Preliminary Servicing Report

556 and 576 Conservation Drive
City of Waterloo

Revised December 2024

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Project No.: 1279

December 12, 2024

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

Dear Ms. Barisdale,

Re: Revised 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. The minor revision since the last issuance of this report dated October 2024 is to document that the width of Esker Lake Drive is 20m.

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



Chris H. Togeretz, P.Eng.
Manager, Design Services

STV/cht
Enclosures (2)

cc Brad Trussler, 2115881 Ontario Limited

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" sewer, 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 other than where a 3m multi-use trail is proposed.

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 at a standard depth. Routing of the sanitary sewer through the proposed park eliminates extreme depths that would otherwise result.

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.

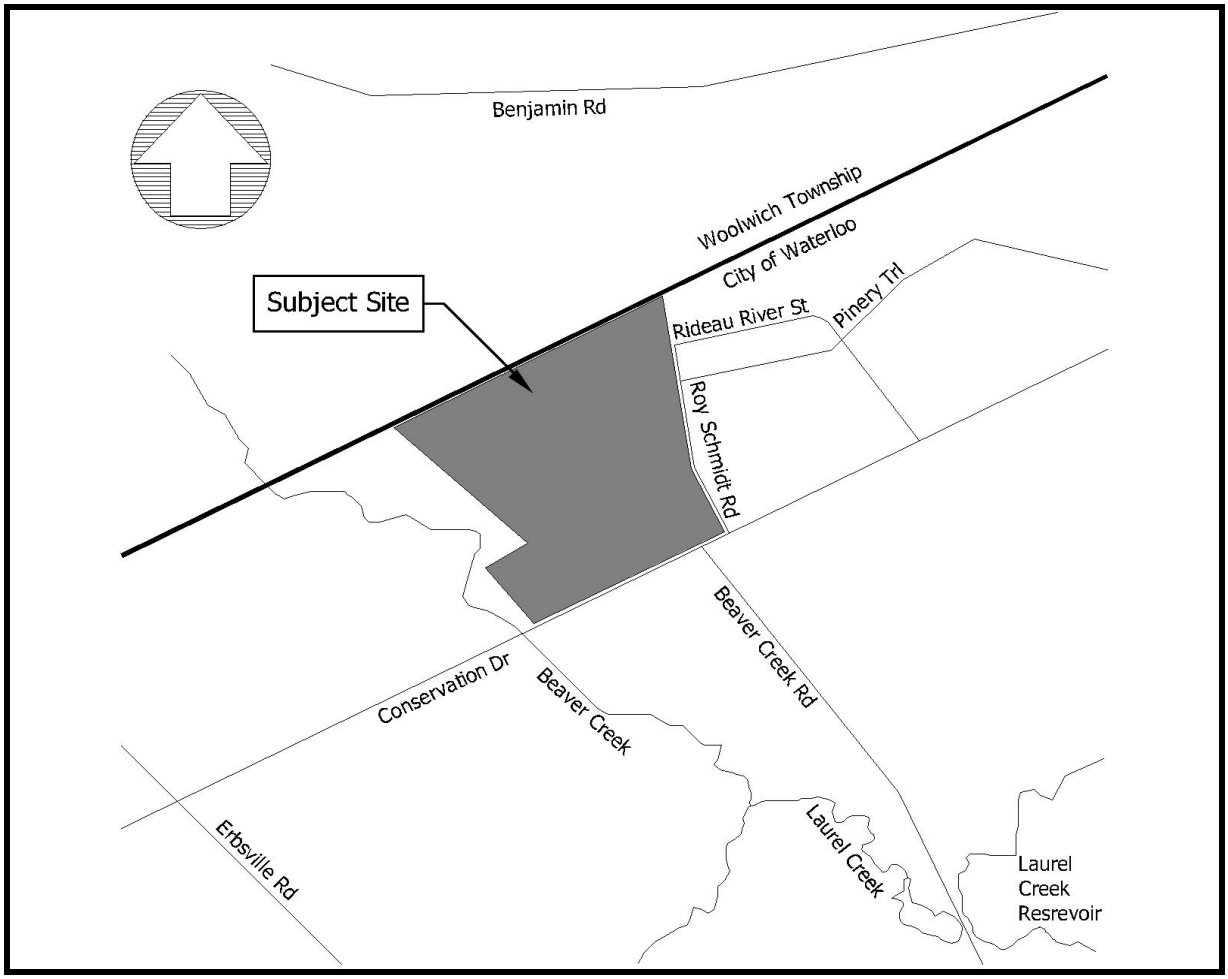


Figure 1: Subdivision Location

Approach

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

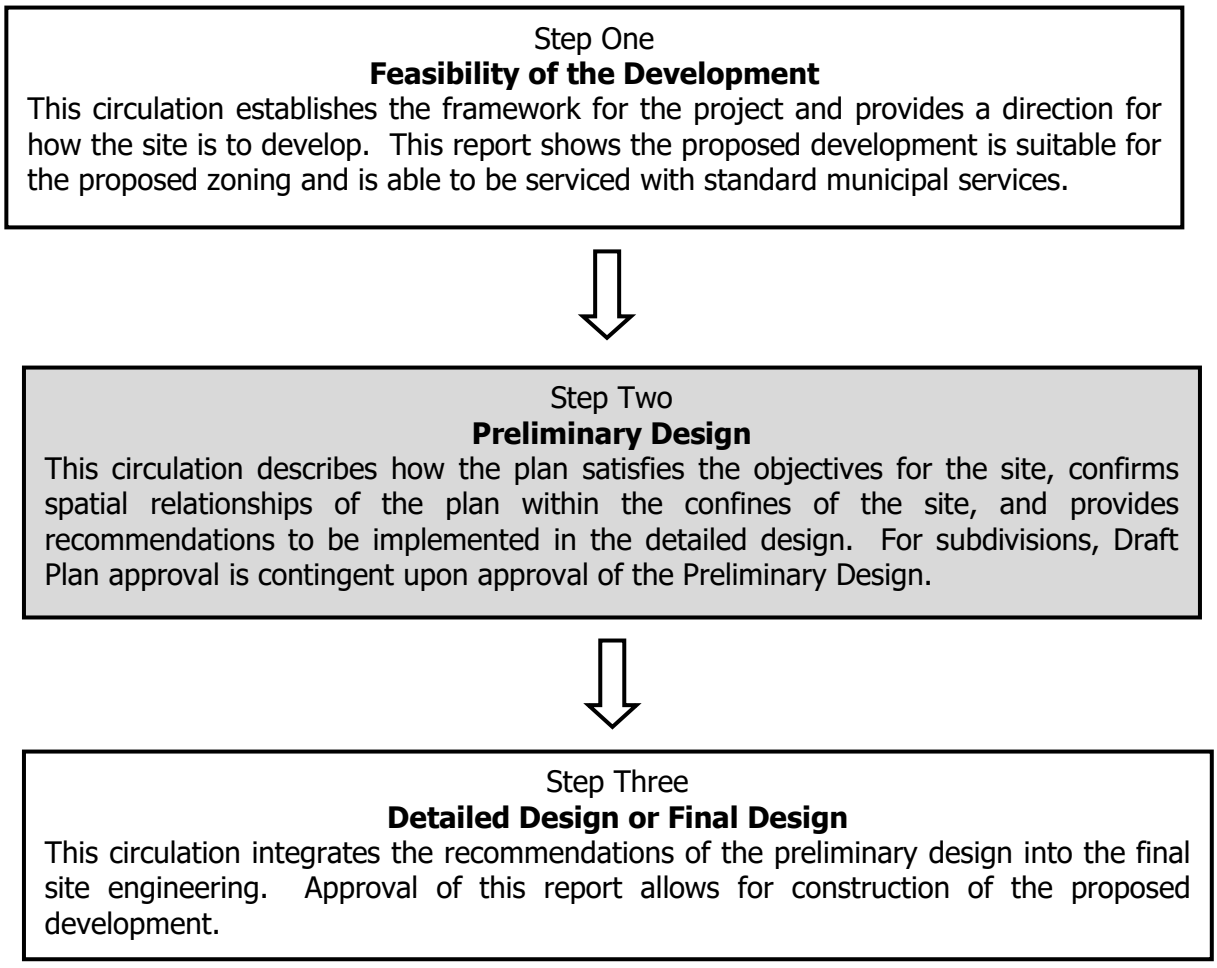


Figure 2: Approach Flowchart

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 (together with this report) 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

Design Criteria for Sanitary Sewers, Storm Sewers and Forcemains for Alterations Authorized under and Environmental Compliance Approval, Ministry of the Environment, Conservation and Parks, 2023
This manual provides guidelines on the planning and design of storm and sanitary sewers in Ontario.

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 Comprehensive Engineering and Landscape Manual, 2023
This manual provides detailed volumes addressing submissions, report writing, and the 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.

The Servicing Report is subject to AODA compliance.

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 (included in Appendix D) conceptually showing the main on-street and off-street sidewalks and trails. On-street cycling lanes are not required by the city.

Noise Studies

Meritech Engineering has updated the Preliminary Noise Assessment under separate cover to accompany this Draft Plan application. This report guides future noise assessments 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 November 2023 (with supplemental information provided in March 2024), as well as from previous submissions. 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
- City of Waterloo comments regarding SWM dated April and June 2024



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 have been 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.

The Region of Waterloo has provided information regarding consolidated pressure zones in this part of the City of Waterloo; however, for the current purposes the water supply on site has been modeled on the assumption that all of the future water distribution system improvements are 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 in 2015, 2021, and 2022. The information provided in 2021 is 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. The model prepared in 2022 includes a connection between the two zones, as well as other improvements.

An update on the time of the physical consolidation was provided by the Region in September 2024:

Timing of the consolidation of Pressure Zone 4C and 5 have been delayed since the last update. Required items for consolidation of Wat 4C and 5 included:

- *New 300 mm Erbsville Road WM from Regal Place to Conservation Drive*
- *New 300 mm Conservation Drive WM from Erbsville Road to Beaver Creek Road*
- *New 300 mm Beaver Creek Road WM from Conservation Drive to 600 m north of Laurelwood Drive*
- *Upgrades to the Lakeshore PS Pumps*

Construction of the new watermains along Beaver Creek Rd, Conservation Dr and Erbsville Rd are scheduled to occur in 2025/2026. As both the current Wat 4C and Wat 5 HGL are at 305 m, the pumps at the Lakeshore PS can be maintained with their current performance following the two-pressure zone consolidation, however upgrades to the Lakeshore Pumping Stations are required under future demands following the growth and buildout of the Beaver Creek developments. Timing for the Lakeshore Pumping Station upgrades is currently unknown.

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 on two figures 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 other than on Esker Lake Road, where a multi-use trail is proposed along the west side up to Pinery Trail. Bike lanes are not proposed.

Staging of the development, as shown on the Draft Plan, considers the logical extension of services and road connections. A 13-metre and a 9.8-metre access point to the adjacent Brohman lands to the northwest are included within Phase 2 of the Draft Plan.

