

**Functional Servicing Report 211 Eliza
Street, Arthur, Ontario**

**Sarah Properties Limited
836 Normandy Drive
Woodstock ON N4T 0E6**



BURNSIDE

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Street, Arthur, Ontario**

**Sarah Properties Limited
836 Normandy Drive
Woodstock ON N4T 0E6**

**R.J. Burnside & Associates Limited
292 Speedvale Avenue West Unit 20
Guelph ON N1H 1C4 CANADA**

**September 2020 (Revised December 2024)
300042585.1000**

Functional Servicing Report 211 Eliza Street, Arthur, Ontario
September 2020 (Revised December 2024)

Distribution List

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Record of Revisions

Revision	Date	Description
0	September 23, 2020	Initial Submission
1	November 23, 2020	Second Submission
2	February 28, 2022	Draft Submission
3	December 19, 2024	Third Submission

R.J. Burnside & Associates Limited

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Services Limited
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1.0 Introduction and Background

R.J. Burnside & Associates Limited (Burnside) has been retained by Sarah Properties Limited to prepare a Functional Servicing Report (FSR) in support of the proposed development at 211 Eliza Street in Arthur, Ontario. This report will support the application for Draft Plan of Subdivision by demonstrating that the subject lands can be provided with municipal servicing in accordance with applicable regulatory requirements and criteria.

A Stormwater Management (SWM) Report has been prepared in December 2024 by Burnside, under a separate cover, and should be reviewed in conjunction with this report.

1.1 Site Description and Context

The site is an 18.46 ha agricultural field located north-east of the Highway 6 and Wellington County Road 109 intersection in the Township of Wellington North. The site is bounded by Eliza Street to the west, a retirement home to the north-west, Eastridge Landing Subdivision (Schmidt Drive) to the north-east, Wellington County Road 109 to the south and an agricultural property to the east. The site is classified as residential (RC1) and is bordered by the Conestogo River on the east and south-west property limits.

Refer to Figure 1 for the location of the site.

1.2 Scope of Work

The following were undertaken to prepare this FSR:

a) Overview of Existing Conditions

- Confirm storm drainage areas from detailed mapping.
- Complete field work to confirm natural features that need to be maintained.
- Prepare a Comprehensive Constraints Map for the development of Draft Plans.
- Coordinate geotechnical analysis for slope stability and erosion hazards of the existing features on the site.

b) Servicing and Grading for the Development

- Identify the water and sanitary servicing requirements for the development area.
- Prepare a functional servicing sewer design to provide water services as well as sanitary and storm services with possible connection points to outlet into the existing surrounding system.
- Prepare preliminary grading of roads, lots and/or blocks to determine impacts and resolution adjacent to environmental features.



KEY MAP OF ONTARIO



Client

SARAH PROPERTIES LIMITED

Figure Title

211 ELIZA DEVELOPMENT
TOWNSHIP OF WELLINGTON NORTH
(ARTHUR ONTARIO)
SITE LOCATION PLAN

Drawn

RS

Scale

N.T.S.

Checked

MB

Date

DECEMBER 2024

Project No.

042585

Figure No.

1

1.3 Background Studies and Documentations

The design concepts presented within this report have been developed to comply with the information contained in the following reports, which were established for this area. These following documents, studies, and reports have been incorporated:

Table 1: Background Studies

Document Title	Prepared By	Date
Class Environmental Assessment Master Plan Study for Water Supply and Sanitary Sewage Systems - Township of Wellington North	Triton Engineering Services Limited	January 2012
Arthur Wastewater Treatment Plant – Class Environmental Assessment – Environmental Study Report	XCG Consultant LTD.	August 17, 2016
Geotechnical Investigation/Slope Stability Proposed Subdivision – 211 Eliza Street, Arthur, Ontario	CMT Engineering Inc.	January 6, 2020, Revised October 17, 2024
Environmental Impact Study	Natural Resource Solution Inc. (NRSI)	2020
Hydrogeological Assessment	R.J. Burnside & Associates Limited	August 2020, Updated November 2024
211 Eliza Subdivision Sanitary & Water Servicing Review 2022 Update Memorandum	Triton Engineering Services Limited	September 12, 2022
Stormwater Management Report	R.J. Burnside & Associates Limited	December 2024

1.4 Existing Site Conditions

The site is primarily an agricultural field that is currently used to farm hay. The Conestogo River (River) borders the site on the east side and flows south crossing under County Road 109. The River then flows west following parallel with Wellington County Road 109 and crosses under the road again ahead of the Wellington County Road 109 / Highway 6 intersection.

The site has a high point (elevation 467.50 m) near the south-east corner, which creates a drainage split across the site. The east portion of the site drains towards the River and the remainder of the site drains south-west and ultimately discharges into the River further downstream.

1.4.1 Soil Conditions

CMT Engineering Inc. (CMT) performed a geotechnical site investigation, in which it is stated that the site is underlain by a variety of soil types including sandy silt, clayey sandy silt, clayey silt and sand. In addition, a slope stability assessment was undertaken by CMT along the east and southwest property limits. The findings of this assessment have been incorporated into the draft plan layout of the site. For additional information, please refer to the Geotechnical Investigation/Slope Stability Assessment by CMT Engineering Inc (Revised 2024).

1.4.2 Groundwater Conditions

A Hydrogeological Assessment has been completed by Burnside and is included under separate cover. As part of the study, four monitoring wells (MW) were installed onsite. These monitoring wells establish the groundwater levels at the installed locations. Data has been gathered from the monitoring wells for over one year and have produced seasonally high groundwater elevations. Table 2 outlines the groundwater levels at each of the MW locations. A figure is included in Appendix A that shows the location of each MW.

Table 2: Seasonally High Groundwater Levels

MW	Seasonally High Groundwater Level (mbgs)
1	2.39
2	3.02
3	1.49
4	0.14

At the location of MW 4, the groundwater is close to the ground surface. Overall, the groundwater elevations are high on the site and has been considered in the design.

1.4.3 Environmental Features

A detailed description of the natural features and functions of the subject property is presented in the Environmental Impact Study by NRSI Natural Resource Solution Inc. (2020), included under separate cover.

1.5 Proposed Site Concept

The development site will include a mixture of 155 single-family detached lots, 44 bungalow townhouses, a 0.5 ha (1.25 ac) block (with 13 to 25 townhouses), a 1.5 ha (3.8 ac) medium density block, a 1.0 ha municipal lands, 0.7 ha undeveloped area, a 0.55 ha (1.631 ac) park block and a 1.08 ha (6.93 ac) commercial block. The proposed commercial block layout will be explored further during Site Plan Application.

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The proposed subdivision will have three entrance connections. The major access road connections will be from Eliza Street on the West side as well as from Wellington County Road 109 on the South-East corner of the development. In addition, a connection will be introduced to the Eastridge Landing Subdivision to the north by connecting to Schmidt Drive. The proposed commercial block will have two additional entrance connections from Wellington County Road 109. The east commercial entrance is proposed just west of the subdivision entrance noted above, and the west commercial entrance is proposed at the south-west corner of the site.

The site will be serviced by watermain as well as storm and sanitary sewers throughout the site, with a connection and discharge point at Eliza Street. Refer to Section 1.6 for the proposed site phasing. Additional utilities like hydro, gas and cable will also be provided from these specific connection points.

Refer to Figure 2 for the Draft Plan.

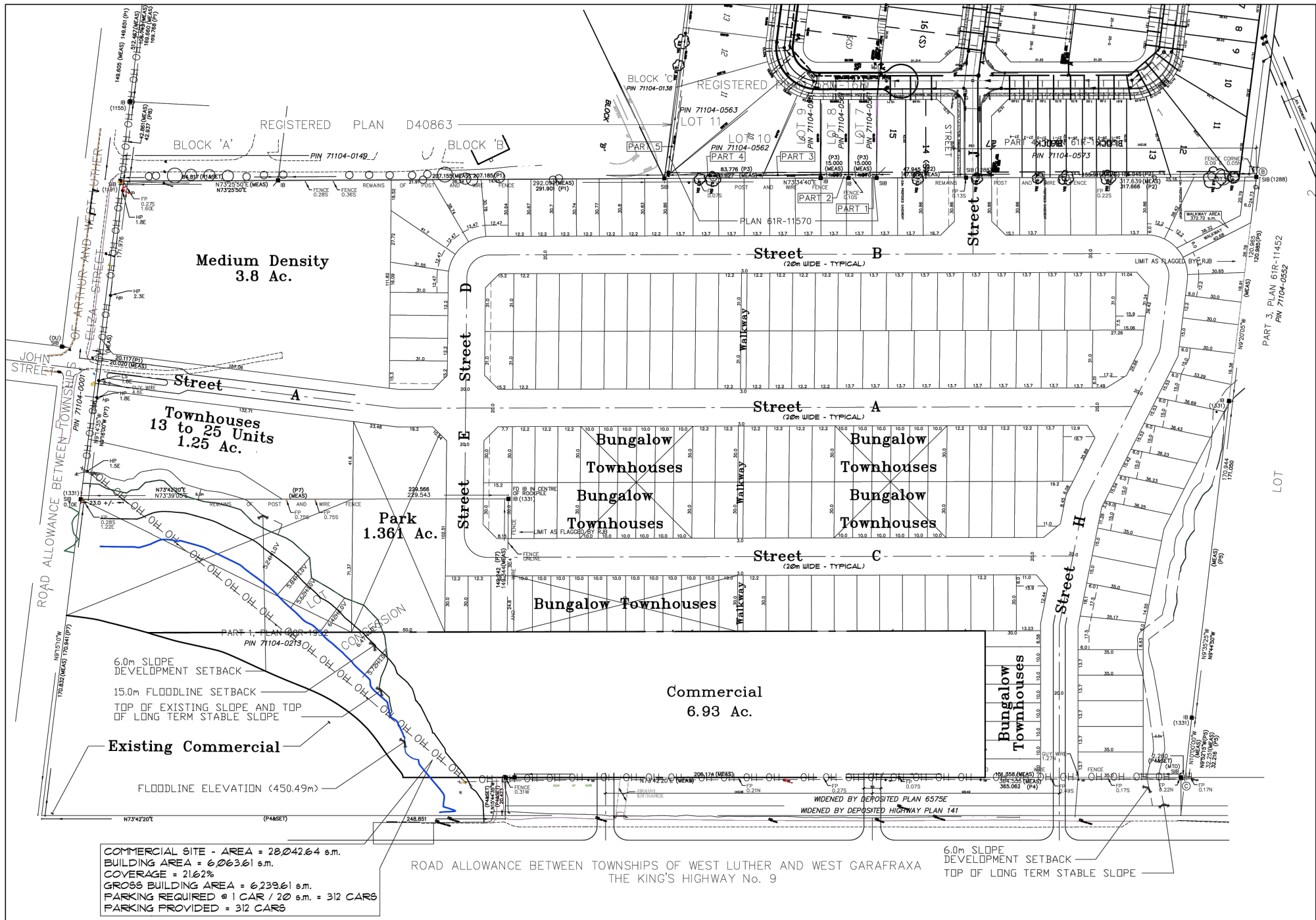
1.6 Proposed Site Phasing

The proposed subdivision will be phased to align with the Township of Wellington North proposed upgrades to the water treatment plant and wastewater treatment plants, as well as improvements to the existing water servicing system provided by Phase 5 of the Eastridge Subdivision, a proposed development neighbouring the site to the north.

A memorandum reviewing the municipal water and sanitary servicing available for the proposed redevelopment was prepared by Triton Engineering Services Limited (Triton) (Updated September 2022) for the Township of Wellington North. The assessment analyzed the required water and sanitary demands for the development based on the previous Draft Plan dated April 2022 with the expected available capacity of the existing water and sanitary servicing capacity. The memo concluded the following:

- **Water Servicing:** The proposed development will have moderate to low pressure and fire flow under the existing water system. The proposed connection through Phase 5 of the neighbourhood Eastridge Subdivision will be required for any significant development to occur to improve available fire flow. The existing water supply system is insufficient to meet the needs of the proposed development. The existing water tower does not provide sufficient storage to service this development.
- **Sanitary Servicing:** The existing sanitary conveyance system does not have sufficient modelled capacity to support the proposed development. The SPS was found to have capacity to support the proposed development. The existing capacity of the wastewater treatment plant (WWTP) is not sufficient to support the development. It was recommended that the development be considered based on the expansion of the WWTP expected to occur by 2025.

