Preliminary Servicing Report

556 and 576 Conservation Drive
City of Waterloo

Revised November 2023

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Project No.: 1279

November 21, 2023

GSP Group
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Attention: Ms. Kristen Barisdale MCIP RPP
Associate, Senior Planner

Dear Ms. Barisdale,

Re: Preliminary Servicing Report
556 and 576 Conservation Drive
City of Waterloo

Please find our revised Preliminary Servicing Report for the above-noted project, in support of Draft Plan Approval.

Our servicing report identifies constraints for environmental issues, sanitary sewerage, water supply, and storm drainage/stormwater management. Our report also considers grading constraints, transportation, and utility availability. Where necessary, reasonable assumptions based on normal industry practices have been used and are described as such.

It is our opinion that adequate services exist to support this project. Recommendations from our report shall be incorporated into the detailed design phase of the project, following approval of the draft plan.

Yours very truly,

MERITECH ENGINEERING

Stefan Van Hartingsveldt, C.E.T.
Project Lead

LICENSED PROFESSIONAL ENGINEER
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100147133
11/21/2023
PROVINCE OF ONTARIO

Chris H. Togeretz, P.Eng.
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STV/cht
Enclosures (2)

cc Nicole Cook, 2115881 Ontario Limited
Brad Trussler, Mattamy Development Corporation

Executive Summary

The proposed 29-hectare residential development is located on the north side of Conservation Drive at the northern terminus of Beaver Creek Road in Waterloo. It is bordered by residential, agricultural, and recreational lands. The site will be developed for single-family and multi-family units with a school parcel, park block, open spaces, and a stormwater management facility. The development is being processed through the Draft Plan of Subdivision process with the City of Waterloo and the Region of Waterloo.

Modified 18-meter and 20-meter municipal cross-sections are proposed, with sanitary and storm sewers, a third pipe "clean water collector", watermain, and other utilities. The sanitary sewer is proposed to be moved off the centreline of the road and a clean water collector pipe has been added to the typical cross-sections. Sidewalk is proposed on both sides of all streets.

Sanitary sewers for the development will discharge into the proposed infrastructure in Conservation Drive and Beaver Creek Road, and then to the proposed Beaver Creek Sanitary Pumping Station north of the Laurel Creek Reservoir. A 250mm sanitary sewer will be required downstream of the development to accommodate the calculated peak flow of 33 L/s. Sanitary connections shall be provided to each lot and connect to the proposed sewer. The "Brohman" lands to the northwest have been accounted for using a gravity connection installed as low as required. This requirement necessitated a routing of the sanitary sewer through the proposed park.

The City has proposed to provide 300mm diameter watermains in Conservation Drive and Beaver Creek Road adjacent to the subject lands. These mains will provide additional flows to the proposed subdivision. The proposed watermain is a combination of 150mm, 200mm, and 300mm watermain. This provides adequate flow and pressure for firefighting supply in accordance with the Ontario Building Code and FUS.

Storm drainage is divided into east and west catchments in accordance with the North Waterloo Scoped Subwatershed Study. The west catchment discharges to the on-site stormwater management facility and is attenuated for quantity control and quality control. The east side discharges off-site for quality enhancement without quantity controls.

For the subject lands, a 1050mm diameter storm sewer with a peak flow of 1.9 m^3/sec is to be incorporated in the Beaver Creek Road storm sewer sizing. Storm connections shall be provided to each lot for sump pumps and roof leaders and connect to the third-pipe "clean water connector" sewer which infiltrates these clean flows within the road right of ways.

Further refinement of the design in collaboration with the School Board is required to confirm servicing requirements to the school site. The school design should incorporate the conclusions and recommendations stemming from this report.

Enova Power (formerly Waterloo North Hydro) and Bell Canada have confirmed services in the vicinity. It is expected that Rogers also has service but have not responded to requests. Union Gas (now Enbridge) will need to extend mains to service the development and will be coordinated through the detailed design phase and reconstruction of Beaver Creek Road and Conservation Drive.

Approval agencies shall review and approve this document as a suitable approach to a preliminary design configuration and Draft Plan approval.

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For Further Information

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Introduction

The proposed 29 hectare subdivision is located on Conservation Drive in Waterloo, Ontario as shown in Figure 1. The site is bordered by existing residential lands to the east, agricultural lands to the north, Beaver Creek to the west, agricultural lands to the south on the west side of Beaver Creek Road, and the Green Acre Park campground to the south-east.

The site is an irregularly shaped parcel. It is currently used as agricultural lands, and two homes were previously located on the site (now since demolished). The drainage is split; with roughly half of the site going west to Beaver Creek and the remainder draining to the south-east corner of the site where it drains towards Green Acre Park and eventually to the Laurel Creek Reservoir.

The development, as shown on the Draft Plan of Subdivision in Appendix A, is composed of a mix of low density residential, medium density townhomes, a block reserved for a school, a stormwater management block, a park, and open space.

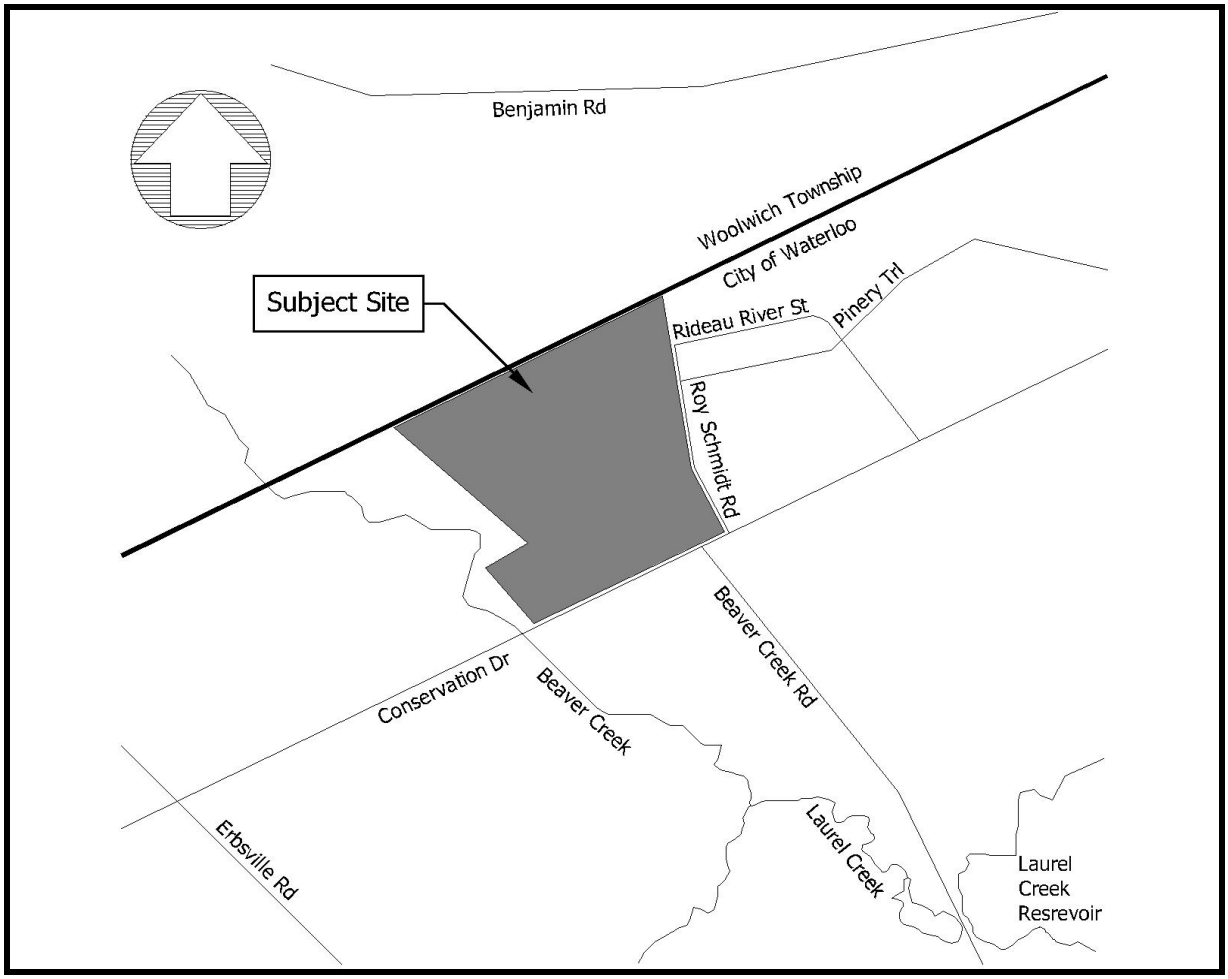


Figure 1: Subdivision Location

Approach

The following flowchart explains a typical submission and approval process. The section highlighted in grey indicates the status of this circulation:

Step One
Feasibility of the Development
This circulation establishes the framework for the project and provides a direction for how the site is to develop. This report shows the proposed development is suitable for the proposed zoning and is able to be serviced with standard municipal services.

⇩

Step Two
Preliminary Design
This circulation describes how the plan satisfies the objectives for the site, confirms spatial relationships of the plan within the confines of the site, and provides recommendations to be implemented in the detailed design. For subdivisions, Draft Plan approval is contingent upon approval of the Preliminary Design.

⇩

Step Three
Detailed Design or Final Design
This circulation integrates the recommendations of the preliminary design into the final site engineering. Approval of this report allows for construction of the proposed development.

Figure 2: Approach Flowchart

Policy Framework

This chapter outlines the framework upon which the plan is built upon. Previous studies, municipal and provincial standards, as well as any field investigations undertaken to support the project, are examples of information described in this chapter. This background information is then used to build an appropriate plan for the site. The next chapter, Objectives and Targets, describes the site-specific requirements noted from the following sources:

Planning Documents

City of Waterloo Official Plan, October 2012
The subject lands are designated Low Density Residential with a future node shown at the intersection of Conservation Drive and Beaver Creek Road.

City of Waterloo Zoning By-law, September 2018
The subject lands are currently zoned Agricultural.

City of Waterloo Transportation Master Plan, IBI Group, April 2011
Conservation Drive is a "Major Collector"; Pinery Trail and Beaver Creek Road are "Minor Collector". Neither Conservation Drive nor Beaver Creek Road are included on exhibit 10.1 – "Recommended Road Network Capacity Enhancements" for the next 20+ years.

Beaver Creek Meadows District Plan, January 8, 2015
The Beaver Creek Meadows District Plan was approved by council on January 25, 2016. It provides detail regarding the design and development of the community. The site is shown as a mix of low density residential, medium density residential, and an elementary school site and is anticipated to be part of the initial phase of development of the community district.

Watershed Plans

Laurel Creek Watershed Study, 1993
This document analyses various elements of the watershed, notably the hydrology and the response to the creek during various rainfall events and recommendations to mitigate flooding. The subject site is within catchments 301 and 310.

North Waterloo Scoped Subwatershed Study, 2013
This document, hereafter referred to as the "NWSSS", provides technical information to assist in the development of a District Plan, the completion of Class Environmental Assessment processes, and the design of subdivisions.

Stormwater Management Studies

Meritech Engineering submitted a Preliminary Stormwater Management Report in July 2016 to accompany the first Draft Plan application. The report presents the proposed stormwater

management approach for the western half of the subject site. The report has since been updated (herein) and is being re-submitted as part of the complete submission package.

The "Developer Group" representing the active developers in the Beaver Creek Meadows District Plan Area (BCM-DPA) have commissioned a stormwater management study for the area, including the east half of the subject site.

MOE Guidelines

Stormwater Management Planning and Design Manual, Ministry of the Environment, 2003
This manual provides guidelines on the planning and design of stormwater management facilities in Ontario.

Draft Low Impact Development (LID) Stormwater Management Guidance V. 1, 2022
This manual provides guidance on the planning of stormwater management LID technologies in Ontario. Although it is currently in a draft, it has been reviewed and referenced in order to provide a forward-looking design.

Regional Guidelines and Studies

Region of Waterloo and Area Municipalities Design Guidelines and Supplemental Specifications for Municipal Services Guidelines (DGSSMS)
The design portion of this annually-updated document (Part B) provides the local municipalities' design preferences under normal circumstances. These guidelines are read together with other applicable Municipal guidelines and standards.

Waterloo Pressure Zones 4 and 5 Consolidation, ongoing
This study is intended to refine the recommendations of the Class EA study for Beaver Creek Road and Conservation Drive (see below) in conjunction with the City of Waterloo's Water Distribution Master Plan (2017).

Municipal Guidelines

City of Waterloo Development Engineering Manual, 2013
This manual provides design guidelines for servicing and grading of subdivisions. It also includes a list of coefficients to be used in modelling of synthetic design storms.

Stormwater Management Master Plan (SWM-MP) Municipal Class Environmental Assessment, City of Waterloo, 2019
This manual provides design guidelines for stormwater management within the City of Waterloo.

Aesthetic Principles for Storm Water Management, City of Waterloo, 1996
In accordance with accepted practice throughout the Region of Waterloo, this document describes the preferred features to be incorporated into stormwater management facilities in order to achieve aesthetic and functional objectives.

Conservation Authority Guidelines

Greater Golden Horseshoe Area Conservation Authority Erosion & Siltation Control Guideline for Urban Construction, December 2019
This document describes the methodology for determining the erosion potential of a site and the measures that should be undertaken to mitigate construction disturbance.

Environmental Studies

Beaver Creek Road and Conservation Drive Upgrades and Extension of Municipal Service Class Environmental Assessment, Stantec Consulting Ltd., December 14, 2015
This Class EA study assessed options for core infrastructure associated with upgrades to Beaver Creek Road and Conservation Drive. Preferred options were presented for water supply, storm and sanitary system, and transportation upgrades for the Beaver Creek Meadows District Plan Area.

As part of the project team for the subject lands, Natural Resource Solutions Inc. (NRSI) have prepared a Scoped Environmental Study to accompany the application. Recommendations from this report guide the site servicing, grading, and stormwater management.

Geotechnical Studies

A geotechnical investigation was prepared by LVM in 2015. The results of this investigation helped in the formulation of a suitable servicing and grading approach for the subject lands.

Hydrogeological Studies

Hydrogeological investigations and monitoring of the site were carried out within the NWSSS, and this report makes reference to those findings and recommendations.

An additional hydrogeological study was prepared by Stantec in December 2021 to support the current application. Further site investigation was undertaken and recommendations were made to direct the stormwater management approach summarized in this report.

Transportation Studies

The Conservation Drive and Beaver Creek Class EA document guides the general framework for the reconstruction of Conservation Drive and Beaver Creek Road. The study provided recommendations for both vehicular transportation along with active transportation networks.

In support of the 2016 Draft Plan application, Salvini Consulting prepared an "Intersection Operations Assessment Study"; the general approach that was presented in this study has been maintained through the various minor incremental changes to the Draft Plan. Most recently, additional information regarding the planned active transportation elements of the

Draft Plan and the transportation planning considerations for development of the planned school block have been provided.

GSP Group have prepared an Active Transportation Plan showing the on-street and off-street trails, sidewalks, and cycling lanes.

Noise Studies

Meritech Engineering has previously prepared a Preliminary Noise Assessment under separate cover to accompany the Draft Plan application. This report guides grading and placement of noise attenuation features due to noise arising from traffic on Conservation Drive.

Pre-Consultation

Pre-Submission Comments from the Grand River Conservation Authority dated September 14, 2015 have been included in Appendix E of the Preliminary Stormwater Management Report. Key items from these comments are included in the following chapter 'Objectives and Criteria'.

Reconnaissance

Meritech staff visited the site on November 17, 2015 in order to verify existing drainage patterns of the site and adjacent properties, to confirm existing infrastructure surrounding the site, and to make note of all aboveground features on neighbouring properties. See Figure 3 for existing conditions photographs.

Review Comments

Comments have been received from the following sources in response to the most recent submission dated September/October 2022, as well as from previous submission. Relevant components related to Meritech's responses have been incorporated into the revised reports.

- City of Waterloo comments dated January 19, 2021 and February 3, 2021
- Grand River Conservation Authority (GRCA) comments dated July 8, 2021
- GRCA comments dated November 18, 2022
- City of Waterloo comments dated March 3, 2023



Looking South from NE corner



Looking East across site



Looking North along Roy Schmidt



Looking SE across site



Looking South across East side of site



Looking West along North PL

Figure 3: Existing Condition Photographs

Objectives and Criteria

This section outlines the objectives and criteria for the wide variety of issues considered in this report; the subsequent Discussion section will demonstrate how the objectives presented in this section have been achieved and how the criteria are met.

Sanitary Servicing

The primary objective with respect to sanitary servicing is that a sanitary sewer system servicing the site can be constructed as per MECP, Region of Waterloo (SSMS), and City of Waterloo standards.

The development will outlet into proposed infrastructure in Conservation Drive and Beaver Creek Road and then to the proposed Beaver Creek Sanitary Pumping Station just north of the Laurel Creek Reservoir. These works are ongoing as part of the implementation phase of the Beaver Creek Road and Conservation Drive Upgrades and Extension of Municipal Services Class Environmental Assessment. Flow rates from the subject site will be provided to ensure capacity in the proposed infrastructure.

Water Servicing

There are two objectives regarding water servicing: provide domestic water supply as per Provincial, Regional, and City requirements, and ensure that an adequate fire-fighting water supply is available as per Ontario Building Code and other Regional requirements (FUS).

An existing 300mm diameter watermain stub exists in Conservation Drive just east of Beaver Creek Road, and an existing 200mm diameter watermain is looped through Pinery Trail and Rideau River Drive. In the *Beaver Creek Road and Conservation Drive Upgrades and Extension of Municipal Services Class Environmental Assessment,* it is proposed to provide a 300mm diameter watermain in Conservation Drive and Beaver Creek Road adjacent to the subject lands, sometime in the future.

In the absence of any final recommendations from the Region of Waterloo regarding consolidated pressure zones in this part of the City of Waterloo, for the current purposes the water supply on site has been modeled on the assumption that the future watermain extension on Beaver Creek Road is not yet complete. The modelling has been completed using an extension of the 300mm diameter watermain in Conservation Drive into the site and looped to a connection to the 200mm diameter watermain in Pinery Trail.

The Region of Waterloo has provided pressure information for proposed junctions JCT_MTC_01 and JCT_MTC_03 located on the proposed loop through the site from Conservation Drive to Pinery Trail, in zone WAT 4C. They also provided the information for proposed junction JCT_39019, located at the corner of Conservation Drive and Beaver Creek Road, which includes future watermains looped through Beaver Creek Road, Conservation Drive and Erbsville Road, in zone WAT 5. This information is used later in this report to analyse the water distribution system and show that proposed internal water system is able to provide fire protection as per OBC and FUS guidelines. It is anticipated that a future

model, which will include a connection between the two zones, will be developed when boundary pressure/flow information is available from the Region of Waterloo.

Storm Servicing

The primary objective with respect to storm servicing is that a storm sewer system servicing the site can be constructed as per Ministry of the Environment, Conservation and Parks (MECP), Region of Waterloo (SSMS), and City of Waterloo standards.

The development has been discretized and has two primary outlets, as per the North Waterloo Scoped Subwatershed Study (NWSSS). The west side of the site outlets to a proposed stormwater management block included within the subject site. The east side of the site outlets to proposed infrastructure south of the intersection of Conservation Drive and Beaver Creek Road. The receiving storm sewer on Beaver Creek Road shall be sized to convey peak flow rates generated from the subject site.

On-site stormwater management features are to be reviewed in conjunction with the storm servicing. Clean roof runoff from the majority of the subdivision will be directed into a proposed clean water collector (CWC) "third-pipe" system. This clean runoff will be infiltrated. Overflows are to be provided to the storm sewer system.

Stormwater Management

Stormwater techniques have evolved considerably in the past decades, in that peak flow control is not the only component of a complete stormwater management solution. In accordance with Section 5.2.1 of the MOE manual and the NWSSS, modern techniques include a 'treatment-train' approach of lot-level controls, water balance and infiltration, and water quality enhancement.

In accordance with the NWSSS the following objectives were established for areas within the study area:

- Maintain, and where possible, enhance the hydrologic inputs to Beaver Creek and wetland communities to minimize the influence of development
- Maintain and protect hydrologic functions
- Ensure no impairment of water quality leaving Beaver Creek, Laurel Creek, and Laurel reservoir
- Ensure no significant increase in erosion potential occurs in Beaver Creek or at discharge points from the development area

It should be noted that the subject site is divided into two main catchments of the NWSSS. The western half discharges to Beaver Creek while the eastern half discharges to the south, towards the Laurel Creek Reservoir. The focus of stormwater management in this report is the western half of the site; the eastern half of the site is being accommodated for in an off-site facility. Notwithstanding, some of the lot level control applies to both halves, and includes:

- Utilize the treatment train approach
- Maintain peak flows towards Beaver Creek at or below existing levels for all storms up to and including the Regional storm event
- Provide enhanced water quality control towards Beaver Creek including extended detention storage
- Implement thermal mitigation measures for stormwater discharge to Beaver Creek
- Provide quality control for flows from the east half of the site (discharging to Laurel Creek Reservoir as opposed to Beaver Creek)

Grading and Drainage

Grading of the development site has been determined by a number of factors including:

- Dividing the site drainage between the storm sewer outlets (Beaver Creek to the west; and Conservation Drive to the south)
- Directing overland flows to the respective stormwater management facility
- The location of the stormwater management facility and the elevation of its outlet
- Matching existing or proposed elevations at proposed intersections
- Matching elevations along neighboring properties
- Providing sufficient cover on watermain and sewers
- Conforming to a typical road cross-section and typical lot grading requirements
- Minimizing earthmoving costs

Transportation

The road network proposed on the Draft Plan is to meet the principles of the Beaver Creek Meadows District Plan and the standards of the City of Waterloo as "complete streets".

Utilities

The following utility companies are required to confirm their ability to service the development and have been circulated.

- Canada Post
- Enova Power (formerly Waterloo North Hydro)
- Bell Canada
- Rogers Cable
- Enbridge (formerly Union Gas)

Discussion

Subdivision Design

A mixture of uses are proposed for the development (refer to the proposed Draft Plan, which currently is comprised of single detached lots, street townhouses, back-to-back townhouses, future development blocks, and a school site. Besides the requirement for municipal rights of way, the current plan also includes a park, open space, and a stormwater management block.

Modified 18-meter and 20-meter standard municipal cross-sections are proposed, with sanitary, storm, and CWC sewers; watermain; and other utilities in standard locations as required by the City. The proposed road cross-sections can be seen in Appendix B. The sanitary sewer is proposed to be moved off the centreline and a clean water collector (CWC) pipe added to the section through the majority of the site. Sidewalk is proposed on both sides of all streets and a multi-use trail is proposed along the west side of Esker Lake Road up to Pinery Trail. Bike lanes are proposed on Esker Lake Road.