As a result of previous 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, as shown on the preliminary design sheets in Appendix C. 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 reports 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

The first and second sequence is modeled and discussed in the following section, in keeping with the boundary conditions modeling provided by the Region in 2021. 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	18	11.3m x 18m (37' x 59')	203.4m²	358.8	2+basement
B highest single	13			364.8	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			360.5	2+basement

Table 2: Water Modeling Locations

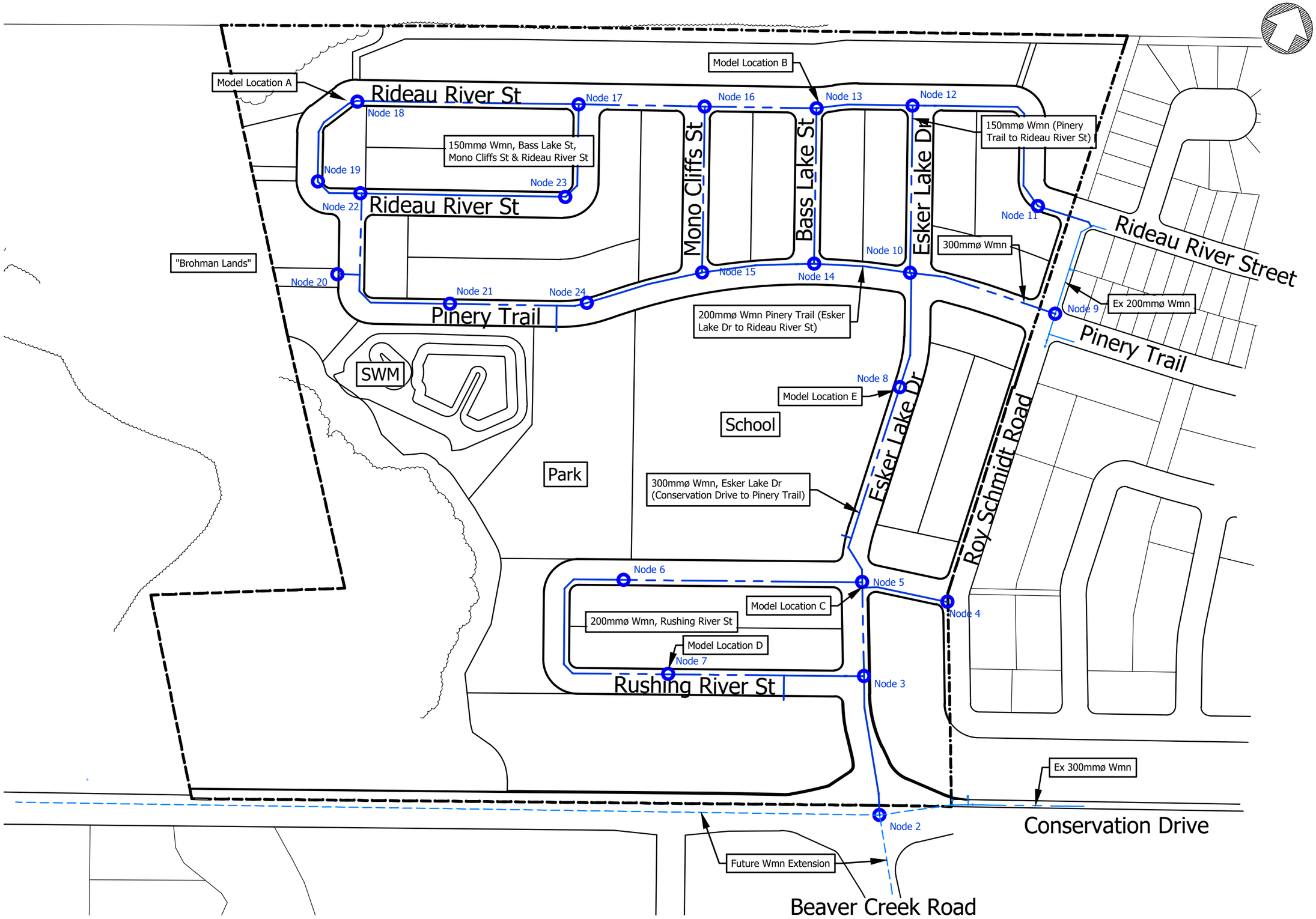
The proposed watermain is a combination of 150mm, 200mm, and 300mm watermain. Both Figure 4 (Watermain Layout Schematic) and the Preliminary Servicing Plan included in Appendix B show the proposed watermains for the development.

Future Development ("Brohman Lands")

Development of the portion of the "Brohman Lands" adjacent to Stage 2 will add to the domestic demands. As only a pre-submission consultation has occurred as of the date of the writing of this report, the unit count for these lands is not yet determined. Further, as will be demonstrated below, the domestic demand is minor relative to the required fire flows.

Through the detailed design phase (engineering approvals leading to construction) following Draft Plan Approval, if new information is provided regarding these external lands, it will be added to the modeling.

It is anticipated that a 150mm or 200mm diameter service will be provided to the external lands, and that modeling would be performed demonstrating that this dead-end service is capable of providing the firefighting flows that will be required for that development. Fire walls may be required/proposed, depending on the proposed type of units.



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DRAWING: Watermain Layout Schematic
556 & 576 Conservation Drive

DRAWN BY:	STV	CHECKED BY:	CHT
FILE NAME:	1279.Figures	DATE:	Oct 2024
SCALE:	1:2500		
	Figure 4		

Analysis Results

Modeling of the existing and proposed water distribution systems 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 design 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.

Firefighting Analysis

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.

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)	185 @ 88 L/s	96
A.2	88	100	JCT_39019	Full Buildout	184	110
B.1	88	100	JCT_MTC_01	Only to Activa (east)	148	102
B.2	88	100	JCT_39019	Full Buildout	210	124
C	200-250 *	-	JCT_39019	Full Buildout	140 @ 152 L/s	152
D	97	133	JCT_39019	Full Buildout w/ Firewall	190	154
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 (14.3m head) pressure (DGSSMS).

It is noted that the *Max Day* demand is calculated by multiplying the base demand of 8.1 L/s (see "Water Demand Calculations" sheet in Appendix C) 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. This is shown in the Region's modeling provided in 2022:

Node	Elevation (mASL)	2021 Results (partial looping)	2022 Results (ultimate configuration)
		Available Fire Flow (L/s)	Available Fire Flow (L/s)
JCT_20344/ JCT_MTC_01	364.0	126.8	199.4
JCT_24774/ JCT_39019	354.0	204.7	276.2

Table 4: Future Conditions

Non-Firefighting Analysis

Water pressures during the Max Day and Peak Hour scenarios have been checked and summarized in Table 5. 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 21** (358.0m)	**Peak Hour HGL** (m)	**Pressure at Node 13** (364.8m)	**Pressure at Node 21** (358.0m)
JCT_MTC_01	362.9	404.60	390	457	404.27	387	454
JCT_MTC_03	358.2	404.59	390	457	404.25	387	454
JCT_39019	356.6	402.45	369	436	401.00	355	422

Table 5: Non-Fire Scenario Pressures (kPa)

The Region's most recent modeling, provided in 2022 for the ultimate condition, states that the "Average Day and Maximum Day pressures remain relatively unchanged under the ultimate consolidation configuration." Thus, Table 5 is valid for the ultimate condition as well.

Storm Servicing

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

The development will have multiple outlets, as shown on the catchment plan and preliminary design sheets in Appendix C. 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.

Drainage to/through the roundabout (minor and major systems) has been coordinated with the Conservation Drive/Beaver Creek Road reconstruction project – refer to figure included in Appendix B and overland flow calculations included in Appendix C. The southbound lanes headed into the roundabout need to accommodate the overland flow, so that it is conveyed to Beaver Creek Road and not east on Conservation Drive.

Stormwater Management

A wet pond 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 wet pond (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.

A temporary embankment down to existing property line is proposed on the Phase 2 blocks as an interim condition.

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. The preliminary grading and servicing plan has been shared with Stantec via the City in order to confirm grades as presented will work for both designs. Additional coordination occurred in November – December 2024 to ensure that the grading of the roundabout at Esker Lake Drive and Conservation Drive adequately conveys overland flows to Beaver Creek Drive.

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." Timing of the trail construction will be confirmed at a later date. Included as Appendix D are two figures showing that a standard pickup truck is easily able to navigate the trail's bends.

There are a number of typical road cross-sections in the subdivision, dependent on the right-of-way width and whether or not multi-use trails are present on a particular street. Table 6 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. The City confirmed on November 4, 2024, that Esker Lake Drive is to be a 20m right of way, with wider boulevards to allow for snow storage and utilities.

Street	Right of Way width (m)	3.0m multi-use trail	1.8m sidewalk	Lane widths (m)	Boulevard Width (curb to sidewalk) (m)
Local Streets	18	No	Both sides	3.7	2.7
Pinery (Roy Schmidt to Esker Lake)	20	No	Both sides	3.7	3.7
Esker Lake (Conservation to Pinery)	20	West side	East side	3.7	2.5 (west) 3.7 (east)

Table 6: 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 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 wet pond/infiltration gallery 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.

This report is AODA compliant and meets the current provincial standard for compliance.

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.

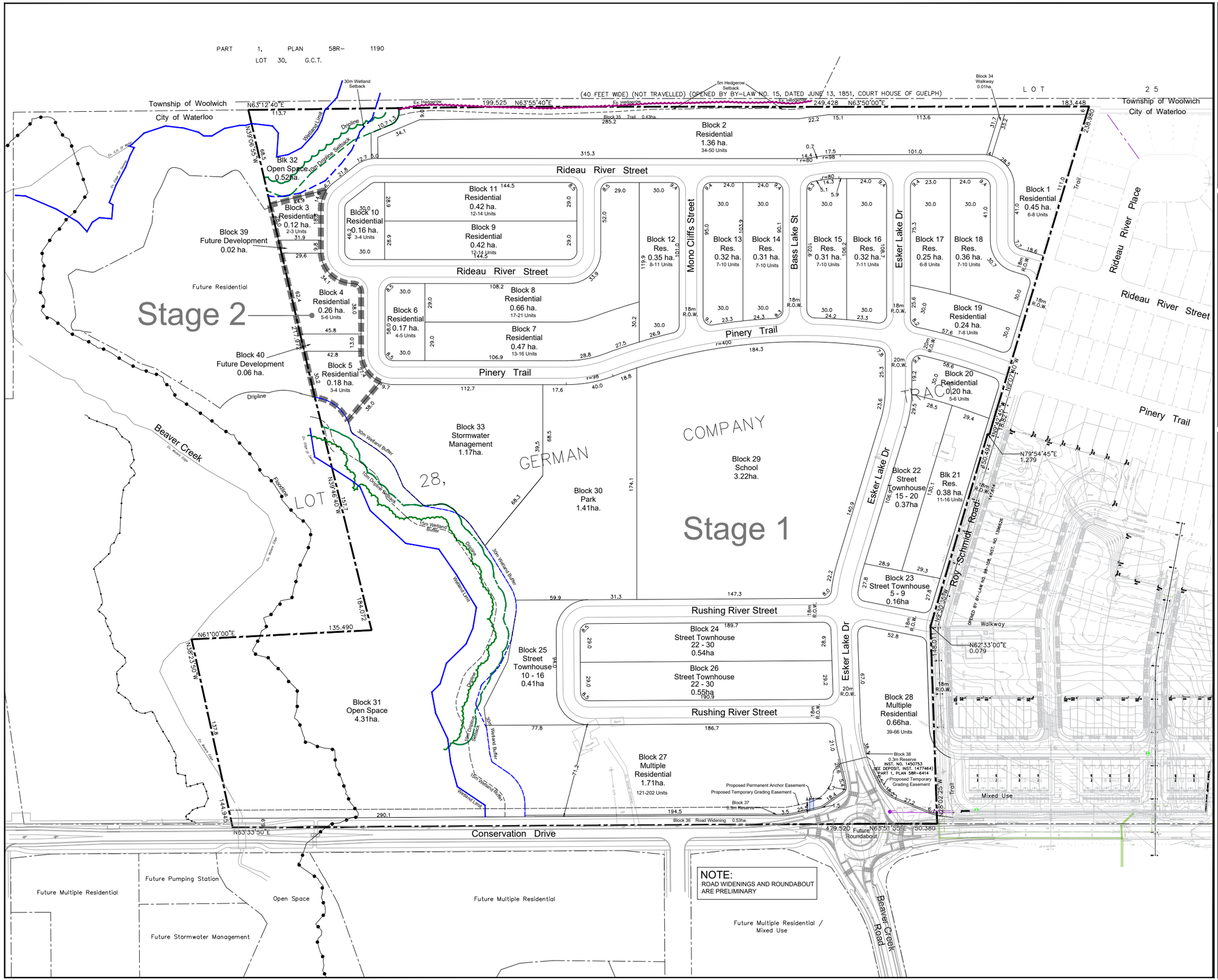
Storm connections should be provided to each lot for sump pumps and connect to the internal clean water collector (CWC) sewer, along with roof leader discharge.

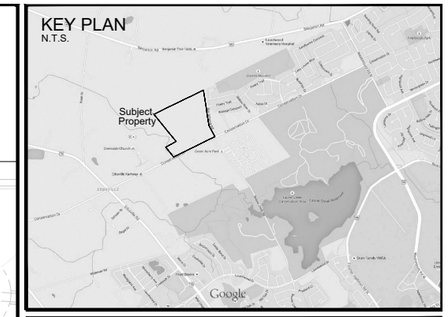
Post-development peak flows shall be attenuated to target peak flow rates for the northwest part of the subdivision.

A detailed water distribution design shall be prepared during detailed design. 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





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)	1-2,6-21	173-232	7.14
Street Townhouses	22-26	74-105	2.03
Multiple Residential	27,28	160-268	2.36
School	29		3.20
Park	30		1.41
Open Space	31,32		4.83
Stormwater Management	33		1.18
Walkway	34		0.01
Trail	35		0.43
Road Widening	36		0.53
0.3m Reserve	37,38		0.00
Roads			4.88
Total		404-610	28.0

STAGE 2

DESCRIPTION	LOTS/BLKS.	UNITS	AREA (ha.)
Residential (single detached)	3-5	10-13	0.56
Future Development	39,40		0.09
Total		10-13	0.65

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	February 7,2024
March 15, 2020	July 29, 2024
March 19, 2020	August 15, 2024
August 19, 2021	August 26, 2024
May 24, 2023	November 28, 2024

Date: July 29, 2015	Drawn By: S.L./E.F.	Dwg. File Name: dp09009zw.dwg
Scale: 1:1250 metric	Project No.: 09009.40	

Appendix B: Design Drawings

Design figures

Road cross section dwgs

Match existing elevations along entire northern limit

Rideau River Street

Infiltration gallery

French Drain

2.5m Asphalt Trail

Rideau River Place

Rideau River Street

Mono Cliffs St

Bass Lake St

Esker Lake Dr

Phase 2 blocks to be developed in the future when grading allows.