For additional information, please refer to the 211 Eliza Subdivision Sanitary & Water Servicing Review Memorandum: 2022 Update provided in Appendix B.

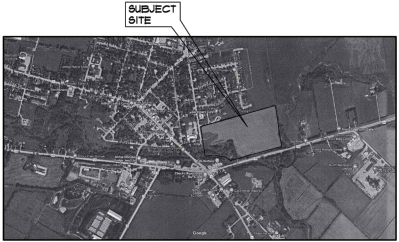


COMMERCIAL SITE - AREA = 28,042.64 s.m.
BUILDING AREA = 6,063.61 s.m.
COVERAGE = 21.62%
GROSS BUILDING AREA = 6,239.61 s.m.
PARKING REQUIRED @ 1 CAR / 20 s.m. = 312 CARS
PARKING PROVIDED = 312 CARS

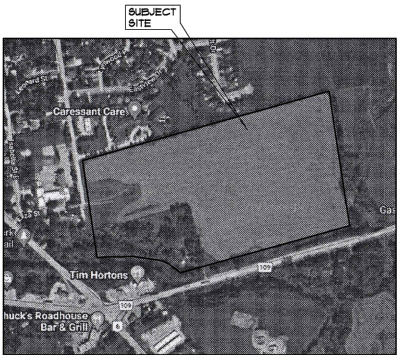
Draft Plan

1 : 1000

GROSS SITE AREA = 184,568.05 s.m. / 45.606 Ac.



Key Map



Google Site Photo

Site Data

GROSS SITE AREA = 184,568.05 s.m.
ROAD ALLOW. AREA = 34,266.75 s.m.
RESIDENTIAL AREA = 98,636.68 s.m.
COMMERCIAL SITE = 28,042.64 s.m.
PARK AREA = 5,507.38 s.m.
PARK AREA = 5.56% OF RESIDENTIAL
WALKWAY = 828.73 s.m.
MUNICIPAL LAND = 10,487.56 s.m.
UNDEVELOPED AREA = 6,738.31 s.m.

NO. SINGLE FAMILY LOTS = 155
NO. OF TOWNHOUSE UNITS = 13 TO 25
NO. OF BUNGALOW TOWNHOUSES = 44
MED. DENSITY RES. SITE = 15,377.56 s.m.

PLAN OF SURVEY OF
PART OF LOT 1
CONCESSION 1
GEOGRAPHIC TOWNSHIP OF WEST LUTHER
NOW IN THE
TOWNSHIP OF WELLINGTON NORTH
COUNTY OF WELLINGTON
SCALE 1 : 1000
METRIC DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND
CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.
BLACK, SHOEMAKER, ROBINSON & DONALDSON LTD.

SURVEYOR'S CERTIFICATE
I CERTIFY THAT:
1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS
ACT, THE SURVEYORS ACT AND THE LAND TITLES ACT AND THE REGULATIONS
MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON JULY 27, 2019.

AUGUST 7, 2019
DATE
RAYMOND J. SIBTHORP
ONTARIO LAND SURVEYOR
BSR&D
ONTARIO LAND SURVEYORS SURVEYING
URBAN & RURAL PLANNERS
237 WOODLAWN ROAD WEST #101, GUELPH, ON N1H 8J1
T: (519) 822-4031 F: (519) 822-1220 www.jrhomes.com
DRAWN BY: RJS CHECKED BY: RJS REFERENCE NO.: 19-14-004-00
FILE: DATED: AUG. 8, 2019

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INFORMATION CONTAINED HEREIN IS THE PROPERTY OF THE COORDINATOR AND
PERSONAL PROFESSIONALS(S) AND MUST NOT BE REPRODUCED TO BENEFIT ANY
OTHER PROJECT.
THE OWNER WARRANTS THAT
SITE PLANS AND CONCEPT PLANS WILL BE VERIFIED BY A SURVEYOR TO
INCLUDE DIMENSIONS, BEARINGS, SET BACKS, AREA CALCULATIONS, GRADES,
E.I.M., EASEMENTS, ELEVATIONS, AND ENCROACHMENTS.
BUILDING FOUNDATION LAYOUT MUST BE VERIFIED BY A SURVEYOR.
PLEASE ASK QUESTIONS IF YOU NEED CLARIFICATION OF INFORMATION FROM
"INSTRUMENTS OF SERVICE".
IT IS THE RESPONSIBILITY OF THE OWNER, VIEWER, TENANT, CONTRACTOR AND
THOSE TO BE FAMILIAR WITH THE PROJECT AS A WHOLE. ALL DISCREPANCIES
AND DIMENSIONAL ERRORS ON THE PLANS AND RELATED DOCUMENTS MUST BE
REPORTED TO THIS OFFICE FOR CONSIDERATION AND CORRECTIVE RE-DESIGN
AND RE-ISSUANCE PRIOR TO THE WORK.

2081788 ONTARIO CORPORATION
2 Prince Edward Road
Woodstock, Ontario N4V 1G7
ATTENTION: Mr. Walter Broos (519) 539-7116

Draft Plan

PROJECT:
PROPOSED RESIDENTIAL
SUBDIVISION
ELIZA STREET

ARTHUR ONTARIO

SHEET TITLE:
DRAFT PLAN

DATE: DEC. 13 / 24 DRAWN: M.S.

DP:1

SHEET No.
SCALE: 1 : 1000 COMP. REF.
/ARTHUR/SITE46A



SARAH PROPERTIES LIMITED

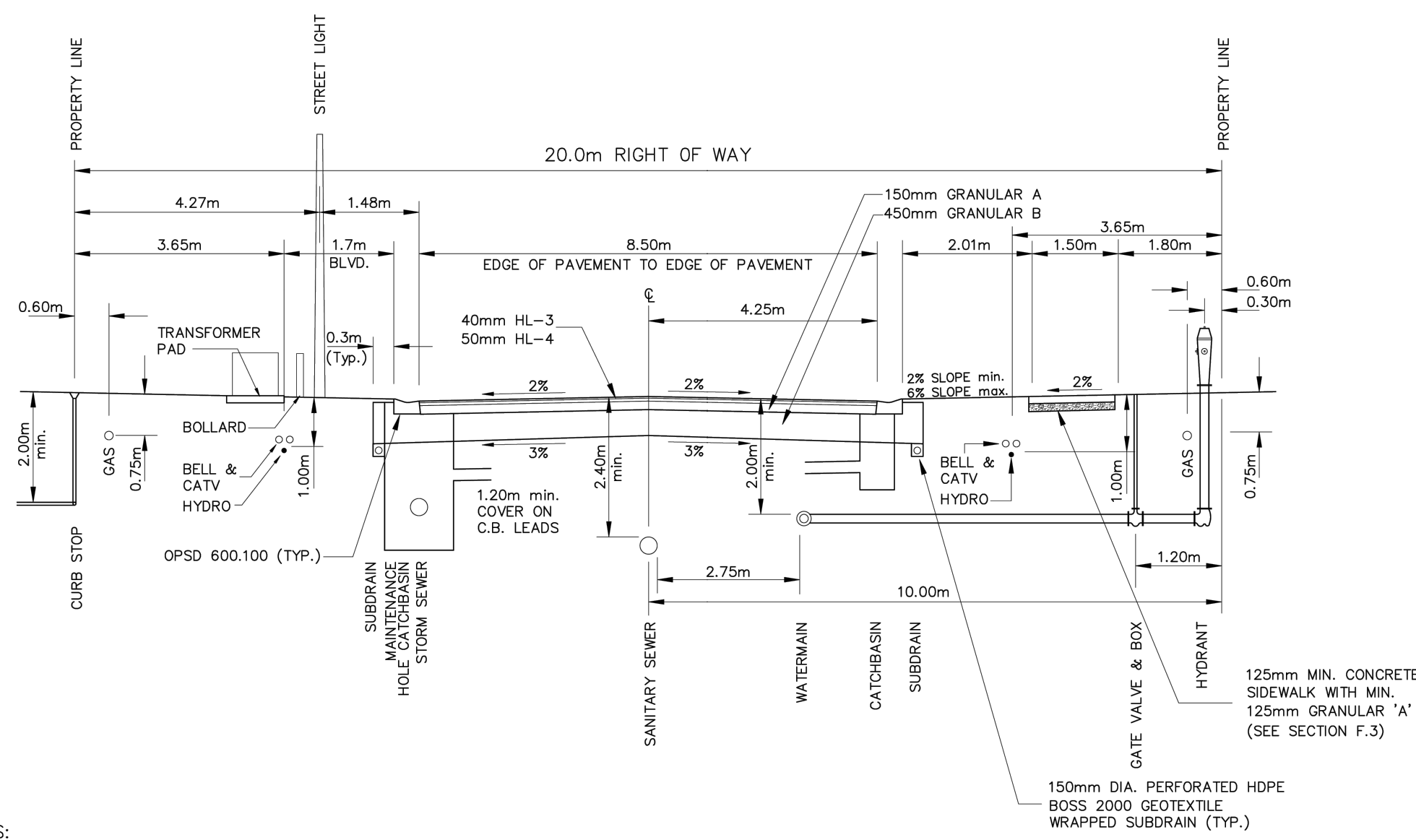
Figure Title
211 ELIZA DEVELOPMENT
TOWNSHIP OF WELLINGTON NORTH
(ARTHUR ONTARIO)
DRAFT PLAN OF SUBDIVISION

Drawn RS Checked MB Date DECEMBER 2024 Figure No. 2
Scale 1:2000 Project No. 042585

2.0 Roadways

2.1 Municipal Rights-of-Way

All Rights-of-Way (ROWs) are based on the Standard Cross Section for Local Street of a 20.0 m ROW by Township of Wellington North, which can be referenced in Figure 3. The 20.0 m ROW will be introduced throughout the entire proposed subdivision, connecting to Eliza Street, Wellington County Road 109 and Schmidt Drive access points.



NOTES:

1. BOLLARDS ARE NOT TYPICALLY REQUIRED, RATHER THEY ARE ASSESSED ON A CASE-BY-CASE BASIS AND AT THE SOLE DISCRETION OF WELLINGTON NORTH POWER INC. AND THE TOWNSHIP.
2. CATCHBASIN LEADS TO HAVE A MINIMUM 1% SLOPE.

TOWNSHIP OF WELLINGTON NORTH	DATE APRIL, 2022	REV. 3
STANDARD CROSS-SECTION LOCAL STREET – 20.0m R.O.W.	STD. R1	



Client

SARAH PROPERTIES LIMITED

Figure Title

211 ELIZA DEVELOPMENT
TOWNSHIP OF WELLINGTON NORTH
(ARTHUR ONTARIO)
PROPOSED TYPICAL ROAD CROSS-SECTION

Drawn
AM

Checked
MB

Date
DECEMBER 2024

Scale
N.T.S.

Project No.
042585

Figure No.

3

3.0 Water Distribution

3.1 Water Design Criteria

The proposed water distribution within the property will be designed and constructed to current Township of Wellington North and Ministry of Environment, Conservation and Parks (MECP) criteria and specifications, which are as follows:

- Greater of maximum Daily Demand plus Fire and Peak Demand Flow.
- Average Day: 350 litres per capita per day.

3.2 Pressure Zone Boundaries

The development site is currently within an moderate to low Pressure Zone, which gives the proposed site access to a water supply at a minimum demanding pressure of 42 psi and fire flow of 78 L/sec. Refer to Appendix B for further clarification from the Township of Wellington North's 211 Eliza Subdivision Sanitary & Water Servicing Review 2024 Update, prepared by Triton Engineering.

3.3 Existing Water Infrastructure

There is an existing 150 mm PVC watermain on Eliza Street that can service the proposed development site. In addition there is a 150 mm PVC watermain at the end of Schmidt Drive (Eastridge Landing Subdivision).

3.4 Proposed Water Distribution Layout

The proposed water supply for the proposed subdivision and commercial development will be delivered by the existing municipal watermain that services the Town of Arthur. The water supply requirement is estimated to be 283.08 m³/day for the Domestic demand and maximum hourly demand flows to be 9.79 l/s. Refer to the Township of Wellington North's 211 Eliza Subdivision Sanitary & Water Servicing Review 2024 Update, prepared by Triton Engineering for more information regarding the existing system and required upgrades in Appendix B, and servicing calculations provided in Appendix C.

