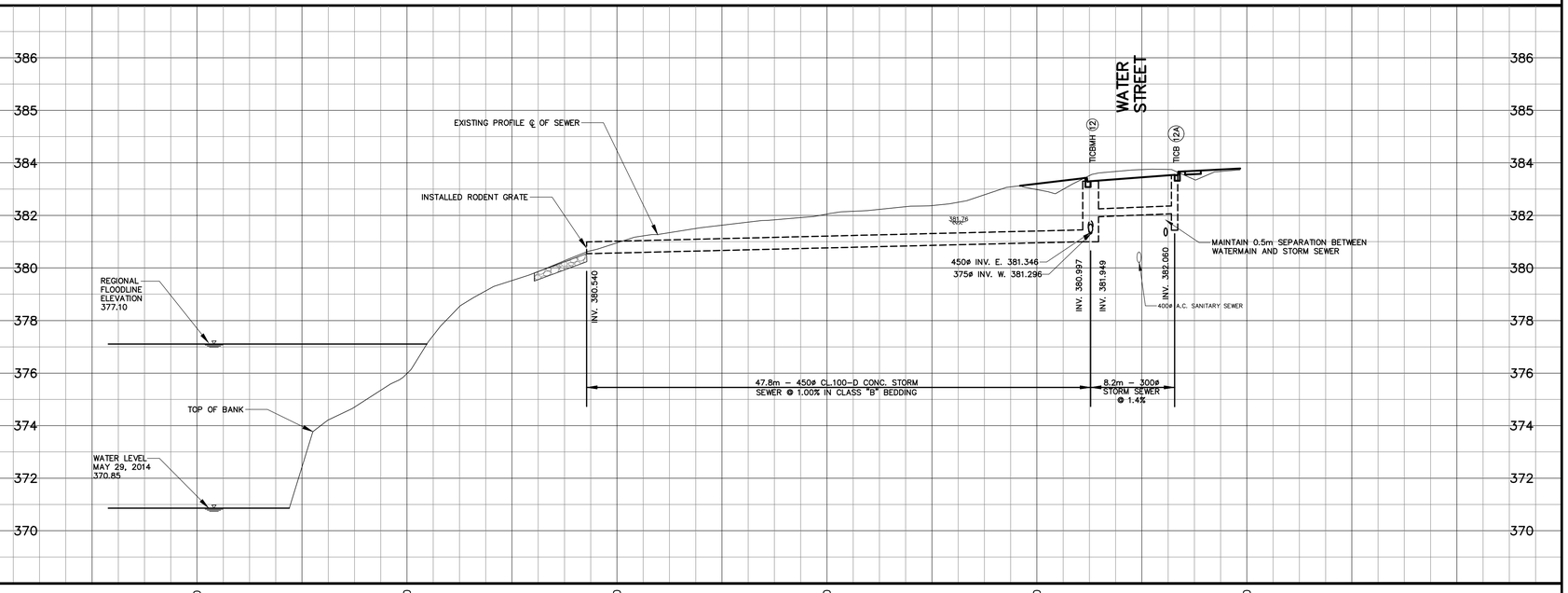


LEGEND:

- CLEAR & GRUB
- EASTERN WHITE CEDAR (250mm–WB)
- GRCA FLOODLINE
- 50mm HL3F, 100mm GRAN."A", 200mm GRAN."B"
- BRICK PAVERS, 30mm SAND BASE, 200mm GRAN."A"
- 100mm GRAN."A", 200mm GRAN."B"
- 381.76 TOP OF BEDROCK

SEE DWG. No. 04

B.M. 14–6137–11 Elev. 376.347
NAIL AND WASHERS IN BELL POLE ON EAST SIDE OF WATERLOO STREET R.O.W. 68m NORTH OF CENTER OF WATER STREET



NOTES

THE LOCATION OF UTILITIES IS APPROXIMATE ONLY AND SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED. THE CONTRACTOR SHALL PROVE THE LOCATION OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION AGAINST DAMAGE.

No	DATE	REVISION	INITIAL
4.	FEB. 2017	RECORD INFORMATION	d.g.d.
3.	APR. 2015	ISSUED FOR TENDER	d.g.d.
2.	DEC. 2014	ISSUED FOR G.R.C.A. APPROVAL	d.g.d.
1.	DEC. 2014	ISSUED FOR M.O.E. APPROVAL	d.g.d.

RECONSTRUCTION OF
WATER STREET
(ELORA)

TOWNSHIP OF CENTRE WELLINGTON
1 MACDONALD SQUARE
ELORA, ONTARIO N0B 1S0

PLAN AND PROFILE
WATERLOO STREET STORM OUTLET

CONTRACT No **T–11–15**
PROJECT No **M6137**
DRAWN BY: A.S.B. (AutoCAD)
CHECKED BY: P.F.Z.
APPROVED BY: D.G.D.
DATE: AUGUST, 2014

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

SCALES
1:250 HORIZONTAL
1:100 VERTICAL

DRAWING NUMBER **06**

CARLTON PLACE

METCALFE STREET/WR 21

CLYDE STREET

WATER STREET

O'BRIEN PARK

BLDG. No. 22

BLDG. No. 23 (DRILL SHED/L.C.B.O.)

HOUSE No. 32

GARAGE

CLYDE STREET PUMPING STATION

SCREENED PORCH

INSTALLED HYDRANT SET

14.0m – 150ø HDPE STORM SEWER AND CONNECT TO CATCHBASIN A3 INV. ELEV. – 378.600

RELOCATED CATCHBASIN T/G ELEV – 379.90

INV. CSP 378.279 ICSP ø600

OBV. CSP 384.592 ø800

5.5m – 150ø HDPE STORM SEWER AND CONNECTED TO RELOCATED CATCHBASIN

INSTALLED NEW HANDRAIL

BROKE INTO & CONNECTED TO EXIST. CB – ELEV. – 377.861

6.6m – 250ø STORM SEWER @ 12.42%

24.2m – 150ø HDPE STORM SEWER AND CONNECTED TO EX. DOWNSPOUT

CONNECTED EXIST. DOWNSPOUT TO EX. STORM SEWER

10.0m – 150ø HDPE STORM SEWER AND CONNECTED TO EX. DOWNSPOUT

5.0m – 150ø HDPE STORM SEWER AND CONNECTED TO EX. DOWNSPOUT

26.0m – 250ø STORM SEWER @ 3.0%

NEW PAVEMENT

10.0m – 250ø STORM SEWER @ 1.0%

18.0m – 250ø STORM SEWER @ 7.0%

CONCRETE BUMPERS

200mmø STORM SERVICE

20mmø WATER SERVICE

CONSTRUCTED 1.5m WIDE CONC. SIDEWALK

40.0m TAPER (MATCH TO EXISTING)

BH 1 380.636

BH 2 380.601

BH 3 383.408

BH 4 376.797

BH 5 380.312

BH 6 385.943

BH 14 386.623

P.I. – STA. 2+132.028 METCALFE STREET
P.I. – STA. 1+141.466 WATER STREET

BC STA. 2+139.685

CBMH A1

CB A1A

CB A1B

CB A2

CB A3

CBMH 9

CBMH 10

CBMH 11

TCBMH 12

TICBMH

SECTION A–A
N.T.S.

RETAINING WALL
RETAINING WALL
NEW BARRIER CURB (OPSD 600.110)
RELOCATED CATCHBASIN TOP GRATE – ELEV. 379.78
BLDG. No. 23 (DRILL SHED/L.C.B.O.)
380.00
379.00
378.00
1.5m
125mm CONC. SIDEWALK
100mm GRANULAR "A"
150ø HDPE STORM SEWER INV. ELEV. – 378.70
450mm IMPORTED TOPSOIL
APPROVED GRANULAR BACKFILL COMPACTED TO 95% S.P.D.
FILTER FABRIC
ARMOUR STONE RETAINING WALL (600mm x 600mm x 1200mm TYPL.)
ROAD BASE AS PER TYPICALS (SEE DWG. No. 09)
125mm CONC. SIDEWALK
100mm GRANULAR "A"
150mm GRANULAR "A" COMPACTED TO 98% S.P.D.
100mmø PERFORATED CORRUGATED H.D.P.E. GEOTEXTILE WRAPPED SUBDRAIN (TYPL.)

STORM STRUCTURE DATA

No.	OUTLET	INLET	TOP GRATE/COVER	REMARKS
CB A1A	379.73	–	381.18	OPSD 705.010
CB A1B	378.42	–	380.07	OPSD 705.010
CBMH A1	378.32	FROM A1A – 378.51 FROM A1B – 378.32	379.96	OPSD 701.010
CB A2	377.28	377.55	378.75	OPSD 705.010
CB A3	378.55	FROM NORTH – 378.60	380.00	OPSD 705.010

LEGEND:

- CLEAR AND GRUB
- BH.1 BOREHOLE LOCATIONS TAKEN FROM GEOTECHNICAL INVESTIGATION PREPARED BY NAYLOR ENGINEERING ASSOC. LTD., DATED JAN 28, 2009, JOB No. 7980G1.R01
- 8909 APPROX. TOP OF BEDROCK. ACTUAL ELEVATION TO BE VERIFIED AT TIME OF CONSTRUCTION
- 379.85 T / 379.73 B PROPOSED ELEVATION (T – TOP OF CURB, B – BOTTOM OF CURB)
- NEW STREET LIGHT POLE
- 50mm HL3C ASPHALT, 150mm GRAN. "A", 150mm GRAN. "B"
- GRCA REGIONAL FLOODLINE

NOTES:

1. CLYDE STREET AND L.C.B.O. PARKING LOT PAVEMENT STRUCTURE
   - 40mm HL3 ASPHALT
   - 50mm HL4 ASPHALT
   - 150mm GRANULAR "A"
   - 450mm GRANULAR "B"
2. FOR MASONRY RESTORATION AND FOUNDATION DRAIN DETAILS/PLANS REFER TO CONTRACT DOCUMENTS (SECTION C AND SECTION G)

NOTES

THE LOCATION OF UTILITIES IS APPROXIMATE ONLY AND SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED. THE CONTRACTOR SHALL PROVE THE LOCATION OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION AGAINST DAMAGE.

No	DATE	REVISION	INITIAL
4.	MAY 10	RECORD INFORMATION	d.g.d.
3.	NOV. 09	REVISED GRADING	d.g.d.
2.	SEP. 09	ISSUED FOR CONSTRUCTION (REVISED LCBO ENTRANCE)	d.g.d.
1.	JUL. 09	ISSUED FOR TENDER	d.g.d.

RECONSTRUCTION OF
CLYDE STREET
AND
MUNICIPAL PARKING LOT
(ELORA)

TOWNSHIP OF CENTRE WELLINGTON
1 MacDONALD SQUARE
ELORA, ONTARIO N0B 1S0

PLAN

CONTRACT No T–06–09
PROJECT No M6061
DRAWN BY: w.a.j.h. (AutoCAD)
CHECKED BY: D.G.D.
APPROVED BY: D.A.H.
DATE: JANUARY, 2009

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

SCALES
1:250 HORIZONTAL
N/A VERTICAL

DRAWING NUMBER 08

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix B

Existing Condition Sanitary Sewer Calculations

SANITARY SEWER DESIGN

Existing Conditions - 127 First Line and 159 First Line

Township of Centre Wellington (Elora)

q = average daily per capita flow (350 L/cap/d

i = unit of peak extraneous flow (0.15 L/ha/s)

A = Tributary area in gross hectares

F = Peaking factor

Qp = peak population flow (L/s)

Qi = peak extraneous flow (L/s)

Qd = peak design flow (m^3/s)

Persons per Unit (PPU) as per Schedule 3 from the Township of Centre Wellington Development Charges Background Study - Consolidated Report (Watson & Associates Economists Ltd. dated March 24, 2026)

Unit Type	People Per Unit (PPU)
Low Density - Singles	3.278
Low Density - Semis	3.278
Low Density - Towns	2.351
Apartments	1.837

$F = 1 + \frac{14}{4 + (P)^{1/2}}$ where P is population in 1000's

$Q(p) = \frac{PqM}{86.4}$ (L/s)

$Qi = iA$

$Qd = Qp + Qi + Qc + Qin$ (m^3/s)

					Residential								Commercial (28 m^3/ha/d)			Industrial (0.50 L/s/ha)				Proposed Sewer						
Location																									
Street	Upstream MH	Downstream MH		# of Units	Indiv. Pop'n	Cumul. Pop'n	Area (ha)	Cumul. Area	Calculated Peaking Factor (F)	Actual Peaking Factor (F)	Pop. Flow Qp (L/s)	Res. Infilt. Flow Qi (L/s)	Comm. Area (ha)	Cumul. Area	Comm. Flow Qc (L/s)	Inst. Area (ha)	Cumul. Area	Inst. Flow Qin (L/s)	Peak Design Flow Q (m^3/s)	Length (m)	Pipe Size (mm)	Type of Pipe	Grade %	Capacity (m^3/s)	Full Flow Velocity (m/s)	Actual velocity at Q(d)
First Line	MH.AA	MH.Z	Low Density - Singles	5	16	16	0.57	0.57	4.391	4.0	0.29	0.09	0.00	0.00	0.00	0.00	0.00	0.00	**0.000**	49.9	200	0.013	1.15	0.035	1.120	0.258
First Line	MH.Z	MH.Y	Low Density - Singles	6	18	34	0.75	1.32	4.346	4.0	0.60	0.20	0.00	0.00	0.00	0.00	0.00	0.00	**0.001**	99.6	200	0.013	0.47	0.022	0.716	0.351
Spencer Drive	MH.Y	MH.X	Low Density - Singles	3	9	43	0.40	1.72	4.328	4.0	0.75	0.26	0.00	0.00	0.00	0.00	0.00	0.00	**0.001**	60.0	200	0.013	0.43	0.022	0.685	0.390
Spencer Drive	MH.X	MH.W	Low Density - Singles	6	18	60	0.53	2.25	4.298	4.0	1.05	0.34	0.00	0.00	0.00	0.00	0.00	0.00	**0.001**	100.6	200	0.013	0.48	0.023	0.723	0.420
Spencer Drive	MH.W	MH.F	Low Density - Singles	7	20	81	0.60	2.85	4.268	4.0	1.39	0.43	0.00	0.00	0.00	0.00	0.00	0.00	**0.002**	100.5	250	0.013	0.48	0.041	0.839	0.411
Stafford Street	MH	MH.F	Low Density - Singles	170	497	497	12.38	12.38	3.976	3.976	8.00	1.86	0.00	0.00	0.00	0.00	0.00	0.00	**0.010**	88.8	200	0.013	0.50	0.023	0.738	0.701
Spencer Drive	MH	MH.F	Low Density - Singles	36	105	105	2.57	2.57	4.238	4.0	1.81	0.39	0.00	0.00	0.00	0.00	0.00	0.00	**0.002**	99.5	200	0.013	1.85	0.045	1.420	0.809
Stafford Street	MH.F	MH.E	Low Density - Singles	0	0	682	0.10	17.90	3.901	3.901	10.78	2.69	0.00	0.00	0.00	0.00	0.00	0.00	**0.013**	56.5	300	0.013	0.37	0.059	0.832	0.666
Stafford Street	SAN S	MH.E	Low Density - Singles	1	3	3	3.01	3.01	4.453	4.0	0.05	0.45	0.00	0.00	0.00	0.00	0.00	0.00	**0.001**	13.6	150	0.013	2.21	0.023	1.280	0.000
Stafford Street	MH.E	SPS	Low Density - Singles	0	0	685	0.00	20.91	3.900	3.900	10.83	3.14	0.00	0.00	0.00	0.00	0.00	0.00	**0.014**	19.6	300	0.013	0.50	0.068	0.967	0.755
Stafford Street (Forcemain)	SPS	MH.D	Low Density - Singles	0	0	685	0.00	20.91	3.900	3.900	10.83	3.14	0.00	0.00	0.00	0.00	0.00	0.00	**0.014**			0.013		0.000	#DIV/0!	#DIV/0!
Bridge Street	MH.D	MH.C/MH.253	Low Density - Singles	0	0	685	0.00	20.91	3.900	3.900	10.83	3.14	0.00	0.00	0.00	0.00	0.00	0.00	**0.014**	65.0	300	0.013	1.00	0.097	1.368	0.958
Bridge Street	MH.C/MH.253	MH.252	Low Density - Singles	0	0	685	0.00	20.91	3.900	3.900	10.83	3.14	0.00	0.00	0.00	0.00	0.00	0.00	**0.014**	64.0	300	0.013	1.50	0.118	1.675	1.139
Bridge Street	MH.252	MH.251	Low Density - Singles	0	0	685	0.00	20.91	3.900	3.900	10.83	3.14	0.00	0.00	0.00	0.00	0.00	0.00	**0.014**	94.0	300	0.013	0.48	0.067	0.948	0.749
Bridge Street	MH.251	MH.245/MH.3A	Low Density - Singles	8	23	709	0.87	21.78	3.891	3.891	11.17	3.27	0.00	0.00	0.00	0.00	0.00	0.00	**0.014**	100.0	300	0.013	0.66	0.079	1.111	0.856
Bridge Street	SAN S	MH.245/MH.3A	Low Density - Singles	0	0	0	0.00	0.00	0.000	0.000	0.00	0.00	0.00	0.00	0.00	30.60	30.60	15.30	**0.015**	13.5	200	0.013	0.50	0.023	0.738	0.790
Bridge Street	MH.245/MH.3A	MH.2A	Low Density - Singles	4	12	720	0.60	22.38	3.887	3.887	11.34	3.36	0.00	0.00	0.00	0.00	30.60	15.30	**0.030**	100.2	300	0.013	0.47	0.066	0.938	0.910
Murray Drive	MH	MH.2A	Low Density - Singles	53	155	155	5.48	5.48	4.187	4.0	2.63	0.82	0.00	0.00	0.00	0.00	0.00	0.00	**0.003**	37.0	200	0.013	0.50	0.023	0.738	0.532
Bridge Street	MH.2A	MH.1A	Low Density - Singles	6	18	893	1.04	28.90	3.831	3.831	13.85	4.34	0.00	0.00	0.00	0.00	30.60	15.30	**0.033**	92.1	300	0.013	0.43	0.063	0.897	0.915
Bridge Street	MH.1A	MH.192	Low Density - Singles	5	15	907	1.00	29.90	3.827	3.827	14.07	4.49	0.00	0.00	0.00	0.00	30.60	15.30	**0.034**	93.7	300	0.013	0.45	0.065	0.918	0.927
Bridge Street	MH.192	MH.193	Low Density - Singles	5	15	922	0.83	30.73	3.822	3.822	14.28	4.61	0.00	0.00	0.00	0.00	30.60	15.30	**0.034**	113.5	300	0.013	0.48	0.067	0.948	0.957
McNab Street	MH	MH193	Low Density - Singles	11	32	32	1.62	1.62	4.350	4.0	0.57	0.24	0.00	0.00	0.00	0.00	0.00	0.00	**0.001**	156.0	200	0.013	0.50	0.023	0.738	0.295

Bridge Street	MH.193	MH.194	Low Density - Singles	0	0	954	0.17	32.52	3.813	3.813	14.74	4.88	0.00	0.00	0.00	0.00	30.60	15.30	**0.035**	65.3	200	0.013	8.30	0.094	3.008	2.767
Bridge Street	MH.194	MH.195	Low Density - Singles	0	0	954	0.18	32.70	3.813	3.813	14.74	4.91	0.00	0.00	0.00	0.00	30.60	15.30	**0.035**	61.0	200	0.013	8.61	0.096	3.063	2.787
Bridge Street	MH	MH.195	Low Density - Singles	7	20	20	0.90	0.90	4.379	4.0	0.36	0.14	0.00	0.00	0.00	0.00	0.00	0.00	**0.000**	68.0	200	0.013	0.50	0.023	0.738	0.244
Water Street	MH	MH.195	Low Density - Singles	283	827	827	37.55	37.55	3.852	3.852	12.90	5.63	0.00	0.00	0.00	0.00	0.00	0.00	**0.019**	103.0	300	0.013	0.50	0.068	0.967	0.832
Water Street	MH.195	MH.196	Low Density - Singles	7	20	1822	1.07	72.22	3.617	3.617	26.69	10.83	0.00	0.00	0.00	0.00	30.60	15.30	**0.053**	107.7	375	0.013	0.60	0.136	1.230	1.156
Water Street	MH.196	MH.197	Low Density - Singles	5	15	1836	0.83	73.05	3.614	3.614	26.88	10.96	0.00	0.00	0.00	0.00	30.60	15.30	**0.053**	81.5	375	0.013	0.56	0.131	1.188	1.129
Water Street	MH.197	MH.198	Low Density - Singles	7	20	1857	1.16	74.21	3.611	3.611	27.16	11.13	0.00	0.00	0.00	0.00	30.60	15.30	**0.054**	93.8	375	0.013	0.50	0.124	1.123	1.078
Water Street	MH.198	MH.199	Low Density - Singles	8	23	1880	1.07	75.28	3.607	3.607	27.47	11.29	0.00	0.00	0.00	0.00	30.60	15.30	**0.054**	99.3	375	0.013	0.58	0.134	1.209	1.136
Water Street	MH.199	MH.200	Low Density - Singles	7	20	1900	1.46	76.74	3.603	3.603	27.74	11.51	0.00	0.00	0.00	0.00	30.60	15.30	**0.055**	91.0	400	0.013	0.24	0.102	0.815	0.831
Water Street	MH.200	MH.201	Low Density - Singles	6	18	1918	0.77	77.51	3.600	3.600	27.97	11.63	0.00	0.00	0.00	0.00	30.60	15.30	**0.055**	100.5	400	0.013	0.20	0.093	0.741	0.771
Water Street	MH.201	MH.202	Low Density - Singles	8	23	1941	1.27	78.78	3.596	3.596	28.28	11.82	0.00	0.00	0.00	0.00	30.60	15.30	**0.055**	102.8	400	0.013	0.17	0.086	0.684	0.725
Water Street	MH.202	MH.203	Low Density - Singles	3	9	1950	0.53	79.31	3.594	3.594	28.39	11.90	0.00	0.00	0.00	0.00	30.60	15.30	**0.056**	107.5	400	0.013	0.17	0.085	0.678	0.726
McNab Street	MH	MH.187	Low Density - Singles	3	9	9	0.35	0.35	4.420	4.0	0.16	0.05	0.00	0.00	0.00	0.00	0.00	0.00	**0.000**	42.5	200	0.013	0.50	0.023	0.738	0.170
McNab Street	MH	MH.187	Low Density - Singles	8	23	23	1.18	1.18	4.371	4.0	0.41	0.18	0.00	0.00	0.00	0.00	0.00	0.00	**0.001**	126.5	200	0.013	0.50	0.023	0.738	0.295
High Street	MH	MH.187	Low Density - Singles	323	943	943	30.29	30.29	3.816	3.816	14.59	4.54	0.00	0.00	0.00	0.00	0.00	0.00	**0.019**	102.5	200	0.013	0.50	0.023	0.738	0.823
High Street	MH.187	MH.188	Low Density - Singles	2	6	981	0.48	32.30	3.805	3.805	15.13	4.85	0.00	0.00	0.00	0.00	0.00	0.00	**0.020**	54.0	250	0.013	0.95	0.058	1.183	1.065
High Street	MH.188	MH.189	Low Density - Singles	1	3	984	0.13	32.43	3.804	3.804	15.17	4.86	0.00	0.00	0.00	0.00	0.00	0.00	**0.020**	49.8	250	0.013	4.42	0.125	2.548	1.860
Water Street	MH.189	MH.203	Low Density - Singles	0	0	984	0.00	32.43	3.804	3.804	15.17	4.86	0.00	0.00	0.00	0.00	0.00	0.00	**0.020**	56.5	250	0.013	1.12	0.063	1.284	1.143
Clyde Street	MH.203	MH.204	Low Density - Singles	0	0	2934	0.00	111.74	3.451	3.451	41.02	16.76	0.00	0.00	0.00	0.00	30.60	15.30	**0.073**	72.5	375	0.013	0.50	0.124	1.123	1.167
Carleton Place	MH.199	MH.200	Low Density - Singles	8	23	23	0.80	0.80	4.371	4.0	0.41	0.12	0.00	0.00	0.00	0.00	0.00	0.00	**0.001**	89.2	250	0.013	1.13	0.063	1.288	0.296
Carleton Place	MH.200	MH.201	Low Density - Singles	2	6	29	0.29	1.09	4.357	4.0	0.52	0.16	0.00	0.00	0.00	0.00	0.00	0.00	**0.001**	76.2	300	0.013	0.66	0.079	1.111	0.256
Victoria Street	MH	MH.201	Low Density - Singles	27	79	79	5.35	5.35	4.270	4.0	1.36	0.80	3.28	3.28	1.06	1.43	1.43	0.72	**0.004**	35.6	200	0.013	0.35	0.019	0.618	0.482
Carleton Place	MH.201	MH.173/MH.202	Low Density - Singles	3	9	117	0.52	6.96	4.224	4.0	2.00	1.04	0.00	3.28	1.06	0.00	1.43	0.72	**0.005**	63.4	400	0.013	0.53	0.152	1.207	0.483
Carleton Place	MH.173/MH.202	MH.174	Low Density - Singles	1	0	117	0.00	6.96	4.224	4.0	2.00	1.04	0.00	3.28	1.06	0.32	1.75	0.88	**0.005**	41.2	400	0.013	0.50	0.147	1.172	0.469
Clyde Street	MH.149A	MH.174	Low Density - Singles	1426	4165	4165	211.57	211.57	3.318	3.318	55.98	31.74	2.00	2.00	0.65	2.00	2.00	1.00	**0.089**	28.5	450	0.013	0.50	0.202	1.268	1.230
Clyde Street	MH.174	MH.204	Low Density - Singles	0	0	4282	0.00	218.53	3.307	3.307	57.36	32.78	0.00	5.28	1.71	0.00	3.75	1.88	**0.094**	40.6	525	0.013	0.50	0.304	1.405	1.250
Clyde Street	MH.204	SPS	Low Density - Singles	0	0	7217	0.00	330.27	3.094	3.094	90.44	49.54	0.00	5.28	1.71	0.00	34.35	17.18	**0.159**	2.5	525	0.013	1.20	0.471	2.176	1.959
Carleton Place	SPS	WWTP																								

Minimum diameter = 200 mm
Minimum acceptable velocity = 0.6 m/s
Maximum acceptable velocity = 3.0 m/s
Roughness Coefficient for PVC pipe = 0.013

Date:	August 2026
Designed By:	AEK
Checked By:	AEK

Project:	Existing Conditions - 127 First Line and 159 First Line
File:	300060179.0000

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix C

Proposed Condition Sanitary Sewer Calculations

q = average daily per capita flow (350 L/cap/d

i = unit of peak extraneous flow (0.15 L/ha/s)

A = Tributary area in gross hectares

F = Peaking factor

Qp = peak population flow (L/s)

Qi = peak extraneous flow (L/s)

Qd = peak design flow (m^3/s)

Persons per Unit (PPU) as per Schedule 3 from the Township of Centre Wellington Development Charges Background Study - Consolidated Report (Watson & Associates Economists Ltd. dated March 24, 2026)

Unit Type	People Per Unit (PPU)
Low Density - Singles	3.278
Low Density - Semis	3.278
Low Density - Towns	2.351
Apartments	1.837

SANITARY SEWER DESIGN

Proposed Conditions - 127 First Line (Phase 1 ONLY) and 159 First Line (Phase 1 ONLY)

Township of Centre Wellington (Elora)

$F = 1 + \frac{14}{4 + (P)^{1/2}}$ where P is population in 1000's

$Q(p) = \frac{PqM}{86.4}$ (L/s)

$Qi = iA$

$Qd = Qp + Qi + Qc + Qin$ (m^3/s)

					Residential								Commercial (28 m^3/ha/d)			Industrial (0.50 L/s/ha)									
Location																				Proposed Sewer					
Street	Upstream MH	Downstream MH	Unit Type	# of Units	Indiv. Pop'n	Cumul. Pop'n	Area (ha)	Cumul. Area	Calculated Peaking Factor (F)	Actual Peaking Factor (F)	Pop. Flow Qp (L/s)	Res. Infilt. Flow Qi (L/s)	Comm. Area (ha)	Cumul. Area	Comm. Flow Qc (L/s)	Inst. Area (ha)	Cumul. Area	Inst. Flow Qin (L/s)	Peak Design Flow Q (m^3/s)	Length (m)	Pipe Size (mm)	Type of Pipe	Grade %	Capacity (m^3/s)	Full Flow Velocity (m/s)	Actual velocity at Q(d)
Block 1 159 First Line		**MH.AA**	**Low Density - Singles**	**37**	**121**	**121**	**1.42**	**1.42**	**4.220**	**4.0**	**1.97**	**0.21**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.002**	20.0	200	0.013	0.50	0.023	0.738	0.465
Block 2 159 First Line		**MH.AA**	**Low Density - Singles**	**7**	**23**	**144**	**0.26**	**1.68**	**4.197**	**4.0**	**2.34**	**0.25**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.003**	20.0	200	0.013	0.50	0.023	0.738	0.472
Block 3 159 First Line		**MH.AA**	**Low Density - Singles**	**9**	**30**	**174**	**0.29**	**1.97**	**4.170**	**4.0**	**2.82**	**0.30**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.003**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 4 159 First Line		**MH.AA**	**Low Density - Singles**	**9**	**30**	**203**	**0.33**	**2.30**	**4.145**	**4.0**	**3.29**	**0.35**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.004**	20.0	200	0.013	0.50	0.023	0.738	0.539
Block 5 159 First Line		**MH.AA**	**Low Density - Singles**	**20**	**66**	**269**	**0.80**	**3.10**	**4.098**	**4.0**	**4.36**	**0.47**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.005**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 6 159 First Line		**MH.AA**	**Low Density - Semis**	**8**	**26**	**295**	**0.29**	**3.39**	**4.082**	**4.0**	**4.78**	**0.51**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.005**	20.0	200	0.013	0.50	0.023	0.738	0.591
Block 7 159 First Line		**MH.AA**	**Low Density - Semis**	**9**	**30**	**325**	**0.32**	**3.71**	**4.064**	**4.0**	**5.26**	**0.56**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.006**	20.0	200	0.013	0.50	0.023	0.738	0.613
Block 8 159 First Line		**MH.AA**	**Low Density - Towns**	**10**	**24**	**348**	**0.34**	**4.05**	**4.050**	**4.0**	**5.64**	**0.61**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.006**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 9 159 First Line		**MH.AA**	**Low Density - Singles**	**22**	**72**	**420**	**0.78**	**4.83**	**4.012**	**4.0**	**6.81**	**0.72**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.008**	20.0	200	0.013	0.50	0.023	0.738	0.657
Block 10 159 First Line		**MH.AA**	**Low Density - Towns**	**16**	**38**	**458**	**0.56**	**5.39**	**3.994**	**3.994**	**7.41**	**0.81**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.008**	20.0	200	0.013	0.50	0.023	0.738	0.000
First Line	MH.AA	MH.Z	Low Density - Singles	5	16	474	0.57	5.96	3.986	3.986	7.66	0.89	0.00	0.00	0.00	0.00	0.00	0.00	0.009	49.9	200	0.013	1.15	0.035	1.120	0.929
First Line	MH.Z	MH.Y	Low Density - Singles	6	20	494	0.75	6.71	3.977	3.977	7.96	1.01	0.00	0.00	0.00	0.00	0.00	0.00	0.009	99.6	200	0.013	0.47	0.022	0.716	0.673
Block 1 127 First Line		**MH.Y**	**Low Density - Singles**	**3**	**10**	**10**	**0.35**	**0.35**	**4.415**	**4.0**	**0.16**	**0.05**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.0002**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 1 127 First Line		**MH.Y**	**Low Density - Towns**	**16**	**38**	**47**	**0.35**	**0.70**	**4.319**	**4.0**	**0.77**	**0.10**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.0009**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 4 127 First Line		**MH.Y**	**Low Density - Towns**	**11**	**26**	**73**	**0.48**	**1.18**	**4.278**	**4.0**	**1.19**	**0.18**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.0014**	20.0	200	0.013	0.50	0.023	0.738	0.428
Block 5 127 First Line		**MH.Y**	**Low Density - Towns**	**30**	**71**	**144**	**0.57**	**1.75**	**4.197**	**4.0**	**2.33**	**0.26**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.0026**	20.0	200	0.013	0.50	0.023	0.738	0.472
Block 6 127 First Line		**MH.Y**	**Low Density - Towns**	**48**	**113**	**257**	**0.88**	**2.63**	**4.107**	**4.0**	**4.16**	**0.39**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00455**	20.0	200	0.013	0.50	0.023	0.738	0.576
Spencer Drive	MH.Y	MH.X	Low Density - Singles	3	10	760	0.40	9.74	3.874	3.874	11.93	1.46	0.00	0.00	0.00	0.00	0.00	0.00	0.013	60.0	200	0.013	0.43	0.022	0.685	0.719
Spencer Drive	MH.X	MH.W	Low Density - Singles	6	20	780	0.53	10.27	3.867	3.867	12.22	1.54	0.00	0.00	0.00	0.00	0.00	0.00	0.014	100.6	200	0.013	0.48	0.023	0.723	0.759
Spencer Drive	MH.W	MH.F	Low Density - Singles	7	23	803	0.60	10.87	3.859	3.859	12.55	1.63	0.00	0.00	0.00	0.00	0.00	0.00	0.014	100.5	250	0.013	0.48	0.041	0.839	0.755
Stafford Street	MH	MH.F	Low Density - Singles	170	557	557	12.38	12.38	3.950	3.950	8.92	1.86	0.00	0.00	0.00	0.00	0.00	0.00	0.011	88.8	200	0.013	0.50	0.023	0.738	0.716
Spencer Drive	MH	MH.F	Low Density - Singles	36	118	118	2.57	2.57	4.223	4.0	1.91	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.002	99.5	200	0.013	1.85	0.045	1.420	0.809
Stafford Street	MH.F	MH.E	Low Density - Singles	0	0	1478	0.10	25.92	3.684	3.684	22.06	3.89	0.00	0.00	0.00	0.00	0.00	0.00	0.026	56.5	300	0.013	0.37	0.059	0.832	0.807
Stafford Street	SAN S	MH.E	Low Density - Singles	1	3	3	3.01	3.01	4.451	4.0	0.05	0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.001	13.6	150	0.013	2.21	0.023	1.280	0.000
Stafford Street	MH.E	SPS	Low Density - Singles	0	0	1482	0.00	28.93	3.683	3.683	22.11	4.34	0.00	0.00	0.00	0.00	0.00	0.00	0.026	19.6	300	0.013	0.50	0.068	0.967	0.909
Stafford Street (Forcemain)	SPS	MH.D	Low Density - Singles	0	0	1482	0.00	28.93	3.683	3.683	22.11	4.34	0.00	0.00	0.00	0.00	0.00	0.00	0.026			0.013		0.000	#DIV/0!	#DIV/0!
Bridge Street	MH.D	MH.C/MH.253	Low Density - Singles	0	0	1482	0.00	28.93	3.683	3.683	22.11	4.34	0.00	0.00	0.00	0.00	0.00	0.00	0.026	65.0	300	0.013	1.00	0.097	1.368	1.177
Bridge Street	MH.C/MH.253	MH.252	Low Density - Singles	0	0	1482	0.00	28.93	3.683	3.683	22.11	4.34	0.00	0.00	0.00	0.00	0.00	0.00	0.026	64.0	300	0.013	1.50	0.118	1.675	1.324
Bridge Street	MH.252	MH.251	Low Density - Singles	0	0	1482	0.00	28.93	3.683	3.683	22.11	4.34	0.00	0.00	0.00	0.00	0.00	0.00	0.026	94.0	300	0.013	0.48	0.067	0.948	0.891
Bridge Street	MH.251	MH.245/MH.3A	Low Density - Singles	8	26	1508	0.87	29.80	3.678	3.678	22.46	4.47	0.00	0.00	0.00	0.00	0.00	0.00	0.027	100.0	300	0.013	0.66	0.079	1.111	1.000

Bridge Street	SAN S	MH.245/MH.3A	Low Density - Singles	0	0	0	0.00	0.00	0.000	0.000	0.00	0.00	0.00	0.00	0.00	30.60	30.60	15.30	0.015	13.5	200	0.013	0.50	0.023	0.738	0.790
Bridge Street	MH.245/MH.3A	MH.2A	Low Density - Singles	4	13	1521	0.60	30.40	3.675	3.675	22.64	4.56	0.00	0.00	0.00	0.00	30.60	15.30	0.043	100.2	300	0.013	0.47	0.066	0.938	0.994
Murray Drive	MH	MH.2A	Low Density - Singles	53	174	174	5.48	5.48	4.170	4.0	2.82	0.82	0.00	0.00	0.00	0.00	0.00	0.00	0.004	37.0	200	0.013	0.50	0.023	0.738	0.539
Bridge Street	MH.2A	MH.1A	Low Density - Singles	6	20	1714	1.04	36.92	3.637	3.637	25.26	5.54	0.00	0.00	0.00	0.00	30.60	15.30	0.046	92.1	300	0.013	0.43	0.063	0.897	0.982
Bridge Street	MH.1A	MH.192	Low Density - Singles	5	16	1731	1.00	37.92	3.634	3.634	25.48	5.69	0.00	0.00	0.00	0.00	30.60	15.30	0.046	93.7	300	0.013	0.45	0.065	0.918	1.000
Bridge Street	MH.192	MH.193	Low Density - Singles	5	16	1747	0.83	38.75	3.631	3.631	25.69	5.81	0.00	0.00	0.00	0.00	30.60	15.30	0.047	113.5	300	0.013	0.48	0.067	0.948	1.024
McNab Street	MH	MH193	Low Density - Singles	11	36	36	1.62	1.62	4.341	4.0	0.58	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.001	156.0	200	0.013	0.50	0.023	0.738	0.362
Bridge Street	MH.193	MH.194	Low Density - Singles	0	0	1783	0.17	40.54	3.624	3.624	26.18	6.08	0.00	0.00	0.00	0.00	30.60	15.30	0.048	65.3	200	0.013	8.30	0.094	3.008	3.008
Bridge Street	MH.194	MH.195	Low Density - Singles	0	0	1783	0.18	40.72	3.624	3.624	26.18	6.11	0.00	0.00	0.00	0.00	30.60	15.30	0.048	61.0	200	0.013	8.61	0.096	3.063	3.032
Bridge Street	MH	MH.195	Low Density - Singles	7	23	23	0.90	0.90	4.372	4.0	0.37	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.001	68.0	200	0.013	0.50	0.023	0.738	0.244
Water Street	MH	MH.195	Low Density - Singles	283	928	928	37.55	37.55	3.821	3.821	14.36	5.63	0.00	0.00	0.00	0.00	0.00	0.00	0.020	103.0	300	0.013	0.50	0.068	0.967	0.851
Water Street	MH.195	MH.196	Low Density - Singles	7	23	2757	1.07	80.24	3.473	3.473	38.79	12.04	0.00	0.00	0.00	0.00	30.60	15.30	0.066	107.7	375	0.013	0.60	0.136	1.230	1.217
Water Street	MH.196	MH.197	Low Density - Singles	5	16	2773	0.83	81.07	3.471	3.471	38.99	12.16	0.00	0.00	0.00	0.00	30.60	15.30	0.066	81.5	375	0.013	0.56	0.131	1.188	1.200
Water Street	MH.197	MH.198	Low Density - Singles	7	23	2796	1.16	82.23	3.468	3.468	39.28	12.33	0.00	0.00	0.00	0.00	30.60	15.30	0.067	93.8	375	0.013	0.50	0.124	1.123	1.145
Water Street	MH.198	MH.199	Low Density - Singles	8	26	2822	1.07	83.30	3.465	3.465	39.61	12.50	0.00	0.00	0.00	0.00	30.60	15.30	0.067	99.3	375	0.013	0.58	0.134	1.209	1.209
Water Street	MH.199	MH.200	Low Density - Singles	7	23	2845	1.46	84.76	3.462	3.462	39.90	12.71	0.00	0.00	0.00	0.00	30.60	15.30	0.068	91.0	400	0.013	0.24	0.102	0.815	0.872
Water Street	MH.200	MH.201	Low Density - Singles	6	20	2865	0.77	85.53	3.459	3.459	40.15	12.83	0.00	0.00	0.00	0.00	30.60	15.30	0.068	100.5	400	0.013	0.20	0.093	0.741	0.812
Water Street	MH.201	MH.202	Low Density - Singles	8	26	2891	1.27	86.80	3.456	3.456	40.47	13.02	0.00	0.00	0.00	0.00	30.60	15.30	0.069	102.8	400	0.013	0.17	0.086	0.684	0.759
Water Street	MH.202	MH.203	Low Density - Singles	3	10	2901	0.53	87.33	3.455	3.455	40.60	13.10	0.00	0.00	0.00	0.00	30.60	15.30	0.069	107.5	400	0.013	0.17	0.085	0.678	0.753
McNab Street	MH	MH.187	Low Density - Singles	3	10	10	0.35	0.35	4.415	4.0	0.16	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.000	42.5	200	0.013	0.50	0.023	0.738	0.170
McNab Street	MH	MH.187	Low Density - Singles	8	26	26	1.18	1.18	4.364	4.0	0.42	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.001	126.5	200	0.013	0.50	0.023	0.738	0.295
High Street	MH	MH.187	Low Density - Singles	323	1059	1059	30.29	30.29	3.784	3.784	16.23	4.54	0.00	0.00	0.00	0.00	0.00	0.00	0.021	102.5	200	0.013	0.50	0.023	0.738	0.834
High Street	MH.187	MH.188	Low Density - Singles	2	7	1101	0.48	32.30	3.773	3.773	16.83	4.85	0.00	0.00	0.00	0.00	0.00	0.00	0.022	54.0	250	0.013	0.95	0.058	1.183	1.088
High Street	MH.188	MH.189	Low Density - Singles	1	3	1105	0.13	32.43	3.772	3.772	16.88	4.86	0.00	0.00	0.00	0.00	0.00	0.00	0.022	49.8	250	0.013	4.42	0.125	2.548	1.885
Water Street	MH.189	MH.203	Low Density - Singles	0	0	1105	0.00	32.43	3.772	3.772	16.88	4.86	0.00	0.00	0.00	0.00	0.00	0.00	0.022	56.5	250	0.013	1.12	0.063	1.284	1.156
Clyde Street	MH.203	MH.204	Low Density - Singles	0	0	4006	0.00	119.76	3.333	3.333	54.08	17.96	0.00	0.00	0.00	0.00	30.60	15.30	0.087	72.5	375	0.013	0.50	0.124	1.123	1.212
Carleton Place	MH.199	MH.200	Low Density - Singles	8	26	26	0.80	0.80	4.364	4.0	0.42	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.001	89.2	250	0.013	1.13	0.063	1.288	0.296
Carleton Place	MH.200	MH.201	Low Density - Singles	2	7	33	0.29	1.09	4.348	4.0	0.53	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.001	76.2	300	0.013	0.66	0.079	1.111	0.256
Victoria Street	MH	MH.201	Low Density - Singles	27	89	89	5.35	5.35	4.258	4.0	1.43	0.80	3.28	3.28	1.06	1.43	1.43	0.72	0.004	35.6	200	0.013	0.35	0.019	0.618	0.488
Carleton Place	MH.201	MH.173/MH.202	Low Density - Singles	3	10	131	0.52	6.96	4.209	4.0	2.12	1.04	0.00	3.28	1.06	0.00	1.43	0.72	0.005	63.4	400	0.013	0.53	0.152	1.207	0.483
Carleton Place	MH.173/MH.202	MH.174	Low Density - Singles	1	3	134	0.00	6.96	4.206	4.0	2.18	1.04	0.00	3.28	1.06	0.32	1.75	0.88	0.005	41.2	400	0.013	0.50	0.147	1.172	0.574
Clyde Street	MH.149A	MH.174	Low Density - Singles	1426	4674	4674	211.57	211.57	3.272	3.272	61.96	31.74	2.00	2.00	0.65	2.00	2.00	1.00	0.095	28.5	450	0.013	0.50	0.202	1.268	1.242
Clyde Street	MH.174	MH.204	Low Density - Singles	0	0	4809	0.00	218.53	3.261	3.261	63.52	32.78	0.00	5.28	1.71	0.00	3.75	1.88	0.100	40.6	525	0.013	0.50	0.304	1.405	1.250

Clyde Street	MH.204	SPS	Low Density - Singles	0	0	8814	0.00	338.29	3.009	3.009	107.44	50.74	0.00	5.28	1.71	0.00	34.35	17.18	0.177	2.5	525	0.013	1.20	0.471	2.176	2.024
Carleton Place	SPS	WWTP																								

Minimum diameter = 200 mm
Minimum acceptable velocity = 0.6 m/s
Maximum acceptable velocity = 3.0 m/s
Roughness Coefficient for PVC pipe = 0.013

Date: August 2026
Designed By: AEK
Checked By: AEK

Project: Proposed Conditions - 127 First Line (Phase 1 ONLY) and 159 First Line (Phase 1 ONLY)
File: 300060179.0000

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix C

Proposed Condition Sanitary Sewer Flows to Sewage Pumping Station

q = average daily per capita flow (350 L/cap/d

i = unit of peak extraneous flow (0.15 L/ha/s)

A = Tributary area in gross hectares

F = Peaking factor

Qp = peak population flow (L/s)

Qi = peak extraneous flow (L/s)

Qd = peak design flow (m^3/s)

Persons per Unit (PPU) as per Schedule 3 from the Township of Centre Wellington Development Charges Background Study - Consolidated Report (Watson & Associates Economists Ltd. dated March 24, 2026)

Unit Type	People Per Unit (PPU)
Low Density - Singles	3.278
Low Density - Semis	3.278
Low Density - Towns	2.351
Apartments	1.837

SANITARY SEWER DESIGN

Proposed Conditions - 127 First Line (Remainder of Lands) and 159 First Line (Remainder of Lands)

Township of Centre Wellington (Elora)

$F = 1 + \frac{14}{4 + (P)^{1/2}}$ where P is population in 1000's

$Q(p) = \frac{PqM}{86.4}$ (L/s)

Qi = iA

Qd = Qp + Qi + Qc + Qin (m^3/s)

Location					Residential								Commercial (28 m^3/ha/d)			Industrial (0.50 L/s/ha)			Peak Design Flow Q (m^3/s)	Proposed Sewer						
Street	Upstream MH	Downstream MH	Unit Type	# of Units	Indiv. Pop'n	Cumul. Pop'n	Area (ha)	Cumul. Area	Calculated Peaking Factor (F)	Actual Peaking Factor (F)	Pop. Flow Qp (L/s)	Res. Infilt. Flow Qi (L/s)	Comm. Area (ha)	Cumul. Area	Comm. Flow Qc (L/s)	Inst. Area (ha)	Cumul. Area	Inst. Flow Qin (L/s)		Length (m)	Pipe Size (mm)	Type of Pipe	Grade %	Capacity (m^3/s)	Full Flow Velocity (m/s)	Actual velocity at Q(d)
Block 11 159 First Line			**Low Density - Singles**	**27**	**89**	**89**	**1.08**	**1.08**	**4.258**	**4.0**	**1.43**	**0.16**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.002**	20.0	200	0.013	0.50	0.023	0.738	0.428
Block 12 159 First Line			**Low Density - Towns**	**16**	**38**	**126**	**0.55**	**1.63**	**4.215**	**4.0**	**2.04**	**0.24**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.002**	20.0	200	0.013	0.50	0.023	0.738	0.472
Block 13 159 First Line			**Low Density - Singles**	**19**	**62**	**188**	**0.91**	**2.54**	**4.157**	**4.0**	**3.05**	**0.38**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.003**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 14 159 First Line			**Low Density - Singles**	**14**	**46**	**234**	**0.49**	**3.03**	**4.122**	**4.0**	**3.80**	**0.45**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.004**	20.0	200	0.013	0.50	0.023	0.738	0.568
Block 15 159 First Line			**Low Density - Singles**	**34**	**111**	**346**	**1.19**	**4.22**	**4.051**	**4.0**	**5.60**	**0.63**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.006**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 16 159 First Line			**Low Density - Singles**	**15**	**49**	**395**	**0.50**	**4.72**	**4.025**	**4.0**	**6.40**	**0.71**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.007**	20.0	200	0.013	0.50	0.023	0.738	0.657
Block 17 159 First Line			**Low Density - Singles**	**14**	**46**	**441**	**0.49**	**5.21**	**4.002**	**4.0**	**7.14**	**0.78**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.008**	20.0	200	0.013	0.50	0.023	0.738	0.664
Block 18 159 First Line			**Low Density - Singles**	**21**	**69**	**510**	**0.87**	**6.08**	**3.970**	**3.970**	**8.20**	**0.91**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.009**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 19 159 First Line			**Low Density - Singles**	**24**	**79**	**588**	**0.85**	**6.93**	**3.937**	**3.937**	**9.38**	**1.04**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.010**	20.0	200	0.013	0.50	0.023	0.738	0.716
Block 20 159 First Line			**Low Density - Singles**	**21**	**69**	**657**	**0.87**	**7.80**	**3.910**	**3.910**	**10.41**	**1.17**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.012**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 21 159 First Line			**Low Density - Singles**	**11**	**36**	**693**	**0.38**	**8.18**	**3.897**	**3.897**	**10.94**	**1.23**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.012**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 22 159 First Line			**Low Density - Singles**	**11**	**36**	**729**	**0.38**	**8.56**	**3.884**	**3.884**	**11.47**	**1.28**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.013**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 23 159 First Line			**Low Density - Singles**	**7**	**23**	**752**	**0.24**	**8.80**	**3.876**	**3.876**	**11.81**	**1.32**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.013**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 24 159 First Line			**Low Density - Singles**	**22**	**72**	**824**	**0.88**	**9.68**	**3.853**	**3.853**	**12.86**	**1.45**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.014**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 25 159 First Line			**Low Density - Singles**	**46**	**151**	**975**	**1.94**	**11.62**	**3.807**	**3.807**	**15.04**	**1.74**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.017**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 26 159 First Line			**Low Density - Singles**	**12**	**39**	**1014**	**0.41**	**12.03**	**3.796**	**3.796**	**15.60**	**1.80**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.017**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 27 159 First Line			**Low Density - Singles**	**12**	**39**	**1054**	**0.42**	**12.45**	**3.785**	**3.785**	**16.16**	**1.87**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.018**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 28 159 First Line			**Low Density - Singles**	**7**	**23**	**1077**	**0.24**	**12.69**	**3.779**	**3.779**	**16.48**	**1.90**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.018**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 29 159 First Line			**Low Density - Singles**	**14**	**46**	**1123**	**0.52**	**13.21**	**3.767**	**3.767**	**17.13**	**1.98**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.019**	20.0	250	0.013	0.50	0.042	0.857	0.000
Block 30 159 First Line			**Low Density - Singles**	**19**	**62**	**1185**	**0.72**	**13.93**	**3.751**	**3.751**	**18.01**	**2.09**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.020**	20.0	250	0.013	0.50	0.042	0.857	0.000
Block 31 159 First Line			**Apartments**	**89**	**163**	**1348**	**1.91**	**15.84**	**3.713**	**3.713**	**20.28**	**2.38**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.023**	20.0	250	0.013	0.50	0.042	0.857	0.000
Block 2 127 First Line			**Low Density - Towns**	**28**	**66**	**66**	**0.38**	**0.38**	**4.289**	**4.0**	**1.07**	**0.06**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.0011**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 3 127 First Line			**Low Density - Towns**	**26**	**61**	**127**	**0.36**	**0.74**	**4.214**	**4.0**	**2.06**	**0.11**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.0022**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 4 127 First Line			**Low Density - Towns**	**20**	**47**	**174**	**0.48**	**1.22**	**4.169**	**4.0**	**2.82**	**0.18**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.0030**	20.0	200	0.013	0.50	0.023	0.738	0.502
Block 7 127 First Line			**Low Density - Singles**	**26**	**85**	**259**	**0.67**	**1.88**	**4.105**	**4.0**	**4.20**	**0.28**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.0045**	20.0	200	0.013	0.50	0.023	0.738	0.576
Block 8 127 First Line			**Low Density - Singles**	**45**	**148**	**407**	**0.94**	**2.82**	**4.019**	**4.0**	**6.59**	**0.42**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.0070**	20.0	200	0.013	0.50	0.023	0.738	0.650
Block 9 127 First Line			**Low Density - Towns**	**18**	**42**	**449**	**0.38**	**3.21**	**3.998**	**3.998**	**7.27**	**0.48**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.0078**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 10 127 First Line			**Low Density - Singles**	**21**	**69**	**518**	**0.46**	**3.67**	**3.966**	**3.966**	**8.32**	**0.55**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.0089**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 11 127 First Line			**Low Density - Towns**	**16**	**38**	**555**	**0.31**	**3.98**	**3.950**	**3.950**	**8.89**	**0.60**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.0095**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 12 127 First Line			**Low Density - Towns**	**16**	**38**	**593**	**0.31**	**4.30**	**3.935**	**3.935**	**9.45**	**0.64**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.0101**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 13 127 First Line			**Low Density - Singles**	**53**	**174**	**767**	**1.08**	**5.38**	**3.871**	**3.871**	**12.03**	**0.81**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.0128**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 14 127 First Line			**Low Density - Singles**	**32**	**105**	**872**	**0.70**	**6.08**	**3.838**	**3.838**	**13.55**	**0.91**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.0145**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 15 127 First Line			**Low Density - Towns**	**16**	**38**	**909**	**0.31**	**6.39**	**3.826**	**3.826**	**14.09**	**0.96**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.0151**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 16 127 First Line			**Low Density - Towns**	**16**	**38**	**947**	**0.31**	**6.70**	**3.815**	**3.815**	**14.64**	**1.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.0156**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 17 127 First Line			**Low Density - Singles**	**9**	**30**	**976**	**0.34**	**7.04**	**3.807**	**3.807**	**15.06**	**1.06**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.0161**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 18 127 First Line			**Low Density - Singles**	**22**	**72**	**1049**	**0.48**	**7.52**	**3.787**	**3.787**	**16.08**	**1.13**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.0172**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 19 127 First Line			**Low Density - Towns**	**46**	**108**	**1157**	**0.61**	**8.13**	**3.758**	**3.758**	**17.61**	**1.22**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.0188**	20.0	250	0.013	0.50	0.042	0.857	0.000
Block 20 127 First Line			**Apartments**	**85**	**156**	**1313**	**1.14**	**9.27**	**3.721**	**3.721**	**19.79**	**1.39**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.0212**	20.0	250	0.013	0.50	0.042	0.857	0.000
Block 21 127 First Line			**Apartments**	**74**	**136**	**1449**	**0.99**	**10.26**	**3.690**	**3.690**	**21.66**	**1.54**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.0232**	20.0	250	0.013	0.50	0.042	0.857	0.000