Staging of the development, as shown on the Draft Plan, considers the logical extension of services and road connections. Two 9-metre wide access points to the adjacent Brohman lands to the northwest are included within Phase 2 of the Draft Plan.

As a result of the comments received from the City, a Fence Layout Plan that indicates the location of all the temporary and permanent fencing required on site, is attached in Appendix D. This plan is in accordance with the Blanding's Turtle Mitigation Plan and shows the 1.5 m black vinyl chain-link fence on all public-private interfaces.

Sanitary Servicing

The preferred option for sanitary servicing, as established by the Beaver Creek Road and Conservation Drive Upgrades and Extension of Municipal Services Class Environmental Assessment, is to provide a single sewer outlet into proposed infrastructure in Conservation Drive and Beaver Creek Road that will flow to the proposed Beaver Creek Sanitary Pumping Station north of the Laurel Creek Reservoir.

A small portion of the site at the north-east corner is intended to connect to an existing sewer on Rideau River Street, based on topography and proposed grading.

The Brohman lands to the north-west have been included in the sanitary design as these external lands are intended to drain through the subject site.

Based on the unit counts provided in the Draft Plan, peak flows have been estimated by applying peaking factors to the average day demands shown in Table 1. The flows were calculated based on areas shown on the proposed Draft Plan and combined to provide a total peak flow. Population densities are provided in the City of Waterloo Development Manual. A conservative Harmon peaking factor of 4 is used at this preliminary phase.

As shown below, the proposed 3.21 ha school site yields a design flow of 0.80 L/s using a demand of 0.25 (L/s)/ha as per the DGSSMS. In order to verify this design flow is adequate, the MOE's estimate (Design Guidelines for Sewage Works and Design Guidelines for Drinking-Water Systems, both 2008) of 70-140 L/d per student over eight hours multiplied by an estimated student population of more than 500 results in a non-peaked design flow of 1.2 L/s – 2.4 L/s, and the peaking factor is assumed to be 2.0.

Unit Type	Flow	Area (ha)	Units	Peak Flow (L/s)
Institutional	0.25 (L/s)/ha	3.21	-	~1.6 to ~4.8
Residential	275 (L/cap)/day			
Singles		7.98	260 x 3.3ppu	10.5
Towns/Multi Blocks		4.38	349 x 2.18ppu	9.4
Brohman		2.03	35 * x 3.3ppu	1.6
Infiltration	0.25 (L/s)/ha	± 23	-	5.8
				Total: 28 – 33

* Assumed

Table 1: Sanitary Flows

The proposed development of will generate peak flows of approximately 28 L/s – 33 L/s. This peak flow rate is about 70% - 75% of the capacity of the 250mm diameter sewer leaving the site.

Additional design information on the proposed school will be used in the detailed design phase to determine an appropriate peaking factor and thus the design flow from the facility, as the school site could contribute up to about 20% of the total flows from the development. For current purposes this analysis confirms the maximum size sanitary sewer for the site is 250mm, and recommends that the detailed design of Beaver Creek Road sanitary sewer allow for a maximum peak flow from this development of 33 L/s.

Through the detailed design phase, the preliminary calculations in Table 1 above will be refined; for instance, when a more detailed Site Plan for the adjacent Brohman lands is available, or when the institutional needs are better known.

Water Servicing

Existing Infrastructure

As shown on the Region's modeling report in Appendix E, an existing 300mm diameter watermain stub exists in Conservation Drive just east of Beaver Creek Road and an existing 200mm diameter watermain is looped through Pinery Trail and Rideau River Street. It is proposed in the *Beaver Creek Road and Conservation Drive Upgrades and Extension of Municipal Services Class Environmental Assessment* to provide 300mm diameter watermains in Conservation Drive and Beaver Creek Road adjacent to the subject lands in the future. These future mains will provide additional flows to the proposed subdivision; the intent of

this modeling is to demonstrate that the subdivision can be developed prior to ultimate looping described in the EA.

Proposed Development

The availability of a sufficient firefighting water supply will determine which parts of the development can proceed. The anticipated sequence of watermain connections is as follows:

- Initial connection will be from the existing stub on Conservation Drive to the Activa lands on the east.
- Next, together with Stage 1 of the Beaver Creek Road project, adding a loop to the interim condition, south along Beaver Creek Road to Laurelwood Drive
- Finally, adding another loop to Stage 1 to connect Conservation Drive to Erbsville Road

Only the first and second sequence is currently modeled and discussed in the following section, in keeping with the boundary conditions modeling provided by the Region. In Table 3 they are referred to as connections "only to Activa" and "full buildout".

A number of modeling locations have been selected as the most likely 'worst-case' events. Each will be modeled to demonstrate the ability of the water distribution network to provide an adequate firefighting supply. These locations are:

a. Single detached home furthest away from the watermain connections to the subdivision
b. Single detached homes at the highest point of the site
c. School central to the site
d. Street townhouse block of units at the southwest corner of the subdivision
e. Street townhouse block of units on the east side of Esker Lake Drive, north of Rushing River Street

Modeling inputs for each of these locations are shown in Table 2. All buildings are assumed to be constructed with standard wooden frames with concrete foundations. With the exception of the school, the buildings are not proposed to be fitted with sprinklers.

Modeling Locations Description	**Node**	**Assumed Building Size**	**Total Building Footprint**	**Approx. Centreline Elevation**	**Storeys**
A furthest single	19	11.3m x 18m (37' x 59')	203.4m²	357.1	2+basement
B highest single	13			364.9	2+basement
C school	5	4650m² (50,000ft²)	4650m²	358.2	1
D 6-unit townhouse block	7	6.5m x 15.5m ea (21' x 51'ea)	604.5m²	357.4	2+basement
E 6-unit townhouse block	8			360.50	2+basement

Table 2: Water Modeling Locations

The proposed watermain is a combination of 150mm, 200mm, and 300mm watermain. Both Figure 4 (Watermain Layout Schematic) and the Preliminary Servicing Plan included in Appendix B show the proposed watermains for the development.

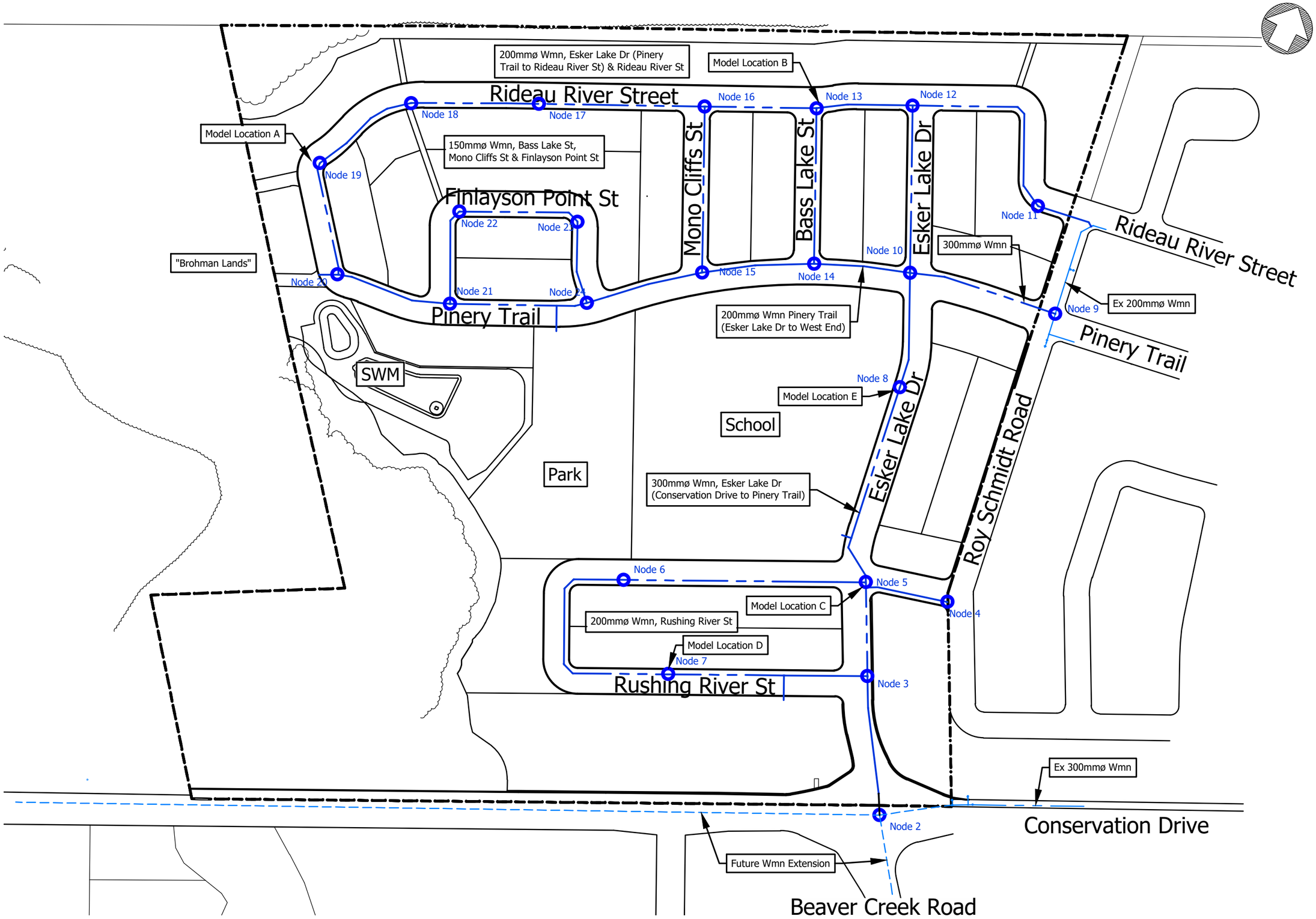
Analysis Results

Modeling of the existing water distribution system was provided by the Region of Waterloo and is included in Appendix E. Surface elevations were used in the EPANET modeling as specified in the Regional Municipality of Waterloo Design Guidelines (DGSSMS). Demand was estimated by unit counts, with population per unit factors from the City's development manual; refer to base Water Demand Calculations in Appendix C. For the school, the average day demand is taken to be 3.7 L/s based on a demand of 210 (L/d)/student over 8 hours (MOECP) with an assumed population of 500.

Table 3 shows the results of the modeling for each of the modeling locations run. For additional details, refer to EPANET output in Appendix C.

At this phase of design, only the most conservative modeling scenario was run, the "maximum day plus fire" scenario using the Fire Underwriters Study (FUS) methodology. Other scenarios such as the minimum hour, base demand, and peak hour have much smaller demands and can be completed at a future design phase to confirm suitable operating pressures during normal conditions, etc. Similarly, the Building Code (OBC) calculations result in lower firefighting demands than the FUS method.

The fire flow values for any higher-density and school sites are to be confirmed when information becomes available during the Site Plan Approval phase. Similarly, further information will be able to be provided for the design of the Brohman lands at a future date.



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DRAWING: Watermain Layout Schematic
556 & 576 Conservation Drive

DRAWN BY:	STV	CHECKED BY:	CHT
FILE NAME:	1279.Figures	DATE:	Nov 2023
SCALE:	1:2500		
	Figure 4		

Location	Estimated Fire Demand (L/s)	Assumed Fire Demand (L/s)	Reservoir Used	Watermain Construction Connectivity	Min. Pressure @ Assumed Fire Demand (kPa)	Max. Fireflow Available
A.1	88	100	JCT_MTC_01	Only to Activa (east)	162	106
A.2	88	100	JCT_39019	Full Buildout	225	124
B.1	88	100	JCT_MTC_01	Only to Activa (east)	147	102
B.2	88	100	JCT_39019	Full Buildout	210	124
C	200-250 *	-	JCT_39019	Full Buildout	140 @ 157 L/s	157
D	97	133	JCT_39019	Full Buildout w/ Firewall	189	156
E	97	133	JCT_MTC_01	Only to Activa (east) w/ Firewall	189 @ 97 L/s	111

*Estimated, reference the Tri-City Water Distribution Master Plan, 2009, and the Cambridge West MESP's *Surface Water Resources and Municipal Servicing Study*, 2013

Table 3: FUS Water Modeling Inputs/Results (*Max Day Plus Fire*)

"Full buildout" in Table 3 above refers to the modeling provided by the Region of Waterloo (see Appendix E) and is expected to result in lower pressures and/or firefighting flows than the ultimate state of the watermain distribution system will be able to provide.

It was determined that during the maximum day plus fire scenarios the proposed watermain in the subdivision is sufficient to convey the firefighting flows to the single detached homes and street townhomes as per FUS requirements and maintain the minimum 140 kPa pressure (DGSSMS).

It is noted that the *Max Day* demand is 8.25 L/s (see "Water Demand Calculations" sheet in Appendix C) multiplied by the Max Day factor of 1.34 to give a factored demand of 11 L/s. Thus, the flow rates in the modeling consistently are 11 L/s greater than the fire flow rates being modeled.

Table 3 shows that the townhouses at modeling location E will be required to be constructed with firewalls, should they be constructed prior to full buildout.

The school will likely require the future 300mm diameter watermain from Beaver Creek Road to be constructed in order to achieve the required firefighting flows shown in Table 3. Final modeling for the school site will need to be completed during the Site Plan process to confirm if there are restrictions on building size, materials, fire walls, or the need for fire suppression (i.e. sprinkler system) for the school. Confirmation of watermain sizes internal to the subdivision shall be completed within the detailed design phase and refined for approval prior to construction or registration. The water distribution system should provide the required fire flow shown in Table 3. Development of the school block is not anticipated

to be immediate; it is our understanding that construction of a school would happen perhaps several years after Registration of the first Stage. Full implementation of the EA is expected to be complete by then, meaning that a larger fire flow will be available than currently provided as shown in Table 3.

Water pressures during the Max Day and Peak Hour scenarios have been checked and summarized in Table 4. As friction loss is negligible in low flow scenarios due to the proximity of the supply nodes provided by the Region, pressures can be determined by the elevation difference between the HGL and highest/lowest nodes in the subdivision. This shows that the pressures sit between the required levels of 350 kPa – 550 kPa in the Max Day scenario and 275 kPa – 700 kPa in the Peak Hour scenario (DGSSMS section B.2.4.3).

Node	**Elev** (m)	**Max Day HGL** (m)	**Pressure at Node 13** (364.8m)	**Pressure at Node 20** (356.6m)	**Peak Hour HGL** (m)	**Pressure at Node 13** (364.8m)	**Pressure at Node 20** (356.6m)
JCT_MTC_01	362.9	404.60	390	471	404.27	387	467
JCT_MTC_03	358.2	404.59	390	471	404.25	387	467
JCT_39019	356.6	402.45	369	450	401.00	355	435

Table 4: Non-Fire Scenario Pressures (kPa)

Storm Servicing

Runoff coefficients were obtained from the *City of Waterloo Development Engineering Manual*.

The development will have multiple outlets. The west side of the site will outlet to the proposed stormwater management block included in the subject site, and from there towards Beaver Creek. This catchment area includes the drainage from some of the Brohman lands. The east side of the site will outlet to proposed infrastructure at the intersection of Conservation Drive and Beaver Creek Road; it will be necessary to ensure that the proposed external infrastructure is designed with sufficient capacity. In both cases, minor flow conveyance will be through the storm sewer system and the major storm conveyance will be along the roads. The subdivision's outflow at the intersection of Conservation Drive and Beaver Creek Road is approximately 1.9m³/s, which is able to be conveyed by a 1050mm diameter storm sewer.

As further described in the updated Preliminary Stormwater Management Report, a clean water collector (CWC) system will be provided throughout the subdivision in order to provide infiltration to achieve a water balance for the site. This system can be generally viewed as a third pipe system whereby roof leaders and sump pump connections are collected separately from road drainage and infiltrate through a perforated pipe within the municipal right of way.

Stormwater Management

A constructed wetland with an infiltration gallery is proposed to provide control from the west half of the site, the location of which is influenced by existing topography: the stormwater management block is proposed at the low point if the site, at the west side of the site adjacent to Beaver Creek. The forebay and constructed wetland (with infiltration gallery) are adequately sized to store the volume of water required to attenuate storms from the 2-year up to the Regional Storm event to the levels indicated in the subwatershed study and to provide an "Enhanced" level of treatment in accordance with the 2003 MOE Guidelines. The pond outlet will be composed of a reverse slope outlet pipe with an orifice-controlled outlet pipe, twin overflow culverts, and an overflow weir for the Regional event.

The facility will discharge to Beaver Creek and includes the following:

- A central location, with easy access, for sediment removal
- Flood control up to the Regional storm event, matching flows provided in the subwatershed study
- An aesthetically pleasing facility designed to blend into surrounding lands and trails
- Easily maintainable and accessible inlets and outlets

Water Quantity

The stormwater management facility meets the water quantity targets by attenuating peak flows leaving the site for the requisite storm events. The updated Preliminary Stormwater Management Report describes this in more detail.

Water Quality

The site was designed to meet the Enhanced level of water quality control by implementing a sediment forebay along with pre-treatment through grassed swales.

Water Balance, Infiltration, and Groundwater

A water balance will be provided through the use of a combination of lot-level, conveyance, and end-of-pipe techniques: roof water to soak away pits; a clean water collector third pipe system, an end-of-pipe infiltrating facility, and common infiltration trenches. Refer to the Preliminary Stormwater Management Report for details.

Grading and Drainage

The primary consideration for establishing road grades is to provide for major storm routes to convey the surface flow to the stormwater management facilities serving the subdivision. The road surface profile provides these routes and all grades are within the minimum and maximum allowable grades. The road centreline gradient and rates of pavement cross slope will provide rapid surface drainage. The roadways will be constructed in accordance with the City's standards.

Due to the topographic nature of the site, consideration has been given to designing the site for a mix of standard house types. The limit of grading will typically be to the established lot property lines. The intent of the proposed lot grading design is to discharge surface water away from the building envelope. The front drainage of all the lots will be discharged to the road to be captured in the storm sewer and directed to the stormwater management facilities.

The geotechnical report provides a recommendation that basement floor slabs be installed about the groundwater levels (section 5.5.2). Based on previous projects within the City of Waterloo, it is believed that through the detailed design phase it will be necessary to demonstrate 0.5m separation to the seasonally high groundwater table from the underside of footings.

Depending on the style of unit, the elevation of the underside of footing is typically in the range of ±1.7m to ±2m below street centreline elevations. A careful review of the Preliminary Grading Plan against Figure 12 of the Hydrogeological Assessment (seasonally high groundwater contours) shows that no part of the subdivision is expected to be at risk of not being able to have standard depth basements with more than adequate separation to groundwater.

Included in Appendix D are drawings showing the trail along the north property boundary. City staff reviewed the options presented for Avon Trail and confirmed that Option 1 was preferred in an email dated February 29, 2019 (Attached in Appendix D). Option 2 involved constructing a retaining wall and the City staff did not prefer a retaining wall on public property. The grading in Option 1 has been revised to match the current Draft Plan.

Transportation

The roundabout and grading of Conservation Drive is being carried out by Stantec Consulting and the results of their design will be incorporated into the detailed design of the subdivision. It is recommended that the preliminary grading and servicing plan be shared with Stantec in order to confirm grades as presented will work for both designs.

City comments identified the desire for confirmation that a truck performing tree, trail, or other maintenance would be able to turn the corners of the trail system at the north limits of the subdivision. Comments noted that it "…is anticipated that that stub portion would not need to be built as trail yet (or ever depending on the layout of the trail network on the adjacent property). A sign should be installed at this location (with wording and construction to be approved by Engineering Services) that indicates the trail does not continue west."

Included as Appendix D are two figures showing that a standard pickup truck is easily able to navigate the trail's bends. The Draft Plan shows that the hammerhead proposed at the northwest corner, behind Block 3, has been accounted for in the lot fabric.

There are a number of typical road cross-sections in the subdivision, dependent on whether or not multi-use trails and bike lanes are present on a particular street. Table 5 shows the proposed details for each type of road; please reference Table 9.4 of the City's Transportation Master Plan regarding the City's standard requirements for Minor Collector roads.

Street	Right of Way width (m)	1.5m bike lanes	3.0m multi-use trail	1.8m sidewalk	Lane widths (m)	Boulevard Width (curb to sidewalk) (m)
Local Streets	18	No	No	Both sides	3.7	2.7
Pinery (Roy Schmidt to Esker Lake Drive)	20	No	No	Both sides	3.7	3.7
Esker Lake Drive (Conservation to Pinery)	20	Yes	West side	East side	3.5	1.5

Table 5: Standard Road Cross-section Information

Utilities

The following utility companies have responded with their ability to service the development:

- Enova Power (formerly Waterloo North Hydro)
  - The area is serviced by overhead conductors, no concerns were identified.
- Bell Canada
  - Existing lines adjacent to the site are not of sufficient size to service the development; therefore, services will need to be extended from the intersection of Conservation Drive and Waterton Drive.
- Rogers Cable
  - No comment.
- Enbridge (formerly Union Gas)
  - There is not an existing line to service the site. A line should be brought through to the area for development of all properties and will be further investigated through the detailed design phase.

Conclusions

Sanitary sewerage is towards the south, along Beaver Creek Road to a pumping station currently being sited/detailed by others.

Provision of 150mm-300mm diameter watermains through the subdivision provides adequate flow and pressure as per MECP and Region guidelines for firefighting supply. Development of the school block may be contingent on the timing of construction of the future extension of watermain up Beaver Creek Road. There may be restrictions on building size, materials, fire walls, or the need for fire suppression (i.e. sprinkler system) for the school.

The storm sewer outflow at the intersection of Conservation Drive and Beaver Creek Road is approximately 1.9m³/s, which would require a 1050mm diameter storm sewer for this site alone.

The stormwater management plan consists of a flow split between Beaver Creek to the west and an off-site facility south of Conservation Drive. The subdivision stormwater management facility includes a forebay and constructed wetland/infiltrating basin to attenuate various storm events and provide water quality control. A water balance is provided through the use of multiple lot-level, conveyance, and end-of-pipe measures.

Recommendations

The final design should incorporate the conclusions and recommendations stemming from this report.

Sanitary connections should be provided to each lot and connect to the proposed sewer.

A 250mm sanitary sewer with an allowance for a peak flow of 33 L/s should be incorporated downstream for servicing this development. This flow is to be further refined during detailed design depending on the school site sizing.

A 1050mm storm sewer with peak flow of 1.9 m^3/sec is to be incorporated in the Beaver Creek Road storm sewer sizing, for servicing this site.

Storm connections should be provided to each lot for sump pumps and connect to the internal clean water collector (CWC) sewer, along with roof leader discharge.