Pinery Trail

SWM Pond

Pedestrian Crossing

Drainage from park block will not cross onto private lots.

School

Park

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

Bollards/gates to be confirmed in detailed design

3.0m Asphalt Walkway

Rushing River St

Roy Schmidt Road

Wasaga Crescent

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)

Ex. Top of Valley

Ex. Toe of Valley

Ex. Centre of Swale

Ex. Watercourse

Ex. Wetland Edge

15m Wetland Buffer

Wetland Limit

4.6m Asphalt Pond Access

10m Drainage Swale

Ex. Hydro Pole

Ex. Bell Pedestal

Ex. Gas Valve

Split point of sanitary and 3rd pipe.

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

~Inv @ Intersection
Wat=362.70
San=361.65
CWC=362.00

~Inv @ Intersection
Stm=360.50
Wat=361.10
San=359.50
CWC=359.80

Pr Culvert

~Inv
Stm=358.50
Wat=355.79
San=356.40
CWC=358.00

Rideau River Street

~Inv @ Intersection
Stm=360.50
Wat=357.63
San=357.60
CWC=358.50

150mmø Wmn, Rideau River St, Mono Cliffs St & Bass Lake St

Rideau River Street

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

150mmø Wmn, Esker Lake Dr (Pinery Trail to Rideau River Street) & Rideau River Street

Mono Cliffs St

Bass Lake St

Esker Lake Dr

Rideau River Place

Rideau River Street

~Inv @ Intersection
Stm=357.30
Wat=355.50
San=355.20
CWC=356.80

~Inv
Stm=354.10
Wat=355.00
San=354.70
CWC=354.50

Pinery Trail

~Inv @ Intersection
Stm=360.05
Wat=358.35 (Dip)
San=359.00
CWC=359.50

~Inv @ Intersection
Stm=359.50
Wat=360.80
San=358.75
CWC=359.00

300mmø Wmn

Ex 200mmø Wmn

900mmø Stm into SWM Pond

~Inv @ Intersection
Stm=358.00
Wat=356.54 (Dip)
San=356.70
CWC=357.70

~Inv
Stm=356.00
Wat=355.80
San=354.00
CWC=355.40

200mmø Wmn Pinery Trail (Esker Lake Dr to Rideau River St)

Split point of sanitary and 3rd pipe.

Pinery Trail

Wet Pond

Ex. 100m Contour

Ex. Hedgerow

Ex. Ditch

10m Ditch/Top Setback

Infiltration Gallery

Underground Infiltration System

15m Wetland Buffer

Level spreader

300mmø Wmn, Esker Lake Dr (Conservation Drive to Pinery Trail)

Esker Lake Dr

3rd pipe (CWC) system for roof leaders.

200mmø San, Remainder of Subdivision

School roof area to infiltration. Exact location to be determined.

~Inv
Wat=355.65
San=352.60
CWC=355.50

~Inv @ Intersection
Stm=354.90
Wat=354.10 (dip)
San=351.40
CWC=355.50

Roy Schmidt Road

Wasaga Crescent

Rushing River St

Overflow to storm sewer from CWC system (typ)

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

200mmø Wmn, Rushing River St

250mmø San, Esker Lake Dr (Conservation Drive to North end of Rushing River St)

Infiltration gallery

30m Wetland Buffer

Ex. Waters Edge

Ex. Waters Edge

Esker Lake Dr

~Inv @ Intersection
Stm=353.50
Wat=354.80
San=350.90
CWC=353.70

Overflow to storm sewer from CWC system

Culverts to direct drainage under trail

600mmø Stm to External SWM Facility
Required Inv=353.35

1050mmø Stm to External SWM Facility
Required Inv=352.90

250mmø San to External SPS
Inv=349.10

Connection of watermain by others

Conservation Drive

Servicing Legend

- Ex=Existing
- Ex Sanitary/Storm Manhole/CB Manhole
- Ex Sanitary Sewer (Flow Direction)
- Ex Storm Sewer (Flow Direction)
- Ex Water Valve/Curb Stop
- Ex Fire Hydrant & Valve Set
- Pr=Proposed
- Pr Sanitary/Storm Manhole
- Pr Sanitary Sewer (Flow Direction)
- Pr Storm Sewer (Flow Direction)
- Pr Water Valve/Curb Stop/Reducer
- Pr Fire Hydrant & Valve Set

1:1000

LICENSED PROFESSIONAL ENGINEER
C. H. TOGERETZ
100147133
2024-10-18
PROVINCE OF ONTARIO

MERIDIAN ENGINEERING
315 Bishop Street North, Suite 202 Cambridge
T 519.623.1140 F 519.623.7334 www.meridian.ca

DRAWING: Preliminary Servicing Plan
556 & 576 Conservation Drive

DRAWN BY:	STV	SCALE:	1: 1000
CHECKED BY:	CHT		1279-SS
DATE:	Oct 2024		
FILE NAME:	1279 Figures		

3:1 slope to match exiting elevations along western boundary in the interim condition.

Infiltration gallery in trail block

Match existing elevations along entire northern limit

Rideau River Street

Rideau River Street

Mono Cliffs Street

Bass Lake St.

Esker Lake Dr

Rideau River Place

Rideau River Street

Pinery Trail

Pinery Trail

Single row silt fence, as per OPSD 219.131.

Pinery Trail

Forebay and Wet Pond

SWM Pond to act as Temp Silt Pond during grading operations

Park

School

Esker Lake Dr

Roy Schmidt Road

Double row silt fence, as per OPSD 219.131.

Topsoil not to be stockpiled on the park block

Rushing River Street

Esker Lake Dr

Rushing River Street

Infiltration gallery

Conservation Drive

Existing or proposed ground

Proposed ground

Flow direction

0.15m Min 0.5m Max

1 : 2

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

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

Total Basin Volume

Active Storage Volume

Pre-grade

Undisturbed ground or compacted backfill

Rip-rap, 300mm deep

Dead Storage Volume

Outlet piped to grade or storm sewer

Temp Silt Pond

Double Silt Fence

Single Silt Fence

Sediment Control Pond Outlet Detail

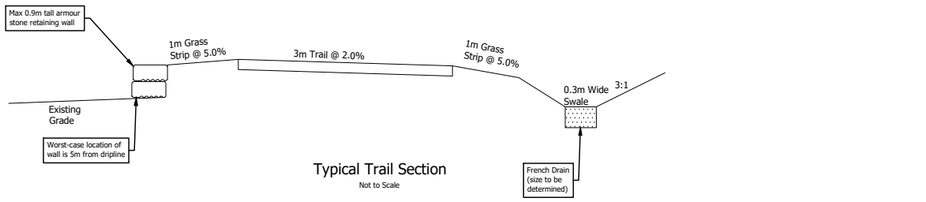
Not to Scale

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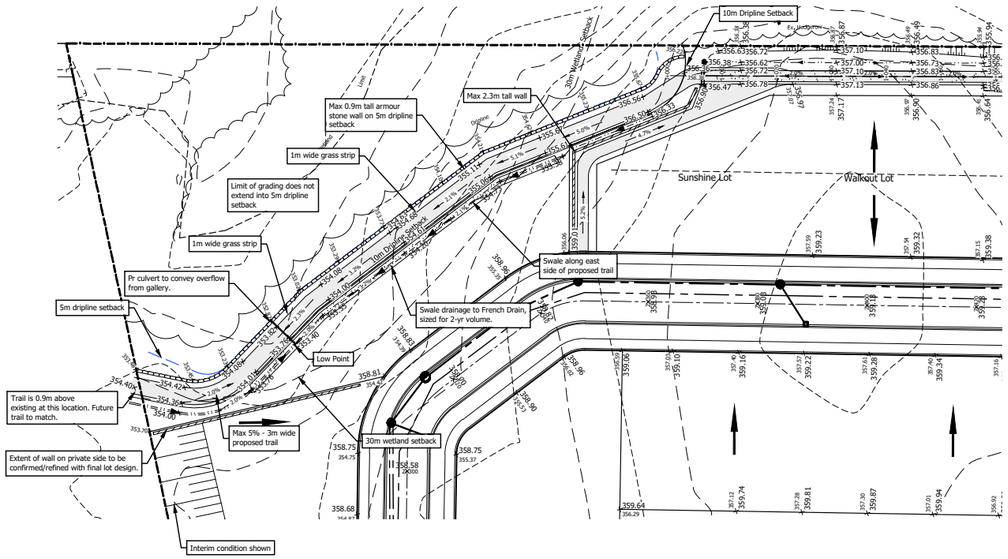
DRAWING: Preliminary Erosion & Sediment Control Plan
556 & 576 Conservation Drive

DRAWN BY:	STV	CHECKED BY:	CHT
FILE NAME:	1279-Figures	DATE:	Oct 2024
SCALE:	1: 1000		
	1279-ESC		



Typical Trail Section

Not to Scale



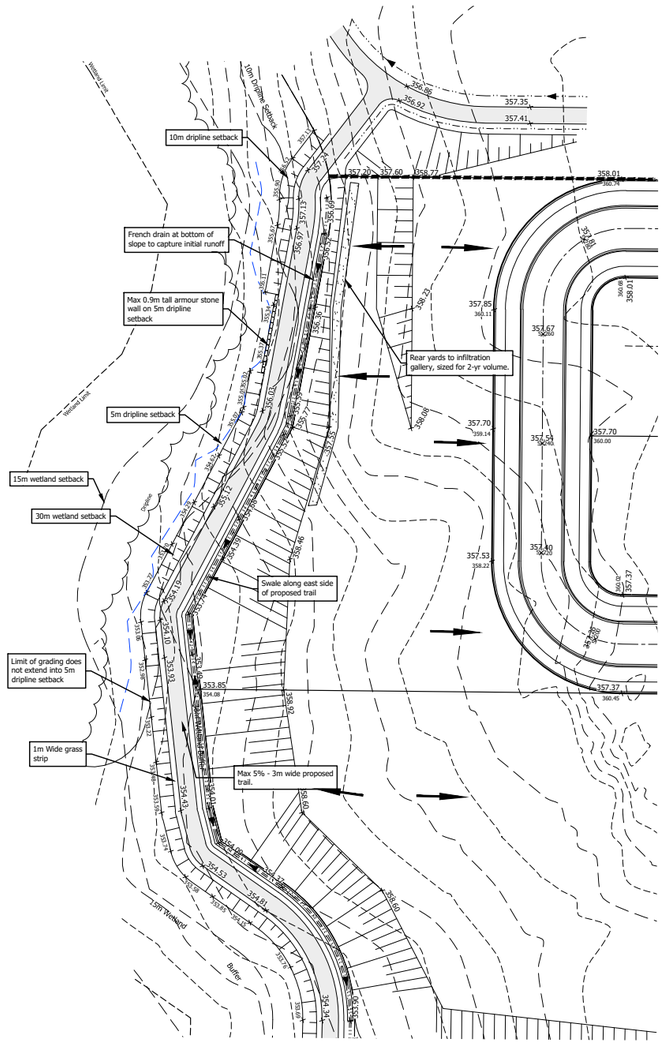
Trail North-West of Rideau River Street

1:500



Typical Trail Section

Not to Scale



Trail West of Rushing River Street

1:500

MERITECH
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DRAWING: Trail Grading Details and Cross-Sections
556 & 576 Conservation Drive