Minimum diameter = 200 mm
Minimum acceptable velocity = 0.6 m/s
Maximum acceptable velocity = 3.0 m/s
Roughness Coefficient for PVC pipe = 0.013

Date: September 2026
Designed By: AEK
Checked By: AEK

Project: Proposed Conditions - 127 First Line (Remainder of Lands) and 159 First Line (Remainder of Lands)
File: 300060179.0000

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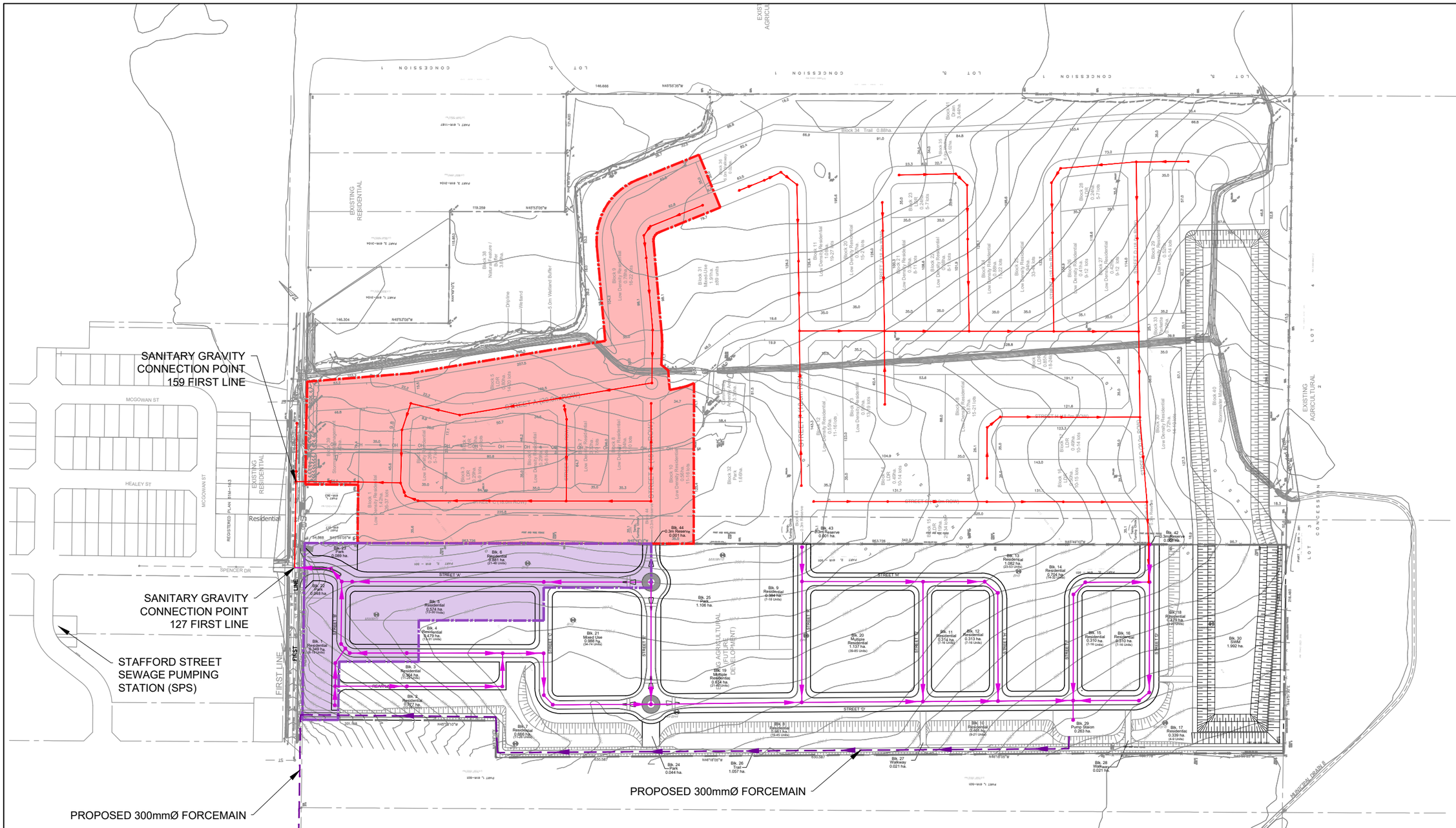
Figures

Figure 1: Phase 1 Gravity Sanitary Servicing Area
Figure 2: Sewage Pumping Station Service Area
Figure 3A: Proposed 300 mm dia. Sanitary Forcemain Alignment
Figure 3B: Proposed 300 mm dia. Sanitary Forcemain Alignment



LEGEND

- PROPERTY LINE
- 401.5 EXISTING GROUND CONTOUR
- SWM SAN EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- PROPOSED SANITARY SEWER
- 127 1ST LINE PHASE 1 SANITARY SEWER AREA (TOTAL OF 3.2ha AND 108 UNITS)
- 159 1ST LINE PHASE 1 SANITARY SEWER AREA (TOTAL OF 8.5ha AND147 UNITS)
- 159 1ST LINE PHASE 1 SANITARY SEWER

BURNSIDE

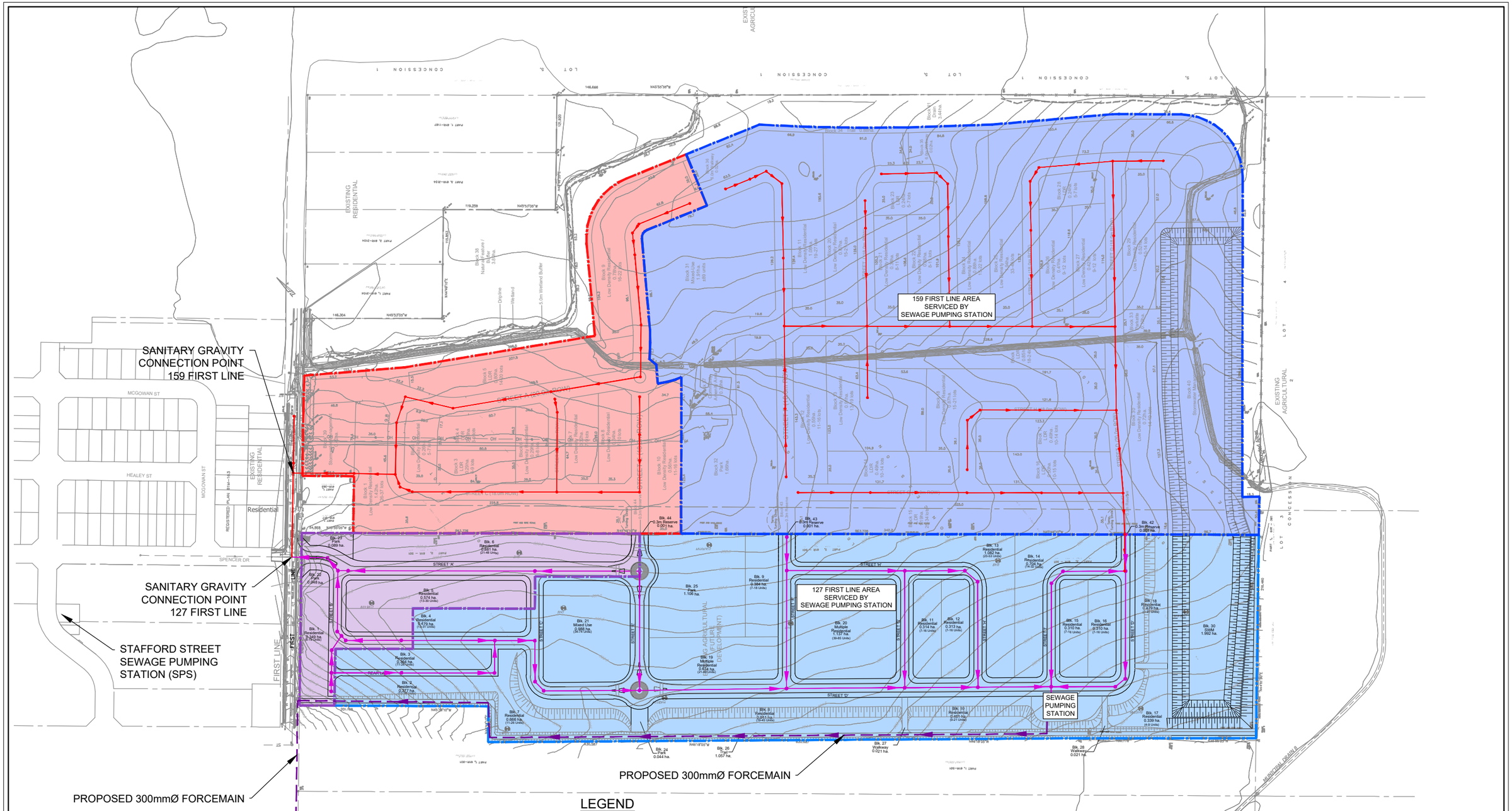
Client: **ELORA GREENS INC.**

Figure Title: **127 & 159 FIRST LINE TOWNSHIP OF CENTRE WELLINGTON (ELORA)**

PHASE 1 - GRAVITY SANITARY SERVICING AREA

Drawn	Checked	Date	Figure No.
M.M.	M.B.	AUGUST 2026	FIG1
Scale		Project No.	
1:4000		060179	

File: u:\060179\0000\03-PRD\FSR FIGURES\060179 - PH1 - SSWR AREA.dwg Date Plotted: September 4, 2026 - 12:55 PM



LEGEND

- PROPERTY LINE
- 401.5 EXISTING GROUND CONTOUR
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- PROPOSED SANITARY SEWER
- 127 1ST LINE PHASE 1 SANITARY SEWER AREA (TOTAL OF 3.2ha AND 108 UNITS)
- 127 1ST LINE PHASE 2 SANITARY SEWER AREA (TOTAL OF 18.3ha AND 569 UNITS)
- 159 1ST LINE PHASE 1 SANITARY SEWER AREA (TOTAL OF 8.5ha AND 147 UNITS)
- 159 1ST LINE PHASE 2 SANITARY SEWER AREA (TOTAL OF 26.5ha AND 455 UNITS)
- 159 1ST LINE PHASE 2 SANITARY SEWER

0 40 80 160 240 320
Metres

BURNSIDE

Client: **ELORA GREENS INC.**

Figure Title: **127 & 159 FIRST LINE TOWNSHIP OF CENTRE WELLINGTON (ELORA)**

SEWAGE PUMPING STATION SERVICE AREA

Drawn	Checked	Date	Figure No.
M.M.	M.B.	AUGUST 2026	**FIG2**
Scale		Project No.	
1:4000		060179	

File: \\rjburnside.com\Nasuni\Data\CADD\060179\0000\03-PRD\FSR FIGURES\060179 - PH1 - SSWR AREA.dwg Date Plotted: September 9, 2026 - 5:06 PM

LEGEND

- PROPERTY BOUNDARY
- PROP. SANITARY FORCEMAIN ROUTE
- PROP. SANITARY FORCEMAIN DIRECTION
- PROPOSED SANITARY SEWER
- PROPOSED STORM SEWER
- PROPOSED WATERMAIN
- EXISTING CONTOURS (431.0)





NOTES:
PROPERTY LINES, AND AERIAL SHOWN ON THIS DRAWING ARE INTERPRETTED FROM THE WELLINGTION COUNTY GIS VIEWER, JULY 2026.
TOPOGRAPHIC CONTOURS WERE OBTAINED FROM THE LIDAR PROJECT, UPPER THAMES-GRAND RIVER 2025, JULY 2026.
THIS DRAWING IS FOR INFORMAITON PURPOSES ONLY, THE ACCURACY OF PROPERTY LINES AND CONTOUR INFOMRATION IS NOT GUARANTEED.

0 20 40 60 80
Metres

BURNSIDE

Client
ELORA GREENS INC.

Figure Title
127 FIRST LINE
TOWNSHIP OF CENTRE WELLINGTON (ELORA)
PROPOSED 300mm DIA. SANITARY FORCEMAIN ALIGNMENT

Drawn	Checked	Date	Figure No.
D.S.	A.K.	JULY 2026	**FIG3A**
Scale		Project No.	
1:1000		060179	

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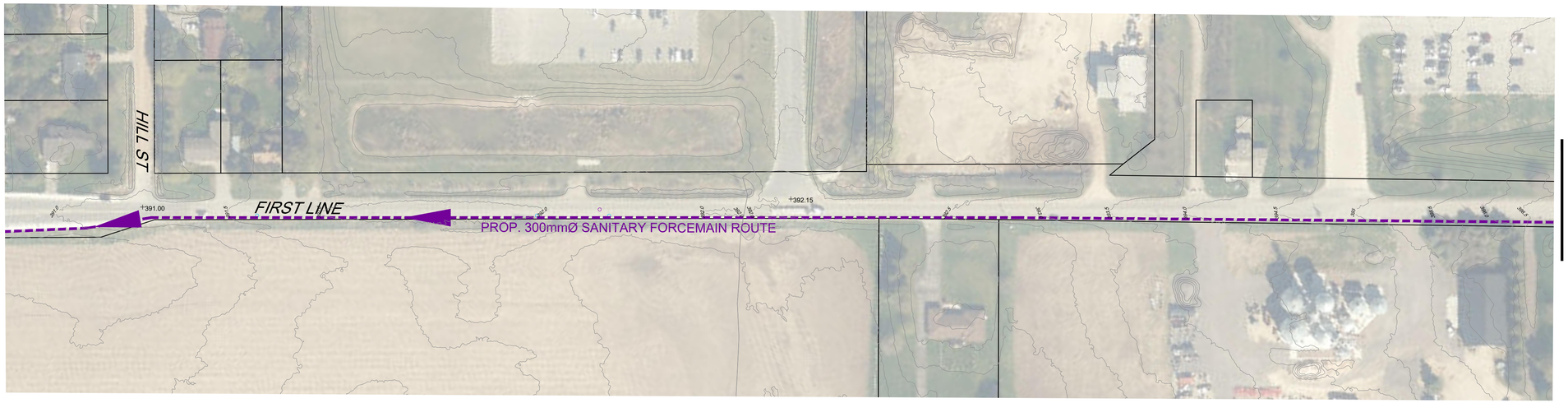
LEGEND

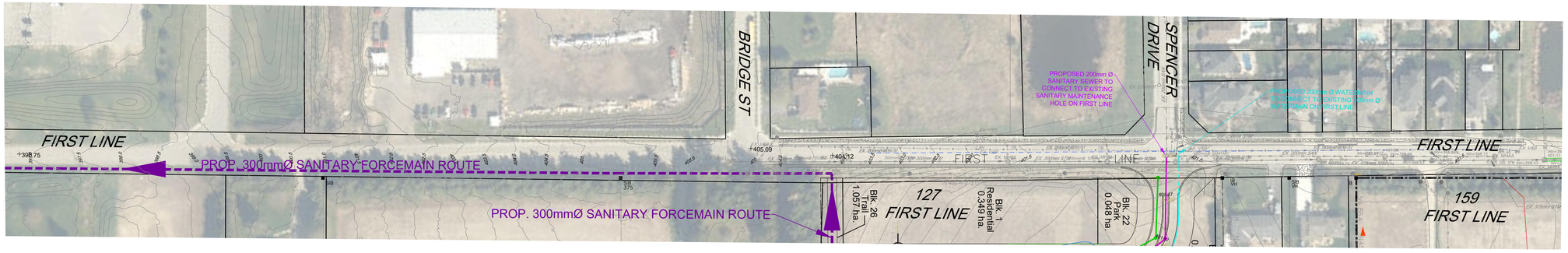
- PROPERTY BOUNDARY
- PROP. SANITARY FORCEMAIN ROUTE
- PROP. SANITARY FORCEMAIN DIRECTION
- PROPOSED SANITARY SEWER
- PROPOSED STORM SEWER
- PROPOSED WATERMAIN
- EXISTING CONTOURS (437.0)

MATCHLINE 2



MATCHLINE 3

MATCHLINE 3



NOTES:
PROPERTY LINES, AND AERIAL SHOWN ON THIS DRAWING ARE INTERPRETTED FROM THE WELLINGTION COUNTY GIS VIEWER, JULY 2026.
TOPOGRAPHIC CONTOURS WERE OBTAINED FROM THE LIDAR PROJECT, UPPER THAMES-GRAND RIVER 2025, JULY 2026.
THIS DRAWING IS FOR INFORMAITON PURPOSES ONLY, THE ACCURACY OF PROPERTY LINES AND CONTOUR INFOMRATION IS NOT GUARANTEED.

0 20 40 60 80
Metres

BURNSIDE

Client
ELORA GREENS INC.

Figure Title
127 FIRST LINE
TOWNSHIP OF CENTRE WELLINGTON (ELORA)
PROPOSED 300mm DIA. SANITARY FORCEMAIN ALIGNMENT

Drawn	Checked	Date	Figure No.
D.S	A.K.	JULY 2026	FIG3B
Scale		Project No.	
1:1000		060179	

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Appendix E

Tech Memo – Stafford Street SPS and Clyde Street SPS – Capacity Investigation and Assessment (Burnside, dated Sept 2026)

R.J. Burnside & Associates Limited 292 Speedvale Avenue West Unit 20 Guelph ON N1H 1C4 CANADA
telephone (519) 823-4995 **fax** (226) 526-9660 **web** www.rjburnside.com

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Technical Memorandum

Date: September 11, 2026 **Project No.:** 300060179.0000

Project Name: Stafford Street Sewage Pumping Station (SPS) and Clyde Street Sewage Pumping Station (SPS) - Capacity Investigation and Assessment

Client Name: Elora Greens Inc. and WrightHaven Homes

Submitted To: Mr. Farhan Kamali Siddiqui and Mr. Steven Wright

Submitted By: Gary Voorthuyzen, P.Eng.

1.0 Introduction

Elora Greens Inc. (Elora Greens) has retained R.J. Burnside & Associates Limited (Burnside) to complete the background investigation and preliminary engineering necessary to support a Draft Plan of Subdivision application for the residential development of the subject lands located on the south side of First Line in Elora, between Bridge Street and Spencer Drive. The site is approximately 21.6 ha (53.4 ac) in size and is located within the jurisdiction of the Township of Centre Wellington (Township), County of Wellington (County) and the Grand River Conservation Authority (GRCA). Elora Greens is intending to develop between 299-684 residential units, including the associated municipal roads / rights-of-way, parkland / trails and stormwater management facility at the site.

In response to the pre-consultation comments received from the Township (dated September 19, 2025), Burnside has undertaken an investigation into the available wastewater servicing infrastructure and outlet locations that are available to service the subject lands, as well as the adjacent development lands (WrightHaven Homes located at 159 First Line). As part of this investigation, Burnside has completed an investigation and assessment of the Township's existing Stafford Street Sewage Pumping Station (SPS) and existing Clyde Street SPS.

The purpose of this investigation and assessment is to identify and confirm the following:

- The theoretical capacity of each SPS (Stafford Street and Clyde Street)
- The peak flows that are currently discharging to each of the SPS's
- The available unused capacity in each SPS (Stafford Street and Clyde Street) that could potentially be utilized to service the proposed development of both 127 First Line and 159 First Line.

This technical memorandum summarizes the results of the capacity review.

2.0 Stafford Street SPS

The Stafford Street SPS (19 Stafford Street) was constructed in 2008 and is located on the south side of Stafford Street, between Spencer Drive and Bridge Street, across the street from South Ridge Park in Elora. Wastewater from the SPS is pumped through a 150 mm diameter polyvinyl chloride (PVC) forcemain approximately 200 m in length, ultimately outlets to a manhole and gravity sanitary sewer at the intersection of Stafford Street and Bridge Street. The Certificate of Approval (C of A) for the SPS is included in Attachment A.

The SPS consists of a rectangular pre-cast concrete wet well (approximately 3.7 m x 2.4 m) with a total depth of approximately 8.3 m below grade. The wet well is equipped with an inlet basket screen. The SPS also includes a precast concrete valve chamber, control building with an indoor standby diesel generator, and an overflow manhole. The wet well contains two submersible pumps which operate in a lead / lag configuration. The pumps are equipped with variable frequency drives (VFDs). The wastewater level in the wet well is measured by an ultrasonic level transmitter, and backup floats are provided.

The Stafford Street SPS was originally designed to service a contributing drainage area of 21.1 ha consisting of 274 residential units and future external development lands consisting of 48 additional residential units, as well as 25.4 ha of future development land located on the south side of First Line. From the South Ridge Subdivision Sewage Pumping Station Final Design Brief (Gamsby and Mannerow Limited, dated April 2008), the Stafford Street SPS has been designed to accommodate a flow of 21.4 L/s from the 21.1 ha of contributing drainage area and 20.3 L/s from the 25.4 ha of future development land, for a total design capacity of 41.7 L/s. The original developments have been completed, and the remaining capacity can be utilized at these proposed development areas south of First Line.

The VFDs allow the pumps at the Stafford Street SPS to operate at lower speeds to pump the initial lower flows, and the speeds can be increased in the future with additional development. The 2008 Design Brief indicates that the SPS has been designed to pump an ultimate peak flow of 41.7 L/s (3,603 m^3/d) at 15.5 m total dynamic head (TDH). The design brief also notes that the pumps will initially be designed to pump at 21.4 L/s at 9.0 m TDH (based on a frequency of 43 Hz) to meet the interim design point.

The pump information provided in the 2008 Design Brief provides is summarized in Table 1.

Table 1: Stafford Street SPS Pump Specifications

	Pump 1	Pump 2
Pump Type	Submersible	Submersible
Manufacturer	Flygt	Flygt
Pump Model	NP3153.181 HT	NP3153.181 HT
Capacity	34.9 L/s @ 16.4 m TDH	34.9 L/s @ 16.4 m TDH
Impeller Dia.	239 mm	239 mm
Motor Size	11 kW (15 hp)	11 kW (15 hp)
Incoming Power	600 V / 3 PH / 60 Hz	600 V / 3 PH / 60 Hz

The pumping system was designed to operate in a lead / lag configuration. When the wet well level reaches the lead pump start setpoint, the pump will run until the level reaches the lower stop setpoint. However, if the lead pump cannot keep up with the incoming flows and the wet well level continues to rise until it reaches the lag pump start level, the second pump will turn on such that both pumps are running simultaneously.

2.1 Historical Flow Analysis

To review the station's ability to handle the sewage flows generated by the current catchment area during peak flow events, historical operational data was analyzed. Burnside requested data from the Township to review the highest daily flow rates that were recorded during a three-year period (January 2023 to September 2025) on the SPS's magnetic flowmeter. Based on the past three years of data, the highest daily flow of 180 m^3/day was recorded on April 3, 2025.

The flow and wet well level data is recorded on the Supervisory Control and Data Acquisition (SCADA) system on a minute-by-minute basis. This data was requested for the dates of the highest daily flows, as it was assumed the peak hour flow would also occur on these dates.

There is no flow measurement on the incoming sewage flow into the wet well. As a result, the flow rate discharging to the Stafford Street SPS (i.e., the incoming flow rate) was calculated per minute based on the approximated pumped volume each minute (instantaneous flow is recorded at each minute by the flow meter at the SPS outlet) and the change in wet well level (using an internal wet well area of approximately 8.79 m^2) to determine the volume. Based on the incoming flow rate calculated for each minute, this data was used to determine the peak flow rate over each 60-minute period throughout the day. The result of this analysis is summarized in Table 2, which identifies the highest peak hour flow calculated for the maximum day flow event.

Table 2: Current Stafford Street SPS Peak Hour Flow Rate

Date	Calculated Peak Hour Flow	
	L/s	m^3/hr
April 3, 2025	3.2	11.5

Based on the current peak flow analysis described above (3.2 L/s) and the ultimate peak design capacity of 41.7 L/s for the SPS, the current available unused capacity in the Stafford Street SPS is approximately 38.5 L/s. While the design report notes that the station was designed to initially pump at 21.4 L/s (based on a VFD frequency of 43 Hz), the historical data analyzed shows that the station is currently pumping at approximately 29 L/s.

2.2 Capacity for Additional Flow from Developments

In order to review whether the current excess capacity at the Stafford Street SPS would be able to accommodate the additional flows associated with the proposed residential developments in the area, projected wastewater flows have been calculated for the Phase 1 development area and are summarized in Table 3. The calculations utilized an average day wastewater flow of 350 L/p/d as outlined in the Township's Development Manual (dated June 2024). Detailed calculations are provided in Attachment B.

The projections in Table 3 are conservative given that new developments typically have lower flows compared to existing infrastructure and that the projections incorporate infiltration allowances into the total peak flow calculations.

Table 3: Wastewater Flow Projections for Future Developments

Development	Data	Projection
127 First Line (Elora Greens)	Units	108
	Population	257
	Peak Flow (L/s)	4.16
	Infiltration (0.15 L/s/ha)	0.39
	Total Elora Greens Peak Flow (L/s)	**4.55**
159 First Line (WrightHaven Homes)	Units	147
	Population	458
	Peak Flow (L/s)	7.41
	Infiltration (0.15 L/s/ha)	0.81
	Total WrightHaven Homes Peak Flow (L/s)	**8.22**
	Total Development Peak Flow (L/s)	**12.77**

As shown in Table 3, the anticipated peak flows from the first phase of construction of each development area (127 First Line and 159 First Line) are projected to be approximately 12.8 L/s. Based on the available unused capacity of 38.5 L/s, the Stafford Street SPS would be able to service the current catchment area as well as the anticipated first phase of construction for the development lands located on the south side of First Line. Furthermore, based on the historical peak flow of 3.2 L/s plus the additional 12.8 L/s projected from these developments, the projected inflow (15 L/s total) is still less than the current pumping rate and the pumped flow rate being discharged from the Stafford St SPS would not need to increase.

3.0 Clyde Street SPS

All of the wastewater generated in Elora drains or discharges to the Clyde Street SPS which pumps the sewage through a 300 mm ductile iron forcemain to the Elora Wastewater Treatment Plant (WWTP). This includes the flow pumped from the Stafford SPS, which discharges to the sanitary sewer system and then eventually directed to the Clyde Street SPS.

The Clyde Street SPS (10 Clyde Street) is located on the east side of Clyde Street, between Metcalfe Street and Water Street East, adjacent to the Grand River. It is a wet well / dry well type SPS with a pump room, a screen room, a below grade flow meter chamber, and a standby diesel generator. The Clyde Street SPS was upgraded by the Township between 2012 and 2015.

The Clyde Street SPS has an inlet trough which flows into an equalization cell that drains into a dual cell concrete wet well. The Clyde Street SPS is equipped with three dry pit sewage pumps located in the pump room (dry well). The Environmental Compliance Approval (ECA) issued by the Ministry of the Environment (ECA No. 4030-8SNJ59, dated May 11, 2012) is included in Attachment C and indicates that one pump rated at 60.0 L/s at 13.4 m TDH accommodates dry weather flows. The ECA also indicates that there are two pumps (duty / standby) each rated at 173.6 L/s (15,000 m^3/d) at 25.4 m TDH which provide backup pumping capacity during wet weather flows. Based on the information provided with the duty / standby peak pumps, the design capacity of the station is 173.6 L/s with one peak pump operating. The pumps are equipped with VFDs to minimize hydraulic surges and provide energy efficiency. The wastewater level in the wet well is measured by an ultrasonic level transmitter, and backup floats are provided.

The pump capacities listed in the ECA (as amended in 2012) are summarized in Table 4.

Table 4: Clyde Street SPS Pump Capacities

	Jockey Pump	Duty Peak Pump	Standby Peak Pump
Capacity	60.0 L/s @ 13.4 m TDH	173.6 L/s @ 25.4 m TDH	173.6 L/s @ 25.4 m TDH

3.1 Historical Flow Analysis

Historical operational data was also analyzed for the Clyde Street SPS. Burnside requested data from the Township to review the highest daily flow rates that were recorded during the past three years (January 2023 to September 2025) on the SPS's magnetic flowmeter to evaluate the SPS's performance during the peak flow event. Similarly to the Stafford Street SPS, the highest daily flow rate at the Clyde Street SPS in the three years analyzed was recorded on April 3, 2025. The total flows from the three highest days over this period are summarized in Table 5.

Table 5: Clyde Street SPS Maximum Day Flows (Jan 2023 – Sep 2025)

Date	Flow (m^3/d)
April 3, 2025	10,421
April 4, 2025	6,093
April 1, 2023	5,932

As displayed in Table 5, the flow on April 3, 2025, was significantly higher (52%) than the second highest day which occurred on the following day (April 4, 2025).

The flow and wet well level data is recorded on the SCADA system. The Township was able to provide minute by minute data for the selected maximum day flows over the past three years, as the peak hour flow was also assumed to occur during these maximum day flows.

There is no flow measurement on the incoming sewage flow into the wet well. As a result, the incoming flow rate was calculated based on the approximated pumped volume (totalized flow measured by the flow meter on the outlet) and the change in the level recorded in each wet well cell. The area utilized in the calculation varies depending on the level, as the sewage level starts to fill the equalization cell, backs up into the inlet trough, and eventually into the lower screen room.

Based on the incoming flow rate calculated for each minute, this data was used to determine the peak flow rate over each 60-minute period throughout the day. The result of this analysis is summarized in Table 6, which identifies the highest peak hour flow rates calculated for the maximum day flow event and the second highest day flow event.

Table 6: Current Clyde Street SPS Peak Hour Flow Rates

Date	Calculated Peak Hour Flow	
	L/s	m^3/hr
April 3, 2025	197.3	710.3
April 4, 2025	81.6	293.8

As noted in Section 3.0, the design capacity of the SPS is 173.6 L/s. On April 3, 2025, the peak inflow into the station was calculated to be approximately 197.3 L/s which exceeds the SPS design capacity. This is consistent with the fact that the Township also reported that the SPS overflowed into the Grand River on April 3, 2025.

The flows experienced on this date could potentially be considered an anomaly given that the peak flow on the second highest date over the past three years was significantly (83%) lower. Multiple other municipalities in southern Ontario also experienced sewage overflows on this date given the extreme rainfall and snowmelt that occurred. If this highest flow (which appears to be an abnormal extreme value) were to be excluded, utilizing the peak hour flow on second highest day as the governing scenario would indicate an excess capacity of 92.0 L/s at the Clyde Street SPS.

3.2 Capacity for Additional Flow from Developments

As shown in Table 3 in Section 2.2, the peak flows associated with the first phase of construction from the 127 and 159 First Line development areas are projected to be approximately 12.8 L/s. Based on the peak hour flow from the second highest day flow event discussed in Section 3.2, there would be ample capacity (92 L/s) at the Clyde Street SPS to accommodate the first phase of construction from these developments.

It is important to note that the Clyde Street SPS should currently have capacity allocated for the peak flows from the Stafford Street SPS. As Elora's entire wastewater collection system drains or discharges to the Clyde Street SPS, the SPS should have theoretical capacity allocated for the peak flow from each upstream SPS plus the catchment area that drains by gravity sewers to the Clyde Street SPS. The data shows that the peak flows at the Stafford Street SPS remained very low during the extreme flow event on April 3, 2025, indicating that the excess flows experienced at the Clyde Street SPS would be related to infiltration and inflow issues in the system outside of the Stafford Street SPS catchment area which these developments will impact.

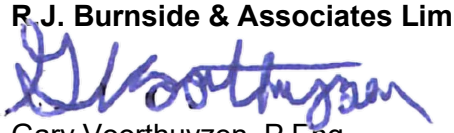
The Stafford Street SPS data shown in Sections 2.1 and 2.2 indicates that there is available capacity in the Stafford Street SPS to handle these developments. The pumps at the Stafford Street SPS do not need to be upsized to handle the ultimate demand, therefore the capacity allocated for the Stafford SPS at the Clyde Street SPS does not need to be changed. Additionally, while the existing peak hour inflow to the Stafford Street SPS is very low (3.2 L/s), the sewage collects in the wet well and the pumps need to pump at a higher flow rate to ensure scouring velocities in the forcemain are maintained. The historical data analyzed shows that the Stafford Street SPS pumps were pumping at approximately 29 L/s during the peak flow event. Based on this, the VFD speed (pumping rate) at the Stafford SPS would not need to be adjusted and the Clyde Street SPS would receive the same peak instantaneous flow from the Stafford Street SPS that it does currently, just for a longer period. Therefore, the peak instantaneous flow at the Clyde SPS would therefore not be affected by this development.

4.0 Conclusion

Based on the historical data available from the past three years, there are no concerns with regards to the Stafford Street SPS's capacity and its ability to handle the flows generated by the catchment area's existing population. The SPS would also be able to handle the projected flows from the first phase of construction for the 127 and 159 First Line developments in addition to the existing flows.

Additionally, the Clyde Street SPS also has the capacity to handle the ultimate flows associated with the Stafford Street SPS. Based on the projected flows, the pumping rate at the Stafford Street SPS would not need to increase based on the additional flows. Therefore, the current peak instantaneous inflow to the Clyde Street SPS should not be affected by this development.

R.J. Burnside & Associates Limited



Gary Voorthuyzen, P.Eng.
Project Engineer

GV:af

Enclosure(s) Attachment A: Stafford Street SPS Certificate of Approval
Attachment B: Wastewater Flow Projection Calculations
Attachment C: Clyde Street SPS Environmental Compliance Approval

cc: Angela Kroetsch, P.Eng., R.J. Burnside & Associates Limited
Dan Ferguson, MBA, P.Eng., PMP, WalterFedy
Ashley Klashoff, CET, WalterFedy

Other than by the addressee, copying or distribution of this document, in whole or in part, is not permitted without the express written consent of R.J. Burnside & Associates Limited.

In the preparation of the various instruments of service contained herein, R.J. Burnside & Associates Limited was required to use and rely upon various sources of information (including but not limited to reports, data, drawings, observations) produced by parties other than R.J. Burnside & Associates Limited. For its part R.J. Burnside & Associates Limited has proceeded based on the belief that the third party/parties in question produced this documentation using accepted industry standards and best practices and that all information was therefore accurate, correct and free of errors at the time of consultation. As such, the comments, recommendations and materials presented in this instrument of service reflect our best judgment in light of the information available at the time of preparation. R.J. Burnside & Associates Limited, its employees, affiliates and subcontractors accept no liability for inaccuracies or errors in the instruments of service provided to the client, arising from deficiencies in the aforementioned third party materials and documents.

R.J. Burnside & Associates Limited makes no warranties, either express or implied, of merchantability and fitness of the documents and other instruments of service for any purpose other than that specified by the contract.

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Attachment A

Stafford Street SPS Certificate of Approval

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Ontario

Ministry of the Environment
Ministère de l'Environnement

AMENDED CERTIFICATE OF APPROVAL
MUNICIPAL AND PRIVATE SEWAGE WORKS

NUMBER 9839-7GDGQ2
Issue Date: July 23, 2008

Elora Ridge Developments Limited
100 MacQueen Blvd, No. Unit 3
Centre Wellington, Ontario
N1M 3T8

Site Location: South Ridge Subdivision
Southeastern side of Stafford Street, near intersection with Spencer Drive.
Centre Wellington Township, County of Wellington, Ontario

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

- one (1) ***sanitary sewage pumping station*** to be constructed on the southeastern side of Stafford Street, in the Township of Centre Wellington, designed to be capable of handling a future peak flow of 41.7 L/s, consisting of a 3.6 m x 2.4 m rectangular wet well equipped with two (2) submersible pumps, one for duty and one for standby, each pump equipped with a variable frequency drive (VFD) with a rated flow of 21.6 L/s at a total dynamic head of 8.9 m when the frequency is rated at 43 Hz, complete with electrical and electronic control systems, an ultrasonic transducer with back-up level sensor probe connected to the Township SCADA system, basket screen, ventilation pipes, access ladders and platform, 3.6 m x 2.4 m rectangular valve chamber containing discharge piping and valves, a 40 kW generator set, overflow pipe and all other appurtenances necessary to have a complete and operable pumping station, discharging via a 150 mm diameter PVC forcemain to an existing sanitary sewer on Bridge Street;

all in accordance with:

1. Application for Municipal and Private Sewage Works, dated April 5, 2006, and received on April 21, 2006, and all supporting documentation and information including a design brief, final plans and specifications prepared by Gamsby and Mannerow Limited.

2. Application for Municipal and Private Sewage Works, dated ???, 2008, and received on ???, 2008, and all supporting documentation and information including a design brief, final plans and specifications prepared by Gamsby and Mannerow Limited.

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

1. "*Act*" means the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended;

2. "*Certificate*" means this entire certificate of approval document, issued in accordance with Section 53 of the *Act*, and includes any schedules;

3. "*Director*" means any *Ministry* employee appointed by the Minister pursuant to section 5 of the *Act*;

4. "*District Manager*" means the District Manager of the Guelph District Office of the Ministry;

5. "*Ministry*" means the Ontario Ministry of the Environment;

6. "*Owner*" means Elora Ridge Developments Limited and includes its successors and assignees;

7. "*Regional Director*" means the Regional Director of the West-Central Region of the Ministry;

8. "*Substantial Completion*" has the same meaning as *"substantial performance*" in the Construction Lien Act; and

9. "*Works*" means the sewage works described in the *Owner*'s application, this *Certificate* and in the supporting documentation referred to herein, to the extent approved by this *Certificate*.

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL PROVISIONS

1.1 The *Owner* shall ensure that any person authorized to carry out work on or operate any aspect of the *Works* is notified of this *Certificate* and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

1.2 Except as otherwise provided by these Conditions, the *Owner* shall design, build, install, operate and maintain the *Works* in accordance with the description given in this *Certificate*, the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this *Certificate*.

1.3 Where there is a conflict between a provision of any submitted document referred to in this *Certificate* and the Conditions of this *Certificate*, the Conditions in this *Certificate* shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

1.4 Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

1.5 The requirements of this *Certificate* are severable. If any requirement of this *Certificate*, or the application of any requirement of this *Certificate* to any circumstance, is held invalid or unenforceable, the application of such requirement to other circumstances and the remainder of this *Certificate* shall not be affected thereby.

2. EXPIRY OF APPROVAL

2.1 The approval issued by this *Certificate* will cease to apply to those parts of the *Works* which have not been constructed within five (5) years of the date of this *Certificate*.

3. UPON THE SUBSTANTIAL COMPLETION OF THE WORKS

3.1 Upon the *Substantial Completion* of the *Works*, the Owner shall prepare a statement, certified by a Professional Engineer, that the works are constructed in accordance with this *Certificate*, and upon request, shall make the written statement available for inspection by Ministry personnel.

3.2 Within one year of the *Substantial Completion* of the *Works*, a set of as-built drawings showing the works "as constructed" shall be prepared. These drawings shall be kept up to date through revisions undertaken from time to time and a copy shall be retained at the *Works* for the operational life of the *Works*.

4. OPERATION AND MAINTENANCE

4.1 The *Owner* shall exercise due diligence in ensuring that, at all times, the *Works* and the related equipment and appurtenances used to achieve compliance with this *Certificate* are properly operated and maintained. Proper operation and maintenance shall include effective performance, adequate funding, adequate operator staffing and training, including training in all procedures and other requirements of this *Certificate* and the *Act* and regulations, adequate laboratory facilities, process controls and alarms and the use of process chemicals and other substances used in the *Works*.

4.2 The *Owner* shall prepare an operations manual within six (6) months of *Substantial Completion* of the *Works*, that includes, but not necessarily limited to, the following information:

(a) operating procedures for routine operation of the *Works*;

(b) inspection programs, including frequency of inspection, for the *Works* and the methods or tests employed to detect when maintenance is necessary;

(c) repair and maintenance programs, including the frequency of repair and maintenance for the *Works*;

(d) procedures for the inspection and calibration of monitoring equipment;

(e) a spill prevention control and countermeasures plan, consisting of contingency plans and procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations, including notification of the *District Manager*; and

(f) procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.

4.3 The *Owner* shall maintain the operations manual current and retain a copy at the location of the *Works* for the operational life of the *Works*. Upon request, the *Owner* shall make the manual available to *Ministry* staff.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the *Works* are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the *Certificate* and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. The condition also advises the *Owners* their responsibility to notify any person they authorized to carry out work pursuant to this *Certificate* the existence of this *Certificate*.

2. Condition 2 is included to ensure that, when the *Works* are constructed, the *Works* will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.

3. Condition 3 is included to ensure that the *Works* are constructed in accordance with the approval and that record drawings of the *Works* "as constructed" are maintained for future references.

4. Condition 4 is included to require that the *Works* be properly operated, maintained, funded, staffed and equipped such that the environment is protected and deterioration, loss, injury or damage to any person or property is prevented. As well, the inclusion of a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the *Owner* and made available to the *Ministry*. Such a manual is an integral part of the operation of the *Works*. Its compilation and use should assist the *Owner* in staff training, in proper plant operation and in identifying and planning for contingencies during possible abnormal conditions. The manual will also act as a benchmark for *Ministry* staff when reviewing the *Owner*'s operation of the *Works.*

This Certificate of Approval revokes and replaces Certificate(s) of Approval No. 1975-6R9JKE issued on June 30, 2006

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;

CONTENT COPY OF ORIGINAL

5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, 15th Floor
Toronto, Ontario
M5G 1E5

AND

The Director
Section 53, *Ontario Water Resources Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 23rd day of July, 2008

Mansoor Mahmood, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

RS/
c: District Manager, MOE Guelph District Office
Township Clerk, Township of Centre Wellington
County Clerk, County of Wellington
Matthew Ballaban, Gamsby and Mannerow Limited

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Attachment B

Wastewater Flow Projection Calculations

q = average daily per capita flow (350 L/cap/d
i = unit of peak extraneous flow (0.15 L/ha/s)
A = Tributary area in gross hectares
F = Peaking factor
Qp = peak population flow (L/s)
Qi = peak extraneous flow (L/s)
Qd = peak design flow (m^3/s)

Persons per Unit (PPU) as per Schedule 3 from the Township of Centre Wellington Development Charges Background Study - Consolidated Report (Watson & Associates Economists Ltd. dated March 24, 2026)

Unit Type	People Per Unit (PPU)
Low Density - Singles	3.278
Low Density - Semis	3.278
Low Density - Towns	2.351
Apartments	1.837

SANITARY SEWER DESIGN

Proposed Conditions - 127 First Line (Phase 1 ONLY) and 159 First Line (Phase 1 ONLY)

Township of Centre Wellington (Elora)

$F = 1 + \frac{14}{4 + (P)^{1/2}}$ where P is population in 1000's

$Q(p) = \frac{PqM}{86.4}$ (L/s)

$Qi = iA$

$Qd = Qp + Qi + Qc + Qin$ (m^3/s)

Location					Residential									Commercial (28 m^3/ha/d)			Industrial (0.50 L/s/ha)				Proposed Sewer						
Street	Upstream MH	Downstream MH	Unit Type	# of Units	Indiv. Pop'n	Cumul. Pop'n	Area (ha)	Cumul. Area	Calculated Peaking Factor (F)	Actual Peaking Factor (F)	Pop. Flow Qp (L/s)	Res. Infilt. Flow Qi (L/s)	Comm. Area (ha)	Cumul. Area	Comm. Flow Qc (L/s)	Inst. Area (ha)	Cumul. Area	Inst. Flow Qin (L/s)	Peak Design Flow Q (m^3/s)	Length (m)	Pipe Size (mm)	Type of Pipe	Grade %	Capacity (m^3/s)	Full Flow Velocity (m/s)	Actual velocity at Q(d)
Block 1 159 First Line		**MH.AA**	**Low Density - Singles**	**37**	**121**	**121**	**1.42**	**1.42**	**4.220**	**4.0**	**1.97**	**0.21**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.002**	20.0	200	0.013	0.50	0.023	0.738	0.465
Block 2 159 First Line		**MH.AA**	**Low Density - Singles**	**7**	**23**	**144**	**0.26**	**1.68**	**4.197**	**4.0**	**2.34**	**0.25**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.003**	20.0	200	0.013	0.50	0.023	0.738	0.472
Block 3 159 First Line		**MH.AA**	**Low Density - Singles**	**9**	**30**	**174**	**0.29**	**1.97**	**4.170**	**4.0**	**2.82**	**0.30**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.003**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 4 159 First Line		**MH.AA**	**Low Density - Singles**	**9**	**30**	**203**	**0.33**	**2.30**	**4.145**	**4.0**	**3.29**	**0.35**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.004**	20.0	200	0.013	0.50	0.023	0.738	0.539
Block 5 159 First Line		**MH.AA**	**Low Density - Singles**	**20**	**66**	**269**	**0.80**	**3.10**	**4.098**	**4.0**	**4.36**	**0.47**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.005**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 6 159 First Line		**MH.AA**	**Low Density - Semis**	**8**	**26**	**295**	**0.29**	**3.39**	**4.082**	**4.0**	**4.78**	**0.51**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.005**	20.0	200	0.013	0.50	0.023	0.738	0.591
Block 7 159 First Line		**MH.AA**	**Low Density - Semis**	**9**	**30**	**325**	**0.32**	**3.71**	**4.064**	**4.0**	**5.26**	**0.56**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.006**	20.0	200	0.013	0.50	0.023	0.738	0.613
Block 8 159 First Line		**MH.AA**	**Low Density - Towns**	**10**	**24**	**348**	**0.34**	**4.05**	**4.050**	**4.0**	**5.64**	**0.61**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.006**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 9 159 First Line		**MH.AA**	**Low Density - Singles**	**22**	**72**	**420**	**0.78**	**4.83**	**4.012**	**4.0**	**6.81**	**0.72**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.008**	20.0	200	0.013	0.50	0.023	0.738	0.657
Block 10 159 First Line		**MH.AA**	**Low Density - Towns**	**16**	**38**	**458**	**0.56**	**5.39**	**3.994**	**3.994**	**7.41**	**0.81**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.008**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 1 127 First Line		**MH.Y**	**Low Density - Singles**	**3**	**10**	**10**	**0.35**	**0.35**	**4.415**	**4.0**	**0.16**	**0.05**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.0002**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 1 127 First Line		**MH.Y**	**Low Density - Towns**	**16**	**38**	**47**	**0.35**	**0.70**	**4.319**	**4.0**	**0.77**	**0.10**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.0009**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 4 127 First Line		**MH.Y**	**Low Density - Towns**	**11**	**26**	**73**	**0.48**	**1.18**	**4.278**	**4.0**	**1.19**	**0.18**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.0014**	20.0	200	0.013	0.50	0.023	0.738	0.428
Block 5 127 First Line		**MH.Y**	**Low Density - Towns**	**30**	**71**	**144**	**0.57**	**1.75**	**4.197**	**4.0**	**2.33**	**0.26**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.0026**	20.0	200	0.013	0.50	0.023	0.738	0.472
Block 6 127 First Line		**MH.Y**	**Low Density - Towns**	**48**	**113**	**257**	**0.88**	**2.63**	**4.107**	**4.0**	**4.16**	**0.39**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.0046**	20.0	200	0.013	0.50	0.023	0.738	0.576

Minimum diameter = 200 mm
Minimum acceptable velocity = 0.6 m/s
Maximum acceptable velocity = 3.0 m/s
Roughness Coefficient for PVC pipe = 0.013

Date:	August 2026
Designed By:	AEK
Checked By:	AEK

Project:	Proposed Conditions - 127 First Line (Phase 1 ONLY) and 159 First Line (Phase 1 ONLY)
File:	300060179.0000

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Attachment C

Clyde Street SPS Environmental Compliance Approval

Content Copy Of Original

Ontario

Ministry of the Environment
Ministère de l'Environnement

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER 4030-8SNJ59
Issue Date: May 11, 2012

The Corporation of the Township of Centre Wellington
1 MacDonald Sq
Post Office Box, No. 10
Elora, Ontario
N0B 1S0

Site Location: Elora Wastewater Treatment Plant
49 Guelph Rd Elora
Centre Wellington Township, County of Wellington

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

Upgrading and expansion of the existing Elora Wastewater Treatment Plant (WWTP), located at the above site location, for the treatment and disposal of sewage and rated at the capacities mentioned below and consisting of the following *Works;*

Stage	***Rated Capacity***
Current (*Existing Works* and partial completion of *Proposed Works*)	3,066 m 3 /d
Expanded (*Substantial Completion* of all *Proposed Works*)	5,000 m 3 /d

PROPOSED WORKS

Clyde Street Sewage Pumping Station (off-site)

- expansion of existing pumping station located approximately 85 m northeast of Metcalfe Street in Elora to provide new lower and upper screen rooms and generator room;
- removal of existing manual bar screen and installation of a basket screen in lower screen room, including diversion of influent channel through the lower screen room;
- removal of existing sewage pumps and installation of three (3) dry pit sewage pumps, two pumps (one standby) each rated at 173.6 L/s (15,000 m 3 /d) at 25.4 m TDH to provide 100% backup during wet weather flows and one pump rated at 60 L/s at 13.4 m TDH to accommodate dry weather flows, all equipped with VFDs;
- realignment of pump discharge pipe to the existing forcemain;
- one (1) magnetic flowmeter in a outside inground chamber;
- removal of the existing generator and installation of one (1) 200 kW diesel generator set, complete with a 1136.5 L fuel oil tank and all related ancillary equipment;

Elora Sewage Treatment Plant

Influent Sewers

- realignment of existing 300 mm diameter Clyde Street Sewage Pumping Station forcemain to the influent complex;
- realignment of existing 100 mm diameter Elora George Conservation Area Park forcemain to the influent complex;
- construction of a 300 mm diameter forcemain for future connection of the forcemain from the David Street Sewage Pumping Station to the influent complex;

Influent Complex

- one (1) self-cleaning automatic bar screen with a bar spacing of 12.7 mm, having a *Peak Flow Rate* of 173.6 L/s, together with a screenings washer/compactor;
- a bypass manually cleaned bar screen with a bar spacing of 50 mm;
- one (1) vortex grit chamber having a *Peak Flow Rate* of 173.6 L/s, together with airlift pumps, blowers and a grit dewatering screw/conveyor;
- screenings and grit disposal bin;
- a Parshall flume for influent flow measurement;

Aeration Tanks

- two (2) 19.0 m x 22.1 m x 5.1 m SWD three-pass plug-flow extended aeration tanks equipped with fine bubble diffusion systems;
- four (4) blowers (two standby), each duty blower has a capacity of 600 L/s at 57.1 kPa discharge pressure and each standby blower has a capacity of 1,200 L/s at 67.5 kPa discharge pressure;

Secondary Clarifiers

- one (1) clarifier distribution box to distribute mixed liquor from the aeration tanks at a ratio of approximately 50% to the existing clarifiers and 50% to the new clarifier;
- one (1) 17.2 m x 17.2 m x 4.25 m SWD clarifier, with collector mechanism and Stamford baffles and scum collection box;
- modification and retrofitting of existing clarifiers with new collector mechanism and Stamford baffles and scum collection box and removal of corner sweeps;

Return Activated Sludge System

- two (2) return activated sludge pumps (one standby) for the new clarifier, each rated at 58 L/s at 9.3 m TDH and equipped with timers and VFDs;
- one (1) magnetic flowmeter for the common pump discharge line;
- replacement of the existing RAS pumps for the existing clarifiers with three (3) return activated sludge pumps (one standby), each rated at 29 L/s at 4.9 m TDH and equipped with timers and VFDs;

Waste Activated Sludge System

- two (2) waste activated sludge and scum pumps (one standby) for the new clarifier, each rated at 13.6 L/s at 5.5 m TDH;
- one (1) magnetic flowmeter for the common pump discharge line;
- replacement of the existing waste activated sludge and scum pumps for the existing clarifiers with two (2) waste activated sludge and scum pumps (one standby), each rated at 14.1 L/s at 8.4 m TDH;

Tertiary Filters

- two (2) 8.53 m x 4.88 m shallow bed automatic backwash filters, each having a *Peak Flow Rate* of 86.8 L/s and equipped with travelling bridge, wash water pump and backwash pump;

- two (2) filter reject pumps (one standby), each rated at 32.3 L/s at 10.3 m TDH and return line to the influent complex;

Disinfection System

- a UV disinfection channel equipped with two (2) UV banks (one standby), each with a *Peak Flow Rate* of 173.6 L/s and having 65% of the radiation output at the wave length of 253.7 nm and a nominal average intensity of radiation of 30,000 watt.sec/cm 2 ;
- one (1) Parshall flume for plant effluent flow measurement;

Outfall Sewer

- a 600 mm diameter sewer from the plant effluent channel to stormwater MH5 on Wellington Road 7;
- a 600 mm diameter plant effluent overflow pipe to the existing 400 mm diameter effluent sewer;

Phosphorus Removal

- one (1) 30,000 L capacity chemical storage tank;
- three (3) chemical metering pumps (one standby) each with a maximum capacity of 1.5 L/min to inject phosphorus removing chemical downstream of the aeration tanks and prior to the clarifiers;

Sludge Stabilization

- one (1) 200 m 3 aerated waste activated sludge holding/batching tank together with one (1) blower with a capacity of 130 L/s at 64 kPa and two (2) transfer pumps (one standby), each rated at 7.4 L/s at 17.6 m TDH to the Lystek system or the aerated biosolids storage tanks;
- one (1) inline grinder;
- one (1) magnetic flowmeter on the centrifuge feed piping;
- one (1) centrifuge for dewatering waste activated sludge, having a capacity of 5.5 L/s;
- one (1) 5,000 L capacity dewatered sludge storage/transfer tank;
- one (1) dewatered sludge feed pump, rated at 6.1 L/s at 58 m TDH;
- one (1) 5,000 L capacity Lystek reactor with high speed mixer and direct steam injection ports;
- polymer system consisting of a storage tank, two feed pumps, polymer mixing chamber and a polymer metering pump;
- two (2) Lystek transfer pumps;
- one (1) magnetic flowmeter on the common discharge piping for the Lystek transfer pumps;
- one (1) steam boiler complete with water pretreatment system;
- one (1) waste collection drainage pump rated at 24 L/s at 9.2 m TDH;

Biosolids Management

- two (2) 500 m 3 biosolids storage tanks each equipped with fine bubble aeration system, together with two (2) air blowers, each with a capacity of 350 L/s at 64 kPa;
- two (2) 1,000 m 3 biosolids storage tanks;
- supernatant hoppers and one (1) supernatant return pump to the influent complex, rated at 10 L/s at 6.3 m TDH;
- two (2) biosolids loading pumps (one standby), each rated at 35 L/s at 92.4 m differential pressure, for mixing, recirculation or transferring to the sludge loading pad;
- one (1) sludge loading drain pump to the influent complex rated at 8.0 L/s at 27.3 m differential pressure;
- utilize the spare biosolids storage capacity at the Elora WWTP to store excess biosolids generated at the Fergus WWTP as needed when unforeseen circumstances occur;

Standby Power

- one (1) 1,200 kW diesel generator set and 6,818 L capacity fuel storage tank;

Odour Control

- one (1) odour control system serving the influent and sludge dewatering complexes;
- one (1) odour control system serving the biosolids storage complex;

PREVIOUS WORKS

Sanitary Sewers (off-site)

- sanitary sewers on municipal property, Carlton Place, Guelph Road, Ross Street, Victoria Street, Water Street, Bridge Street, McNab Street, High Street, Nichol Street, Waterloo Street, York Street, Hamilton Street, David Street, Easement and Metcalf Street South and a two-barrel sanitary sewage syphon crossing the Grand River, in the Town of Elora;

Clyde Street Sewage Pumping Station (off-site) (to be modified)

- a drywell/wetwell type pumping station located adjacent to Clyde Street approx. 85 m northeast of Metcalf Street South consisting of: a dual chamber wet well, with each chamber measuring approx. 3.75 m x 3.6 m x 3.25 m, complete with bar screen, slide gates and sluice gates for cross connection;
- two (2) dry-put, centrifugal, variable speed vertical raw sewage pumps, each with a minimum continuous capacity of 50 L/s, and a high speed capacity of 73.5 L/s at 12.8 m T.D.H., with provisions for future modifications to the impellers and motor to provide a future capacity of 113 L/s at 15.4 m T.D.H.;
- one (1) 70 kW diesel generator set for purpose of emergency standby power, complete with a 900 L fuel oil tank and all related ancillary equipment;
- pump seal water system, forced positive ventilation for wet well, forced positive ventilation for dry well and all related valves and appurtenances;

Elora Sewage Treatment Plant

- a sewage treatment plant located in the Township of Central Wellington on Broken Front Lot, Concession I, east of the Grand River, approx. 100 m southwest of Guelph Street at Ross Street and consisting of:

Influent Sewers (to be realigned and extended)

- a 300 mm diameter sewage forcemain from Clyde Street Sewage Pumping Station to the inlet works;
- a 100 mm diameter sewage forcemain from Elora George Conservation Area Park to the inlet works;

Inlet Works (to be decommissioned)

- one (1) mechanically cleaned bar screen with a bypass channel and manually cleaned bar screen;

Grit Removal (to be decommissioned)

- one (1) aerated grit tank measuring 4.0 m x 3.0 m x 2.66 m SWD;
- one (1) submerged "swing out" type air diffusion header assembly;
- two (2) air lift pump assemblies for the removal of grit to the grit decanting channels;
- two (2) grit decanting channels;
- two (2) air blowers each rated at 100 L/s at 41 kPa to provide air for grit removal air diffusers, air lift

pumps and channel aeration; each equipped with air intake filter silencers and inlet snubbers, and located beneath the inlet works in a room designated Blower Room No. 2 measuring approx. 4.8 m x 5.9 m;

Aeration Tanks (to be decommissioned)

- four (4) aeration tanks capable of either plug flow or complete mix configuration by means of adjustable weirs, each tank measuring approx. 7.2 m x 7.2 m x 4.34 m SWD with a total volume of 899 m 3 ;
- four (4) single speed mechanical aerations with adjustable blade tips each with an oxygen transfer capability of 2.12 kg O 2 /h/kW (elec.);

Secondary Clarifiers (to be modified)

- two (2) square clarifiers, each measuring approx. 12.2 m x 12.2 m x 3.8 m (avg. depth) with a total volume of 1,120 m 3 ;
- each clarifier equipped with a circular sludge collector mechanism complete with corner sweep mechanisms, rapid sludge removal system and scum skimmers;

Return Activated Sludge System (to be modified)

- three (3) variable speed return sludge pumps each rated at 95.8 m 3 /h at 7.62 m T.D.H.; two pumps to be duty pumps feeding from two separate sludge hoppers each measuring 1.5 m x 1.2 m x 2.85 m SWD with the third pump to act as standby and feeding from either hopper; return sludge to be obtained from the rapid sludge removal system;
- two (2) 75 mm magnetic type flow meters capable of measuring between 15.9 m 3 /h and 95.8 m 3 /h;

Waste Activated Sludge System (to be modified)

- two (2) variable speed waste sludge pumps each rated at 34 m 3 /h at 9.14 m T.D.H. feeding from a common waste sludge hopper measuring 1.5 m x 1.2 m x 2.85 m SWD; waste sludge to be obtained from the clarifier scraper sump and scum hopper;
- one (1) 50 mm magnetic type flow meters capable of measuring between 3.6 m 3 /h and 34 m 3 /h;

Total Effluent Flow Metering (to be decommissioned)

- one (1) Parshall Flume located prior to chlorination and capable of measuring a maximum of 552 m 3 /h; the flume to measure all plant bypass flows in addition to the treated effluent;

Chlorination System (to be decommissioned)

- two (2) chlorine contact chambers, each consisting of a two pass tank measuring approx. 4.6 m x 3.6 m x 3.13 (avg. depth) for a total volume of 103 m 3 ;
- a sodium hypochlorite system consisting of a 1,800 L capacity storage tank and one (1) metering pump rated at 100 L/d including a standby gravity feed system;

Outfall Sewer

- a 400 mm diameter effluent sewer from the chlorine contact chamber to MH81A where plant effluent is combined with stormwater;
- a 750 mm diameter combined plant effluent and stormwater sewer from MH81A to the outfall to Grand River near the Elora Mill Dam;

Phosphorus Removal (to be decommissioned)

- one (1) 27,300 L capacity fibreglass reinforced plastic chemical storage tank;
- two (2) positive displacement, hydraulically operated diaphragm chemical metering pumps each capable of having it output manually varied over a 20:1 range of 75.7 L/h at 375 kPa to 3.785 L/h; each located in the control building;
- one (1) emergency chemical dewatering pump rated at 1.2 L/s at 15 m for emptying the chemical storage tank and discharging to a fitting on the wall of the control building;

Aerobic Digesters (to be decommissioned)

- two (2) aerobic digesters each measuring approx. 13.4 m x 6.1 m x 3.34 m SWD having a total volume of 547 m 3 ;
- two (2) rotary positive displacement type air blowers each rated at 1,494 m 3 /h at 55 kPa;
- eight (8) air diffusion header assemblies arranged for crossroll aeration within the digesters;
- two (2) submersible digested sludge pumps each rated at 34 m 3 /h at 6.09 m and discharging to the sludge thickening tank influent trough;

Sludge Thickening (to be decommissioned)

- two (2) sludge thickening tanks each measuring approx. 7.91 m x 1.8 m x 2.36 m (avg. depth) having a total volume of 67.1 m 3 ;
- two (2) wet pit sludge pumps each rated at 34 m 3 /h at 3 m T.D.H. to be used for transfer of thickened sludge to holding tank;

Digested Sludge Holding Tank (to be decommissioned)

- one (1) digested sludge holding tank located beneath the control building and measuring approx. 8.23 m x 6.3 m x 3.58 m SWD having a total volume of 17.4 m 3 ;
- one (1) duplex plunger sludge disposal pump rated at 45 m 3 /h at 13.4 m T.D.H. with discharge to the truck sludge loading facilities;

Supernatant Transfer Facilities (to be decommissioned)

- one (1) submersible supernatant return pump rated at 34 m 3 /h at 7.62 m and discharging to the aeration tanks;

MISCELLANEOUS

- all other controls, electrical equipment, instrumentation, piping, pumps, valves and appurtenances essential for the proper operation of the aforementioned sewage works;

all in accordance with the submitted supporting documents listed in Schedule A.