Post-development peak flows shall be attenuated to target peak flow rates for the northwest part of the subdivision.

A detailed water distribution design shall be prepared during detailed design, and future conditions modeling should be provided by the Region to demonstrate that the proposed school site has FUS-level firefighting flows. Water modeling for multi-unit blocks shall be prepared at the time of site plan submissions.

Approval agencies shall review and approve this document as a suitable approach to a preliminary design configuration and Draft Plan approval.

Appendix A: Draft Plan

PART 1, PLAN 58R– 1190
LOT 30, G.C.T.

Township of Woolwich
City of Waterloo

(40 FEET WIDE) (NOT TRAVELLED) (OPENED BY BY–LAW NO. 15, DATED JUNE 13, 1851, COURT HOUSE OF GUELPH)

LOT 25

Township of Woolwich
City of Waterloo

N63°12'40"E 199.525 N63°55'40"E 249.428 N63°50'00"E 183.448

Rideau River Street

RIDEAU RIVER PLACE

Rideau River Place

Rideau River Street

Finlayson Point Street

Pinery Trail

Rushing River Street

Rushing River Street

Conservation Drive

Mono Cliffs Street

Bass Lake St

Esker Lake Dr

Esker Lake Dr

Esker Lake Dr

Schmidt Road

Beaver Creek Road

Stage 1

Stage 2

Block 1 Residential 0.45 ha. 6-8 Units

Block 2 Residential 1.29 ha. 32-47 Units

Block 3 Residential 0.41 ha. 8 -11 Units

Blk 33 Open Space 0.46ha.

Block 4 Residential 0.18 ha. 4-6 Units

Block 5 Res. 0.26 ha. 5-7 Units

Block 6 Residential 0.12 ha. 3-5 Units

Block 7 Residential 0.45 ha. 12-17 Units

Block 8 Res. 0.35 ha. 8-11 Units

Block 9 Residential 0.62 ha. 14-20 Units

Block 10 Residential 0.33 ha. 5-8 Units

Block 11 Residential 0.23 ha. 6-9 Units

Block 12 Residential 0.24 ha. 6-9 Units

Block 13 Residential 0.35 ha. 8-12 Units

Block 14 Res. 0.32 ha. 7-10 Units

Block 15 Res. 0.31 ha. 7-10 Units

Block 16 Res. 0.31 ha. 7-10 Units

Block 17 Res. 0.32 ha. 7-11 Units

Block 18 Res. 0.25 ha. 6-8 Units

Block 19 Res. 0.37 ha. 7-10 Units

Block 20 Residential 0.25 ha. 7-8 Units

Block 21 Residential 0.19 ha. 5-6 Units

Block 22 Res. 0.37 ha. 11-16 Units

Block 23 Street Townhouse 15 - 20 0.40ha

Block 24 Street Townhouse 5 - 9 0.40ha

Block 25 Street Townhouse 22 - 30 0.54ha

Block 26 Street Townhouse 10 - 16 0.43ha

Block 27 Street Townhouse 22 - 30 0.54ha

Block 28 Multiple Residential 1.71ha. 121-202 Units

Block 29 Multiple Residential 0.64ha. 39-66 Units

Block 30 School 3.21ha.

Block 31 Park 1.41ha.

Block 32 Open Space 4.24ha.

Block 34 Stormwater Management 1.03ha.

Block 35 Walkway 0.01ha.

Block 36 Walkway 0.01ha.

Block 37 Walkway 0.02ha.

Block 38 Trail 0.41ha

Block 39 Road Widening 0.52ha

Block 40 0.3m Reserve

Block 41 0.3m Reserve INST. NO. 1450753 SEE DEPOSIT, INST. 1477464) PART 1, PLAN 58R–6414

Blk. 2 Residential 0.274 ha (10 Units)

Blk. 3 Residential 0.150 ha. (3-5 Units)

Blk. 4 Residential 0.165 ha. (3-5 Units)

Blk. 5 Residential 0.250 ha. (5-9 Units)

Blk. 6 Residential 0.265 ha. (3-5 Units)

Blk. 7 Residential 0.418 ha. (8-13 Units)

Blk. 8 Residential 0.279 ha. (6-9 Units)

Blk. 9 Residential 0.276 ha. (5-8 Units)

Blk. 15 Street Towns 0.109 ha. (5 Units)

Blk. 16 Street Towns 0.182 ha. (8 Units)

Blk. 17 Street Towns 0.104 ha. (5 Units)

Blk. 19 Multiple Residential/ Mixed Use 0.802 ha. (48-120 Units)

Blk. 20 4.0m Walkway 0.025 ha. Walkway

Blk. 24 Future Development 0.086 ha. (4 Units)

Blk. 25 1.942m Road Widening 0.073 ha.

Blk. 28 0.3m Reserve 0.014 ha.

Future Residential

Future Multiple Residential

Future Pumping Station

Open Space

Future Stormwater Management

Future Multiple Residential

Future Multiple Residential / Mixed Use

Mixed Use

Temporary Turning Circle

Future Roundabout

Proposed Permanent Anchor Easement
Proposed Temporary Grading Easement

Proposed Temporary Grading Easement

Beaver Creek

Wetland Limit

Dripline

Dripline Setback

30m Wetland Setback

30m Wetland Buffer

15m Wetland Buffer

5m Hedgerow Setback

Ex. Hedgerow

Ex. Top of Bank

Ex. Edge of Water

Ex. Crk. or River

Ex. Culvert

Ex. Drainage Ditch

Over Ditching Setback

Burn

Trail

Recreation

Residential

REGISTERED PLAN 58M-175

PINERY TRAIL

BLOCK 175

BLOCK 176

GERMAN COMPANY TRACT

LOT 28

NOTE:
ROAD WIDENINGS AND ROUNDABOUT ARE PRELIMINARY

KEY PLAN
N.T.S.

Subject Property

Google

DRAFT PLAN OF SUBDIVISION

Part of Lot 28
German Company Tract
City of Waterloo
Regional Municipality of Waterloo

LAND USE SCHEDULE

STAGE 1

DESCRIPTION	LOTS/BLKS.	UNITS	AREA (ha.)
Residential (single detached)	1-3,5-22	184-255	7.82
Street Townhouses	23-27	74-105	2.12
Multiple Residential	28,29	160-268	2.35
School	30		3.21
Park	31		1.41
Open Space	32,33		4.70
Stormwater Management	34		1.03
Walkway	35-37		0.04
Trail	38		0.41
Road Widening	39		0.52
0.3m Reserve	40,41		0.00
Roads			4.69
Total		414-624	28.3

STAGE 2

DESCRIPTION	LOTS/BLKS.	UNITS	AREA (ha.)
Residential (single detached)	4	4-6	0.18
Future Developement	42,43		0.05
Total		4-6	0.23

NOTE: Wetland boundary provided by NRSI August 2021

ADDITIONAL INFORMATION

(UNDER SECTION 51(17) OF THE PLANNING ACT)

INFORMATION REQUIRED BY CLAUSES a,b,c,d,e,f,g,j and I ARE AS SHOWN ON THE DRAFT PLAN.
h) Municipal water supply
i) Well-drained sandy loam on lacustrine deposits
k) All sanitary and storm sewers as required

OWNER'S CERTIFICATE

I AUTHORIZE THE GSP GROUP INC. TO PREPARE AND SUBMIT THIS DRAFT PLAN OF SUBDIVISION TO THE REGIONAL MUNICIPALITY OF WATERLOO.

2115681 ONTARIO LIMITED — August 17, 2016 DATE

SURVEYOR'S CERTIFICATE

I CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE CORRECTLY SHOWN.

RAYMOND J SIBTHORP, O.L.S. — August 18, 2016 DATE
MacDonald Tamblyn Lord Surveying Limited

GSP group
PLANNING I URBAN DESIGN I LANDSCAPE ARCHITECTURE
gspgroup.ca

REVISIONS

April 30, 2020	July 12, 2023
June 25, 2020	November 13, 2023
March 10, 2020	
March 15, 2020	
March 19, 2020	
August 19, 2021	
May 24, 2023	

Date: July 29, 2015	Drawn By: S.L./ML	Dwg. File Name: dp09009zt.dwg
Scale: 1:1250 metric	Project No.: 09009.40	

Appendix B: Design Drawings

Design drawings

Road cross section dwgs

Rideau River Street

Finlayson Point Street

Pinery Trail

Mono Cliffs Street

Bass Lake St

Esker Lake Dr

Rideau River Place

Infiltration gallery

Infiltration gallery in trail block

Match existing elevations along entire northern limit

Constructed Wetland/Infiltration Gallery

SWM Pond to act as Temp Silt Pond during grading operations

Single row silt fence, as per OPSD 219.130.

Double row silt fence, as per OPSD 219.130.

Topsoil not to be stockpiled on the park block

Park

School

Rushing River Street

Roy Schmidt Road

Conservation Drive

Beaver Creek

Ex. Water Edge

Ex. Edge of Swamp

Ex. Top of Bank

Ex. Edge of Wetland

Ex. Ditch

Ex. Culvert

Ex. Post & Wire Fence

Wetland Limit

Proposed Limit

Existing or proposed ground

Proposed ground

Flow direction

0.15m Min
0.5m Max

1:2

0.5m

Control Swale Detail

Not to Scale

Existing asphalt area

Catchbasin frame & grate

Provide erosion control filter cloth (silt sack) between catchbasin/manhole moduloc and frame. Alternatively, attach erosion control filter cloth firmly to the underside of the catchbasin lid to ensure adequate filtering of sediments.

OPSD Precast catchbasin or
OPSD Precast manhole

Catchbasin Protection in Paved Area

Not to Scale

Temp Silt Pond

Double Silt Fence

Single Silt Fence

1.0m high snow fence c/w T-bar post @ 2.0m o/c

Filter fabric

15mmø clear stone filter, 150mm thick

Hickenbottom c/w orifice

Top of berm

0.5m

Rock fill 150mmø min.

Overflow

Water level

0.3m freeboard

0.3m overboard

5.0m min.

Final lot grade

Pre-grade

Total Basin Volume

Active Storage Volume

Undisturbed ground or compacted backfill

Rip-rap, 300mm deep

Dead Storage Volume

Outlet piped to grade or storm sewer

MERITECH engineering
1150 Bellfield Crescent, Ottawa, ON K2C 3J8
T:(613)521-0454 F:(613)521-2304 www.meritech.ca

DRAWING: Preliminary Erosion & Sediment Control Plan
556 & 576 Conservation Drive

DRAWN BY:	STV	SCALE:	1: 1000
CHECKED BY:	CMT		
DATE:	Nov 2023		1279-ESC
FILE NAME:	1279 Figures		

Match existing elevations along entire northern limit

Infiltration gallery

Infiltration gallery

Rideau River Street

2.5m Asphalt Trail

Rideau River Place

Rideau River Street

Pedestrian Crossing

Mono Cliffs St

Finlayson Point St

Bass Lake St

Esker Lake Dr

Area to be developed in the future when grading allows.

Pinery Trail

Pinery Trail

Pedestrian Crossing

Drainage from park block will not cross onto private lots.

SWM Pond

4.0m Asphalt Pond Access

10m Dripline Setback

30m Wetland Buffer

3.0m Asphalt Walkway

Park

School

Refer to park grading concept in the Preliminary Servicing Report, Appendix D, for additional grades and slopes.

Esker Lake Dr

Roy Schmidt Road

Wasaga Crescent

Bollards/gates to be confirmed in detailed design

15m Wetland Buffer

Ex. Waters Edge

Ex. Top of Bank

Ex. Crest of Slope

Ex. Crest of Creek

Rushing River St

Drainage from park block will not cross onto private lots.

Max. 5.0% slope on trails

Infiltration gallery

2.0m grassed swale between trail and property line.

3.0m Asphalt Walkway

Esker Lake Dr to be super-elevated south of Rushing River St to force overland flow route into south-bound lane only.

Proposed Conservation Drive and roundabout design (by others)

All lots are back-to-front or split drainage unless shown otherwise:

W/O = "walkout" type lot
SS = "sunshine" or "lookout" type lot

MERITECH Engineering
1150 Bank St., Suite 202, Ottawa, ON K1S 3W7
T 613.521.1140 F 613.521.2337 www.meritech.ca

DRAWING: Preliminary Grading Plan
556 & 576 Conservation Drive

DRAWN BY:	STV	SCALE:	1: 1000
CHECKED BY:	CH	DATE:	Nov 2023
FILE NAME:	1279_Figures		1279-SG

Split point of sanitary and 3rd pipe.

Rear yards to infiltration gallery, sized for 2-yr volume.

~Inv @ Intersection
Wat=362.70
San=361.60
CWC=362.00

~Inv @ Intersection
Stm=360.50
Wat=361.30
San=359.50
CWC=360.00

Rear yards to infiltration gallery, sized for 2-yr volume.

Rideau River Street

~Inv @ Intersection
Stm=354.90
Wat=355.00
San=354.20
CWC=354.45

~Inv @ Intersection
Stm=360.95
Wat=360.75
San=360.00
CWC=360.50

200mmø Wmn, Esker Lake Dr (Pinery Trail to Rideau River Street) & Rideau River Street

150mmø Wmn, Finlayson Point St, Mono Cliffs St & Bass Lake St

Finlayson Point St

Mono Cliffs St

Bass Lake St

Esker Lake Dr

Rideau River Place

~Inv @ Intersection
Stm=354.30
Wat=354.55
San=353.50
CWC=354.30

~Inv @ Intersection
Stm=356.20
Wat=356.40
San=355.50
CWC=356.00

~Inv @ Intersection
Stm=360.05
Wat=360.00
San=359.00
CWC=359.50

~Inv @ Intersection
Stm=359.50
Wat=360.80
San=358.75
CWC=359.10

Pinery Trail

Rideau River Street

300mmø Wmn

Ex 200mmø Wmn

900mmø Stm into SWM Pond

~Inv @ Intersection
Stm=355.00
Wat=355.20
San=353.10
CWC=354.50

~Inv @ Intersection
Stm=355.60
Wat=355.80
San=352.60
CWC=355.00

~Inv @ Intersection
Stm=358.00
Wat=358.15
San=357.20
CWC=357.70

200mmø Wmn Pinery Trail (Esker Lake Dr to West End)

Split point of sanitary and 3rd pipe.

Pinery Trail

Wetland

Underground Infiltration System

Ex. Water Edge

Ex. Edge of Swamp

Ex. Cl. Of Creek

Ex. Cl. Of Valley

Ex. Edge of Swamp

Ex. Water Edge

Ex. Water Edge

Ex. Water Edge

Ex. Water Edge

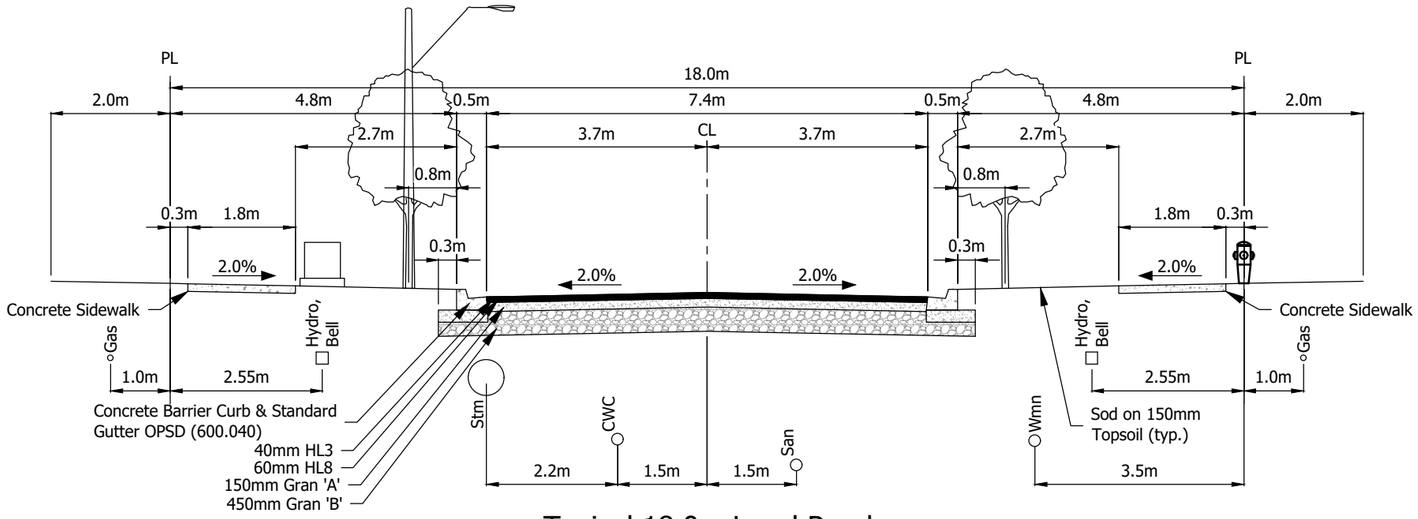
Ex. Hedgerow

5m Hedgerow Setback

Ex. Hedgerow

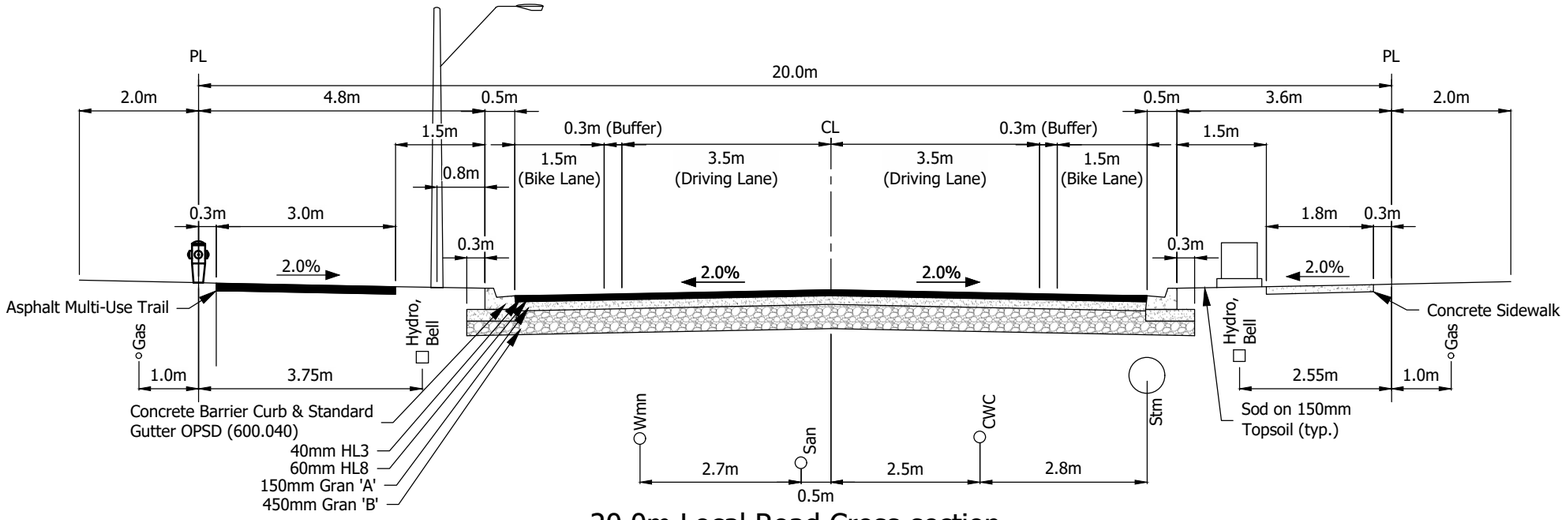
Ex. Hedgerow

Ex. Hedgerow



Typical 18.0m Local Road
Cross-section

Not to Scale



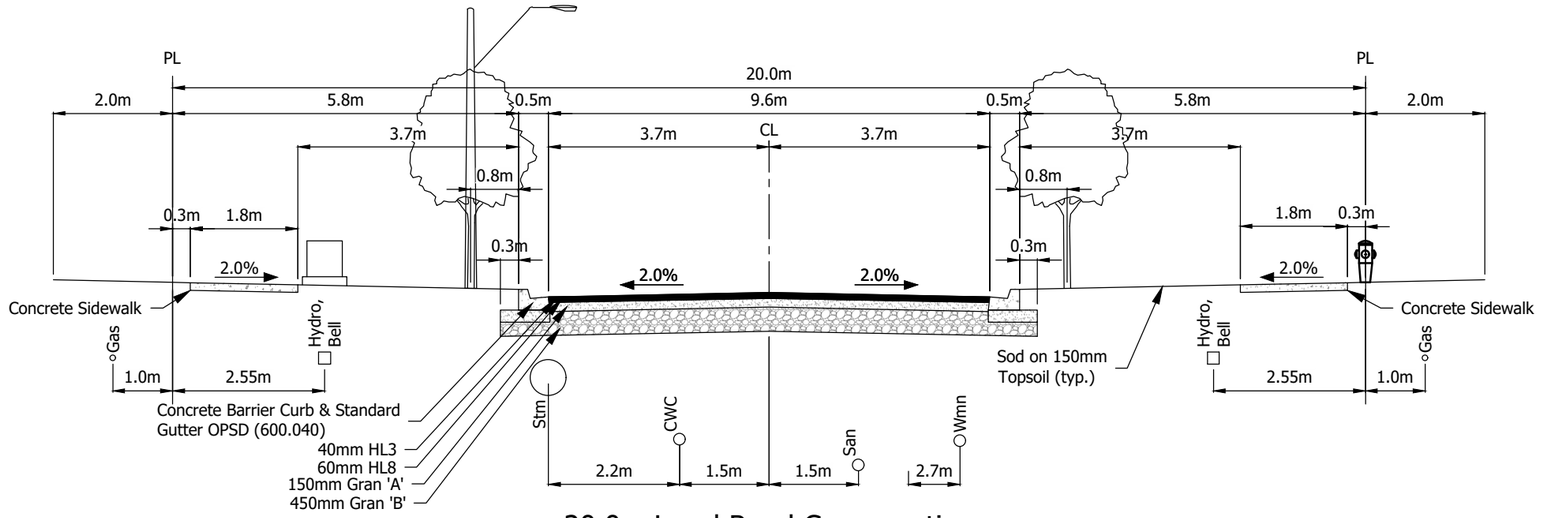
20.0m Local Road Cross-section
Esker Lake Drive (Conservation Drive to Pinery Trail)

Not to Scale

MERITECH engineering
1315 Bishop Street North, Suite 202 Cambridge
T 519.623.1140 F 519.623.7334 www.meritech.ca

DRAWING: Proposed Street Sections - 1
556 & 576 Conservation Drive

DRAWN BY:	STV	CHECKED BY:	CHT
FILE NAME:	1279.Figures	DATE:	Oct 2023
		SCALE:	NTS
			Cross-Sections 1