The Conceptual Underground Servicing Plan (Drawing CUSP) included in this FSR is a preliminary plan indicating connection points, as well as layout and routing for the proposed watermain. The proposed 150 mm PVC watermain connection will be at Eliza Street, as the residential development builds out, the watermain connection to Schmidt Drive via Street J will complete the watermain loop to the existing infrastructure within the proposed subdivision. A minimum cover of 2.0 m will be ensured for the entire length of water services within the development.

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The existing 150 mm cast iron watermain section on Eliza Street between the retirement home and Eliza Street (going west) is planned to be upgraded to a PVC pipe as per the 2012 Class Environmental Assessment Master Plan Study.

3.5 External Water Distribution Improvements

The December 2024 Triton Servicing memo explores multiple servicing opportunities to improve the external water distribution system. Refer to Appendix B.

4.0 Wastewater Servicing

4.1 Wastewater Design Criteria

The proposed wastewater sewers will be designed and constructed to the current Township of Wellington North and MECP criteria and specifications. The following summary of applicable criteria will be applied in generating the average and peak flows:

- Domestic flow rate: 350 L/capita/day
- Extraneous Flows: 0.15 L/ha.sec
- Peaking Factor: Harmon Formula
- Design Minimum and Maximum:
 - Pipe Diameter: Minimum size for local sanitary sewer is 200 mm
 - Flow Velocity: Max. 3.0 m/s for full pipe, Min. 0.6 m/s

Sanitary Design Sheets will be prepared during detailed designed stage to confirm that the above parameters are within the acceptable limits per the Township's standard and to confirm sizing of the sanitary sewers within the site.

4.2 Existing Wastewater Infrastructure

Currently there is an existing 200 mm asbestos cement sanitary gravity sewer on Eliza Street that flows west towards Isabella Street East.

4.3 Proposed Wastewater Servicing

The proposed subdivision and commercial development will connect and discharge to the existing municipal 200 mm sanitary sewer system located with the Eliza right of way. The expected maximum daily demand is estimated to be 334.25 m³/day and the expected hourly demand is estimated at 15.18 l/s.

The proposed commercial block has an estimate average daily flow of 0.91 l/s based on the MECP standards for general commercial average sanitary flow (28 m³/day/ha). Refer to the Township of Wellington North's 211 Eliza Subdivision Sanitary & Water Servicing Review 2024 Update, prepared by Triton Engineering for more information regarding the existing system and required upgrades in Appendix B, and servicing calculations provided in Appendix C. A 200 mm PVC sanitary gravity pipe system will be introduced throughout the entire proposed subdivision and will outlet into the existing 200 mm sanitary gravity sewer on Eliza Street connecting through the existing maintenance hole. Due to grading restraints on the South-East corner of the development there will be pumped sanitary services required for at least 14 lots, along Street H, to allow the connection into the proposed gravity sanitary sewer network. The proposed commercial block will also be connected into the subdivision sanitary sewer and serviced through an easement connecting the proposed gravity sewer at Street E.

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Refer to the Conceptual Underground Servicing Plan (Drawing CUSP) included in this FSR for reference.

4.4 Downstream Wastewater Improvements in the Future

The capacity of the existing sanitary gravity sewer downstream the development is sufficient in areas and at theoretical capacity in others, as this application progresses, we propose flow monitoring along the sections of Francis Street currently operating at 60% theoretical capacity. The Arthur Wastewater Treatment Plant is currently operating at approximately 92% capacity and will reach a capacity of 157% by 2031 and therefore requires an upgrade as stated within the Arthur WWTP Class EA Environmental Study Report by XCG Consultants LTD. (August 17, 2016). The expansion of the existing Frederic Street Pumping Station in 2021 increased capacity to 110 L/s and has sufficient capacity to service the proposed development and allocated developments discharging through it, as outlined in the Sanitary and Water Servicing Review Memo by Triton (December 2024). A Phase 2 WWTP expansion is planned for the future, though timing is still unknown. The expansion is expected to increase plant capacity by 440 m³/day.

5.0 Utilities

Utilities will be installed in a joint utility trench. Design will be provided by the utility companies. It appears that there are connections for natural gas and electrical supply adjacent to the perimeter of the site. During the detailed design stage, consultation with Union Gas (natural gas) and Wellington North Power Inc. (hydro) will take place to confirm adequate external utility supply.

Hydro Poles along Wellington Road 109 will need to be relocated along the development's frontage due to the extensive regrading required with the tie into Street H.

6.0 Grading and Storm Drainage

6.1 Site Grading

The conceptual site grading design provided in Drawing GRD1 of the FSR has been developed in consideration of the following requirements and constraints and in compliment with the Stormwater Management Report:

- Conformance of the Township of Wellington North grading and drainage criteria.
- Matching of existing boundary grades and street connections (at Eliza Street and Wellington County Road 109).
- Integration of proposed Commercial Block within subdivision development, including access into proposed subdivision as well as entrance from Wellington County Road 109.
- Optimization of earthworks (i.e., minimizing fill).
- Provision for adequate cover on proposed services.
- Conveyance of stormwater within site and minimize external runoff within the next submission.

6.2 Existing Storm Drainage

To calculate runoff volumes and peak drainage flows in the existing condition, the site was divided into four drainage sub-catchments based on the existing contours. Catchment boundaries were delineated using topographic survey information based on topographic surveys completed by Van Harten Surveying Inc. in June 2024 and September 2024. The catchments are described in the table below and further in the Stormwater Management Report (Burnside 2024).

Table 3: Existing Catchments

Catchment ID	Area (ha)	Outlet Location
101	4.53	Roadside ditch along Eliza Street (ultimate outlet: Conestogo River)
102	5.63	Conestogo River
103	3.83	Municipal Ditch North of Wellington 109 Rd (ultimate outlet: Conestogo River)
104	4.47	Conestogo River
Total	18.46	

Under existing conditions, the Site is divided into four drainage areas which drain overland and ultimately outlet to two portions of the Conestogo River. Catchment 101 (4.53 ha) drains west toward a small roadside ditch along Eliza Street. This ditch ultimately drains south toward the portion of the Conestogo River in between Wellington County Road 109 and Highway 6, south-west of the site. Catchment 102 (5.63 ha) drains south and directly outlets to the same portion of the Conestogo River as

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Catchments 101. Catchment 103 (3.83 ha) drains south toward a municipal ditch along Wellington Road 109. The municipal ditch drains west and ultimately outlets to the same portion of the Conestogo River as Catchments 101 and 102. Catchment 104 (4.47 ha) drains east toward the Conestogo River and outlets to the portion of the river before it goes under Wellington County Road 109.

There is an existing 900 mm storm sewer on Eliza Street that drains to the south and discharges into the Conestogo River. This existing sewer is not currently used as a drainage outlet for the existing site.

6.3 Proposed Storm Drainage

The overall existing drainage pattern is maintained under proposed conditions, which is outlined as a design requirement in Section 1.2. The Proposed Site is divided into four sections with four separate outlets.

The proposed drainage areas are summarized in Table 4, refer to accompanying Stormwater Management Report (Burnside 2024).

Table 4: Proposed Site Catchments

Site Area/ Catchment ID	Area (ha)	Outlet #	Outlet Location
201	1.96	1	Existing 900 mm diameter storm sewer and ditch along Eliza Street
202	10.82*	2	Outlet Channel 2
203	1.06	3	Future storm sewer system within ROW of Wellington County Road 109
204	4.57	4	Outlet Channel 4

*Area includes Commercial Block (2.23 ha)

Catchment Area 201 will drain to Outlet 1, is designed to maintain the drainage pattern of existing catchments 101 and 102 and will outlet directly to the portion of the Conestogo River between Wellington County Road 109 and Highway 6. The area includes a medium density and a townhouse block. The runoff for these blocks requires their own block specific quantity and quality control before being released into the proposed storm sewer.

Catchment Area 202, includes the commercial block, will drain to Outlet 2, is designed to maintain the drainage pattern of existing catchment 102 and 103, and will outlet directly to the Conestogo River via a proposed outlet channel. The runoff for the commercial block requires its own block specific quantity and quality control before being release into the proposed outlet channel.

Catchment Area 203 will drain to Outlet 3, incorporating the future urbanization of Wellington County Road 109, and will outlet within the existing municipal ditch at existing bridge. The exact location of the outlet to be coordinated with County of Wellington's proposed upgrades.

Catchment 204 will drain to Outlet 4, is designed to maintain the drainage pattern of existing Catchment 104 and will outlet directly to the section of Conestogo River directly east of the site.

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Refer to the Stormwater Management Report (Burnside 2024) for additional information on proposed quality and quantity controls and how the development will interact with the Conestogo River and the Conceptual Underground Servicing Plan (Drawing CUSP) included in this FSR for reference.

7.0 Erosion and Sediment Control

The erosion and sediment control plan for the site will be developed in accordance with the Town of Arthur, Township of Wellington North and the Grand River Conservation Authority (GRCA) guidelines and best practices. The plan will be completed at detailed design stage prior to the undertaking of any grading activity on site.

Erosion and sediment control will be implemented for all construction activities including topsoil stripping, foundation excavation and stockpiling of material. The following erosion and sediment control measures will be implemented:

- A temporary Silt fence will be installed along the property boundary in all locations where runoff will be discharged from the site to adjacent lands. Double row fencing may be appropriate adjacent to sensitive natural areas. The silt fence will serve to minimize the opportunity for waterborne sediments to be washed on to the adjacent properties. Upon completion of the grading, any area not subject to active construction within 30 days will be topsoiled and hydroseeded as per OPSS 572.
- Inspection and maintenance of all silt fencing will start after installation is complete. The silt fence will be inspected on a weekly basis during active construction or after a rainfall event of 13 mm or greater. Maintenance will be requested to be carried out, within 48 hours, on any part of the silt fence found to need repair. Once catchbasins have been installed, the grates will be wrapped in filter cloth. This will be maintained until all building and landscaping are completed. The LID features and infiltration galleries will be kept "off-line" until construction is complete, and the site is stabilized with vegetation to minimize sediment accumulation within features. Sediment will be prevented from entering the galleries using filter fabric on storm structures and silt fencing. Check dams, etc., for erosion / velocity control will be provided.
- Gravel mud mats will be provided at all construction access points to minimize off-site tracking of sediment.
- Once construction and landscaping have been substantially completed, the silt fence will be removed, any accumulated sediment will be removed, and the landscaping will be completed.

All temporary erosion and sediment control measures will be routinely inspected and repaired if required during construction. Temporary controls will not be removed until the areas they served have been restored and stabilized

All reasonable measures will be shown within an Erosion and Sediment Control Drawing at a later submission to ensure that sediment loading is minimized both during and following construction. Additional details will be provided as part of the detailed design.

8.0 Conclusions and Recommendations

The preceding report provides an investigation of the proposed servicing for the residential and commercial development at 211 Eliza Street in Arthur.

As outlined in the report above, the existing municipal services need to be upgraded to support the full build out of the proposed development. Opportunities to construct the commercial block prior to the rest of the development's construction may be explored; provided capacity in the WTP is allocated and appropriate water supply provided. Stormwater Management has been explored in further detail in the supplementary SWM Report submitted under separate cover and details the outlet and quality controls required to meet GRCA, Township and County requirements. We propose that this report be accepted for review and approval in order to facilitate the Draft Plan of Subdivision approval for the subject property.