For the purpose of this environmental compliance approval, the following definitions apply:

"Act" means the Ontario Water Resources Act , R.S.O. 1990, Chapter 0.40, as amended;

"Annual Average Concentration" means the arithmetic mean of the *Monthly Average Concentrations* of a contaminant in the effluent calculated for any particular calendar year;

"Annual Average Loading" means the value obtained by multiplying the *Annual Average Concentration* of a contaminant by the *Average Daily Flow* over the same calendar year;

"Approval" means this entire document and any schedules attached to it, and the application;

" *Average Daily Flow* " means the cumulative total sewage flow to the sewage works during a calendar year divided by the number of days during which sewage was flowing to the sewage works that year;

" *BOD5* " (also known as TBOD 5) means five day biochemical oxygen demand measured in an unfiltered sample and includes carbonaceous and nitrogenous oxygen demand;

" *By-pass"* means any discharge from the *Works* that does not undergo any treatment or receives only partial treatment before it is discharged to the environment;

" *CBOD5* " means five day carbonaceous (nitrification inhibited) biochemical oxygen demand measured in an unfiltered sample;

" *Daily Concentration* " means the concentration of a contaminant in the effluent discharged over any single day, as measured by a composite or grab sample, whichever is required;

"Director" means a person appointed by the Minister pursuant to section 5 of the *EPA* for the purposes of Part II.1 of the *EPA;*

" *District Manager* " means the District Manager of the Guelph Office of the Ministry;

" *E. Coli* " refers to the thermally tolerant forms of Escherichia that can survive at 44.5 degrees Celsius;

"EPA" means the Environmental Protection Act , R.S.O. 1990, c.E.19, as amended;

" *Geometric Mean Density* " is the nth root of the product of multiplication of the results of n number of samples over the period specified;

"Ministry" means the ministry of the government of Ontario responsible for the *EPA* and *OWRA* and includes all officials, employees or other persons acting on its behalf;

" *Monthly Average Concentration* " means the arithmetic mean of all *Daily Concentrations* of a contaminant in the effluent sampled or measured, or both, during a calendar month;

" *Monthly Average Daily Flow* " means the cumulative total sewage flow to the sewage works during a calendar month divided by the number of days during which sewage was flowing to the sewage works that month;

" *Monthly Average Loading* " means the value obtained by multiplying the *Monthly Average Concentration* of a contaminant by the *Monthly Average Daily Flow* over the same calendar month:

" *Owner* " means The Corporation of the Township of Centre Wellington and includes its successors and assignees;

"OWRA" means the Ontario Water Resources Act , R.S.O. 1990, c. O.40, as amended;

" *Peak Flow Rate* " means the maximum rate of sewage flow for which the plant or process unit was designed;

"Previous Works" means those portions of the sewage works previously constructed and approved under an *Approval* ;

"Proposed Works" means the sewage works described in the Owner's application, this Approval, to the extent approved by this *Approval;*

" *Rated Capacity* " means the *Average Daily Flow* for which the *Works* are approved to handle;

" *Regional Director* " means the Regional Director of the West Central Region of the Ministry;

"Substantial Completion" has the same meaning as *"substantial performance* " in the Construction Lien Act ; and

"Works" means the sewage works described in the *Owner* 's application, and this *Approval* , and includes both *Proposed Works* and *Previous Works.*

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL PROVISION S

(1) The *Owner* shall ensure that any person authorized to carry out work on or operate any aspect of the *Works* is notified of this *Approval* and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

(2) Except as otherwise provided by these conditions, the *Owner* shall design, build, install, operate and maintain the *Works* in accordance with the description given in this *Approval* , and the application for approval of the *Works.*

(3) Where there is a conflict between a provision of any document in the schedule referred to in this *Approval* and the conditions of this *Approval* , the Conditions in this *Approval* shall take precedence, and where there is a conflict between the documents in the schedule, the document bearing the most recent date shall prevail.

(4) Where there is a conflict between the documents listed in the Schedule submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

(5) The Conditions of this *Approval* are severable. If any Condition of this *Approval* , or the application of any requirement of this *Approval* to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this *Approval* shall not be affected thereby.

(6) The approval granted by this *Approval* is based upon a review of the *Works* in the context of its effect on the environment, its process performance and general principles of wastewater engineering. The review did not include a consideration of the architectural, mechanical, electrical or structural components and minor details of the *Works* except to the extent necessary to review the *Works* .

2. EXPIRY OF APPROVAL

This *Approval* will cease to apply to those parts of the *Works* which have not been constructed within five (5) years of the date of this *Approval.*

3. CHANGE OF OWNER

(1) The *Owner* shall notify the *District Manager* and the *Director,* in writing, of any of the following changes within 30 days of the change occurring:

(a) change of *Owner* ;

(b) change of address of the *Owner* ;

(c) change of partners where the *Owner* is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act , R.S.O. 1990, c.B17 shall be included in the notification to the *District Manager* ;

(d) change of name of the corporation where the *Owner* is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act , R.S.O. 1990, c. C39 shall be included in the notification to the *District Manager* ;

(2) In the event of any change in ownership of the *Works* , other than a change to a successor municipality, the *Owner* shall notify in writing the succeeding owner of the existence of this *Approval,* and a copy of such notice shall be forwarded to the *District Manager* and the *Director* .

4. UPON THE SUBSTANTIAL COMPLETION OF THE WORKS

(1) Upon the *Substantial Completion* of the *Proposed Works,* the Owner shall prepare a statement, certified by a Professional Engineer, that the works are constructed in accordance with this *Approval* , and upon request, shall make the written statement available for inspection by Ministry personnel.

(2) Within six months of the *Substantial Completion* of the *Proposed Works,* a set of as-built drawings showing the works “as constructed” shall be prepared. These drawings shall be kept up to date through revisions undertaken from time to time and a copy shall be retained at the *Works* for the operational life of the *Works* .

5. BY-PASSES

(1) Any *By-pass* of sewage from any portion of the *Works* is prohibited, except where:

(a) it is necessary to avoid loss of life, personal injury, danger to public health or severe property damage;

(b) the *District Manager* agrees that it is necessary for the purpose of carrying out essential maintenance and the *District Manager* has given prior written acknowledgment of the *by-pass* ; or

(c) the *Regional Director* has given prior written acknowledgment of the *By-pass* .

(2) The *Owner* shall collect at least one (1) grab sample of the *By-pass* and have it analyzed for the parameters outlined in Condition 7, using the protocols in Condition 9.

(3) The *Owner* shall maintain a logbook of all *By-pass* events which shall include, at a minimum, the

time, location, duration, quantity of *By-pass* , the authority for *By-pass* pursuant to subsection (1), and the reasons for the occurrence.

(4) The *Owner* shall, in the event of a *By-pass* event pursuant to subsection (1), disinfect the by-passed effluent prior to it reaching the receiver such that the receiver is not negatively impacted.

6. EFFLUENT OBJECTIVES

(1) The *Owner* shall use best efforts to design, construct and operate the *Works* with the objective that the concentrations of the materials named below as effluent parameters are not exceeded in the effluent from the *Works* .

Table 1A - Effluent Objectives - until six months after commissioning of *Proposed Works*

Effluent Parameter	**Average Concentration** (milligrams per litre unless otherwise indicated)
CBOD5	15.0
Total Suspended Solids	15.0
Total Phosphorus	0.8

Table 1B - Effluent Objectives - six months after commissioning of *Proposed Works*

Effluent Parameter	**Average Concentration** (milligrams per litre unless otherwise indicated)	**Average Loading** (kilograms per day unless otherwise indicated)
CBOD5	8.0	40.0
Total Suspended Solids	8.0	40.0
Total Phosphorus	0.2	1.0
Total Ammonia Nitrogen	0.6 (May 1 to Nov 30) 3.0 (Dec 1 to Apr 30)	3.0 15.0
E. Coli	100 organisms per 100 mL Monthly *Geometric Mean Density*	-

(2) The *Owner* shall use best efforts to:

(a) maintain the pH of the effluent from the *Works* within the range of 6.5 - 9.0, inclusive, at all times;

(b) operate the works within the *Rated Capacity* of the *Works* ;

(c) ensure that the effluent from the *Works* is essentially free of floating and settleable solids and does not contain oil or any other substance in amounts sufficient to create a visible film or sheen or foam or discolouration on the receiving waters.

(3) The *Owner* shall include in all reports submitted in accordance with Condition 10 a summary of the efforts made and results achieved under this Condition.

7. EFFLUENT LIMITS

(1) The *Owner* shall design and construct the *Works* and operate and maintain the *Works* such that the concentrations of the materials named below as effluent parameters are not exceeded in the effluent from the *Works:*

Table 2A - Effluent Limits - until six months after commissioning of *Proposed Works*		
Effluent Parameter	**Average Concentration** (milligrams per litre unless otherwise indicated)	**Average Loading** (kilograms per day unless otherwise indicated)
CBOD5	25.0	76.65
Total Suspended Solids	25.0	76.65
Total Phosphorus	1.0	3.07
E. Coli	200 organisms per 100 mL Monthly *Geometric Mean Density*	-

Table 2B - Effluent Limits - six months after commissioning of *Proposed Works*		
Effluent Parameter	**Average Concentration** (milligrams per litre unless otherwise indicated)	**Average Loading** (kilograms per day unless otherwise indicated)
CBOD5	15.0	75.0
Total Suspended Solids	15.0	75.0
Total Phosphorus	0.3	1.5
Total Ammonia Nitrogen	2.0 (May 1 to Nov 30) 5.0 (Dec 1 to Apr 30)	10.0 25.0
E. Coli	200 organisms per 100 mL Monthly *Geometric Mean Density*	-

(2) For the purposes of determining compliance with and enforcing subsection (1):

Until six months after commissioning of *Proposed Works:*

(a) The *Annual Average Concentration* of *CBOD5* and Total Suspended Solids in Column 1 of Table 2A shall not exceed the corresponding maximum concentration set out in Column 2 of Table 2A.

(b) The *Monthly Average Concentration* of Total Phosphorus in Column 1 of Table 2A shall not exceed the corresponding maximum concentration set out in Column 2 of Table 2A.

(c) The *Annual Average Loading* of a parameter in Column 1 of Table 2A shall not exceed the corresponding maximum concentration set out in Column 3 of Table 2A.

Six months after commissioning of *Proposed Works:*

(a) The *Monthly Average Concentration* of a parameter named in Column 1 of Table 2B shall not exceed the corresponding maximum concentration set out in Column 2 of Table 2B.

(b) The *Monthly Average Loading* of a parameter named in Column 1 of Table 2B shall not exceed the corresponding maximum concentration set out in Column 3 of Table 2B.

(3) The pH of the effluent shall be maintained between 6.0 to 9.5, inclusive, at all times.

(4) Notwithstanding the subsections above, the *Owner* shall operate and maintain the *Works* such that the effluent is continuously disinfected so that the monthly *Geometric Mean Density* of *E. Coli* does not exceed 200 organisms per 100 millilitres of effluent discharged from the *Works.*

8. OPERATION AND MAINTENANCE

(1) The *Owner* shall exercise due diligence in ensuring that, at all times, the *Works* and the related equipment and appurtenances used to achieve compliance with this *Approval* are properly operated and maintained. Proper operation and maintenance shall include effective performance, adequate funding, adequate operator staffing and training, including training in all procedures and other requirements of this *Approval* and the *Act* and regulations, adequate laboratory facilities, process controls and alarms and the use of process chemicals and other substances used in the *Works* .

(2) The *Owner* shall prepare or update the operations manual within six (6) months of *Substantial Completion* of the *Proposed Works* , that includes, but not necessarily limited to, the following information:

(a) operating procedures for routine operation of the *Works* ;

(b) inspection programs, including frequency of inspection, for the *Works* and the methods or tests employed to detect when maintenance is necessary;

(c) repair and maintenance programs, including the frequency of repair and maintenance for the *Works* ;

(d) procedures for the inspection and calibration of monitoring equipment;

(e) a spill prevention control and countermeasures plan, consisting of contingency plans and procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations, including notification of the *District Manager* ; and

(f) procedures for receiving, responding and recording public complaints, including recording any followup actions taken.

(3) The *Owner* shall maintain the operations manual current and retain a copy at the location of the *Works* for the operational life of the *Works* . Upon request, the *Owner* shall make the manual available to *Ministry* staff.

(4) The *Owner* shall provide for the overall operation of the *Works* with an operator who holds a

licence that is applicable to that type of facility and that is of the same class as or higher than the class of the facility in accordance with Ontario Regulation 129/04.

9. MONITORING AND RECORDING

The *Owner* shall, upon commencement of operation of the *Works* , carry out the following monitoring program:

(1) All samples and measurements taken for the purposes of this *Approval* are to be taken at a time and in a location characteristic of the quality and quantity of the effluent stream over the time period being monitored.

(2) For the purposes of this condition, the following definitions apply:

(a) Weekly means once each week;
(b) Monthly means once each month;
(c) Quarterly means once every three months;

(3) Samples shall be collected at the following sampling points, at the frequency specified, by means of the specified sample type and analyzed for each parameter listed and all results recorded:

Table 3A - Raw Sewage Monitoring - prior to commissioning of *Proposed Works*		
Parameters	**Sample Type**	**Frequency**
CBOD5	Composite	Quarterly
Total Suspended Solids	Composite	Quarterly
Total Kjeldahl Nitrogen	Composite	Quarterly
Total Phosphorus	Composite	Quarterly

Table 3B - Raw Sewage Monitoring - upon commissioning of *Proposed Works*		
Parameters	**Sample Type**	**Frequency**
BOD5	Composite	Weekly
Total Suspended Solids	Composite	Weekly
Total Kjeldahl Nitrogen	Composite	Weekly
Total Phosphorus	Composite	Weekly

Table 4A - Effluent Monitoring - prior to commissioning of *Proposed Works*		
Parameters	**Sample Type**	**Frequency**
CBOD5	Composite	Monthly
Total Suspended Solids	Composite	Monthly
Total Phosphorus	Composite	Weekly
Total Ammonia Nitrogen	Composite	Weekly
E. Coli	Grab	Weekly
pH	Grab	Weekly
Temperature	Grab	Weekly

Table 4B - Effluent Monitoring - upon commissioning of *Proposed Works*		
Parameters	**Sample Type**	**Frequency**
CBOD5	Composite	Weekly
Total Suspended Solids	Composite	Weekly
Total Ammonia Nitrogen	Composite	Weekly
Total Phosphorus	Composite	Weekly
E. Coli	Grab	Weekly
pH	Grab	Weekly
Temperature	Grab	Weekly

Unionized Ammonia	Calculated	Weekly

(4) The methods and protocols for sampling, analysis and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

(a) the Ministry's Procedure F-10-1, “Procedures for Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works (Liquid Waste Streams Only), as amended from time to time by more recently published editions;

(b) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (January 1999), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions;

(c) the publication "Standard Methods for the Examination of Water and Wastewater" (21st edition), as amended from time to time by more recently published editions; and,

(5) The temperature and pH of the effluent from the *Works* shall be determined in the field at the time of sampling for Total Ammonia Nitrogen. The concentration of un-ionized ammonia shall be calculated using the total ammonia concentration, pH and temperature using the methodology stipulated in "Ontario's Provincial Water Quality Objectives" dated July 1994, as amended, for ammonia (un-ionized).

(6) The *Owner* shall install and maintain (a) continuous flow measuring device(s), to measure the flowrate of the influent to or effluent from the *Works* with an accuracy to within plus or minus 15 per cent (+/- 15%) of the actual flowrate for the entire design range of the flow measuring device, and record the flowrate at a daily frequency.

10. REPORTING

(1) One week prior to the start up of the operation of the *Proposed Works* , the *Owner* shall notify the *District Manager* (in writing) of the pending start up date.

(2) Ten (10) days prior to the date of a planned *By-pass* being conducted pursuant to Condition 5 and as soon as possible for an unplanned *By-pass* , the *Owner* shall notify the *District Manager* (in writing) of the pending start date, in addition to an assessment of the potential adverse effects on the environment and the duration of the *By-pass* .

(3) The *Owner* shall report to the *District Manager* or designate, any exceedence of any parameter specified in Condition 7 orally, as soon as reasonably possible, and in writing within seven (7) of the exceedance.

(4) In addition to the obligations under Part X of the Environmental Protection Act , the *Owner* shall, within 10 working days of the occurrence of any reportable spill as defined in Ontario Regulation 675/98, bypass or loss of any product, by-product, intermediate product, oil, solvent, waste material or any other polluting substance into the environment, submit a full written report of the occurrence to the *District Manager* describing the cause and discovery of the spill or loss, clean-up and recovery measures taken, preventative measures to be taken and schedule of implementation.

(5) The *Owner* shall, upon request, make all manuals, plans, records, data, procedures and supporting documentation available to *Ministry* staff.

(6) The *Owner* shall prepare, and submit to the *District Manager* a performance report, on an annual

basis, within ninety (90) days following the end of the period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the *Works* and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:

(a) a summary and interpretation of all monitoring data and a comparison to the effluent limits outlined in Condition 7, including an overview of the success and adequacy of the *Works* ;

(b) a description of any operating problems encountered and corrective actions taken;

(c) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the *Works* ;

(d) a summary of any effluent quality assurance or control measures undertaken in the reporting period;

(e) a summary of the calibration and maintenance carried out on all effluent monitoring equipment; and

(f) a description of efforts made and results achieved in meeting the Effluent Objectives of Condition 6.

(g) a tabulation of the volume of sludge generated in the reporting period, an outline of anticipated volumes to be generated in the next reporting period and a summary of the locations to where the sludge was disposed;

(h) a summary of any complaints received during the reporting period and any steps taken to address the complaints; and

(i) a summary of all *By-pass* , spill or abnormal discharge events.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the *Works* are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the *Approval* and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. The condition also advises the Owners their responsibility to notify any person they authorized to carry out work pursuant to this *Approval* the existence of this *Approval* .

2. Condition 2 is included to ensure that the *Works* are constructed in a timely manner so that standards applicable at the time of Approval of the *Works* are still applicable at the time of construction, to ensure the ongoing protection of the environment.

3. Condition 3 is included to ensure that the *Ministry* records are kept accurate and current with respect to the approved works and to ensure that subsequent owners of the *Works* are made aware of the *Approval* and continue to operate the *Works* in compliance with it.

4. Condition 4 is included to ensure that the *Works* are constructed in accordance with the approval and that record drawings of the *Works* "as constructed" are maintained for future references.

5. Condition 5 is included to indicate that by-passes of untreated sewage to the receiving watercourse is prohibited, save in certain limited circumstances where the failure to *By-pass* could result in greater injury to the public interest than the *By-pass* itself where a *By-pass* will not violate the approved effluent requirements, or where the *By-pass* can be limited or otherwise mitigated by handling it in accordance with an approved contingency plan. The notification and documentation requirements allow the *Ministry* to take action in an informed manner and will ensure the *Owner* is aware of the extent and frequency of *By-pass* events.

6. Condition 6 is imposed to establish non-enforceable effluent quality objectives which the *Owner* is obligated to use best efforts to strive towards on an ongoing basis. These objectives are to be used as a mechanism to trigger corrective action proactively and voluntarily before environmental impairment occurs and before the compliance limits of Condition 7 are exceeded.

7. Condition 7 is imposed to ensure that the effluent discharged from the *Works* to the Grand River meets the *Ministry* 's effluent quality requirements thus minimizing environmental impact on the receiver and to protect water quality, fish and other aquatic life in the receiving water body.

8. Condition 8 is included to require that the *Works* be properly operated, maintained, funded, staffed and equipped such that the environment is protected and deterioration, loss, injury or damage to any person or property is prevented. As well, the inclusion of a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the owner and made available to the *Ministry* . Such a manual is an integral part of the operation of the *Works* . Its compilation and use should assist the *Owner* in staff training, in proper plant operation and in identifying and planning for contingencies during possible abnormal conditions. The manual will also act as a benchmark for *Ministry* staff when reviewing the *Owner'* s operation of the work.

9. Condition 9 is included to enable the *Owner* to evaluate and demonstrate the performance of the *Works* , on a continual basis, so that the *Works* are properly operated and maintained at a level which is consistent with the design objectives and effluent limits specified in the *Approval* and that the *Works* does not cause any impairment to the receiving watercourse.

10. Condition 10 is included to provide a performance record for future references, to ensure that the *Ministry* is made aware of problems as they arise, and to provide a compliance record for all the terms and conditions outlined in this *Approval,* so that the *Ministry* can work with the *Owner* in resolving any problems in a timely manner.

Schedule A

1. Final plans and specifications prepared by R.V. Anderson Associates Limited;
2. Application for amendment submitted by Marc Ethier of the Ontario Clean Water Agency dated June 20, 1996;
3. Application for Approval of Sewage Works submitted by Christine Furlong of Triton Engineering Services Limited received on December 30, 2011, for the proposed expansion and upgrades to a rated capacity of 5,000 m 3 /d, including Design Report and engineering drawings.

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). 9418-5NMH5J issued on August 8, 2003.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

1. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The environmental compliance approval number;
6. The date of the environmental compliance approval;
7. The name of the Director, and;
8. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal 's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 11th day of May, 2012

Mansoor Mahmood, P.Eng.
Director
appointed for the purposes of Part II.1 of the *Environmental Protection Act*

FL/
c: District Manager, MOE Guelph
Water Standards Section, MOE Standards Development Branch
Christine Furlong, P. Eng., Triton Engineering Services Limited

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Appendix F

Tech Memo – Sanitary Sewer Capacity Assessment – 127 First Line and 159 First Line (Burnside, dated Sept 2026)

R.J. Burnside & Associates Limited 292 Speedvale Avenue West Unit 20 Guelph ON N1H 1C4 CANADA
telephone (519) 823-4995 **fax** (226) 526-9660 **web** www.rjburnside.com

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Technical Memorandum

Date: September 11, 2026 **Project No.:** 300060179.0000

Project Name: Sanitary Sewer Capacity Assessment - 127 First Line and 159 First Line

Client Name: Elora Greens Inc. and WrightHaven Homes

Submitted To: Mr. Farhan Kamali Siddiqui & Mr. Steven Wright

Submitted By: Angela Kroetsch, P.Eng.

1.0 Introduction

Elora Greens Inc. (Elora Greens) has retained R.J. Burnside & Associates Limited (Burnside) to complete the preliminary engineering design necessary to support a Draft Plan of Subdivision application for the residential development of 127 First Line located on the south side of First Line in Elora, between Bridge Street and Spencer Drive. The site is approximately 21.6 ha (53.4 ac) in size and is located within the jurisdiction of the Township of Centre Wellington (Township), County of Wellington (County) and the Grand River Conservation Authority (GRCA). Elora Greens is intending to develop between 299-684 residential units, including the associated municipal roads / rights-of-way, parkland / trails and stormwater management facility at the site.

The lands immediately adjacent to the subject lands (located to the east), known as 159 First Line (42.3 ha or 104.5 ac) and owned by WrightHaven Homes, are also planned for residential development. It is understood that WrightHaven Homes is also planning to development between 455-602 residential units, including the associated municipal roads / rights-of-way, parkland / trails and stormwater management facilities.

Based on pre-consultation comments received from the Township of Centre Wellington for both the 127 First Line and 159 First Line lands, as well as subsequent follow up discussions with the Township, both Elora Greens and WrightHaven Homes have been actively collaborating and coordinating the sanitary servicing strategy for the development of both parcels.

In response to the pre-consultation comments received from the Township (dated September 19, 2025), Burnside has undertaken an investigation into the existing gravity sanitary sewer system to identify the following:

- The theoretical capacity of existing gravity sanitary sewer system from First Line to both the Stafford Street Sewage Pumping Station (SPS) and the Clyde Street Sewage Pumping Station (SPS) and ultimately to the Township of Centre Wellington (Elora) Wastewater Treatment Plant (WWTP)
- The available unused capacity in the existing gravity sanitary sewer system that could potentially be utilized to service the proposed development of both 127 First Line and 159 First Line
- The anticipated peak sanitary sewer flows generated from the Phase 1 development areas for both 127 First Line and 159 First Line
- The ability of the existing gravity sanitary sewer system to convey the anticipated peak sanitary sewer flows generated from the Phase 1 development areas for both 127 First Line and 159 First Line

This technical memorandum summarizes the results of the investigation, including the calculations for the theoretical capacity of the existing gravity sanitary sewer system, the available unused capacity in the existing gravity sanitary sewer system, the anticipated peak sanitary sewer flow rates for the 127 First Line and 159 First Line Phase 1 development areas and the ability of the existing gravity sanitary sewer system to convey both the existing peak flow rates and the anticipated flow rates resulting from the Phase 1 development.

2.0 Existing Gravity Sanitary Sewer System

The existing gravity sanitary sewer system, from First Line to the Stafford Street SPS, Clyde Street SPS and ultimately to the Township of Centre Wellington (Elora) WWTP, consists of the following sanitary sewers:

- 200 mm diameter sanitary sewer on First Line
- 200 mm diameter and 250 mm diameter sanitary sewer on Spencer Drive (from First Line to the intersection of Stafford Street and Spencer Drive)
- 300 mm diameter sanitary sewer on Stafford Street (from the intersection of Stafford Street and Spencer Drive to the Stafford Street SPS)
- 150 mm diameter forcemain on Strafford Street (from the Stafford Street SPS to the intersection of Stafford Street and Bridge Street)
- 300 mm diameter sanitary sewer on Bridge Street (from the intersection of Stafford Street and Bridge Street to the intersection of Water Street and Bridge Street)
- 375 mm and 400 mm diameter sanitary sewers on Water Street (from the intersection of Water Street and Bridge Street to the intersection of Water Street and Clyde Street)
- 375 mm and 525 mm diameter sanitary sewers on Clyde Street (from the intersection of Water Street and Clyde Street to the Clyde Street SPS)

A copy of the Township’s record drawings illustrating the existing gravity sanitary sewer system have been included in Appendix A.

From the Township's record drawings for First Line, Spencer Drive, Stafford Street, Bridge Street, Water Street and Clyde Street, the existing condition peak flow rates and pipe capacity in the existing sanitary sewer system were calculated. The existing condition peak flow rates were calculated completed using an average daily per capita flow of 350 L/cap/d and an infiltration flow of 0.15 L/ha/s. The estimated population was calculated based on the number of existing residential units in the catchment area for each reach of existing sanitary sewer and the persons per unit (ppu) identified in Schedule 3 of the Township of Centre Wellington Development Charges Background Study – Consolidated Report (Watson & Associates Economists Ltd. dated March 24, 2026).

The calculated peak flow rate and minimum pipe capacity for each section of sanitary sewer are as follows:

- The existing 200 mm diameter gravity sanitary sewer on First Line has a peak design flow rate of 1 L/s and a maximum capacity of 22 L/s.
- The existing 200 mm diameter gravity sanitary sewer on Spencer Drive has a peak design flow rate of 1 L/s and a maximum capacity of 23 L/s.
- The existing 250 mm diameter gravity sanitary sewer on Spencer Drive has a peak design flow rate of 2 L/s and a maximum capacity of 41 L/s.
- The existing 300 mm diameter gravity sanitary sewer on Stafford Street has a peak design flow rate of 14 L/s and a maximum capacity that ranges from 59 L/s to 68 L/s.
- The existing 300 mm diameter gravity sanitary sewer on Bridge Street has a peak design flow rate of 34 L/s. The maximum capacity in the existing 300 mm diameter gravity sanitary sewer on Bridge Street ranges from 63 L/s to 118 L/s.
- The existing 375 mm diameter gravity sanitary sewer on Water Street has a peak design flow rate of 54 L/s. The maximum capacity in the existing 375 mm diameter gravity sanitary sewer on Water Street ranges from 124 L/s to 136 L/s.
- The exiting 400 mm diameter gravity sanitary sewer on Water Street has a peak design flow rate of 56 L/s. The maximum capacity in the existing 400 mm diameter gravity sanitary sewer on Water Street ranges from 85 L/s to 102 L/s.
- The existing 375 mm diameter gravity sanitary sewer on Clyde Street has a peak design flow rate of 73 L/s. The maximum capacity in the existing 375 mm diameter gravity sanitary sewer on Clyde Street is 124 L/s.
- The existing 525 mm diameter gravity sanitary sewer on Clyde Street has a peak design flow rate of 159 L/s. The maximum capacity in the existing 525 mm diameter gravity sanitary sewer on Clyde Street is 471 L/s.

A copy of the existing conditions sanitary sewer design calculation sheet, which identifies the theoretical capacity of existing gravity sanitary sewer system from First Line to both the Stafford Street Sewage Pumping Station (SPS) and the Clyde Street Sewage Pumping Station (SPS) and ultimately to the Township of Centre Wellington (Elora) Wastewater Treatment Plant (WWTP), has been included in Appendix B.

Based on a comparison of the existing condition peak design flow rates against the maximum capacity in the existing gravity sanitary sewer system, the available unused capacity in the existing gravity sanitary sewer system was determined to be 16.4 L/s. This represents 80% of the available unused capacity in the existing 200 mm diameter gravity sanitary sewer on Spencer Drive (between First Line and Stafford Street).

3.0 Peak Sanitary Sewer Flow Rates From the Phase 1 Development Areas For Both 127 First Line and 159 First Line

In support of Draft Plan approval, the anticipated sanitary sewer flow rates generated from the Phase 1 development area for both 127 First Line and 159 First Line have been calculated. As outlined in the Township of Centre Wellington Development Charges Background Study - Consolidated Report (dated March 24, 2026), the anticipated sanitary sewer flow rates have been calculated based on the following criteria:

- Average daily per capita flow of 350 L/cap/d
- An infiltration flow of 0.15 L/ha/s
- 3.278 people per unit for low density development (singles)
- 3.278 people per unit for low density development (semis)
- 2.351 people per unit for low density development (townhouses)
- 1.837 people per unit for apartments

The anticipated peak sanitary sewer flow rates generated for 127 First Line and 159 First Line, respectively, are summarized in Table 1 and Table 2 as follows:

Table 1: Peak Sanitary Sewer Flow Rate for 127 First Line – Phase 1 ONLY

	Unit Type	# of Units	Population	Area (ha)	Peaking Factor	Peak Flow Rate (L/s)	Infiltration Flow Rate (L/s)	TOTAL Peak Flow Rate (L/s)
Block 1	Low Density (Singles)	3	10	0.35	-	-	-	-
Block 1	Low Density (Townhouses)	16	38	0.35	-	-	-	-
Block 4	Low Density (Townhouses)	11	26	0.48	-	-	-	-
Block 5	Low Density (Townhouses)	30	71	0.57	-	-	-	-
Block 6	Low Density (Townhouses)	48	113	0.88	-	-	-	-
TOTAL			**257**	**2.63**	**4.0**	**4.16**	**0.39**	**4.55**

Table 2: Peak Sanitary Sewer Flow Rate for 159 First Line – Phase 1 ONLY

	Unit Type	# of Units	Population	Area (ha)	Peaking Factor	Peak Flow Rate (L/s)	Infiltration Flow Rate (L/s)	TOTAL Peak Flow Rate (L/s)
Block 1	Low Density (Singles)	37	121	1.42	-	-	-	-
Block 2	Low Density (Singles)	7	23	0.26	-	-	-	-
Block 3	Low Density (Singles)	9	30	0.29	-	-	-	-
Block 4	Low Density (Singles)	9	30	0.33	-	-	-	-
Block 5	Low Density (Singles)	20	66	0.80	-	-	-	-
Block 6	Low Density (Semis)	8	26	0.29	-	-	-	-
Block 7	Low Density (Semis)	9	30	0.32	-	-	-	-
Block 8	Low Density (Townhouses)	10	24	0.34	-	-	-	-
Block 9	Low Density (Singles)	22	72	0.78	-	-	-	-
Block 10	Low Density (Townhouses)	16	38	0.56	-	-	-	-
TOTAL			**458**	**5.39**	**3.994**	**7.41**	**0.81**	**8.22**

Figure 1 illustrates the limits of the Phase 1 sanitary sewer servicing area for both 127 First Line and 159 First Line.

As outlined above, the anticipated peak sanitary sewer flow rate for Phase 1 of the 127 First Line and 159 First Line developments has been calculated to be 4.55 L/s and 8.22 L/s, respectively. Therefore, the total anticipated peak sanitary sewer flow rate to be conveyed by the existing gravity sanitary sewer system is 12.77 L/s, which is less than the maximum available unused capacity in the existing gravity sanitary sewer system of 16.4 L/s.

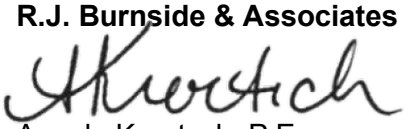
A copy of the sanitary sewer design calculation sheet utilized to calculate the anticipated peak sanitary sewer flow rates for 127 First Line and 159 First Line has been appended (see Appendix C).

Therefore, the existing gravity sanitary sewer system has sufficient capacity to convey the anticipated peak sanitary sewer flow rates generated from the Phase 1 development areas for both 127 First Line and 159 First Line.

4.0 Conclusion

Based on the data available from the existing gravity sanitary sewer system, existing gravity sanitary sewer system, from First Line to the Stafford Street SPS, Clyde Street SPS and ultimately to the Township of Centre Wellington (Elora) WWTP, has sufficient unused capacity to adequately convey the anticipated peak flows generated from the Phase 1 development of 127 First Line and 159 First Line.

R.J. Burnside & Associates Limited



Angela Kroetsch, P.Eng.
Project Engineer

AK:js/af

Enclosure(s) Appendix A: Plan and Profile Drawings
Appendix B: Existing Condition Sanitary Sewer Calculations
Appendix C: Proposed Condition Sanitary Sewer Calculations

cc: Angela Kroetsch, P.Eng., R.J. Burnside & Associates Limited
Dan Ferguson, MBA, P.Eng., PMP, WalterFedy
Ashley Klashoff, CET, WalterFedy

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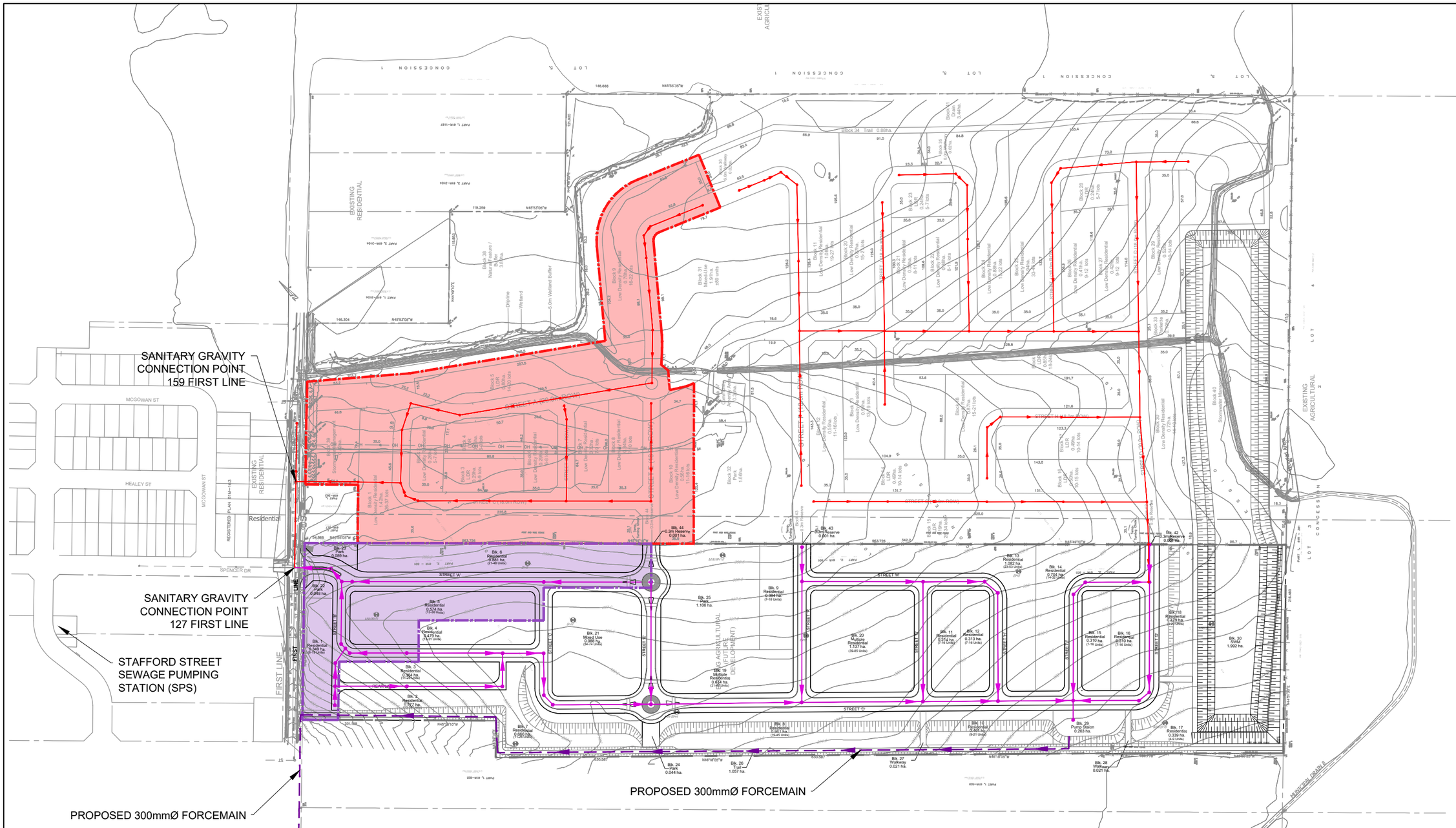


LEGEND

- PROPERTY LINE
- 401.5 EXISTING GROUND CONTOUR
- SWM SAN EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- PROPOSED SANITARY SEWER
- 127 1ST LINE PHASE 1 SANITARY SEWER AREA (TOTAL OF 3.2ha AND 108 UNITS)
- 159 1ST LINE PHASE 1 SANITARY SEWER AREA (TOTAL OF 8.5ha AND147 UNITS)
- 159 1ST LINE PHASE 1 SANITARY SEWER

BURNSIDE

Client: **ELORA GREENS INC.**

Figure Title: **127 & 159 FIRST LINE TOWNSHIP OF CENTRE WELLINGTON (ELORA)**

PHASE 1 - GRAVITY SANITARY SERVICING AREA

Drawn	Checked	Date	Figure No.
M.M.	M.B.	AUGUST 2026	FIG1
Scale		Project No.	
1:4000		060179	

File: u:\060179\0000\03-PRD\FSR FIGURES\060179 - PH1 - SSWR AREA.dwg Date Plotted: September 4, 2026 - 12:55 PM

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

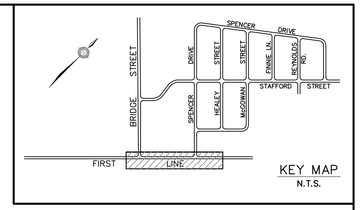
e

Appendix A

Plan and Profile Drawings

CONSTRUCTION

NOTE:
SEE DRAWINGS SL-1 TO SL-5 FOR HYDRO ROAD CROSSING DETAILS



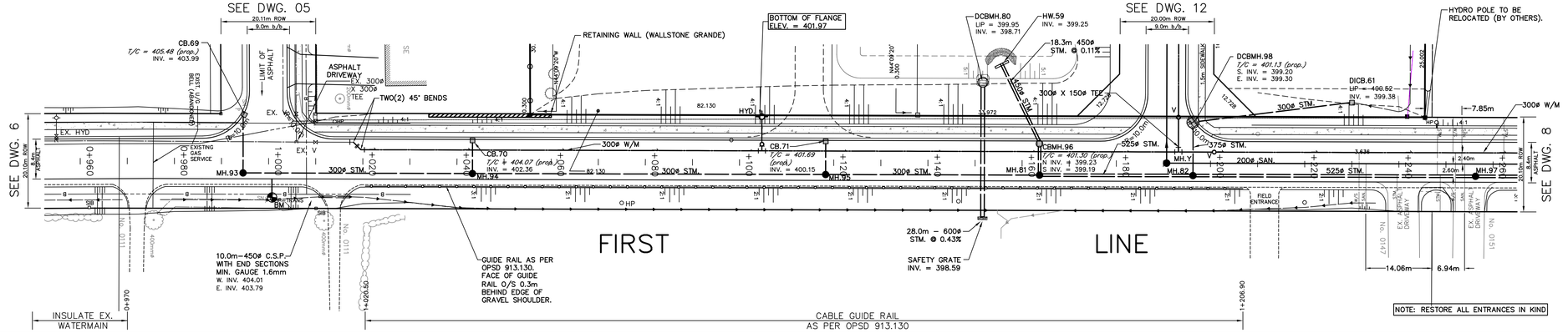
KEY MAP
N.T.S.

BRIDGE STREET

SEE DWG. 05

SPENCER DRIVE

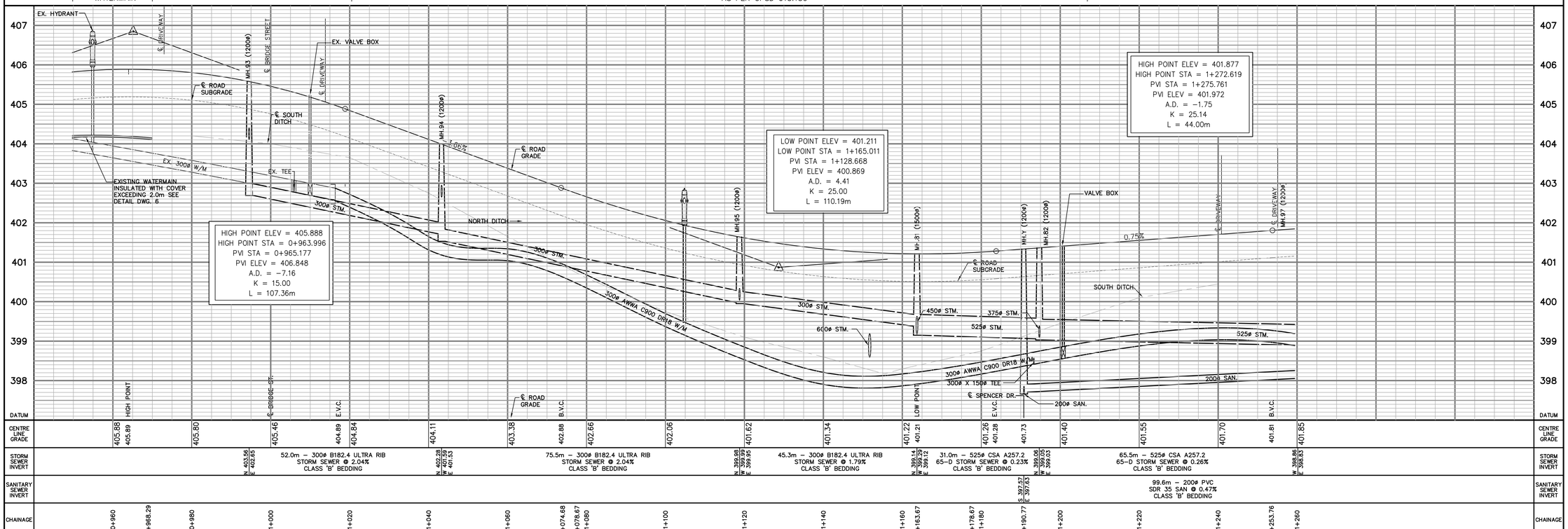
SEE DWG. 12



NOTE: RESTORE ALL ENTRANCES IN KIND

LEGEND:

- PROPERTY LINE
- EX. STORM SEWER
- PROP. STORM SEWER
- PROP. CATCH BASIN
- PROP. CATCH BASIN MANHOLE
- EX. FIRE HYDRANT
- PROP. FIRE HYDRANT
- DRAINAGE FLOW
- T/G = 337.33 — TOP OF GRADE (REAR YARD CB'S)
- T/C = 337.74 — TOP OF CURB (CB'S & DCB'S)
- SWALE
- REMOVE AND DISPOSE TREES



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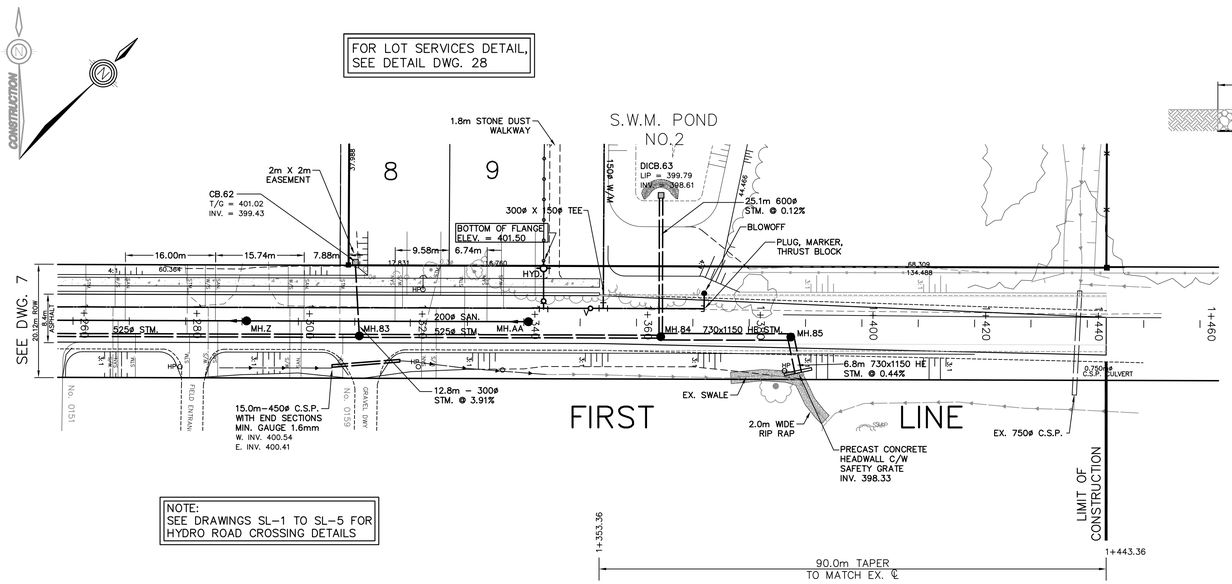
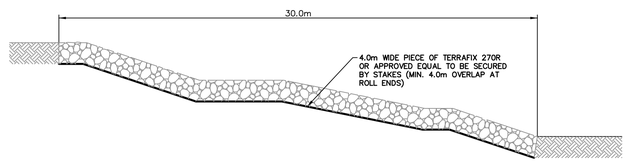
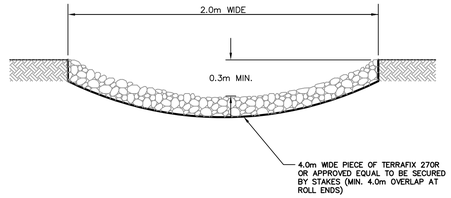
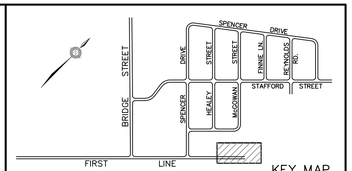






FILTER FABRIC MAT DETAILS
N.T.S.