DRAWN BY:	STV	CHECKED BY:	CHT
FILE NAME:	1279-Figures	DATE:	Oct 2024

SCALE: 1:500 — 1279-Tail_Sections

1:500

0 2.5 5 10 15 20

LICENSED PROFESSIONAL ENGINEER
C. H. TOGERETZ
100147133
2024-10-18
PROVINCE OF ONTARIO

Rideau River Street
Pinery Trail
Rushing River St
Conservation Drive
Mono Cliffs St
Bass Lake St
Esker Lake Dr
Rideau River Place
Roy Schaidle Road
Wasaga Crescent
Kawartha Street
5m Hedgerow Setback
East/ West Drainage Split
Pr Culvert
525mmø@0.6%
600mmø@0.6%
675mmø@0.8%
825mmø@1%
450mmø@2.6%
375mmø@2.3%
675mmø@1%
525mmø@1.0%
900mmø@1.0%
1050mmø@0.6%
1050mmø@0.7%
450mmø@0.6%
Underground Infiltration System
Wetland
Ex. Watercourse
Ex. Water Edge
10m Dripline Setback
15m Wetland Buffer
30m Wetland Buffer
Wetland Limit
Ditch
1 & 1/2 Storey Stucco Home
1.03 / 11 / 0.60
0.33 / 10 / 0.60
2.14 / 2 / 0.30
2.69 / 1 / 0.30
0.75 / 12 / 0.60
1.24 / 18 / 0.60
0.83 / 16 / 0.60
0.67 / 14 / 0.60
1.61 / 3 / 0.60
0.85 / EXT / 0.60
0.70 / 13 / 0.60
0.51 / 17 / 0.60
0.19 / 15 / 0.60
0.65 / 21 / 0.60
0.22 / 22 / 0.60
2.54 / 5 / 0.50
1.66 / 4 / 0.60
2.28 / 20 / 0.25
0.43 / 6 / 0.75
1.72 / 7 / 0.75
0.75 / 8 / 0.75
1.47 / 9 / 0.75
AA BB CC DD EE FF GG HH JJ KK LL MM XX YY
A B C D E F G H

Area / ID / C — Drainage area (ha); Drainage area number; Run-off coefficient; Drainage area boundaries; Overland flow direction

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

1:1000

LICENSED PROFESSIONAL ENGINEER
C. H. TOGERETZ
100147133
2024-10-18
PROVINCE OF ONTARIO

DRAWING: Storm Drainage Area Plan
556 & 576 Conservation Drive

DRAWN BY:	STV/ACC	CHECKED BY:	CHT
FILE NAME:	1279-Figures	DATE:	Oct 2024
SCALE:	1: 1000		1279-Stm

Rideau River Street

Mono Cliffs St

Bass Lake St

Esker Lake Dr

Pinery Trail

Rideau River Place

Rideau River Street

Pinery Trail

Esker Lake Dr

Roy Schmidt Road

Wasaga Crescent

Kawartha Street

Rushing River St

Esker Lake Dr

Conservation Drive

2.03
3
RES 116

8.99
4
RES 538

3.81
1
RES 14

3.81
2
RES 249

0.41
7
RES 35

7.29
5
RES/INS 607

0.83
6
RES 144

Wet Pond

Underground Infrastructure System

200mmø@0.6%min.

250mmø@0.6%min.

30m Wetland Buffer

10m Dripline Setback

15m Wetland Buffer

Wetland Line

Ex. Watercourse

Ex. Waters Edge

1 & 1/2 Storey Stucco Residence

5m Hedgerow Setback

Area
ID
Zone | Pop

Drainage area (ha)
Drainage area number
Population
Zoning
Drainage area boundaries

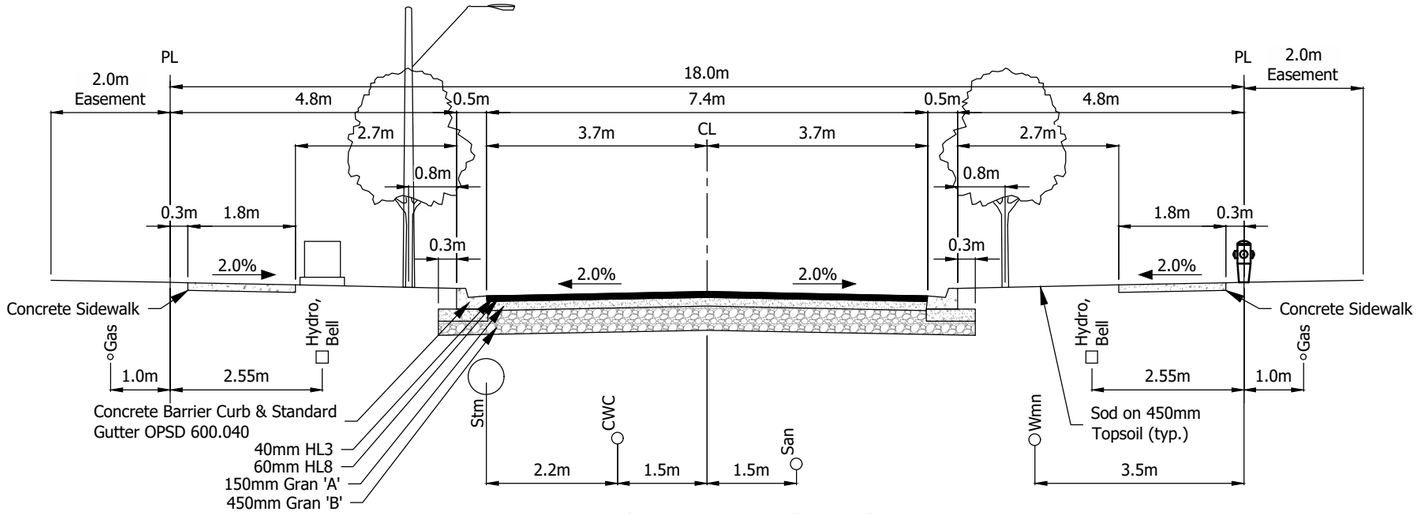
LICENSED PROFESSIONAL ENGINEER
C. H. TOGERETZ
100147133
2024-10-18
PROVINCE OF ONTARIO

1:1000

MERIDIAN
Land Development Engineering
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T 519.623.1140 F 519.623.7334 www.meridian.ca

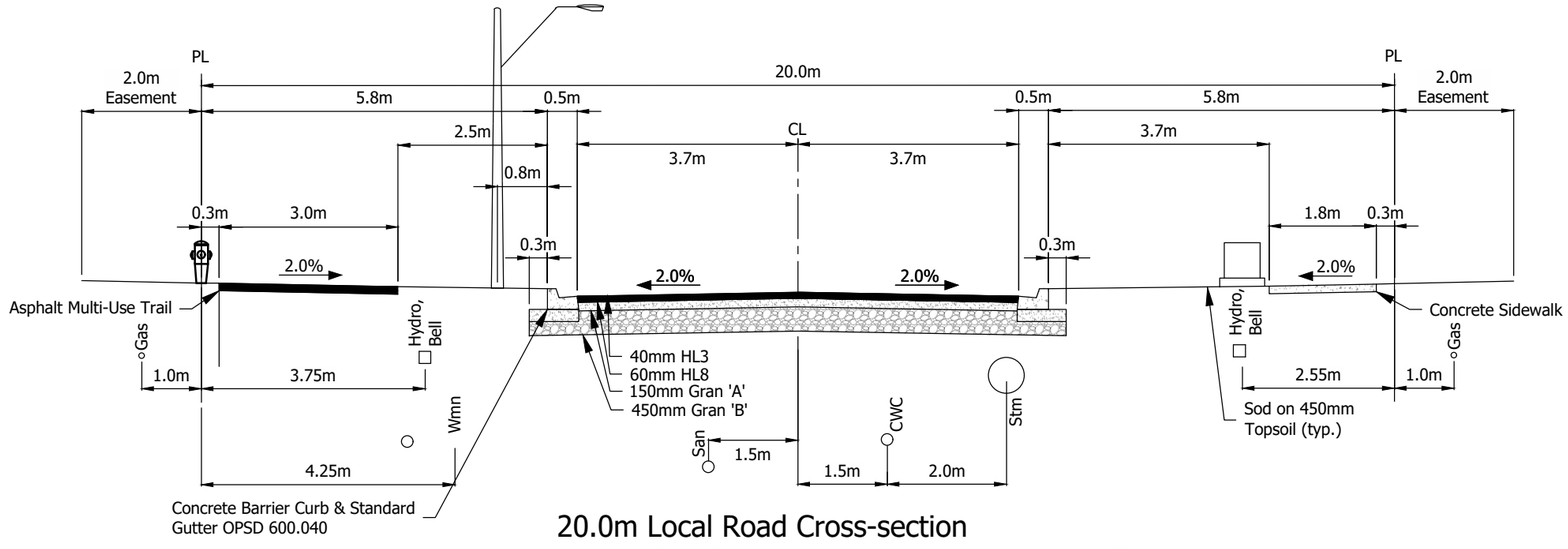
DRAWING: Sanitary Drainage Area Plan
556 & 576 Conservation Drive

DRAWN BY:	STV/ACC	CHECKED BY:	CHT
FILE NAME:	1279-Figures	DATE:	Oct 2024
SCALE:	1: 1000		
			1279-San



Typical 18.0m Local Road
Cross-section

Not to Scale



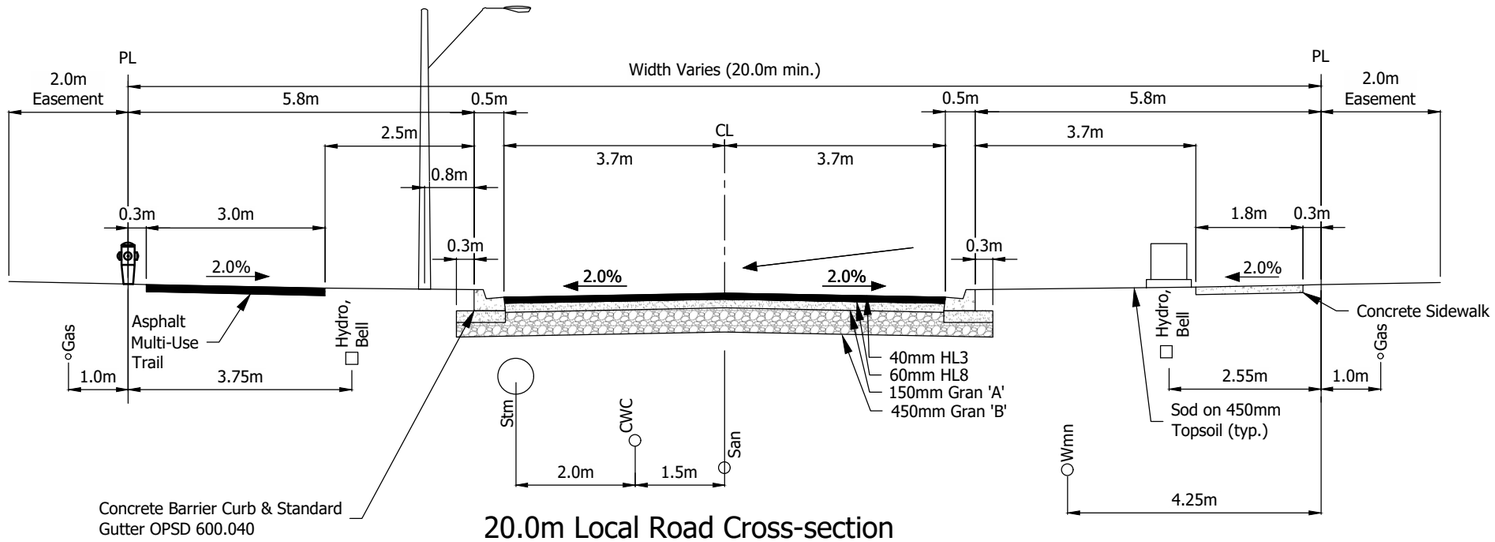
20.0m Local Road Cross-section
Esker Lake Drive (Rushing River Street to Pinery Trail)

Not to Scale

MERITECH engineering
1315 Bishop Street North, Suite 202 Cambridge
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DRAWING: Proposed Street Sections - 1
556 & 576 Conservation Drive