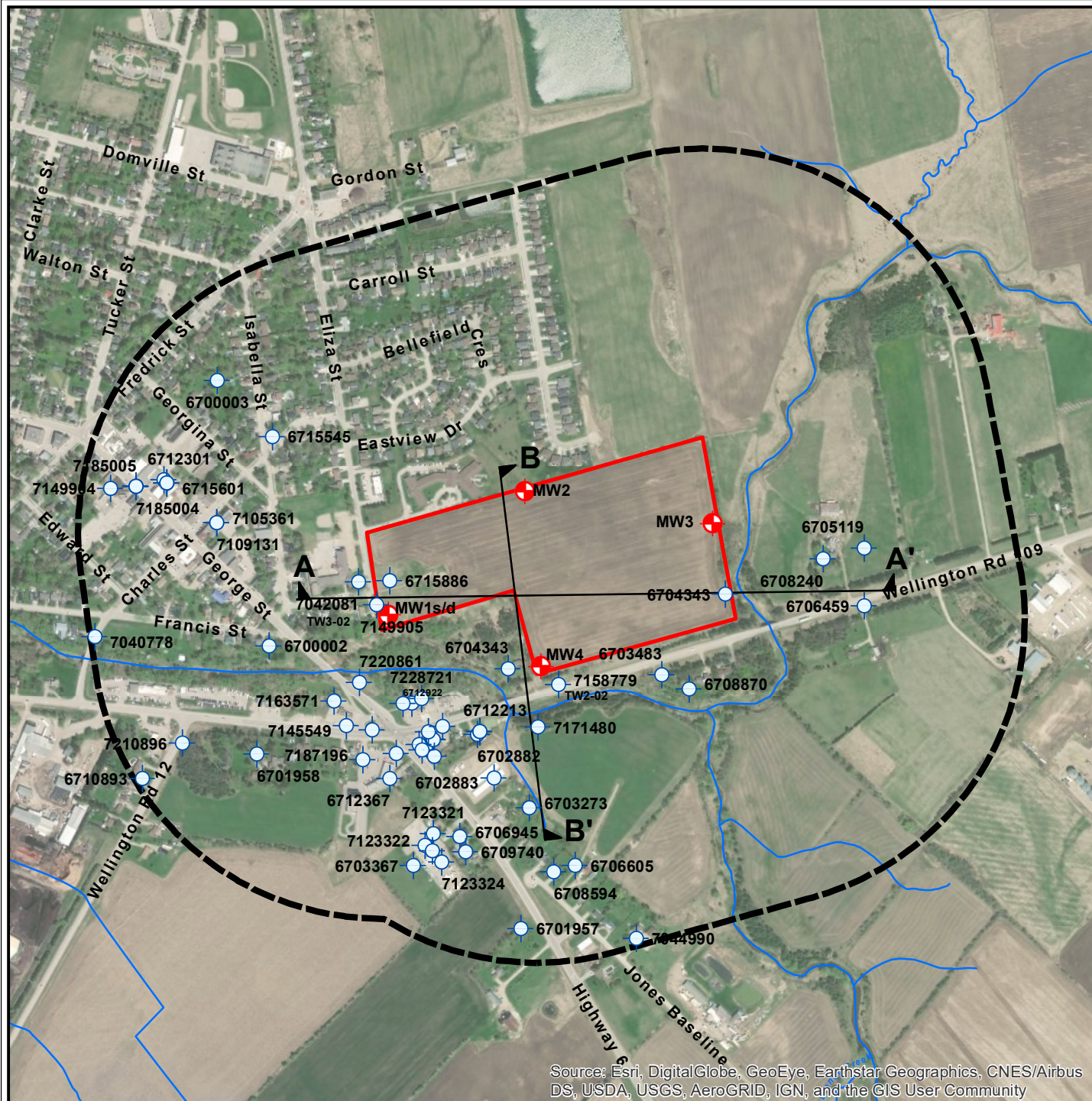


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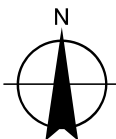
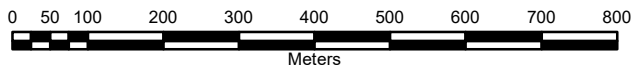
Appendix A

Monitoring Well Locations



LEGEND

- SUBJECT LANDS
- 500m BUFFER
- WATERCOURSE
- ⊕ MONITORING WELL (RJB, 2019)
- ⊕ MECP WELL RECORD LOCATION
- ▲ CROSS-SECTION LOCATION KEY



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Client / Report

**BROOS PROPERTIES
ARTHUR, ONTARIO
HYDROGEOLOGICAL STUDY**

Figure Title:

**BOREHOLE, WELL AND
CROSS-SECTION LOCATIONS**

Drawn	Checked	Date	Figure No.
SK	SC	June 2020	6
Scale		Project No.	
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Appendix B

211 Eliza Subdivision Sanitary & Water Servicing Review Memorandum: 2022 Update

December 2024 Update prepared by Triton
Engineering Services Limited

Memorandum

DATE: September 12, 2022

TO: Tammy Stevenson

FROM: Dustin Lyttle

RE: 211 Eliza Subdivision
Sanitary & Water
Servicing Review
2022 Update

FILE: A5527A

Introduction:

The following is a summary of the Municipal water and sanitary servicing available for the conceptual mixed-use subdivision located at 211 Eliza Street in Arthur (the Subdivision), commonly referred to as "Sarah Properties". This assessment is based on the Draft Plan, attached for reference, dated April 12, 2022 prepared by BSR & D Ltd.

This assessment has examined the expected available capacity of the sanitary sewers downstream of the Subdivision, the available capacity of the Arthur WWTP, and the expected municipal water servicing and supply available to the Subdivision development. The current Draft Plan indicates 174 single lots, 64 townhouse units, a 130-unit high density residential block, and a commercial plaza with a site area of 0.92ha.

Existing System Conditions:

Stage 1 Developments:

Currently, there are 4 residential developments proposed and/or under development within the Community of Arthur that have been allocated Reserve Capacity as listed below:

- Eastridge Landing (Phase 3 & 4) (103 Singles)
- Forest View Estates (10 Singles & 8 Semi's, 8 Townhouse Units & 24 Apartment Units)
- Cachet Development (132 Singles & 64 Townhouse Units)
- Seawaves Homes (37 Townhouse Units)

These developments have been included in the "Stage 1" analysis as discussed within the Township of Wellington North, Arthur Water and Sanitary Systems Technical Study, dated November 2020 (2020 Arthur Technical Study).

Sanitary Servicing:

Sanitary servicing to the Subdivision is available by way of the existing 200mm diameter Asbestos Cement sewer on John Street. Sewage flows from the area are conveyed down Francis Street to the Frederick Street SPS, ultimately being pumped to the Arthur WWTP.

Water Servicing:

Water service to the Subdivision is available by way of the existing 150mm diameter municipal PVC watermain on John Street. An additional water service connection will be available through the neighbouring Eastridge Subdivision (Phase 5), which is assumed to be provided by way of 150mm PVC watermain.

Proposed Conditions:

Development Population:

The most recent Draft Plans for the Subdivision, dated April 12, 2022, indicate that the Subdivision will include 174 single units, 64 townhouses, 130 high-density residential units, and 0.92ha of commercial space.

A single detached unit within a new development is referred to as an “Equivalent Residential Units” (ERU) and is assumed to have an average density of 2.69 people per unit (ppu) based on the 2018 Growth Management Plan. For the purpose of this assessment, townhouses will have a ppu of 2.43 (90% density of ERU), and the high-density residential units will have a ppu of 2.16 (80% density of ERU). This results in the following expected serviced residential populations.

Table 1 – Proposed Units, Densities, and ERU's

Unit Type	Units	ERU Per Unit	PPU	Population
Single Detached	174	1.0	2.69	470
Townhouses	64	0.9	2.43	156
High Density Residential	130	0.8	2.16	281
Commercial Space	0.92ha	-	-	-

Water Servicing:

Estimated Water Demand:

The 2021 Reserve Capacity Calculations (RCC) for Arthur reported an average density of 2.4 people per existing unit resulting in an average day demand (ADD) and maximum day demand of 0.260 and 0.384 m³/capita/day. The MDD of the residential population in the Subdivision has therefore been estimated using the same MDD, assuming the new population will consume the same amount of water as the existing population.

The MDD of the commercial building has been estimated based on the property size of 0.92ha and applying the MECP standard of 28 m³/day/ha produced by institutional or commercial industrial lands.

Table 2 – Expected Water Demands

Component	Population	MDD	
		(L/s)	(m ³ /day)
174 Single Detached Units	470	2.09	180.40
64 Townhouses	156	0.70	60.00
130 High Density Residential Units	281	1.25	107.90
0.92ha Commercial Space	0.92ha	0.30	25.76
Total		4.34	374.06

Given that a new ERU is expected to have a greater density (2.69ppu), the expected MDD of a new ERU will be 1.04m³/day. Therefore, based on the above and the following formula, the proposed Subdivision will consume 360 ERUs of the water system.

$$\frac{374.06\text{m}^3/\text{day}}{1.04\text{m}^3/\text{day}/\text{ERU}} = 360 \text{ ERU}$$

Fire Flows and Pressure:

The system pressure and expected water available for fire fighting purposes has been modelled under three different conditions, each with two scenarios.

The first condition, “Proposed Conditions”, provides the modelling results assuming full build-out of the Subdivision, utilizing the existing water towers and does not consider the impact of other future developments within the community.

The second condition “Proposed Conditions (New Water Tower)” provides the modelling results assuming full-build out of the Subdivision and a new water tower servicing the community that is 10 meters higher than the existing and located in the northeast quadrant of the system, as proposed within the 2020 Arthur Technical Study.

As Arthur continues to grow, the potential impact of developments within the Stage 1 boundary, as outlined in the November 2020 Arthur Technical Study, should be considered. Therefore, we have also examined the “Future Conditions (New Tower)” system with the complete development of areas currently designated as within Stage 1 and the construction of the new higher water tower.

The first scenario (Scenario 1) in each condition provides the modelling results for the Subdivision via the existing 150mm diameter watermain on John Street. The second scenario (Scenario 2) in each condition considers servicing the Subdivision via the watermain on John Street and an additional connection through the Eastridge Subdivision, which is assumed to be 150mm.

Based on the existing topography of the Subdivision site, the highest current elevation is noted as approximately 467.5m however this is for a small area which could likely be eliminated during final grading. Therefore, the highest grade will be assumed as **467.0m** for the assessment of available water service.

Based on the above, the expected typical water pressure and available fire flow for fire fighting purposes at this high point are presented in the following table.

Table 3 – Available Water

Scenario	Proposed Conditions		Proposed Conditions (New Tower)		Future Conditions (New Tower)	
	Operating Pressure (PSI)	Fire Flow* (L/s)	Operating Pressure (PSI)	Fire Flow (L/s)	Operating Pressure (PSI)	Fire Flow (L/s)
Scenario 1	45.1	42.54	56.9	44.50	59.4	53.99
Scenario 2	45.3	85.73	57.1	94.94	59.6	107.22

**Multi-leg Tower included.*

Water Tower Assessment:

The 2021 RCC for Arthur reported that the current water system has an available storage volume of 1,137 m³ which does not include the existing Multi-leg Tower. This structure it is nearing the end of its expected life and is therefore not considered as a reliable source of water storage.

Based on the above, as presented in the 2021 RCC and as per MECP guidelines, the required storage for the existing system is 994 m³ based on the 3-year MDD of 1,531 m³/day and the existing population of 2,323 people, leaving a surplus of 143 m³. However, with the addition of the proposed subdivision (360 ERUs) and those already committed, the Township will require an estimated 1,878 m³ of storage, resulting in a 741 m³ deficit. Surplus supply will address this deficiency to a certain extent, but additional storage should be provided prior to build out of this development.

Water Supply Reserve Capacity:

The 2021 RCC for Arthur reported that the current water system has a firm capacity of 2,255 m³/day and a remaining available capacity of 489 units (509 m³/day). However, since the 2021 RCC has been completed, an additional 60 Units of Allocation has been granted for 2022 and 98 Units in 2023. This results in the current RCC having only 331 ERUs available for development. The proposed development will require 360 ERUs of water supply capacity resulting in a 29-unit deficit.

Sanitary Servicing:

Estimated Sanitary Loading:

The proposed residential portion of the Subdivision is estimated to be equivalent to 907 people. As discussed within the 2021 RCC, new Developments are constructed with improved collection systems resulting in lower expected per person flow rates. Therefore, to account for this, a new residential unit per person flow rate of 0.350m³/day is used. This equates to an expected ADF of 316.51 m³/day being contributed to the system by the residential component of the Subdivision.

The proposed commercial space has an estimated site area of 0.92ha, which yields a commercial ADF of 25.76 m³/day (L/s) based on the MECP standards for general commercial average sanitary flow (28 m³/day/ha).

Table 4 – Expected Wastewater Flows:

Component	Population	ADF	
		(L/s)	(m ³ /day)
174 Single Detached Units ¹	470	1.90	163.91
64 Townhouses ¹	156	0.63	54.64
130 High Density Residential Units ¹	281	1.13	97.97
0.92ha Commercial Space ²	0.92ha	0.30	25.76
Total		3.96	342.27

¹ Calculation accounts for infiltration.