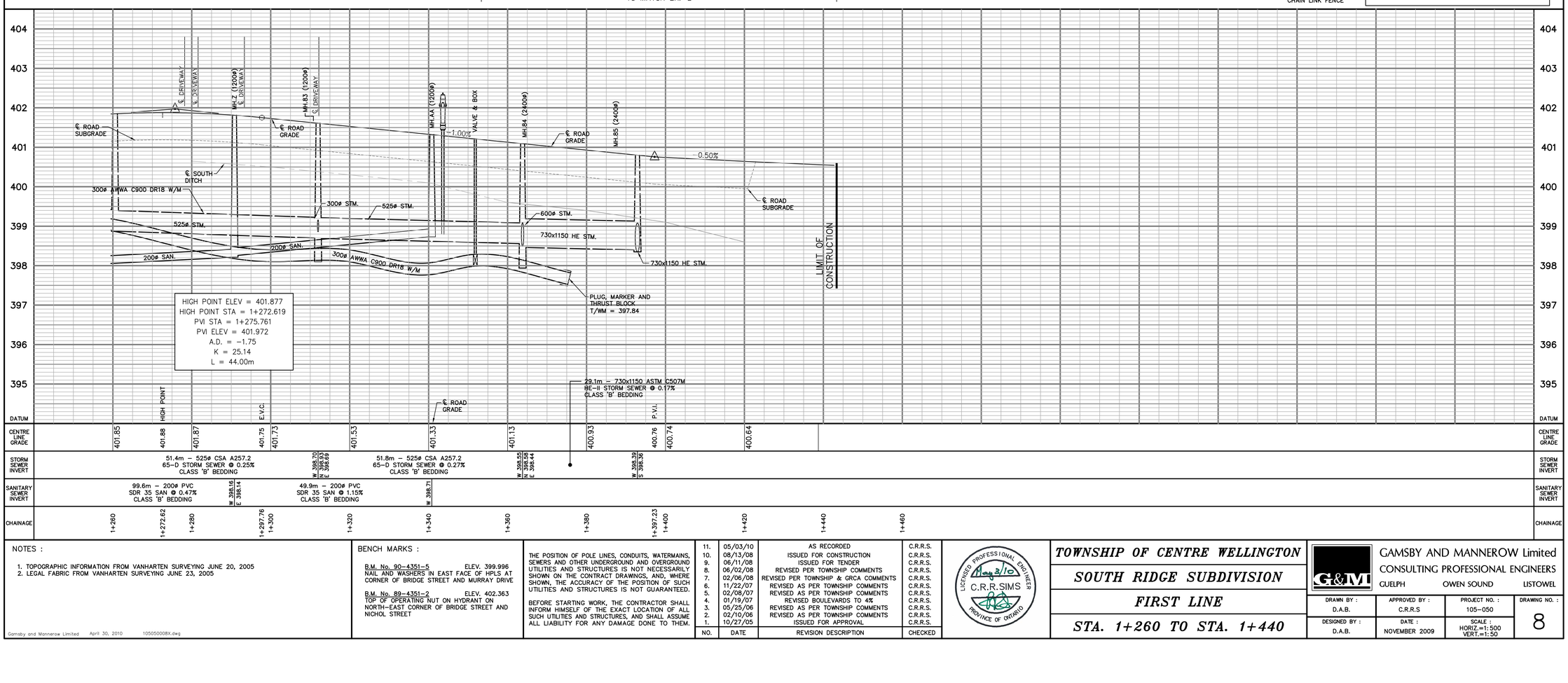


KEY MAP
N.T.S.

1.5m HIGH BLACK VINYL COATED, HEAVY DUTY CHAIN LINK FENCE

LEGEND:

- PROPERTY LINE
- EX. STORM SEWER
- PROP. STORM SEWER
- PROP. CATCH BASIN
- PROP. CATCH BASIN MANHOLE
- EX. FIRE HYDRANT
- PROP. FIRE HYDRANT
- DRAINAGE FLOW
- T/G = 337.33 — TOP OF GRATE (REAR YARD CB'S)
- T/C = 337.74 — TOP OF CURB (CB'S & DCB'S)
- SWALE
- SAN — 100ø PVC SDR–28 SANITARY LATERAL SERVICE IN CLASS "B" BEDDING
- W/S — 19ø TYPE "K" SOFT COPPER WATER SERVICE LATERAL
- STM. — 100ø PVC SDR–28 STORM LATERAL SERVICE IN CLASS "B" BEDDING



NOTES :

1. TOPOGRAPHIC INFORMATION FROM VANHARTEN SURVEYING JUNE 20, 2005
2. LEGAL FABRIC FROM VANHARTEN SURVEYING JUNE 23, 2005

BENCH MARKS :

B.M. No. 90–4351–5 ELEV. 399.996
NAIL AND WASHERS IN EAST FACE OF HPLS AT CORNER OF BRIDGE STREET AND MURRAY DRIVE

B.M. No. 89–4351–2 ELEV. 402.363
TOP OF OPERATING NUT ON HYDRANT ON NORTH–EAST CORNER OF BRIDGE STREET AND NICHOL STREET

THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED.

BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES, AND SHALL ASSUME ALL LIABILITY FOR ANY DAMAGE DONE TO THEM.

NO.	DATE	REVISION DESCRIPTION	CHECKED
11.	05/03/10	AS RECORDED	C.R.R.S.
10.	08/13/08	ISSUED FOR CONSTRUCTION	C.R.R.S.
9.	06/11/08	ISSUED FOR TENDER	C.R.R.S.
8.	06/02/08	REVISED PER TOWNSHIP COMMENTS	C.R.R.S.
7.	02/06/08	REVISED PER TOWNSHIP & GRCA COMMENTS	C.R.R.S.
6.	11/22/07	REVISED AS PER TOWNSHIP COMMENTS	C.R.R.S.
5.	02/08/07	REVISED AS PER TOWNSHIP COMMENTS	C.R.R.S.
4.	01/19/07	REVISED BOULEVARDS TO 4%	C.R.R.S.
3.	05/25/06	REVISED AS PER TOWNSHIP COMMENTS	C.R.R.S.
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1.	10/27/05	ISSUED FOR APPROVAL	C.R.R.S.

LICENSED PROFESSIONAL ENGINEER C.R.R.SIMS PROVINCE OF ONTARIO

TOWNSHIP OF CENTRE WELLINGTON
SOUTH RIDGE SUBDIVISION
FIRST LINE
STA. 1+260 TO STA. 1+440

GAMSBY AND MANNEROW Limited
CONSULTING PROFESSIONAL ENGINEERS
GUELPH OWEN SOUND LISTOWEL

DRAWN BY :	APPROVED BY :	PROJECT NO. :	DRAWING NO. :
D.A.B.	C.R.R.S	105–050	8
DESIGNED BY :	DATE :	SCALE :	
D.A.B.	NOVEMBER 2009	HORIZ.=1:500 VERT.=1:50	

CONSTRUCTION

SEE DWG. 07

FIRST LINE

SEE DWG. 07

NOTE:
SEE DRAWINGS SL-1 TO SL-5 FOR HYDRO ROAD CROSSING DETAILS

SEE DWG. 20

McGOWAN STREET

FOR LOT SERVICES DETAIL, SEE DETAIL DWG. 28

SEE DWG. 10

STAFFORD STREET

SEE DWG. 09

STAFFORD STREET

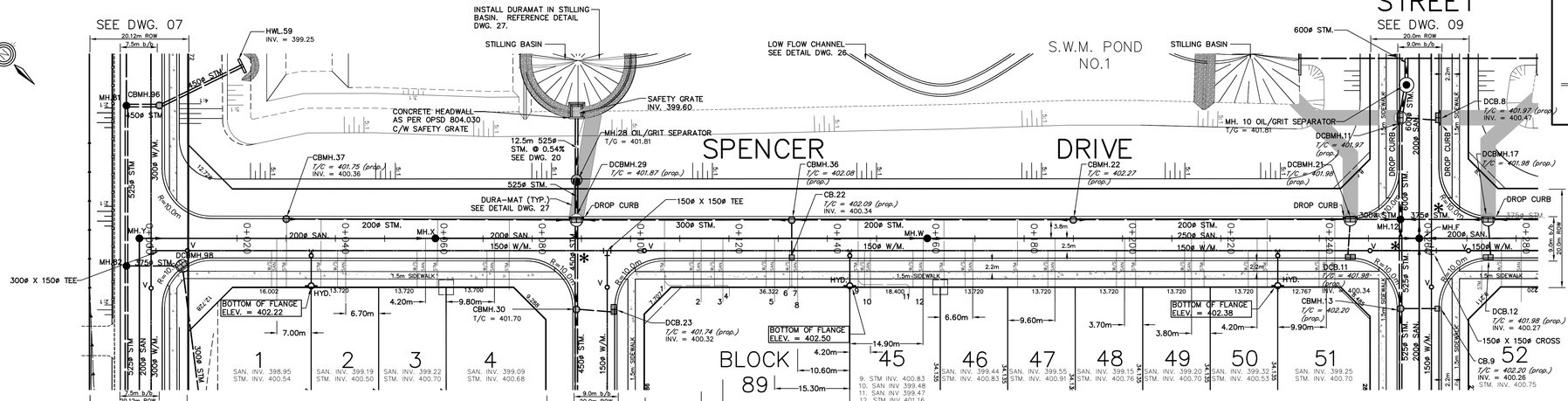
SEE DWG. 13

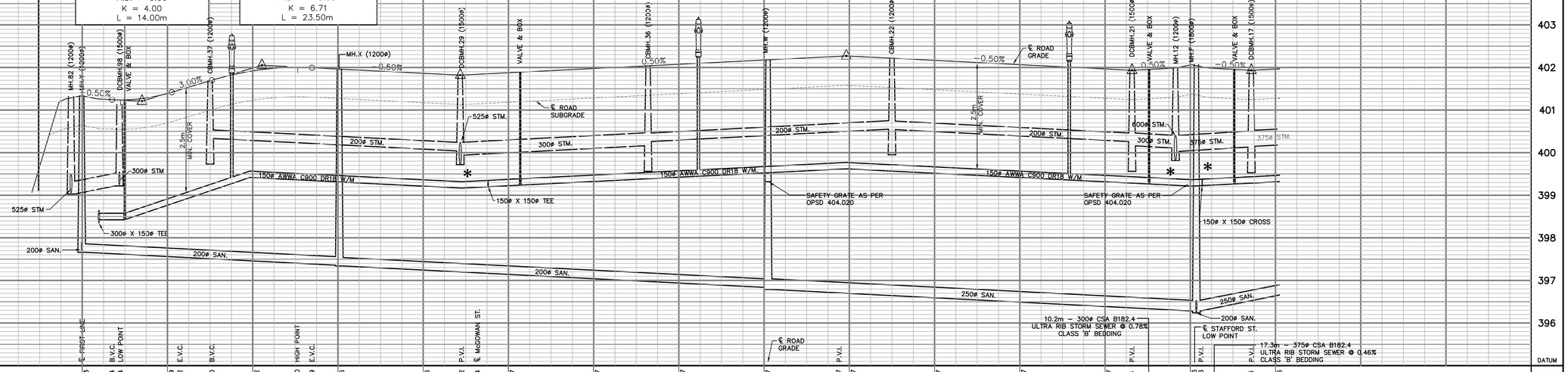
DEPRESSED CURB FOR EMERGENCY OVERFLOW

KEY MAP
N.T.S.

LEGEND:

- PROPERTY LINE
- EX. STORM SEWER
- PROP. STORM SEWER
- PROP. CATCH BASIN
- PROP. CATCH BASIN MANHOLE
- EX. FIRE HYDRANT
- PROP. FIRE HYDRANT
- DRAINAGE FLOW
- T/G = 337.33 — TOP OF GRATE (REAR YARD CB'S)
- T/C = 337.74 — TOP OF CURB (CB'S & DCB'S)
- SWALE
- * — DEFLECT WATERMAIN UNDER SEWER MINIMUM CLEARANCE TO BE 0.5m
- SAN — 100ø PVC SDR-28 SANITARY LATERAL SERVICE IN CLASS "B" BEDDING
- W/S — 19ø TYPE "K" SOFT COPPER WATER SERVICE LATERAL
- STM — 100ø PVC SDR-28 STORM LATERAL SERVICE IN CLASS "B" BEDDING





NOTES :

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3.	05/25/06	REVISED AS PER TOWNSHIP COMMENTS	C.R.R.S.
2.	02/10/06	REVISED AS PER TOWNSHIP COMMENTS	C.R.R.S.
1.	10/27/05	ISSUED FOR APPROVAL	C.R.R.S.

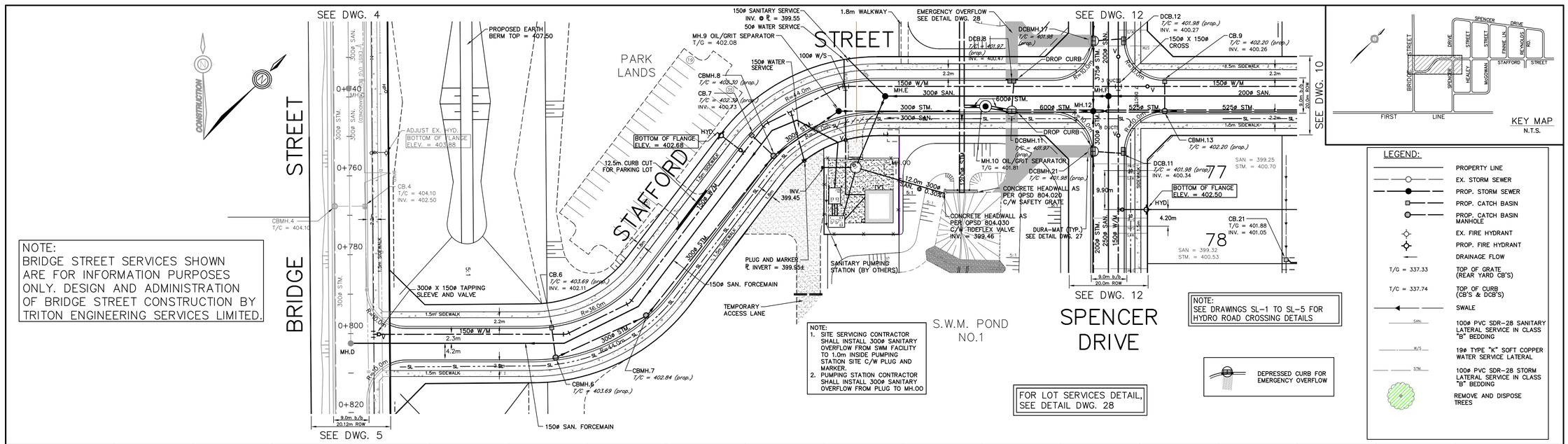
LICENSED PROFESSIONAL ENGINEERS C.R.R.SIMS PROVINCE OF ONTARIO

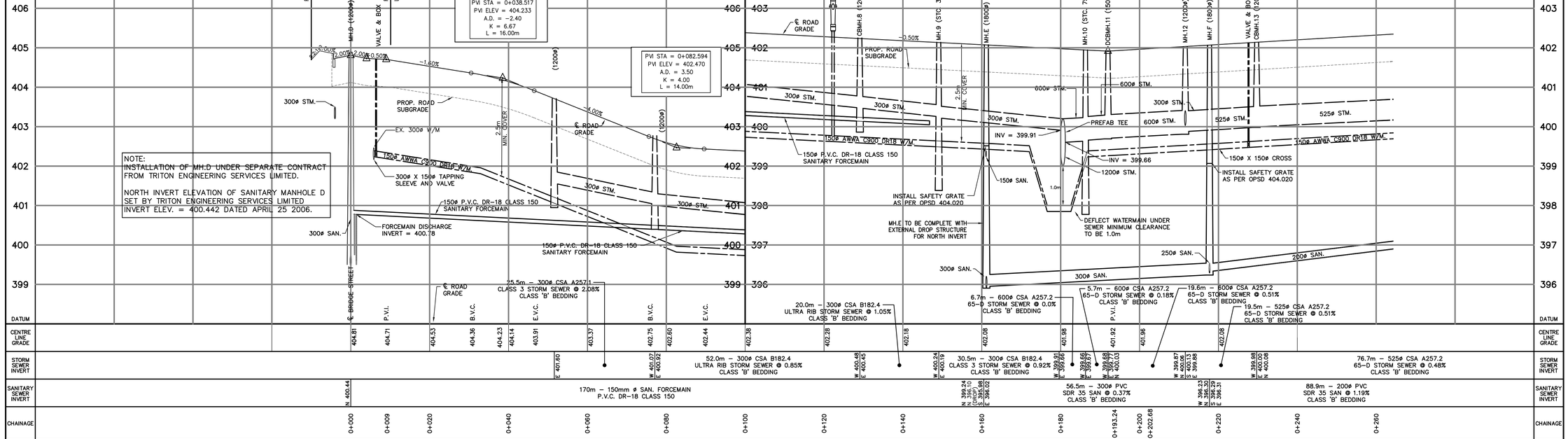
TOWNSHIP OF CENTRE WELLINGTON
SOUTH RIDGE SUBDIVISION
SPENCER DRIVE
STA. 0+000 TO STA. 0+280

GAMSBY AND MANNEROW Limited
CONSULTING PROFESSIONAL ENGINEERS
GUELPH OWEN SOUND LISTOWEL

DRAWN BY :	APPROVED BY :	PROJECT NO. :	DRAWING NO. :
D.A.B.	C.R.R.S	105-050	12
DESIGNED BY :	DATE :	SCALE :	
D.A.B.	NOVEMBER 2009	HORIZ.=1:500 VERT.=1:50	

Gamsby and Mannerow Limited April 30, 2010 105050012X.dwg





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LICENSED PROFESSIONAL ENGINEER C.R.R.SIMS PROVINCE OF ONTARIO

TOWNSHIP OF CENTRE WELLINGTON
SOUTH RIDGE SUBDIVISION
STAFFORD STREET
STA. 0+000 TO STA. 0+260

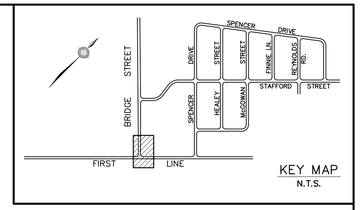
GAMSBY AND MANNEROW Limited
CONSULTING PROFESSIONAL ENGINEERS
GUELPH OWEN SOUND LISTOWEL

DRAWN BY :	APPROVED BY :	PROJECT NO. :	DRAWING NO. :
D.A.B.	C.R.R.S	105-050	9
DESIGNED BY :	DATE :	SCALE :	
D.A.B.	NOVEMBER 2009	HORIZ.=1:500 VERT.=1:50	

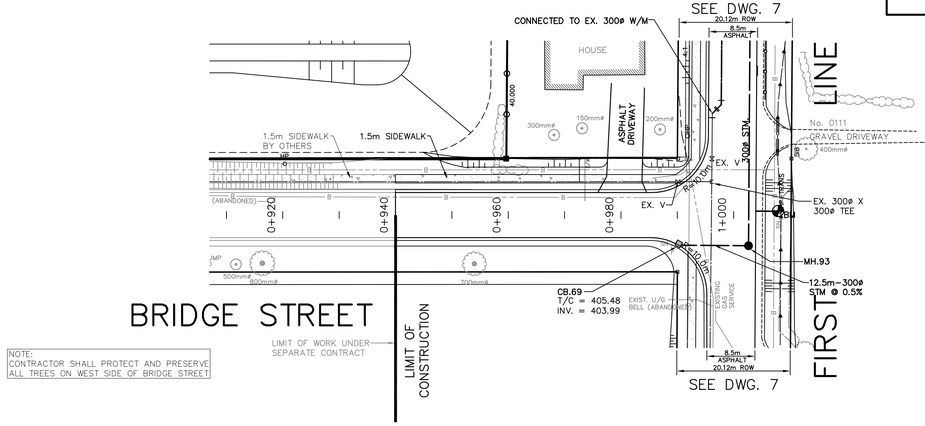
CONSTRUCTION

NOTE:
THIS DRAWING IS FOR INFORMATION PURPOSES ONLY. DESIGN AND ADMINISTRATION OF BRIDGE STREET CONSTRUCTION BY TRITON ENGINEERING SERVICES LIMITED.

NOTE:
SEE DRAWINGS SL-1 TO SL-5 FOR HYDRO ROAD CROSSING DETAILS



KEY MAP
N.T.S.

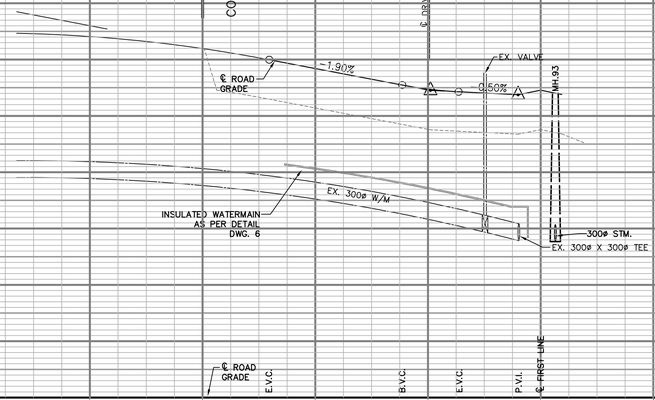


NOTE:
CONTRACTOR SHALL PROTECT AND PRESERVE ALL TREES ON WEST SIDE OF BRIDGE STREET

LEGEND:
- PROPERTY LINE
- EX. STORM SEWER
- PROP. STORM SEWER
- PROP. CATCH BASIN
- PROP. CATCH BASIN MANHOLE
- EX. FIRE HYDRANT
- PROP. FIRE HYDRANT
- DRAINAGE FLOW
- T/G = 337.33 — TOP OF GRATE (REAR YARD CB'S)
- T/C = 337.74 — TOP OF CURB (CB'S & DCB'S)
- SWALE
- REMOVE AND DISPOSE TREES

HIGH POINT ELEV = 406.471
HIGH POINT STA = 0+901.954
PVI STA = 0+894.340
PVI ELEV = 407.090
A.D. = -4.38
K = 26.26
L = 115.00m

PVI STA = 0+980.442
PVI ELEV = 405.454
A.D. = 1.40
K = 7.14
L = 10.00m



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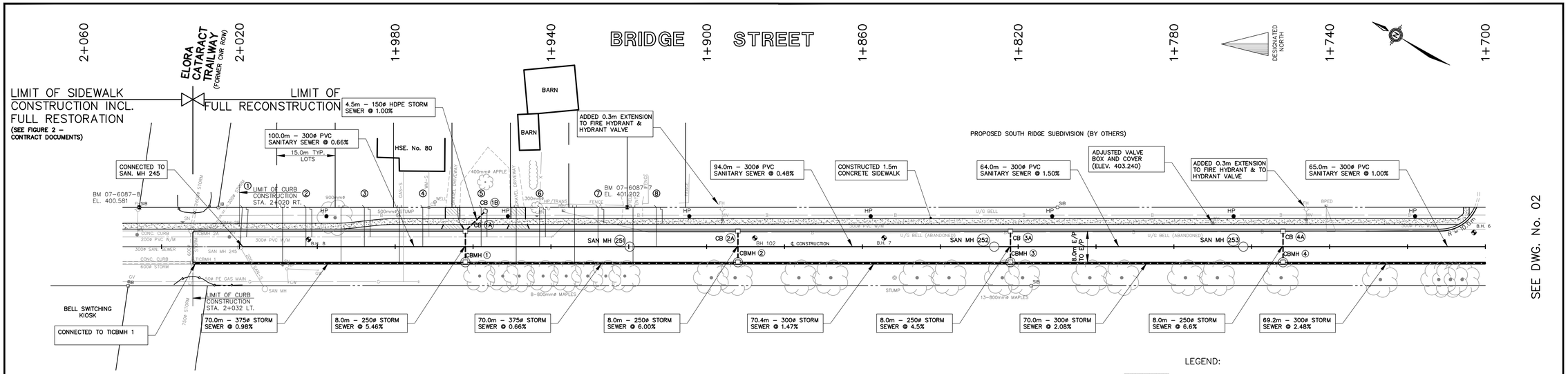


B.M. No. 07–6087–7 Elev. 401.202
IRON BAR ON EAST SIDE OF BRIDGE STREET AT STA. 1+904.7.

B.M. No. 07–6087–8 Elev. 400.581
TOP OPERATING NUT OF FIRE HYDRANT ON EAST SIDE OF BRIDGE STREET, NORTH OF ELORA CATARACT TRAILWAY

NOTES:

1. INSTALLED 90ø BELL DUCT FROM STA. 2+045 TO 1+705 TO SERVICE PROPOSED SUBDIVISION (SEE TYPICAL ROAD SECTION FOR LOCATIONS)
2. FOR DETAILS REGARDING UNDERGROUND ELECTRICAL SERVICING OF PROPOSED LOTS 1–8, REFER TO DRAWING SK–1 IN CONTRACT DOCUMENTS.

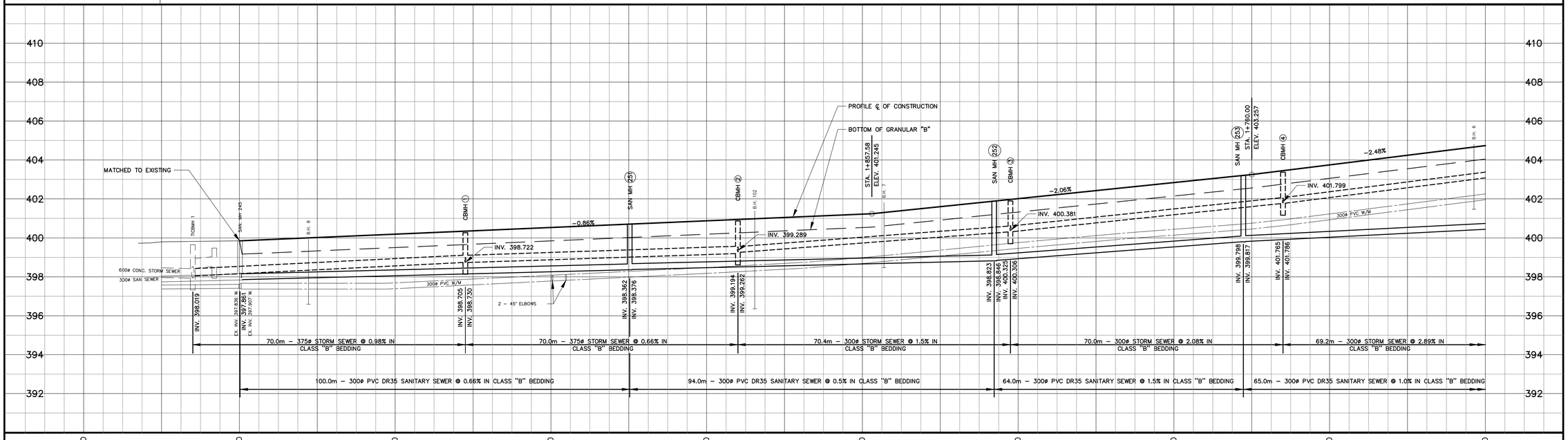
LEGEND:

50mm HL3C, 150mm GRAN."A", 150mm GRAN."B"

BH 8 BOREHOLE LOCATIONS TAKEN FROM GEOTECHNICAL INVESTIGATION PREPARED BY ENGLAND NAYLOR ENGINEERING LTD. DATED APRIL 21, 1995, PROJECT No. 1095G1.R01

BH 102 BOREHOLE LOCATIONS TAKEN FROM GEOTECHNICAL INVESTIGATION PREPARED BY NAYLOR ENGINEERING ASSOCIATES LTD. DATED SEPTEMBER 14, 2005, PROJECT No. 3244G2.R01

NEW STORM SEWER SERVICE
NEW SANITARY SERVICE
NEW WATER SERVICE
HP NEW HYDRO POLE BY OTHERS



NOTES

THE LOCATION OF UTILITIES IS APPROXIMATE ONLY AND SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED. THE CONTRACTOR SHALL PROVE THE LOCATION OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION AGAINST DAMAGE.

No	DATE	REVISION	INITIAL
3.	APR. 2010	RECORD INFORMATION	d.g.d.
2.	JUL. 2008	ISSUED FOR TENDER	d.g.d.
1.	FEB. 2007	ISSUED FOR M.O.E. APPROVAL	d.g.d.

RECONSTRUCTION OF
BRIDGE STREET
(ELORA)

TOWNSHIP OF CENTRE WELLINGTON
P.O. BOX 10, 1 MACDONALD SQUARE
ELORA, ONTARIO N0B 1S0

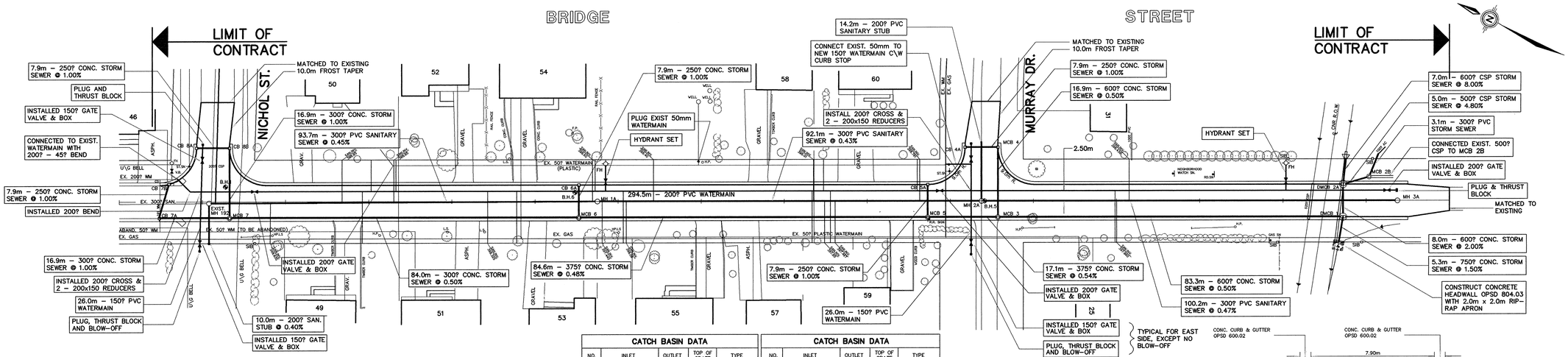
PLAN AND PROFILE
STATION 1+700 TO STATION 2+020

CONTRACT No	T–06–08
PROJECT No	M6087
DRAWN BY:	A.S.B. (AutoCAD)
CHECKED BY:	D.G.D.
APPROVED BY:	D.B.M.
DATE:	JUNE, 2006

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

SCALES
1:500 HORIZONTAL
1:100 VERTICAL

DRAWING NUMBER **01**



B.M. No. 90–4351–5 Elev. 399.996
NAIL AND WASHERS IN EAST FACE OF HPLS @ STA. 0+435.5 O\S RT. ON BRIDGE STREET AT MURRAY DRIVE.

B.M. No. 89–4351–2 Elev. 402.363
TOP OF OPERATING NUT ON HYDRANT ON NORTH–EAST CORNER OF BRIDGE STREET AND NICHOL STREET.

NOTES:

1. INSTALLED 20mm WATER SERVICES FROM 200? WATERMAIN TO PROPERTY LINE AT HSE No.s 49, 50, 52, 53, 54, 55, 57, 58, 59, 60, 25 AND STA. 0+350 Lt. INCLUDING 50x75 MARKER AT PROPERTY LINE
2. INSTALL 20mm WATER SERVICE FROM 200? WATERMAIN AND RECONNECT TO EXIST. SERVICE AT PROPERTY LINE, HSE No.51
3. EXISTING 50mm WATERMAIN ON BRIDGE ST. CONNECTED TO 150? WATERMAIN AND REMAIN IN SERVICE.
4. INSTALLED 150mm PVC SANITARY SERVICE FROM NEW SAN. SEWER TO PROPERTY LINE AT HSE. No.s 49, 50, 51, 52, 53, 54, 55, 57, 58, 59, 60, 31, 25 AND STA. 0+348.5 Lt. INCLUDING 50x75 MARKER AT PROPERTY LINE.
5. EXTENDED EXIST. 19mm WATER SERVICE @ STA. 0+229.8 TO WEST PROPERTY LINE TO SERVICE VACANT LOT.

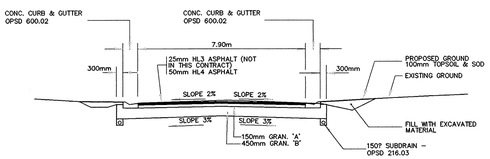
CATCH BASIN DATA

NO.	INLET	OUTLET	TOP OF GRATE	TYPE
CB 8A CB 8B	-------- FROM 8A – 399.819	399.898 399.769	401.150 401.150	OPSD 705.02 TYPE 'A'
CB 7A CB 7B MCB 7	-------- FROM 7A – 399.819 FROM 8B – 399.600 FROM 7B – 399.600	399.898 399.769 399.393	401.409 401.409 401.260	OPSD 705.02 TYPE 'A' OPSD 701.01
CB 6A MCB 6	-------- FROM 6A – 399.155 FROM 7 – 399.005	399.234 398.922	400.550 400.500	705.02 TYP. 'A' OPSD 701.01
CB 5A MCB 5	-------- FROM 5A – 398.660 FROM 6 – 398.514	398.739 398.468	400.150 400.150	705.02 TYP. 'A' OPSD 701.01
CB 4A MCB 4	-------- FROM 4A – 398.660	398.739 398.635	400.280 400.280	705.02 TYP. 'A' OPSD 701.01

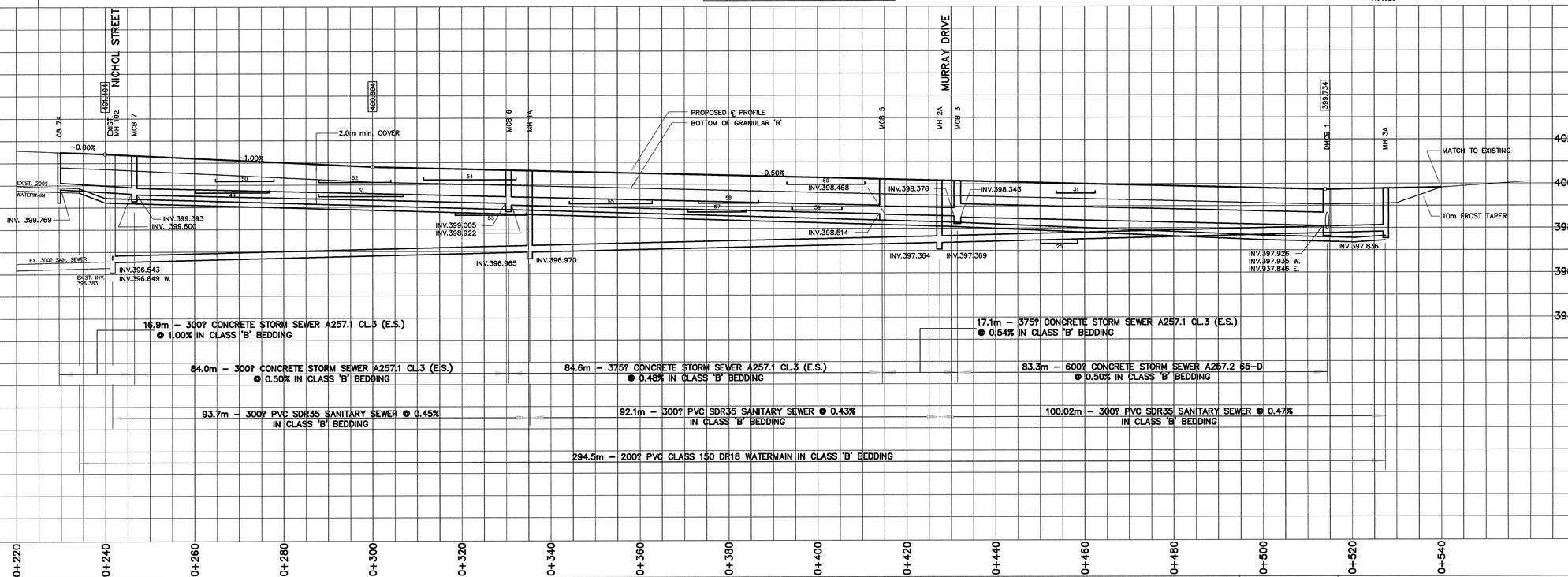
NOTE: CB & MCB TO HAVE 600mm SUMPS

CATCH BASIN DATA

NO.	INLET	OUTLET	TOP OF GRATE	TYPE
MCB 3	FROM 5 – 398.376 FROM 4 – 398.550	398.343	400.070	OPSD 701.02
DMCB 2A	FROM 400? & 600? – 398.391 FROM 2B – 398.436	398.341	399.655	OPSD 703.02
MCB 2B	FROM 500? – 398.531	398.531	399.480	OPSD 701.02
DMCB 1	FROM 2A – 397.846 FROM 3 – 397.926	397.935	399.655	OPSD 703.02
OUTLET H'WALL	--------	397.731	-----	OPSD 804.03
400? INLET	398.825	-----	-----	OPSD 801.02
600? INLET	398.655	-----	-----	OPSD 801.02



TYPICAL ROAD SECTION
N.T.S.



1. THE LOCATION OF UTILITIES IS APPROXIMATE ONLY AND SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED. THE CONTRACTOR SHALL PROVE THE LOCATION OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION AGAINST DAMAGE.

1	MAR.,1992	"AS RECORDED"	g.m.

RECONSTRUCTION OF
BRIDGE STREET

VILLAGE OF ELORA
BOX 508 – 136 METCALFE STREET
ELORA, ONTARIO N0B 1S0

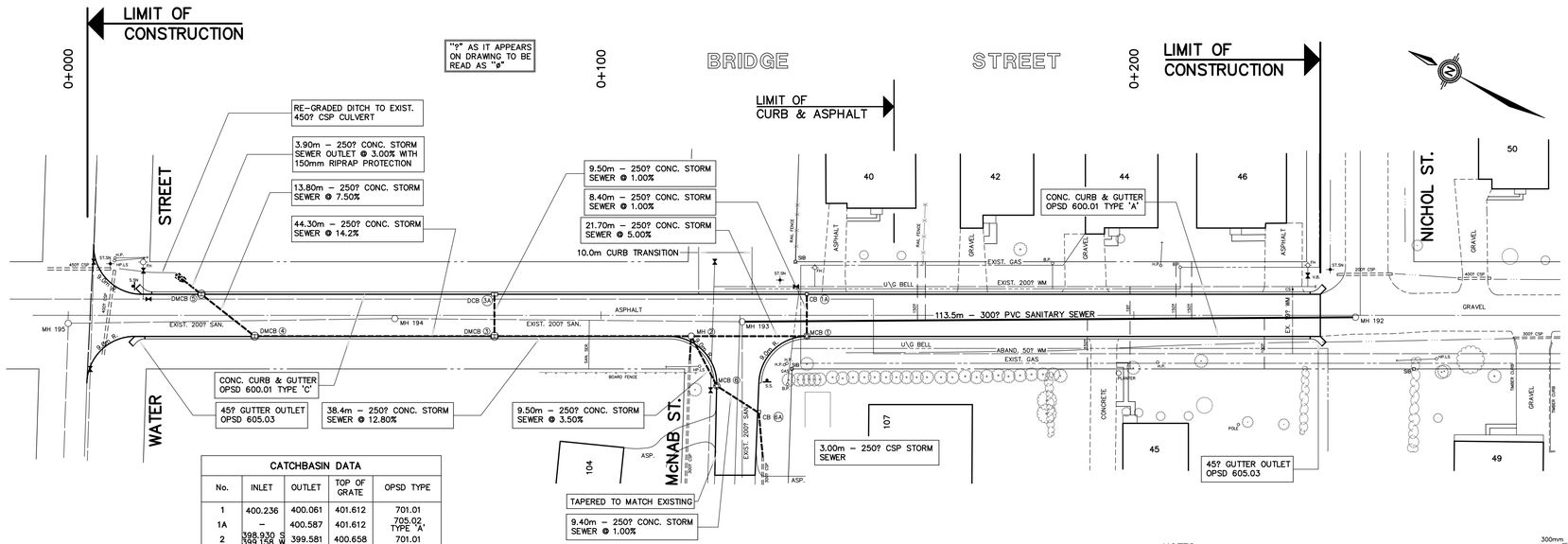
M4351

PLAN AND PROFILE
STATION 0+220 TO STATION 0+540

g.m.
D.A.H.
D.B.M.
MAY, 1991

1 : 500
1 : 100

2



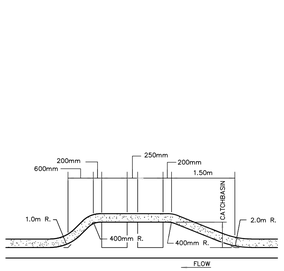
CATCHBASIN DATA				
No.	INLET	OUTLET	TOP OF GRATE	OPSD TYPE
1	400.236	400.061	401.612	701.01
1A	–	400.587	401.612	705.02 TYPE 'A'
2	398.930 S 399.158 W	399.581	400.658	701.01
3	394.169 S & E	398.881	395.526	705.01
3A	–	394.065	395.526	705.01
4	387.642	387.615	388.936	703.01
5	386.573	386.537	387.861	703.01
OUTLET	–	386.422	–	–
6	399.720	399.688	401.190	701.01
6A	399.825	399.956	401.174	705.02 TYPE 'A'
INLET	399.831	–	–	–

B.M. No.89–4351–3 Elev. 387.992
TOP OF OPERATING NUT ON HYDRANT, SOUTH–EAST CORNER OF BRIDGE ST. AND WATER STREET.

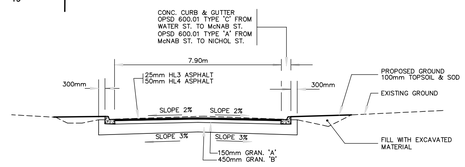
B.M. No.89–4351–1 Elev. 402.596
TOP OF OPERATING NUT ON HYDRANT IN FRONT OF HOUSE No.40, CORNER OF BRIDGE ST. AND McNAB ST

NOTES:

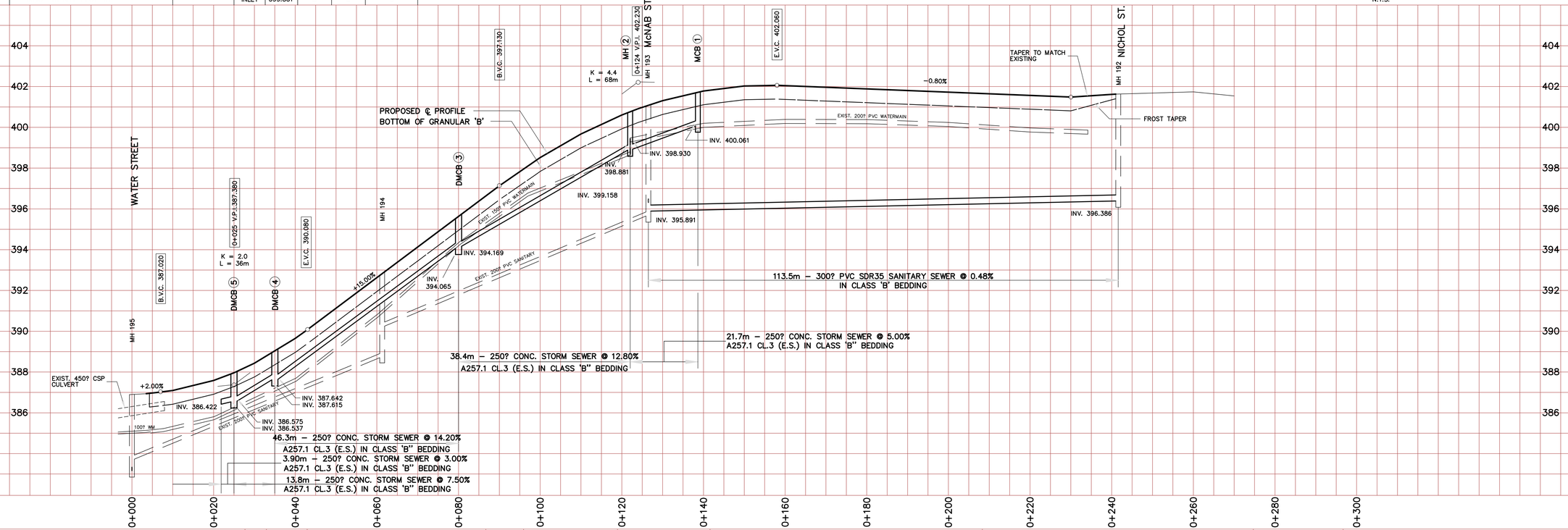
1. CURB SETBACK REQUIRED FOR DMCB 3, DCB 3A, DMCB 4 AND DMCB 5. FOR DETAIL SEE THIS DRAWING.
2. RECONNECT SANITARY SERVICES FROM HOUSE No.40, 42, 44, 45 AND 46 TO NEW 300ø SANITARY SEWER.



DETAIL OF TYPICAL CURB SETBACK
N.T.S.



TYPICAL ROAD SECTION
N.T.S.



1. THE LOCATION OF UTILITIES IS APPROXIMATE ONLY AND SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED. THE CONTRACTOR SHALL PROVE THE LOCATION OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION AGAINST DAMAGE.

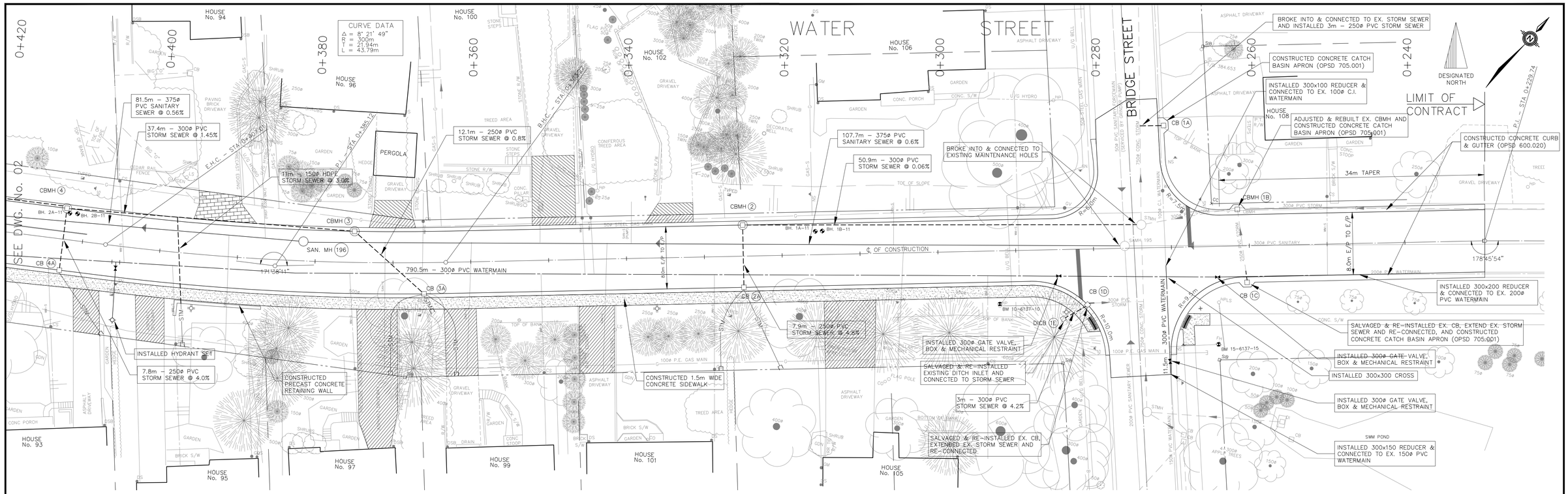
1	JULY'90	"AS RECORDED"	g.m.

RECONSTRUCTION OF
BRIDGE STREET

VILLAGE OF ELORA
BOX 508 – 136 METCALFE STREET
ELORA, ONTARIO N0B 1S0

PLAN AND PROFILE
WATER STREET TO STATION 0+300

M4351
g.m. (AutoCAD)
D.A.H.
D.B.M.
AUGUST, 1989
1 : 500
1 : 100
1



NOTES:

1. INSTALLED NEW 25mm WATER SERVICE FROM NEW 300mm WATERMAIN TO PROPERTY LINE AND CONNECTED TO EXISTING FOR HOUSE No. 94, 95, 96, 97, 99, 100, 101, 102, 105, AND 106
2. CONNECTED EXISTING 100mm SANITARY SERVICE TO NEW 375mm SANITARY SEWER FOR HOUSE No. 94, 95, 96, 97, 99, 100, 101, 102, 105, AND 106
3. INSTALLED NEW 100mm STORM SERVICE AND PROPERTY MARKER FROM STORM SEWER TO PROPERTY LINE AT No. 95, 97, 99, 101, AND 105

LEGEND:

- 50mm HL3F, 100mm GRAN."A", 200mm GRAN."B"
- BRICK PAVERS, 30mm SAND BASE, 200mm GRAN."A"
- 100mm GRAN."A", 200mm GRAN."B"
- BH. 1–11 BOREHOLE LOCATIONS TAKEN FROM GEOTECHNICAL INVESTIGATION PREPARED BY L.V.M. DATED FEB. 22, 2011, REF. No. 160–P038136–0100–GE–0001–00
- STM PROPOSED STORM SERVICE
- TACTILE PLATE
- 381.76 BOR TOP OF BEDROCK

B.M. 15–6137–15 Elev. 388.429
TOP NUT OF FIRE HYDRANT ON SOUTH EAST CORNER OF WATER STREET AND BRIDGE STREET

NOTES

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No	DATE	REVISION	INITIAL
4.	FEB. 2017	RECORD INFORMATION	d.g.d.
3.	APR. 2015	ISSUED FOR TENDER	d.g.d.
2.	DEC. 2014	ISSUED FOR G.R.C.A. APPROVAL	d.g.d.
1.	DEC. 2014	ISSUED FOR M.O.E. APPROVAL	d.g.d.

RECONSTRUCTION OF
WATER STREET
(ELORA)

TOWNSHIP OF CENTRE WELLINGTON
1 MACDONALD SQUARE
ELORA, ONTARIO N0B 1S0

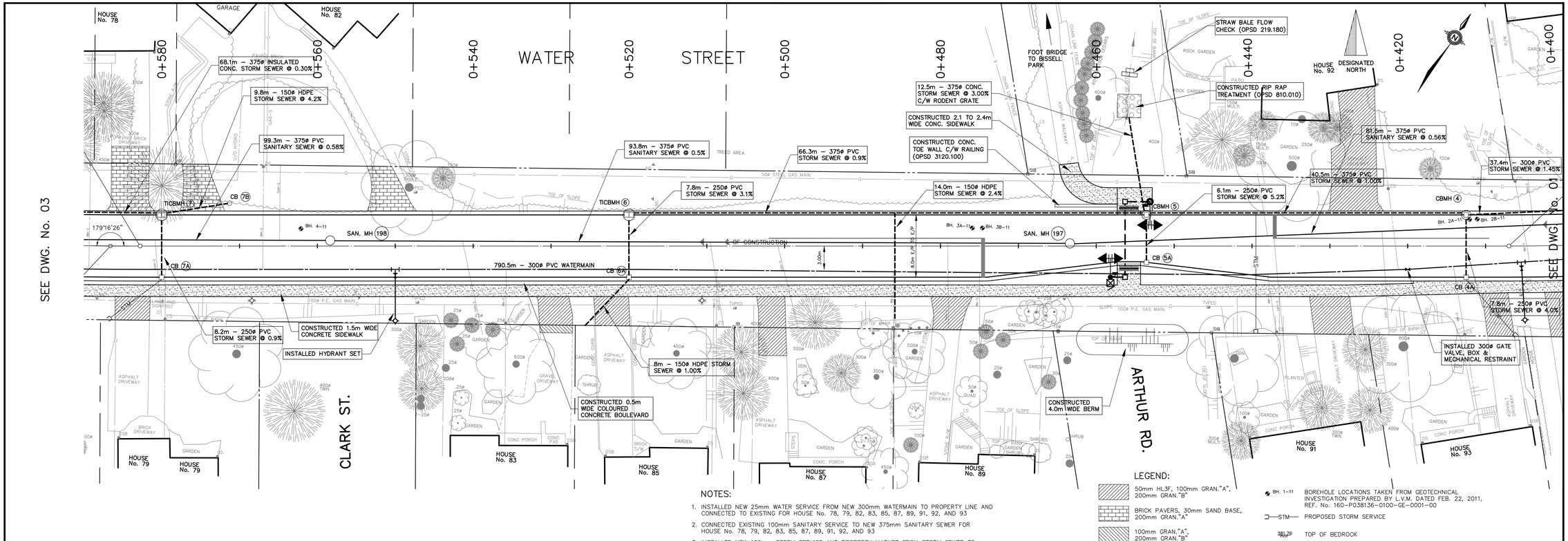
PLAN AND PROFILE
BRIDGE STREET TO STA. 0+420

CONTRACT No	T–11–15
PROJECT No	M6137
DRAWN BY:	A.S.B. (MACAD)
CHECKED BY:	P.F.Z.
APPROVED BY:	D.G.D.
DATE:	AUGUST, 2014

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

SCALES
1:250 HORIZONTAL
1:50 VERTICAL

DRAWING NUMBER **01**

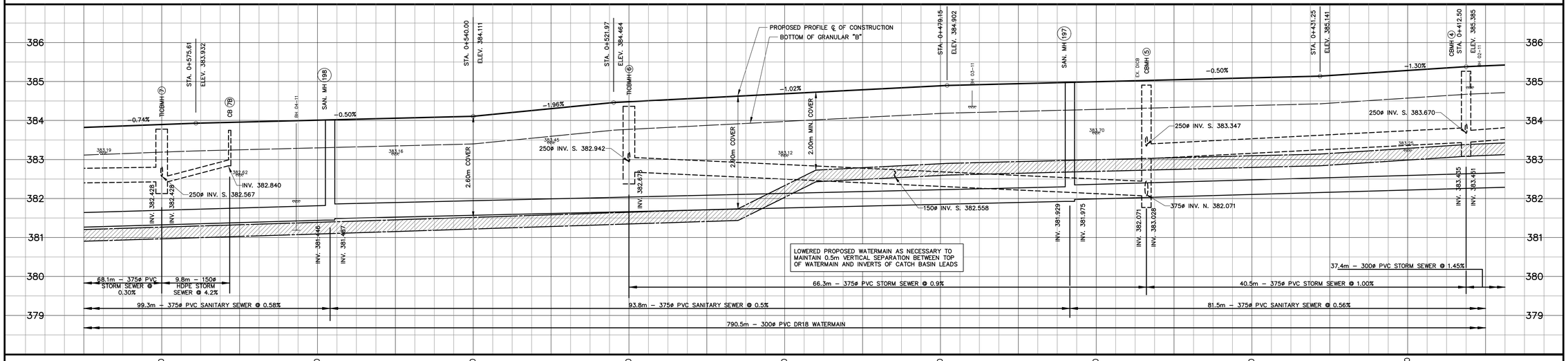


NOTES:

1. INSTALLED NEW 25mm WATER SERVICE FROM NEW 300mm WATERMAIN TO PROPERTY LINE AND CONNECTED TO EXISTING FOR HOUSE No. 78, 79, 82, 83, 85, 87, 89, 91, 92, AND 93
2. CONNECTED EXISTING 100mm SANITARY SERVICE TO NEW 375mm SANITARY SEWER FOR HOUSE No. 78, 79, 82, 83, 85, 87, 89, 91, 92, AND 93
3. INSTALLED NEW 100mm STORM SERVICE AND PROPERTY MARKER FROM STORM SEWER TO PROPERTY LINE AT No. 79, 91, AND 93

LEGEND:

- 50mm HL3F, 100mm GRAN."A", 200mm GRAN."B"
- BRICK PAVERS, 30mm SAND BASE, 200mm GRAN."A"
- 100mm GRAN."A", 200mm GRAN."B"
- TACTILE PLATE
- BH. 1–11 BOREHOLE LOCATIONS TAKEN FROM GEOTECHNICAL INVESTIGATION PREPARED BY L.V.M. DATED FEB. 22, 2011, REF. No. 160–P038136–0100–GE–0001–00
- STM PROPOSED STORM SERVICE
- 383.76 ROCK TOP OF BEDROCK
- E 386.750 PROPOSED TOP OF BERM ELEVATION



NOTES

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No	DATE	REVISION	INITIAL
4.	FEB. 2017	RECORD INFORMATION	d.g.d.
3.	APR. 2015	ISSUED FOR TENDER	d.g.d.
2.	DEC. 2014	ISSUED FOR G.R.C.A. APPROVAL	d.g.d.
1.	DEC. 2014	ISSUED FOR M.O.E. APPROVAL	d.g.d.