20.0m Local Road Cross-section
Pinery Trail (Roy Schmidt to Esker Lake Drive)

Not to Scale

MERITECH engineering
1315 Bishop Street North, Suite 202 Cambridge
T 519.623.1140 F 519.623.7334 www.meritech.ca

DRAWING: Proposed Street Sections - 2
556 & 576 Conservation Drive

DRAWN BY: STV	CHECKED BY: CHT	SCALE: NTS	
FILE NAME: 1279.Figures	DATE: Oct 2023	Cross-Sections 2	

Appendix C: Calculations

Water demand calcs

EPANET output

MERITECH engineering

Project: Conservation
File: 1279
Completed by: STV
Date: 2017-10-20 rev: 2020-06-04
Checked by: CHT
Date: 2018-01-09

Water Demand Calculations

City of Waterloo

Node	Elevation (m)	Node Type	# of Units	Pop. Density (ppl/unit)	Pop.	Demand (l/cap/day)	Demand (l/sec)
2	356.50						
3	357.15	towns	66	2.440	162	225	0.422
4	358.25	singles	8	3.250	26	225	0.068
5	358.20	school	1	500.000	500	210	3.646
		towns	4	2.440	10	225	0.026
		total				225	3.672
6	358.10	towns	30	2.440	74	225	0.193
7	357.40	towns	231	2.440	564	225	1.469
8	360.50	towns	18	2.440	44	225	0.115
9	363.20	singles	14	3.250	46	225	0.120
10	362.90	singles	19	3.250	62	225	0.161
11	363.50	singles	18	3.250	59	225	0.154
12	363.50	singles	21	3.250	69	225	0.180
13	364.80	singles	18	3.250	59	225	0.154
14	362.00	singles	18	3.250	59	225	0.154
15	360.30	singles	16	3.250	52	225	0.135
16	362.90	singles	23	3.250	75	225	0.195
17	359.00	singles	21	3.250	69	225	0.180
18	357.60	singles	18	3.250	59	225	0.154
19	357.10	singles	14	3.250	46	225	0.120
20	356.60	singles	8	3.250	26	225	0.068
21	357.20	singles	18	3.250	59	225	0.154
22	357.50	singles	19	3.250	62	225	0.161
23	358.20	singles	17	3.250	56	225	0.146
24	358.60	singles	9	3.250	30	225	0.078
		Totals	629	-	2268	-	8.250

Fire Flow Calculations

1999 Fire Underwriters Survey (FUS) Method

Project: Conservation Dr
File: 1279
Calculated by: STV
Date: 24-Oct-17
Checked by: checkedby
Date: 1-Jan-00

Singles

Buildings require a sufficient amount of water, based on the FUS, for fire fighting purposes.
The required fire flow (L/minute) is expressed by the equation:

where **C =** Coefficient related to the type of construction.
A = Floor area (m²)

$$F = 220 \cdot C \cdot \sqrt{A}$$

A)	**Building structure 'C'**	**=**	1.0
B)	**A (m²)**	**=**	203.40
C)	**# Floors (excl. basement)**		2
D)	**F (L/min)**	**=**	4437
	Rounded	**=**	**4000**

E) Type of occupancy/contents

(●) Non-Combustible ( ) Free Burning
( ) Limited Combustible ( ) Rapid Burning
( ) Combustible

Fire hazard adjustment	-	-25%
Adjustment	**=**	**-1000**
F_{adj} (L/min)		**3000**

F) % reduction based on sprinkler system effectiveness = 0.00%
Reduction - **0**

G)

	Distance to nearest building (m)	% addition
N	30.0	10%
E	2.4	25%
S	13.0	15%
W	2.4	25%

% addition based on building separation = 75%
Addition + **2250**

H) Total Fire Flow = 5250 L/min
= **88** **L/sec**

Note: For groupings of detached one family and small two family dwellings not exceeding 2 stories in height, the following value may be used.
(for other residential buildings, the regular method should be used)

Exposure Distances: 0.00 m
Type of Construction (W/M): W

Total Fire Flow (L/min) = 8000 = 133 L/sec

Fire Flow Calculations

1999 Fire Underwriters Survey (FUS) Method

Project: Conservation Dr
File: 1279
Calculated by: STV
Date: 24-Oct-17
Checked by: checkedby
Date: 1-Jan-00

12-Unit Back-to-Back Townhouse Block

Buildings require a sufficient amount of water, based on the FUS, for fire fighting purposes.
The required fire flow (L/minute) is expressed by the equation:

where **C =** Coefficient related to the type of construction.
A = Floor area (m²)

$$F = 220 \cdot C \cdot \sqrt{A}$$

A)	**Building structure 'C'**	**=**	1.0
B)	**A (m²)**	**=**	286.00
C)	**# Floors (excl. basement)**		3
D)	**F (L/min)**	**=**	6444
	Rounded	**=**	**6000**

E) Type of occupancy/contents

(●) Non-Combustible ( ) Free Burning
( ) Limited Combustible ( ) Rapid Burning
( ) Combustible

Fire hazard adjustment	-	25%
Adjustment	**=**	**-1500**
F_{adj} (L/min)		**4500**

F) % reduction based on sprinkler system effectiveness = 0.00%
Reduction - **0**

G)

	Distance to nearest building (m)	% addition
N	24.0	10%
E	2.4	25%
S	24.0	10%
W	Fire wall	10%

% addition based on building separation = 55%
Addition + **2475**

H) Total Fire Flow = 6975 L/min
= **116** **L/sec**

Note: For groupings of detached one family and small two family dwellings not exceeding 2 stories in height, the following value may be used.
(for other residential buildings, the regular method should be used)

Exposure Distances: 0.00 m
Type of Construction (W/M): W

Total Fire Flow (L/min) = 8000 = 133 L/sec

MERITECH

Fire Flow Calculations

1999 Fire Underwriters Survey (FUS) Method

Project: Conservation Dr
File: 1279
Calculated by: STV
Date: 24-Oct-17
Checked by: checkedby
Date: 1-Jan-00

Street Towns

Buildings require a sufficient amount of water, based on the FUS, for fire fighting purposes.
The required fire flow (L/minute) is expressed by the equation:

where **C =** Coefficient related to the type of construction.
A = Floor area (m²)

$$F = 220 \cdot C \cdot \sqrt{A}$$

A)	**Building structure 'C'**	**=**	1.0
B)	**A (m²)**	**=**	302.25
C)	**# Floors (excl. basement)**		2
D)	**F (L/min)**	**=**	5409
	Rounded	**=**	**5000**

E) Type of occupancy/contents

(●) Non-Combustible ( ) Free Burning
( ) Limited Combustible ( ) Rapid Burning
( ) Combustible

Fire hazard adjustment	-	25%
Adjustment	**=**	**-1250**
F_{adj} (L/min)		**3750**

F) % reduction based on sprinkler system effectiveness = 0.00%
Reduction - **0**

G)

	Distance to nearest building (m)	% addition
N	14.0	15%
E	3.0	25%
S	28.0	10%
W	Fire Wall	10%

% addition based on building separation = 60%
Addition + **2250**

H) Total Fire Flow = 6000 L/min
= **100** **L/sec**

Note: For groupings of detached one family and small two family dwellings not exceeding 2 stories in height, the following value may be used.
(for other residential buildings, the regular method should be used)

Exposure Distances: 0.00 m
Type of Construction (W/M): W

Total Fire Flow (L/min) = 8000 = 133 L/sec

MERITECH

Fire Flow Calculations

1999 Fire Underwriters Survey (FUS) Method

Project: Conservation Dr
File: 1279
Calculated by: STV
Date: 21-Sep-21
Checked by: checkedby
Date: 1-Jan-00

Street A - Street Towns

Buildings require a sufficient amount of water, based on the FUS, for fire fighting purposes.
The required fire flow (L/minute) is expressed by the equation:

where **C =** Coefficient related to the type of construction.
A = Floor area (m²)

$$F = 220 \cdot C \cdot \sqrt{A}$$

A)	**Building structure 'C'**	**=**	1.0
B)	**A (m²)**	**=**	302.25
C)	**# Floors (excl. basement)**		2
D)	**F (L/min)**	**=**	5409
	Rounded	**=**	**5000**

E) Type of occupancy/contents

(●) Non-Combustible ( ) Free Burning
( ) Limited Combustible ( ) Rapid Burning
( ) Combustible

Fire hazard adjustment	**-**	-25%
Adjustment	**=**	**-1250**
F_{adj} (L/min)		**3750**

F) % reduction based on sprinkler system effectiveness	**=**	0.00%
Reduction	**-**	**0**

G)

	Distance to nearest building (m)	% addition
N	3.0	25%
E	15.0	15%
S	Fire Wall	10%
W	34.0	5%

% addition based on building separation	**=**		55%
Addition	**+**	**2063**	

H)	**Total Fire Flow**	**=**	5813 L/min
		=	**97 L/sec**

Note: For groupings of detached one family and small two family dwellings not exceeding 2 stories in height, the following value may be used.
(for other residential buildings, the regular method should be used)

Exposure Distances:	0.00	m
Type of Construction (W/M):	W	

Total Fire Flow (L/min) = 8000 = 133 L/sec

```
*************************************************************************
*                            E P A N E T                                *
*                     Hydraulic and Water Quality                       *
*                     Analysis for Pipe Networks                        *
*                           Version 2.2                                 *
*************************************************************************
```

Input File: 1279.A.1 - JCT1.Node19.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm	
2	4	5	75	150	
8	7	6	170	200	
10	7	3	140	200	
11	5	8	105	300	
14	10	9	90	300	
15	10	12	120	150	
16	12	11	120	150	
17	12	13	70	150	
18	13	14	120	150	
19	10	14	80	200	
20	14	15	75	200	
21	15	16	120	150	
22	16	17	110	150	
23	17	18	100	150	
24	18	19	85	150	
25	19	20	85	200	
26	20	21	85	200	
27	21	22	70	150	
28	22	23	120	150	
29	15	24	70	200	
30	23	24	50	150	
31	24	21	115	200	
32	16	13	80	150	
1	5	3	70	300	
3	3	2	95	300	
4	5	6	155	200	
5	11	25	75	150	
6	9	25	70	200	
7	1	10	5	300	
9	1	8	110	300	
12	26	1	#N/A	#N/A	Pump

Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality	
2	0.00	383.02	26.52	0.00	
4	0.09	383.02	24.77	0.00	
5	4.92	383.02	24.82	0.00	
3	0.57	383.02	25.87	0.00	
6	0.26	383.02	24.92	0.00	
7	1.97	383.02	25.62	0.00	
8	0.15	383.02	22.52	0.00	
9	0.16	382.99	19.79	0.00	
10	0.22	383.00	20.10	0.00	
11	0.21	382.72	19.22	0.00	
12	0.24	382.37	18.87	0.00	
13	0.21	381.37	16.57	0.00	
14	0.21	381.39	19.39	0.00	
15	0.18	380.01	19.71	0.00	
16	0.26	380.00	17.10	0.00	
17	0.24	377.97	18.97	0.00	
18	0.21	376.15	18.55	0.00	
19	100.16	374.63	17.53	0.00	
20	0.09	376.09	19.49	0.00	
21	0.21	377.56	20.36	0.00	
22	0.22	377.91	20.41	0.00	
23	0.20	378.51	20.31	0.00	
24	0.10	378.77	20.17	0.00	
25	0.00	382.94	20.54	0.00	
1	0.00	383.03	20.23	0.00	
26	-111.06	362.90	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status	
2	-0.09	0.01	0.00	Open	
8	-0.72	0.02	0.00	Open	
10	-1.25	0.04	0.01	Open	
11	-7.80	0.11	0.04	Open	
14	12.52	0.18	0.11	Open	
15	16.80	0.95	5.30	Open	
16	-12.16	0.69	2.91	Open	
17	28.71	1.62	14.31	Open	
18	-3.09	0.17	0.23	Open	
19	73.56	2.34	20.12	Open	
20	70.27	2.24	18.48	Open	
21	1.58	0.09	0.07	Open	
22	32.92	1.86	18.43	Open	
23	32.68	1.85	18.18	Open	
24	32.47	1.84	17.97	Open	
25	-67.69	2.15	17.25	Open	
26	-67.78	2.16	17.29	Open	
27	-16.15	0.91	4.93	Open	
28	-16.37	0.93	5.05	Open	
29	68.50	2.18	17.63	Open	
30	-16.57	0.94	5.17	Open	
31	51.83	1.65	10.52	Open	
32	-31.60	1.79	17.08	Open	
1	1.82	0.03	0.00	Open	
3	0.00	0.00	0.00	Open	
4	0.98	0.03	0.01	Open	
5	-12.36	0.70	3.00	Open	
6	12.36	0.39	0.74	Open	
7	103.10	1.46	5.22	Open	
9	7.96	0.11	0.05	Open	
12	111.06	0.00	-20.13	Open	Pump

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```
*************************************************************
*                          E P A N E T                      *
*                  Hydraulic and Water Quality              *
*                  Analysis for Pipe Networks               *
*                        Version 2.2                        *
*************************************************************
```

Input File: 1279.A.2 - JCT39019.Node19.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm	
2	4	5	75	150	
8	7	6	170	200	
10	7	3	140	200	
14	10	9	90	300	
15	10	12	120	150	
16	12	11	120	150	
17	12	13	70	150	
18	13	14	120	150	
19	10	14	80	200	
20	14	15	75	200	
21	15	16	120	150	
22	16	17	110	150	
23	17	18	100	150	
24	18	19	85	150	
25	19	20	85	200	
26	20	21	85	200	
27	21	22	70	150	
28	22	23	120	150	
29	15	24	70	200	
30	23	24	50	150	
31	24	21	115	200	
32	16	13	80	150	
1	5	3	70	300	
3	3	2	95	300	
4	5	6	155	200	
5	8	10	115	300	
9	11	25	75	150	
11	25	9	70	200	
6	5	8	105	300	
7	1	2	#N/A	#N/A	Pump

Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality	
2	0.00	391.41	34.91	0.00	
4	0.09	390.51	32.26	0.00	
5	4.92	390.51	32.31	0.00	
3	0.57	390.84	33.69	0.00	
6	0.26	390.61	32.51	0.00	
7	1.97	390.72	33.32	0.00	
8	0.15	389.96	29.46	0.00	
9	0.16	389.36	26.16	0.00	
10	0.22	389.36	26.46	0.00	
11	0.21	389.08	25.58	0.00	
12	0.24	388.73	25.23	0.00	
13	0.21	387.73	22.93	0.00	
14	0.21	387.76	25.76	0.00	
15	0.18	386.37	26.07	0.00	
16	0.26	386.36	23.46	0.00	
17	0.24	384.33	25.33	0.00	
18	0.21	382.52	24.92	0.00	
19	100.16	380.99	23.89	0.00	
20	0.09	382.45	25.85	0.00	
21	0.21	383.92	26.72	0.00	
22	0.22	384.27	26.77	0.00	
23	0.20	384.88	26.68	0.00	
24	0.10	385.13	26.53	0.00	
25	0.00	389.30	26.90	0.00	
1	-111.06	356.60	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status	
2	-0.09	0.01	0.00	Open	
8	11.48	0.37	0.64	Open	
10	-13.45	0.43	0.86	Open	
14	12.52	0.18	0.11	Open	
15	16.80	0.95	5.30	Open	
16	-12.16	0.69	2.91	Open	
17	28.71	1.62	14.31	Open	
18	-3.09	0.17	0.23	Open	
19	73.56	2.34	20.12	Open	
20	70.27	2.24	18.48	Open	
21	1.58	0.09	0.07	Open	
22	32.92	1.86	18.43	Open	
23	32.68	1.85	18.18	Open	
24	32.47	1.84	17.97	Open	
25	-67.69	2.15	17.25	Open	
26	-67.78	2.16	17.29	Open	
27	-16.15	0.91	4.93	Open	
28	-16.37	0.93	5.05	Open	
29	68.50	2.18	17.63	Open	
30	-16.57	0.94	5.17	Open	
31	51.83	1.65	10.52	Open	
32	-31.60	1.79	17.08	Open	
1	-97.05	1.37	4.66	Open	
3	-111.06	1.57	5.99	Open	
4	-11.22	0.36	0.62	Open	
5	103.10	1.46	5.22	Open	
9	-12.36	0.70	3.00	Open	
11	-12.36	0.39	0.74	Open	
6	103.26	1.46	5.23	Open	
7	111.06	0.00	-34.81	Open	Pump

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```
*************************************************************
*                          E P A N E T                      *
*                  Hydraulic and Water Quality              *
*                  Analysis for Pipe Networks               *
*                        Version 2.2                        *
*************************************************************
```

Input File: 1279.B.1 - JCT1.Node13.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm	
2	4	5	75	150	
8	7	6	170	200	
10	7	3	140	200	
11	5	8	105	300	
14	10	9	90	300	
15	10	12	120	150	
16	12	11	120	150	
17	12	13	70	150	
18	13	14	120	150	
19	10	14	80	200	
20	14	15	75	200	
21	15	16	120	150	
22	16	17	110	150	
23	17	18	100	150	
24	18	19	85	150	
25	19	20	85	200	
26	20	21	85	200	
27	21	22	70	150	
28	22	23	120	150	
29	15	24	70	200	
30	23	24	50	150	
31	24	21	115	200	
32	16	13	80	150	
1	5	3	70	300	
3	3	2	95	300	
4	5	6	155	200	
5	11	25	75	150	
6	9	25	70	200	
7	1	10	5	300	
9	1	8	110	300	
12	26	1	#N/A	#N/A	Pump

Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality	
2	0.00	383.02	26.52	0.00	
4	0.09	383.02	24.77	0.00	
5	4.92	383.02	24.82	0.00	
3	0.57	383.02	25.87	0.00	
6	0.26	383.02	24.92	0.00	
7	1.97	383.02	25.62	0.00	
8	0.15	383.02	22.52	0.00	
9	0.16	382.98	19.78	0.00	
10	0.22	383.00	20.10	0.00	
11	0.21	382.45	18.95	0.00	
12	0.24	381.77	18.27	0.00	
13	100.21	379.81	15.01	0.00	
14	0.21	381.86	19.86	0.00	
15	0.18	381.59	21.29	0.00	
16	0.26	380.86	17.96	0.00	
17	0.24	381.06	22.06	0.00	
18	0.21	381.25	23.65	0.00	
19	0.16	381.42	24.32	0.00	
20	0.09	381.47	24.87	0.00	
21	0.21	381.51	24.31	0.00	
22	0.22	381.52	24.02	0.00	
23	0.20	381.54	23.34	0.00	
24	0.10	381.55	22.95	0.00	
25	0.00	382.88	20.48	0.00	
1	0.00	383.03	20.23	0.00	
26	-111.06	362.90	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status	
2	-0.09	0.01	0.00	Open	
8	-0.72	0.02	0.00	Open	
10	-1.25	0.04	0.01	Open	
11	-7.80	0.11	0.04	Open	
14	17.80	0.25	0.20	Open	
15	24.03	1.36	10.29	Open	
16	-17.43	0.99	5.68	Open	
17	41.23	2.33	27.96	Open	
18	-31.62	1.79	17.10	Open	
19	61.05	1.94	14.25	Open	
20	29.22	0.93	3.64	Open	
21	18.13	1.03	6.11	Open	
22	-9.49	0.54	1.84	Open	
23	-9.73	0.55	1.93	Open	
24	-9.94	0.56	2.01	Open	
25	-10.10	0.32	0.51	Open	
26	-10.19	0.32	0.52	Open	
27	-2.34	0.13	0.14	Open	
28	-2.56	0.14	0.16	Open	
29	10.91	0.35	0.59	Open	
30	-2.75	0.16	0.19	Open	
31	8.05	0.26	0.33	Open	
32	27.36	1.55	13.08	Open	
1	1.82	0.03	0.00	Open	
3	0.00	0.00	0.00	Open	
4	0.98	0.03	0.01	Open	
5	-17.64	1.00	5.80	Open	
6	17.64	0.56	1.43	Open	
7	103.10	1.46	5.22	Open	
9	7.96	0.11	0.05	Open	
12	111.06	0.00	-20.13	Open	Pump

```
*************************************************************************
*                            E P A N E T                                *
*                     Hydraulic and Water Quality                       *
*                     Analysis for Pipe Networks                        *
*                           Version 2.2                                 *
*************************************************************************

Input File: 1279.B.2 - JCT39019.Node13.net
```

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm	
2	4	5	75	150	
8	7	6	170	200	
10	7	3	140	200	
14	10	9	90	300	
15	10	12	120	150	
16	12	11	120	150	
17	12	13	70	150	
18	13	14	120	150	
19	10	14	80	200	
20	14	15	75	200	
21	15	16	120	150	
22	16	17	110	150	
23	17	18	100	150	
24	18	19	85	150	
25	19	20	85	200	
26	20	21	85	200	
27	21	22	70	150	
28	22	23	120	150	
29	15	24	70	200	
30	23	24	50	150	
31	24	21	115	200	
32	16	13	80	150	
1	5	3	70	300	
3	3	2	95	300	
4	5	6	155	200	
5	8	10	115	300	
9	11	25	75	150	
11	25	9	70	200	
6	5	8	105	300	
7	1	2	#N/A	#N/A	Pump

Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality	
2	0.00	391.41	34.91	0.00	
4	0.09	390.51	32.26	0.00	
5	4.92	390.51	32.31	0.00	
3	0.57	390.84	33.69	0.00	
6	0.26	390.61	32.51	0.00	
7	1.97	390.72	33.32	0.00	
8	0.15	389.96	29.46	0.00	
9	0.16	389.35	26.15	0.00	
10	0.22	389.36	26.46	0.00	
11	0.21	388.81	25.31	0.00	
12	0.24	388.13	24.63	0.00	
13	100.21	386.17	21.37	0.00	
14	0.21	388.23	26.23	0.00	
15	0.18	387.95	27.65	0.00	
16	0.26	387.22	24.32	0.00	
17	0.24	387.42	28.42	0.00	
18	0.21	387.61	30.01	0.00	
19	0.16	387.79	30.69	0.00	
20	0.09	387.83	31.23	0.00	
21	0.21	387.87	30.67	0.00	
22	0.22	387.88	30.38	0.00	
23	0.20	387.90	29.70	0.00	
24	0.10	387.91	29.31	0.00	
25	0.00	389.25	26.85	0.00	
1	-111.06	356.60	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status	
2	-0.09	0.01	0.00	Open	
8	11.48	0.37	0.64	Open	
10	-13.45	0.43	0.86	Open	
14	17.80	0.25	0.20	Open	
15	24.03	1.36	10.29	Open	
16	-17.43	0.99	5.68	Open	
17	41.23	2.33	27.96	Open	
18	-31.62	1.79	17.10	Open	
19	61.05	1.94	14.25	Open	
20	29.22	0.93	3.64	Open	
21	18.13	1.03	6.11	Open	
22	-9.49	0.54	1.84	Open	
23	-9.73	0.55	1.93	Open	
24	-9.94	0.56	2.01	Open	
25	-10.10	0.32	0.51	Open	
26	-10.19	0.32	0.52	Open	
27	-2.34	0.13	0.14	Open	
28	-2.56	0.14	0.16	Open	
29	10.91	0.35	0.59	Open	
30	-2.75	0.16	0.19	Open	
31	8.05	0.26	0.33	Open	
32	27.36	1.55	13.08	Open	
1	-97.05	1.37	4.66	Open	
3	-111.06	1.57	5.99	Open	
4	-11.22	0.36	0.62	Open	
5	103.10	1.46	5.22	Open	
9	-17.64	1.00	5.80	Open	
11	-17.64	0.56	1.43	Open	
6	103.26	1.46	5.23	Open	
7	111.06	0.00	-34.81	Open	Pump

```
*************************************************************************
*                            E P A N E T                                *
*                     Hydraulic and Water Quality                       *
*                     Analysis for Pipe Networks                        *
*                           Version 2.2                                 *
*************************************************************************
```