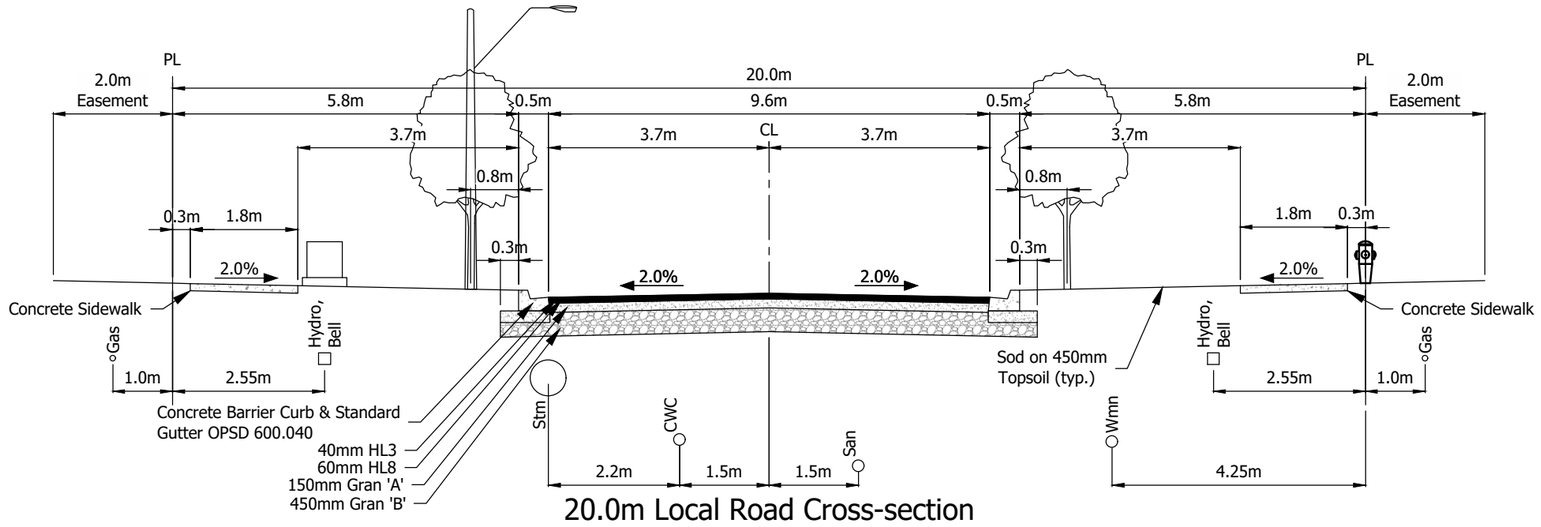
DRAWN BY: STV	CHECKED BY: CHT	SCALE: NTS	
FILE NAME: 1279.Figures	DATE: Dec 2024		Cross-Sections 1



20.0m Local Road Cross-section

Esker Lake Drive (Conservation Drive to Rushing River Street)

Not to Scale



20.0m Local Road Cross-section

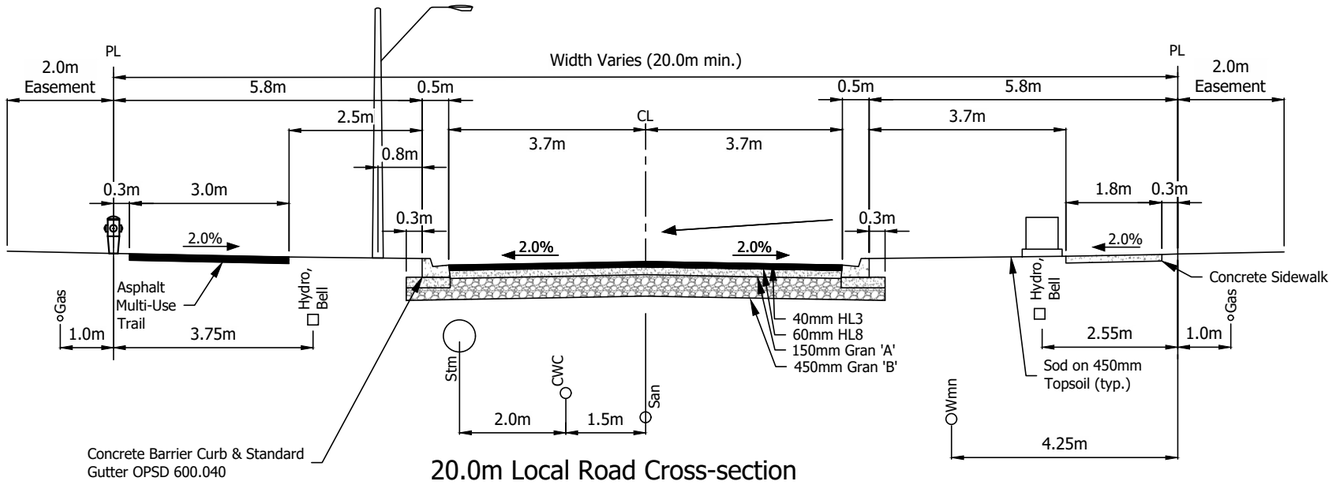
Pinery Trail (Roy Schmidt Road to Esker Lake Drive)

Not to Scale

MERITECH engineering
1315 Bishop Street North, Suite 202 Cambridge
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DRAWING: Proposed Street Sections - 2
556 & 576 Conservation Drive

DRAWN BY:	STV	SCALE:	NTS
CHECKED BY:	CHT		Cross-Sections 2
FILE NAME:	1279.Figures	DATE:	Dec 2024



20.0m Local Road Cross-section

Esker Lake Drive (Conservation Drive to Rushing River Street)

Not to Scale

Minor flow (5-year) conveyance will be through the storm sewer system and the major storm conveyance (100-year) will be aboveground.

The subdivision's outflow at the intersection of Conservation Drive and Beaver Creek Road in the 5-year storm (±2.0 m³/s), is able to be conveyed by a 1050mm diameter storm sewer.

The remaining 100-year flow (±1.7 m³/s) can be conveyed overland. To meet Safe Access policy, max. depth of flow is ±0.25m deep @ max. velocity of 1.7 m/s (achieved with a slope of 1.0%).

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

1:750

DRAWING: Conservation Dr. Roundabout

DRAWN BY:	RCU	CHECKED BY:	CHT
FILE NAME:	1279.Figures	DATE:	Dec 2024

SCALE: 1:750

Roundabout

Appendix C: Calculations

Water demand calcs

EPANET output

Channel Design Sheet (Overland Flow Towards the Roundabout)

Sanitary and Storm Design Sheets

MERITECH engineering

Project: Conservation
File: 1279
Completed by: STV
Date: 2017-10-20 rev: 2020-06-04
Checked by: CHT rev: 2024-10-18
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	Connection					
3	357.15	multiple res	66	2.440	162	225	0.422
4	358.25	singles	8	3.250	26	225	0.068
		towns	4	2.440	10	225	0.026
		total					0.094
5 "C"	358.20	school			500	210	3.646
		towns	7	2.440	18	225	0.047
		total					3.693
6	358.10	towns	38	2.440	93	225	0.242
7 "D"	357.40	multiple res + towns	240	2.440	586	225	1.526
8 "E"	360.50	towns	18	2.440	44	225	0.115
9	363.20	singles	13	3.250	43	225	0.112
10	362.90	singles	17	3.250	56	225	0.146
11	363.50	singles	18	3.250	59	225	0.154
12	363.50	singles	22	3.250	72	225	0.188
13 "B"	364.80	singles	18	3.250	59	225	0.154
14	362.00	singles	10	3.250	33	225	0.086
15	360.30	singles	11	3.250	36	225	0.094
16	362.90	singles	19	3.250	62	225	0.161
17	360.30	singles	26	3.250	85	225	0.221
18 "A"	358.80	singles	14	3.250	46	225	0.120
19	358.30	singles	9	3.250	30	225	0.078
20	358.00	singles	10	3.250	33	225	0.086
21	358.00	singles	8	3.250	26	225	0.068
22	358.20	singles	14	3.250	46	225	0.120
23	359.70	singles	20	3.250	65	225	0.169
24	358.50	singles	8	3.250	26	225	0.068
		Totals	618	-	2216	-	8.089

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.Node18.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	90	150	
23	17	18	155	150	
24	18	19	75	150	
25	22	20	60	200	
26	20	21	75	200	
29	15	24	90	200	
31	24	21	100	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	115	300	
13	22	19	40	150	
27	17	23	75	150	
28	23	22	150	150	
12	26	1	#N/A	#N/A	Pump

Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality	
2	0.00	387.04	30.54	0.00	
4	0.13	387.04	28.79	0.00	
5	4.95	387.04	28.84	0.00	
3	0.57	387.04	29.89	0.00	
6	0.32	387.04	28.94	0.00	
7	2.04	387.04	29.64	0.00	
8	0.15	387.04	26.54	0.00	
9	0.15	387.02	23.82	0.00	
10	0.20	387.03	24.13	0.00	
11	0.21	386.80	23.30	0.00	
12	0.25	386.51	23.01	0.00	
13	0.21	385.71	20.91	0.00	
14	0.12	385.77	23.77	0.00	
15	0.13	384.76	24.46	0.00	
16	0.22	384.44	21.54	0.00	
17	0.30	381.87	21.57	0.00	
18	88.16	377.66	18.86	0.00	
19	0.10	380.40	22.10	0.00	
20	0.12	382.40	24.40	0.00	
21	0.09	383.06	25.06	0.00	
22	0.16	381.86	23.66	0.00	
23	0.23	381.87	22.17	0.00	
24	0.09	383.95	25.45	0.00	
25	0.00	386.98	24.58	0.00	
1	0.00	387.05	24.15	0.00	
26	-98.87	362.90	0.00	0.00	Reservoir

Page 3
Link Results:

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status	
2	-0.13	0.01	0.00	Open	
8	-0.73	0.02	0.00	Open	
10	-1.32	0.04	0.01	Open	
11	-8.01	0.11	0.05	Open	
14	11.19	0.16	0.09	Open	
15	14.98	0.85	4.29	Open	
16	-10.83	0.61	2.35	Open	
17	25.57	1.45	11.54	Open	
18	-4.96	0.28	0.55	Open	
19	64.34	2.05	15.70	Open	
20	59.26	1.89	13.48	Open	
21	11.62	0.66	2.68	Open	
22	41.72	2.36	28.58	Open	
23	40.56	2.30	27.13	Open	
24	-47.60	2.69	36.48	Open	
25	-47.22	1.50	8.85	Open	
26	-47.34	1.51	8.89	Open	
29	47.52	1.51	8.96	Open	
31	47.43	1.51	8.93	Open	
32	-30.32	1.72	15.83	Open	
1	1.88	0.03	0.00	Open	
3	0.00	0.00	0.00	Open	
4	1.05	0.03	0.01	Open	
5	-11.04	0.62	2.44	Open	
6	11.04	0.35	0.60	Open	
7	90.71	1.28	4.12	Open	
9	8.16	0.12	0.05	Open	
13	47.70	2.70	36.63	Open	
27	0.86	0.05	0.02	Open	
28	0.64	0.04	0.01	Open	
12	98.87	0.00	-24.15	Open	Pump

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

Input File: 1279.A.2 - JCT39019.Node18.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	90	150	
23	17	18	155	150	
24	18	19	75	150	
25	22	20	60	200	
26	20	21	75	200	
29	15	24	90	200	
31	24	21	100	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	115	300	
13	22	19	40	150	
27	17	23	75	150	
28	23	22	150	150	
12	26	2	#N/A	#N/A	Pump

Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality	
2	0.00	391.44	34.94	0.00	
4	0.13	390.55	32.30	0.00	
5	4.95	390.55	32.35	0.00	
3	0.57	390.87	33.72	0.00	
6	0.32	390.64	32.54	0.00	
7	2.04	390.75	33.35	0.00	
8	0.15	390.00	29.50	0.00	
9	0.15	389.37	26.17	0.00	
10	0.20	389.38	26.48	0.00	
11	0.21	389.09	25.59	0.00	
12	0.25	388.73	25.23	0.00	
13	0.21	387.71	22.91	0.00	
14	0.12	387.80	25.80	0.00	
15	0.13	386.52	26.22	0.00	
16	0.22	386.12	23.22	0.00	
17	0.30	382.87	22.57	0.00	
18	100.17	377.54	18.74	0.00	
19	0.10	381.01	22.71	0.00	
20	0.12	383.53	25.53	0.00	
21	0.09	384.38	26.38	0.00	
22	0.16	382.86	24.66	0.00	
23	0.23	382.86	23.16	0.00	
24	0.09	385.50	27.00	0.00	
25	0.00	389.32	26.92	0.00	
1	0.00	389.41	26.51	0.00	
26	-110.88	356.60	0.00	0.00	Reservoir

Page 3
Link Results:

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
2	-0.13	0.01	0.00	Open
8	11.45	0.36	0.64	Open
10	-13.49	0.43	0.87	Open
11	102.87	1.46	5.20	Open
14	12.63	0.18	0.11	Open
15	16.96	0.96	5.40	Open
16	-12.28	0.69	2.97	Open
17	28.99	1.64	14.56	Open
18	-5.61	0.32	0.69	Open
19	72.92	2.32	19.80	Open
20	67.20	2.14	17.02	Open
21	13.17	0.75	3.38	Open
22	47.35	2.68	36.12	Open
23	46.08	2.61	34.36	Open
24	-54.08	3.06	46.21	Open
25	-53.61	1.71	11.20	Open
26	-53.72	1.71	11.24	Open
29	53.91	1.72	11.31	Open
31	53.81	1.71	11.28	Open
32	-34.39	1.95	19.98	Open
1	-96.83	1.37	4.64	Open
3	-110.88	1.57	5.97	Open
4	-11.12	0.35	0.61	Open
5	-12.48	0.71	3.06	Open
6	12.48	0.40	0.75	Open
7	102.72	1.45	5.18	Open
9	-102.72	1.45	5.18	Open
13	54.19	3.07	46.38	Open
27	0.97	0.05	0.03	Open
28	0.74	0.04	0.02	Open
12	110.88	0.00	-34.84	Open Pump

```
*************************************************************************
*                            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	90	150	
23	17	18	155	150	
24	18	19	75	150	
25	22	20	60	200	
26	20	21	75	200	
29	15	24	90	200	
31	24	21	100	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	115	300	
13	22	19	40	150	
27	17	23	75	150	
28	23	22	150	150	
12	26	1	#N/A	#N/A	Pump

Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality	
2	0.00	383.08	26.58	0.00	
4	0.13	383.08	24.83	0.00	
5	4.95	383.08	24.88	0.00	
3	0.57	383.08	25.93	0.00	
6	0.32	383.08	24.98	0.00	
7	2.04	383.08	25.68	0.00	
8	0.15	383.09	22.59	0.00	
9	0.15	383.05	19.85	0.00	
10	0.20	383.07	20.17	0.00	
11	0.21	382.52	19.02	0.00	
12	0.25	381.85	18.35	0.00	
13	100.21	379.91	15.11	0.00	
14	0.12	381.93	19.93	0.00	
15	0.13	381.65	21.35	0.00	
16	0.22	381.00	18.10	0.00	
17	0.30	381.23	20.93	0.00	
18	0.16	381.33	22.53	0.00	
19	0.10	381.38	23.08	0.00	
20	0.12	381.46	23.46	0.00	
21	0.09	381.51	23.51	0.00	
22	0.16	381.41	23.21	0.00	
23	0.23	381.29	21.59	0.00	
24	0.09	381.58	23.08	0.00	
25	0.00	382.95	20.55	0.00	
1	0.00	383.09	20.29	0.00	
26	-110.88	362.90	0.00	0.00	Reservoir

Page 3
Link Results:

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status
2	-0.13	0.01	0.00	Open
8	-0.73	0.02	0.00	Open
10	-1.32	0.04	0.01	Open
11	-8.01	0.11	0.05	Open
14	17.68	0.25	0.20	Open
15	23.88	1.35	10.17	Open
16	-17.32	0.98	5.61	Open
17	40.95	2.32	27.60	Open
18	-31.31	1.77	16.80	Open
19	60.96	1.94	14.21	Open
20	29.54	0.94	3.71	Open
21	16.98	0.96	5.41	Open
22	-11.19	0.63	2.50	Open
23	-5.49	0.31	0.67	Open
24	-5.65	0.32	0.70	Open
25	-12.14	0.39	0.71	Open
26	-12.25	0.39	0.73	Open
29	12.43	0.40	0.75	Open
31	12.34	0.39	0.74	Open
32	27.95	1.58	13.61	Open
1	1.88	0.03	0.00	Open
3	0.00	0.00	0.00	Open
4	1.05	0.03	0.01	Open
5	-17.53	0.99	5.73	Open
6	17.53	0.56	1.41	Open
7	102.71	1.45	5.19	Open
9	8.16	0.12	0.05	Open
13	5.75	0.33	0.73	Open
27	-6.00	0.34	0.79	Open
28	-6.22	0.35	0.84	Open
12	110.88	0.00	-20.19	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	
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	90	150	
23	17	18	155	150	
24	18	19	75	150	
25	22	20	60	200	
26	20	21	75	200	
29	15	24	90	200	
31	24	21	100	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	115	300	
13	22	19	40	150	
27	17	23	75	150	
28	23	22	150	150	
12	26	2	#N/A	#N/A	Pump

Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality	
2	0.00	391.44	34.94	0.00	
4	0.13	390.55	32.30	0.00	
5	4.95	390.55	32.35	0.00	
3	0.57	390.88	33.73	0.00	
6	0.32	390.64	32.54	0.00	
7	2.04	390.75	33.35	0.00	
8	0.15	390.00	29.50	0.00	
9	0.15	389.37	26.17	0.00	
10	0.20	389.38	26.48	0.00	
11	0.21	388.84	25.34	0.00	
12	0.25	388.16	24.66	0.00	
13	100.21	386.23	21.43	0.00	
14	0.12	388.25	26.25	0.00	
15	0.13	387.97	27.67	0.00	
16	0.22	387.32	24.42	0.00	
17	0.30	387.54	27.24	0.00	
18	0.16	387.65	28.85	0.00	
19	0.10	387.70	29.40	0.00	
20	0.12	387.77	29.77	0.00	
21	0.09	387.83	29.83	0.00	
22	0.16	387.73	29.53	0.00	
23	0.23	387.60	27.90	0.00	
24	0.09	387.90	29.40	0.00	
25	0.00	389.27	26.87	0.00	
1	0.00	389.41	26.51	0.00	
26	-110.88	356.60	0.00	0.00	Reservoir

Page 3
Link Results:

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status
2	-0.13	0.01	0.00	Open
8	11.44	0.36	0.64	Open
10	-13.49	0.43	0.87	Open
11	102.87	1.46	5.20	Open
14	17.68	0.25	0.20	Open
15	23.88	1.35	10.17	Open
16	-17.32	0.98	5.61	Open
17	40.95	2.32	27.60	Open
18	-31.31	1.77	16.80	Open
19	60.96	1.94	14.21	Open
20	29.54	0.94	3.71	Open
21	16.98	0.96	5.41	Open
22	-11.19	0.63	2.50	Open
23	-5.49	0.31	0.67	Open
24	-5.65	0.32	0.70	Open
25	-12.14	0.39	0.71	Open
26	-12.25	0.39	0.73	Open
29	12.43	0.40	0.75	Open
31	12.34	0.39	0.74	Open
32	27.95	1.58	13.61	Open
1	-96.82	1.37	4.64	Open
3	-110.88	1.57	5.97	Open
4	-11.12	0.35	0.61	Open
5	-17.53	0.99	5.73	Open
6	17.53	0.56	1.41	Open
7	102.71	1.45	5.18	Open
9	-102.71	1.45	5.18	Open
13	5.75	0.33	0.73	Open
27	-6.00	0.34	0.79	Open
28	-6.22	0.35	0.84	Open
12	110.88	0.00	-34.84	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	
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	90	150	
23	17	18	155	150	
24	18	19	75	150	
25	22	20	60	200	
26	20	21	75	200	
29	15	24	90	200	
31	24	21	100	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	115	300	
13	22	19	40	150	
27	17	23	75	150	
28	23	22	150	150	
12	26	2	#N/A	#N/A	Pump

Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality	
2	0.00	381.04	24.54	0.00	
4	0.13	379.21	20.96	0.00	
5	156.95	379.21	21.01	0.00	
3	0.57	379.88	22.73	0.00	
6	0.32	379.42	21.32	0.00	
7	2.04	379.65	22.25	0.00	
8	0.15	379.21	18.71	0.00	
9	0.15	379.21	16.01	0.00	
10	0.20	379.21	16.31	0.00	
11	0.21	379.21	15.71	0.00	
12	0.25	379.21	15.71	0.00	
13	0.21	379.21	14.41	0.00	
14	0.12	379.21	17.21	0.00	
15	0.13	379.21	18.91	0.00	
16	0.22	379.21	16.31	0.00	
17	0.30	379.21	18.91	0.00	
18	0.16	379.21	20.41	0.00	
19	0.10	379.21	20.91	0.00	
20	0.12	379.21	21.21	0.00	
21	0.09	379.21	21.21	0.00	
22	0.16	379.21	21.01	0.00	
23	0.23	379.21	19.51	0.00	
24	0.09	379.21	20.71	0.00	
25	0.00	379.21	16.81	0.00	
1	0.00	379.21	16.31	0.00	
26	-162.88	356.60	0.00	0.00	Reservoir

Page 3
Link Results:

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
2	-0.13	0.01	0.00	Open
8	17.19	0.55	1.36	Open
10	-19.23	0.61	1.68	Open
11	2.87	0.04	0.01	Open
14	0.60	0.01	0.00	Open
15	0.48	0.03	0.01	Open
16	-0.24	0.01	0.00	Open
17	0.46	0.03	0.01	Open
18	-0.24	0.01	0.00	Open
19	1.45	0.05	0.01	Open
20	1.09	0.03	0.01	Open
21	0.23	0.01	0.00	Open
22	0.51	0.03	0.01	Open
23	0.09	0.00	0.00	Open
24	-0.07	0.00	0.00	Open
25	-0.44	0.01	0.00	Open
26	-0.56	0.02	0.00	Open
29	0.74	0.02	0.00	Open
31	0.65	0.02	0.00	Open
32	-0.49	0.03	0.01	Open
1	-143.08	2.02	9.57	Open
3	-162.88	2.30	12.17	Open
4	-16.86	0.54	1.31	Open
5	-0.45	0.03	0.01	Open
6	0.45	0.01	0.00	Open
7	2.71	0.04	0.00	Open
9	-2.71	0.04	0.01	Open
13	0.18	0.01	0.00	Open
27	0.13	0.01	0.00	Open
28	-0.10	0.01	0.00	Open
12	162.88	0.00	-24.44	Open Pump

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

Input File: 1279.D - 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	
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	90	150	
23	17	18	155	150	
24	18	19	75	150	
25	22	20	60	200	
26	20	21	75	200	
29	15	24	90	200	
31	24	21	100	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	115	300	
13	22	19	40	150	
27	17	23	75	150	
28	23	22	150	150	
12	26	2	#N/A	#N/A	Pump

Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality	
2	0.00	385.19	28.69	0.00	
4	0.13	384.13	25.88	0.00	
5	4.95	384.13	25.93	0.00	
3	0.57	384.27	27.12	0.00	
6	0.32	382.49	24.39	0.00	
7	135.05	380.72	23.32	0.00	
8	0.15	384.13	23.63	0.00	
9	0.15	384.13	20.93	0.00	
10	0.20	384.13	21.23	0.00	
11	0.21	384.13	20.63	0.00	
12	0.25	384.13	20.63	0.00	
13	0.21	384.13	19.33	0.00	
14	0.12	384.13	22.13	0.00	
15	0.13	384.13	23.83	0.00	
16	0.22	384.13	21.23	0.00	
17	0.30	384.13	23.83	0.00	
18	0.16	384.13	25.33	0.00	
19	0.10	384.13	25.83	0.00	
20	0.12	384.13	26.13	0.00	
21	0.09	384.13	26.13	0.00	
22	0.16	384.13	25.93	0.00	
23	0.23	384.13	24.43	0.00	
24	0.09	384.13	25.63	0.00	
25	0.00	384.13	21.73	0.00	
1	0.00	384.13	21.23	0.00	
26	-143.88	356.60	0.00	0.00	Reservoir

Page 3
Link Results:

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
2	-0.13	0.01	0.00	Open
8	-51.67	1.64	10.46	Open
10	-83.37	2.65	25.37	Open
11	2.87	0.04	0.01	Open
14	0.60	0.01	0.00	Open
15	0.48	0.03	0.01	Open
16	-0.24	0.01	0.00	Open
17	0.46	0.03	0.01	Open
18	-0.24	0.01	0.00	Open
19	1.45	0.05	0.01	Open
20	1.09	0.03	0.01	Open
21	0.23	0.01	0.00	Open
22	0.51	0.03	0.01	Open
23	0.09	0.00	0.00	Open
24	-0.07	0.00	0.00	Open
25	-0.44	0.01	0.00	Open
26	-0.56	0.02	0.00	Open
29	0.74	0.02	0.00	Open
31	0.65	0.02	0.00	Open
32	-0.49	0.03	0.01	Open
1	-59.94	0.85	1.91	Open
3	-143.88	2.04	9.67	Open
4	51.99	1.66	10.58	Open
5	-0.45	0.03	0.01	Open
6	0.45	0.01	0.00	Open
7	2.71	0.04	0.01	Open
9	-2.71	0.04	0.01	Open
13	0.18	0.01	0.00	Open
27	0.13	0.01	0.00	Open
28	-0.10	0.01	0.00	Open
12	143.88	0.00	-28.59	Open Pump

```
******************************************************************************
*                            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	90	150	
23	17	18	155	150	
24	18	19	75	150	
25	22	20	60	200	
26	20	21	75	200	
29	15	24	90	200	
31	24	21	100	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	115	300	
13	22	19	40	150	
27	17	23	75	150	
28	23	22	150	150	
12	26	1	#N/A	#N/A	Pump

Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality	
2	0.00	383.47	26.97	0.00	
4	0.13	383.47	25.22	0.00	
5	4.95	383.47	25.27	0.00	
3	0.57	383.47	26.32	0.00	
6	0.32	383.47	25.37	0.00	
7	2.04	383.47	26.07	0.00	
8	97.15	383.48	22.98	0.00	
9	0.15	384.10	20.90	0.00	
10	0.20	384.10	21.20	0.00	
11	0.21	384.10	20.60	0.00	
12	0.25	384.10	20.60	0.00	
13	0.21	384.10	19.30	0.00	
14	0.12	384.10	22.10	0.00	
15	0.13	384.10	23.80	0.00	
16	0.22	384.10	21.20	0.00	
17	0.30	384.10	23.80	0.00	
18	0.16	384.10	25.30	0.00	
19	0.10	384.10	25.80	0.00	
20	0.12	384.10	26.10	0.00	
21	0.09	384.10	26.10	0.00	
22	0.16	384.10	25.90	0.00	
23	0.23	384.10	24.40	0.00	
24	0.09	384.10	25.60	0.00	
25	0.00	384.10	21.70	0.00	
1	0.00	384.10	21.30	0.00	
26	-107.87	362.90	0.00	0.00	Reservoir

Page 3
Link Results:

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
2	-0.13	0.01	0.00	Open
8	-0.73	0.02	0.00	Open
10	-1.32	0.04	0.01	Open
11	-8.01	0.11	0.05	Open
14	0.60	0.01	0.00	Open
15	0.48	0.03	0.01	Open
16	-0.24	0.01	0.00	Open
17	0.46	0.03	0.01	Open
18	-0.24	0.01	0.00	Open
19	1.45	0.05	0.01	Open
20	1.09	0.03	0.01	Open
21	0.23	0.01	0.00	Open
22	0.51	0.03	0.01	Open
23	0.09	0.00	0.00	Open
24	-0.07	0.00	0.00	Open
25	-0.44	0.01	0.00	Open
26	-0.56	0.02	0.00	Open
29	0.74	0.02	0.00	Open
31	0.65	0.02	0.00	Open
32	-0.49	0.03	0.01	Open
1	1.88	0.03	0.00	Open
3	0.00	0.00	0.00	Open
4	1.05	0.03	0.01	Open
5	-0.45	0.03	0.01	Open
6	0.45	0.01	0.00	Open
7	2.71	0.04	0.01	Open
9	105.16	1.49	5.41	Open
13	0.18	0.01	0.00	Open
27	0.13	0.01	0.00	Open
28	-0.10	0.01	0.00	Open
12	107.87	0.00	-21.20	Open Pump

MERITECH

Channel Calculations

Project: Conservation Drive
File: 1279
Calculated by: CHT
Date: 19-Dec-16
Checked by: CHT
Date: 15-Oct-24

Channel Type: **1.7 m³/s** overland flow through roundabout and down Beaver Creek Road

MAIN CHANNEL

Bot. Width "B1" (m)	Depth (m)	Left Slope "Z1"	Right Slope "Z1"	Man. Coeff. "N1"	Grade "S1" (%)
0.000	0.255	0.00	32.00	0.015	1.00
		#DIV/0!	(3.1%)		

OVERFLOW CHANNEL

Left Bank (m)	Right Bank (m)	Depth (m)	Left Slope "Z2"	Right Slope "Z2"	Man. Coeff. "N2"	Grade "S2" (%)
0.000	0.000	0.000	0.00	0.00	0.000	1.00
			#DIV/0!	#DIV/0!		

MAIN CHANNEL

Top Width (m)	Flow Area "A" (m²)	Wet. Perim. "P" (m)	Hyd. Radius "R=A/P"	Cap. "Q" (L/s)	Vel. "V" (m/s)
8.160	1.040	8.419	0.124	1,724.1	1.66

OVERFLOW CHANNEL

Bottom Width "B2" (m)	Top Width (m)	Flow Area "A" (m²)	Wet. Perim. "P" (m)	Hyd. Radius "R=A/P"	Cap. "Q" (L/s)	Vel. "V" (m/s)
8.160	0.000	0.000	0.000	0.000	0.0	0.00

COMBINED CAPACITY

Bot. Width (m)	Top Width (m)	Total Depth (m)	Total Cap. (L/s)	Avg. Vel. (m/s)
0.000	8.160	0.255	1,724.1	1.66

Input Parameters

B1	Bottom width of low flow channel (m)
Z1	Side slope of the low flow channel ZH:1V
N1	Manning's coefficient for low flow channel
B2	Width of main overflow bank above the low flow channel (m)
Z2	Side slope of the main channel ZH:1V
N2	Manning's coefficient for the main channel

MERITECH

Sanitary Sewer Design Sheet

for

The City of Waterloo

Ref#

Project: Conservation Dr
File: 1279
Calc'd by: XCC
Date: 6-Mar-24
Chk'd by: CHT
Date: 18-Oct-24

Pipe Velocities: 0.60 m/s min. (pipe full)
3.00 m/s max. (actual flow)
n= 0.013 all pipe material

Residential average daily flow (q): 275 L/cap/d (B.3.1.2.1 from SSMS)

Unit extraneous flow (E): 0.25 L/s/ha (B.3.1.2.6 from SSMS)

q = average daily per capita flow (L/cap/d)
I = Unit of peak extraneous flow (L/s/ha)
Q(p) = peak population flow (L/s)
Q(I) = peak extraneous flow (L/s)
Q(d) = peak design flow (L/s)

Peaking Factor:
M = 1 + 14/(4+(P/1000)^0.5)
Q(p) = (P/1000)qM/86.4 (L/s)
Q(I) = IA (L/s) ; where A = Area in hectares
Q(d) = Q(p) + Q(I) (L/s)

Peaking Factor: 2

Manning Equation:
Qcap. = (D/1000)^2.667*(S/100)^0.5/(3.211*n)*1000 (L/s)
D: pipe size (mm)
S: slope (grade) of pipe (%)
n: roughness coeffiecient

Location		Unit Count (ppu)			Residential 0.0032 (L/s/cap)						School		140	Infiltration		0.25		Pipe							
					Individual		Accumulative																		
From	To	3.3 Single Semi	2.18 Town Multi	Area ID	P (person)	Area (ha)	P (person)	Area (ha)	Peak Factor M	Pop. Q(p) (L/s)	School Area (ha)	Accum Area (ha)	Peak Flow (L/s)	Total Area	Accum Total Area	Extran. Q(I) (L/s)	Design Q(d) (L/s)	Length L (m)	Size D (mm)	Pipe Mat'l	Slope S (%)	Capacity Qcap. (L/s)	Velocity V (m/s)	Q(d)/Qcap	Actual Velocity (m/s)
Northwest																									
A	Ex Sewer	4		1	14	0.28	14	0.28	4.399	0.196				0.280	0.280	0.070	0.266	150.0	200	PVC	1.09%	35.728	1.102	0.7%	0.011
	B	56	29	2	249	3.77	249	3.77	4.112	3.259				3.770	3.770	0.943	4.201	590.0	200	PVC	0.60%	26.507	0.817	15.8%	0.621
	D	198	0	3 & 4	654	11.02	654	11.02	3.911	8.142				11.020	11.020	2.755	10.897	1530.0	200	PVC	0.60%	26.507	0.817	41.1%	0.797
D	B		278	5	607	4.07	1261	15.09	3.733	14.982	3.22	3.22	4.861	7.290	18.310	4.578	24.421	476.0	250	PVC	0.60%	48.061	0.948	50.8%	0.963
	B						249	3.77							3.770										
D	B						1261	15.09				3.22			18.310										
B	E						1510	18.86	3.677	17.674		3.22	4.861		22.080	5.520	28.056	75.0	250	PVC	0.60%	48.061	0.948	58.4%	0.996
E	F		66	6	144	0.82	1654	19.68	3.648	19.207		3.22	4.861	0.820	22.900	5.725	29.793	90.0	250	PVC	0.60%	48.061	0.948	62.0%	1.005
Site to Activa Pr Sewer			16	7	35	0.41	35	0.41	4.344	0.484		0.00	4.861	0.410	0.410	0.103	5.447	10.0	200	PVC	0.60%	26.507	0.817	20.6%	0.670

MERITECH

Storm Sewer Hydraulic Design Sheet

for

The City of Waterloo

Ref #

Project: Conservation Drive
File: 1279
Calc'd by: XCC
Date: 6-Mar-24
Chk'd by: CHT
Date: 17-Oct-24

I=A/(Tc+B)^C
A= 1755
B= 12.347
C= 0.895
Tc= 10

Pipe Velocities: 0.6 m/s min.
6.0 m/s max.
n= 0.024 CSP
n= 0.013 Conc./PVC/HDPE

5 Year Design Storm

Rational Formula: Q =CIA/0.36
Where: Q : peak flow (L/s)
C : runoff coefficient
I : rainfall intensity (mm/hr)
A : area (ha)

Concentration time: tc = ti + tf (minute)
Where: ti: inlet time before pipe (minute)
tf: time of flow in pipe (minute)
tf = L/60V
ti = 10

Manning Equation:
Qcap.=(D/1000)^2.667*(S/100)^0.5/(3.211*n)*1000 (L/s)
D: pipe size (mm)
S: slope (grade) of pipe (%)
n: roughness coeffiecient

Location		Runoff									Pipe								
From	To	Area ID	Area A (ha)	"C"	Section "AC" (ha)	Accum. "AC" (ha)	ti (Min.)	tc (Min.)	"I" (mm/hr)	Peak Flow Q (L/s)	Length L (m)	N.D. D (mm)	Pipe Mat'l	Slope S (%)	Qcap. (full) (L/s)	V (full) (m/s)	tf (Min.)	Q/Qcap.	Actual Velocity (m/s)
To South																			
A	B	1	2.69	0.30	0.807	0.807	10.00	11.14	108.824	243.948	105.0	525	PVC	0.60%	333.125	1.539	1.14	73%	1.693
B	C	2, 3	3.75	0.43	1.620	2.427	11.14	12.13	104.096	701.778	140.0	675	PVC	1.00%	840.588	2.349	0.99	83%	2.643
C	D	4	1.66	0.60	0.996	3.423	12.13	13.04	100.307	953.750	190.0	675	PVC	2.20%	1246.794	3.484	0.91	76%	3.867
E	D	5	2.54	0.50	1.270	1.270	10.00	11.43	108.824	383.908	170.0	525	PVC	1.00%	430.062	1.987	1.43	89%	2.265
D	F	6	0.43	0.75	0.323	5.016	13.04	13.65	97.087	1352.604	105.0	900	Concrete	1.00%	1810.311	2.846	0.61	75%	3.144
G	F	7	1.72	0.75	1.290	1.290	10.00	12.59	108.824	389.954	261.0	600	Concrete	0.60%	475.611	1.682	2.59	82%	1.884
F	H	8	0.75	0.75	0.563	6.868	13.65	13.98	95.029	1812.938	48.0	1050	Concrete	0.60%	2115.211	2.443	0.33	86%	2.760
H	downstream	9	1.47	0.75	1.103	7.971	13.98	14.05	93.970	2080.526	12.0	1050	Concrete	0.80%	2442.435	2.821	0.07	85%	3.187
To West																			
AA	BB	10,11	1.36	0.60	0.816	0.816	10.00	12.61	108.824	246.668	220.0	525	PVC	0.50%	304.100	1.405	2.61	81%	1.573
BB	CC	12	0.75	0.60	0.450	1.266	12.61	14.34	98.580	346.672	159.0	600	Concrete	0.50%	434.172	1.536	1.73	80%	1.712
XX	CC	18	1.24	0.60	0.744	0.744	10.00	11.84	108.824	224.904	155.0	525	Concrete	0.50%	304.100	1.405	1.84	74%	1.545
BB	CC					1.266		14.34											
XX	CC					0.744		11.84											
CC	DD	13	0.70	0.60	0.420	2.430	14.34	14.81	92.854	626.762	55.0	750	Concrete	0.60%	862.341	1.952	0.47	73%	2.147
MM	DD	EXT	0.85	0.60	0.510	0.510	10.00	11.32	108.824	154.168	110.0	450	PVC	0.60%	220.842	1.389	1.32	70%	1.507
CC	DD					2.430		14.81											
MM	DD					0.510		11.32											
DD	YY				0.000	2.940	14.81	15.03	91.415	746.556	26.0	750	PVC	0.60%	862.341	1.952	0.22	87%	2.215
EE	FF	14,15	0.86	0.60	0.516	0.516	10.00	10.77	108.824	155.982	120.0	375	PVC	2.70%	288.097	2.608	0.77	54%	2.661
FF	GG	16	0.83	0.60	0.498	1.014	10.77	10.88	105.588	297.405	19.0	450	PVC	2.60%	459.720	2.891	0.11	65%	3.093
GG	HH	17	0.51	0.60	0.306	1.320	10.88	11.27	105.142	385.520	68.0	450	PVC	2.60%	459.720	2.891	0.39	84%	3.252