² Peaked Flow

Given that a new ERU is expected to have a greater density (2.69ppu), the expected ADF of a new ERU will be 0.942m³/day Based on the above, the proposed Subdivision will consume approximately 363 ERUs of sanitary treatment capacity.

$$\frac{342.27\text{m}^3/\text{day}}{0.942\text{m}^3/\text{day}/\text{ERU}} = 363 \text{ ERU}$$

Sanitary Conveyance:

The sewers downstream of the proposed Subdivision have been modelled under three different conditions. The existing conditions which indicate the sewers current modelled percent full, the proposed condition which includes the proposed development, and Stage 1 conditions which includes all developments within Stage 1, including this Subdivision.

Under the above noted loadings, which are then peaked using the Harmon Formula as applicable, the existing sanitary sewer system downstream of the area is not expected to have sufficient capacity under either of the proposed conditions.

The analysis of these results is summarized in the table below.

Table 5 – Downstream Sewer Capacity Analysis

	Modelled Percent Full			Sewer Details			
	Existing	Proposed	Stage 1	Length (m)	Slope (%)	Diameter (mm)	Material
MH-163 to MH-164 on John St.	24.9%	114.3%	114.3%	85.6	0.23	200	AC
MH-190 to MH-189 on Francis St.	46.7%	106.9%	114.9%	87.9	0.49	200	PVC
MH-179 to MH-178 on Francis St.	66.2%	135.9%	145.2%	76.5	0.36	200	AC
MH-178 to MH-177 on Francis St.	65.6%	130.6%	139.3%	45.1	0.41	200	AC
MH-177 to MH-176 on Francis St.	65.1%	129.2%	137.8%	36.0	0.42	200	AC
MH-176 to MH-175 on Francis St.	58.2%	115.4%	123.1%	22.9	0.52	200	AC

In addition to the above noted surcharged sewers, there are multiple sections along John Street and Francis Street that are near their capacity.

Fredrick St. SPS Assessment:

The sanitary flows from the proposed Subdivision are conveyed down Francis Street to the Fredrick Street Pumping Station (SPS), which has a rated capacity of 110 L/s after being upgraded in 2021 as recommended in the 2018 Wastewater Treatment Plant Design Brief by CIMA+.

Under existing conditions, the SPS will receive 77.9 L/s of sewage with the addition of the Subdivision. Under Stage 1 conditions, the SPS will receive 74.9 L/s of sewage as the reconstruction of Domville Street will redirect some of the flows being conveyed to the Fredrick SPS. Under both conditions, the SPS has sufficient capacity to service the development.

Sanitary Treatment Reserve Capacity:

The 2021 RCC for Arthur reported that the current sanitary system has a design capacity of 1,860 m³/day following the 2021 expansion. Currently, there are 212 ERUs committed for capacity, and the maximum day flow (3-year average) is 1,293 m³/day (1,372 ERUs). This indicates that the remaining available capacity for Arthur is 391 units (368 m³/day).

However, since the 2021 RCC has been completed, an additional 60 Units of allocation has been granted to the for 2022 and 98 Units in 2023. This results in the current RCC having 233 ERUs available for development.

The proposed development will require 363 ERUs of sanitary treatment capacity resulting in a 130-unit deficit. However, Phase 2 of the WWTP Expansion is expected to increase the plant capacity by 440m³/day (439 ERUs) resulting in a treatment capacity of 2,300m³/day.

Conclusion:

Water Servicing

Based on the above assumptions, the development will have moderate to low pressure and fire flow under existing water system without the addition of a new higher tower and an additional connection through the Eastridge Subdivision. The construction of a new water tower at a higher elevation will improve the pressures and available fire flow. However, the connection through Phase 5 of the Eastridge Subdivision will result in a significant improvement of available fire flows to the development and add redundancy in supply. It should be noted that the additional feed will be required for any significant development to occur on the subject property, however the timing of Phase 5 of the Eastridge Subdivision is not known. The implications of this will need to be discussed further.

The capacity of the existing water supply system is not sufficient to meet the needs of the proposed development. The water system has a remaining capacity of 331 ERUs, and this Subdivision will require 360 ERUs, leaving 29 ERUs of this development unallocated.

Additionally, the existing water tower will not provide enough storage to service this development. It is recommended that details for a new water tower be investigated in order to allow further growth of the community.

Sanitary Servicing

Based on this analysis, the current sanitary conveyance system does not have sufficient modelled capacity to support the proposed Subdivision. The development of the area results in multiple sections of sewer on Francis Street to be surcharged or nearing capacity. It is recommended that a flow monitoring program be implemented to confirm actual flows and determine the need to increase capacity of the system. The SPS however does have capacity to support the development.

Additionally, the current capacity of the treatment plant is not sufficient to support this development. The WWTP has an available capacity of 233 ERUs, and this Subdivision will require 363 ERUs, leaving 130 ERUs shortfall for this development. It is recommended that this development be considered based on the expansion of the WWTP which is expected to occur by 2025, increasing capacity to 2,300 m³/day.

If you have any questions, please feel free to contact us.



Dustin Lyttle, P.Eng

Memorandum

DATE: December 18, 2024

TO: Frank Goulding

FROM: Dustin Lyttle

RE: 211 Eliza Subdivision
Sanitary & Water
Servicing Review
2024 Update

FILE: A5527A

Introduction:

The following serves as an **update** to the previous servicing assessment completed for this property in September 2022 and is a summary of the Municipal water and sanitary servicing available for the conceptual mixed-use subdivision (the Subdivision) located at 211 Eliza St in Arthur.

This assessment is based on the Draft Plan, attached for reference, dated November 3, 2024, prepared by BSR&D Ltd, and has examined the expected available conveyance capacity of the sanitary sewers downstream of the Subdivision, and the expected municipal water servicing and supply available to the Subdivision development. The current Draft Plan indicates 155 single lots, sixty-nine (69) townhouse units (25 Townhouse units and 44 Bungalow Townhouses), a medium density residential site with an area of 1.54 ha and a commercial site with an area of 2.80 ha.

In addition to the above, this review will provide recommendations regarding the road layout and slopes as proposed.

Existing Services:

Sanitary Servicing:

Sanitary servicing to the Subdivision is available by way of the existing 200mm diameter Asbestos Cement (AC) sewer on Eliza St. Sewage flows from the area are conveyed down Francis St to the Frederick St SPS, ultimately being pumped to the Arthur WWTP.

Water Servicing:

Water service to the Subdivision is available by way of the existing 150mm diameter municipal watermain on Eliza St. A second 150mm PVC watermain must be connected through the neighbouring Eastridge Subdivision (Phase 5) which has not yet been constructed.

In addition to the assessment assuming two water service connections from Eliza St and Eastridge, a scenario with a third 150mm diameter municipal PVC watermain connection from Wellington Rd 109 (WR109) was considered.

Proposed Conditions:

Allocated Developments:

Currently, there are seven residential developments proposed and/or in progress within Arthur that have already been allocated Reserve Capacity (Allocated Developments), assigning the required sewage treatment and/or water supply capacity of the municipal infrastructure to the Development.

Within the 2023 Reserve Capacity Calculations (RCC) the following Developments have been granted Allocation.

- Eastridge Landing (Phase 3 & 4) (103 Singles)

- Forest View Estates (10 Singles & 8 Semis, 8 Townhouse Units & 24 Apartment Units)
- Seawaves Homes (37 Townhouse Units)
- D. Martin Development (1 Single)
- Cachet development (197 Singles)
- VED Homes (35 Singles)
- Infill Lots (20 Singles)

The Subdivision Population:

The most recent Draft Plan for the Subdivision indicates a proposed 155 single units, sixty-nine (69) townhouses, a 1.54 ha medium density residential area, and 2.80 ha of commercial space.

A single detached unit within a new development is referred to as an “Equivalent Residential Units” (ERU) and is predicted to have a density of **2.63** people per unit (ppu) by the year 2026, as per the 2024 Growth Management Action Plan. It is estimated that the medium density blocks will have a housing density of thirty-five (35) units per ha. Given the medium residential site is 1.54 ha this will equate to fifty-four (54) units. This results in a total expected 278 units or 731 people for the Subdivision.

Water Servicing:

Estimated Water Demand:

The 2024 RCC for Arthur reports an average density of **2.60** people per existing unit resulting in an average day demand (ADD) and maximum day demand (MDD) of **0.183** and **0.280m³/capita/day**, respectively. The MDD of the residential population in the Subdivision has therefore been estimated using the same per person MDD, assuming the new population will consume the same amount of water as the existing population.

The MDD of the commercial building has been estimated based on the property size of 2.80 ha and applying the MECP standard of 28 m³/day/ha produced by institutional, commercial, or industrial lands and is not peaked.

Table 1 – Expected Water Demands

Component	Population	MDD	
		(L/s)	(m ³ /day)
155 Single Detached Units	408	1.32	114.24
69 Townhouses	181	0.59	50.68
(54 units approx.) Medium Density Residential Space	142	0.46	39.76
2.80ha Commercial Space	2.80ha	0.91	78.40
Total		3.28	283.08

Given that a new ERU is expected to have a density of 2.63 ppu as per the 2024 Growth Management Action plan, the expected MDD of a new ERU will be 0.736m³/day. Therefore, based on the above and the following formula, the proposed Subdivision will consume **385 ERUs** of the water system:

$$\frac{283.08\text{m}^3/\text{day}}{0.736\text{m}^3/\text{day}/\text{ERU}} = 385 \text{ ERU}$$

Fire Flows and Pressure:

The system pressure and expected water available for fire fighting purposes has been modelled under two different conditions, each with two scenarios.

Condition 1 – Existing

The first condition, (Existing Conditions), provides the modelling results assuming full build-out of the Subdivision, utilizing the existing water towers and does not consider the impact of other future developments within the community.

Condition 2 – Allocated & New Water Tower

The second condition (Allocated Condition - New Water Tower) presents the modeling results for the full build-out of developments, including all those that have already been granted allocation. It further assumes a new water tower servicing the community operates at same level as the Spheroid Tower (496.7m) which is 2.0m below the maximum operating level of the potential new water tower. The new tower is expected to be located off the intersection of Well St and Macauley St. This condition assumes the removal of the multi-leg tower from the system, as the tower is approaching the end of its service life and will be decommissioned.

Scenario 1 – Two Water Service Connections

The first scenario (Scenario 1) in each condition provides the modelling results for the Subdivision via the existing 150mm diameter watermain on Eliza St along with one other connection to the Eastridge subdivision via a proposed 150mm diameter watermain.

Scenario 2 – Three Water Service Connections

The second scenario (Scenario 2) in each condition considers servicing the Subdivision via the watermain on Eliza St, the connection to the Eastridge Subdivision and a third additional connection from WR109.

Based on the proposed grading plan provided for the Subdivision, the highest elevation is noted at approximately **467.0m** for the assessment of available water service. Based on this, the expected typical water pressure and available fire flow for fire fighting purposes at this high point are presented in the following table.

Table 2 – Available Water

Scenarios	Condition 1 Existing		Condition 2 Allocated & New Water Tower	
	Operating Pressure (PSI)	Fire Flow* (L/s)	Operating Pressure (PSI)	Fire Flow (L/s)
Scenario 1 – Two Connections	42.4	77.65	41.5	78.28
Scenario 2 – Three Connections	42.5	110.35	41.5	103.02

**Multi-leg Tower included.*

Water Storage and Supply:

The 2024 RCC for Arthur identified a potential deficit is in storage and supply capacity. However, the Township has initiated a Municipal Class EA to examine and establish a water supply and storage approach which is currently underway.

Sanitary Servicing:

Estimated Sanitary Loading:

The proposed residential portion of the Subdivision is estimated to be equivalent to 731 people. As discussed within the 2024 RCC, new Developments are constructed with improved collection systems resulting in lower expected per person flow rates. Therefore, to account for this, a new residential unit per person flow rate of 0.350m³/day is used. This equates to an expected ADF of 255.85m³/day being contributed to the system by the residential component of the Subdivision.

The proposed commercial space has an estimated site area of 2.80ha, which yields a commercial ADF of 78.4 m³/day based on the MECF standards for general commercial average sanitary flow (28 m³/day/ha).