Input File: 1279.C - JCT39019.Node5.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm	
2	4	5	75	150	
8	7	6	170	200	
10	7	3	140	200	
14	10	9	90	300	
15	10	12	120	150	
16	12	11	120	150	
17	12	13	70	150	
18	13	14	120	150	
19	10	14	80	200	
20	14	15	75	200	
21	15	16	120	150	
22	16	17	110	150	
23	17	18	100	150	
24	18	19	85	150	
25	19	20	85	200	
26	20	21	85	200	
27	21	22	70	150	
28	22	23	120	150	
29	15	24	70	200	
30	23	24	50	150	
31	24	21	115	200	
32	16	13	80	150	
1	5	3	70	300	
3	3	2	95	300	
4	5	6	155	200	
5	8	10	115	300	
9	11	25	75	150	
11	25	9	70	200	
6	5	8	105	300	
7	1	2	#N/A	#N/A	Pump

Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality	
2	0.00	380.91	24.41	0.00	
4	0.09	379.07	20.82	0.00	
5	157.32	379.07	20.87	0.00	
3	0.57	379.74	22.59	0.00	
6	0.26	379.27	21.17	0.00	
7	1.97	379.51	22.11	0.00	
8	0.15	379.07	18.57	0.00	
9	0.16	379.06	15.86	0.00	
10	0.22	379.07	16.17	0.00	
11	0.21	379.06	15.56	0.00	
12	0.24	379.06	15.56	0.00	
13	0.21	379.06	14.26	0.00	
14	0.21	379.06	17.06	0.00	
15	0.18	379.06	18.76	0.00	
16	0.26	379.06	16.16	0.00	
17	0.24	379.06	20.06	0.00	
18	0.21	379.06	21.46	0.00	
19	0.16	379.06	21.96	0.00	
20	0.09	379.06	22.46	0.00	
21	0.21	379.06	21.86	0.00	
22	0.22	379.06	21.56	0.00	
23	0.20	379.06	20.86	0.00	
24	0.10	379.06	20.46	0.00	
25	0.00	379.06	16.66	0.00	
1	-163.45	356.60	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status	
2	-0.09	0.01	0.00	Open	
8	17.26	0.55	1.37	Open	
10	-19.23	0.61	1.68	Open	
14	0.64	0.01	0.00	Open	
15	0.52	0.03	0.01	Open	
16	-0.28	0.02	0.00	Open	
17	0.56	0.03	0.01	Open	
18	-0.20	0.01	0.00	Open	
19	1.72	0.05	0.02	Open	
20	1.31	0.04	0.01	Open	
21	0.13	0.01	0.00	Open	
22	0.42	0.02	0.01	Open	
23	0.18	0.01	0.00	Open	
24	-0.02	0.00	0.00	Open	
25	-0.18	0.01	0.00	Open	
26	-0.28	0.01	0.00	Open	
27	0.07	0.00	0.00	Open	
28	-0.15	0.01	0.00	Open	
29	1.00	0.03	0.01	Open	
30	-0.34	0.02	0.00	Open	
31	0.55	0.02	0.00	Open	
32	-0.55	0.03	0.01	Open	
1	-143.66	2.03	9.64	Open	
3	-163.45	2.31	12.25	Open	
4	-17.00	0.54	1.34	Open	
5	3.10	0.04	0.01	Open	
9	-0.48	0.03	0.01	Open	
11	-0.48	0.02	0.00	Open	
6	3.25	0.05	0.01	Open	
7	163.45	0.00	-24.31	Open	Pump

```
*************************************************************************
*                            E P A N E T                                *
*                     Hydraulic and Water Quality                       *
*                     Analysis for Pipe Networks                        *
*                           Version 2.2                                 *
*************************************************************************
```

Input File: 1279.D (133LPS) - JCT39019.Node7.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm	
2	4	5	75	150	
8	7	6	170	200	
10	7	3	140	200	
14	10	9	90	300	
15	10	12	120	150	
16	12	11	120	150	
17	12	13	70	150	
18	13	14	120	150	
19	10	14	80	200	
20	14	15	75	200	
21	15	16	120	150	
22	16	17	110	150	
23	17	18	100	150	
24	18	19	85	150	
25	19	20	85	200	
26	20	21	85	200	
27	21	22	70	150	
28	22	23	120	150	
29	15	24	70	200	
30	23	24	50	150	
31	24	21	115	200	
32	16	13	80	150	
1	5	3	70	300	
3	3	2	95	300	
4	5	6	155	200	
5	8	10	115	300	
9	11	25	75	150	
11	25	9	70	200	
6	5	8	105	300	
7	1	2	#N/A	#N/A	Pump

Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality	
2	0.00	385.15	28.65	0.00	
4	0.09	384.09	25.84	0.00	
5	4.92	384.09	25.89	0.00	
3	0.57	384.23	27.08	0.00	
6	0.26	382.46	24.36	0.00	
7	134.97	380.68	23.28	0.00	
8	0.15	384.09	23.59	0.00	
9	0.16	384.09	20.89	0.00	
10	0.22	384.09	21.19	0.00	
11	0.21	384.09	20.59	0.00	
12	0.24	384.09	20.59	0.00	
13	0.21	384.09	19.29	0.00	
14	0.21	384.09	22.09	0.00	
15	0.18	384.09	23.79	0.00	
16	0.26	384.09	21.19	0.00	
17	0.24	384.09	25.09	0.00	
18	0.21	384.09	26.49	0.00	
19	0.16	384.09	26.99	0.00	
20	0.09	384.09	27.49	0.00	
21	0.21	384.09	26.89	0.00	
22	0.22	384.09	26.59	0.00	
23	0.20	384.09	25.89	0.00	
24	0.10	384.09	25.49	0.00	
25	0.00	384.09	21.69	0.00	
1	-144.06	356.60	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status	
2	-0.09	0.01	0.00	Open	
8	-51.65	1.64	10.45	Open	
10	-83.31	2.65	25.34	Open	
14	0.64	0.01	0.00	Open	
15	0.52	0.03	0.01	Open	
16	-0.28	0.02	0.00	Open	
17	0.56	0.03	0.01	Open	
18	-0.20	0.01	0.00	Open	
19	1.72	0.05	0.02	Open	
20	1.31	0.04	0.01	Open	
21	0.13	0.01	0.00	Open	
22	0.42	0.02	0.01	Open	
23	0.18	0.01	0.00	Open	
24	-0.02	0.00	0.00	Open	
25	-0.18	0.01	0.00	Open	
26	-0.28	0.01	0.00	Open	
27	0.07	0.00	0.00	Open	
28	-0.15	0.01	0.00	Open	
29	1.00	0.03	0.01	Open	
30	-0.34	0.02	0.00	Open	
31	0.55	0.02	0.00	Open	
32	-0.55	0.03	0.01	Open	
1	-60.18	0.85	1.92	Open	
3	-144.06	2.04	9.69	Open	
4	51.91	1.65	10.55	Open	
5	3.10	0.04	0.01	Open	
9	-0.48	0.03	0.01	Open	
11	-0.48	0.02	0.00	Open	
6	3.25	0.05	0.01	Open	
7	144.06	0.00	-28.55	Open	Pump

Page 1 8/29/2022 10:38:50 AM

```
******************************************************************
*                          E P A N E T                           *
*                  Hydraulic and Water Quality                   *
*                  Analysis for Pipe Networks                    *
*                        Version 2.2                             *
******************************************************************
```

Input File: 1279.E - JCT1.Node8.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm	
2	4	5	75	150	
8	7	6	170	200	
10	7	3	140	200	
11	5	8	105	300	
14	10	9	90	300	
15	10	12	120	150	
16	12	11	120	150	
17	12	13	70	150	
18	13	14	120	150	
19	10	14	80	200	
20	14	15	75	200	
21	15	16	120	150	
22	16	17	110	150	
23	17	18	100	150	
24	18	19	85	150	
25	19	20	85	200	
26	20	21	85	200	
27	21	22	70	150	
28	22	23	120	150	
29	15	24	70	200	
30	23	24	50	150	
31	24	21	115	200	
32	16	13	80	150	
1	5	3	70	300	
3	3	2	95	300	
4	5	6	155	200	
5	11	25	75	150	
6	9	25	70	200	
7	1	10	5	300	
9	1	8	110	300	
12	26	1	#N/A	#N/A	Pump

Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality	
2	0.00	383.44	26.94	0.00	
4	0.09	383.44	25.19	0.00	
5	4.92	383.44	25.24	0.00	
3	0.57	383.44	26.29	0.00	
6	0.26	383.44	25.34	0.00	
7	1.97	383.44	26.04	0.00	
8	97.15	383.45	22.95	0.00	
9	0.16	384.04	20.84	0.00	
10	0.22	384.04	21.14	0.00	
11	0.21	384.04	20.54	0.00	
12	0.24	384.04	20.54	0.00	
13	0.21	384.04	19.24	0.00	
14	0.21	384.04	22.04	0.00	
15	0.18	384.04	23.74	0.00	
16	0.26	384.04	21.14	0.00	
17	0.24	384.04	25.04	0.00	
18	0.21	384.04	26.44	0.00	
19	0.16	384.04	26.94	0.00	
20	0.09	384.04	27.44	0.00	
21	0.21	384.04	26.84	0.00	
22	0.22	384.04	26.54	0.00	
23	0.20	384.04	25.84	0.00	
24	0.10	384.04	25.44	0.00	
25	0.00	384.04	21.64	0.00	
1	0.00	384.04	21.24	0.00	
26	-108.06	362.90	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status	
2	-0.09	0.01	0.00	Open	
8	-0.72	0.02	0.00	Open	
10	-1.25	0.04	0.01	Open	
11	-7.80	0.11	0.04	Open	
14	0.64	0.01	0.00	Open	
15	0.52	0.03	0.01	Open	
16	-0.28	0.02	0.00	Open	
17	0.56	0.03	0.01	Open	
18	-0.20	0.01	0.00	Open	
19	1.72	0.05	0.02	Open	
20	1.31	0.04	0.01	Open	
21	0.13	0.01	0.00	Open	
22	0.42	0.02	0.01	Open	
23	0.18	0.01	0.00	Open	
24	-0.02	0.00	0.00	Open	
25	-0.18	0.01	0.00	Open	
26	-0.28	0.01	0.00	Open	
27	0.07	0.00	0.00	Open	
28	-0.14	0.01	0.00	Open	
29	1.00	0.03	0.01	Open	
30	-0.34	0.02	0.00	Open	
31	0.55	0.02	0.00	Open	
32	-0.56	0.03	0.01	Open	
1	1.82	0.03	0.00	Open	
3	0.00	0.00	0.00	Open	
4	0.98	0.03	0.01	Open	
5	-0.48	0.03	0.01	Open	
6	0.48	0.02	0.00	Open	
7	3.10	0.04	0.01	Open	
9	104.96	1.48	5.39	Open	
12	108.06	0.00	-21.14	Open	Pump

Appendix D: Supplemental Sketches

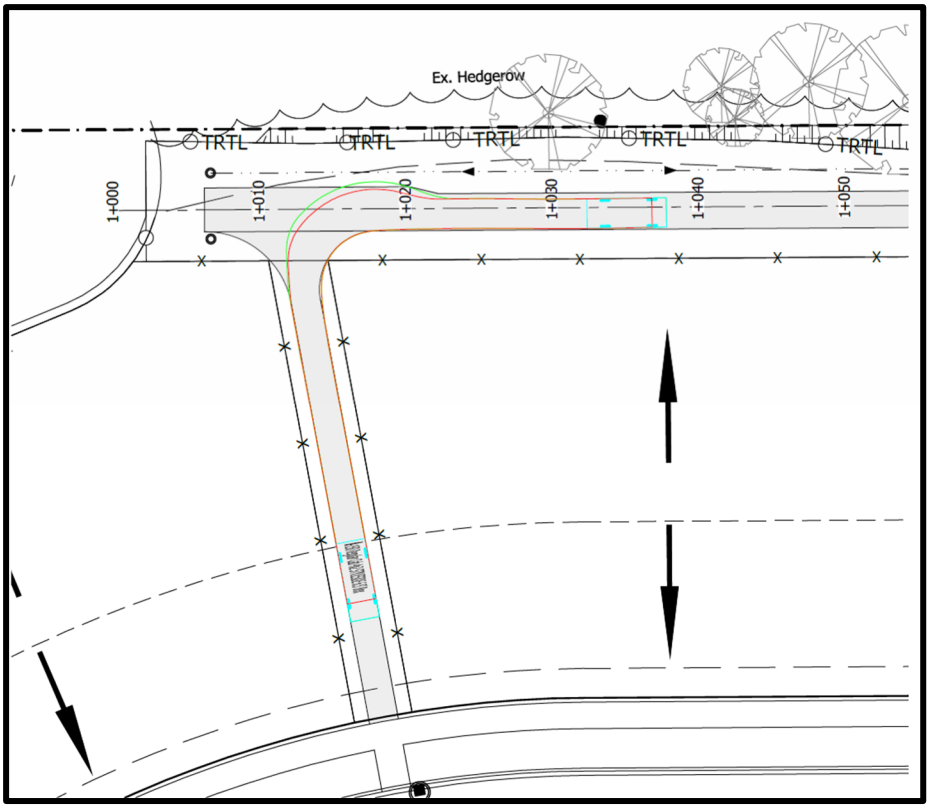
Truck Turning – Trail

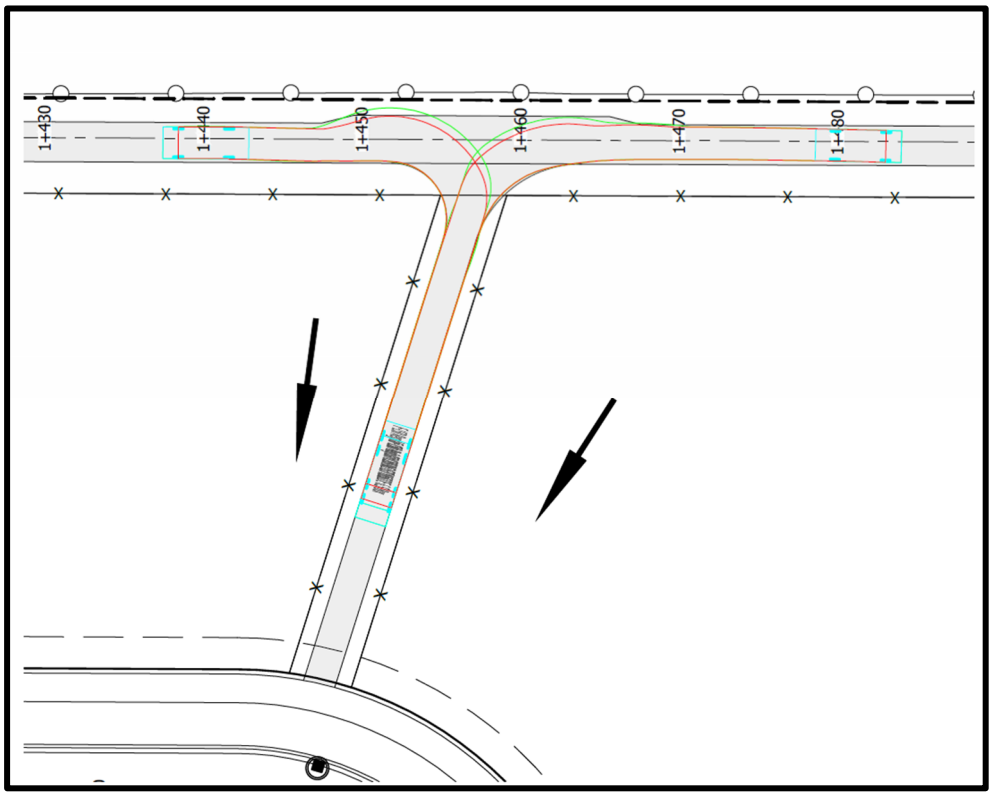
Park Grading Concept

Fence Plan

North Property Line Grading Drawings and Memo

Truck turning - Trail


Ex. Hedgerow
TRTL
TRTL
TRTL
TRTL
TRTL
1+000
1+010
1+020
1+030
1+040
1+050


1+430
1+440
1+450
1+460
1+470
1+480

ery Trail

BOLLARD GATE

DOG WASTE DISPOSAL

MOLOK GARBAGE

134

135

HYDRO CONNECTION AND APPROXIMATE LOCATION OF FUTURE LIGHT

PROPOSED ALTERNATIVE SANITARY SEWER CONNECTION

RINK LOCATION

30000

JUNIOR PLAY STRUCTURE

SAUCER SWING

18000

3m WIDE CONNECTION TO SCHOOL PROPERTY

Swale

Swale

PREFERRED SANITARY SEWER CONNECTION AND ASSOCIATED EASEMENT REQUIREMENT

12000

Block 247

Park

SOCCER PITCH EXTENDING FROM NEIGHBOURING SCHOOL PROPERTY

PASSIVE OPEN SPACE 1-2% SLOPE

4m WIDE STORMWATER POND ACCESS

FULL COURT

3 BAY SWING SET

REST AREA

BIKE RACKS

SENIOR PLAY STRUCTURE

30m Wetland Buffer

10m Dripline Setback

5 0 5 10 20

1:500 (m)

PRELIMINARY PARK PLAN

CONSERVATION DRIVE
WATERLOO

GSP group

201-72 Victoria Street South
Kitchener, Ontario N2G 4Y9
T 519 569 8883
F 519 569 8643

162 Locke Street South, Suite 200
Hamilton, Ontario L8P 4A9
T 905 572 7477

www.gspgroup.ca

drawing no.

L-SK #1

drawn by	LB
checked by	
printed	

scale	AS SHOWN
date	May 15, 2023
file	09009

drawing title:

PARK ELEMENTS AND SANITARY CONNECTION

LANDSCAPE SKETCH #1

Approx. end of turtle fence (attached to paige wire fence); 250m from wetland boundary

Silt fence on wooden stakes installed 0.5m in front of ex. farm fence

Double silt fence 4m apart

Silt fence @1m from edge of trail

Double silt fence ends approx. 25 m along Conservation Dr.

- Proposed turtle barrier fence- refined from NRSI EIS
- Living fence
- 1.5m Black-vinyl fence
- Double silt fence
- Silt fence
- Existing/new paige wire farm fence
- Dead end Barricade

Note: Line work is schematic in appearance

MERITECH engineering
1315 Bishop Street North, Suite 202 Cambridge
T 519.623.1140 F 519.623.7334 www.meritech.ca

DRAWING: Fence Layout Plan
556 & 576 Conservation Drive

DRAWN BY:	MS	SCALE:	1:2500
CHECKED BY:	CHT		Fence
FILE NAME:	1279.Figures	DATE:	Nov 2023

Memo

Date: February 13, 2019

To: Kristen Barisdale, MCIP, RPP
Associate, Senior Planner

cc: Glenn Scheels

From: Ian S. Robertson, P.Eng.

Re: **Trail Grading**
Cook/Mattamy Subdivision
Beaver Creek Meadows
City of Waterloo

Please find attached two options showing proposed grading along the north property line of the Cook/Mattamy development at 556/576 Conservation Drive.

Background

Our previous full submission for grading of the subject lands included a design along the north property line that included several retaining walls. The City of Waterloo requested that we reconsider our design in an attempt to reduce or eliminate these walls.

Discussion

We have met with the project team as well as City staff to determine the preferred features/criteria for the trail area. We have worked closely with the natural environment consultant, NRSI, to determine the impact on existing vegetation along this discontinuous hedgerow. As further described in the NRSI memo, the current design provides for and perhaps even enhances the potential for a wildlife linkage.

We have also worked with the builder, Mattamy, to refine their housing style in order to improve the lot grading design.

Option #1

This option virtually eliminates any retaining walls along the north property line. As shown on the plans attached, it is possible to provide the desired 3.0m trail, desired maintenance shoulders, while maintaining adjacent sideslopes within the space available. This option will have an impact on existing vegetation, but it is expected that the open space along the trail could be planted to compensate for any removals.

WWW.MERITECH.CA

Option #2

There is a natural high point in the land that causes the longitudinal slope of the trail to exceed the desired 5% for pedestrian use. In Option #1 the maximum slope is 9% for approximately 30m. Therefore, we looked at a second option to reduce the trail slope from 9% to 5%. In doing so, we re-introduce short sections of retaining walls.

Please refer to the drawings attached for plan/profile views as well as cross sections of the proposed trail.

It should be noted that we have taken liberties to shift the trail as necessary within the 3m and 5m blocks, in order to best accommodate the geometric design. It may be worthwhile inquiring of the City if these two blocks ought to be combined into a single open space block.

Summary

These two options substantially reduce the amount of retaining wall required along the north property line, while still providing the necessary trail geometry and sideslopes.

We trust that this meets the intent of the City's request. We look forward to receiving feedback on which option is preferred.