RECONSTRUCTION OF

WATER STREET

(ELORA)

TOWNSHIP OF CENTRE WELLINGTON
1 MACDONALD SQUARE
ELORA, ONTARIO N0B 1S0

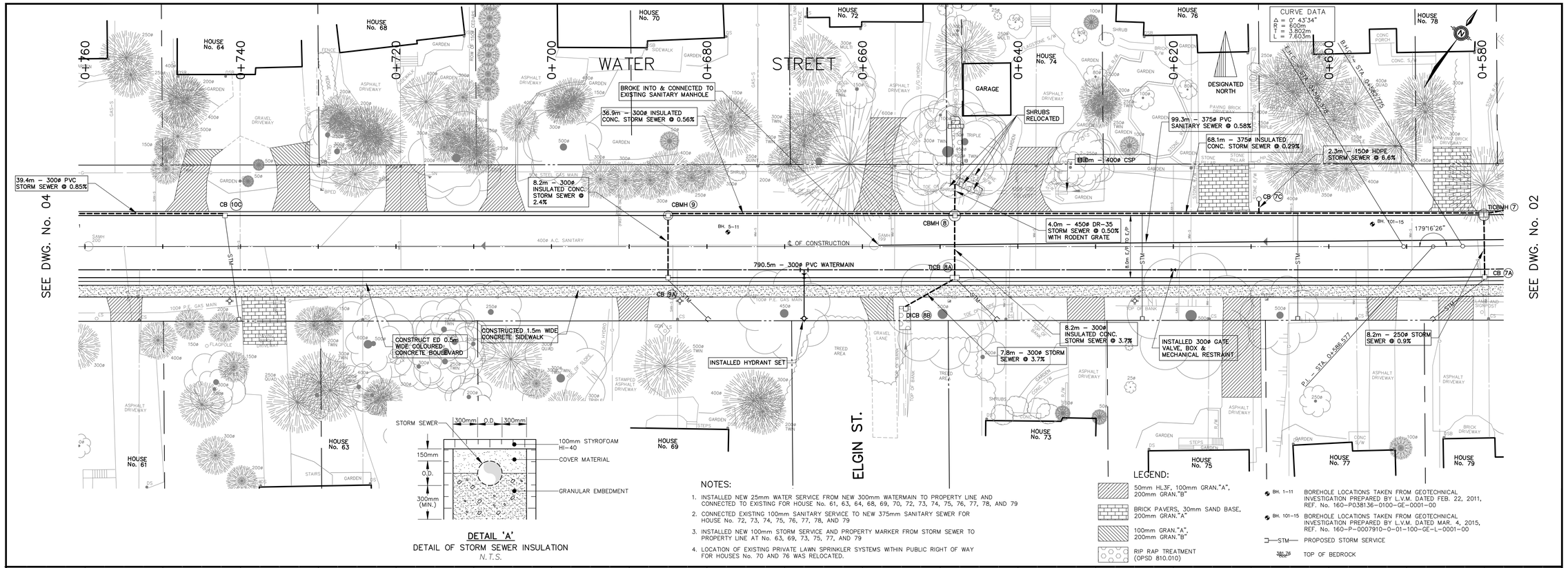
PLAN AND PROFILE
STA. 0+420 TO STA. 0+580

CONTRACT No	T–11–15
PROJECT No	M6137
DRAWN BY:	A.S.B. (AutoCAD)
CHECKED BY:	P.F.Z.
APPROVED BY:	D.G.D.
DATE:	AUGUST, 2014

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

SCALES
1:250 HORIZONTAL
1:50 VERTICAL

DRAWING NUMBER **02**



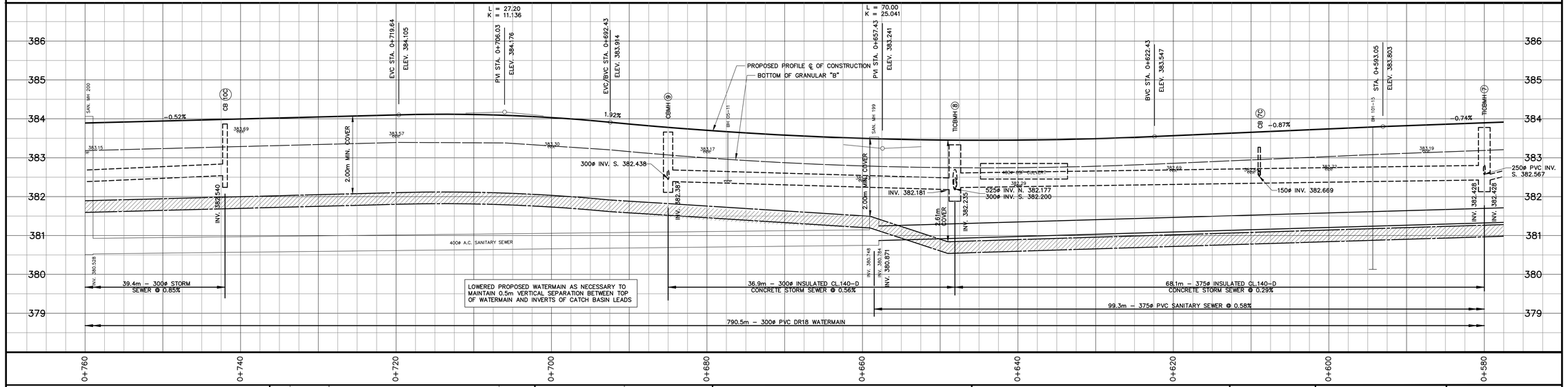
DETAIL 'A'
DETAIL OF STORM SEWER INSULATION
N.T.S.

NOTES:

1. INSTALLED NEW 25mm WATER SERVICE FROM NEW 300mm WATERMAIN TO PROPERTY LINE AND CONNECTED TO EXISTING FOR HOUSE No. 61, 63, 64, 68, 69, 70, 72, 73, 74, 75, 76, 77, 78, AND 79
2. CONNECTED EXISTING 100mm SANITARY SERVICE TO NEW 375mm SANITARY SEWER FOR HOUSE No. 72, 73, 74, 75, 76, 77, 78, AND 79
3. INSTALLED NEW 100mm STORM SERVICE AND PROPERTY MARKER FROM STORM SEWER TO PROPERTY LINE AT No. 63, 69, 73, 75, 77, AND 79
4. LOCATION OF EXISTING PRIVATE LAWN SPRINKLER SYSTEMS WITHIN PUBLIC RIGHT OF WAY FOR HOUSES No. 70 AND 76 WAS RELOCATED.

LEGEND:

- 50mm HL3F, 100mm GRAN."A", 200mm GRAN."B"
- BRICK PAVERS, 30mm SAND BASE, 200mm GRAN."A"
- 100mm GRAN."A", 200mm GRAN."B"
- RIP RAP TREATMENT (OPSD 810.010)
- BH. 1-11 BOREHOLE LOCATIONS TAKEN FROM GEOTECHNICAL INVESTIGATION PREPARED BY L.V.M. DATED FEB. 22, 2011, REF. No. 160-P03813G-0100-GE-0001-00
- BH. 101-15 BOREHOLE LOCATIONS TAKEN FROM GEOTECHNICAL INVESTIGATION PREPARED BY L.V.M. DATED MAR. 4, 2015, REF. No. 160-P-0007910-0-01-100-GE-L-0001-00
- STM PROPOSED STORM SERVICE
- 381.26 TOP OF BEDROCK



NOTES

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No	DATE	REVISION	INITIAL
4.	FEB. 2017	RECORD INFORMATION	d.g.d.
3.	APR. 2015	ISSUED FOR TENDER	d.g.d.
2.	DEC. 2014	ISSUED FOR G.R.C.A. APPROVAL	d.g.d.
1.	DEC. 2014	ISSUED FOR M.O.E. APPROVAL	d.g.d.

RECONSTRUCTION OF

WATER STREET

(ELORA)

TOWNSHIP OF CENTRE WELLINGTON
1 MACDONALD SQUARE
ELORA, ONTARIO N0B 1S0

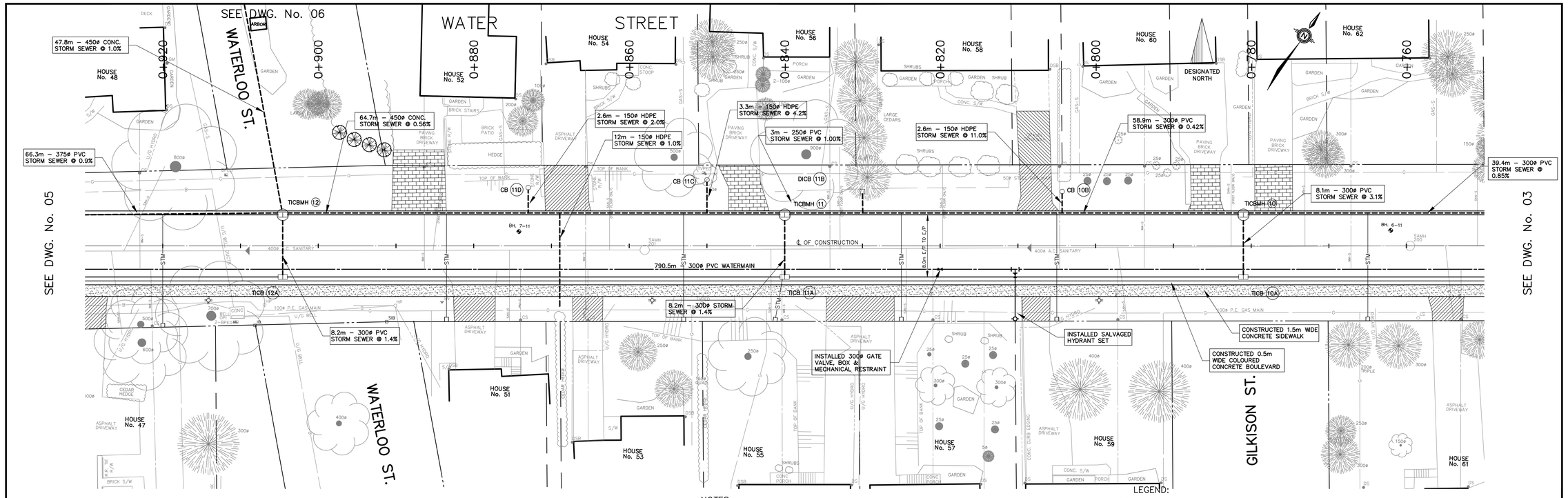
PLAN AND PROFILE
STA. 0+580 TO STA. 0+760

CONTRACT No	T-11-15
PROJECT No	M6137
DRAWN BY:	A.S.B. (AutoCAD)
CHECKED BY:	P.F.Z.
APPROVED BY:	D.G.D.
DATE:	AUGUST, 2014

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

SCALES
1:250 HORIZONTAL
1:50 VERTICAL

DRAWING NUMBER **03**

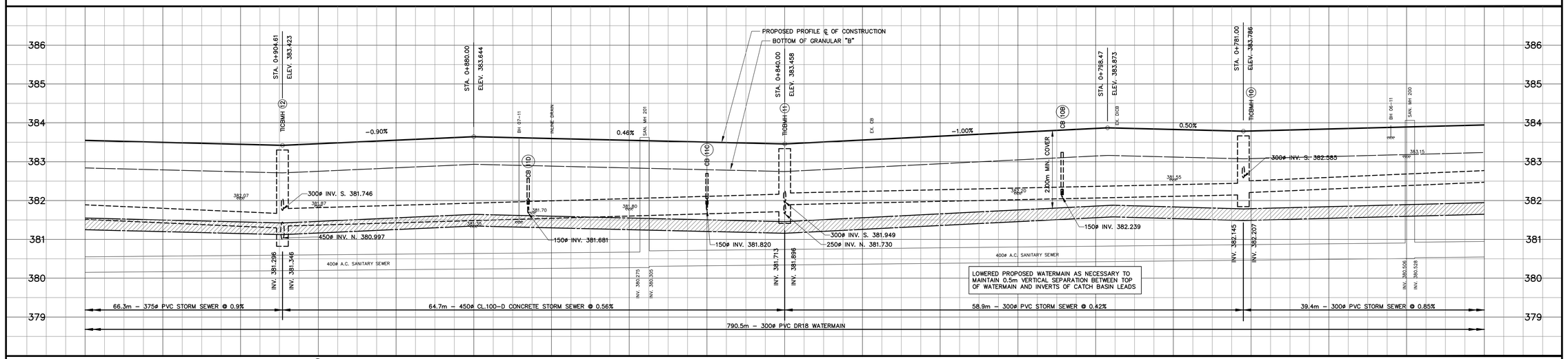


NOTES:

1. INSTALLED NEW 25mm WATER SERVICE FROM NEW 300mm WATERMAIN TO PROPERTY LINE AND CONNECTED TO EXISTING FOR HOUSE No. 47, 48, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, AND 62
2. INSTALLED NEW 100mm STORM SERVICE AND PROPERTY MARKER FROM STORM SEWER TO PROPERTY LINE AT No. 47, 51, 53, 55, 57, 59, AND 61

LEGEND:

- 50mm HL3F, 100mm GRAN."A", 200mm GRAN."B"
- BRICK PAVERS, 30mm SAND BASE, 200mm GRAN."A"
- 100mm GRAN."A", 200mm GRAN."B"
- BH. 1–11 BOREHOLE LOCATIONS TAKEN FROM GEOTECHNICAL INVESTIGATION PREPARED BY L.V.M. DATED FEB. 22, 2011, REF. No. 160–P038136–0100–GE–0001–00
- STM PROPOSED STORM SERVICE
- 381.76 / 00.0 TOP OF BEDROCK
- EASTERN WHITE CEDAR (250mm–WB)



NOTES

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No	DATE	REVISION	INITIAL
4.	FEB. 2017	RECORD INFORMATION	d.g.d.
3.	APR. 2015	ISSUED FOR TENDER	d.g.d.
2.	DEC. 2014	ISSUED FOR G.R.C.A. APPROVAL	d.g.d.
1.	DEC. 2014	ISSUED FOR M.O.E. APPROVAL	d.g.d.

RECONSTRUCTION OF

WATER STREET

(ELORA)

TOWNSHIP OF CENTRE WELLINGTON
1 MACDONALD SQUARE
ELORA, ONTARIO N0B 1S0

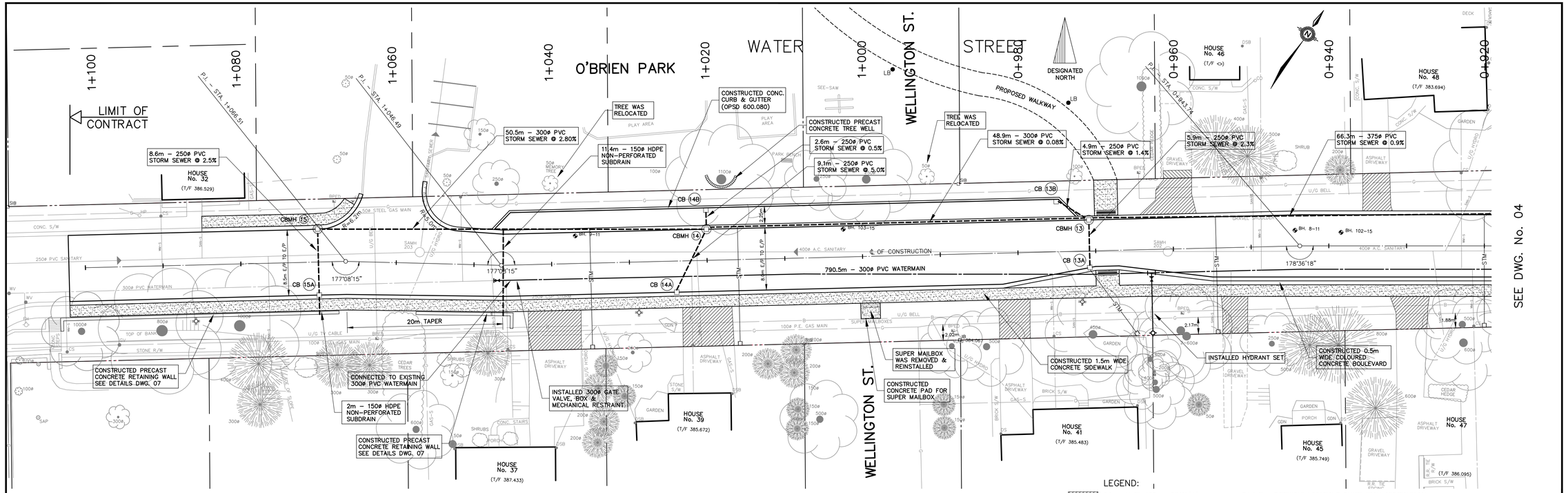
PLAN AND PROFILE
STA. 0+760 TO STA. 0+920

CONTRACT No	T–11–15
PROJECT No	M6137
DRAWN BY:	A.S.B. (AutoCAD)
CHECKED BY:	P.F.Z.
APPROVED BY:	D.G.D.
DATE:	AUGUST, 2014

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

SCALES
1:250 HORIZONTAL
1:50 VERTICAL

DRAWING NUMBER **04**

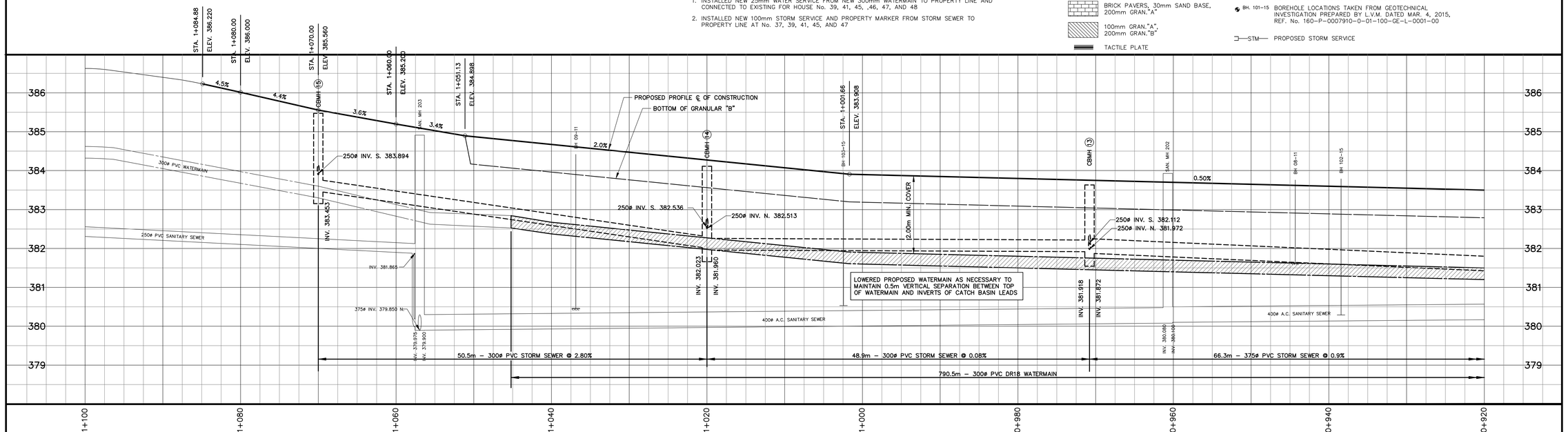


NOTES:

1. INSTALLED NEW 25mm WATER SERVICE FROM NEW 300mm WATERMAIN TO PROPERTY LINE AND CONNECTED TO EXISTING FOR HOUSE No. 39, 41, 45, ,46, 47, AND 48
2. INSTALLED NEW 100mm STORM SERVICE AND PROPERTY MARKER FROM STORM SEWER TO PROPERTY LINE AT No. 37, 39, 41, 45, AND 47

LEGEND:

- 50mm HL3F, 100mm GRAN."A", 200mm GRAN."B"
- BRICK PAVERS, 30mm SAND BASE, 200mm GRAN."A"
- 100mm GRAN."A", 200mm GRAN."B"
- TACTILE PLATE
- BH. 1–11 BOREHOLE LOCATIONS TAKEN FROM GEOTECHNICAL INVESTIGATION PREPARED BY L.V.M. DATED FEB. 22, 2011, REF. No. 160–P038136–0100–GE–0001–00
- BH. 101–15 BOREHOLE LOCATIONS TAKEN FROM GEOTECHNICAL INVESTIGATION PREPARED BY L.V.M. DATED MAR. 4, 2015, REF. No. 160–P–0007910–0–01–100–GE–L–0001–00
- STM PROPOSED STORM SERVICE



NOTES

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No	DATE	REVISION	INITIAL
4.	FEB. 2017	RECORD INFORMATION	d.g.d.
3.	APR. 2015	ISSUED FOR TENDER	d.g.d.
2.	DEC. 2014	ISSUED FOR GRCA APPROVAL	d.g.d.
1.	DEC. 2014	ISSUED FOR M.O.E. APPROVAL	d.g.d.

RECONSTRUCTION OF

WATER STREET

(ELORA)

TOWNSHIP OF CENTRE WELLINGTON
1 MACDONALD SQUARE
ELORA, ONTARIO N0B 1S0

PLAN AND PROFILE

STA. 0+920 TO CLYDE STREET

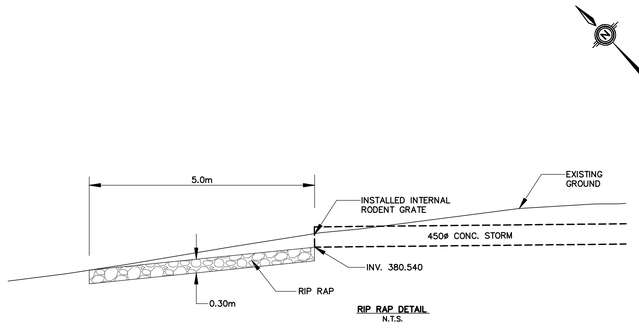
CONTRACT No	T–11–15
PROJECT No	M6137
DRAWN BY:	A.S.B. (AutoCAD)
CHECKED BY:	P.F.Z.
APPROVED BY:	D.G.D.
DATE:	AUGUST, 2014

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

SCALES

1:250 HORIZONTAL — 1:50 VERTICAL

DRAWING NUMBER **05**



RIP RAP DETAIL
N.T.S.

SEE DWG. No. 04

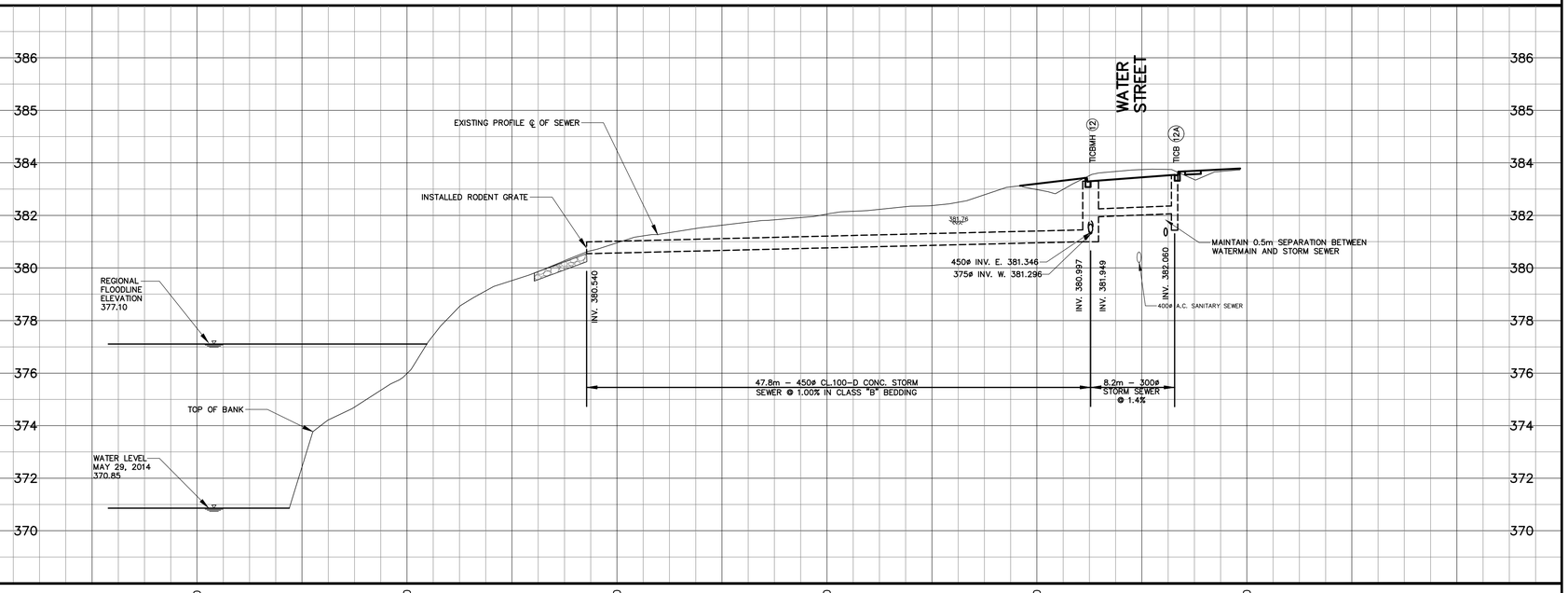


LEGEND:

- CLEAR & GRUB
- EASTERN WHITE CEDAR (250mm–WB)
- GRCA FLOODLINE
- 50mm HL3F, 100mm GRAN."A", 200mm GRAN."B"
- BRICK PAVERS, 30mm SAND BASE, 200mm GRAN."A"
- 100mm GRAN."A", 200mm GRAN."B"
- 381.76 TOP OF BEDROCK

SEE DWG. No. 04

B.M. 14–6137–11 Elev. 376.347
NAIL AND WASHERS IN BELL POLE ON EAST SIDE OF WATERLOO STREET R.O.W. 68m NORTH OF CENTER OF WATER STREET



NOTES

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No	DATE	REVISION	INITIAL
4.	FEB. 2017	RECORD INFORMATION	d.g.d.
3.	APR. 2015	ISSUED FOR TENDER	d.g.d.
2.	DEC. 2014	ISSUED FOR G.R.C.A. APPROVAL	d.g.d.
1.	DEC. 2014	ISSUED FOR M.O.E. APPROVAL	d.g.d.

RECONSTRUCTION OF
WATER STREET
(ELORA)

TOWNSHIP OF CENTRE WELLINGTON
1 MACDONALD SQUARE
ELORA, ONTARIO N0B 1S0

PLAN AND PROFILE
WATERLOO STREET STORM OUTLET

CONTRACT No **T–11–15**
PROJECT No **M6137**
DRAWN BY: A.S.B. (AutoCAD)
CHECKED BY: P.F.Z.
APPROVED BY: D.G.D.
DATE: AUGUST, 2014

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

SCALES
1:250 HORIZONTAL
1:100 VERTICAL

DRAWING NUMBER **06**

CARLTON PLACE

METCALFE STREET/WR 21

CLYDE STREET

WATER STREET

O'BRIEN PARK

BLDG. No. 22

BLDG. No. 23 (DRILL SHED/L.C.B.O.)

HOUSE No. 32

GARAGE

CLYDE STREET PUMPING STATION

SCREENED PORCH

INSTALLED HYDRANT SET

14.0m – 150ø HDPE STORM SEWER AND CONNECT TO CATCHBASIN A3 INV. ELEV. – 378.600

RELOCATED CATCHBASIN T/G ELEV – 379.90

INV. CSP 378.279 ICSP ø600

OBV. CSP 384.592 ø800

5.5m – 150ø HDPE STORM SEWER AND CONNECTED TO RELOCATED CATCHBASIN

INSTALLED NEW HANDRAIL

BROKE INTO & CONNECTED TO EXIST. CB – ELEV. – 377.861

6.6m – 250ø STORM SEWER @ 12.42%

24.2m – 150ø HDPE STORM SEWER AND CONNECTED TO EX. DOWNSPOUT

CONNECTED EXIST. DOWNSPOUT TO EX. STORM SEWER

10.0m – 150ø HDPE STORM SEWER AND CONNECTED TO EX. DOWNSPOUT

5.0m – 150ø HDPE STORM SEWER AND CONNECTED TO EX. DOWNSPOUT

26.0m – 250ø STORM SEWER @ 3.0%

NEW PAVEMENT

10.0m – 250ø STORM SEWER @ 1.0%

18.0m – 250ø STORM SEWER @ 7.0%

CONCRETE BUMPERS

200mmø STORM SERVICE

20mmø WATER SERVICE

CONSTRUCTED 1.5m WIDE CONC. SIDEWALK

40.0m TAPER (MATCH TO EXISTING)

BH 1 380.636

BH 2 380.601

BH 3 383.408

BH 4 376.797

BH 5 380.312

BH 6 385.943

BH 14 386.623

P.I. – STA. 2+132.028 METCALFE STREET
P.I. – STA. 1+141.466 WATER STREET

BC STA. 2+139.685

CBMH A1

CB A1A

CB A1B

CB A2

CB A3

CBMH 9

CBMH 10

CBMH 11

TCBMH 12

TICBMH

SECTION A–A
N.T.S.

RETAINING WALL
RETAINING WALL
NEW BARRIER CURB (OPSD 600.110)
RELOCATED CATCHBASIN TOP GRATE – ELEV. 379.78
BLDG. No. 23 (DRILL SHED/L.C.B.O.)
380.00
379.00
378.00
1.5m
125mm CONC. SIDEWALK
100mm GRANULAR "A"
150ø HDPE STORM SEWER INV. ELEV. – 378.70
450mm IMPORTED TOPSOIL
APPROVED GRANULAR BACKFILL COMPACTED TO 95% S.P.D.
FILTER FABRIC
ARMOUR STONE RETAINING WALL (600mm x 600mm x 1200mm TYPL.)
ROAD BASE AS PER TYPICALS (SEE DWG. No. 09)
125mm CONC. SIDEWALK
100mm GRANULAR "A"
150mm GRANULAR "A" COMPACTED TO 98% S.P.D.
100mmø PERFORATED CORRUGATED H.D.P.E. GEOTEXTILE WRAPPED SUBDRAIN (TYPL.)

STORM STRUCTURE DATA

No.	OUTLET	INLET	TOP GRATE/COVER	REMARKS
CB A1A	379.73	–	381.18	OPSD 705.010
CB A1B	378.42	–	380.07	OPSD 705.010
CBMH A1	378.32	FROM A1A – 378.51 FROM A1B – 378.32	379.96	OPSD 701.010
CB A2	377.28	377.55	378.75	OPSD 705.010
CB A3	378.55	FROM NORTH – 378.60	380.00	OPSD 705.010

LEGEND:

- CLEAR AND GRUB
- BH.1 BOREHOLE LOCATIONS TAKEN FROM GEOTECHNICAL INVESTIGATION PREPARED BY NAYLOR ENGINEERING ASSOC. LTD., DATED JAN 28, 2009, JOB No. 7980G1.R01
- 8909 APPROX. TOP OF BEDROCK. ACTUAL ELEVATION TO BE VERIFIED AT TIME OF CONSTRUCTION
- 379.85 T / 379.73 B PROPOSED ELEVATION (T – TOP OF CURB, B – BOTTOM OF CURB)
- NEW STREET LIGHT POLE
- 50mm HL3C ASPHALT, 150mm GRAN. "A", 150mm GRAN. "B"
- GRCA REGIONAL FLOODLINE

NOTES:

1. CLYDE STREET AND L.C.B.O. PARKING LOT PAVEMENT STRUCTURE
   - 40mm HL3 ASPHALT
   - 50mm HL4 ASPHALT
   - 150mm GRANULAR "A"
   - 450mm GRANULAR "B"
2. FOR MASONRY RESTORATION AND FOUNDATION DRAIN DETAILS/PLANS REFER TO CONTRACT DOCUMENTS (SECTION C AND SECTION G)

NOTES

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No	DATE	REVISION	INITIAL
4.	MAY 10	RECORD INFORMATION	d.g.d.
3.	NOV. 09	REVISED GRADING	d.g.d.
2.	SEP. 09	ISSUED FOR CONSTRUCTION (REVISED LCBO ENTRANCE)	d.g.d.
1.	JUL. 09	ISSUED FOR TENDER	d.g.d.

RECONSTRUCTION OF
CLYDE STREET
AND
MUNICIPAL PARKING LOT
(ELORA)

TOWNSHIP OF CENTRE WELLINGTON
1 MacDONALD SQUARE
ELORA, ONTARIO N0B 1S0

PLAN

CONTRACT No T–06–09
PROJECT No M6061
DRAWN BY: w.a.j.h. (AutoCAD)
CHECKED BY: D.G.D.
APPROVED BY: D.A.H.
DATE: JANUARY, 2009

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

SCALES
1:250 HORIZONTAL
N/A VERTICAL

DRAWING NUMBER 08

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix B

Existing Condition Sanitary Sewer Calculations

SANITARY SEWER DESIGN

Existing Conditions - 127 First Line and 159 First Line

Township of Centre Wellington (Elora)

q = average daily per capita flow (350 L/cap/d

i = unit of peak extraneous flow (0.15 L/ha/s)

A = Tributary area in gross hectares

F = Peaking factor

Qp = peak population flow (L/s)

Qi = peak extraneous flow (L/s)

Qd = peak design flow (m^3/s)

Persons per Unit (PPU) as per Schedule 3 from the Township of Centre Wellington Development Charges Background Study - Consolidated Report (Watson & Associates Economists Ltd. dated March 24, 2026)

Unit Type	People Per Unit (PPU)
Low Density - Singles	3.278
Low Density - Semis	3.278
Low Density - Towns	2.351
Apartments	1.837

$F = 1 + \frac{14}{4 + (P)^{1/2}}$ where P is population in 1000's

$Q(p) = \frac{PqM}{86.4}$ (L/s)

$Qi = iA$

$Qd = Qp + Qi + Qc + Qin$ (m^3/s)

					Residential								Commercial (28 m^3/ha/d)			Industrial (0.50 L/s/ha)				Proposed Sewer						
Location																									
Street	Upstream MH	Downstream MH		# of Units	Indiv. Pop'n	Cumul. Pop'n	Area (ha)	Cumul. Area	Calculated Peaking Factor (F)	Actual Peaking Factor (F)	Pop. Flow Qp (L/s)	Res. Infilt. Flow Qi (L/s)	Comm. Area (ha)	Cumul. Area	Comm. Flow Qc (L/s)	Inst. Area (ha)	Cumul. Area	Inst. Flow Qin (L/s)	Peak Design Flow Q (m^3/s)	Length (m)	Pipe Size (mm)	Type of Pipe	Grade %	Capacity (m^3/s)	Full Flow Velocity (m/s)	Actual velocity at Q(d)
First Line	MH.AA	MH.Z	Low Density - Singles	5	16	16	0.57	0.57	4.391	4.0	0.29	0.09	0.00	0.00	0.00	0.00	0.00	0.00	**0.000**	49.9	200	0.013	1.15	0.035	1.120	0.258
First Line	MH.Z	MH.Y	Low Density - Singles	6	18	34	0.75	1.32	4.346	4.0	0.60	0.20	0.00	0.00	0.00	0.00	0.00	0.00	**0.001**	99.6	200	0.013	0.47	0.022	0.716	0.351
Spencer Drive	MH.Y	MH.X	Low Density - Singles	3	9	43	0.40	1.72	4.328	4.0	0.75	0.26	0.00	0.00	0.00	0.00	0.00	0.00	**0.001**	60.0	200	0.013	0.43	0.022	0.685	0.390
Spencer Drive	MH.X	MH.W	Low Density - Singles	6	18	60	0.53	2.25	4.298	4.0	1.05	0.34	0.00	0.00	0.00	0.00	0.00	0.00	**0.001**	100.6	200	0.013	0.48	0.023	0.723	0.420
Spencer Drive	MH.W	MH.F	Low Density - Singles	7	20	81	0.60	2.85	4.268	4.0	1.39	0.43	0.00	0.00	0.00	0.00	0.00	0.00	**0.002**	100.5	250	0.013	0.48	0.041	0.839	0.411
Stafford Street	MH	MH.F	Low Density - Singles	170	497	497	12.38	12.38	3.976	3.976	8.00	1.86	0.00	0.00	0.00	0.00	0.00	0.00	**0.010**	88.8	200	0.013	0.50	0.023	0.738	0.701
Spencer Drive	MH	MH.F	Low Density - Singles	36	105	105	2.57	2.57	4.238	4.0	1.81	0.39	0.00	0.00	0.00	0.00	0.00	0.00	**0.002**	99.5	200	0.013	1.85	0.045	1.420	0.809
Stafford Street	MH.F	MH.E	Low Density - Singles	0	0	682	0.10	17.90	3.901	3.901	10.78	2.69	0.00	0.00	0.00	0.00	0.00	0.00	**0.013**	56.5	300	0.013	0.37	0.059	0.832	0.666
Stafford Street	SAN S	MH.E	Low Density - Singles	1	3	3	3.01	3.01	4.453	4.0	0.05	0.45	0.00	0.00	0.00	0.00	0.00	0.00	**0.001**	13.6	150	0.013	2.21	0.023	1.280	0.000
Stafford Street	MH.E	SPS	Low Density - Singles	0	0	685	0.00	20.91	3.900	3.900	10.83	3.14	0.00	0.00	0.00	0.00	0.00	0.00	**0.014**	19.6	300	0.013	0.50	0.068	0.967	0.755
Stafford Street (Forcemain)	SPS	MH.D	Low Density - Singles	0	0	685	0.00	20.91	3.900	3.900	10.83	3.14	0.00	0.00	0.00	0.00	0.00	0.00	**0.014**			0.013		0.000	#DIV/0!	#DIV/0!
Bridge Street	MH.D	MH.C/MH.253	Low Density - Singles	0	0	685	0.00	20.91	3.900	3.900	10.83	3.14	0.00	0.00	0.00	0.00	0.00	0.00	**0.014**	65.0	300	0.013	1.00	0.097	1.368	0.958
Bridge Street	MH.C/MH.253	MH.252	Low Density - Singles	0	0	685	0.00	20.91	3.900	3.900	10.83	3.14	0.00	0.00	0.00	0.00	0.00	0.00	**0.014**	64.0	300	0.013	1.50	0.118	1.675	1.139
Bridge Street	MH.252	MH.251	Low Density - Singles	0	0	685	0.00	20.91	3.900	3.900	10.83	3.14	0.00	0.00	0.00	0.00	0.00	0.00	**0.014**	94.0	300	0.013	0.48	0.067	0.948	0.749
Bridge Street	MH.251	MH.245/MH.3A	Low Density - Singles	8	23	709	0.87	21.78	3.891	3.891	11.17	3.27	0.00	0.00	0.00	0.00	0.00	0.00	**0.014**	100.0	300	0.013	0.66	0.079	1.111	0.856
Bridge Street	SAN S	MH.245/MH.3A	Low Density - Singles	0	0	0	0.00	0.00	0.000	0.000	0.00	0.00	0.00	0.00	0.00	30.60	30.60	15.30	**0.015**	13.5	200	0.013	0.50	0.023	0.738	0.790
Bridge Street	MH.245/MH.3A	MH.2A	Low Density - Singles	4	12	720	0.60	22.38	3.887	3.887	11.34	3.36	0.00	0.00	0.00	0.00	30.60	15.30	**0.030**	100.2	300	0.013	0.47	0.066	0.938	0.910
Murray Drive	MH	MH.2A	Low Density - Singles	53	155	155	5.48	5.48	4.187	4.0	2.63	0.82	0.00	0.00	0.00	0.00	0.00	0.00	**0.003**	37.0	200	0.013	0.50	0.023	0.738	0.532
Bridge Street	MH.2A	MH.1A	Low Density - Singles	6	18	893	1.04	28.90	3.831	3.831	13.85	4.34	0.00	0.00	0.00	0.00	30.60	15.30	**0.033**	92.1	300	0.013	0.43	0.063	0.897	0.915
Bridge Street	MH.1A	MH.192	Low Density - Singles	5	15	907	1.00	29.90	3.827	3.827	14.07	4.49	0.00	0.00	0.00	0.00	30.60	15.30	**0.034**	93.7	300	0.013	0.45	0.065	0.918	0.927
Bridge Street	MH.192	MH.193	Low Density - Singles	5	15	922	0.83	30.73	3.822	3.822	14.28	4.61	0.00	0.00	0.00	0.00	30.60	15.30	**0.034**	113.5	300	0.013	0.48	0.067	0.948	0.957
McNab Street	MH	MH193	Low Density - Singles	11	32	32	1.62	1.62	4.350	4.0	0.57	0.24	0.00	0.00	0.00	0.00	0.00	0.00	**0.001**	156.0	200	0.013	0.50	0.023	0.738	0.295

Bridge Street	MH.193	MH.194	Low Density - Singles	0	0	954	0.17	32.52	3.813	3.813	14.74	4.88	0.00	0.00	0.00	0.00	30.60	15.30	**0.035**	65.3	200	0.013	8.30	0.094	3.008	2.767
Bridge Street	MH.194	MH.195	Low Density - Singles	0	0	954	0.18	32.70	3.813	3.813	14.74	4.91	0.00	0.00	0.00	0.00	30.60	15.30	**0.035**	61.0	200	0.013	8.61	0.096	3.063	2.787
Bridge Street	MH	MH.195	Low Density - Singles	7	20	20	0.90	0.90	4.379	4.0	0.36	0.14	0.00	0.00	0.00	0.00	0.00	0.00	**0.000**	68.0	200	0.013	0.50	0.023	0.738	0.244
Water Street	MH	MH.195	Low Density - Singles	283	827	827	37.55	37.55	3.852	3.852	12.90	5.63	0.00	0.00	0.00	0.00	0.00	0.00	**0.019**	103.0	300	0.013	0.50	0.068	0.967	0.832
Water Street	MH.195	MH.196	Low Density - Singles	7	20	1822	1.07	72.22	3.617	3.617	26.69	10.83	0.00	0.00	0.00	0.00	30.60	15.30	**0.053**	107.7	375	0.013	0.60	0.136	1.230	1.156
Water Street	MH.196	MH.197	Low Density - Singles	5	15	1836	0.83	73.05	3.614	3.614	26.88	10.96	0.00	0.00	0.00	0.00	30.60	15.30	**0.053**	81.5	375	0.013	0.56	0.131	1.188	1.129
Water Street	MH.197	MH.198	Low Density - Singles	7	20	1857	1.16	74.21	3.611	3.611	27.16	11.13	0.00	0.00	0.00	0.00	30.60	15.30	**0.054**	93.8	375	0.013	0.50	0.124	1.123	1.078
Water Street	MH.198	MH.199	Low Density - Singles	8	23	1880	1.07	75.28	3.607	3.607	27.47	11.29	0.00	0.00	0.00	0.00	30.60	15.30	**0.054**	99.3	375	0.013	0.58	0.134	1.209	1.136
Water Street	MH.199	MH.200	Low Density - Singles	7	20	1900	1.46	76.74	3.603	3.603	27.74	11.51	0.00	0.00	0.00	0.00	30.60	15.30	**0.055**	91.0	400	0.013	0.24	0.102	0.815	0.831
Water Street	MH.200	MH.201	Low Density - Singles	6	18	1918	0.77	77.51	3.600	3.600	27.97	11.63	0.00	0.00	0.00	0.00	30.60	15.30	**0.055**	100.5	400	0.013	0.20	0.093	0.741	0.771
Water Street	MH.201	MH.202	Low Density - Singles	8	23	1941	1.27	78.78	3.596	3.596	28.28	11.82	0.00	0.00	0.00	0.00	30.60	15.30	**0.055**	102.8	400	0.013	0.17	0.086	0.684	0.725
Water Street	MH.202	MH.203	Low Density - Singles	3	9	1950	0.53	79.31	3.594	3.594	28.39	11.90	0.00	0.00	0.00	0.00	30.60	15.30	**0.056**	107.5	400	0.013	0.17	0.085	0.678	0.726
McNab Street	MH	MH.187	Low Density - Singles	3	9	9	0.35	0.35	4.420	4.0	0.16	0.05	0.00	0.00	0.00	0.00	0.00	0.00	**0.000**	42.5	200	0.013	0.50	0.023	0.738	0.170
McNab Street	MH	MH.187	Low Density - Singles	8	23	23	1.18	1.18	4.371	4.0	0.41	0.18	0.00	0.00	0.00	0.00	0.00	0.00	**0.001**	126.5	200	0.013	0.50	0.023	0.738	0.295
High Street	MH	MH.187	Low Density - Singles	323	943	943	30.29	30.29	3.816	3.816	14.59	4.54	0.00	0.00	0.00	0.00	0.00	0.00	**0.019**	102.5	200	0.013	0.50	0.023	0.738	0.823
High Street	MH.187	MH.188	Low Density - Singles	2	6	981	0.48	32.30	3.805	3.805	15.13	4.85	0.00	0.00	0.00	0.00	0.00	0.00	**0.020**	54.0	250	0.013	0.95	0.058	1.183	1.065
High Street	MH.188	MH.189	Low Density - Singles	1	3	984	0.13	32.43	3.804	3.804	15.17	4.86	0.00	0.00	0.00	0.00	0.00	0.00	**0.020**	49.8	250	0.013	4.42	0.125	2.548	1.860
Water Street	MH.189	MH.203	Low Density - Singles	0	0	984	0.00	32.43	3.804	3.804	15.17	4.86	0.00	0.00	0.00	0.00	0.00	0.00	**0.020**	56.5	250	0.013	1.12	0.063	1.284	1.143
Clyde Street	MH.203	MH.204	Low Density - Singles	0	0	2934	0.00	111.74	3.451	3.451	41.02	16.76	0.00	0.00	0.00	0.00	30.60	15.30	**0.073**	72.5	375	0.013	0.50	0.124	1.123	1.167
Carleton Place	MH.199	MH.200	Low Density - Singles	8	23	23	0.80	0.80	4.371	4.0	0.41	0.12	0.00	0.00	0.00	0.00	0.00	0.00	**0.001**	89.2	250	0.013	1.13	0.063	1.288	0.296
Carleton Place	MH.200	MH.201	Low Density - Singles	2	6	29	0.29	1.09	4.357	4.0	0.52	0.16	0.00	0.00	0.00	0.00	0.00	0.00	**0.001**	76.2	300	0.013	0.66	0.079	1.111	0.256
Victoria Street	MH	MH.201	Low Density - Singles	27	79	79	5.35	5.35	4.270	4.0	1.36	0.80	3.28	3.28	1.06	1.43	1.43	0.72	**0.004**	35.6	200	0.013	0.35	0.019	0.618	0.482
Carleton Place	MH.201	MH.173/MH.202	Low Density - Singles	3	9	117	0.52	6.96	4.224	4.0	2.00	1.04	0.00	3.28	1.06	0.00	1.43	0.72	**0.005**	63.4	400	0.013	0.53	0.152	1.207	0.483
Carleton Place	MH.173/MH.202	MH.174	Low Density - Singles	1	0	117	0.00	6.96	4.224	4.0	2.00	1.04	0.00	3.28	1.06	0.32	1.75	0.88	**0.005**	41.2	400	0.013	0.50	0.147	1.172	0.469
Clyde Street	MH.149A	MH.174	Low Density - Singles	1426	4165	4165	211.57	211.57	3.318	3.318	55.98	31.74	2.00	2.00	0.65	2.00	2.00	1.00	**0.089**	28.5	450	0.013	0.50	0.202	1.268	1.230
Clyde Street	MH.174	MH.204	Low Density - Singles	0	0	4282	0.00	218.53	3.307	3.307	57.36	32.78	0.00	5.28	1.71	0.00	3.75	1.88	**0.094**	40.6	525	0.013	0.50	0.304	1.405	1.250
Clyde Street	MH.204	SPS	Low Density - Singles	0	0	7217	0.00	330.27	3.094	3.094	90.44	49.54	0.00	5.28	1.71	0.00	34.35	17.18	**0.159**	2.5	525	0.013	1.20	0.471	2.176	1.959
Carleton Place	SPS	WWTP																								

Minimum diameter = 200 mm
Minimum acceptable velocity = 0.6 m/s
Maximum acceptable velocity = 3.0 m/s
Roughness Coefficient for PVC pipe = 0.013

Date:	August 2026
Designed By:	AEK
Checked By:	AEK

Project:	Existing Conditions - 127 First Line and 159 First Line
File:	300060179.0000

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix C

Proposed Condition Sanitary Sewer Calculations

q = average daily per capita flow (350 L/cap/d

i = unit of peak extraneous flow (0.15 L/ha/s)

A = Tributary area in gross hectares

F = Peaking factor

Qp = peak population flow (L/s)

Qi = peak extraneous flow (L/s)

Qd = peak design flow (m^3/s)

Persons per Unit (PPU) as per Schedule 3 from the Township of Centre Wellington Development Charges Background Study - Consolidated Report (Watson & Associates Economists Ltd. dated March 24, 2026)

Unit Type	People Per Unit (PPU)
Low Density - Singles	3.278
Low Density - Semis	3.278
Low Density - Towns	2.351
Apartments	1.837

SANITARY SEWER DESIGN

Proposed Conditions - 127 First Line (Phase 1 ONLY) and 159 First Line (Phase 1 ONLY)

Township of Centre Wellington (Elora)

$F = 1 + \frac{14}{4 + (P)^{1/2}}$ where P is population in 1000's

$Q(p) = \frac{PqM}{86.4}$ (L/s)

$Qi = iA$

$Qd = Qp + Qi + Qc + Qin$ (m^3/s)