Given that a new ERU is expected to have a density of 2.63 ppu, the expected ADF of a new ERU will be 0.921m³/day. Based on the above, the proposed Subdivision will consume approximately **363 ERUs** of sanitary treatment capacity.

$$\frac{334.25\text{m}^3/\text{day}}{0.921\text{m}^3/\text{day}/\text{ERU}} = 363\text{ERU}$$

Sanitary Conveyance:

A small area near WR109 will integrate a low-pressure sewer (LPS) into the sanitary servicing design to address locations where gravity-based sewage movement is inadequate. Given the elevation differences across the site and the potential challenges in moving sewage, the use of an LPS will be permitted.

The sewers downstream of the Subdivision have been modelled under two different conditions. The existing conditions which indicate the sewers current modelled percent full and the proposed condition which includes the proposed Subdivision. It should be noted that the Developments that have already received Allocation do not contribute to the sewers downstream of the Subdivision.

Under the above noted loadings, which are then peaked using the Harmon Formula as applicable, the existing sanitary sewer system downstream of the area may be surcharged in the Proposed condition. To further examine this, the hydraulic grade line of the sewage is shown in Figures 1 and 2 attached, which highlights that the surcharge is typically only at or slightly above the invert of the sewers.

Table 5 – Downstream Sewer Capacity Analysis

Pipe Section	Modelled Percent Full		Sewer Details			
	Existing (No subdivision)	Proposed (Subdivision)	Length (m)	Slope (%)	Diameter (mm)	Material
MH-163 to MH-164 on John St.	20.5%	62.3%	62.2	0.48	200	AC
MH-190 to MH-189 on Francis St.	43.1%	90.1%	87.9	0.49	200	PVC
MH-179 to MH-178 on Francis St.	60.8%	115.4%	76.5	0.36	200	AC
MH-178 to MH-177 on Francis St.	59.8%	110.8%	45.1	0.41	200	AC
MH-177 to MH-176 on Francis St.	59.4%	109.6%	36.0	0.42	200	AC
MH-176 to MH-175 on Francis St.	53.1%	97.9%	22.9	0.52	200	AC

Frederick St. SPS Assessment:

The sanitary flows from the proposed Subdivision are conveyed down Francis St to the Frederick St Pumping Station (SPS), which has a rated capacity of 110 L/s after being upgraded in 2021 as recommended in the 2018 Wastewater Treatment Plant Design Brief by CIMA+.

Considering the Subdivision and Allocated Developments, the SPS is expected to receive less than 100L/s sewage indicating that the SPS has sufficient capacity to service the Subdivision.

Sanitary Treatment Reserve Capacity:

Arthur is currently under a sewage treatment allocation freeze for all types of developments as defined in the Sewage Allocation Policy. This freeze will remain in effect until the Phase 2 expansion project has been tendered and awarded, though the timing for this project is still unknown. Developers must apply for sewage allocation for Council's consideration and approval in accordance with the Sewage Allocation Policy.

Phase 2 of the WWTP Expansion is expected to increase the plant capacity by 440m³/day (467 ERUs) resulting in a treatment capacity of 2,300m³/day.

Conclusion:

Water Servicing

Based on the above assumptions, the development will have moderate to low pressure and fire flow available. To provide the minimum allowable pressures and fire flows a watermain connection through Phase 5 of the Eastridge Subdivision must be established. The developers' engineer will need to review the above and determine if the available fire flow as modelled is sufficient without the third watermain connection through Wellington Road 109 (WR109).

Sanitary Servicing

The Subdivision results in sections of sewer on Francis St approaching or exceeding full capacity. However, sewers can typically accommodate moderate surcharge without inundating services to homes or businesses, as reflected in the profile in Figure 2. Based on this analysis, the current sanitary conveyance system is expected to have sufficient capacity to support the Subdivision.

Despite the forgoing, a flow monitoring program is required and must be implemented to confirm actual flows, assessing the need to increase capacity of the system. The Developer will be responsible for funding this study that will be managed by the Municipality. Therefore, a flow monitoring study to evaluate the capacity along Francis St is required to confirm sufficient sewer system capacity to support the Subdivision. The study will need to examine the inflow and infiltration during the spring melt (i.e., March to June) to provide insight into the actual condition of flows along Francis St. The details and implementation of program are to be discussed further.

Road Layout

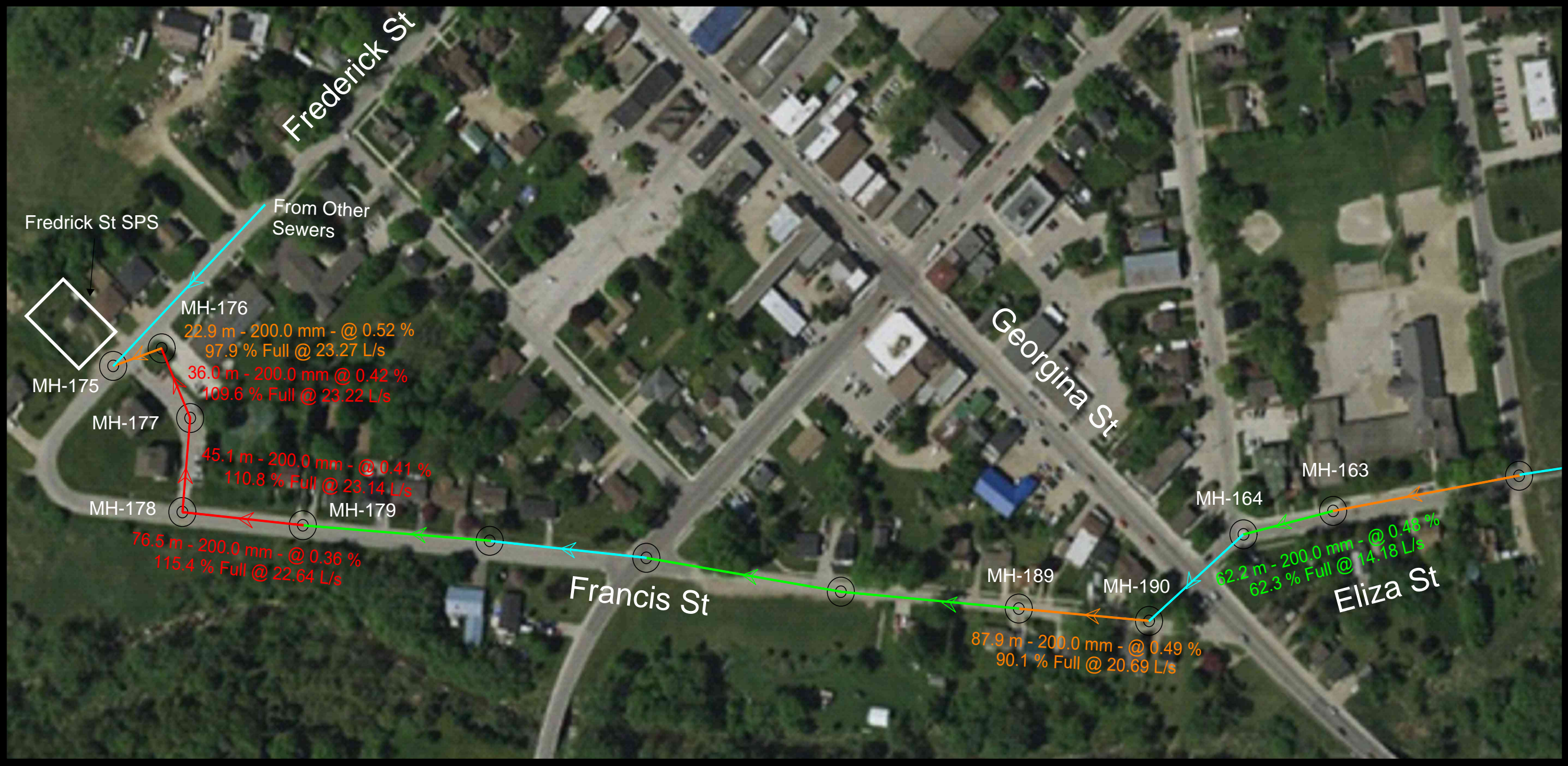
The access road to the site via WR109 is permitted to have a maximum slope of 8% as per the Geometric Design Guide for Canadian Roads (GDG), however a stopping platform (<4%) is to be provided for a minimum of 20m from the stop bar at the WR109 intersection. The County of Wellington may have additional requirements for the connection to WR109.

Additionally, an internal road connection to the Commercial Block is required, as previously discussed and shown in the Draft Plan of subdivision, dated January 7, 2024, attached for reference.

The multiple entrances proposed onto WR109 including the two (2) for the Commercial Block and one (1) for the internal Subdivision connection, will be commented on by the County.

If you have any questions, please feel free to contact us.

Figure 1



Legend

Conduit Percent Full (%)

- <= 50.0
- <= 75.0
- <= 105.0
- <= 200.0

Length - Diameter - Slope
Percent Full - Flow

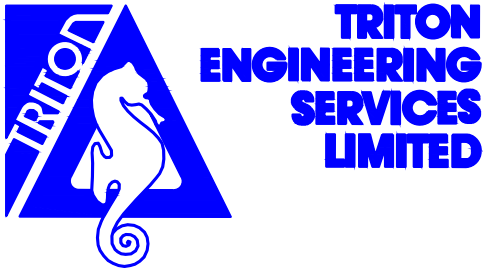
Notes:

1. Pipe lengths are not to scale.
2. Sanitary service location of the subject site has been assumed.

Proposed Condition
Sanitary Sewer Network Plan
View

Sewer Capacity Analysis for New Mixed-Use Development
Municipal Servicing Assessment - Sanitary Sewer Assessment

211 ELIZA STREET, ARTHUR, ONTARIO



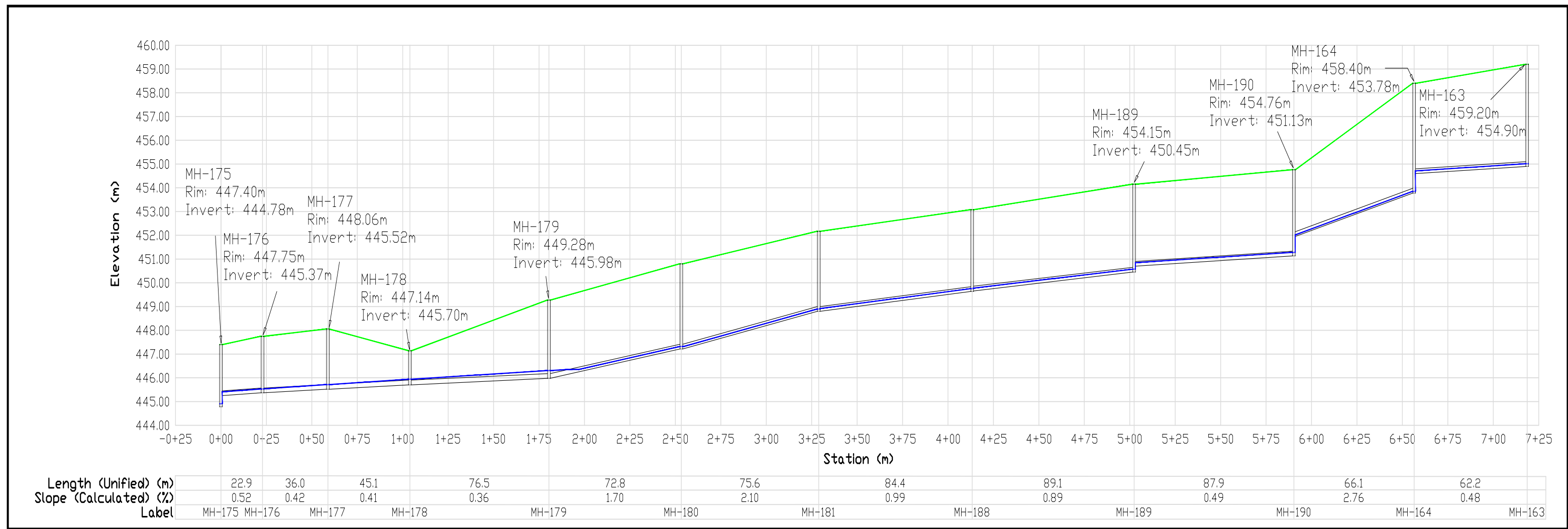
Legend

HGL
Ground Level

Notes:

1. Ground level is approximated.

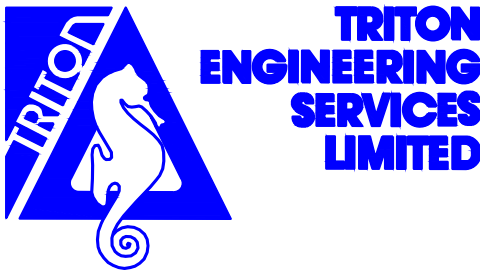
Figure 2

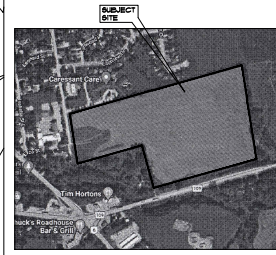
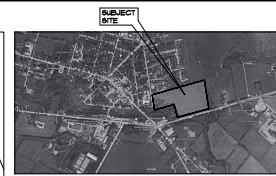
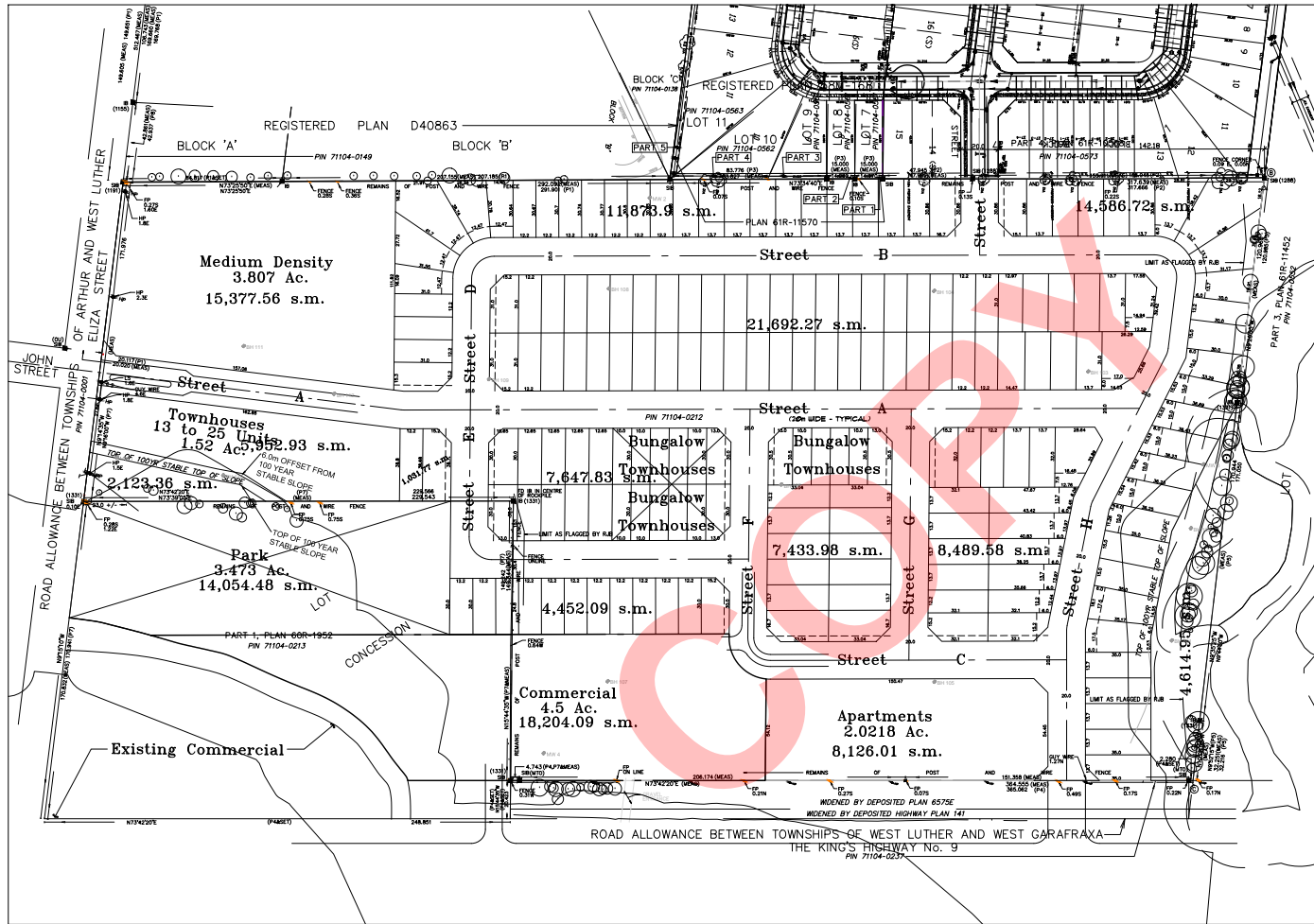


Proposed Condition
Sanitary Sewer Network Profile
View

Sewer Capacity Analysis for New Mixed-Use Development
Municipal Servicing Assessment - Sanitary Sewer Assessment

211 ELIZA STREET, ARTHUR, ONTARIO





Site Data

GROSS SITE AREA = 18,456.05 a.m.
ROAD ALLOW AREA = 39,938.3 a.m.
RESIDENTIAL AREA = 105,632.81 a.m.
COMMERCIAL SITE = 18,204.09 a.m.
PARK AREA = 14,054.48 a.m.
PARK AREA = 13.31% OF RESIDENTIAL
UNDEVELOPED AREA = 6,138.31 a.m.
NO. SINGLE FAMILY LOTS = 164
NO. OF TOWNHOUSE UNITS = 13 TO 25
NO. OF BUNGALOW TOWNHOUSES = 18
APARTMENT SITE = 8,126.01 a.m.
MED. DENSITY RES. SITE = 15,317.56 a.m.

PLAN OF SURVEY OF
PART OF LOT 1
CONCESSION 1
GEOGRAPHIC TOWNSHIP OF WEST LUTHER
NOW IN THE
TOWNSHIP OF WELLINGTON NORTH
COUNTY OF WELLINGTON
SCALE 1 : 1000

METRIC: DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND
CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.
BLACK, SHOEMAKER, ROBINSON & DONALDSON LTD.

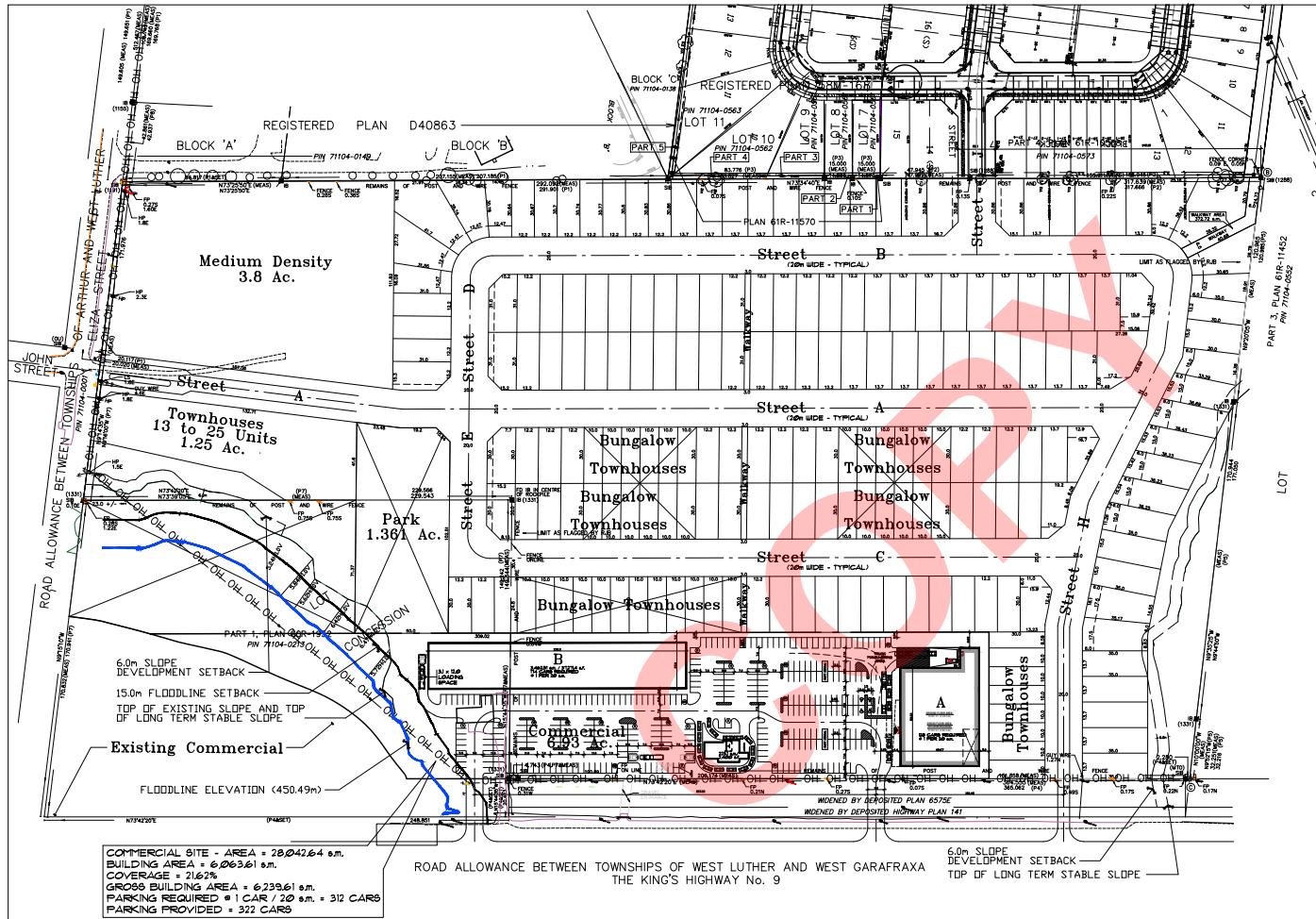
SURVEYOR'S CERTIFICATE
I CERTIFY THAT
1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS
ACT, THE SURVEYORS ACT AND THE LAND TITLES ACT AND THE REGULATIONS
MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON JULY 27, 2018.

AUGUST 7, 2018
DATE

RAYMOND J. SHERIDAN
ONTOARIO LAND SURVEYOR

BSRD
257 WILSON AVENUE WEST, SUITE 100, GUELPH, ON N1H 1K1
(519) 835-4441 • (519) 835-4442 • www.bsrd.com

DRAWN BY: RJS	CHECKED BY: RJS	REFERENCE NO: 18-14-004-00
TITLE:	D	



Draft Plan

1 : 1000

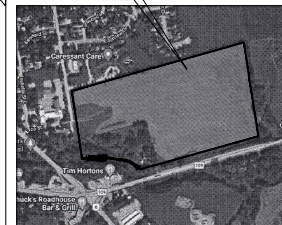


Page 9 of 9

GROSS SITE AREA = 184,568.05 s.m. / 45,606 Ac.



Key Map



Google Site Photo

Site Data

GROSS SITE AREA = 184,568.05 s.m.
ROAD ALLOW. AREA = 34,266.15 s.m.
RESIDENTIAL AREA = 98,696.68 s.m.
COMMERCIAL SITE = 28,042.64 s.m.
PARK AREA = 5,507.38 s.m.
WALKWAY = 1,222.13 s.m.
MUNICIPAL LAND = 10,487.56 s.m.
UNDEVELOPED AREA = 6,739.31 s.m.

NO. SINGLE FAMILY LOTS = 155
NO. OF TOWNHOUSE UNITS = 13 TO 25
NO. OF BUNGALOW TOWNHOUSES = 44
MED. DENSITY RES. SITE = 15,311.56 s.m.

PLAN OF SURVEY OF
PART OF LOT 1
CONCESSION 1
GEOGRAPHIC TOWNSHIP OF WEST LUTHER
TOWNSHIP OF WELLINGTON NORTH
COUNTY OF WELLINGTON
SCALE 1 : 1000

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

BLACK, SHOEMAKER, ROBINSON & DONALDSON LTD.
SURVEYOR'S CERTIFICATE

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON JULY 27, 2019.