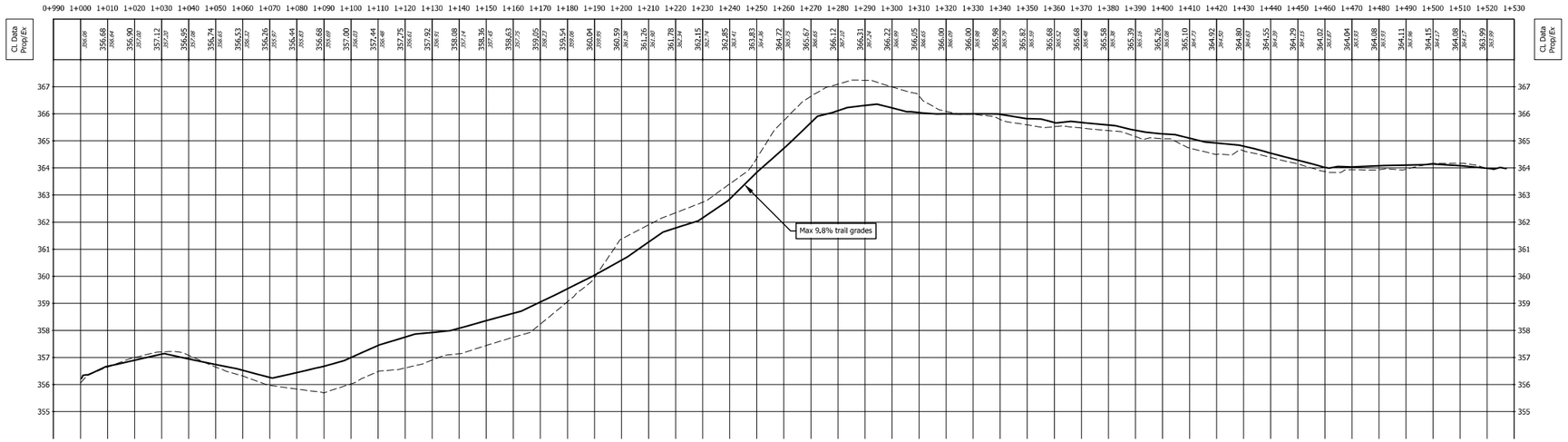
WWW.MERITECH.CA

MERITECH engineering
1150 Morrison Dr., Suite 202, Ottawa, ON
T 613.823.1240 F 613.823.2334 www.meritech.ca

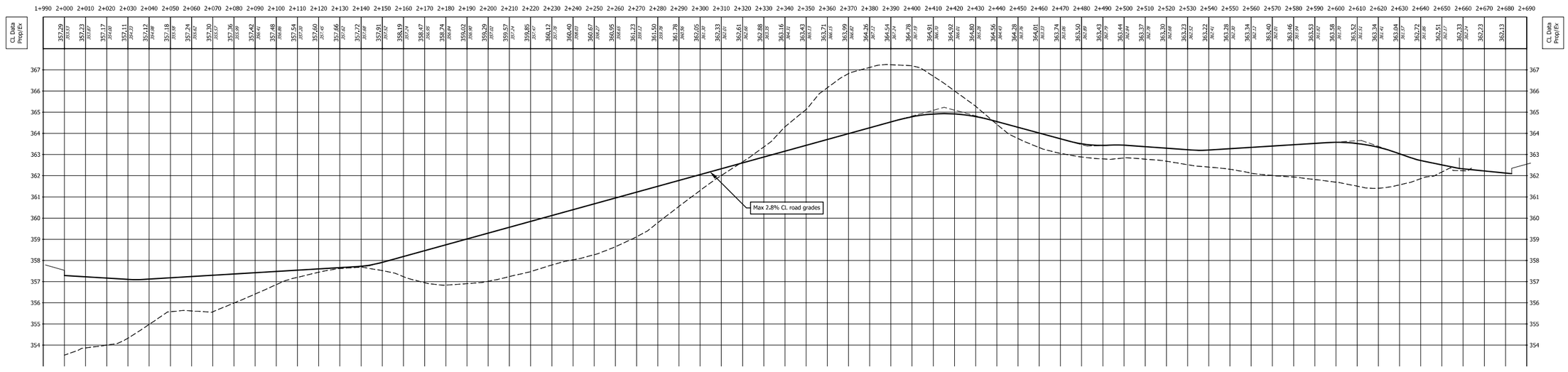
DRAWING: Conceptual Trail Grading - Option 1
556 & 576 Conservation Drive

DRAWN BY:	STV	SCALE:	1:500
CHECKED BY:	CHT		
DATE:	Feb, 2019		
FILE NAME:	1279-Figures		1279-NorthPL

Trail



Rideau River Street



MERITECH engineering
1150 Morrison Dr., Suite 202, Ottawa, ON
T: 613.823.1240 F: 613.823.2328 www.meritech.ca

DRAWING: Conceptual Profiles - Option 1
556 & 576 Conservation Drive

DRAWN BY:	CHECKED BY:	SCALE:
STV	CHT	1:1000
FILE NAME:	DATE:	
1279/Figures	Feb, 2019	1279-Profile

Trail, SL-1 1+005

Trail, SL-4 1+080

Trail, SL-7 1+170

Trail, SL-10 1+260

Trail, SL-2 1+020

Trail, SL-5 1+110

Trail, SL-8 1+200

Trail, SL-11 1+290

Trail, SL-3 1+050

Trail, SL-6 1+140

Trail, SL-9 1+230

Trail, SL-12 1+320

MERITECH engineering
1101 Brew City Redevelopment Dr., Unit 2, Oshkosh, WI 54901
T 519.623.1240 F 519.623.2324 www.meritechengineering.ca

DRAWING: Conceptual Trail Sections - 1 - Option 1
556 & 576 Conservation Drive

DRAWN BY:	STV	SCALE:	1:500
CHECKED BY:	CHT		
DATE:	Feb, 2019		
FILE NAME:	1279/figures		1279-XSect1

Trail, SL-13 1+350

Trail, SL-16 1+440

Trail, SL-19 1+515

Trail, SL-14 1+380

Trail, SL-17 1+470

Trail, SL-15 1+410

Trail, SL-18 1+500

MERITECH engineering
1150 Parkwood Circle SW, Suite 202, Cochrane
T 519.623.1140 F 519.623.2324 www.meritech.ca

DRAWING: Conceptual Trail Sections - 2 - Option 1
556 & 576 Conservation Drive

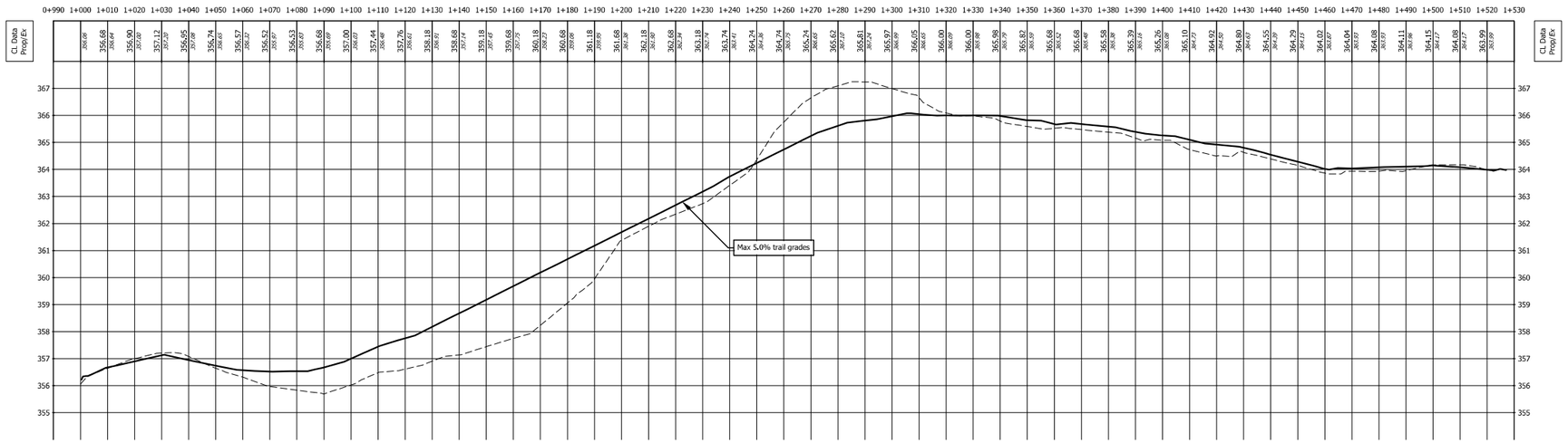
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SCALE:	1:500		
	1279-XSect2		

MERITECH engineering
1150 Morrison Dr., Suite 202, Ottawa, ON
T 613.823.1240 F 613.823.2334 www.meritech.ca

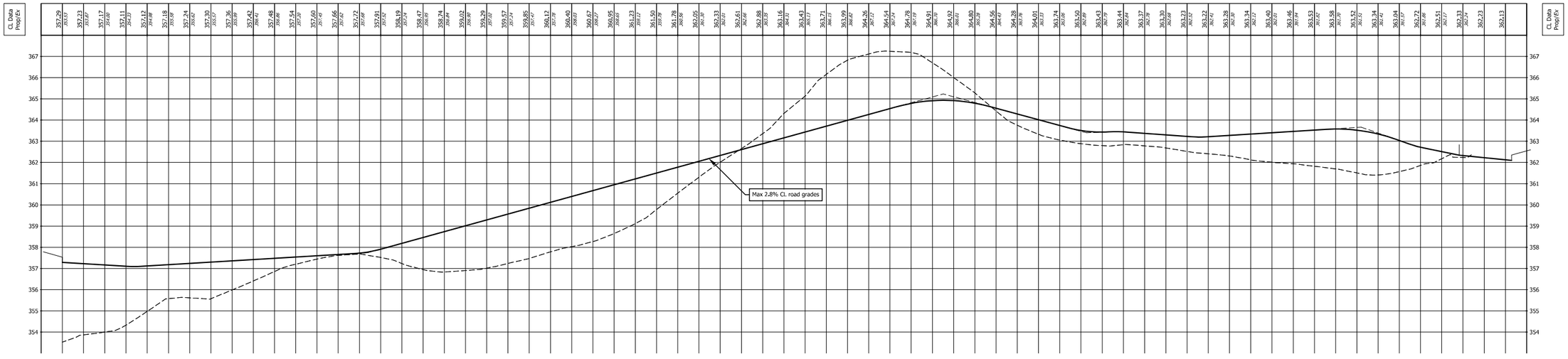
DRAWING: Conceptual Trail Grading - Option 2
556 & 576 Conservation Drive

DRAWN BY:	STV	SCALE:	1:500
CHECKED BY:	CHT		
DATE:	Feb, 2019		
FILE NAME:	1279-Figures - 2		1279-NorthPL

Trail



Rideau River Street



MERITECH engineering
1150 Morrison Dr., Suite 302, Ottawa, ON
T: 613.823.1240 F: 613.823.2326 www.meritech.ca

DRAWING: Conceptual Profiles - Option 2
556 & 576 Conservation Drive

DRAWN BY:	CHECKED BY:	SCALE:
STV	CHT	1:1000
FILE NAME: 1279/Figures - 2	DATE: Feb, 2019	1279-Profile

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Trail, SL-4 1+080

Trail, SL-7 1+170

Trail, SL-10 1+260

Trail, SL-2 1+020

Trail, SL-5 1+110

Trail, SL-8 1+200

Trail, SL-11 1+290

Trail, SL-3 1+050

Trail, SL-6 1+140

Trail, SL-9 1+230

Trail, SL-12 1+320

MERITECH engineering
1101 Brew City Redevelopment Dr., Unit 2, Oshkosh, WI 54901
T 519.623.1240 F 519.623.2334 www.meritechengineering.ca

DRAWING: Conceptual Trail Sections - 1 - Option 2
556 & 576 Conservation Drive

DRAWN BY:	CHECKED BY:	SCALE:
STV	CHT	1:500
FILE NAME: 1279\figures - 2	DATE:	1279-XSect1
	Feb, 2019	

Trail, SL-13 1+350

Trail, SL-16 1+440

Trail, SL-19 1+515

Trail, SL-14 1+380

Trail, SL-17 1+470

Trail, SL-15 1+410

Trail, SL-18 1+500

MERITECH engineering
1150 Bronte St S Unit 201, Milton, ON L9E 2L7
T 519.823.1240 F 519.823.2324 www.meritech.ca

DRAWING: Conceptual Trail Sections - 2 - Option 2
556 & 576 Conservation Drive

DRAWN BY:	STV	SCALE:	1:500
CHECKED BY:	CHT		
DATE:	Feb, 2019		1279-XSect2
FILE NAME:	1279-Figures - 2		

From: Stefan VanHartingsveldt
Sent: June 7, 2023 10:20 AM
To: Mithra Sriram
Subject: FW: Conservation Drive - North Property Boundary JQ1279

Categories: Tracked To Dynamics 365

Mithra,
Here is the email we got with comments/responses to our trail submission.
Stefan

From: Kristen Barisdale <kbarisdale@gspgroup.ca>
Sent: Friday, March 1, 2019 2:54 PM
To: icook@cookhomes.ca; Brad.Trussler@mattamycorp.com; Ian S. Robertson <ianr@meritech.ca>; Stefan VanHartingsveldt <stefanv@meritech.ca>; Elaine Gosnell <egosnell@nrsi.on.ca>
Cc: Glenn Scheels <gscheels@gspgroup.ca>
Subject: FW: Conservation Drive - North Property Boundary

All,

See response below from the City regarding the north property.

The City appears to be accepting our preferred option, which is Option #1 with the natural linkage that tapers east to west.

Ian/Stefan – it seems to me that most of their commentary below relates to engineering.

I suggest that we have a quick conference call (or meeting, if preferred) to go through each comment step by step to ensure we are addressing their concerns promptly.

Please confirm your availability on the following dates:

Tuesday, March 5 between 9:00 and 11:30
Wednesday, March 6 between 9:00 and 11:30, or 1:30 and 4:30
Thursday, March 7 between 9:00 and 2:00
Friday, March 8 between 9:00 and 12:00

Thanks everyone!

Kristen Barisdale, MCIP, RPP
Associate, Senior Planner

GSP Group Inc.
Planning | Urban Design | Landscape Architecture
72 Victoria Street South, Suite 201
Kitchener, ON N2G 4Y9
519 569 8883



From: Natalie Hardacre <Natalie.Hardacre@waterloo.ca>
Sent: Thursday, February 28, 2019 1:48 PM
To: Kristen Barisdale <kbarisdale@gspgroup.ca>
Cc: Barb MageeTurner <Barb.MageeTurner@waterloo.ca>; Robyn McMullen <Robyn.McMullen@waterloo.ca>; Darren Scott <Darren.Scott@waterloo.ca>; Philip Hewitson <Philip.Hewitson@waterloo.ca>; Glenn Scheels <gscheels@gspgroup.ca>
Subject: RE: Conservation Drive - North Property Boundary

Hello Kristen,

City staff have reviewed the options presented in your email below for the north property boundary of Draft Plan 30T-16402, particularly the ecological corridor and Avon Trail connection. In response, please accept the following comments.

Option 1

- This concept is the preferred of the two options presented, but still requires adjustments.
- Please further reduce grades to achieve a maximum 8% slope to meet AODA standards.
    - Can low section west of 9% grade be raised to reduce slope?
    - Retaining walls on private property should be reduced to the extent possible. It is staff's preference that these retaining walls be removed completely.
- We understand that grading is a challenge with this site. To assist your team with the grading review and in attempt to improve proposed conditions, please provide grading cross sections of the site in a north south direction from Conservation Drive to the north property limit. These should include, at a minimum:
    - The location of the most extreme grades (highest point and lowest point)
    - A few other locations throughout the property.
- Please provide additional information with respect to proposed grading on private lots with retaining walls. These lots, along with others along the north property limit, appear to be 'split' however it is unclear where the north half of the lots drain to and the overall drainage approach for the trail system. Staff require a better understanding of how these lots are graded to ensure no ponding/drainage onto the trail block.
- More legible trail cross sections are required. At a minimum, cross sections should show location of property lines, trail and buffer and corresponding slopes respectively for reference.
- Confirm that proposed slopes shown within trail block are 3:1. It may be possible to review 1:1 slopes in specific locations to reduce the need for retaining walls. This can be reviewed in connection with our Engineering Department.

Option 2

- This concept is not supported by staff.
- Staff are not supportive of retaining walls on public property.
- Conceptual Trail Sections show a grade drop of between 1.0 to 2.0 metres in many sections of the trail. This significant grade differential is not supported by staff for various reasons including safety, the need for a railing in many locations, future erosion of the trail, and long term maintenance and liability.

Other Requirements/Considerations

- Both the ecological/hedgerow block and the trail block can be consolidated as one Block on the Draft Plan of Subdivision, to be conveyed to the City.

- A full Naturalization and Planting Plan will be required for this entire Block.
- The condition of trees and anticipated/possible tree removal will be subject to review and approval by the City's Landscape Architect and Engineering Services.
- The developer will be responsible for the installation of the City standard black vinyl chain link fencing along the trail at 1.5m min. height.
- Staff require that all trees to be retained are tagged/flagged. Implementation measures to ensure their protection and preservation will be the responsibility of the developer and to the satisfaction of the City.
- A full detailed design is required for the trail, including where the trail connects to walkways, ensuring sufficient turning radius for maintenance vehicles, cross slopes, drainage, and able to support vehicular traffic.
- Additional 4.0 metres wide walkways are required to connect Rideau River Street with the trail, particularly on the east half of the property. Consider aligning a walkway with Street A, or see comment below.
- An overland flow route is shown as existing from the abutting lands to the north in the location of Lot 7 and Lot 8. Where will this flow be directed to? Consider a walkway in this location (between Lot 7 and Lot 8) to accommodate flows in addition to establishing a pedestrian connecting between Rideau River Street and the trail.
- A 4.0 metre wide walkway connection should be provided between Street D and Rideau River Street.

Should you have any questions with the above, please do not hesitate to contact me.

Thanks,

Natalie



Natalie Hardacre, BES, MCIP, RPP
Development Planner, Planning Approvals
Integrated Planning & Public Works
City of Waterloo
100 Regina Street South
PO Box 337 STN Waterloo, ON N2J 4A8
P: 519.514.0225 | **F:** 519.747.8523 | **TTY:** 1.866.786.3941
E: natalie.hardacre@waterloo.ca | www.waterloo.ca

From: Kristen Barisdale [mailto:kbarisdale@gspgroup.ca]
Sent: Wednesday, February 13, 2019 5:36 PM
To: Natalie Hardacre; Barb MageeTurner; Robyn McMullen
Cc: Ian Robertson; Stefan VanHartingsveldt; Glenn Scheels; Elaine Gosnell
Subject: Conservation Drive - North Property Boundary

Good afternoon all,

Further to our last meeting regarding the north property line, and the trail connection and natural heritage linkage, please find attached the supplementary information prepared by both Meritech and NRSI to assist with your review and consideration.

In addition, I am attaching the most recent version of the draft plan of subdivision, which accounts for the trail and linkage connection as assessed in the material provided by Meritech and NRSI.

Please let us know if you have any questions, or would like to discuss further.

Kristen Barisdale, MCIP, RPP
Associate, Senior Planner

GSP Group Inc.
Planning | Urban Design | Landscape Architecture
72 Victoria Street South, Suite 201
Kitchener, ON N2G 4Y9
519 569 8883



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Existing wetland finger to the west

Paige wire fence on wooden posts to be installed at top of slope between trail and farm lands to the north.

Drainage goes west to wetland finger.

2.5m asphalt trail

Planted hedgerow area used to make up grade. Max 3:1 slopes

1.5m vinyl chain-link fence to be installed on property line between lots and trail

Proposed 255m x 2m x 0.84m clear stone infiltration gallery

10" Nyloplast drains in swale connected to 200mma perforated pipe in infiltration gallery (typ)

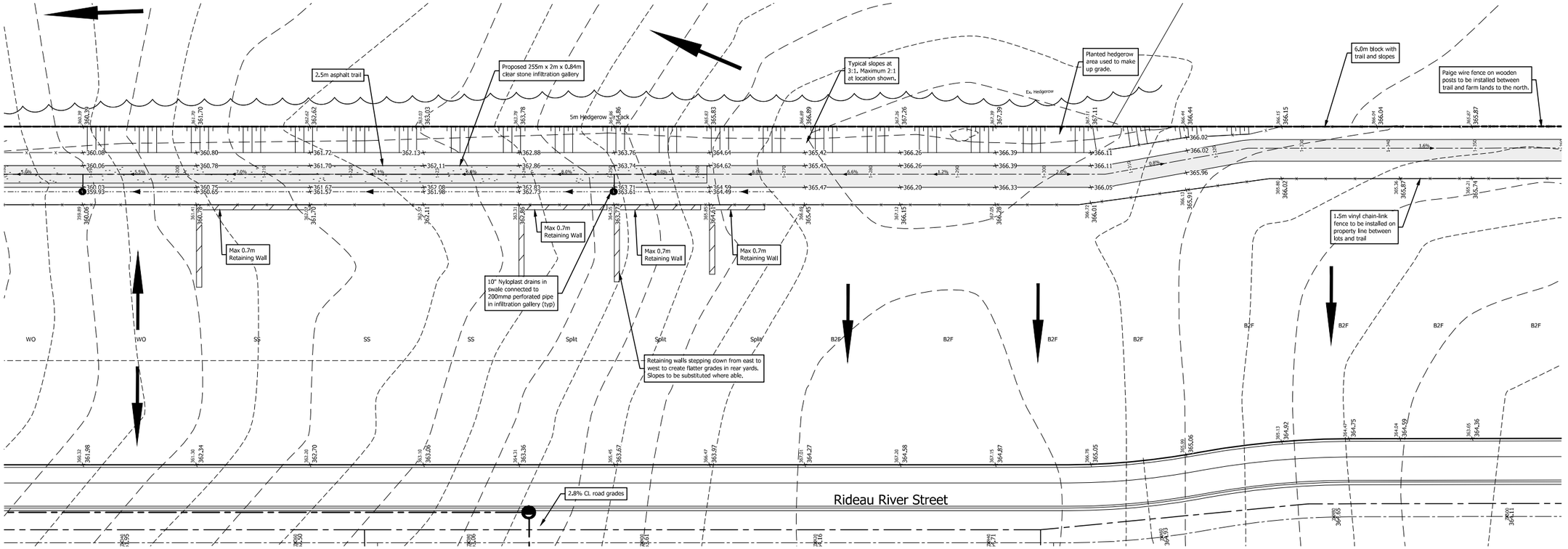
3.0m asphalt trail connection

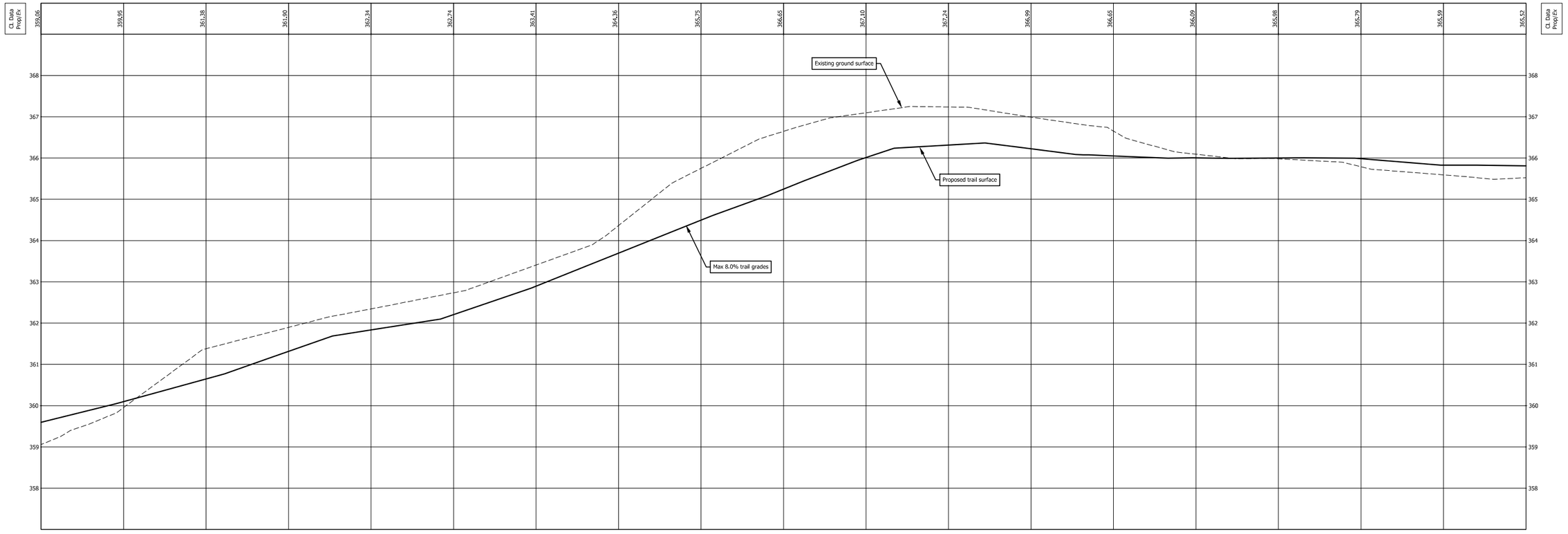
Max 3.0% CL road grades

MERIDIAN engineering
1135 Bella Rd, Kamloops, BC, V2C 2M2
T 250.823.2148 F 250.823.2304 www.meridian.ca