					Residential								Commercial (28 m^3/ha/d)			Industrial (0.50 L/s/ha)									
Location																				Proposed Sewer					
Street	Upstream MH	Downstream MH	Unit Type	# of Units	Indiv. Pop'n	Cumul. Pop'n	Area (ha)	Cumul. Area	Calculated Peaking Factor (F)	Actual Peaking Factor (F)	Pop. Flow Qp (L/s)	Res. Infilt. Flow Qi (L/s)	Comm. Area (ha)	Cumul. Area	Comm. Flow Qc (L/s)	Inst. Area (ha)	Cumul. Area	Inst. Flow Qin (L/s)	Peak Design Flow Q (m^3/s)	Length (m)	Pipe Size (mm)	Type of Pipe	Grade %	Capacity (m^3/s)	Full Flow Velocity (m/s)	Actual velocity at Q(d)
Block 1 159 First Line		**MH.AA**	**Low Density - Singles**	**37**	**121**	**121**	**1.42**	**1.42**	**4.220**	**4.0**	**1.97**	**0.21**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.002**	20.0	200	0.013	0.50	0.023	0.738	0.465
Block 2 159 First Line		**MH.AA**	**Low Density - Singles**	**7**	**23**	**144**	**0.26**	**1.68**	**4.197**	**4.0**	**2.34**	**0.25**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.003**	20.0	200	0.013	0.50	0.023	0.738	0.472
Block 3 159 First Line		**MH.AA**	**Low Density - Singles**	**9**	**30**	**174**	**0.29**	**1.97**	**4.170**	**4.0**	**2.82**	**0.30**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.003**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 4 159 First Line		**MH.AA**	**Low Density - Singles**	**9**	**30**	**203**	**0.33**	**2.30**	**4.145**	**4.0**	**3.29**	**0.35**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.004**	20.0	200	0.013	0.50	0.023	0.738	0.539
Block 5 159 First Line		**MH.AA**	**Low Density - Singles**	**20**	**66**	**269**	**0.80**	**3.10**	**4.098**	**4.0**	**4.36**	**0.47**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.005**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 6 159 First Line		**MH.AA**	**Low Density - Semis**	**8**	**26**	**295**	**0.29**	**3.39**	**4.082**	**4.0**	**4.78**	**0.51**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.005**	20.0	200	0.013	0.50	0.023	0.738	0.591
Block 7 159 First Line		**MH.AA**	**Low Density - Semis**	**9**	**30**	**325**	**0.32**	**3.71**	**4.064**	**4.0**	**5.26**	**0.56**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.006**	20.0	200	0.013	0.50	0.023	0.738	0.613
Block 8 159 First Line		**MH.AA**	**Low Density - Towns**	**10**	**24**	**348**	**0.34**	**4.05**	**4.050**	**4.0**	**5.64**	**0.61**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.006**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 9 159 First Line		**MH.AA**	**Low Density - Singles**	**22**	**72**	**420**	**0.78**	**4.83**	**4.012**	**4.0**	**6.81**	**0.72**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.008**	20.0	200	0.013	0.50	0.023	0.738	0.657
Block 10 159 First Line		**MH.AA**	**Low Density - Towns**	**16**	**38**	**458**	**0.56**	**5.39**	**3.994**	**3.994**	**7.41**	**0.81**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.008**	20.0	200	0.013	0.50	0.023	0.738	0.000
First Line	MH.AA	MH.Z	Low Density - Singles	5	16	474	0.57	5.96	3.986	3.986	7.66	0.89	0.00	0.00	0.00	0.00	0.00	0.00	0.009	49.9	200	0.013	1.15	0.035	1.120	0.929
First Line	MH.Z	MH.Y	Low Density - Singles	6	20	494	0.75	6.71	3.977	3.977	7.96	1.01	0.00	0.00	0.00	0.00	0.00	0.00	0.009	99.6	200	0.013	0.47	0.022	0.716	0.673
Block 1 127 First Line		**MH.Y**	**Low Density - Singles**	**3**	**10**	**10**	**0.35**	**0.35**	**4.415**	**4.0**	**0.16**	**0.05**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.0002**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 1 127 First Line		**MH.Y**	**Low Density - Towns**	**16**	**38**	**47**	**0.35**	**0.70**	**4.319**	**4.0**	**0.77**	**0.10**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.0009**	20.0	200	0.013	0.50	0.023	0.738	0.000
Block 4 127 First Line		**MH.Y**	**Low Density - Towns**	**11**	**26**	**73**	**0.48**	**1.18**	**4.278**	**4.0**	**1.19**	**0.18**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.0014**	20.0	200	0.013	0.50	0.023	0.738	0.428
Block 5 127 First Line		**MH.Y**	**Low Density - Towns**	**30**	**71**	**144**	**0.57**	**1.75**	**4.197**	**4.0**	**2.33**	**0.26**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.0026**	20.0	200	0.013	0.50	0.023	0.738	0.472
Block 6 127 First Line		**MH.Y**	**Low Density - Towns**	**48**	**113**	**257**	**0.88**	**2.63**	**4.107**	**4.0**	**4.16**	**0.39**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00455**	20.0	200	0.013	0.50	0.023	0.738	0.576
Spencer Drive	MH.Y	MH.X	Low Density - Singles	3	10	760	0.40	9.74	3.874	3.874	11.93	1.46	0.00	0.00	0.00	0.00	0.00	0.00	0.013	60.0	200	0.013	0.43	0.022	0.685	0.719
Spencer Drive	MH.X	MH.W	Low Density - Singles	6	20	780	0.53	10.27	3.867	3.867	12.22	1.54	0.00	0.00	0.00	0.00	0.00	0.00	0.014	100.6	200	0.013	0.48	0.023	0.723	0.759
Spencer Drive	MH.W	MH.F	Low Density - Singles	7	23	803	0.60	10.87	3.859	3.859	12.55	1.63	0.00	0.00	0.00	0.00	0.00	0.00	0.014	100.5	250	0.013	0.48	0.041	0.839	0.755
Stafford Street	MH	MH.F	Low Density - Singles	170	557	557	12.38	12.38	3.950	3.950	8.92	1.86	0.00	0.00	0.00	0.00	0.00	0.00	0.011	88.8	200	0.013	0.50	0.023	0.738	0.716
Spencer Drive	MH	MH.F	Low Density - Singles	36	118	118	2.57	2.57	4.223	4.0	1.91	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.002	99.5	200	0.013	1.85	0.045	1.420	0.809
Stafford Street	MH.F	MH.E	Low Density - Singles	0	0	1478	0.10	25.92	3.684	3.684	22.06	3.89	0.00	0.00	0.00	0.00	0.00	0.00	0.026	56.5	300	0.013	0.37	0.059	0.832	0.807
Stafford Street	SAN S	MH.E	Low Density - Singles	1	3	3	3.01	3.01	4.451	4.0	0.05	0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.001	13.6	150	0.013	2.21	0.023	1.280	0.000
Stafford Street	MH.E	SPS	Low Density - Singles	0	0	1482	0.00	28.93	3.683	3.683	22.11	4.34	0.00	0.00	0.00	0.00	0.00	0.00	0.026	19.6	300	0.013	0.50	0.068	0.967	0.909
Stafford Street (Forcemain)	SPS	MH.D	Low Density - Singles	0	0	1482	0.00	28.93	3.683	3.683	22.11	4.34	0.00	0.00	0.00	0.00	0.00	0.00	0.026			0.013		0.000	#DIV/0!	#DIV/0!
Bridge Street	MH.D	MH.C/MH.253	Low Density - Singles	0	0	1482	0.00	28.93	3.683	3.683	22.11	4.34	0.00	0.00	0.00	0.00	0.00	0.00	0.026	65.0	300	0.013	1.00	0.097	1.368	1.177
Bridge Street	MH.C/MH.253	MH.252	Low Density - Singles	0	0	1482	0.00	28.93	3.683	3.683	22.11	4.34	0.00	0.00	0.00	0.00	0.00	0.00	0.026	64.0	300	0.013	1.50	0.118	1.675	1.324
Bridge Street	MH.252	MH.251	Low Density - Singles	0	0	1482	0.00	28.93	3.683	3.683	22.11	4.34	0.00	0.00	0.00	0.00	0.00	0.00	0.026	94.0	300	0.013	0.48	0.067	0.948	0.891
Bridge Street	MH.251	MH.245/MH.3A	Low Density - Singles	8	26	1508	0.87	29.80	3.678	3.678	22.46	4.47	0.00	0.00	0.00	0.00	0.00	0.00	0.027	100.0	300	0.013	0.66	0.079	1.111	1.000

Bridge Street	SAN S	MH.245/MH.3A	Low Density - Singles	0	0	0	0.00	0.00	0.000	0.000	0.00	0.00	0.00	0.00	0.00	30.60	30.60	15.30	0.015	13.5	200	0.013	0.50	0.023	0.738	0.790
Bridge Street	MH.245/MH.3A	MH.2A	Low Density - Singles	4	13	1521	0.60	30.40	3.675	3.675	22.64	4.56	0.00	0.00	0.00	0.00	30.60	15.30	0.043	100.2	300	0.013	0.47	0.066	0.938	0.994
Murray Drive	MH	MH.2A	Low Density - Singles	53	174	174	5.48	5.48	4.170	4.0	2.82	0.82	0.00	0.00	0.00	0.00	0.00	0.00	0.004	37.0	200	0.013	0.50	0.023	0.738	0.539
Bridge Street	MH.2A	MH.1A	Low Density - Singles	6	20	1714	1.04	36.92	3.637	3.637	25.26	5.54	0.00	0.00	0.00	0.00	30.60	15.30	0.046	92.1	300	0.013	0.43	0.063	0.897	0.982
Bridge Street	MH.1A	MH.192	Low Density - Singles	5	16	1731	1.00	37.92	3.634	3.634	25.48	5.69	0.00	0.00	0.00	0.00	30.60	15.30	0.046	93.7	300	0.013	0.45	0.065	0.918	1.000
Bridge Street	MH.192	MH.193	Low Density - Singles	5	16	1747	0.83	38.75	3.631	3.631	25.69	5.81	0.00	0.00	0.00	0.00	30.60	15.30	0.047	113.5	300	0.013	0.48	0.067	0.948	1.024
McNab Street	MH	MH193	Low Density - Singles	11	36	36	1.62	1.62	4.341	4.0	0.58	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.001	156.0	200	0.013	0.50	0.023	0.738	0.362
Bridge Street	MH.193	MH.194	Low Density - Singles	0	0	1783	0.17	40.54	3.624	3.624	26.18	6.08	0.00	0.00	0.00	0.00	30.60	15.30	0.048	65.3	200	0.013	8.30	0.094	3.008	3.008
Bridge Street	MH.194	MH.195	Low Density - Singles	0	0	1783	0.18	40.72	3.624	3.624	26.18	6.11	0.00	0.00	0.00	0.00	30.60	15.30	0.048	61.0	200	0.013	8.61	0.096	3.063	3.032
Bridge Street	MH	MH.195	Low Density - Singles	7	23	23	0.90	0.90	4.372	4.0	0.37	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.001	68.0	200	0.013	0.50	0.023	0.738	0.244
Water Street	MH	MH.195	Low Density - Singles	283	928	928	37.55	37.55	3.821	3.821	14.36	5.63	0.00	0.00	0.00	0.00	0.00	0.00	0.020	103.0	300	0.013	0.50	0.068	0.967	0.851
Water Street	MH.195	MH.196	Low Density - Singles	7	23	2757	1.07	80.24	3.473	3.473	38.79	12.04	0.00	0.00	0.00	0.00	30.60	15.30	0.066	107.7	375	0.013	0.60	0.136	1.230	1.217
Water Street	MH.196	MH.197	Low Density - Singles	5	16	2773	0.83	81.07	3.471	3.471	38.99	12.16	0.00	0.00	0.00	0.00	30.60	15.30	0.066	81.5	375	0.013	0.56	0.131	1.188	1.200
Water Street	MH.197	MH.198	Low Density - Singles	7	23	2796	1.16	82.23	3.468	3.468	39.28	12.33	0.00	0.00	0.00	0.00	30.60	15.30	0.067	93.8	375	0.013	0.50	0.124	1.123	1.145
Water Street	MH.198	MH.199	Low Density - Singles	8	26	2822	1.07	83.30	3.465	3.465	39.61	12.50	0.00	0.00	0.00	0.00	30.60	15.30	0.067	99.3	375	0.013	0.58	0.134	1.209	1.209
Water Street	MH.199	MH.200	Low Density - Singles	7	23	2845	1.46	84.76	3.462	3.462	39.90	12.71	0.00	0.00	0.00	0.00	30.60	15.30	0.068	91.0	400	0.013	0.24	0.102	0.815	0.872
Water Street	MH.200	MH.201	Low Density - Singles	6	20	2865	0.77	85.53	3.459	3.459	40.15	12.83	0.00	0.00	0.00	0.00	30.60	15.30	0.068	100.5	400	0.013	0.20	0.093	0.741	0.812
Water Street	MH.201	MH.202	Low Density - Singles	8	26	2891	1.27	86.80	3.456	3.456	40.47	13.02	0.00	0.00	0.00	0.00	30.60	15.30	0.069	102.8	400	0.013	0.17	0.086	0.684	0.759
Water Street	MH.202	MH.203	Low Density - Singles	3	10	2901	0.53	87.33	3.455	3.455	40.60	13.10	0.00	0.00	0.00	0.00	30.60	15.30	0.069	107.5	400	0.013	0.17	0.085	0.678	0.753
McNab Street	MH	MH.187	Low Density - Singles	3	10	10	0.35	0.35	4.415	4.0	0.16	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.000	42.5	200	0.013	0.50	0.023	0.738	0.170
McNab Street	MH	MH.187	Low Density - Singles	8	26	26	1.18	1.18	4.364	4.0	0.42	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.001	126.5	200	0.013	0.50	0.023	0.738	0.295
High Street	MH	MH.187	Low Density - Singles	323	1059	1059	30.29	30.29	3.784	3.784	16.23	4.54	0.00	0.00	0.00	0.00	0.00	0.00	0.021	102.5	200	0.013	0.50	0.023	0.738	0.834
High Street	MH.187	MH.188	Low Density - Singles	2	7	1101	0.48	32.30	3.773	3.773	16.83	4.85	0.00	0.00	0.00	0.00	0.00	0.00	0.022	54.0	250	0.013	0.95	0.058	1.183	1.088
High Street	MH.188	MH.189	Low Density - Singles	1	3	1105	0.13	32.43	3.772	3.772	16.88	4.86	0.00	0.00	0.00	0.00	0.00	0.00	0.022	49.8	250	0.013	4.42	0.125	2.548	1.885
Water Street	MH.189	MH.203	Low Density - Singles	0	0	1105	0.00	32.43	3.772	3.772	16.88	4.86	0.00	0.00	0.00	0.00	0.00	0.00	0.022	56.5	250	0.013	1.12	0.063	1.284	1.156
Clyde Street	MH.203	MH.204	Low Density - Singles	0	0	4006	0.00	119.76	3.333	3.333	54.08	17.96	0.00	0.00	0.00	0.00	30.60	15.30	0.087	72.5	375	0.013	0.50	0.124	1.123	1.212
Carleton Place	MH.199	MH.200	Low Density - Singles	8	26	26	0.80	0.80	4.364	4.0	0.42	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.001	89.2	250	0.013	1.13	0.063	1.288	0.296
Carleton Place	MH.200	MH.201	Low Density - Singles	2	7	33	0.29	1.09	4.348	4.0	0.53	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.001	76.2	300	0.013	0.66	0.079	1.111	0.256
Victoria Street	MH	MH.201	Low Density - Singles	27	89	89	5.35	5.35	4.258	4.0	1.43	0.80	3.28	3.28	1.06	1.43	1.43	0.72	0.004	35.6	200	0.013	0.35	0.019	0.618	0.488
Carleton Place	MH.201	MH.173/MH.202	Low Density - Singles	3	10	131	0.52	6.96	4.209	4.0	2.12	1.04	0.00	3.28	1.06	0.00	1.43	0.72	0.005	63.4	400	0.013	0.53	0.152	1.207	0.483
Carleton Place	MH.173/MH.202	MH.174	Low Density - Singles	1	3	134	0.00	6.96	4.206	4.0	2.18	1.04	0.00	3.28	1.06	0.32	1.75	0.88	0.005	41.2	400	0.013	0.50	0.147	1.172	0.574
Clyde Street	MH.149A	MH.174	Low Density - Singles	1426	4674	4674	211.57	211.57	3.272	3.272	61.96	31.74	2.00	2.00	0.65	2.00	2.00	1.00	0.095	28.5	450	0.013	0.50	0.202	1.268	1.242
Clyde Street	MH.174	MH.204	Low Density - Singles	0	0	4809	0.00	218.53	3.261	3.261	63.52	32.78	0.00	5.28	1.71	0.00	3.75	1.88	0.100	40.6	525	0.013	0.50	0.304	1.405	1.250

Clyde Street	MH.204	SPS	Low Density - Singles	0	0	8814	0.00	338.29	3.009	3.009	107.44	50.74	0.00	5.28	1.71	0.00	34.35	17.18	0.177	2.5	525	0.013	1.20	0.471	2.176	2.024
Carleton Place	SPS	WWTP																								

Minimum diameter = 200 mm
Minimum acceptable velocity = 0.6 m/s
Maximum acceptable velocity = 3.0 m/s
Roughness Coefficient for PVC pipe = 0.013

Date: August 2026
Designed By: AEK
Checked By: AEK

Project: Proposed Conditions - 127 First Line (Phase 1 ONLY) and 159 First Line (Phase 1 ONLY)
File: 300060179.0000

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix G

Stormwater Management Memo (WalterFedy, dated Sept 2026)

WALTERFEDY

TECHNICAL MEMORANDUM

To:	WrightHaven Homes Elora Greens Inc.	Project No.:	2025-0082-10	Date:	September 11, 2026
Attn:	Mr. Steven Wright (WrightHaven) Mr. Farhan Kamali Siddiqui (Elora Greens)	Project:	127 First Line and 159 First Line, Elora		
Subject:	Stormwater Management Memo	From:	S. Fischer, EIT, J. Oreskovic, P.Eng.		

1.1 Introduction

WalterFedy has been retained by WrightHaven Homes to provide consulting engineering services in support of future development of the lands located at 159 First Line in Elora, Township of Centre Wellington, herein referred to as the Site. The adjacent lands located at 127 First Line are slated to be developed by Elora Greens Inc. (Elora Greens), with consulting engineering services provided by R.J. Burnside & Associates Limited (Burnside). Due to the similar nature and timeline of the two developments, WalterFedy has coordinated with Burnside to develop a preferred joint servicing strategy including water, sanitary and stormwater management considerations for the two parcels.

WalterFedy has undertaken the stormwater management portion of the joint servicing strategy. This memo summarizes the proposed stormwater management facilities designed to service 127 First Line and 159 First Line, jointly referred to herein as the Development Lands.

1.2 Reference Documents

In the preparation of this report, the following documents were referenced:

1. *Township of Centre Wellington Development Manual*, Township of Centre Wellington, June 2024.
2. *Stormwater Management Planning and Design Manual*, Ministry of the Environment, Conservation and Parks (MECP), last updated March 2017.
3. *Stormwater Management Report, Final Design, South Ridge Subdivision, Elora Ridge Developments Limited*, Gamsby and Mannerlow Limited, February 2007.
4. Watershed Plan [drawing], Nichol Drain 8 2007, K. Smart Associates Limited, June 15, 2007.
5. *Preliminary Geotechnical Investigation*, Chung & Vander Doelen Engineering Ltd., May 29, 2025.
6. *Draft Scoped Preliminary Hydrogeological Assessment*, Chung & Vander Doelen Engineering Ltd., October 27, 2025.

1.3 Background

The development of the Site into residential land use will significantly increase impervious coverage, thus requiring the implementation of stormwater management (SWM) measures to control the magnitude of peak flows outletting from the future development areas.

Under existing conditions, branch “Drain A” of the existing Nichol Drain 8 Municipal Drain bisects the Site from north to south and joins with a branch from the east with a confluence near the south limit of the Site. From this confluence, the drain continues to flow westward where it leaves the Site at its southwest limit. As part of the proposed works, the north-south and east-west sections of the drain will be relocated to a future Open Space block on the east and south side of the property. The relocated drain will tie back into the existing drain at the south property limit.

To facilitate a sanitary gravity phase to First Line with adequate depth and cover, it is proposed to grade the site such that major overland flow from the north portion of the Site cannot be directed to the consolidated SWMF at the southern end of the Development Lands. Therefore, two stormwater management facilities (SWMFs) will be required to service the Site. The SWMF located at the northern limit of the Site will herein be referred to as the North SWMF, which will capture and control major storm events from the Site up to and including Street E prior to controlled discharge to the municipal drain at the east. The consolidated SWMF at the southern end of the Development Lands will herein be referred to as the South SWMF, which will capture and control minor and major storm events from the southern portion of the Site, as well as majority of the property at 127 First Line, prior to controlled discharge to the municipal drain at the south. Both SWMF will be constructed during the first phase of construction and are intended to service the Site and the Development Lands through phased construction and ultimate buildout. Analysis of each SWMF and its compliance with Township requirements is outlined in the subsequent sections.

1.4 Design Criteria

Under post-development conditions, the imperviousness of the Development Lands residential developments have increased, while the external areas to the north and northeast have remained consistent with the pre-development condition. In order to control the excess runoff generated by the developments, two stormwater management facilities (SWMFs) will be constructed on site.

The proposed SWMFs were sized to meet both quantity and quality requirements outlined in *the Township of Centre Wellington Development Manual* (2024), as follows:

- Quantity Control – Control post-development peak flow discharge to the municipal drain to less than pre-development conditions for the 2-year to 100-year storm events and provide safe conveyance of the Regional storm event (Hurricane Hazel) through the SWM facility.

- Quality Control – Provide an Enhanced (80% total suspended solids (TSS) removal) level of water quality protection per MECP guidelines.

- Erosion Control – Provide extended detention drawdown over a 24- to 48-hour period for the 25 mm (4-hour duration) Chicago Storm event or the MECP required extended detention volume (40 m^3/ha), whichever is greater.

It should be noted that meeting water balance/infiltration targets is not explicitly required by the Township, though it is encouraged if feasible. Geotechnical and hydrogeological investigations conducted by CVD note that on-site infiltration is not feasible across the majority of the Site, as the predominant underlying sand and silt till deposits have low infiltration rates (1-5 mm/hr). This is expected to worsen further during periods of high groundwater in the spring and fall seasons, where the water table is expected to be shallow (<1.5 mbgs). Additionally, the South Ridge Subdivision SWM report noted similar considerations, in which it was determined that the drain down time for an infiltration structure would be 23 days, which exceeds the MECP maximum recommendation of 24 to 48 hours. Therefore, based on the soil characteristics and groundwater conditions present on the Development Lands, on-site infiltration was not considered as a feasible design option to incorporate and thus, a dry pond and wet pond are proposed to meet the Township's development criteria.

1.5 Pre-Development Conditions

Under pre-development conditions, the Development Lands are utilized primarily for agricultural (row crop) purposes. Based on Ontario Soils Mapping, the in-situ soils are comprised of Harriston and Listowel Loam which are characteristic of Hydrologic Soil Group (HSG) B.

The Development Lands in total have an east-west drainage divide, with 37.4 ha draining southwards and 26.5 ha draining westward. Both areas ultimately discharge to the municipal drain (Drain A) but at different locations along the drain alignment.

In addition to the Development Lands, external areas contributing to the municipal drain were also considered and carried through both pre- and post-development models to represent the upstream conditions and their impact on the water level in the municipal drain. The contributing area to the municipal drain is shown in the Watershed Plan drawing for Nichol Drain 8, prepared by K. Smart Associates Limited (2007), which is attached.

One portion of this external area represents the South Ridge Subdivision, located immediately north of the proposed developments and occupying approximately 36 ha. Catchment, storage node, and outlet information were modeled to reflect the parameters outlined in the South Ridge subdivision's Stormwater Management Report (2007). The drainage plan and model schematic from the South Ridge report are attached to this memo. Alternative Runoff Method (ARM) catchments were used in PCSWMM to replicate the Triangular SCS runoff method used in the South Ridge analysis. Additionally, stage-storage-discharge tables provided in the South Ridge report, which are included in Table 2.2 of the attached summary tables, were used to model the outflows from the three storage nodes described.

The external area to the northeast, which has an area of 57.59 ha, was modeled as a mostly undeveloped catchment with an imperviousness of 5%. An additional 0.33 ha development just south of First Line, nestled between the proposed Development Lands, was also included in the model and drains to First Line as overland flow and ultimately to the municipal drain. All external area catchment parameters are included in the attached summary tables. Figure 2 in the appended drawings shows the pre-development drainage areas and flow routes.

Pre-development conditions were modeled using the PCSWMM hydrologic and hydraulic modeling program. A 4-hour Chicago distribution was used for the 2 through 100-year design storms according to the IDF parameters outlined in the *Township of Centre Wellington Development Manual* (June 2024). A 4-hour Chicago distribution was also used for the 25mm (water quality) event, and Hurricane Hazel was used for the Regional storm event analysis. A summary of all pre-development catchment areas is shown in Table 1.

Table 1: Pre-Development Catchments

	Catchment ID	Description	Area (ha)	Percent Impervious
Proposed Development Area	101	Future WrightHaven Homes Development – east side	37.4	5
	102	Future WrightHaven Homes Development – west side	4.9	5
	103	Future Elora Greens Development - to west	21.6	5
		Total	**63.9**	**5**
External Contributing Areas to Municipal Drain	500	External area east of proposed developments	57.59	5
	501	Existing development near First Line	0.33	30
	502.1	South Ridge Subdivision	11.2	5
	502.2	South Ridge Subdivision	8.4	45
	502.3	South Ridge Subdivision	14.95	35
	502.4	South Ridge Subdivision	1.41	15
		Total	**93.9**	**13.7**
		Total Modeled Area	**157.8**	**10.2**

1.6 Post-Development Conditions

Post-development conditions for the Development Lands were discretized into ten catchment areas. Table 2 summarizes the post-development catchments and Figure 2 in the appended drawings outlines their locations and overland flow routes.

Catchment 200 represents the eastern side of the Site, which will be utilized for the relocated municipal drain that will convey upstream flows from First Line to the southern end of the Site, bypassing the SWMF. Catchments 201, 202, and 203 represent Phase 1 of the WrightHaven Homes development. Catchment 201 represents the Phase 1 pond block, which contains a dry pond (North SWMF) that receives major overland flows from Catchment 202. Minor flows from 202, as well as major and minor flows from 203, ultimately flow to the South SWMF. Catchments 204 and 205 represent Phase 2 of the WrightHaven Homes development, with all flows sent to the South SWMF. Catchments 300 and 301 represent the Elora Greens property, with flows from Catchment 300 flowing to the shared SWMF and flows from Catchment 301 flowing uncontrolled to the west towards the municipal drain. Catchment 400 represents the shared pond block, which spans the two properties and contains the South SWMF. The external catchments, Catchments 500-502.4, have the same characteristics as in the pre-development condition. A summary of all pre-development catchment areas is shown in Table 2.

Table 2: Post-Development Catchments

	Catchment ID	Description	Area (ha)	Precent Impervious
Proposed Development Area	200	Woodlot area & drain block	10.4	5
	201	WrightHaven Homes - Phase 1 Pond Block	1.0	70
	202	WrightHaven Homes - Phase 1	2.7	70
	203	WrightHaven Homes - Phase 1	0.6	70
	204	WrightHaven Homes - Phase 2	1.0	70
	205	WrightHaven Homes - Phase 2	23.6	70
	300	Elora Greens Development – to South Pond	17.5	70
	301	Elora Greens Development – to West	2.4	50
	400	Shared Pond Block	4.6	70
		Total	**63.9**	**58.6**
External Contributing Areas to Municipal Drain	500	External area east of proposed developments	57.59	5
	501	Existing development near First Line	0.33	30
	502.1	South Ridge Subdivision	11.2	5
	502.2	South Ridge Subdivision	8.4	45
	502.3	South Ridge Subdivision	14.95	35
	502.4	South Ridge Subdivision	1.41	15
		Total	**93.9**	**14**
		Total Modeled Area	**157.8**	**31.8**

1.6.1 Stormwater Management Facilities

North SWMF

The North SWMF is a dry pond located within the WrightHaven homes development, along its northern property limit on First Line within Catchment 201. The North SWMF services only Phase 1 of the WrightHaven Homes development, as the grading of this portion of the site flows north towards First Line. The SWMF serves to intercept overland (major)

flows from Catchment 202 of Phase 1. All storm runoff from Catchment 201 will be directed to the SWMF. Minor system flows from Catchment 202 will be collected and conveyed to the South SWMF, whereas major flows (greater than 5-year) will drain to the North SWMF.

Table 3 summarizes the preliminary operating levels and storage volumes for the North SWMF. The facility will be 2.1 m deep with 3:1 side slopes, per Township Standards. A 75 mm orifice at the pond bottom conveys outflows to the municipal drain and achieves a drawdown time of 17.8 hours for the MECP required extended detention volume, equivalent to 40 m^3/ha. Due to the small area being serviced by the facility, a drawdown time greater than 12 hours is acceptable, rather than the typical minimum of 24 hours. A gravel jacket shall be installed surrounding the outlet to prevent clogging. An additional 400 mm orifice at a stage of 399.8 m provides controlled drainage for large storm events, and a spill-over weir is located 0.3 m below the top of pond to provide the required freeboard and control any overflows from the pond. Stage-storage information, water quality, and drawdown calculations are attached.

Table 3: North SWM Facility – Dry Pond Operating Levels

Stage	Elevation (m)	Surface Area (m^3)	Volume (m^3)
Bottom of Pond and Outlet Control #1	398.7	2013	0
Outlet Control #2	399.8	2646	2555
Spillover Weir Sill	400.5	3087	4560
Top of Pond	400.8	3285	5513
Outlet Controls:	1) 75 mm diameter low-flow orifice at elev. 398.7 m 2) 400 mm diameter vertical orifice at elev. 399.8 m 2) Spillover weir at elev. 400.5 m		

Outflows from the North SWMF are discharged to the municipal drain near the north end of the property limit. Flows from external areas to the upstream portion of the municipal drain were modeled to represent backflow effects and their impact on the water levels in the North SWMF. The north SWMF was sized such that, backwater effects considered, the water level in the dry pond does not overtop the freeboard in all events up to and including the regional storm. Further discussion of results is presented in Section 1.71.7.

South SWMF

The South SWMF, situated at the south limit of the developments and spanning both properties, will service both the WrightHaven and Elora Greens residential developments. The storm sewer system, which is sized to convey 5-year (minor) flows, discharges to the South SWMF via two inlets on the north edge of the pond. Major system flows will be conveyed as overland flow through the proposed road network where it will spillover into the South SWM facility. Discharge from the pond will be controlled via an outlet structure containing a 250-mm low flow orifice at the top of the permanent pool (elev. 391.8 m) and a 2-m wide weir 1.2 m above that, which serve to control the discharge to the Municipal Drain at the south limit of the WrightHaven property. Overflows from the Regional event will spill via the overflow weir into the Municipal Drain. Due to the shallow groundwater encountered during the geotechnical investigation, the pond will require a compacted clay liner (600 mm thick), a suitable synthetic membrane or geosynthetic liner.

Table 4 summarizes the preliminary operating levels and storage volumes for the MECP wet pond SWM facility (South SWMF). The facility will have 1.5 m deep permanent pool with 3:1 side slopes and a 2.1 m deep active storage depth with 5:1 side slopes up to the spill-over weir, all in accordance with Township standards. The depth of the 25 mm event is at an approximate stage of 392.05 m, which results in a calculated drawdown time of 46.3 hours, within the 24-hour to 48-hour requirement. Stage-storage information, water quality, and drawdown calculations are attached.

Table 4: South SWM Facility – Wet Pond Operating Levels

Stage	Elevation (m)	Active Volume (m^3)	Cumulative Volume (m^3)
Bottom of Pond	390.30	0	0
Permanent Pool	391.80	0	41691
Ext. Det (25mm)	392.06	7827	49518
Spillover Weir Sill	393.60	61505	107867
Top of Pond	393.90	73157	119629
Outlet Controls:	1) 250 mm diameter low-flow orifice (25mm quality) at elev. 391.80 m 2) 2.0 m wide weir with vertical walls. Weir sill elev. 393.00 m 3) Spillover weir at elev. 393.60 m		

Table 5 summarizes the water quality control components of the proposed South SWM facility. In addition to the items indicated in the table, the facility will also include two forebays (one for each storm sewer inlet), as well as maintenance access into the forebays and main cell near the outlet structure.

Table 5: South SWM Facility – Summary of Water Quality Control Requirements

Component	Required	Provided
Protection Level	'Enhanced' (80% long-term TSS removal)	
Drainage Area for Quality Control	48.98 ha (Catchments 202, 203, 204, 205, 300, & 400)	
Percent Impervious	70%	
Req'd MECP Water Quality Unit Volume	225 m^3/ha	
Permanent Pool Volume		
Permanent Pool (Required unit volume = 185 m^3/ha) [A]	9061 m^3	37510 m^3
Permanent Pool Depth	1.0 – 1.5 m	1.5 m
Extended Detention Volume/Control		
Extended Detention Volume (Based on 25mm storm) [B]	7827 m^3	7827 m^3
Extended Detention Depth	Max. 1.0 m	0.23 m (elev. 392.03 m)
Drawdown time for Erosion Control	24 – 48 hours	46.3 hours
Orifice Diameter (Water Quality)	---	250 mm dia. (invert 391.80 m)

[A] Permanent Pool Volume = Total required volume, less 40 m^3/s/ha
[B] MECP minimum requirement is 40 m^3/ha, but 25 mm storm volume governs

1.7 PCSWMM Modelling Results

The post-development conditions were modeled with the PCSWMM using the same storm events as the pre-development model. Table 6 summarizes the post-development peak flows from the site with stormwater management controls in place.

The analysis shows that overall, post-development peak flows are maintained below pre-development peak flows for all modelled storm events. Detailed PCSWMM output files are attached for the 100-year and regional storm events for pre- and post-development.

Table 6: Comparison of Pre-and Post-Development Peak Flow Leaving Site

Storm Event	Pre-Development Peak Flow (m^3/s)	Post-Development Peak Flow (m^3/s)	Peak Flow Reduction (%)
25 mm	0.375	0.277	-26%
2-year	0.755	0.492	-35%
5-year	1.032	0.665	-36%
10-year	1.221	0.806	-34%
25-year	1.527	1.139	-25%
50-year	2.052	1.506	-27%
100-year	2.671	1.918	-28%
Regional	13.164	12.313	-6%

Table 7 shows the pond operating levels for the North and South SWMFs. Further outflow information from the pond outlets is included in the attached summary tables, Table 6. The results indicate that sufficient volume is provided in the North SWMF to control all events up to the regional storm, while the South SWMF controls all events up to the 100-year storm and conveys the Regional Event through the spillover weir.

Table 7: North SWMF and South SWMF Pond Operating Levels

Storm Event	North SWMF Operating Levels			South Pond Operating Levels		
	Max. Volume (m^3)	Ponding Elevation (m)	% Full	Max. Volume (m^3)	Ponding Elevation (m)	% Full
25 mm	150	398.77	3%	7827	392.03	11%
2-year	244	398.82	4%	12859	392.18	18%
5-year	330	398.86	6%	17275	392.30	24%
10-year	553	398.97	10%	20300	392.39	28%
25-year	838	399.1	15%	24058	392.49	33%
50-year	1063	399.19	19%	26950	392.57	37%
100-year	1288	399.29	23%	29847	392.65	41%
Regional	4358	400.43	79%	71524	393.73	98%

1.8 Conclusions

Based on the analysis presented in this report, it is concluded that:

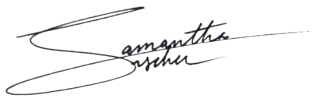
- Storm sewer sizing will be undertaken as part of detailed design to convey the 5-year design storm. Flows exceeding the 5-year storm will be conveyed as overland flows.
- The northern stormwater management facility, North SWMF, adequately attenuates stormwater flows for the Site at 159 First Line.

- The southern stormwater management facility, South SWMF, adequately attenuates stormwater flows resulting from the increased imperviousness of the Development Lands. Water quality targets are achieved by allowing for adequate drawdown time in SWMFs, and overall runoff from the Development Lands to the municipal drain is reduced from pre- to post-development.

All of which is respectfully submitted,

WALTERFEDY





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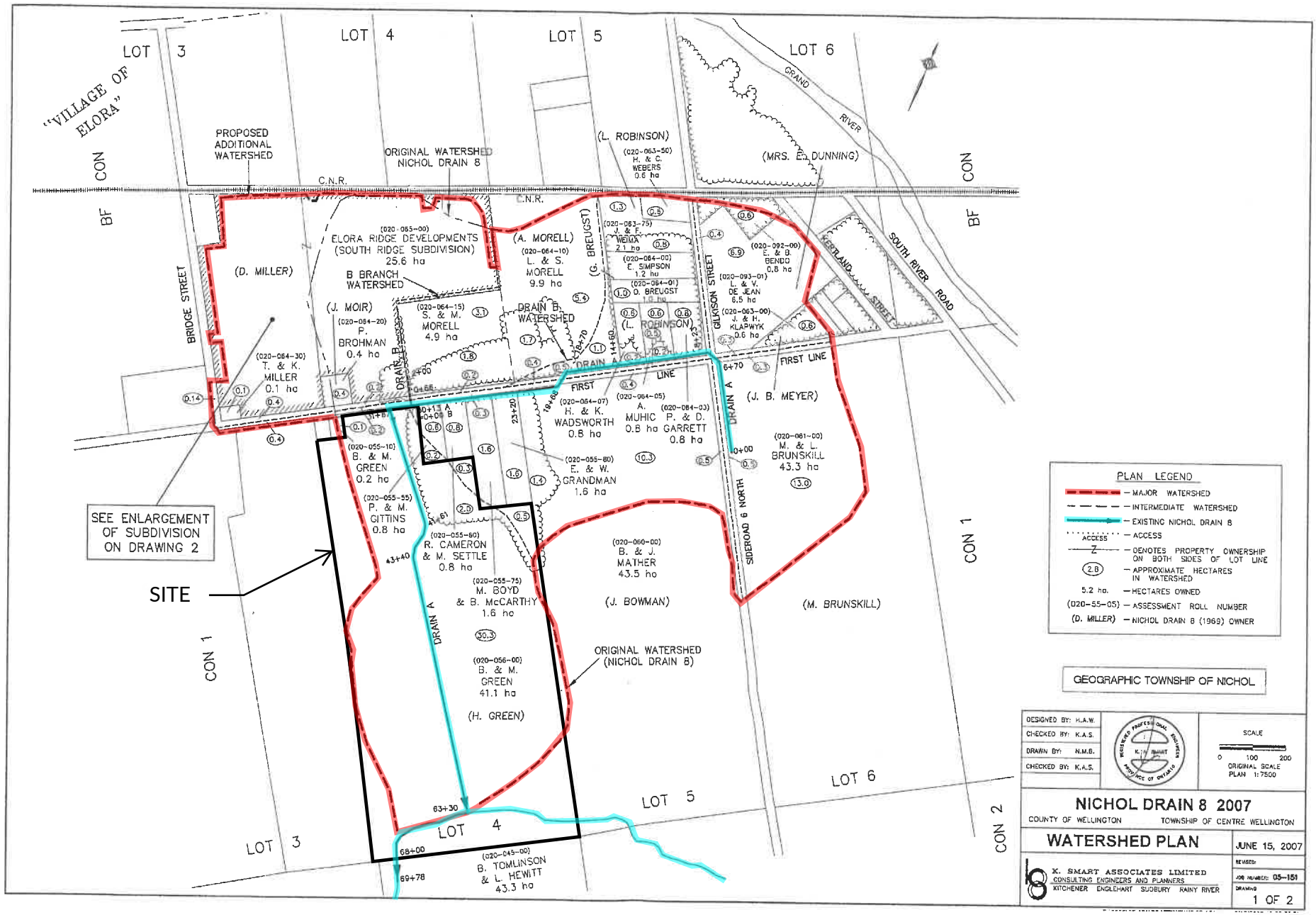
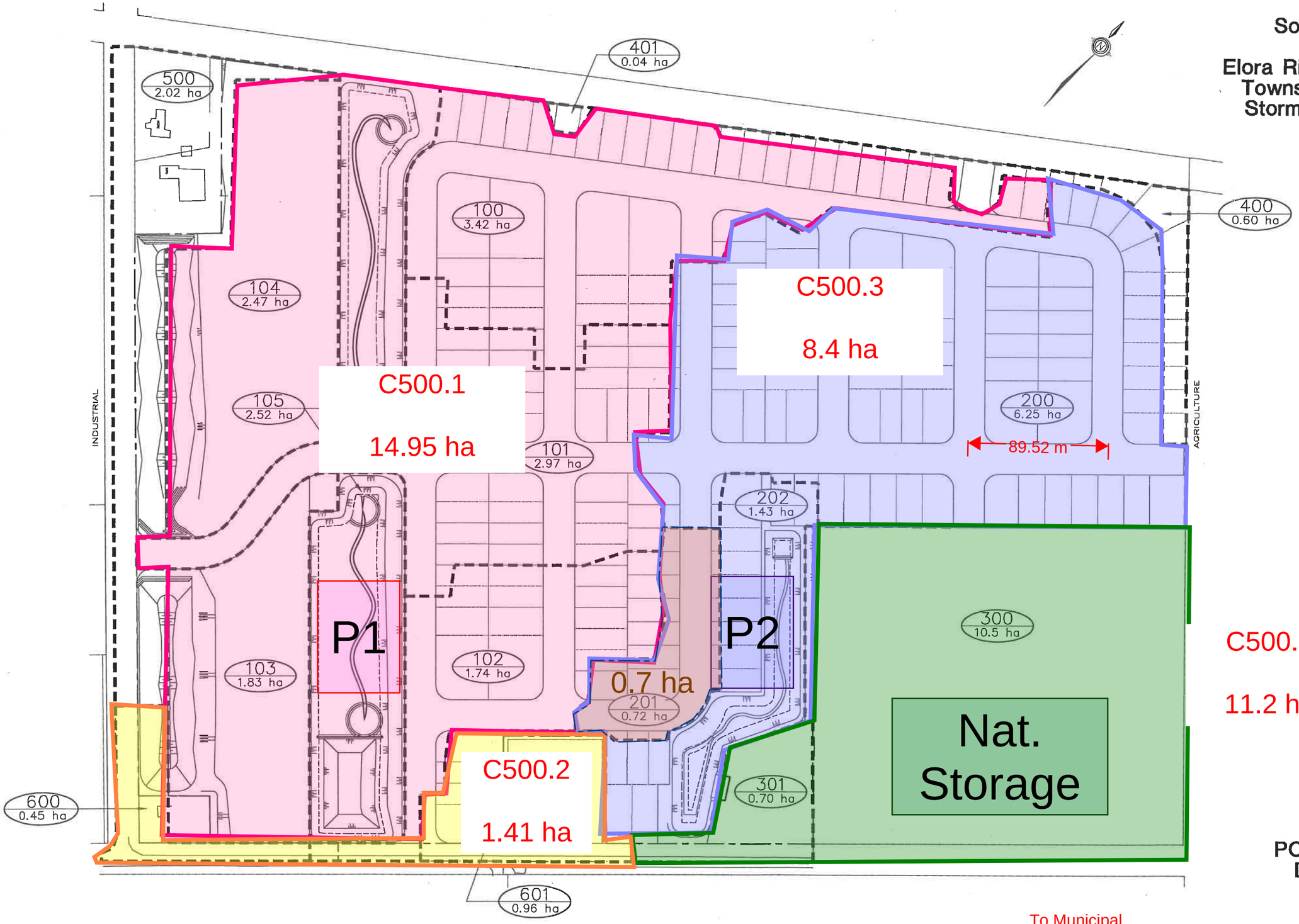
cc: Angela Kroetsch, P.Eng., R.J. Burnside & Associates Limited


LOT 3
LOT 4
LOT 5
LOT 6
"VILLAGE OF ELORA"
CON BF
CON 1
CON 2
PROPOSED ADDITIONAL WATERSHED
ORIGINAL WATERSHED NICHOL DRAIN 8
C.N.R.
GRAND RIVER
(MRS. E. DUNNING)
(L. ROBINSON)
(020-063-50) H. & C. WEBERS 0.6 ha
(020-055-00) ELORA RIDGE DEVELOPMENTS (SOUTH RIDGE SUBDIVISION) 25.6 ha
B BRANCH WATERSHED
(A. MORELL)
(020-064-10) L. & S. MORELL 9.9 ha
(G. BREUGST)
(020-063-75) J. & F. WEIMA 2.1 ha
(020-064-00) E. SIMPSON 1.2 ha
(020-064-01) G. BREUGST 1.8 ha
(020-092-00) E. & B. BENDO 0.8 ha
(020-093-01) L. & V. DE JEAN 6.5 ha
(020-063-00) J. & H. KLAPWYK 0.6 ha
GILKISON STREET
FERRELAND STREET
SOUTH RIVER ROAD
BRIDGE STREET
(D. MILLER)
(J. MOIR)
(020-064-20) P. BROHMAN 0.4 ha
(020-064-15) S. & M. MORELL 4.9 ha
DRAIN B WATERSHED
DRAIN B
DRAIN A
(020-064-30) T. & K. MILLER 0.1 ha
FIRST LINE
(020-064-07) H. & K. WADSWORTH 0.8 ha
(020-064-05) A. MUHIC 0.8 ha
(020-084-03) P. & D. GARRETT 0.8 ha
(J. B. MEYER)
(020-061-00) M. & L. BRUNSKILL 43.3 ha
(020-055-10) B. & M. GREEN 0.2 ha
(020-055-55) P. & M. GITTINS 0.8 ha
(020-055-80) E. & W. GRANDMAN 1.6 ha
SIDEROAD 6 NORTH
SEE ENLARGEMENT OF SUBDIVISION ON DRAWING 2
SITE
(020-055-60) R. CAMERON & M. SETTLE 0.8 ha
(020-055-75) M. BOYD & B. McCARTHY 1.6 ha
(020-060-00) B. & J. MATHER 43.5 ha
(J. BOWMAN)
(M. BRUNSKILL)
ORIGINAL WATERSHED (NICHOL DRAIN 8)
(020-056-00) B. & M. GREEN 41.1 ha
(H. GREEN)
(020-045-00) B. TOMLINSON & L. HEWITT 43.3 ha
PLAN LEGEND
— MAJOR WATERSHED
— INTERMEDIATE WATERSHED
— EXISTING NICHOL DRAIN 8
ACCESS — ACCESS
— DENOTES PROPERTY OWNERSHIP ON BOTH SIDES OF LOT LINE
(2.8) — APPROXIMATE HECTARES IN WATERSHED
5.2 ha. — HECTARES OWNED
(020-55-05) — ASSESSMENT ROLL NUMBER
(D. MILLER) — NICHOL DRAIN 8 (1969) OWNER
GEOGRAPHIC TOWNSHIP OF NICHOL
DESIGNED BY: H.A.W.
CHECKED BY: K.A.S.
DRAWN BY: N.M.B.
CHECKED BY: K.A.S.
SCALE
0 100 200
ORIGINAL SCALE PLAN 1:7500
NICHOL DRAIN 8 2007
COUNTY OF WELLINGTON TOWNSHIP OF CENTRE WELLINGTON
WATERSHED PLAN
JUNE 15, 2007
K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS
KITCHENER ENGLEHART SUDBURY RAINY RIVER
JOB NUMBER: 05-151
DRAWING 1 OF 2

South Ridge Subdivision
Final Design
Elora Ridge Developments Limited
Township of Centre Wellington
Stormwater Management Plan

SCALE: 1:2500



POST DEVELOPMENT DRAINAGE AREAS

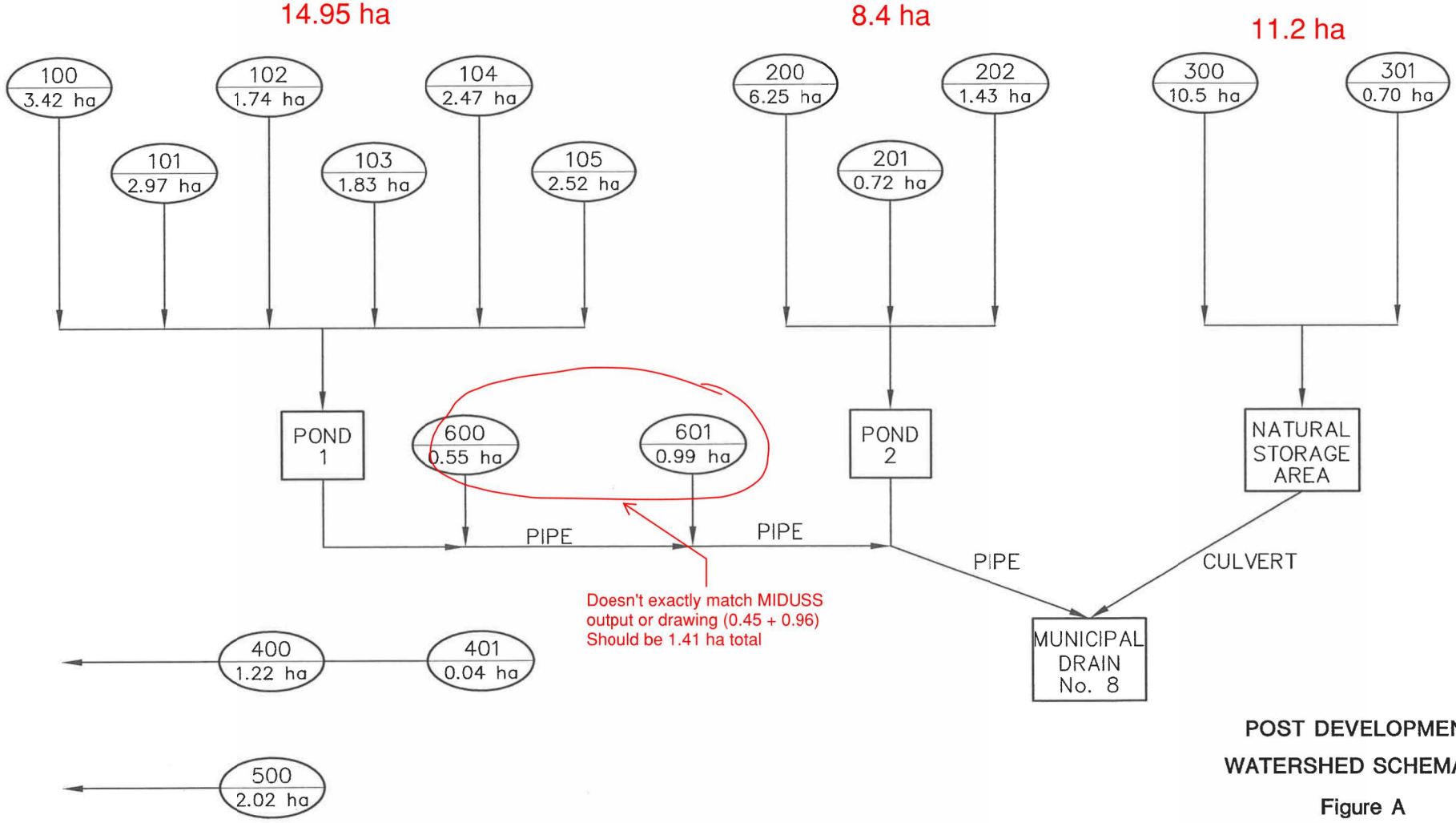
Figure 4

GAMSBY AND MANNEROW Limited

Gamsby and Mannerow Limited FEB 8 2007 105050036.DWG

24.89 ha

South Ridge Subdivision
Final Design
Elora Ridge Developments Limited
Township of Centre Wellington
Stormwater Management Plan



POST DEVELOPMENT

WATERSHED SCHEMATIC

Figure A

GAMSBY AND MANNEROW Limited

Gamsby and Mannerow Limited FEB 8 2007 105050037.DWG

NORTH POND ANALYSIS
STAGE-STORAGE DISCHARGE

WRIGHTHAVEN HOMES
159 FIRST LINE
ELORA, ONTARIO

ELORA LANDS - STAGE-STORAGE-DISCHARGE CALCULATIONS

Outlet Device No. 1 (Quality & Erosion)

Type:	Circular Orifice
Diameter (mm)	**75**
Area (m^2)	0.00442
Invert Elev. (m)	398.70
C/L Elev. (m)	398.74
Disch. Coeff. (C_d)	0.62
Discharge (Q) =	$C_d A (2 g H)^{0.5}$
Number of Orifices:	1

Outlet Device No. 2 (Quantity)

Type:	Circular Orifice
Diameter (mm)	**400**
Area (m^2)	0.12566
Invert Elev. (m)	399.80
C/L Elev. (m)	399.80
Disch. Coeff. (C_d)	0.62
Discharge (Q) =	$C_d A (2 g H)^{0.5}$
Number of Orifices:	1

[redacted]

Outlet No. 4 (Quantity)

Type: Broad crested overflow weir

Sill Elevation (m)	**400.50**
Length (m)	**5.0**
Side Slopes (H:1)	**0**

Discharge (Q) = $1.67 L H^{1.5}$

		SWM Pond Volumes				Outlet No. 1		Outlet No. 2		Outlet No. 3		Outlet No. 4		
	Elevation m	Area m^2	Incremental Volume m^3	Cumulative Volume m^3	**Active Storage Volume m^3**	H m	Discharge m^3/s	H m	Discharge m^3/s	H m	Discharge m^3/s	H m	Discharge m^3/s	**Total Discharge m^3/s**
Bottom of Dry Pond and Control #1	398.7	2012.5	0	0	0	0.00	0.000			[redacted]				
	398.8	2067.02	203.97	203.97	203.97	0.10	0.003							
	398.9	2122.15	209.45	413.42	413.42	0.20	0.005							
	399	2177.89	215	628.42	628.42	0.30	0.006							0.0061
	399.1	2234.25	220.6	849.02	849.02	0.40	0.007							0.0072
	399.2	2291.21	226.27	1075.29	1075.29	0.50	0.008							0.0081
	399.3	2348.79	232	1307.29	1307.29	0.60	0.009							0.0090
	399.4	2406.98	237.78	1545.07	1545.07	0.70	0.010							0.0098
	399.5	2465.78	243.63	1788.7	1788.7	0.80	0.011							0.0105
	399.6	2525.2	249.54	2038.25	2038.25	0.90	0.011							0.0112
	399.7	2585.22	255.52	2293.76	2293.76	1.00	0.012							0.0118
Control # 2 (400 mm orifice)	399.8	2645.86	261.55	2555.31	2555.31	1.10	0.012	0.00	0.000					0.0124
	399.9	2707.11	267.64	2822.96	2822.96	1.20	0.013	0.10	0.007					0.0201
	400	2768.97	273.8	3096.75	3096.75	1.30	0.014	0.20	0.027					0.0407
	400.1	2831.44	280.02	3376.77	3376.77	1.40	0.014	0.30	0.055					0.0691
	400.2	2894.53	286.29	3663.06	3663.06	1.50	0.015	0.40	0.089					0.1038
	400.3	2958.22	292.63	3955.7	3955.7	1.60	0.015	0.50	0.167					0.1818
	400.4	3022.53	299.03	4254.73	4254.73	1.70	0.016	0.60	0.199					0.2148
Weir Sill (overflow)	400.5	3087.45	305.49	4560.22	4560.22	1.80	0.016	0.70	0.227			0.00	0.00	0.2432
	400.6	3152.99	312.02	4872.24	4872.24	1.90	0.017	0.80	0.252			0.10	0.26	0.5325
	400.7	3219.13	318.6	5190.84	5190.84	2.00	0.017	0.90	0.275			0.20	0.75	1.0384
Top of Pond (inc 0.3 m freeboard)	400.8	3285.22	321.96	5512.8	5512.8	2.10	0.017	1.00	0.296			0.30	1.37	1.6849

NORTH POND ANALYSIS
MECP WATER QUALITY

WRIGHTHAVEN HOMES
159 FIRST LINE
ELORA, ONTARIO

Dry Pond SWM Facility

Areas Contributing to SWM Pond for MECP Water Quality

Sub-Catchment ID	Area (ha)	Percent Impervious (%)
Wright & Burnside	3.64	70
TOTAL	**3.64**	**70.0**

SWM Pond

Required protection level:	Enhanced	
Contributing drainage area:	3.64	ha
Impervious level:	70.0	%
Total required water quality storage volume per hectare:	200	m^3/ha
Required permanent pool volume per hectare:	N/A	m^3/ha
Required extended detention storage volume per hectare:	40	m^3/ha
Required permanent pool volume:	N/A	m^3
Provided permanent pool volume:	N/A	m^3
MECP Required extended detention storage volume:	146	m^3
Provided extended detention volume:	2,294	m^3
25mm Runoff Volume:	64	m^3