AUGUST 7, 2019
DATE

RAYMOND J. SHIBOROV
ONARIO LAND SURVEYOR



DRAWN BY: RJS CHECKED BY: RJS REFERENCE NO.: 19-14-004-00
FILE: DATED: AUG. 6, 2019

THIS PLAN AND RELATED DOCUMENTS ARE PREPARED BY OR FOR THE SURVEYOR'S OFFICE AND ARE NOT TO BE USED FOR ANY OTHER PURPOSE.
THE OWNER HEREBY WARRANTS THAT THE PLAN AND RELATED DOCUMENTS ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE REGULATIONS MADE UNDER THEM.
THE SURVEYOR'S OFFICE DOES NOT GUARANTEE THE ACCURACY OF THE INFORMATION PROVIDED IN THIS PLAN AND RELATED DOCUMENTS.
THE SURVEYOR'S OFFICE DOES NOT GUARANTEE THE ACCURACY OF THE INFORMATION PROVIDED IN THIS PLAN AND RELATED DOCUMENTS.
THE SURVEYOR'S OFFICE DOES NOT GUARANTEE THE ACCURACY OF THE INFORMATION PROVIDED IN THIS PLAN AND RELATED DOCUMENTS.

2081788 ONTARIO CORPORATION
2 Prince Edward Road
Westborough, Ontario N4V 1G7
ATTENTION: Mr. Walter Broos (519) 539-7116

Draft Plan



PROJECT:
PROPOSED RESIDENTIAL
SUBDIVISION
ELIZA STREET

ARTHUR ONTARIO

SHEET TITLE:
DRAFT PLAN

DATE: NOV. 3 / 24 DRAWN: M.B.

DP:1

SHEET No.: 1 : 1000 COMP. REF.: /ARTHUR/SITE45A



BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix C

Servicing Calculations

Project:
211 Eliza Development
 Arthur, ON
 Sanitary Servicing Calculations

Prepared by: FG
 Checked by: FG
 Project No: 300053741
 Date: 24/12/19

Proposed Site Flows (Street A)
Residential

Type	Quantity	P/Unit	Population
Medium Density	54	2.63	142
Single/Semi Detached	224	2.63	589
Total	224		731

Daily Design Flows = 350 L/cap/day Wellington North Standards
 Population, P = 731

Peaking Factor, M = 3.88 $M = 1 + \frac{14}{4 + P^{0.5}}$

Peak Flow, Q = 11.50 L/s $Q = \frac{P \times Q \times M}{86400} + (A \times I)$

Infiltration

Infiltration Allowance= 0.15 L/s/ha
 Site Area = 18.46 ha
 $Q_{\text{infiltration}} = 2.77$ L/s

Commercial

Daily Design Flows= 28 cu.m/day/ha
 Area = 2.80 ha
 Peaking Factor, M = 1.00
 $Q_{\text{commercial}} = 0.91$ L/s

$Q_{\text{proposed total}} = 15.18$ L/s

Service Connection					
Diameter (mm)	Slope (%)	Full Flow Velocity (m/s)	Capacity (L/s)	Spare Capacity (L/s)	Percent Full (%)
200	0.50	0.74	23.19	8.01	65.45%



Project:
211 Eliza Development
Arthur, ON
Water Demand Calculations

Prepared by: FG
 Checked by: FG
 Project No: 300053741
 Date: 24/12/19

I. Fire Flow Calculation

*Based on Fire Underwriters Survey

Row Townhouses

Table 8: Simplified Method for One and Two Family Dwellings Exceeding 450 sq.m, and Row Housing Exposure distances

Exposure Distances	Suggested Fire Flow (L/min)	
	Wood Frame	Masonry
< 3m	12000	9000
3 to 10m	8000	8000
10.1 to 30m	6000	6000
> 30m	4000	4000

$$F = 9,000.00 \text{ L/min}$$

$$F = 150.00 \text{ L/s}$$

$$F = 2378 \text{ US GPM}$$

$$\text{Fire Flow Required} = 150.00 \text{ L/s}$$

$$\text{Fire Flow Required} = 9,000 \text{ L/min} \quad 2,378 \text{ US GPM}$$

II. Domestic Flow Calculations

Type	Quantity	P/Unit	Population
Medium Density	54	2.63	142
Single/Semi Detached	224	2.63	589
Total	224		731

$$\text{Average Day Demand} = 350 \text{ L/cap/day}$$

$$= 3.0 \text{ L/s}$$

$$= 47 \text{ US GPM}$$

$$\text{Commercial Average Day Demand} = 28 \text{ cu.m/day/ha}$$

$$2.80 \text{ ha}$$

$$0.91 \text{ L/s}$$

$$14 \text{ US GPM}$$

$$\text{Max. Daily Demand Peaking Factor} = 2.12$$

$$\text{Max. Daily Demand} = 7.19 \text{ L/s} \quad (\text{Max Commercial Peaking Factor } 1.0)$$

$$= 114 \text{ US GPM}$$

or

$$\text{Max. Hourly Demand Peaking Factor} = 3.00$$

$$\text{Max. Hourly Demand} = 9.79 \text{ L/s} \quad (\text{Max Commercial Peaking Factor } 1.0)$$

$$= 155 \text{ US GPM}$$

$$\text{Domestic Flow} = 9.79 \text{ L/s} \quad 155 \text{ US GPM}$$

$$\text{Peak Domestic Flow} = 9.79 \text{ L/s}$$

$$\text{Fire Flow} = 150.00 \text{ L/s}$$

$$\text{Max Day Domestic + Fire Demand} = 157.19 \text{ L/s}$$

$$9431.18 \text{ L/min}$$



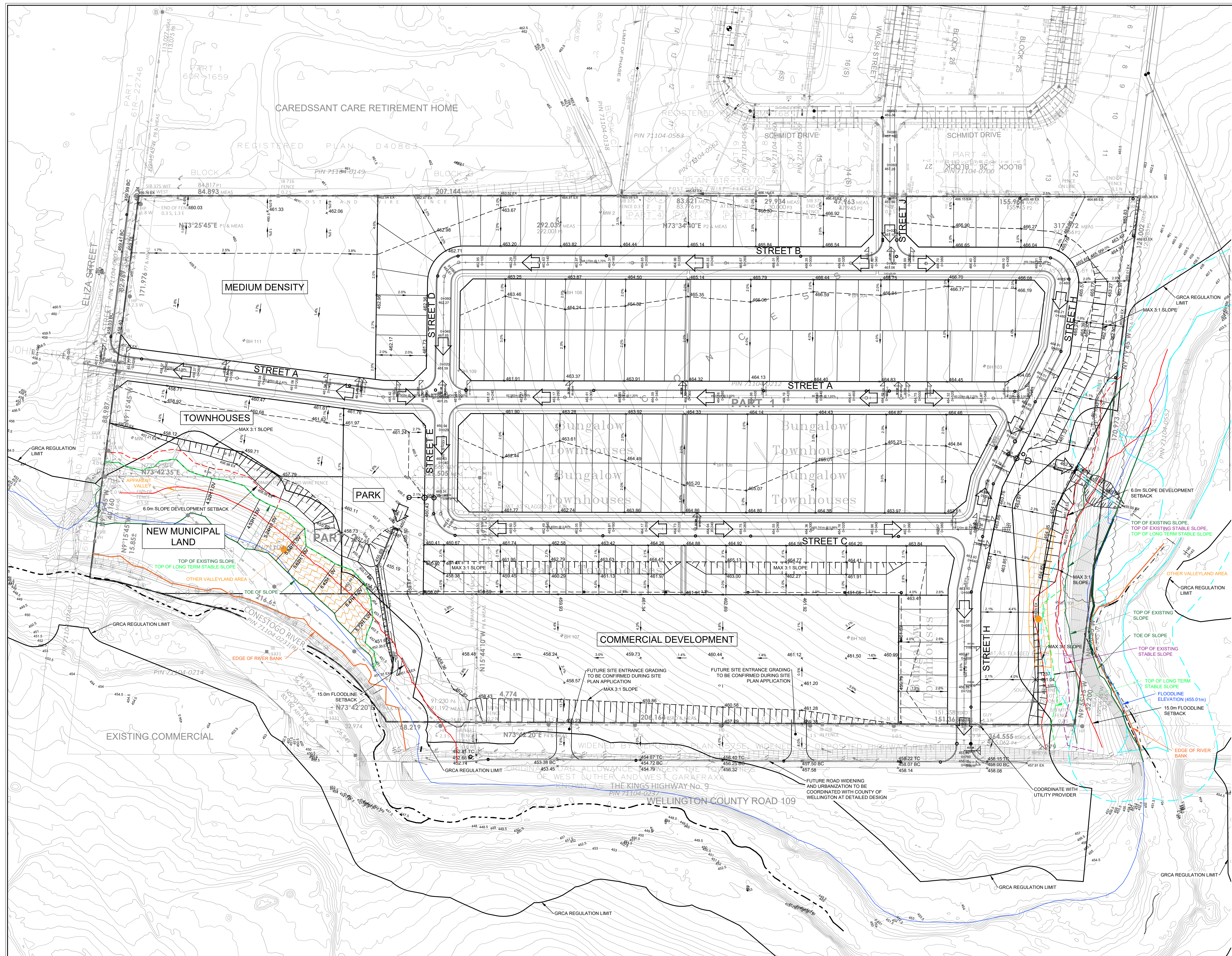
BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]



Drawings





BENCHMARKS:

ELEVATIONS OBTAINED BY VAN HARTEN SURVEYING INC. ARE BASED ON GNSS OBSERVATIONS FROM PERMANENT REFERENCE STATIONS IN NAD83 (CSRS-2010) COORDINATE SYSTEM, WITH HEIGHTS CONVERTED TO ORTHOMETRIC ELEVATIONS ON THE CGVD28 DATUM (1978 ADJUSTMENT) WITH GEOID MODEL HTV2.0, AS SUPPLIED BY NATURAL RESOURCES CANADA.







SITE BM1: NAIL IN HYDRO POLE POINT No. 1001; ELEV 460.07

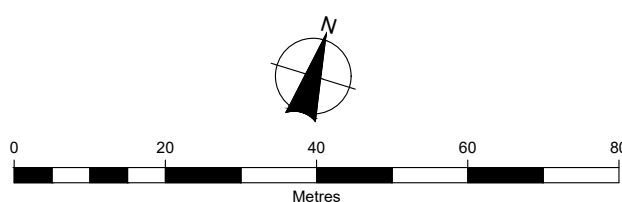
SITE BM2: NAIL IN HYDRO POLE POINT No. 1003; ELEV 458.31

NOTES:

1. TOPOGRAPHIC AND EXISTING FEATURES SURVEY COMPLETED BY VAN HARTEN SURVEYING INC. ON JUNE 13, 2024. ADDITIONAL TOPOGRAPHIC SURVEY OF THE EAST SLOPE AND CONESTOGO RIVER COMPLETED BY VAN HARTEN SURVEYING INC. ON SEPTEMBER 25, 2024. UPDATED LEGAL SURVEY AND OVERHEAD UTILITIES COMPLETED BY VAN HARTEN SURVEYING INC. ON OCTOBER 25, 2024.
2. TOPOGRAPHIC LIDAR DATA 1m CONTOURS FROM GRCA SCRAPED JANUARY 6, 2019 USED FOR EXTERNAL AREAS.
3. DRAFT PLAN RECEIVED DECEMBER 12, 2024.
4. EXISTING MUNICIPAL INFRASTRUCTURE AND LINEWORK OF ELIZA STREET (JOHN ST.) OBTAINED FROM TOWNSHIP OF WELLINGTON NORTH AND A PROFILE DRAWING M6358 - DWG 01, RECEIVED ON 2019-01-25.
5. ELEVATIONS AND LINEWORK OF WALSH STREET OBTAINED FROM KIL BEHN & ASSOCIATES WALSH STREET PLAN & PROFILE DRAWING 070119 - PP.3, RECEIVED 2022-04-21.

LEGEND

-  EDGE OF RIVERBANK
-  TOP/TOE OF EXISTING SLOPE
- TOP OF EXISTING STABLE SLOPE
-  TOP OF LONG TERM STABLE SLOPE
- 6.0 m SLOPE DEVELOPMENT SETBACK
-  FLOODLINE LIMIT
-  GRAND RIVER CREDIT AUTHORITY (GRCA) REGULATION LIMIT
- 15.0 m FLOODLINE SETBACK
-  OTHER VALLEYLAND



Client

SARAH PROPERTIES LIMITED

Figure Title

211 ELIZA DEVELOPMENT
TOWNSHIP OF WELLINGTON NORTH
(ARTHUR, ONTARIO)
PRELIMINARY GRADING PLAN

Drawn

AM

Date

DECEN

Project N	
-----------	--

Figure No.

21

GF