DRAWING: Conceptual Trail Grading - Option 1
556 & 576 Conservation Drive

DRAWN BY:	CHECKED BY:	SCALE:
STV	CH	1:250
FILE NAME: 1279.Figure6	DATE: Aug 2023	1279-NorthPL

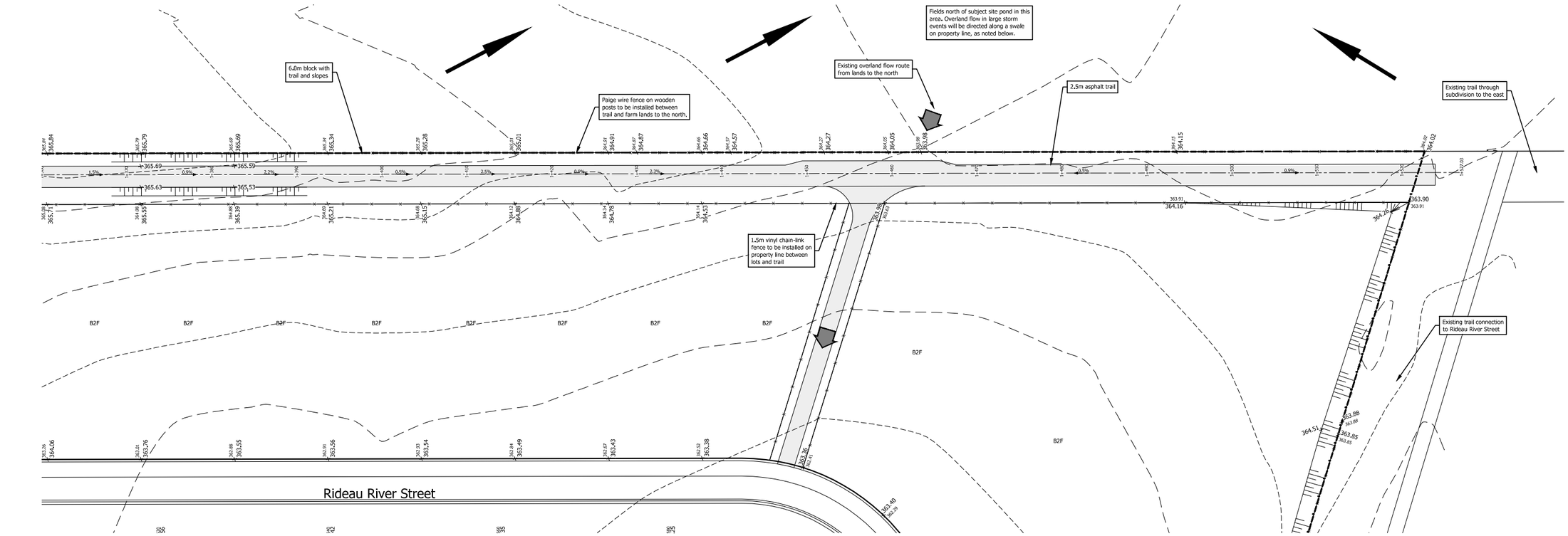


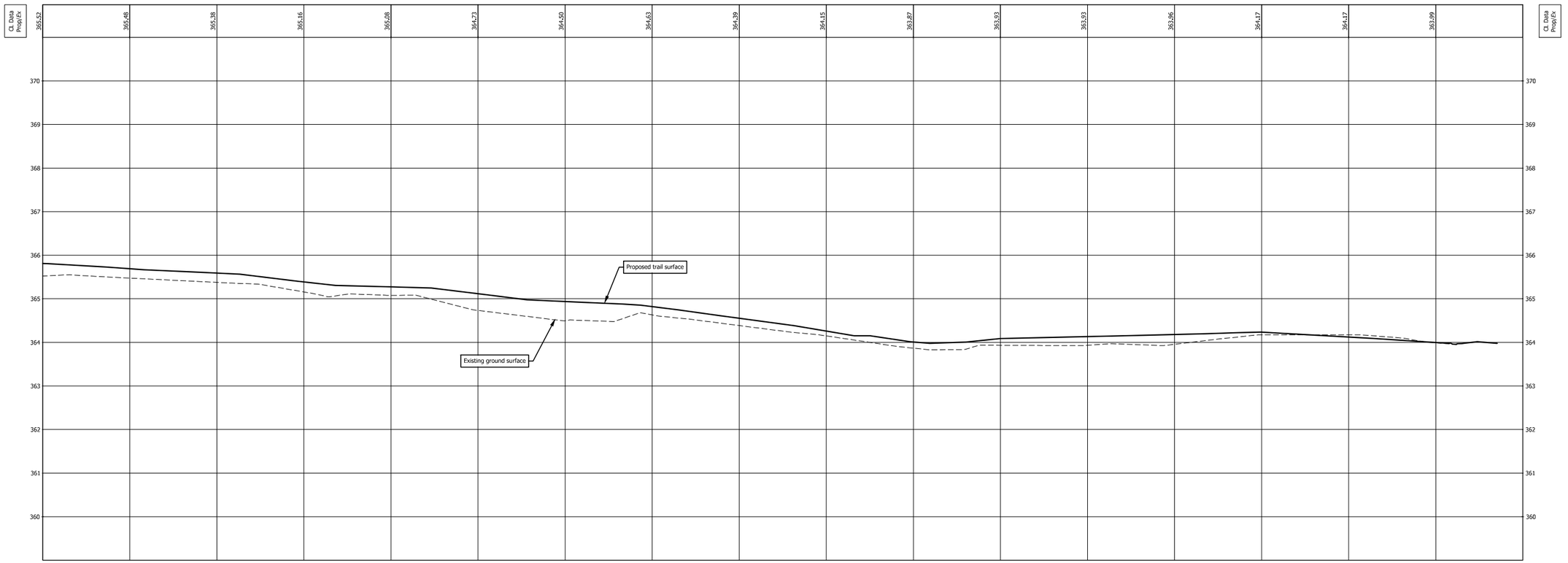


MERITECH engineering
1150 Bank St., Suite 202, Ottawa, ON
T 613.521.1140 F 613.521.2304 www.meritech.ca

DRAWING: Conceptual Trail Grading - Option 1
556 & 576 Conservation Drive

DRAWN BY:	STV	CHECKED BY:	CMT
FILE NAME:	1279-Figures	DATE:	Aug 2023
SCALE:	1:250		
	1279-NorthPL		





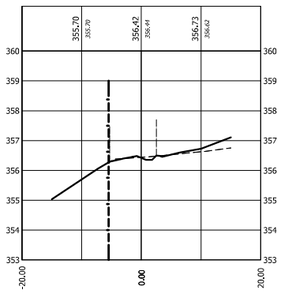
MERIDIAN Engineering
1150 Bank St, Ottawa, ON K1S 3W7
T 613.823.1240 F 613.823.2304 www.meridian.ca

DRAWING: Conceptual Trail Grading - Option 1
556 & 576 Conservation Drive

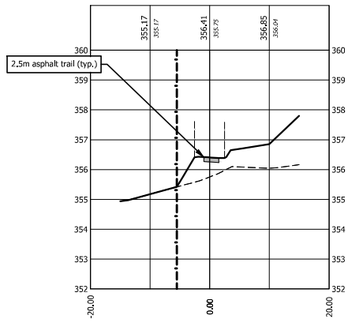
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		DATE:	Aug 2023

1279-NorthPL

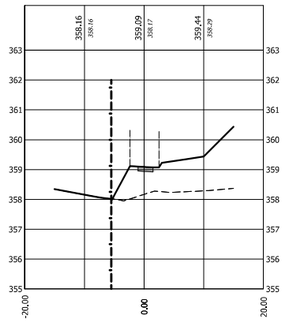
Trail, SL-1 1+005



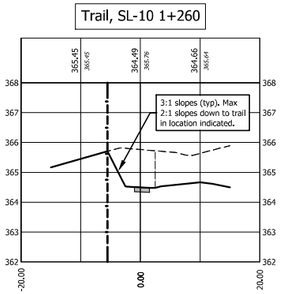
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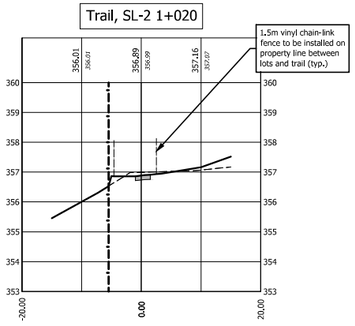
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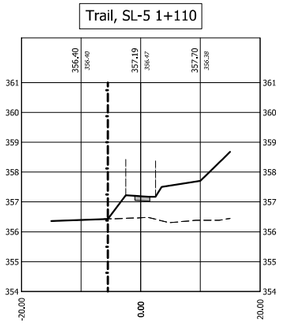
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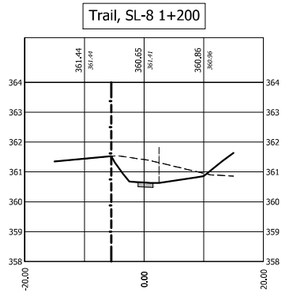
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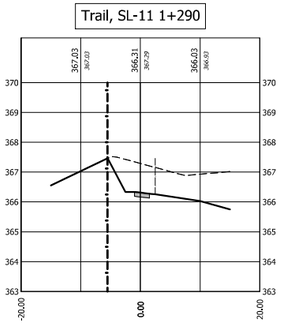
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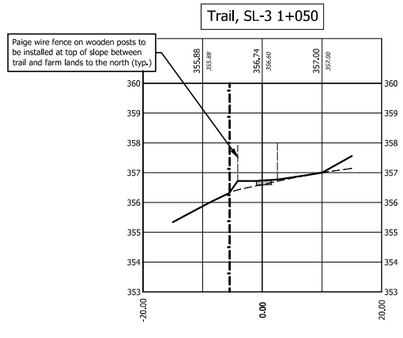
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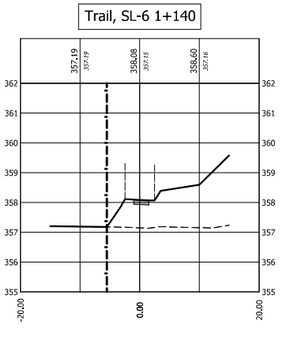
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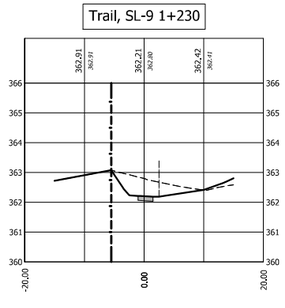
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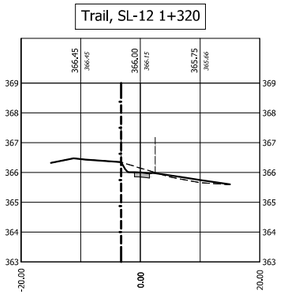
Trail, SL-6 1+140



Trail, SL-9 1+230



Trail, SL-12 1+320



MERIDIAN Engineering
1155 Bank St, Ottawa, ON, K1S 3W3
T 519.823.1140 F 519.623.2304 www.meridian.ca

DRAWING: Conceptual Trail Sections - 1 - Option 1
556 & 576 Conservation Drive

DRAWN BY:	STV	SCALE:	1:500
CHECKED BY:	CHT	DATE:	Aug 2023
FILE NAME:	1279.Figures		1279-XSect1

Trail, SL-13 1+350

Trail, SL-16 1+440

Trail, SL-19 1+515

Trail, SL-14 1+380

Trail, SL-17 1+470

Trail, SL-15 1+410

Trail, SL-18 1+500

MERIDIAN Engineering
1155 Rene Gordon Dr., Ste. 202, London, ON
T 519.631.7140 F 519.631.2304 www.meridian.on.ca

DRAWING: Conceptual Trail Sections - 2 - Option 1
556 & 576 Conservation Drive

DRAWN BY:	STV	CHECKED BY:	CMT
FILE NAME:	1279-Figures	DATE:	Aug 2023
SCALE:	1:500		
	1279-XSect2		

Appendix E: Agency Correspondence

Pre-submission comments

Region's modelling report

Grand River Conservation Authority
Resource Management Division
Kaitlyn Smith, Resource Planner

400 Clyde Road, P.O. Box 729
Cambridge, Ontario N1R 5W6
Phone: (519) 621-2761 ext. 2292
Fax: (519) 621-4945
E-mail: ksmith@grandriver.ca

PLAN REVIEW REPORT:	**Region of Waterloo** **Shiling Yip**

DATE:	**YOUR FILE:**	**GRCA FILE:**
September 14, 2015	Conservation Dr. at Beaver Creek Rd.	Presub 556, 560 & 576 Conservation Drive

RE: **Presubmission Draft Plan of Subdivision & Zone Change Application**
556, 560 and 576 Conservation Drive, City of Waterloo
2115881 Ontario Limited

GRCA COMMENT*:
A portion of the subject properties are regulated by the Grand River Conservation Authority (GRCA) under Ontario Regulation 150/06. GRCA request an opportunity to review the formal applications to ensure conformance with the relevant policies of the Provincial Policy Statement, the North Waterloo Scoped Subwatershed Study, and Ontario Regulation 150/06. Please see below for our detailed review requirements.

1. **Nature of the Application:**
   It is our understanding that the applicant is proposing to develop the vacant properties with a mix of low rise residential uses, including associated school, park, open space, and stormwater management blocks.

2. **GRCA Resource Issues:**
   Information currently available at this office indicates that the subject properties contain the following natural heritage and hazard features of interest to the GRCA:

   - Sunfish Lake – Laurel Creek Provincially Significant Wetland Complex and associated 120 metre allowance
   - Beaver Creek and associated 15 metre allowance
   - One Zone floodplain and associated 5 metre allowance

   Due to the presence of these resource features, a portion of the subject properties is regulated by the GRCA under Ontario Regulation 150/06 (Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation).

3. **Review of Application under the *Planning Act*:**
   For review of the Draft Plan of Subdivision and Zone Change applications, GRCA staff will require submission of the following materials:

   - Scoped Environmental Impact Study (EIS)
   - Stormwater Management (SWM) & Servicing Report
   - Hydrogeological Assessment
   - Pre-construction Monitoring Report (2 years)
   - Preliminary Grading and Erosion and Sediment Control Plans

   We note that the North Waterloo Scoped Subwatershed Study (NWSSS) recommends a 30 metre buffer for all Provincially Significant Wetlands in the subwatershed. The preliminary plan has incorporated this buffer, which also provides sufficient development setback from the creek and floodplain. GRCA staff support the Open Space zoning; however, a portion of the buffer (Block 35) is shown as Park. This is not the intent of the 30 metre buffer; therefore, GRCA staff request that this be revised to Open Space.

We also note that Stormwater Management Blocks 38 and 39 encroach into the wetland buffer. In accordance with the NWSSS, the Scoped EIS and SWM Report will need to demonstrate that there are no feasible locations outside of the buffer and that adverse impacts to the natural features can be avoided and/or mitigated appropriately. Please be advised that buffer encroachment shall only be permitted for *a portion* of stormwater management, not entire facilities.

Trail locations should also be shown on the Draft Plan of Subdivision and addressed in the supporting documentation (with attention paid to the requirements of the NWSSS).

4. **Review of Application under Ontario Regulation 150/06:**
Development proposed with GRCA regulated areas requires prior issuance of a GRCA permit pursuant to Ontario Regulation 150/06. GRCA staff will review the Draft Plan of Subdivision and Zone Change applications for conformance with Ontario Regulation 150/06 and advise of any specific permit requirements through that process.

5. **Plan Review Fees:**
The GRCA applies Plan Review Fees for *Planning Act* applications located within GRCA areas of interest. Given that the Draft Plan of Subdivision and Zone Change applications will be submitted concurrently, only the subdivision fee will be applied.

According to the 2015 Plan Review Fee Schedule, the fee for a Draft Plan of Subdivision application is $2,050 (base fee) plus $1,070 per net hectare (to a maximum of $25,000). Upon submission of the application, the GRCA will invoice for 70% of the total fee. The remaining 30% will be due prior to GRCA providing conditions for Draft Plan Approval. Additional fees are applied for providing clearance of Draft Plan Approval conditions for registration of the plan.

Please be advised that a separate fee is applied for a GRCA permit application. A 'minor' fee of $380 is typically applied in cases where GRCA staff have already reviewed the related Draft Plan of Subdivision.

We trust this information is of assistance. If you have any questions, or require additional information, please do not hesitate to contact the undersigned.

Sincerely,

Kaitlyn Smith
Resource Planner
Grand River Conservation Authority

cc: Kristen Barisdale – GSP Group (email)
Trevor Hawkins – City of Waterloo (email)
Robyn McMullen – City of Waterloo (email)

**** These comments are respectfully submitted as advice and reflect resource concerns within the scope and mandate of the Grand River Conservation Authority***

Region of Waterloo

TRANSPORTATION AND
ENVIRONMENTAL SERVICES
Water Services

150 Frederick Street
Kitchener ON Canada N2G 4J3
Telephone: (519) 575-4426
Fax: (519) 575-4452
www.region.waterloo.on.ca

Date: July 19, 2021
File #: E18-10/KI

Chris Togeretz, P. Eng.
Meritech Engineering
1315 Bishop St N, Suite 202
Cambridge, ON N1R 6Z2
t. 519.623.1140 ext 214
e. christophert@meritech.ca

Dear: Chris

Re: 556-576 Conservation Dr, Waterloo

Please find the results of the modeling simulations for boundary conditions requested on April 13, 2021. The results include a figure showing the locations of the nodes from the Region's model. The diurnal 24-hour demand distribution accounts for the minimum hour and peak hour peaking factors. The maximum pressure on the average day represents the minimum hour, and the minimum pressure on the maximum day represents the peak hour.

Two scenarios were modeled for this request and are summarized in Table 1 below.

Table 1 – Scenario Descriptions

Scenario	Description
Scenario 1	No Beaver Creek Meadows infrastructure included. Servicing for subject site provided by existing infrastructure on Conservation Dr and Roy Schmidt Rd with internal site looping.
Scenario 2	Watermains on Beaver Creek Rd, Conservation Dr, and Erbsville Rd are included, providing WAT 5 looping but no interconnection with WAT 4C. No other WAT 5 watermains included.

For Scenario 2, only the following proposed watermains were included in the analysis:

- Erbsville Rd (Regal Pl to Conservation Dr) 300mm PVC
- Conservation Dr (Erbsville Rd to Beaver Creek Rd) 300mm PVC
- Beaver Creek Rd (Laurel Creek Nature Centre to Conservation Dr) 300mm PVC

The other proposed watermains from the Waterloo Zone 4B, 4C, and 5 consolidations study were not included, specifically the watermains on:

- Bearinger Rd (Laurelwood Dr to Westmount)
- Columbia St. (Westmount Rd to Hagey Blvd)
- Erbsville Rd (Blue Beech Blvd to Werni Ct) and
- Erbsbville Rd (Erbsville Crt to White Elm Blvd)

Attached are a series of spreadsheets containing results for Average Day, Maximum Day demands and available fire flows for various nodes under various scenarios.

Table 2 – Modeling Results

Scenario	Node	Elevation (mASL)	Demand				Fire Flow Results	
			Ave Day (L/s)		Max Day (L/s)		Design Flow (L/s)	Design Pressure (m)
			res	emp	res	emp		
1	JCT_MTC_01	362.9	2.3	1.9	3.5	2.8	126.8	14.0
	JCT_MTC_03	358.2	2.3	1.9	3.5	2.8	122.5	14.0
2	JCT_39019	356.6	4.6	3.7	6.9	5.5	204.7	14.0

A fire flow analysis shows the maximum flow available at a node with an associated design pressure during the maximum day scenario while maintaining the minimum design pressure of 14 m (140 kPa) at all nodes within the pressure zone.

If you have any questions, please contact me.