MECP SWM Design Manual Table 3.2

Protection Level	SWMP Type	Storage Volume (m^3/ha) for Impervious Level			
		35%	*55%*	*70%*	*85%*
Enhanced (80% long-term S.S. removal)	Infiltration	25	30	35	40
	Wetlands	80	105	120	140
	Hybrid Wet Pond/Wetland	110	150	175	195
	Wet Pond	140	190	225	250
Normal (70% long-term S.S. removal)	Infiltration	20	20	25	30
	Wetlands	60	70	80	90
	Hybrid Wet Pond/Wetland	75	90	105	120
	Wet Pond	90	110	130	150
Basic (60% long-term S.S. removal)	Infiltration	20	20	20	20
	Wetlands	60	60	60	60
	Hybrid Wet Pond/Wetland	60	70	75	80
	Wet Pond	60	75	85	95
	Dry Pond (Continuous Flow)	90	150	200	240

NORTH POND ANALYSIS
DRAWDOWN TIME

WRIGHTHAVEN HOMES
159 FIRST LINE
ELORA, ONTARIO

SWMF - Dry Pond - Drawdown Calculations

Pond drawdown time can be estimated using Equation 4.10
(MOEE SWMP Planning & Design Manual)

$$t = \frac{2 A_p}{C A_o (2g)^{0.5}} (h_1^{0.5} - h_2^{0.5})$$

t	= drawdown time in seconds	=	to be calculated	
Ap	= surface area of the pond (m^2)	=	**2053**	(MECP required extended detention volu
C	= discharge coefficient	=	0.62	
D	= diameter of controlling orifice (m)	=	**0.075**	
Ao	= cross-sectional area of orifice (m^2)	=	0.00442	
g	= acceleration due to gravity (m/s^2)	=	9.81	
	Orifice invert elevation (m)	=	***398.700***	
	Orifice centreline elevation (m)		***398.738***	
	Extended detention elevation (m)		***398.774***	(MECP required extended detention volu
h_1	= starting water level above orifice (m)	=	0.0360	
h_2	= ending water level above orifice (m)	=	0.00	

t = 64235.2 seconds = 17.8 hours

SOUTH POND ANALYSIS
STAGE-STORAGE DISCHARGE

WRIGHTHAVEN HOMES
159 FIRST LINE
ELORA, ONTARIO

ELORA LANDS - STAGE-STORAGE-DISCHARGE CALCULATIONS

Outlet Device No. 1 (Quality & Erosion)

Type:	Circular Orifice
Diameter (mm)	**250**
Area (m^2)	0.04909
Invert Elev. (m)	391.80
C/L Elev. (m)	391.93
Disch. Coeff. (C_d)	0.62
Discharge (Q) =	C_d A (2 g H)$^{0.5}$
Number of Orifices:	1

Outlet Device No. 2 (Quantity)

[redacted]

Outlet Device No. 3

Type:	Weir (vertical wall)
Sill Elevation (m)	**393.00**
Length (m)	**2.0**
Side Slopes (H:1)	**0**
Discharge (Q) =	1.84 L H $^{1.5}$

Outlet No. 4 (Quantity)

Type:	Broad crested overflow weir
Sill Elevation (m)	**393.60**
Length (m)	**20.0**
Side Slopes (H:1)	**0** (5%)
Discharge (Q) =	1.67 L H $^{1.5}$

		SWM Pond Volumes				Outlet No. 1		Outlet No. 2	Outlet No. 3		Outlet No. 4		
	Elevation m	Area m^2	Incremental Volume m^3	Cumulative Volume m^3	**Active Storage Volume m^3**	H m	Discharge m^3/s	[redacted]	H m	Discharge m^3/s	H m	Discharge m^3/s	**Total Discharge m^3/s**
Bottom Pond	390.30	23015	0	0	0								
Top Perm. Pool	391.80	32807	3229	41691	0	0.00	0.000						0.0000
	391.90	33428	3321	45012	3321	0.10	0.006						0.0056
	392.00	33861	3364	48377	6685	0.20	0.019						0.0189
25mm Ext. Det. Elev. 392.05	392.10	34515	3408	51785	10093	0.30	0.049						0.0492
	392.20	35085	3491	55276	13584	0.40	0.065						0.0651
	392.30	35440	3526	58802	17110	0.50	0.078						0.0778
	392.40	35795	3562	62363	20672	0.60	0.089						0.0887
	392.50	36149	3597	65961	24269	0.70	0.098						0.0984
	392.60	36504	3633	69593	27902	0.80	0.107						0.1073
	392.70	36858	3668	73261	31570	0.90	0.115						0.1154
	392.80	37212	3703	76965	35273	1.00	0.123						0.1231
	392.90	37565	3739	80704	39012	1.10	0.130						0.1302
	393.00	37919	3774	84478	42786	1.20	0.137		0.00	0.000			0.1370
	393.10	38273	3810	88288	46596	1.30	0.144		0.10	0.116			0.2599
	393.20	38627	3845	92133	50441	1.40	0.150		0.20	0.329			0.4789
	393.30	38981	3880	96013	54321	1.50	0.156		0.30	0.605			0.7603
	393.40	39335	3916	99929	58237	1.60	0.161		0.40	0.931			1.0924
	393.50	39689	3951	103880	62188	1.70	0.167		0.50	1.301			1.4680
Weir Sill Elev. 393.6	393.60	40044	3987	107867	66175	1.80	0.172		0.60	1.710	0.00	0.00	1.8826
	393.70	40399	4022	111889	70197	1.90	0.177		0.70	2.155	0.10	1.06	3.3889
	393.80	40756	4058	115946	74255	2.00	0.183		0.80	2.633	0.20	2.99	5.8031
Top of Pond	393.90	41078	3682	119629	77937	2.10	0.187		0.90	3.142	0.30	5.49	8.8177

SOUTH POND ANALYSIS
MECP WATER QUALITY

WRIGHTHAVEN HOMES
159 FIRST LINE
ELORA, ONTARIO

Wet Pond SWM Facility

Areas Contributing to SWM Pond for MECP Water Quality

Sub-Catchment ID	Area (ha)	Percent Impervious (%)
Wright & Burnside	48.98	70
TOTAL	**48.98**	**70.0**

South SWM Pond

Required protection level:	Enhanced	
Contributing drainage area:	48.98	ha
Impervious level:	70.0	%
Total required water quality storage volume per hectare:	225	m^3/ha
Required permanent pool volume per hectare:	185	m^3/ha
Required extended detention storage volume per hectare:	40	m^3/ha
Required permanent pool volume:	9,061	m^3
Provided permanent pool volume:	41,691	m^3
MECP Required extended detention storage volume:	1,959	m^3
Provided extended detention volume:	13,584	m^3
25mm Runoff Volume:	7,783	m^3

MECP SWM Design Manual Table 3.2

Protection Level	SWMP Type	Storage Volume (m^3/ha) for Impervious Level			
		35%	*55%*	*70%*	*85%*
Enhanced (80% long-term S.S. removal)	Infiltration	25	30	35	40
	Wetlands	80	105	120	140
	Hybrid Wet Pond/Wetland	110	150	175	195
	Wet Pond	140	190	225	250
Normal (70% long-term S.S. removal)	Infiltration	20	20	25	30
	Wetlands	60	70	80	90
	Hybrid Wet Pond/Wetland	75	90	105	120
	Wet Pond	90	110	130	150
Basic (60% long-term S.S. removal)	Infiltration	20	20	20	20
	Wetlands	60	60	60	60
	Hybrid Wet Pond/Wetland	60	70	75	80
	Wet Pond	60	75	85	95
	Dry Pond (Continuous Flow)	90	150	200	240

SOUTH POND ANALYSIS
DRAWDOWN TIME

WRIGHTHAVEN HOMES
159 FIRST LINE
ELORA, ONTARIO

SWMF - Dry Pond - Drawdown Calculations

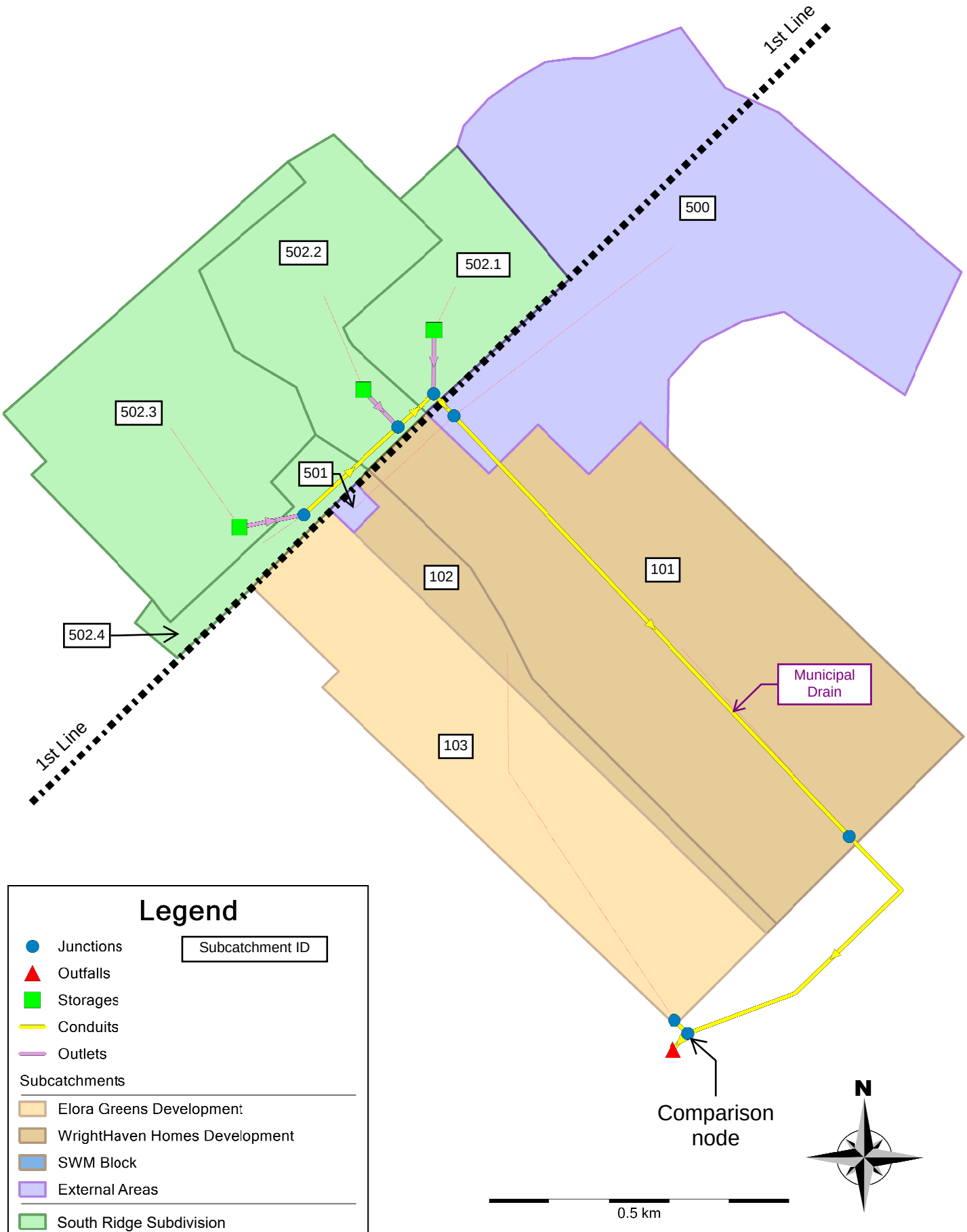
Pond drawdown time can be estimated using Equation 4.10
(MOEE SWMP Planning & Design Manual)

$$t = \frac{2 A_p}{C A_o (2g)^{0.5}} (h_1^{0.5} - h_2^{0.5})$$

t	= drawdown time in seconds	=	to be calculated	
Ap	= surface area of the pond (m^2)	=	**34080**	(Surface area at 25 mm stage)
C	= discharge coefficient	=	0.62	
D	= diameter of controlling orifice (m)	=	**0.250**	
Ao	= cross-sectional area of orifice (m^2)	=	0.04909	
g	= acceleration due to gravity (m/s^2)	=	9.81	
	Orifice invert elevation (m)	=	***391.800***	
	Orifice centreline elevation (m)		***391.925***	
	Extended detention elevation (m)		***392.033***	(25 mm stage)
h_1	= starting water level above orifice (m)	=	0.1085	
h_2	= ending water level above orifice (m)	=	0.00	

t = 166545 seconds = 46.3 hours

PCSWMM Model Layout - Pre-Development



PCSWMM Model Layout - Post-Development

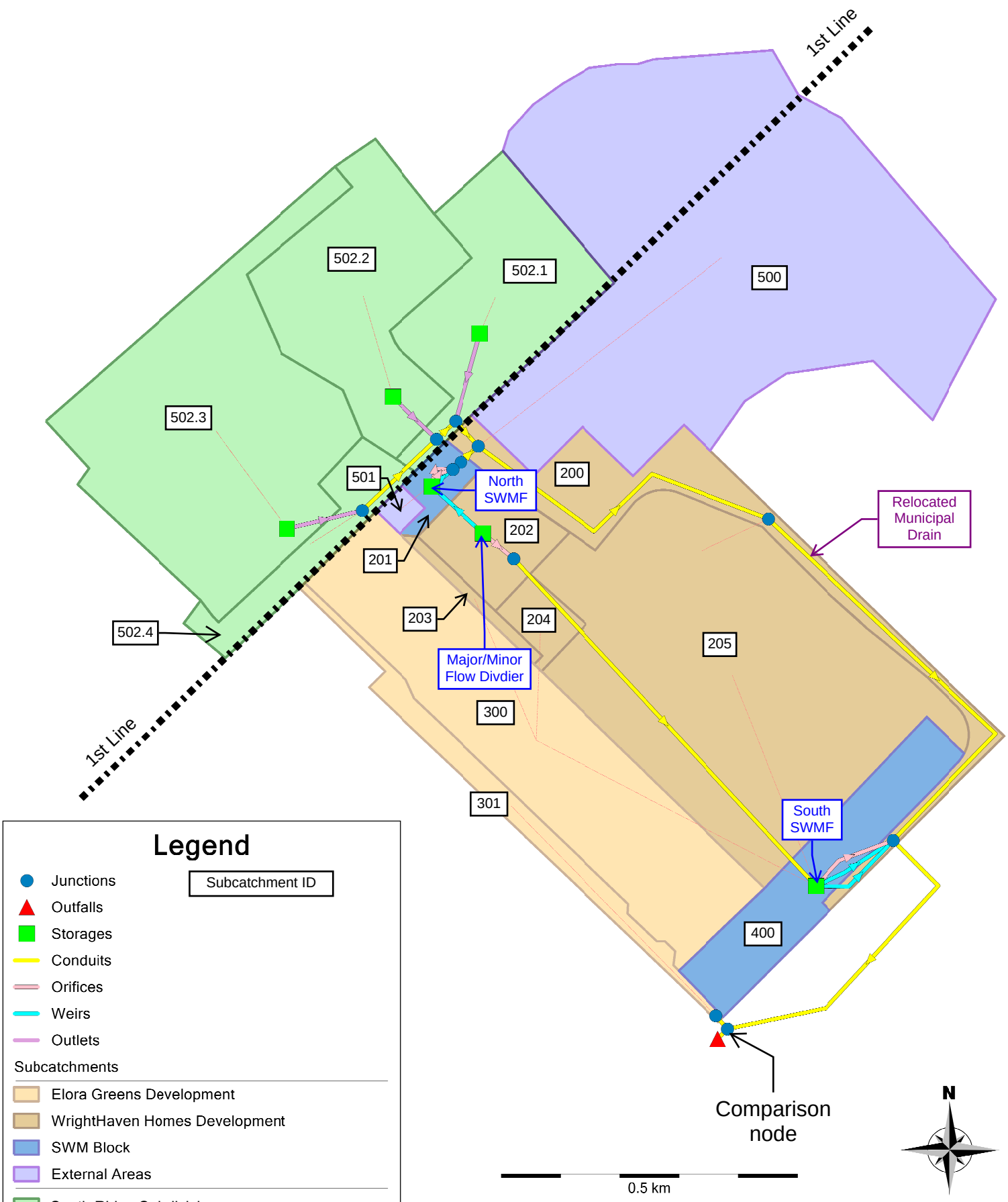


TABLE 1
DESIGN STORM PARAMETERS

WRIGHTHAVEN HOMES
159 FIRST LINE
ELORA, ONTARIO

Design Storm	IDF Storm Parameters[1]		Time of Peak Ratio	Time of Concentration	Storm Duration	Total Rainfall
	a	b	r	(min)	(h)	(mm)
2-year	414.34	0.682	0.35	10.00	4	39.5
5-year	543.94	0.686	0.35	10.00	4	50.7
10-year	628.13	0.687	0.35	10.00	4	58.2
25-year	739.42	0.690	0.35	10.00	4	67.4
50-year	820.51	0.691	0.35	10.00	4	74.4
100-year	896.88	0.691	0.35	10.00	4	81.3

Notes:
(1) IDF parameters obtained from the Township or Centre Wellington Development Manual (June 202
(2) Chicago distribution used for 25mm 4-hour storm with parameters A = 509, B = 6, C = 0.7989

TABLE 2.1
EXTERNAL CATCHMENT PARAMETERS

WRIGHTHAVEN HOMES
159 FIRST LINE
ELORA, ONTARIO

Subcatchment	Ultimate Outlet	Comment	Area	Percent Impervious	Width	Flow Length	Slope	Mannings Roughness		Pervious Curve Number	Depression Storage		Min Infil. Rate	Max Infil. Rate
								Impervious	Pervious		Impervious	Pervious		
			(ha)	(%)	(m)	(m)	(%)				(mm)	(mm)	(mm/hr)	(mm/hr)
External Areas representing upstream flows to Municipal Drain[1]														
500	Municipal Drain - North	External area east of proposed developments	57.59	5	633	910	0.5	0.010	0.100	75	1.0	8.5	1	3.0
501	Municipal Drain - North	Existing development near First Line	0.33	30	165	20	0.5	0.015	0.250	75	1.0	8.5	1	3.0
Alternative Runoff Method (ARM) - South Ridge Subcatchments Catchments [2, 3]														
502.1	Municipal Drain - North	South Ridge Subdivision	11.20	5	-	20	1.0	-	-	-	1.5	5.0	9	163
502.2	Municipal Drain - North	South Ridge Subdivision	8.40	45	-	30	0.8	-	-	-	1.5	5.0	9	163
502.3	Municipal Drain - North	South Ridge Subdivision	14.95	35	-	30	0.7	-	-	-	1.5	5.0	9	163
502.4	Municipal Drain - North	South Ridge Subdivision	1.41	15	-	30	0.7	-	-	-	1.5	5.0	9	163
Total			93.88	13.6										

Notes:

1. Catchments representing external areas are included in both pre- and post-development models
2. Alternative Runoff Method (ARM) catchments were used to replicate the parameters outlined in the South Ridge Subdivision Stormwater Management Report (2007)
3. SCS Triangular UH was selected as the runoff method and Horton was selected as the loss method, in accordance with the 2007 South Ridge SWM Report

TABLE 2.2
PRE-DEVELOPMENT CATCHMENT PARAMETERS

WRIGHTHAVEN HOMES
159 FIRST LINE
ELORA, ONTARIO

Subcatchment	Ultimate Outlet	Comment	Area	Percent Impervious[3]	Width	Flow Length	Slope	Mannings Roughness		Pervious Curve Number	Depression Storage		Percent Zero Impervious
								Impervious	Pervious		Impervious	Pervious	
			(ha)	(%)	(m)	(m)	(%)				(mm)	(mm)	(%)
Pre-Development Catchments - 127 and 159 First Line, Elora													
101	Municipal Drain - South	Future WrightHaven Homes Development - to south	37.36	5	1067	350	1.0	0.015	0.250	75	1.0	8.5	0
102	Municipal Drain - West	Future WrightHaven Homes Development - to west	4.94	5	659	75	1.0	0.015	0.250	75	1.0	8.5	0
103	Municipal Drain - West	Future Elora Greens Housing Development - to west	21.58	5	719	300	2.5	0.015	0.250	75	1.0	8.5	0
Total			63.9	5									

Notes:
1. Curve Number CN of 75 was used to represent contoured row crops, good condition, with a Hydrologic Soil Type B.
2. Width was calculated by PCSWMM as Area/Length.
3. For Hurricane Hazel simulations, CN was adjusted from AMC-II to AMC-III (75 to 88) according to CN Value Conversion Table: https://www.kawarthalakes.ca/media/qwfb1fey/cn-value-conversion-table.pdf

TABLE 3
POST-DEVELOPMENT CATCHMENT PARAMETERS

WRIGHTHAVEN HOMES
159 FIRST LINE
ELORA, ONTARIO

Subcatchment	Ultimate Outlet	Comment	Area	Percent Impervious	Width	Flow Length	Slope	Mannings Roughness		Pervious Curve Number	Depression Storage		Percent Zero Impervious
								Impervious	Pervious		Impervious	Pervious	
			(ha)	(%)	(m)	(m)	(%)				(mm)	(mm)	(%)
Post-Development Catchments - 127 and 159 First Line, Elora													
200	Municipal Drain - South	Woodlot area & drain block	10.43	5	232	450	1.0	0.010	0.100	75	1.0	8.5	25
201	North Pond	WrightHaven Homes - Phase 1 Pond Block	0.96	70	240	40	1.0	0.010	0.100	75	0.1	8.5	25
202	Split North/South Pond	WrightHaven Homes - Phase 1	2.68	70	670	40	1.0	0.010	0.100	75	0.1	8.5	25
203	South Pond	WrightHaven Homes - Phase 1	0.62	70	155	40	1.0	0.010	0.100	75	0.1	8.5	25
204	South Pond	WrightHaven Homes - Phase 2	1.03	70	258	40	1.0	0.010	0.100	75	0.1	8.5	25
205	South Pond	WrightHaven Homes - Phase 2	23.61	70	5903	40	1.0	0.010	0.100	75	0.1	8.5	25
300	South Pond	Elora Greens Development	17.50	70	4375	40	0.5	0.010	0.100	75	0.1	8.5	25
301	Municipal Drain - West	Elora Greens Development	2.43	50	608	40	0.5	0.010	0.100	75	0.1	8.5	25
400	South Pond	Shared Pond Block	4.61	70	1153	40	0.5	0.010	0.100	75	0.1	8.5	25
Total			63.9	59									

Notes:
1. Curve Number CN of 75 was used to represent pervious areas, with a Hydrologic Soil Type B.
2. Width was calculated by PCSWMM as Area/Length.
3. For Hurricane Hazel simulations, CN was adjusted from AMC-II to AMC-III (75 to 88) according to CN Value Conversion Table: https://www.kawarthalakes.ca/media/qwfb1fey/cn-value-conversion-table.pdf

TABLE 4
RUNOFF VOLUME SUMMARY

WRIGHTHAVEN HOMES
159 FIRST LINE
ELORA, ONTARIO

Subcatchment (Outlet)	4-hour Chicago Design Storm						Other Storms	
	2-year (m^3)	5-year (m^3)	10-year (m^3)	25-year (m^3)	50-year (m^3)	100-year (m^3)	25-mm (m^3)	Hurricane Hazel (m^3)
Pre-Development Conditions								
101 (Future WrightHaven Homes Development - to south)	950	2370	3730	5690	7340	9080	450	63490
102 (Future WrightHaven Homes Development - to west)	180	470	690	990	1230	1480	60	8540
103 (Future Elora Greens Housing Development - to west)	710	2000	3110	4640	5890	7190	260	45500
Total to Municipal Drain	**6020**	**12000**	**17700**	**25600**	**32200**	**39500**	**3210**	**251000**
Post-Development Conditions								
200 (Woodlot area & drain block)	310	810	1240	1840	2330	2840	130	17890
201 (WrightHaven Homes - Phase 1 Pond Block)	280	370	430	510	570	640	170	1910
202 (WrightHaven Homes - Phase 1)	770	1030	1210	1430	1600	1770	470	5340
203 (WrightHaven Homes - Phase 1)	180	240	280	330	370	410	110	1240
204 (WrightHaven Homes - Phase 2)	300	400	470	550	620	680	180	2050
205 (WrightHaven Homes - Phase 2)	6780	9090	10670	12620	14130	15630	4140	47080
300 (Elora Greens Development)	5490	7360	8640	10230	11440	12660	3270	36670
301 (Elora Greens Development)	520	730	880	1070	1210	1360	300	6110
400 (Shared Pond Block)	1320	1770	2080	2460	2750	3050	810	9190
Total to North Pond (Dry Pond)	276	369	600	897	1130	1350	168	7260
Total to South Pond (Wet Pond)	14400	19300	22400	26400	29400	32400	8680	92900
Total to Municipal Drain	**14300**	**21200**	**26700**	**33900**	**39500**	**45600**	**8140**	**236000**

TABLE 5
PEAK FLOW SUMMARY

WRIGHTHAVEN HOMES
159 FIRST LINE
ELORA, ONTARIO

Subcatchment (Outlet)	4-hour Chicago Design Storm						Other Storms	
	2-year (m^3/s)	5-year (m^3/s)	10-year (m^3/s)	25-year (m^3/s)	50-year (m^3/s)	100-year (m^3/s)	25-mm (m^3/s)	Hurricane Hazel (m^3)
Pre-Development Conditions								
101 (Future WrightHaven Homes Development - to south)	0.710	0.930	1.070	1.270	1.430	1.600	0.380	3.780
102 (Future WrightHaven Homes Development - to west)	0.090	0.120	0.140	0.170	0.210	0.250	0.050	0.660
103 (Future Elora Greens Housing Development - to west)	0.420	0.550	0.630	0.750	0.860	0.980	0.230	3.040
Total to Municipal Drain	**0.755**	**1.032**	**1.221**	**1.527**	**2.052**	**2.671**	**0.375**	**13.164**
Post-Development Conditions								
200 (Woodlot area & drain block)	0.200	0.260	0.300	0.360	0.410	0.470	0.110	1.220
201 (WrightHaven Homes - Phase 1 Pond Block)	0.250	0.330	0.390	0.460	0.520	0.580	0.140	0.140
202 (WrightHaven Homes - Phase 1)	0.710	0.930	1.080	1.280	1.450	1.630	0.380	0.390
203 (WrightHaven Homes - Phase 1)	0.160	0.220	0.250	0.300	0.340	0.380	0.090	0.090
204 (WrightHaven Homes - Phase 2)	0.270	0.360	0.410	0.490	0.560	0.620	0.140	0.150
205 (WrightHaven Homes - Phase 2)	6.250	8.200	9.480	11.260	12.770	14.320	3.320	3.430
300 (Elora Greens Development)	4.810	6.360	7.400	8.910	10.110	11.320	2.510	2.670
301 (Elora Greens Development)	0.460	0.600	0.700	0.830	0.940	1.060	0.240	0.460
400 (Shared Pond Block)	1.190	1.580	1.830	2.170	2.450	2.740	0.630	0.670
Total to North Pond (Dry Pond)	0.254	0.334	0.385	0.460	0.522	0.606	0.135	0.528
Total to South Pond (Wet Pond)	12.257	16.148	18.714	22.343	25.341	28.387	6.463	6.763
Total to Municipal Drain (Catchment 301 + Pond Discharge)	**0.493**	**0.668**	**0.811**	**1.146**	**1.514**	**1.926**	**0.283**	**12.539**

TABLE 6
POND OPERATING LEVELS SUMMARY

WRIGHTHAVEN HOMES
159 FIRST LINE
ELORA, ONTARIO

PCSWMM Model Element	Design Storm	Peak Inflow (m^3/s)	Peak Outflow from Orifice 1[a] (m^3/s)	Peak Outflow from Orifice 2[b] (m^3/s)	Peak Outflow from Overflow Weir[c] (m^3/s)	Total Peak Outflow (m^3/s)	Total Inflow Volume (m^3)	Max. Storage Volume (m^3)	Max. Level (m)
DryPond_Ph1	**(North Pond)**								
Chicago - 4 hr	2-year	0.254	0.003	0.000	0.000	0.003	276	244	398.82
	5-year	0.334	0.004	0.000	0.000	0.004	369	330	398.86
	10-year	0.385	0.006	0.000	0.000	0.006	600	553	398.97
	25-year	0.460	0.007	0.000	0.000	0.007	897	838	399.10
	50-year	0.522	0.008	0.000	0.000	0.008	1130	1063	399.19
	100-year	0.606	0.009	0.000	0.000	0.009	1350	1288	399.29
Other Storms	25 mm	0.135	0.002	0.000	0.000	0.002	168	150	398.77
	Hurricane Hazel	0.528	0.012	0.277	0.000	0.289	7260	4358	400.43

Maximum Storage required in Pond:	4358	m^3	
Total Storage provided in Pond:	5513	m^3	
Bottom of Pond:	398.7	m	
Top of Pond:	400.8	m	

Outlet Controls
a) 75 mm diameter low-flow orifice at elev. 398.7 m
b) 400 mm diameter vertical orifice at elev. 399.8 m
c) Spillover weir at elev. 400.5 m

PCSWMM Model Element	Design Storm	Peak Inflow (m^3/s)	Peak Outflow from Orifice[a] (m^3/s)	Peak Outflow from Weir 1[b] (m^3/s)	Peak Outflow from Overflow Weir[c] (m^3/s)	Total Peak Outflow (m^3/s)	Total Inflow Volume (m^3)	Max. Storage Volume (m^3)	Max. Level (m)
WetPond	**(South Pond)**								
Chicago - 4 hr	2-year	12.257	0.074	0.000	0.000	0.074	14400	12872	392.23
	5-year	16.148	0.089	0.000	0.000	0.089	19300	17301	392.36
	10-year	18.714	0.098	0.000	0.000	0.098	22400	20335	392.46
	25-year	22.343	0.108	0.000	0.000	0.108	26400	24105	392.57
	50-year	25.341	0.115	0.000	0.000	0.115	29400	27008	392.66
	100-year	28.387	0.122	0.000	0.000	0.122	32400	29919	392.74
Other Storms	25 mm	6.463	0.050	0.000	0.000	0.050	8680	7783	392.06
	Hurricane Hazel	6.763	0.182	2.361	1.823	4.366	92900	67224	393.74

Maximum Storage required in Pond:	67224	m^3	
Total Storage provided in Pond:	73157	m^3	
Bottom of Pond:	391.8	m	
Top of Pond:	393.9	m	

Outlet Controls
a) 250 mm diameter low-flow orifice (25mm quality) at elev. 391.80 m
b) 2.0 m wide weir with vertical walls. Weir sill elev. 393.00 m
c) Spillover weir at elev. 393.60 m

TABLE 7
PEAK FLOW COMPARISON SUMMARY

WRIGHTHAVEN HOMES
159 FIRST LINE
ELORA, ONTARIO

PCSWMM Model Element	Design Storm	Pre-Development Peak Flow (m^3/s)	Post-Development Peak Flow (m^3/s)	Peak Flow Reduction (%)
Total Peak Flow Leaving Site				
Chicago - 4 hr	2-year	0.755	0.493	-35%
	5-year	1.032	0.668	-35%
	10-year	1.221	0.811	-34%
	25-year	1.527	1.146	-25%
	50-year	2.052	1.514	-26%
	100-year	2.671	1.926	-28%
Other Storms	25 mm	0.375	0.283	-25%
	Hurricane Hazel	13.164	12.539	-5%

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.2 (Build 5.2.4)
------------------------------------------------------------

WARNING 10: crest elevation raised to downstream invert for regulator Link C7

*************
Element Count
*************
Number of rain gages ...... 17
Number of subcatchments ... 5
Number of nodes ........... 11
Number of links ........... 10
Number of pollutants ...... 0
Number of land uses ....... 0


****************
Raingage Summary
****************
                                                 Data       Recording
Name                 Data Source                 Type       Interval
----------------------------------------------------------------------
Chicago_3h_100yr_SouthRidge Chicago_3h_100yr_SouthRidge    INTENSITY    5 min.
Chicago_3h_2yr_SouthRidge Chicago_3h_2yr_SouthRidge      INTENSITY    5 min.
Chicago_3h_5yr_SouthRidge Chicago_3h_5yr_SouthRidge      INTENSITY    5 min.
Chicago_4h_100yr     Chicago_4h_100yr            INTENSITY    5 min.
Chicago_4h_10yr      Chicago_4h_10yr             INTENSITY    5 min.
Chicago_4h_25mm      Chicago_4h_25mm             INTENSITY    5 min.
Chicago_4h_25yr      Chicago_4h_25yr             INTENSITY    5 min.
Chicago_4h_2yr       Chicago_4h_2yr              INTENSITY    5 min.
Chicago_4h_50yr      Chicago_4h_50yr             INTENSITY    5 min.
Chicago_4h_5yr       Chicago_4h_5yr              INTENSITY    5 min.
Chicago_6h_100yr     Chicago_6h_100yr            INTENSITY    5 min.
Chicago_6h_50yr      Chicago_6h_50yr             INTENSITY    5 min.
Chicago_6h_5yr       Chicago_6h_5yr              INTENSITY    5 min.
Hurricane_Hazel_(0-25) Hurricane_Hazel_(0-25)         INTENSITY   60 min.
SCS_Type_II_132.5mm_24hr_100yr SCS_Type_II_132.5mm_24hr_100yr INTENSITY    6 min.
SCS_Type_II_75.2mm_12hr_10yr SCS_Type_II_75.2mm_12hr_10yr   INTENSITY    6 min.
SCS_Type_II_88.3mm_12hr_25yr SCS_Type_II_88.3mm_12hr_25yr   INTENSITY    6 min.


********************
Subcatchment Summary
********************
Name                         Area     Width   %Imperv    %Slope Rain Gage            Outlet
-----------------------------------------------------------------------------------------------------------
101                         37.36   1067.43      5.00    1.0000 Chicago_4h_100yr     J_compare_south
102                          4.94    658.67      5.00    1.0000 Chicago_4h_100yr     103
103                         21.58    719.33      5.00    2.5000 Chicago_4h_100yr     J_compare_west
500                         57.59    632.86      5.00    0.5000 Chicago_4h_100yr     J5
501                          0.33    165.00     30.00    0.5000 Chicago_4h_100yr     J5


************
Node Summary
************
                                    Invert      Max.    Ponded    External
Name                 Type            Elev.     Depth      Area    Inflow
-------------------------------------------------------------------------
J_compare_south      JUNCTION       390.70      1.50       0.0
J_compare_total      JUNCTION       387.00      1.50       0.0
J_compare_west       JUNCTION       387.00      1.40       0.0
J2                   JUNCTION       398.82      3.06       0.0
J5                   JUNCTION       398.00      1.80       0.0
J6                   JUNCTION       398.40      2.75       0.0
SR-OUTFLOW           JUNCTION       398.30      2.62       0.0
OF1                  OUTFALL        386.99      1.40       0.0
SR-S1                STORAGE        399.30      1.00       0.0
```

SR-S2	STORAGE	399.30	1.00	0.0
SR-S3	STORAGE	398.23	1.87	0.0

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J5	J_compare_south	CONDUIT	1100.0	0.6935	0.0270
C11	SR-OUTFLOW	J5	CONDUIT	7.3	0.4384	0.0270
C2	J2	J6	CONDUIT	103.1	0.2706	0.0130
C3	J6	SR-OUTFLOW	CONDUIT	29.0	0.1724	0.0130
C4	J_compare_west	J_compare_total	CONDUIT	1.0	1.0001	0.0270
C4_1	J_compare_south	J_compare_total	CONDUIT	450.0	0.8223	0.0270
C4_2	J_compare_total	OF1	CONDUIT	1.0	1.0001	0.0270
C7	SR-S3	SR-OUTFLOW	OUTLET			
OL1	SR-S1	J2	OUTLET			
OL2	SR-S2	J6	OUTLET			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	Drain	1.40	6.58	0.70	8.90	1	16.01
C11	RECT_CLOSED	0.73	0.85	0.22	1.15	1	0.77
C2	CIRCULAR	0.53	0.22	0.13	0.53	1	0.22
C3	RECT_OPEN	0.73	0.85	0.32	1.15	1	1.27
C4	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C4_1	Drain	1.40	6.58	0.70	8.90	1	17.43
C4_2	Drain	1.40	6.58	0.70	8.90	1	19.23

****
Transect Summary
****

Transect Drain
Area:

0.0025	0.0057	0.0096	0.0142	0.0196
0.0256	0.0324	0.0399	0.0481	0.0570
0.0667	0.0770	0.0881	0.0998	0.1123
0.1255	0.1395	0.1541	0.1695	0.1855
0.2023	0.2198	0.2380	0.2570	0.2766
0.2970	0.3180	0.3398	0.3623	0.3855
0.4095	0.4341	0.4595	0.4855	0.5123
0.5398	0.5681	0.5970	0.6267	0.6570
0.6881	0.7199	0.7524	0.7856	0.8196
0.8542	0.8896	0.9257	0.9625	1.0000

Hrad:

0.0343	0.0623	0.0871	0.1102	0.1322
0.1535	0.1743	0.1947	0.2149	0.2349
0.2547	0.2744	0.2940	0.3135	0.3329
0.3523	0.3717	0.3909	0.4102	0.4294
0.4486	0.4678	0.4869	0.5060	0.5251
0.5442	0.5633	0.5824	0.6014	0.6204
0.6395	0.6585	0.6775	0.6965	0.7155
0.7345	0.7535	0.7725	0.7915	0.8104
0.8294	0.8484	0.8673	0.8863	0.9053
0.9242	0.9432	0.9621	0.9811	1.0000

Width:

0.0751	0.0939	0.1128	0.1317	0.1506
0.1694	0.1883	0.2072	0.2261	0.2449
0.2638	0.2827	0.3016	0.3204	0.3393
0.3582	0.3771	0.3960	0.4148	0.4337
0.4526	0.4715	0.4903	0.5092	0.5281

```
           0.5470     0.5658     0.5847     0.6036     0.6225
           0.6413     0.6602     0.6791     0.6980     0.7169
           0.7357     0.7546     0.7735     0.7924     0.8112
           0.8301     0.8490     0.8679     0.8867     0.9056
           0.9245     0.9434     0.9622     0.9811     1.0000


***************
Analysis Options
***************
Flow Units ............... CMS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Infiltration Method ...... CURVE_NUMBER
Flow Routing Method ...... DYNWAVE
Surcharge Method ......... EXTRAN
Starting Date ............ 03/18/2026 00:00:00
Ending Date .............. 03/20/2026 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:01:00
Dry Time Step ............ 00:01:00
Routing Time Step ........ 1.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 1
Head Tolerance ........... 0.001500 m


*************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
*************************     ---------       -------
Total Precipitation ......         9.902        81.296
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         6.827        56.051
Surface Runoff ...........         2.925        24.012
Final Storage ............         0.151         1.243
Continuity Error (%) .....        -0.012


*************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
*************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         2.925        29.247
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         1.177        11.768
External Outflow .........         3.947        39.472
Flooding Loss ............         0.000         0.000
Evaporation Loss .........         0.000         0.000
Exfiltration Loss ........         0.000         0.000
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.169         1.694
Continuity Error (%) .....        -0.371


*************************
Highest Continuity Errors
*************************
Node SR-OUTFLOW (-3.90%)
```

****
Time-Step Critical Elements
****
Link C4_2 (99.70%)

****
Highest Flow Instability Indexes
****
Link C11 (101)
Link C3 (84)
Link C7 (74)

****
Most Frequent Nonconverging Nodes
****
Node SR-OUTFLOW (0.03%)
Node OF1 (0.03%)

****
Routing Time Step Summary
****
Minimum Time Step   :   0.19 sec
Average Time Step   :   0.55 sec
Maximum Time Step   :   1.00 sec
% of Time in Steady State   :   0.00
Average Iterations per Step :   3.04
% of Steps Not Converging   :   0.03
Time Step Frequencies   :
    1.000 - 0.871 sec   :   0.32 %
    0.871 - 0.758 sec   :   0.03 %
    0.758 - 0.660 sec   :   8.80 %
    0.660 - 0.574 sec   :   17.56 %
    0.574 - 0.500 sec   :   73.29 %

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
101	81.30	0.00	0.00	55.77	4.02	20.27	24.29	9.08	1.60	0.299
102	81.30	0.00	0.00	50.11	4.03	25.94	29.97	1.48	0.25	0.369
103	81.30	6.86	0.00	53.59	4.37	28.96	33.33	7.19	0.98	0.378
500	81.30	0.00	0.00	57.78	4.03	18.24	22.28	12.83	2.35	0.274
501	81.30	0.00	0.00	35.34	24.24	20.69	44.93	0.15	0.09	0.553

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
J_compare_south	JUNCTION	0.15	0.59	391.29	0 02:24	0.59
J_compare_total	JUNCTION	0.13	0.62	387.62	0 02:26	0.62
J_compare_west	JUNCTION	0.00	0.00	387.00	0 00:00	0.00
J2	JUNCTION	0.13	0.43	399.25	0 01:38	0.43
J5	JUNCTION	0.46	0.86	398.86	0 02:16	0.86
J6	JUNCTION	0.13	0.53	398.93	0 02:09	0.53
SR-OUTFLOW	JUNCTION	0.18	0.62	398.92	0 02:11	0.62
OF1	OUTFALL	0.13	0.62	387.61	0 02:26	0.62
SR-S1	STORAGE	0.24	0.39	399.69	0 04:13	0.39
SR-S2	STORAGE	0.16	0.63	399.93	0 01:49	0.63
SR-S3	STORAGE	0.25	0.70	398.93	0 02:11	0.70

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
J_compare_south	JUNCTION	1.598	2.528	0 01:25	9.08	32.3	0.161
J_compare_total	JUNCTION	0.000	2.671	0 02:25	0	39.5	0.002
J_compare_west	JUNCTION	0.980	0.980	0 01:25	7.19	7.19	0.000
J2	JUNCTION	0.202	0.224	0 01:37	0.347	4.41	0.071
J5	JUNCTION	2.439	2.439	0 01:25	13	23.3	0.011
J6	JUNCTION	0.000	0.543	0 01:40	0	8.13	-0.113
SR-OUTFLOW	JUNCTION	0.000	0.971	0 01:43	0	10.2	-3.754
OF1	OUTFALL	0.000	2.670	0 02:26	0	39.5	0.000
SR-S1	STORAGE	3.399	3.399	0 01:33	5.67	5.67	0.004
SR-S2	STORAGE	2.400	2.400	0 01:32	3.74	3.74	0.002
SR-S3	STORAGE	0.478	0.569	0 01:40	2.01	2.28	12.350

****
Node Surcharge Summary
****

No nodes were surcharged.

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
SR-S1	3.208	19.0	0.0	0.0	5.322	31.4	0 04:13	0.037
SR-S2	0.536	12.8	0.0	0.0	2.367	56.5	0 01:49	0.349
SR-S3	0.025	0.1	0.0	0.0	0.162	0.9	0 02:11	0.475

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
OF1	99.79	0.250	2.670	39.472
System	99.79	0.250	2.670	39.472

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C1	CHANNEL	1.516	0	02:16	1.27	0.09	0.40
C11	CONDUIT	0.865	0	02:05	1.38	1.13	0.75
C2	CONDUIT	0.220	0	01:38	1.36	0.99	0.70
C3	CONDUIT	0.546	0	01:41	1.05	0.43	0.70
C4	DUMMY	0.980	0	01:25			
C4_1	CHANNEL	2.078	0	02:24	1.49	0.12	0.43
C4_2	CHANNEL	2.670	0	02:26	1.84	0.14	0.44
C7	DUMMY	0.475	0	02:12			
OL1	DUMMY	0.037	0	04:13			
OL2	DUMMY	0.349	0	01:49			

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.98	0.00
C11	1.00	0.00	0.00	0.00	0.99	0.00	0.01	0.00	0.10	0.00
C2	1.00	0.01	0.00	0.00	0.07	0.00	0.00	0.92	0.06	0.00
C3	1.00	0.01	0.00	0.00	0.63	0.00	0.00	0.36	0.01	0.00
C4_1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.09	0.00
C4_2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Upstream	Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C11	0.01	0.01	0.01	0.56	0.01

Analysis begun on: Thu Aug 27 10:23:07 2026
Analysis ended on: Thu Aug 27 10:23:17 2026
Total elapsed time: 00:00:10

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.2 (Build 5.2.4)
-----------------------------------------------------------

WARNING 10: crest elevation raised to downstream invert for regulator Link C7
WARNING 02: maximum depth increased for Node J_compare_south
WARNING 02: maximum depth increased for Node J_compare_total

*************
Element Count
*************
Number of rain gages ...... 17
Number of subcatchments ... 5
Number of nodes ........... 11
Number of links ........... 10
Number of pollutants ...... 0
Number of land uses ....... 0


****************
Raingage Summary
****************
                                                 Data       Recording
Name                 Data Source                 Type       Interval
----------------------------------------------------------------------
Chicago_3h_100yr_SouthRidge Chicago_3h_100yr_SouthRidge    INTENSITY    5 min.
Chicago_3h_2yr_SouthRidge Chicago_3h_2yr_SouthRidge      INTENSITY    5 min.
Chicago_3h_5yr_SouthRidge Chicago_3h_5yr_SouthRidge      INTENSITY    5 min.
Chicago_4h_100yr     Chicago_4h_100yr            INTENSITY    5 min.
Chicago_4h_10yr      Chicago_4h_10yr             INTENSITY    5 min.
Chicago_4h_25mm      Chicago_4h_25mm             INTENSITY    5 min.
Chicago_4h_25yr      Chicago_4h_25yr             INTENSITY    5 min.
Chicago_4h_2yr       Chicago_4h_2yr              INTENSITY    5 min.
Chicago_4h_50yr      Chicago_4h_50yr             INTENSITY    5 min.
Chicago_4h_5yr       Chicago_4h_5yr              INTENSITY    5 min.
Chicago_6h_100yr     Chicago_6h_100yr            INTENSITY    5 min.
Chicago_6h_50yr      Chicago_6h_50yr             INTENSITY    5 min.
Chicago_6h_5yr       Chicago_6h_5yr              INTENSITY    5 min.
Hurricane_Hazel_(0-25) Hurricane_Hazel_(0-25)         INTENSITY   60 min.
SCS_Type_II_132.5mm_24hr_100yr SCS_Type_II_132.5mm_24hr_100yr INTENSITY    6 min.
SCS_Type_II_75.2mm_12hr_10yr SCS_Type_II_75.2mm_12hr_10yr   INTENSITY    6 min.
SCS_Type_II_88.3mm_12hr_25yr SCS_Type_II_88.3mm_12hr_25yr   INTENSITY    6 min.


*******************
Subcatchment Summary
*******************
Name                        Area     Width   %Imperv    %Slope Rain Gage            Outlet
-------------------------------------------------------------------------------------------------------
101                        37.36   1067.43      5.00    1.0000 Hurricane_Hazel_(0-25) J_compare_south
102                         4.94    658.67      5.00    1.0000 Hurricane_Hazel_(0-25) 103
103                        21.58    719.33      5.00    2.5000 Hurricane_Hazel_(0-25) J_compare_west
500                        56.07    616.15      5.00    0.5000 Hurricane_Hazel_(0-25) J5
501                         0.33    165.00     30.00    0.5000 Hurricane_Hazel_(0-25) J5


************
Node Summary
************
                                      Invert      Max.    Ponded    External
Name                 Type              Elev.     Depth      Area    Inflow
-------------------------------------------------------------------------------
J_compare_south      JUNCTION          390.70      1.40       0.0
J_compare_total      JUNCTION          387.00      1.40       0.0
J_compare_west       JUNCTION            0.00    387.01       0.0
J2                   JUNCTION          398.82      3.06       0.0
J5                   JUNCTION          398.00      1.80       0.0
J6                   JUNCTION          398.40      2.75       0.0
SR-OUTFLOW           JUNCTION          398.30      2.62       0.0
```

OF1	OUTFALL	386.99	1.40	0.0
SR-S1	STORAGE	399.30	1.00	0.0
SR-S2	STORAGE	399.30	1.00	0.0
SR-S3	STORAGE	398.23	1.87	0.0

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J5	J_compare_south	CONDUIT	1100.0	0.6935	0.0270
C11	SR-OUTFLOW	J5	CONDUIT	7.3	0.4384	0.0270
C2	J2	J6	CONDUIT	103.1	0.2706	0.0130
C3	J6	SR-OUTFLOW	CONDUIT	29.0	0.1724	0.0130
C4	J_compare_west	J_compare_total	CONDUIT	1.0	1.0001	0.0270
C4_1	J_compare_south	J_compare_total	CONDUIT	450.0	0.8223	0.0270
C4_2	J_compare_total	OF1	CONDUIT	1.0	1.0001	0.0270
C7	SR-S3	SR-OUTFLOW	OUTLET			
OL1	SR-S1	J2	OUTLET			
OL2	SR-S2	J6	OUTLET			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	Drain	1.40	6.58	0.70	8.90	1	16.01
C11	RECT_CLOSED	0.73	0.85	0.22	1.15	1	0.77
C2	CIRCULAR	0.53	0.22	0.13	0.53	1	0.22
C3	RECT_OPEN	0.73	0.85	0.32	1.15	1	1.27
C4	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C4_1	Drain	1.40	6.58	0.70	8.90	1	17.43
C4_2	Drain	1.40	6.58	0.70	8.90	1	19.23

****
Transect Summary
****

Transect Drain
Area:

	0.0025	0.0057	0.0096	0.0142	0.0196
	0.0256	0.0324	0.0399	0.0481	0.0570
	0.0667	0.0770	0.0881	0.0998	0.1123
	0.1255	0.1395	0.1541	0.1695	0.1855
	0.2023	0.2198	0.2380	0.2570	0.2766
	0.2970	0.3180	0.3398	0.3623	0.3855
	0.4095	0.4341	0.4595	0.4855	0.5123
	0.5398	0.5681	0.5970	0.6267	0.6570
	0.6881	0.7199	0.7524	0.7856	0.8196
	0.8542	0.8896	0.9257	0.9625	1.0000

Hrad:

	0.0343	0.0623	0.0871	0.1102	0.1322
	0.1535	0.1743	0.1947	0.2149	0.2349
	0.2547	0.2744	0.2940	0.3135	0.3329
	0.3523	0.3717	0.3909	0.4102	0.4294
	0.4486	0.4678	0.4869	0.5060	0.5251
	0.5442	0.5633	0.5824	0.6014	0.6204
	0.6395	0.6585	0.6775	0.6965	0.7155
	0.7345	0.7535	0.7725	0.7915	0.8104
	0.8294	0.8484	0.8673	0.8863	0.9053
	0.9242	0.9432	0.9621	0.9811	1.0000

Width:

	0.0751	0.0939	0.1128	0.1317	0.1506
	0.1694	0.1883	0.2072	0.2261	0.2449
	0.2638	0.2827	0.3016	0.3204	0.3393

```
           0.3582     0.3771     0.3960     0.4148     0.4337
           0.4526     0.4715     0.4903     0.5092     0.5281
           0.5470     0.5658     0.5847     0.6036     0.6225
           0.6413     0.6602     0.6791     0.6980     0.7169
           0.7357     0.7546     0.7735     0.7924     0.8112
           0.8301     0.8490     0.8679     0.8867     0.9056
           0.9245     0.9434     0.9622     0.9811     1.0000


***************
Analysis Options
***************
Flow Units ............... CMS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Infiltration Method ...... CURVE_NUMBER
Flow Routing Method ...... DYNWAVE
Surcharge Method ......... EXTRAN
Starting Date ............ 03/18/2026 00:00:00
Ending Date .............. 03/20/2026 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:01:00
Dry Time Step ............ 00:01:00
Routing Time Step ........ 1.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 1
Head Tolerance ........... 0.001500 m


**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Total Precipitation ......        25.379       211.000
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         3.955        32.881
Surface Runoff ...........        20.444       169.974
Final Storage ............         0.980         8.147
Continuity Error (%) .....        -0.001


**************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......        20.444       204.447
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         4.578        45.781
External Outflow .........        25.089       250.893
Flooding Loss ............         0.146         1.461
Evaporation Loss .........         0.000         0.000
Exfiltration Loss ........         0.000         0.000
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.538         5.382
Continuity Error (%) .....        -3.001


************************
Highest Continuity Errors
************************
Node J2 (-38.33%)
```

```
  Node SR-OUTFLOW (3.34%)


  **************************
  Time-Step Critical Elements
  **************************
  Link C4_2 (99.71%)


  ******************************
  Highest Flow Instability Indexes
  ******************************
  Link C3 (97)
  Link C11 (87)
  Link C7 (76)
  Link OL1 (46)
  Link C2 (45)


  *********************************
  Most Frequent Nonconverging Nodes
  *********************************
  Node OF1 (31.61%)
  Node J2 (31.57%)
  Node SR-OUTFLOW (6.04%)
  Node J6 (3.45%)


  ************************
  Routing Time Step Summary
  ************************
  Minimum Time Step           :     0.27 sec
  Average Time Step           :     0.50 sec
  Maximum Time Step           :     1.00 sec
  % of Time in Steady State   :     0.00
  Average Iterations per Step :     4.29
  % of Steps Not Converging   :    31.61
  Time Step Frequencies       :
      1.000 -  0.871 sec      :     0.31 %
      0.871 -  0.758 sec      :     0.04 %
      0.758 -  0.660 sec      :     0.08 %
      0.660 -  0.574 sec      :     0.17 %
      0.574 -  0.500 sec      :    99.40 %


  **************************
  Subcatchment Runoff Summary
  **************************


-------------------------------------------------------------------------------------------------------------------
-----------
                           Total      Total      Total      Total     Imperv       Perv      Total       Total
Peak  Runoff
                         Precip      Runon       Evap      Infil     Runoff     Runoff     Runoff      Runoff
Runoff   Coeff
  Subcatchment             mm         mm         mm         mm         mm         mm         mm    10^6 ltr
 CMS

-------------------------------------------------------------------------------------------------------------------
-----------
  101                    211.00       0.00       0.00      32.90      10.50     159.43     169.93       63.49
3.78   0.805
  102                    211.00       0.00       0.00      32.90      10.50     162.31     172.81        8.54
0.66   0.819
  103                    211.00      39.56       0.00      32.90      12.48     198.35     210.83       45.50
3.04   0.841
  500                    211.00       0.00       0.00      32.90      10.51     158.66     169.17       94.86
5.37   0.802
```

```
  501                     211.00       0.00       0.00      24.25      63.08     120.33     183.41        0.61
0.05   0.869
```

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
J_compare_south	JUNCTION	0.32	1.14	391.84	0 11:00	1.14
J_compare_total	JUNCTION	0.31	1.20	388.20	0 11:00	1.20
J_compare_west	JUNCTION	0.00	0.00	0.00	0 00:00	0.00
J2	JUNCTION	0.77	3.06	401.88	0 09:26	2.74
J5	JUNCTION	0.62	1.31	399.31	0 11:00	1.31
J6	JUNCTION	0.29	2.75	401.15	0 10:09	2.50
SR-OUTFLOW	JUNCTION	0.34	2.62	400.92	0 10:59	1.62
OF1	OUTFALL	0.31	1.20	388.19	0 11:00	1.20
SR-S1	STORAGE	0.55	1.00	400.30	0 10:59	1.00
SR-S2	STORAGE	0.24	0.98	400.28	0 11:02	0.98
SR-S3	STORAGE	0.44	1.37	399.60	0 11:44	1.37

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
J_compare_south	JUNCTION	3.779	10.406	0 10:59	63.5	205	0.031
J_compare_total	JUNCTION	0.000	13.164	0 11:00	0	251	-0.001
J_compare_west	JUNCTION	3.039	3.039	0 10:00	45.5	45.5	0.000
J2	JUNCTION	0.176	0.802	0 09:39	1.6	17.9	-27.708
J5	JUNCTION	5.403	7.104	0 10:57	95.5	142	0.000
J6	JUNCTION	0.000	1.270	0 11:02	0	36.6	-0.569
SR-OUTFLOW	JUNCTION	0.000	2.144	0 11:03	0	49.4	3.457
OF1	OUTFALL	0.000	13.156	0 11:00	0	251	0.000
SR-S1	STORAGE	1.946	2.185	0 09:26	20.4	20.4	-9.295
SR-S2	STORAGE	1.114	1.114	0 09:22	12.4	12.4	0.493
SR-S3	STORAGE	1.201	1.811	0 10:39	11.4	12.6	-0.026

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
J2	JUNCTION	15.26	2.526	0.000
J6	JUNCTION	3.06	1.975	0.000
SR-OUTFLOW	JUNCTION	3.40	1.795	0.000

****
Node Flooding Summary
****

Flooding refers to all water that overflows a node, whether it ponds or not.