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WAT 4C Infowater Location : Street A and Pinery Trail
Scenario 1

JCT_MTC_0 Average Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	3.05	404.90	42.00
01:00 hrs	2.62	404.93	42.03
02:00 hrs	2.44	404.93	42.03
03:00 hrs	2.39	404.93	42.03
04:00 hrs	2.21	404.94	42.04
05:00 hrs	2.14	404.95	42.05
06:00 hrs	2.79	404.91	42.01
07:00 hrs	4.17	404.80	41.90
08:00 hrs	5.13	404.70	41.80
09:00 hrs	5.39	404.70	41.80
10:00 hrs	5.41	404.70	41.80
11:00 hrs	5.55	404.69	41.79
12:00 hrs	5.47	404.70	41.80
13:00 hrs	5.25	404.72	41.82
14:00 hrs	5.05	404.74	41.84
15:00 hrs	4.78	404.77	41.87
16:00 hrs	4.77	404.77	41.87
17:00 hrs	4.78	404.76	41.86
18:00 hrs	4.87	404.75	41.85
19:00 hrs	4.87	404.74	41.84
20:00 hrs	4.63	404.76	41.86
21:00 hrs	4.33	404.79	41.89
22:00 hrs	4.04	404.82	41.92
23:00 hrs	3.55	404.86	41.96

Average Day HGL: 404.80
Minimum Hour: 404.95

JCT_MTC_0 Maximum Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	4.26	404.83	41.93
01:00 hrs	3.53	404.88	41.98
02:00 hrs	3.06	404.90	42.00
03:00 hrs	3.25	404.89	41.99
04:00 hrs	3.37	404.88	41.98
05:00 hrs	3.27	404.89	41.99
06:00 hrs	5.49	404.72	41.82
07:00 hrs	7.98	404.40	41.50
08:00 hrs	8.75	404.27	41.37
09:00 hrs	8.71	404.33	41.43
10:00 hrs	8.01	404.44	41.54
11:00 hrs	7.86	404.46	41.56
12:00 hrs	7.82	404.48	41.58
13:00 hrs	7.16	404.53	41.63
14:00 hrs	6.10	404.62	41.72
15:00 hrs	6.40	404.61	41.71
16:00 hrs	6.31	404.58	41.68
17:00 hrs	6.16	404.59	41.69
18:00 hrs	6.83	404.50	41.60
19:00 hrs	7.49	404.41	41.51
20:00 hrs	7.69	404.39	41.49
21:00 hrs	7.27	404.46	41.56
22:00 hrs	6.41	404.60	41.70
23:00 hrs	5.53	404.71	41.81

Maximum Day HGL: 404.60
Peak Hour: 404.27

WAT 4C Infowater Location : Street A and Pinery Trail

JCT_MTC_01	Residual Pressure (m)
0.0	42.0
10.0	41.4
20.0	40.6
30.0	39.5
40.0	38.1
50.0	36.4
60.0	34.4
70.0	32.2
80.0	29.6
90.0	26.9
100.0	23.8
110.0	20.5
120.0	17.0
126.8	14.0

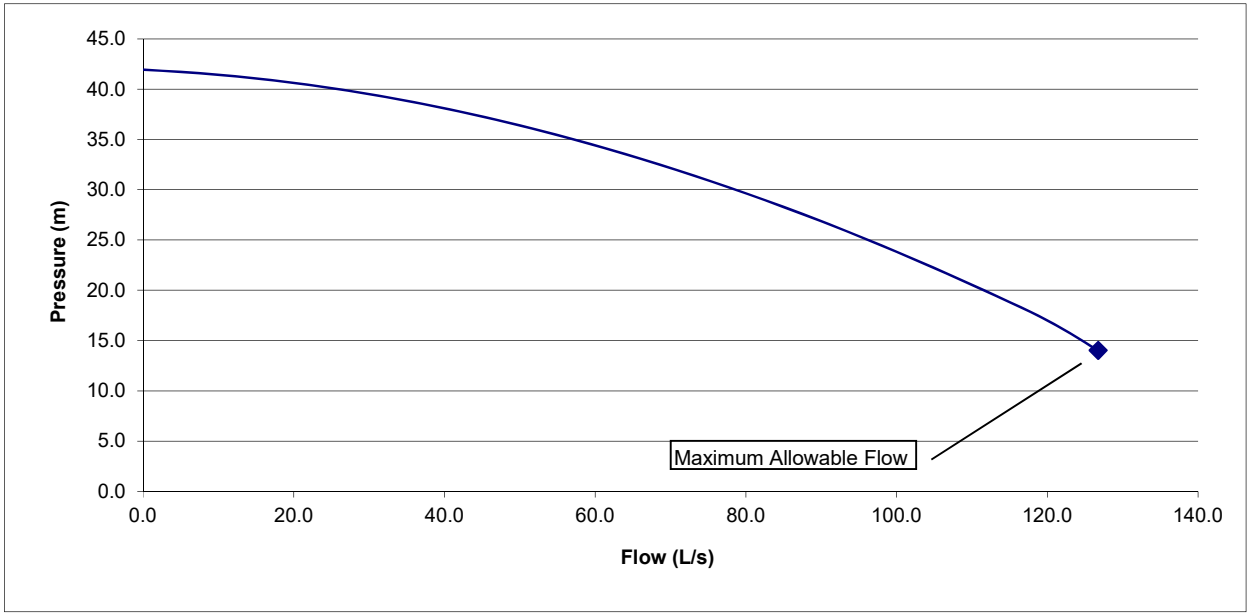
Fire Flow Analysis

Fire Flow Node:	JCT_MTC_01
Design Flow (L/s):	126.8
Design Pressure (m)	14.0

The final adjusted flow at the node to maintain the minimum design pressure (14m (140 kPa)) at ALL locations within the pressure zone.

The lowest allowable pressure at the node to maintain the minimum design pressure (14m (140 kPa)) at ALL locations within the pressure zone.

The constraining node within the pressure zone that drops to the minimum design pressure of (14m (140 kPa)) during the design flow.



WAT 4C Infowater Location : Street A middle
Scenario 1

JCT_MTC_0 Average Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	3.05	404.90	46.70
01:00 hrs	2.62	404.92	46.72
02:00 hrs	2.44	404.93	46.73
03:00 hrs	2.39	404.93	46.73
04:00 hrs	2.21	404.94	46.74
05:00 hrs	2.14	404.95	46.75
06:00 hrs	2.79	404.91	46.71
07:00 hrs	4.17	404.79	46.59
08:00 hrs	5.13	404.69	46.49
09:00 hrs	5.39	404.69	46.49
10:00 hrs	5.41	404.69	46.49
11:00 hrs	5.55	404.68	46.48
12:00 hrs	5.47	404.69	46.49
13:00 hrs	5.25	404.71	46.51
14:00 hrs	5.05	404.74	46.54
15:00 hrs	4.78	404.76	46.56
16:00 hrs	4.77	404.76	46.56
17:00 hrs	4.78	404.76	46.56
18:00 hrs	4.87	404.74	46.54
19:00 hrs	4.87	404.73	46.53
20:00 hrs	4.63	404.75	46.55
21:00 hrs	4.33	404.78	46.58
22:00 hrs	4.04	404.81	46.61
23:00 hrs	3.55	404.86	46.66

Average Day HGL: 404.80
Minimum Hour: 404.95

JCT_MTC_0 Maximum Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	4.26	404.82	46.62
01:00 hrs	3.53	404.88	46.68
02:00 hrs	3.06	404.90	46.70
03:00 hrs	3.25	404.89	46.69
04:00 hrs	3.37	404.88	46.68
05:00 hrs	3.27	404.89	46.69
06:00 hrs	5.49	404.71	46.51
07:00 hrs	7.98	404.38	46.18
08:00 hrs	8.75	404.25	46.05
09:00 hrs	8.71	404.31	46.11
10:00 hrs	8.01	404.42	46.22
11:00 hrs	7.86	404.45	46.25
12:00 hrs	7.82	404.46	46.26
13:00 hrs	7.16	404.52	46.32
14:00 hrs	6.10	404.61	46.41
15:00 hrs	6.40	404.59	46.39
16:00 hrs	6.31	404.57	46.37
17:00 hrs	6.16	404.58	46.38
18:00 hrs	6.83	404.49	46.29
19:00 hrs	7.49	404.40	46.20
20:00 hrs	7.69	404.37	46.17
21:00 hrs	7.27	404.44	46.24
22:00 hrs	6.41	404.59	46.39
23:00 hrs	5.53	404.70	46.50

Maximum Day HGL: 404.59
Peak Hour: 404.25

WAT 4C Infowater Location : Street A middle

JCT_MTC_03	Residual Pressure (m)
0.0	46.7
10.0	46.1
20.0	45.1
30.0	43.8
40.0	42.0
50.0	39.9
60.0	37.4
70.0	34.5
80.0	31.3
90.0	27.8
100.0	23.9
110.0	19.7
120.0	15.2
122.5	14.0

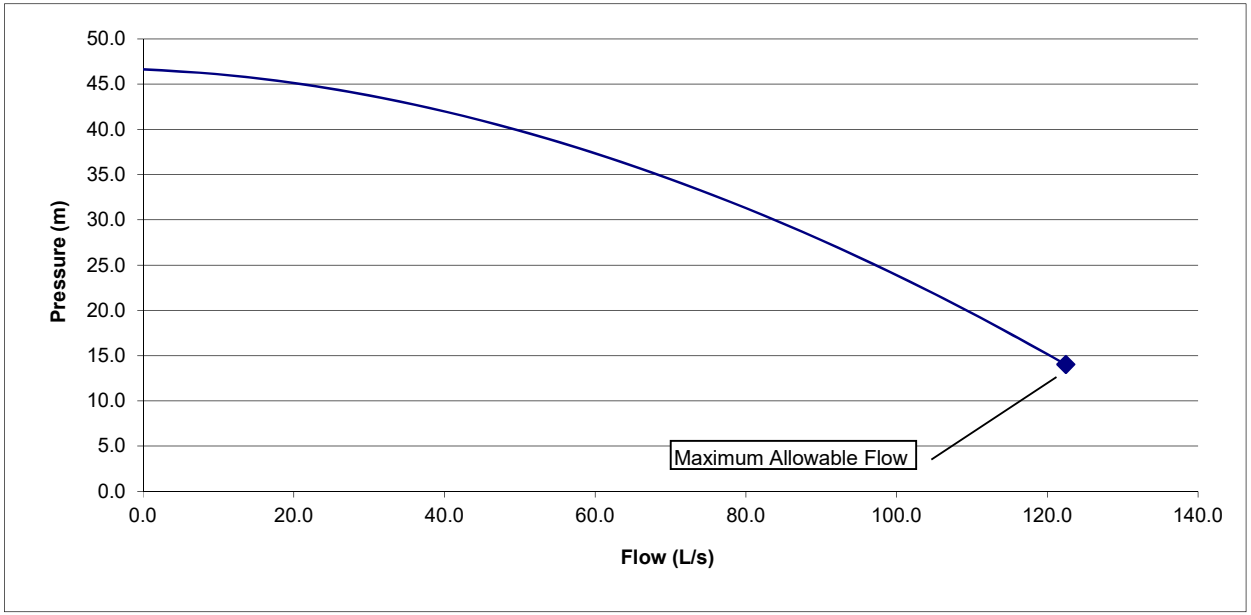
Fire Flow Analysis

Fire Flow Node:	JCT_MTC_03
Design Flow (L/s):	122.5
Design Pressure (m)	14.0

The final adjusted flow at the node to maintain the minimum design pressure (14m (140 kPa)) at ALL locations within the pressure zone.

The lowest allowable pressure at the node to maintain the minimum design pressure (14m (140 kPa)) at ALL locations within the pressure zone.

The constraining node within the pressure zone that drops to the minimum design pressure of (14m (140 kPa)) during the design flow.



WAT 5 Infowater Location : Conservation and Beaver Creek
Scenario 2

JCT_39019 Average Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	6.11	403.54	46.94
01:00 hrs	5.23	403.71	47.11
02:00 hrs	4.89	403.57	46.97
03:00 hrs	4.78	403.57	46.97
04:00 hrs	4.43	403.64	47.04
05:00 hrs	4.27	403.73	47.13
06:00 hrs	5.59	403.52	46.92
07:00 hrs	8.34	402.70	46.10
08:00 hrs	10.26	402.18	45.58
09:00 hrs	10.78	402.40	45.80
10:00 hrs	10.83	402.40	45.80
11:00 hrs	11.11	402.41	45.81
12:00 hrs	10.93	402.67	46.07
13:00 hrs	10.51	402.76	46.16
14:00 hrs	10.10	402.86	46.26
15:00 hrs	9.56	402.97	46.37
16:00 hrs	9.54	402.92	46.32
17:00 hrs	9.56	402.86	46.26
18:00 hrs	9.75	402.68	46.08
19:00 hrs	9.73	402.56	45.96
20:00 hrs	9.26	402.58	45.98
21:00 hrs	8.66	402.71	46.11
22:00 hrs	8.08	402.89	46.29
23:00 hrs	7.10	403.16	46.56

Average Day HGL: 402.96
Minimum Hour: 403.73

JCT_39019 Maximum Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	8.52	403.19	46.59
01:00 hrs	7.06	403.46	46.86
02:00 hrs	6.13	403.47	46.87
03:00 hrs	6.50	403.42	46.82
04:00 hrs	6.75	403.44	46.84
05:00 hrs	6.54	403.54	46.94
06:00 hrs	10.97	402.97	46.37
07:00 hrs	15.97	401.59	44.99
08:00 hrs	17.50	401.00	44.40
09:00 hrs	17.42	401.66	45.06
10:00 hrs	16.03	402.12	45.52
11:00 hrs	15.72	402.21	45.61
12:00 hrs	15.64	402.34	45.74
13:00 hrs	14.32	402.22	45.62
14:00 hrs	12.20	402.05	45.45
15:00 hrs	12.80	403.12	46.52
16:00 hrs	12.61	401.81	45.21
17:00 hrs	12.33	401.74	45.14
18:00 hrs	13.65	401.24	44.64
19:00 hrs	14.98	402.04	45.44
20:00 hrs	15.39	402.01	45.41
21:00 hrs	14.53	402.33	45.73
22:00 hrs	12.83	403.05	46.45
23:00 hrs	11.06	402.72	46.12

Maximum Day HGL: 402.45
Peak Hour: 401.00

WAT 5 Infowater Location : Conservation and Beaver Creek

JCT_39019	Residual Pressure (m)
0.0	46.4
10.0	46.0
20.0	45.5
30.0	44.8
40.0	44.0
50.0	43.1
60.0	42.0
70.0	40.8
80.0	39.5
90.0	38.1
100.0	36.6
110.0	35.0
120.0	33.2
130.0	31.3
140.0	29.4
150.0	27.3
160.0	25.1
170.0	22.8
180.0	20.4
190.0	17.9
200.0	15.3

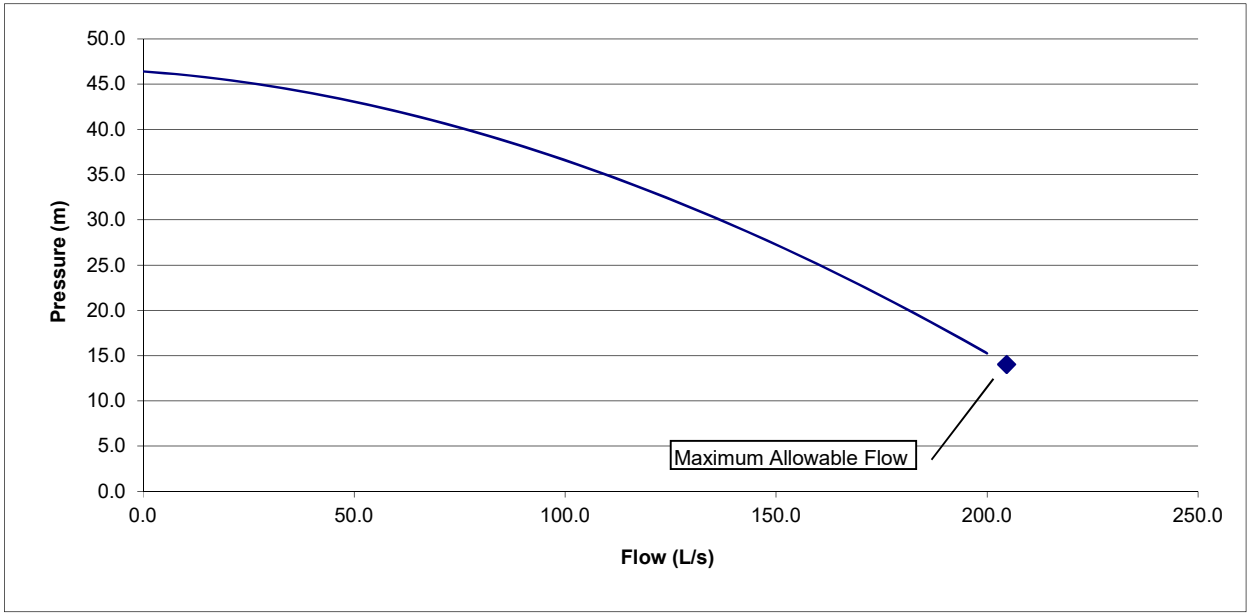
Fire Flow Analysis

Fire Flow Node:	JCT_39019
Design Flow (L/s):	204.7
Design Pressure (m)	14.0

The final adjusted flow at the node to maintain the minimum design pressure (14m (140 kPa)) at ALL locations within the pressure zone.

The lowest allowable pressure at the node to maintain the minimum design pressure (14m (140 kPa)) at ALL locations within the pressure zone.

The constraining node within the pressure zone that drops to the minimum design pressure of (14m (140 kPa)) during the design flow.



Township of Woolwich

City of Waterloo

JCT_MTC_01

JCT_MTC_03

556-576 Conservation Dr

Rideau River Pl

Rideau River St

Pinery Trail

Kelso Dr

Wasaga Cres

Cranberry St

Kawartha St

Roy Schmidt Rd

Conservation Dr

Beaver Creek Rd

0 75 150 300 450 600 Meters

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Region of Waterloo

TRANSPORTATION AND ENVIRONMENTAL SERVICES

Water Services

150 Frederick Street
Kitchener ON Canada N2G 4J3
Telephone: (519) 575-4426
Fax: (519) 575-4452
www.regionofwaterloo.ca

Legend

Junction
Type
- Active
- Domain

Tank
Type
- Active
- Domain

Reservoir
Type
- Active
- Domain

Pump
Type
- Active
- Domain

Valve
Type
- Active
- Domain

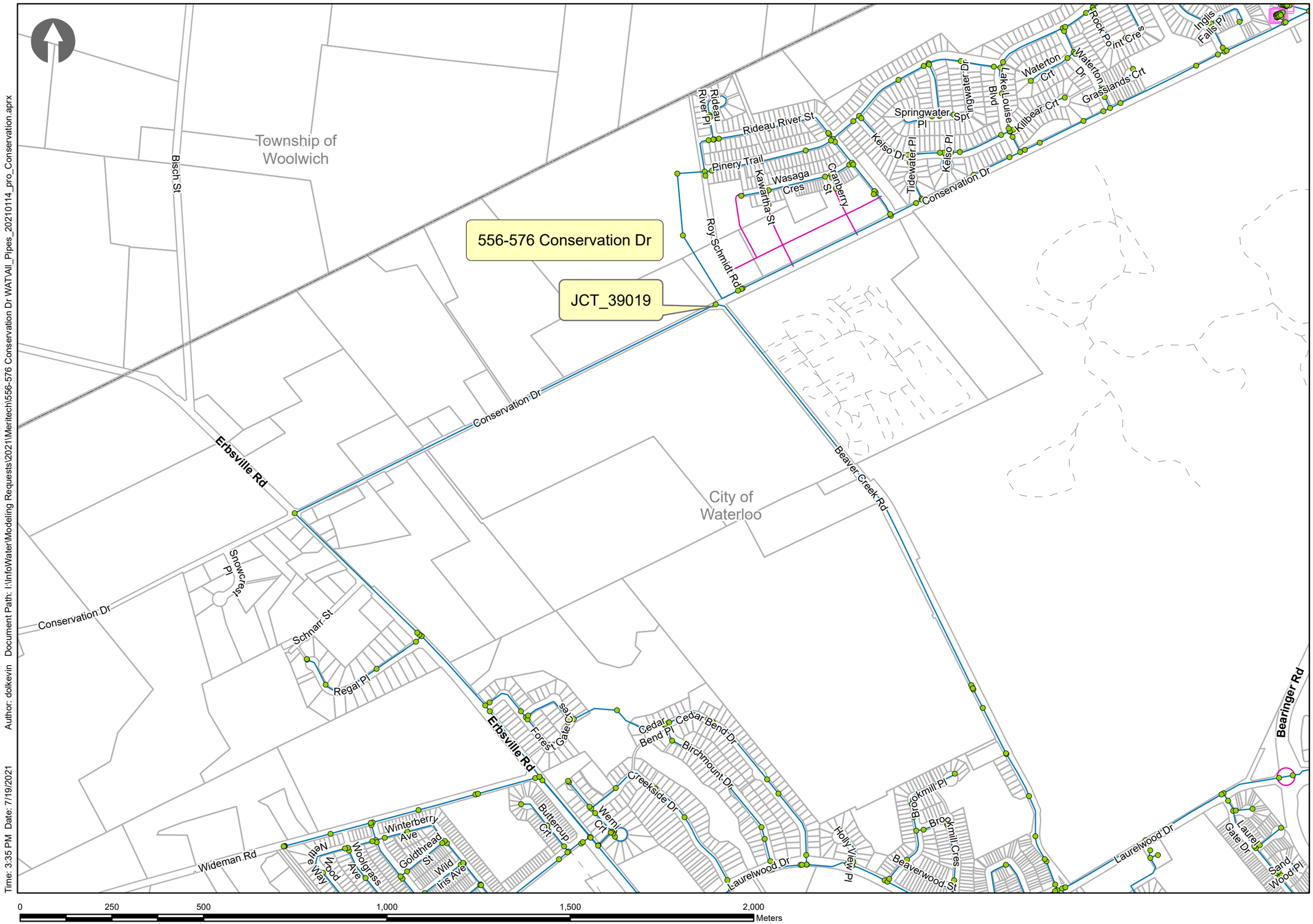
Pipe
Type
- Active
- Domain

Roads

Roads
- Highway
- Arterial/Collector
- Local
- Private
- Proposed Roads

Non modelling data Layer
- Regional Municipal Boundaries
- Assessment Parcels (MPAC)

556-576 Conservation Dr
Scenario 1



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Legend

- Junction
  - Type
    - Active
    - Domain
- Tank
  - Type
    - Active
    - Domain
- Reservoir
  - Type
    - Active
    - Domain
- Pump
  - Type
    - Active
    - Domain
- Valve
  - Type
    - Active
    - Domain
- Pipe
  - Type
    - Active
    - Domain
- Roads
  - Roads
    - Highway
    - Arterial/Collector
    - Local
    - Private
    - Proposed Roads
- Non modelling data Layer
  - Regional Municipal Boundaries
  - Assessment Parcels (MPAC)

556-576 Conservation Dr
Scenario 2