Node	Hours Flooded	Maximum Rate CMS	Time of Max Occurrence days hr:min	Total Flood Volume 10^6 ltr	Maximum Ponded Depth Meters
J2	1.38	0.427	0 09:39	0.407	0.000
J6	0.03	0.402	0 10:59	0.015	0.000
SR-OUTFLOW	0.01	1.046	0 10:59	0.001	0.000
SR-S1	1.13	1.115	0 10:59	1.039	0.000

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
SR-S1	8.180	48.3	0.0	0.0	16.925	100.0	0 10:59	0.756
SR-S2	0.872	20.8	0.0	0.0	4.091	97.7	0 11:02	1.037
SR-S3	0.391	2.1	0.0	0.0	5.931	32.5	0 11:44	0.909

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
OF1	99.80	1.461	13.156	250.892
System	99.80	1.461	13.156	250.892

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C1	CHANNEL	6.628	0 11:00	1.70	0.41	0.76
C11	CONDUIT	1.714	0 10:57	2.03	2.24	1.00
C2	CONDUIT	0.412	0 13:44	1.98	1.84	1.00
C3	CONDUIT	1.321	0 11:03	1.56	1.04	1.00
C4	DUMMY	3.039	0 10:00			
C4_1	CHANNEL	10.363	0 11:00	2.21	0.59	0.84
C4_2	CHANNEL	13.156	0 11:00	2.66	0.68	0.86
C7	DUMMY	0.909	0 11:56			
OL1	DUMMY	0.756	0 23:46			
OL2	DUMMY	1.037	0 11:02			

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl

C1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.98	0.00
C11	1.00	0.00	0.00	0.00	0.99	0.00	0.01	0.00	0.01	0.00
C2	1.00	0.01	0.00	0.00	0.20	0.00	0.00	0.79	0.11	0.00
C3	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.07	0.00
C4_1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.21	0.00
C4_2	1.00	0.00	0.00	0.00	0.91	0.08	0.00	0.00	0.04	0.00

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C11	3.57	3.78	3.63	4.39	1.67
C2	1.90	7.88	3.97	15.44	1.88
C3	2.72	2.95	3.27	0.01	0.99

Analysis begun on: Thu Aug 20 10:22:02 2026
Analysis ended on: Thu Aug 20 10:22:07 2026
Total elapsed time: 00:00:05

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.2 (Build 5.2.4)
------------------------------------------------------------

WARNING 10: crest elevation raised to downstream invert for regulator Link C7

*************
Element Count
*************
Number of rain gages ...... 18
Number of subcatchments ... 11
Number of nodes ........... 18
Number of links ........... 22
Number of pollutants ...... 0
Number of land uses ....... 0


****************
Raingage Summary
****************
                                                 Data       Recording
Name                 Data Source                 Type       Interval
----------------------------------------------------------------------
Chicago_3h_100yr_SouthRidge Chicago_3h_100yr_SouthRidge    INTENSITY    5 min.
Chicago_3h_2yr_SouthRidge Chicago_3h_2yr_SouthRidge      INTENSITY    5 min.
Chicago_3h_5yr_SouthRidge Chicago_3h_5yr_SouthRidge      INTENSITY    5 min.
Chicago_4h_100yr     Chicago_4h_100yr            INTENSITY    5 min.
Chicago_4h_10yr      Chicago_4h_10yr             INTENSITY    5 min.
Chicago_4h_25mm      Chicago_4h_25mm             INTENSITY    5 min.
Chicago_4h_25yr      Chicago_4h_25yr             INTENSITY    5 min.
Chicago_4h_2yr       Chicago_4h_2yr              INTENSITY    5 min.
Chicago_4h_50yr      Chicago_4h_50yr             INTENSITY    5 min.
Chicago_4h_5yr       Chicago_4h_5yr              INTENSITY    5 min.
Chicago_4hr_25mm     Chicago_4hr_25mm            INTENSITY    5 min.
Chicago_6h_100yr     Chicago_6h_100yr            INTENSITY    5 min.
Chicago_6h_50yr      Chicago_6h_50yr             INTENSITY    5 min.
Chicago_6h_5yr       Chicago_6h_5yr              INTENSITY    5 min.
Hurricane_Hazel_(0-25) Hurricane_Hazel_(0-25)      INTENSITY   60 min.
SCS_Type_II_132.5mm_24hr_100yr SCS_Type_II_132.5mm_24hr_100yr INTENSITY    6 min.
SCS_Type_II_75.2mm_12hr_10yr SCS_Type_II_75.2mm_12hr_10yr   INTENSITY    6 min.
SCS_Type_II_88.3mm_12hr_25yr SCS_Type_II_88.3mm_12hr_25yr   INTENSITY    6 min.


********************
Subcatchment Summary
********************
Name                        Area     Width   %Imperv    %Slope Rain Gage            Outlet
-----------------------------------------------------------------------------------------------------------
200                        10.43    231.78      5.00    1.0000 Chicago_4h_100yr     J7
201                         0.96    240.00     70.00    1.0000 Chicago_4h_100yr     DryPond_Ph1
202                         2.68    670.00     70.00    1.0000 Chicago_4h_100yr     J_split
203                         0.62    155.00     70.00    1.0000 Chicago_4h_100yr     300
204                         1.03    257.50     70.00    1.0000 Chicago_4h_100yr     300
205                        23.61   5902.50     70.00    1.0000 Chicago_4h_100yr     WetPond
300                        17.50   4375.00     70.00    0.5000 Chicago_4h_100yr     WetPond
301                         2.43    607.50     50.00    0.5000 Chicago_4h_100yr     J_compare_west
400                         4.61   1152.50     70.00    0.5000 Chicago_4h_100yr     WetPond
500                        57.59    632.86      5.00    0.5000 Chicago_4h_100yr     J5
501                         0.33    165.00     70.00    0.5000 Chicago_4h_100yr     J5


************
Node Summary
************
                                    Invert      Max.    Ponded    External
Name                 Type            Elev.     Depth      Area    Inflow
-------------------------------------------------------------------------
J_compare_south      JUNCTION           390.70      1.50       0.0
J_compare_total      JUNCTION           387.00      1.50       0.0
```

J_compare_west	JUNCTION	387.00	1.40	0.0
J1	JUNCTION	397.00	3.00	0.0
J2	JUNCTION	398.82	3.06	0.0
J3	JUNCTION	398.40	2.81	0.0
J4	JUNCTION	398.70	2.10	0.0
J5	JUNCTION	398.00	1.80	0.0
J6	JUNCTION	398.40	2.75	0.0
J7	JUNCTION	395.03	1.45	0.0
SR-OUTFLOW	JUNCTION	398.30	2.62	0.0
OF1	OUTFALL	386.99	1.40	0.0
DryPond_Ph1	STORAGE	398.70	2.10	0.0
J_split	STORAGE	397.00	5.00	0.0
SR-S1	STORAGE	399.30	1.00	0.0
SR-S2	STORAGE	399.30	1.00	0.0
SR-S3	STORAGE	398.23	1.87	0.0
WetPond	STORAGE	391.80	2.10	0.0

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J1	WetPond	CONDUIT	1040.0	0.5000	0.0130
C11	SR-OUTFLOW	J5	CONDUIT	7.3	0.4384	0.0120
C2	J2	J6	CONDUIT	103.1	0.2706	0.0130
C3	J6	SR-OUTFLOW	CONDUIT	29.0	0.1724	0.0130
C4	J_compare_total	OF1	CONDUIT	1.0	1.0001	0.0270
C4_1	J_compare_south	J_compare_total	CONDUIT	450.0	0.8223	0.0270
C4_2	J_compare_west	J_compare_total	CONDUIT	1.0	1.0001	0.0270
C8_1	J4	J3	CONDUIT	13.4	1.0026	0.0130
C8_2	J3	J5	CONDUIT	32.6	0.5000	0.0130
Mun_Drain_1	J5	J7	CONDUIT	660.0	0.5000	0.0270
Mun_Drain_2	J7	J_compare_south	CONDUIT	870.0	0.4975	0.0270
C6	J_split	J1	ORIFICE			
OR1	DryPond_Ph1	J4	ORIFICE			
OR2	DryPond_Ph1	J4	ORIFICE			
Orf1	WetPond	J_compare_south	ORIFICE			
C5	J_split	DryPond_Ph1	WEIR			
W_OF	WetPond	J_compare_south	WEIR			
W1	WetPond	J_compare_south	WEIR			
W2	DryPond_Ph1	J4	WEIR			
C7	SR-S3	SR-OUTFLOW	OUTLET			
OL1	SR-S1	J2	OUTLET			
OL2	SR-S2	J6	OUTLET			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	CIRCULAR	1.00	0.79	0.25	1.00	1	1.70
C11	RECT_CLOSED	0.73	0.85	0.22	1.15	1	1.72
C2	CIRCULAR	0.53	0.22	0.13	0.53	1	0.22
C3	RECT_CLOSED	0.73	0.85	0.22	1.15	1	1.00
C4	Drain	1.40	6.58	0.70	8.90	1	19.23
C4_1	Drain	1.40	6.58	0.70	8.90	1	17.43
C4_2	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C8_1	CIRCULAR	0.45	0.16	0.11	0.45	1	0.29
C8_2	CIRCULAR	0.45	0.16	0.11	0.45	1	0.20
Mun_Drain_1	Drain	1.40	6.58	0.70	8.90	1	13.60
Mun_Drain_2	Drain	1.40	6.58	0.70	8.90	1	13.56

****
Transect Summary
****

```
Transect Drain
Area:
            0.0025     0.0057     0.0096     0.0142     0.0196
            0.0256     0.0324     0.0399     0.0481     0.0570
            0.0667     0.0770     0.0881     0.0998     0.1123
            0.1255     0.1395     0.1541     0.1695     0.1855
            0.2023     0.2198     0.2380     0.2570     0.2766
            0.2970     0.3180     0.3398     0.3623     0.3855
            0.4095     0.4341     0.4595     0.4855     0.5123
            0.5398     0.5681     0.5970     0.6267     0.6570
            0.6881     0.7199     0.7524     0.7856     0.8196
            0.8542     0.8896     0.9257     0.9625     1.0000
Hrad:
            0.0343     0.0623     0.0871     0.1102     0.1322
            0.1535     0.1743     0.1947     0.2149     0.2349
            0.2547     0.2744     0.2940     0.3135     0.3329
            0.3523     0.3717     0.3909     0.4102     0.4294
            0.4486     0.4678     0.4869     0.5060     0.5251
            0.5442     0.5633     0.5824     0.6014     0.6204
            0.6395     0.6585     0.6775     0.6965     0.7155
            0.7345     0.7535     0.7725     0.7915     0.8104
            0.8294     0.8484     0.8673     0.8863     0.9053
            0.9242     0.9432     0.9621     0.9811     1.0000
Width:
            0.0751     0.0939     0.1128     0.1317     0.1506
            0.1694     0.1883     0.2072     0.2261     0.2449
            0.2638     0.2827     0.3016     0.3204     0.3393
            0.3582     0.3771     0.3960     0.4148     0.4337
            0.4526     0.4715     0.4903     0.5092     0.5281
            0.5470     0.5658     0.5847     0.6036     0.6225
            0.6413     0.6602     0.6791     0.6980     0.7169
            0.7357     0.7546     0.7735     0.7924     0.8112
            0.8301     0.8490     0.8679     0.8867     0.9056
            0.9245     0.9434     0.9622     0.9811     1.0000


****************
Analysis Options
****************
Flow Units ............... CMS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Infiltration Method ...... CURVE_NUMBER
Flow Routing Method ...... DYNWAVE
Surcharge Method ......... EXTRAN
Starting Date ............ 03/18/2026 00:00:00
Ending Date .............. 03/18/2026 04:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:01:00
Dry Time Step ............ 00:01:00
Routing Time Step ........ 1.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 1
Head Tolerance ........... 0.001500 m


**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Total Precipitation ......         9.901        81.294
```

```
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         3.369        27.663
Surface Runoff ...........         4.499        36.939
Final Storage ............         2.046        16.803
Continuity Error (%) .....        -0.137


**************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         4.493        44.931
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         1.161        11.614
External Outflow .........         1.497        14.966
Flooding Loss ............         0.000         0.000
Evaporation Loss .........         0.000         0.000
Exfiltration Loss ........         0.000         0.000
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         4.158        41.580
Continuity Error (%) .....        -0.002


*************************
Highest Continuity Errors
*************************
Node J1 (7.58%)
Node J7 (5.63%)
Node J_compare_south (4.82%)
Node J3 (4.49%)
Node SR-OUTFLOW (-2.74%)


**************************
Time-Step Critical Elements
**************************
Link C4 (98.16%)


*******************************
Highest Flow Instability Indexes
*******************************
Link C3 (70)
Link C11 (69)
Link C7 (65)


*********************************
Most Frequent Nonconverging Nodes
*********************************
Node SR-OUTFLOW (0.12%)
Node OF1 (0.12%)


************************
Routing Time Step Summary
************************
Minimum Time Step           :     0.04 sec
Average Time Step           :     0.52 sec
Maximum Time Step           :     1.00 sec
% of Time in Steady State   :     0.00
Average Iterations per Step :     2.55
% of Steps Not Converging   :     0.12
Time Step Frequencies       :
    1.000 -  0.871 sec      :     2.10 %
    0.871 -  0.758 sec      :     0.48 %
    0.758 -  0.660 sec      :     1.03 %
    0.660 -  0.574 sec      :     4.71 %
```

0.574 - 0.500 sec : 91.68 %

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
200	81.29	0.00	0.00	39.40	4.01	17.17	21.18	2.21	0.47	0.261
201	81.29	0.00	0.00	12.44	56.59	9.03	65.62	0.63	0.58	0.807
202	81.29	0.00	0.00	12.44	56.59	9.03	65.62	1.76	1.63	0.807
203	81.29	0.00	0.00	12.44	56.59	9.03	65.62	0.41	0.38	0.807
204	81.29	0.00	0.00	12.44	56.59	9.03	65.62	0.68	0.62	0.807
205	81.29	0.00	0.00	12.44	56.59	9.03	65.62	15.49	14.32	0.807
300	81.29	6.18	0.00	12.44	60.77	10.76	71.52	12.52	11.32	0.818
301	81.29	0.00	0.00	20.74	40.42	14.57	54.99	1.34	1.06	0.676
400	81.29	0.00	0.00	12.44	56.44	8.93	65.37	3.01	2.74	0.804
500	81.29	0.00	0.00	39.40	3.98	9.59	13.57	7.82	2.35	0.167
501	81.29	0.00	0.00	12.44	56.08	8.86	64.93	0.21	0.20	0.799

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
J_compare_south	JUNCTION	0.36	0.57	391.27	0 02:27	0.57
J_compare_total	JUNCTION	0.36	0.53	387.53	0 02:27	0.53
J_compare_west	JUNCTION	0.00	0.00	387.00	0 00:00	0.00
J1	JUNCTION	0.06	0.08	397.08	0 03:09	0.08
J2	JUNCTION	0.11	0.15	398.97	0 03:59	0.15
J3	JUNCTION	0.34	0.53	398.93	0 01:27	0.52
J4	JUNCTION	0.11	0.23	398.93	0 01:27	0.22
J5	JUNCTION	0.73	0.93	398.93	0 01:27	0.92
J6	JUNCTION	0.34	0.54	398.94	0 01:26	0.53
J7	JUNCTION	0.43	0.63	395.66	0 02:19	0.63
SR-OUTFLOW	JUNCTION	0.43	0.63	398.93	0 01:26	0.62
OF1	OUTFALL	0.36	0.53	387.52	0 02:27	0.53
DryPond_Ph1	STORAGE	0.32	0.59	399.29	0 03:59	0.59
J_split	STORAGE	2.89	4.04	401.04	0 01:30	4.03
SR-S1	STORAGE	0.23	0.39	399.69	0 03:59	0.39
SR-S2	STORAGE	0.38	0.63	399.93	0 01:49	0.63
SR-S3	STORAGE	0.50	0.70	398.93	0 01:26	0.70

WetPond	STORAGE	0.50	0.85	392.65	0	03:59	0.85	

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min		Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
J_compare_south	JUNCTION	0.000	1.855	0	02:21	0	14.5	5.063
J_compare_total	JUNCTION	0.000	1.918	0	02:25	0	15.1	1.221
J_compare_west	JUNCTION	1.059	1.059	0	01:25	1.34	1.34	0.000
J1	JUNCTION	0.000	0.020	0	01:30	0	0.218	8.205
J2	JUNCTION	0.000	0.037	0	03:59	0	0.309	1.040
J3	JUNCTION	0.000	0.014	0	01:22	0	0.0657	4.705
J4	JUNCTION	0.000	0.009	0	03:59	0	0.0629	0.388
J5	JUNCTION	2.546	2.546	0	01:25	8.01	12.5	2.279
J6	JUNCTION	0.202	0.538	0	01:40	0.343	2.51	0.420
J7	JUNCTION	0.465	1.773	0	02:14	2.2	14.3	5.967
SR-OUTFLOW	JUNCTION	0.000	0.975	0	01:41	0	4.5	-2.670
OF1	OUTFALL	0.000	1.917	0	02:27	0	15	0.000
DryPond_Ph1	STORAGE	0.582	0.606	0	01:30	0.63	1.35	0.011
J_split	STORAGE	1.625	1.625	0	01:25	1.76	1.76	0.005
SR-S1	STORAGE	3.399	3.399	0	01:33	5.6	5.6	0.011
SR-S2	STORAGE	2.400	2.400	0	01:32	3.7	3.7	0.007
SR-S3	STORAGE	0.478	0.529	0	01:26	1.97	2.11	6.662
WetPond	STORAGE	28.377	28.387	0	01:25	31	31.2	1.183

****
Node Surcharge Summary
****

No nodes were surcharged.

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m	Max Pcnt Full	Time of Max Occurrence days hr:min		Maximum Outflow CMS
DryPond_Ph1	0.682	12.4	0.0	0.0	1.284	23.3	0	03:59	0.009
J_split	0.595	57.8	0.0	0.0	0.831	80.7	0	01:30	0.458
SR-S1	3.102	18.3	0.0	0.0	5.293	31.3	0	03:59	0.037
SR-S2	1.394	33.3	0.0	0.0	2.367	56.5	0	01:49	0.349
SR-S3	0.097	0.5	0.0	0.0	0.165	0.9	0	01:26	0.480
WetPond	17.424	22.2	0.0	0.0	29.847	38.1	0	03:59	0.115

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
OF1	99.36	1.094	1.917	14.966
System	99.36	1.094	1.917	14.966

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	0.020	0	03:09	0.38	0.01	0.46
C11	CONDUIT	0.855	0	02:03	1.35	0.50	0.79
C2	CONDUIT	0.037	0	03:59	0.51	0.17	0.49
C3	CONDUIT	0.548	0	01:41	1.04	0.55	0.71
C4	CHANNEL	1.917	0	02:27	1.72	0.10	0.38
C4_1	CHANNEL	1.845	0	02:27	1.56	0.11	0.39
C4_2	DUMMY	1.059	0	01:25			
C8_1	CONDUIT	0.010	0	03:59	0.43	0.03	0.67
C8_2	CONDUIT	0.013	0	01:24	0.10	0.06	1.00
Mun_Drain_1	CHANNEL	1.533	0	02:14	1.27	0.11	0.43
Mun_Drain_2	CHANNEL	1.753	0	02:21	1.27	0.13	0.43
C6	ORIFICE	0.020	0	01:30			1.00
OR1	ORIFICE	0.009	0	03:59			1.00
OR2	ORIFICE	0.000	0	00:00			
Orf1	ORIFICE	0.115	0	03:59			1.00
C5	WEIR	0.438	0	01:30			0.35
W_OF	WEIR	0.000	0	00:00			0.00
W1	WEIR	0.000	0	00:00			0.00
W2	WEIR	0.000	0	00:00			0.00
C7	DUMMY	0.480	0	01:26			
OL1	DUMMY	0.037	0	03:59			
OL2	DUMMY	0.349	0	01:49			

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C1	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.88	0.00
C11	1.00	0.02	0.04	0.00	0.89	0.00	0.05	0.00	0.00	0.00
C2	1.00	0.10	0.00	0.00	0.67	0.00	0.00	0.24	0.64	0.00
C3	1.00	0.08	0.00	0.00	0.89	0.00	0.00	0.03	0.02	0.00
C4	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.01	0.00
C4_1	1.00	0.00	0.04	0.00	0.96	0.00	0.00	0.00	0.35	0.00
C8_1	1.00	0.02	0.00	0.00	0.66	0.00	0.00	0.32	0.01	0.00
C8_2	1.00	0.02	0.02	0.00	0.96	0.00	0.00	0.00	0.05	0.00
Mun_Drain_1	1.00	0.00	0.02	0.00	0.98	0.00	0.00	0.00	0.67	0.00
Mun_Drain_2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00

****
Conduit Surcharge Summary
****

	Hours	Hours

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Above Full Normal Flow	Capacity Limited
C8_2	1.60	1.60	2.63	0.01	0.01

Analysis begun on: Tue Sep 1 09:55:19 2026
Analysis ended on: Tue Sep 1 09:55:21 2026
Total elapsed time: 00:00:02

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.2 (Build 5.2.4)
-----------------------------------------------------------

WARNING 10: crest elevation raised to downstream invert for regulator Link C7

*************
Element Count
*************
Number of rain gages ...... 18
Number of subcatchments ... 11
Number of nodes ........... 18
Number of links ........... 22
Number of pollutants ...... 0
Number of land uses ....... 0


****************
Raingage Summary
****************
                                                  Data       Recording
Name                 Data Source                  Type       Interval
----------------------------------------------------------------------
Chicago_3h_100yr_SouthRidge Chicago_3h_100yr_SouthRidge    INTENSITY    5 min.
Chicago_3h_2yr_SouthRidge Chicago_3h_2yr_SouthRidge      INTENSITY    5 min.
Chicago_3h_5yr_SouthRidge Chicago_3h_5yr_SouthRidge      INTENSITY    5 min.
Chicago_4h_100yr     Chicago_4h_100yr            INTENSITY    5 min.
Chicago_4h_10yr      Chicago_4h_10yr             INTENSITY    5 min.
Chicago_4h_25mm      Chicago_4h_25mm             INTENSITY    5 min.
Chicago_4h_25yr      Chicago_4h_25yr             INTENSITY    5 min.
Chicago_4h_2yr       Chicago_4h_2yr              INTENSITY    5 min.
Chicago_4h_50yr      Chicago_4h_50yr             INTENSITY    5 min.
Chicago_4h_5yr       Chicago_4h_5yr              INTENSITY    5 min.
Chicago_4hr_25mm     Chicago_4hr_25mm            INTENSITY    5 min.
Chicago_6h_100yr     Chicago_6h_100yr            INTENSITY    5 min.
Chicago_6h_50yr      Chicago_6h_50yr             INTENSITY    5 min.
Chicago_6h_5yr       Chicago_6h_5yr              INTENSITY    5 min.
Hurricane_Hazel_(0-25) Hurricane_Hazel_(0-25)      INTENSITY   60 min.
SCS_Type_II_132.5mm_24hr_100yr SCS_Type_II_132.5mm_24hr_100yr INTENSITY    6 min.
SCS_Type_II_75.2mm_12hr_10yr SCS_Type_II_75.2mm_12hr_10yr   INTENSITY    6 min.
SCS_Type_II_88.3mm_12hr_25yr SCS_Type_II_88.3mm_12hr_25yr   INTENSITY    6 min.


********************
Subcatchment Summary
********************
Name                         Area     Width   %Imperv    %Slope Rain Gage            Outlet
-------------------------------------------------------------------------------------------------
200                         10.43    231.78      5.00    1.0000 Hurricane_Hazel_(0-25) J7
201                          0.96    240.00     70.00    1.0000 Hurricane_Hazel_(0-25) DryPond_Ph1
202                          2.68    670.00     70.00    1.0000 Hurricane_Hazel_(0-25) DryPond_Ph1
203                          0.62    155.00     70.00    1.0000 Hurricane_Hazel_(0-25) 300
204                          1.03    257.50     70.00    1.0000 Hurricane_Hazel_(0-25) 300
205                         23.61   5902.50     70.00    1.0000 Hurricane_Hazel_(0-25) WetPond
300                         17.50   4375.00     70.00    0.5000 Hurricane_Hazel_(0-25) WetPond
301                          2.43    607.50     50.00    0.5000 Hurricane_Hazel_(0-25) J_compare_west
400                          4.61   1152.50     70.00    0.5000 Hurricane_Hazel_(0-25) WetPond
500                         57.59    632.86      5.00    0.5000 Hurricane_Hazel_(0-25) J5
501                          0.33    165.00     70.00    0.5000 Hurricane_Hazel_(0-25) J5


************
Node Summary
************
                                    Invert      Max.    Ponded    External
Name                 Type            Elev.     Depth      Area    Inflow
-------------------------------------------------------------------------
J_compare_south      JUNCTION       390.70      1.50       0.0
J_compare_total      JUNCTION       387.00      1.50       0.0
```

J_compare_west	JUNCTION	387.00	1.40	0.0
J1	JUNCTION	397.00	3.00	0.0
J2	JUNCTION	398.82	3.06	0.0
J3	JUNCTION	398.40	2.81	0.0
J4	JUNCTION	398.70	2.10	0.0
J5	JUNCTION	398.00	1.80	0.0
J6	JUNCTION	398.40	2.75	0.0
J7	JUNCTION	395.03	1.45	0.0
SR-OUTFLOW	JUNCTION	398.30	2.62	0.0
OF1	OUTFALL	386.99	1.40	0.0
DryPond_Ph1	STORAGE	398.70	2.10	0.0
J_split	STORAGE	397.00	5.00	0.0
SR-S1	STORAGE	399.30	1.00	0.0
SR-S2	STORAGE	399.30	1.00	0.0
SR-S3	STORAGE	398.23	1.87	0.0
WetPond	STORAGE	391.80	2.10	0.0

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J1	WetPond	CONDUIT	1040.0	0.5000	0.0130
C11	SR-OUTFLOW	J5	CONDUIT	7.3	0.4384	0.0120
C2	J2	J6	CONDUIT	103.1	0.2706	0.0130
C3	J6	SR-OUTFLOW	CONDUIT	29.0	0.1724	0.0130
C4	J_compare_total	OF1	CONDUIT	1.0	1.0001	0.0270
C4_1	J_compare_south	J_compare_total	CONDUIT	450.0	0.8223	0.0270
C4_2	J_compare_west	J_compare_total	CONDUIT	1.0	1.0001	0.0270
C8_1	J4	J3	CONDUIT	13.4	1.0026	0.0130
C8_2	J3	J5	CONDUIT	32.6	0.5000	0.0130
Mun_Drain_1	J5	J7	CONDUIT	660.0	0.5000	0.0270
Mun_Drain_2	J7	J_compare_south	CONDUIT	870.0	0.4975	0.0270
C6	J_split	J1	ORIFICE			
OR1	DryPond_Ph1	J4	ORIFICE			
OR2	DryPond_Ph1	J4	ORIFICE			
Orf1	WetPond	J_compare_south	ORIFICE			
C5	J_split	DryPond_Ph1	WEIR			
W_OF	WetPond	J_compare_south	WEIR			
W1	WetPond	J_compare_south	WEIR			
W2	DryPond_Ph1	J4	WEIR			
C7	SR-S3	SR-OUTFLOW	OUTLET			
OL1	SR-S1	J2	OUTLET			
OL2	SR-S2	J6	OUTLET			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	CIRCULAR	1.00	0.79	0.25	1.00	1	1.70
C11	RECT_CLOSED	0.73	0.85	0.22	1.15	1	1.72
C2	CIRCULAR	0.53	0.22	0.13	0.53	1	0.22
C3	RECT_CLOSED	0.73	0.85	0.22	1.15	1	1.00
C4	Drain	1.40	6.58	0.70	8.90	1	19.23
C4_1	Drain	1.40	6.58	0.70	8.90	1	17.43
C4_2	DUMMY	0.00	0.00	0.00	0.00	1	0.00
C8_1	CIRCULAR	0.45	0.16	0.11	0.45	1	0.29
C8_2	CIRCULAR	0.45	0.16	0.11	0.45	1	0.20
Mun_Drain_1	Drain	1.40	6.58	0.70	8.90	1	13.60
Mun_Drain_2	Drain	1.40	6.58	0.70	8.90	1	13.56

****
Transect Summary
****

```
Transect Drain
Area:
            0.0025     0.0057     0.0096     0.0142     0.0196
            0.0256     0.0324     0.0399     0.0481     0.0570
            0.0667     0.0770     0.0881     0.0998     0.1123
            0.1255     0.1395     0.1541     0.1695     0.1855
            0.2023     0.2198     0.2380     0.2570     0.2766
            0.2970     0.3180     0.3398     0.3623     0.3855
            0.4095     0.4341     0.4595     0.4855     0.5123
            0.5398     0.5681     0.5970     0.6267     0.6570
            0.6881     0.7199     0.7524     0.7856     0.8196
            0.8542     0.8896     0.9257     0.9625     1.0000
Hrad:
            0.0343     0.0623     0.0871     0.1102     0.1322
            0.1535     0.1743     0.1947     0.2149     0.2349
            0.2547     0.2744     0.2940     0.3135     0.3329
            0.3523     0.3717     0.3909     0.4102     0.4294
            0.4486     0.4678     0.4869     0.5060     0.5251
            0.5442     0.5633     0.5824     0.6014     0.6204
            0.6395     0.6585     0.6775     0.6965     0.7155
            0.7345     0.7535     0.7725     0.7915     0.8104
            0.8294     0.8484     0.8673     0.8863     0.9053
            0.9242     0.9432     0.9621     0.9811     1.0000
Width:
            0.0751     0.0939     0.1128     0.1317     0.1506
            0.1694     0.1883     0.2072     0.2261     0.2449
            0.2638     0.2827     0.3016     0.3204     0.3393
            0.3582     0.3771     0.3960     0.4148     0.4337
            0.4526     0.4715     0.4903     0.5092     0.5281
            0.5470     0.5658     0.5847     0.6036     0.6225
            0.6413     0.6602     0.6791     0.6980     0.7169
            0.7357     0.7546     0.7735     0.7924     0.8112
            0.8301     0.8490     0.8679     0.8867     0.9056
            0.9245     0.9434     0.9622     0.9811     1.0000


****************
Analysis Options
****************
Flow Units ............... CMS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Infiltration Method ...... CURVE_NUMBER
Flow Routing Method ...... DYNWAVE
Surcharge Method ......... EXTRAN
Starting Date ............ 03/18/2026 00:00:00
Ending Date .............. 03/20/2026 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:01:00
Dry Time Step ............ 00:01:00
Routing Time Step ........ 1.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 1
Head Tolerance ........... 0.001500 m


**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Total Precipitation ......        25.698       211.000
```

```
Evaporation Loss .........          0.000          0.000
Infiltration Loss ........          2.814         23.103
Surface Runoff ...........         22.234        182.558
Final Storage ............          0.651          5.346
Continuity Error (%) .....         -0.003


**************************        Volume         Volume
Flow Routing Continuity        hectare-m       10^6 ltr
**************************     ---------      ---------
Dry Weather Inflow .......          0.000          0.000
Wet Weather Inflow .......         22.234        222.339
Groundwater Inflow .......          0.000          0.000
RDII Inflow ..............          0.000          0.000
External Inflow ..........          4.576         45.762
External Outflow .........         23.532        235.323
Flooding Loss ............          0.115          1.148
Evaporation Loss .........          0.000          0.000
Exfiltration Loss ........          0.000          0.000
Initial Stored Volume ....          0.000          0.000
Final Stored Volume ......          3.971         39.711
Continuity Error (%) .....         -3.014


*************************
Highest Continuity Errors
*************************
Node J2 (-45.13%)
Node SR-OUTFLOW (2.08%)


***************************
Time-Step Critical Elements
***************************
Link C4 (99.85%)


*******************************
Highest Flow Instability Indexes
*******************************
Link C3 (102)
Link C11 (92)
Link C7 (84)
Link OL1 (46)
Link C2 (45)


*********************************
Most Frequent Nonconverging Nodes
*********************************
Node OF1 (31.84%)
Node J2 (31.41%)
Node SR-OUTFLOW (5.98%)
Node J6 (4.19%)


*************************
Routing Time Step Summary
*************************
Minimum Time Step           :     0.23 sec
Average Time Step           :     0.50 sec
Maximum Time Step           :     1.00 sec
% of Time in Steady State   :     0.00
Average Iterations per Step :     4.29
% of Steps Not Converging   :    31.84
Time Step Frequencies       :
    1.000 -  0.871 sec      :     0.17 %
    0.871 -  0.758 sec      :     0.04 %
    0.758 -  0.660 sec      :     0.10 %
```

```
     0.660 -  0.574 sec      :     1.14 %
     0.574 -  0.500 sec      :    98.55 %
```

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
200	211.00	0.00	0.00	32.90	10.51	161.00	171.51	17.89	1.22	0.813
201	211.00	0.00	0.00	10.39	147.69	51.72	199.41	1.91	0.14	0.945
202	211.00	0.00	0.00	10.39	147.69	51.72	199.41	5.34	0.39	0.945
203	211.00	0.00	0.00	10.39	147.69	51.72	199.41	1.24	0.09	0.945
204	211.00	0.00	0.00	10.39	147.69	51.72	199.41	2.05	0.15	0.945
205	211.00	0.00	0.00	10.39	147.69	51.72	199.41	47.08	3.43	0.945
300	211.00	18.80	0.00	10.39	160.84	57.33	218.18	38.18	2.78	0.949
301	211.00	0.00	0.00	17.32	105.49	86.08	191.57	4.66	0.35	0.908
400	211.00	0.00	0.00	10.39	147.66	51.70	199.35	9.19	0.67	0.945
500	211.00	0.00	0.00	32.90	10.51	158.66	169.17	97.43	5.51	0.802
501	211.00	0.00	0.00	10.39	147.19	51.68	198.86	0.66	0.05	0.942

Node Depth Summary

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
J_compare_south	JUNCTION	0.38	1.22	391.92	0 11:03	1.22
J_compare_total	JUNCTION	0.35	1.17	388.17	0 11:02	1.17
J_compare_west	JUNCTION	0.00	0.00	387.00	0 00:00	0.00
J1	JUNCTION	0.00	0.00	397.00	0 00:00	0.00
J2	JUNCTION	0.76	3.06	401.88	0 09:30	2.48
J3	JUNCTION	0.28	1.34	399.74	0 11:00	1.33
J4	JUNCTION	0.16	1.16	399.86	0 11:00	1.16
J5	JUNCTION	0.66	1.40	399.40	0 11:00	1.40
J6	JUNCTION	0.30	2.75	401.15	0 09:56	2.09
J7	JUNCTION	0.34	1.14	396.17	0 11:01	1.14
SR-OUTFLOW	JUNCTION	0.36	2.62	400.92	0 10:42	1.74
OF1	OUTFALL	0.34	1.17	388.16	0 11:02	1.17
DryPond_Ph1	STORAGE	0.87	1.74	400.44	0 11:01	1.74
J_split	STORAGE	0.00	0.00	397.00	0 00:00	0.00
SR-S1	STORAGE	0.55	1.00	400.30	0 11:01	1.00
SR-S2	STORAGE	0.25	1.00	400.30	0 10:08	1.00

SR-S3	STORAGE	0.45	1.40	399.63	0	11:44	1.40	
WetPond	STORAGE	1.09	1.93	393.73	0	11:00	1.93	

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min		Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent	
J_compare_south	JUNCTION	0.000	12.206	0	11:00	0	231	0.103	
J_compare_total	JUNCTION	0.000	12.313	0	11:00	0	235	0.015	
J_compare_west	JUNCTION	0.350	0.350	0	10:00	4.66	4.66	0.000	
J1	JUNCTION	0.000	0.000	0	00:00	0	0	0.000	ltr
J2	JUNCTION	0.000	0.756	0	23:47	0	16.3	-31.098	
J3	JUNCTION	0.000	0.285	0	11:08	0	5.94	0.003	
J4	JUNCTION	0.000	0.285	0	11:08	0	5.94	0.004	
J5	JUNCTION	5.548	7.486	0	10:54	98.1	151	0.008	
J6	JUNCTION	0.176	1.560	0	10:08	1.6	37.5	0.649	
J7	JUNCTION	1.222	8.135	0	10:59	17.9	169	-0.005	
SR-OUTFLOW	JUNCTION	0.000	2.053	0	10:42	0	51.2	2.121	
OF1	OUTFALL	0.000	12.302	0	11:02	0	235	0.000	
DryPond_Ph1	STORAGE	0.528	0.528	0	10:00	7.26	7.26	0.002	
J_split	STORAGE	0.000	0.000	0	00:00	0	0	0.000	ltr
SR-S1	STORAGE	1.944	2.071	0	09:30	20.3	20.4	-9.225	
SR-S2	STORAGE	1.114	1.114	0	09:51	12.4	12.4	-0.004	
SR-S3	STORAGE	1.201	1.830	0	10:33	11.4	14.2	0.712	
WetPond	STORAGE	6.873	6.873	0	10:00	94.5	94.5	0.409	

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
J2	JUNCTION	15.19	2.526	0.000
J3	JUNCTION	7.15	0.721	1.473
J6	JUNCTION	3.33	1.975	0.000
SR-OUTFLOW	JUNCTION	3.54	1.795	0.000

****
Node Flooding Summary
****

Flooding refers to all water that overflows a node, whether it ponds or not.

Node	Hours Flooded	Maximum Rate CMS	Time of Max Occurrence days hr:min		Total Flood Volume 10^6 ltr	Maximum Ponded Depth Meters
J2	0.08	0.376	0	23:47	0.043	0.000
J6	0.10	0.574	0	10:10	0.143	0.000
SR-OUTFLOW	0.01	1.021	0	10:42	0.001	0.000
SR-S1	1.10	1.096	0	11:01	0.920	0.000
SR-S2	0.03	0.968	0	10:08	0.042	0.000

****

Storage Volume Summary
****

Storage Unit	Average Volume 1000 m	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
DryPond_Ph1	2.003	36.3	0.0	0.0	4.362	79.1	0 11:01	0.285
J_split	0.000	0.0	0.0	0.0	0.000	0.0	0 00:00	0.000
SR-S1	8.184	48.4	0.0	0.0	16.925	100.0	0 11:01	0.756
SR-S2	0.879	21.0	0.0	0.0	4.187	100.0	0 10:08	1.163
SR-S3	0.436	2.4	0.0	0.0	6.444	35.3	0 11:44	0.928
WetPond	38.874	49.6	0.0	0.0	71.524	91.3	0 11:00	4.112

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
OF1	99.95	1.370	12.302	235.322
System	99.95	1.370	12.302	235.322

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	0.000	0 00:00	0.00	0.00	0.50
C11	CONDUIT	1.752	0 11:13	2.07	1.02	1.00
C2	CONDUIT	0.412	0 13:45	1.98	1.84	1.00
C3	CONDUIT	1.269	0 10:06	1.50	1.27	1.00
C4	CHANNEL	12.302	0 11:02	2.61	0.64	0.84
C4_1	CHANNEL	12.137	0 11:03	2.49	0.70	0.85
C4_2	DUMMY	0.350	0 10:00			
C8_1	CONDUIT	0.285	0 11:08	1.79	1.00	1.00
C8_2	CONDUIT	0.285	0 11:08	1.79	1.42	1.00
Mun_Drain_1	CHANNEL	7.040	0 11:00	1.66	0.52	0.79
Mun_Drain_2	CHANNEL	8.095	0 11:01	1.80	0.60	0.84
C6	ORIFICE	0.000	0 00:00			0.00
OR1	ORIFICE	0.012	0 15:48			1.00
OR2	ORIFICE	0.276	0 11:08			
Orf1	ORIFICE	0.181	0 11:00			1.00
C5	WEIR	0.000	0 00:00			0.00
W_OF	WEIR	1.621	0 11:00			0.44
W1	WEIR	2.310	0 11:00			0.73
W2	WEIR	0.000	0 00:00			0.00
C7	DUMMY	0.928	0 11:44			
OL1	DUMMY	0.756	0 23:47			
OL2	DUMMY	1.163	0 10:08			

****
Flow Classification Summary
****

	Adjusted	Fraction of Time in Flow Class

Conduit	/Actual Length	Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C1	1.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C11	1.00	0.00	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
C2	1.00	0.01	0.00	0.00	0.21	0.00	0.00	0.78	0.08	0.00
C3	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.08	0.00
C4	1.00	0.00	0.00	0.00	0.92	0.08	0.00	0.00	0.04	0.00
C4_1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.02	0.00
C8_1	1.00	0.00	0.00	0.00	0.42	0.01	0.00	0.57	0.19	0.00
C8_2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.34	0.00
Mun_Drain_1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.87	0.00
Mun_Drain_2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.78	0.00

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C11	4.07	4.07	4.27	0.01	0.75
C2	1.95	7.88	4.24	15.23	1.87
C3	2.74	3.18	3.30	1.04	0.82
C8_1	4.31	4.31	7.15	0.01	0.31
C8_2	8.86	8.86	17.43	3.33	3.33

Analysis begun on: Tue Sep 1 09:28:26 2026
Analysis ended on: Tue Sep 1 09:28:33 2026
Total elapsed time: 00:00:07

LEGEND

PROPOSED OVERLAND FLOW ROUTE

PROPOSED STORM DRAINAGE AREA

10 — AREA ID

0.2 — AREA IN HECTARES

500
57.59

101
37.36

102
4.94

501
0.33

502
35.96

103
21.58

PROJECT:

127 & 159 1st LINE LANDS

TITLE:

EXISTING CATCHMENT PLAN

REPRODUCTION OR DISTRIBUTION FOR PURPOSES OTHER THAN AUTHORIZED BY WALTERFEDY IS FORBIDDEN.
CONTRACTORS SHALL VERIFY AND BE RESPONSIBLE FOR ALL DIMENSIONS AND CONDITIONS ON THE JOB AND
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SCALE:	1:3000	DATE:	2026-08-17
DRAWN BY:	KDB	PROJECT NO.:	2026-0082
CHECKED BY:	AK	FILE:	STM_EX

SHEET NO.:

FIG 2.0

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LEGEND

- PROPOSED OVERLAND FLOW ROUTE
- PROPOSED STORM DRAINAGE AREA
- 10 / 0.2 — AREA ID / AREA IN HECTARES
- FLOWS TO MUNICIPAL DRAIN
- MAJOR AND MINOR FLOWS TO NORTH POND
- MAJOR FLOWS TO NORTH POND AND MINORS TO SOUTH POND
- MAJOR AND MINORS TO SOUTH POND

520 / 57.59

200 / 10.43

MAJOR FLOWS TO NORTH POND, MINOR FLOWS TO SOUTH POND

PHASE LIMIT LINE

MAJOR AND MINOR FLOWS TO SOUTH POND

205 / 23.61

MAJOR AND MINOR FLOWS TO NORTH POND

201 / 0.96

202 / 2.68

204 / 1.03

400 / 4.61

501 / 0.33

203 / 0.62

300 / 16.74

502 / 35.95

301 / 3.19

PROJECT:

127 & 159 1st LINE LANDS

TITLE:

PROPOSED CATCHMENT PLAN

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SCALE:	1:3000	DATE:	2026-08-17
DRAWN BY:	KDB	PROJECT NO.:	2026-0082
CHECKED BY:	AK	FILE:	STM_PR

SHEET NO.:

FIG 3.0

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BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix H

Preliminary Water Balance Analysis (Burnside, dated Sept 2026)

WATER BALANCE CALCULATIONS
127 First Line, Elora
Elora Greens Inc.
Centre Wellington, ON
PROJECT No: 300060179

BURNSIDE

TABLE WB-1

Pre- and Post-Development Monthly Water Balance Components

Based on Thornthwaite's Soil Moisture Balance Approach with a Soil Moisture Retention of 200 mm (moderately rooted vegetation in silty/sandy till)

Climate data from FERGUS SHAND DAM MOE Climate Station (1981 - 2010)

Potential Evapotranspiration Calculation	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**YEAR**
Average Temperature (Degree C)	-7.40	-6.30	-1.90	5.70	12.20	17.50	20.00	19.00	14.90	8.30	2.10	-3.90	**6.7**
Heat index: $i = (t/5)^{1.514}$	0.00	0.00	0.00	1.22	3.86	6.66	8.16	7.55	5.22	2.15	0.27	0.00	**35.1**
Unadjusted Daily Potential Evapotranspiration U (mm)	0.00	0.00	0.00	26.65	59.36	86.76	99.85	94.61	73.26	39.58	9.32	0.00	**489**
Adjusting Factor for U (Latitude 43° 44' N)	0.81	0.82	1.02	1.12	1.26	1.28	1.29	1.2	1.04	0.95	0.81	0.77	
Adjusted Potential Evapotranspiration PET (mm)	0	0	0	30	75	111	129	114	76	38	8	0	**579**
COMPONENTS	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**YEAR**
Precipitation (P)	68	56	60	74	87	84	89	97	93	77	93	69	**945.9**
Potential Evapotranspiration (PET)	0	0	0	30	75	111	129	114	76	38	8	0	**579**
P - PET	68	56	60	44	12	-27	-40	-17	17	40	85	69	**367**
Change in Soil Moisture Storage	0	0	0	0	0	-27	-40	-17	17	40	27	0	**0**
Soil Moisture Storage max 200 mm	200	200	200	200	200	173	133	116	133	173	200	200	
Actual Evapotranspiration (AET)	0	0	0	30	75	111	129	114	76	38	8	0	**579**
Soil Moisture Deficit max 200 mm	0	0	0	0	0	27	67	84	67	27	0	0	
Water Surplus - available for infiltration or runoff	68	56	60	44	12	0	0	0	0	0	58	69	**367**
Potential Infiltration (based on MOE metholodogy*; independent of temperature)	34	28	30	22	6	0	0	0	0	0	29	34	**183**
Potential Direct Surface Water Runoff (independent of temperature)	34	28	30	22	6	0	0	0	0	0	29	34	**183**
IMPERVIOUS AREA WATER SURPLUS													
Precipitation (P)	946	mm/year											
Potential Evaporation (PE) from impervious areas (assume 15%)	142	mm/year											
P-PE (surplus available for runoff from impervious areas)	804	mm/year											

Assume January storage is 100% of Soil Moisture Storage
Soil Moisture Storage 200 mm <-- See "Water Holding Capacity" values in Table 3.1, MOE SWMPDM, 2003

*MOE SWM infiltration calculations

topography - rolling land	0.2	<-- Infiltration Factors from the bottom section of Table 3.1, MOE SWMPDM, 2003
soils - sandy/silty till	0.2	<-- Infiltration Factors from the bottom section of Table 3.1, MOE SWMPDM, 2003
cover - crops	0.1	<-- Infiltration Factors from the bottom section of Table 3.1, MOE SWMPDM, 2003
Infiltration factor	**0.5**	

Latitude of site (or climate station) 43 ° N.

WATER BALANCE CALCULATIONS
127 First Line, Elora
Elora Greens Inc.
Centre Wellington, ON
PROJECT No: 300060179

BURNSIDE

TABLE WB-2

Pre- and Post-Development Monthly Water Balance Components

Based on Thornthwaite's Soil Moisture Balance Approach with a Soil Moisture Retention of 125 mm (Urban Lawns in Sandy/Silty Till)

Climate data from FERGUS SHAND DAM MOE Climate Station (1981 - 2010)

Potential Evapotranspiration Calculation	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**YEAR**
Average Temperature (Degree C)	-7.40	-6.30	-1.90	5.70	12.20	17.50	20.00	19.00	14.90	8.30	2.10	-3.90	**6.7**
Heat index: $i = (t/5)^{1.514}$	0.00	0.00	0.00	1.22	3.86	6.66	8.16	7.55	5.22	2.15	0.27	0.00	**35.1**
Unadjusted Daily Potential Evapotranspiration U (mm)	0.00	0.00	0.00	26.65	59.36	86.76	99.85	94.61	73.26	39.58	9.32	0.00	**489**
Adjusting Factor for U (Latitude 43° 44' N)	0.81	0.82	1.02	1.12	1.26	1.28	1.29	1.2	1.04	0.95	0.81	0.77	
Adjusted Potential Evapotranspiration PET (mm)	0	0	0	30	75	111	129	114	76	38	8	0	**579**
COMPONENTS	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**YEAR**
Precipitation (P)	68	56	60	74	87	84	89	97	93	77	93	69	**945.9**
Potential Evapotranspiration (PET)	0	0	0	30	75	111	129	114	76	38	8	0	**579**
P - PET	68	56	60	44	12	-27	-40	-17	17	40	85	69	**367**
Change in Soil Moisture Storage	0	0	0	0	0	-27	-40	-17	17	40	27	0	**0**
Soil Moisture Storage max 125 mm	125	125	125	125	125	98	58	41	58	98	125	125	
Actual Evapotranspiration (AET)	0	0	0	30	75	111	129	114	76	38	8	0	**579**
Soil Moisture Deficit max 125 mm	0	0	0	0	0	27	67	84	67	27	0	0	
Water Surplus - available for infiltration or runoff	68	56	60	44	12	0	0	0	0	0	58	69	**367**
Potential Infiltration (based on MOE metholodogy*; independent of temperature)	34	28	30	22	6	0	0	0	0	0	29	34	**183**
Potential Direct Surface Water Runoff (independent of temperature)	34	28	30	22	6	0	0	0	0	0	29	34	**183**
IMPERVIOUS AREA WATER SURPLUS													
Precipitation (P)	946	mm/year											
Potential Evaporation (PE) from impervious areas (assume 15%)	142	mm/year											
P-PE (surplus available for runoff from impervious areas)	804	mm/year											

Assume January storage is 100% of Soil Moisture Storage
Soil Moisture Storage 125 mm <-- See "Water Holding Capacity" values in Table 3.1, MOE SWMPDM, 2003

*MOE SWM infiltration calculations

topography - rolling land	0.2	<-- Infiltration Factors from the bottom section of Table 3.1, MOE SWMPDM, 2003
soils - sandy/silty till	0.2	<-- Infiltration Factors from the bottom section of Table 3.1, MOE SWMPDM, 2003
cover - grass	0.1	<-- Infiltration Factors from the bottom section of Table 3.1, MOE SWMPDM, 2003
Infiltration factor	**0.5**	

Latitude of site (or climate station) 43 ° N.

WATER BALANCE CALCULATIONS
127 First Line, Elora
Elora Greens Inc.
Centre Wellington, ON
PROJECT No: 300060179

BURNSIDE

TABLE WB-3

Water Balance - Existing Conditions and Post-Development

Land Use	Approx. Land Area* (m^2)	Estimated Impervious Fraction for Land Use	Estimated Impervious Area (m^2)	Runoff from Impervious Area** (m/a)	Runoff Volume from Impervious Area (m^3/a)	Estimated Pervious Area (m^2)	Runoff from Pervious Area** (m/a)	Runoff Volume from Pervious Area (m^3/a)	Infiltration from Pervious Area** (m/a)	Infiltration Volume from Pervious Area (m^3/a)	Total Runoff Volume (m^3/a)	Total Infiltration Volume (m^3/a)
Exising Land Use												
Agricultural	215,810	0.00	0	0.804	0	215,810	0.183	39,549	0.183	39,549	39,549	39,549
TOTAL PRE-DEVELOPMENT	**215,810**		**0**		**0**	**215,810**		**39,549**		**39,549**	**39,549**	**39,549**
Post-Development Land Use												
Residential	93,270		65,289	0.804	52,493	27,981	0.183	5,128	0.183	5,128	57,621	5,128
Multiple Residential	17,510		12,257	0.804	9,855	5,253	0.183	963	0.183	963	10,817	963
Mixed Use	9,880		6,916	0.804	5,561	2,964	0.183	543	0.183	543	6,104	543
Park	12,870	0.70	9,009	0.804	7,243	3,861	0.183	708	0.183	708	7,951	708
SWM Block	19,920		13,944	0.804	11,211	5,976	0.183	1,095	0.183	1,095	12,306	1,095
Pump Station	2,630		1,841	0.804	1,480	789	0.183	145	0.183	145	1,625	145
ROW	48,740		34,118	0.804	27,431	14,622	0.183	2,680	0.183	2,680	30,111	2,680
Trail	10,570	0.50	5,285	0.804	4,249	5,285	0.183	969	0.183	969	5,218	969
Walkways	420	0.50	210	0.804	169	210	0.183	38	0.183	38	207	38
TOTAL POST-DEVELOPMENT	**215,810**		**148,869**		**119,693**	**46,824**		**12,268**		**12,268**	**131,960**	**12,268**
									% Change from Pre to Post		334	69
									Effect of development (with no mitigation)		3.3 times increase in runoff	69% reduction in infiltration

* areas taken from draft plan, dated March 6, 2026
** figures from Table WB-1 and WB-2.

To balance pre- to post-,
the infiltration target (m^3/a)= **27,282** **m^3/a**

R.J. Burnside & Associates Limited