Storm Sewer Hydraulic Design Sheet

Project: Conservation Drive
File: 1279
Calc'd by: XCC
Date: 6-Mar-24
Chk'd by: CHT
Date: 17-Oct-24

for

The City of Waterloo

Ref #

I=A/(Tc+B)^C
A= 1755
B= 12.347
C= 0.895
Tc= 10

Pipe Velocities: 0.6 m/s min.
6.0 m/s max.
n= 0.024 CSP
n= 0.013 Conc./PVC/HDPE

5 Year Design Storm

Rational Formula: Q =CIA/0.36
Where: Q : peak flow (L/s)
C : runoff coefficient
I : rainfall intensity (mm/hr)
A : area (ha)

Concentration time: tc = ti + tf (minute)
Where: ti: inlet time before pipe (minute)
tf: time of flow in pipe (minute)
tf = L/60V
ti = 10

Manning Equation:
Qcap.=(D/1000)^2.667*(S/100)^0.5/(3.211*n)*1000 (L/s)
D: pipe size (mm)
S: slope (grade) of pipe (%)
n: roughness coeffiecient

Location		Runoff									Pipe								
From	To	Area ID	Area A (ha)	"C"	Section "AC" (ha)	Accum. "AC" (ha)	ti (Min.)	tc (Min.)	"I" (mm/hr)	Peak Flow Q (L/s)	Length L (m)	N.D. D (mm)	Pipe Mat'l	Slope S (%)	Qcap. (full) (L/s)	V (full) (m/s)	tf (Min.)	Q/Qcap.	Actual Velocity (m/s)
HH	LL	21	0.65	0.60	0.390	1.710	11.27	12.42	103.578	491.996	115.0	675	Concrete	0.50%	594.386	1.661	1.15	83%	1.869
LL	YY	22	0.22	0.60	0.132	1.842	12.42	12.77	99.249	507.822	40.0	825	Concrete	0.50%	1015.006	1.899	0.35	50%	1.899
DD	YY					2.940		15.03											
LL	YY					1.842		12.77											
YY	SWM facility				0.000	4.782	15.03	15.19	90.751	1205.478	22.0	900	Concrete	0.60%	1402.261	2.204	0.17	86%	2.491
KK (park)	Pond	20	2.28	0.25	0.570	0.570	10.00	10.14	108.824	172.305	12.0	450	PVC	0.60%	220.842	1.389	0.14	78%	1.548

Appendix D: Supplemental Sketches

Truck Turning – Trail

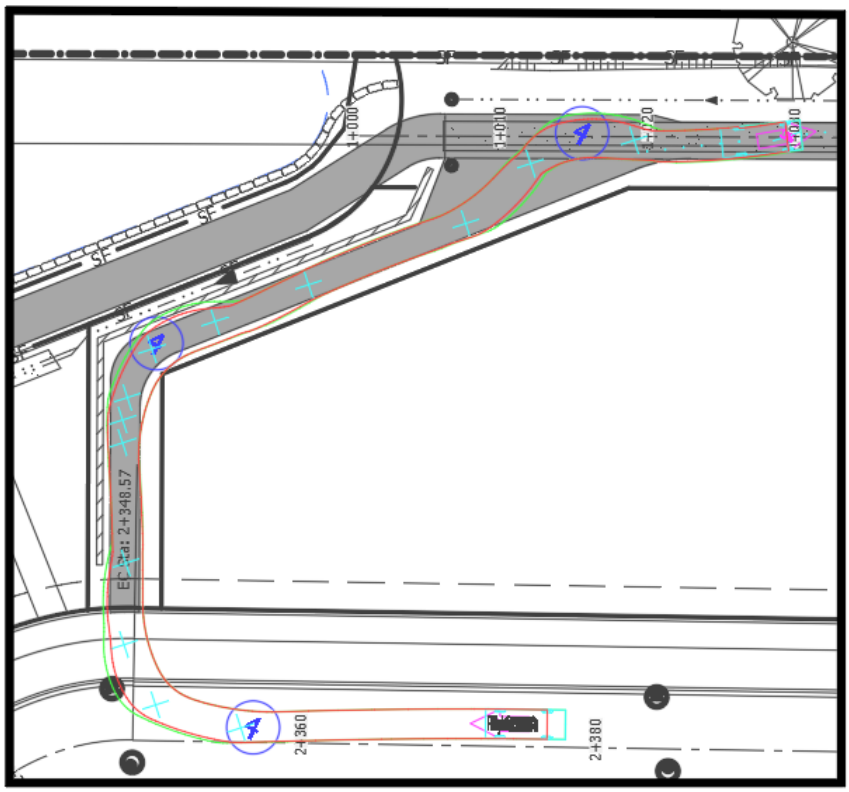
Park Grading Concept

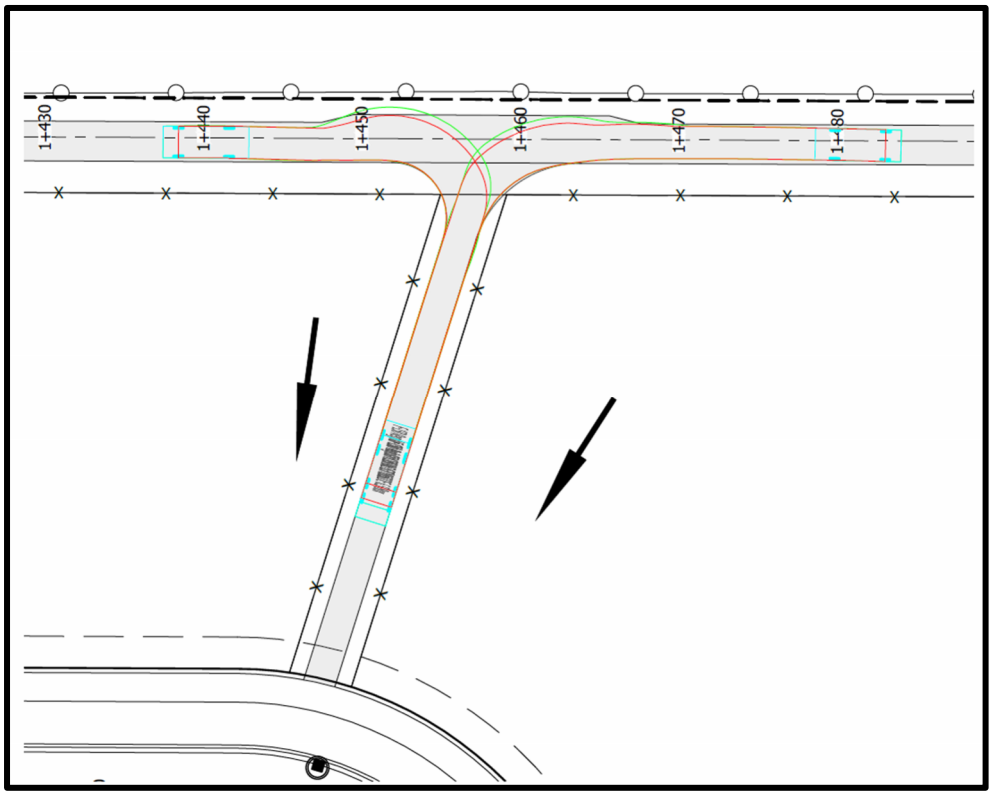
Fence Plan

Active Transportation Plan

North Property Line Grading Drawings and Memo

Truck turning - Trail





PERMANENT SIGNAGE

BOLLARD GATE

DOG WASTE DISPOSAL

MOLOK GARBAGE

HYDRO CONNECTION AND APPROXIMATE LOCATION OF FUTURE LIGHT

RINK LOCATION

PROPOSED ALTERNATIVE SANITARY SEWER CONNECTION

JUNIOR PLAY STRUCTURE

SAUCER SWING

3m WIDE CONNECTION TO SCHOOL PROPERTY

Swale

Swale

PREFERRED SANITARY SEWER CONNECTION AND ASSOCIATED EASEMENT REQUIREMENT

SOCCER PITCH EXTENDING FROM NEIGHBOURING SCHOOL PROPERTY

PASSIVE OPEN SPACE 1-2% SLOPE

4m WIDE STORMWATER POND ACCESS

FULL COURT

SENIOR PLAY STRUCTURE

BIKE RACKS

3 BAY SWING SET

PERMANENT SIGNAGE

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	Dec. 4, 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 Drive

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:	Oct 2024

PART 1, PLAN 58R–1190
LOT 30, G.C.T.

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

L O T 2 5

Township of Woolwich
City of Waterloo

Township of Woolwich
City of Waterloo

N63°12'40"E 113.7

N63°55'40"E 199.525

N63°50'00"E 249.428

N63°50'00"E 183.448

30m Wetland Setback

5m Hedgerow Setback

Ex. Hedgerow

Block 34 Walkway 0.01ha.

Block 32 Trail 0.43ha. 285.2

Block 2
Residential
1.36 ha.
34-50 Units

Rideau River Street

Block 11
Residential
0.42 ha.
12-14 Units

Block 10
Residential
0.16 ha.
3-4 Units

Block 9
Residential
0.42 ha.
12-14 Units

Rideau River Street

Block 3
Residential
0.12 ha.
2-3 Units

Blk 32
Open Space
0.52ha.

Wetland Limit

Dripline

10m Dripline Setback

Block 39
Future Development
0.02 ha.

Future Residential

Stage 2

Block 4
Residential
0.26 ha.
5-6 Units

Block 40
Future Development
0.06 ha.

Block 5
Residential
0.18 ha.
3-4 Units

Block 12
Res.
0.35 ha.
8-11 Units

Mono Cliffs Street

Block 13
Res.
0.32 ha.
7-10 Units

Block 14
Res.
0.31 ha.
7-10 Units

Bass Lake St

Block 15
Res.
0.31 ha.
7-10 Units

Block 16
Res.
0.32 ha.
7-11 Units

Esker Lake Dr

Block 17
Res.
0.25 ha.
6-8 Units

Block 18
Res.
0.36 ha.
7-10 Units

Block 19
Residential
0.24 ha.
7-8 Units

Block 1
Residential
0.45 ha.
6-8 Units

Rideau River Place

Rideau River Street

Block 6
Residential
0.17 ha.
4-5 Units

Block 8
Residential
0.66 ha.
17-21 Units

Block 7
Residential
0.47 ha.
13-16 Units

Pinery Trail

Pinery Trail

Block 20
Residential
0.20 ha.
5-6 Units

Pinery Trail

Block 33
Stormwater
Management
1.17ha.

Block 29
School
3.22ha.

Block 30
Park
1.41ha.

Block 22
Street
Townhouse
15 - 20
0.39ha

Blk 21
Res.
0.38 ha.
11-16 Units

Roy Schmidt Road

Beaver Creek

Dripline

30m Wetland Buffer

10m Dripline Setback

15m Wetland Buffer

Wetland Limit

Stage 1

Block 24
Street Townhouse
22 - 30
0.55ha

Block 26
Street Townhouse
22 - 30
0.55ha

Block 25
Street
Townhouse
10 - 16
0.40ha

Rushing River Street

Rushing River Street

Block 23
Street Townhouse
5 - 9
0.16ha

Block 28
Multiple
Residential
0.66ha.
39-66 Units

Block 27
Multiple
Residential
1.71ha.
121-202 Units

Block 31
Open Space
4.31ha.

Block 38
0.3m Reserve
INST. NO. 1450753
SEE DEPOSIT, INST. 1477464)
PART 1, PLAN 58R–6414

Proposed Temporary Grading Easement

Proposed Permanent Anchor Easement

Proposed Temporary Grading Easement

Block 37
0.3m Reserve

Block 36 Road Widening 0.53ha.

Conservation Drive

Future Roundabout

N63°51'55"E 50.380

N61°00'00"E 135.490

N38°23'50"W 184.072

N63°33'50"E 144.945

Walkway

N62°33'00"E 0.079

N79°54'45"E 1.279

Mixed Use

Trail

Future Multiple Residential

Future Pumping Station

Open Space

Future Stormwater Management

Future Multiple Residential

Future Multiple Residential / Mixed Use

NOTE:
ROAD WIDENINGS AND ROUNDABOUT ARE PRELIMINARY

Multi-use Trails

Sidewalks

* All Streets, including on-street pedestrian and cycling facilities, to be designed in accordance with the City of Waterloo Standards

KEY PLAN
N.T.S.

Subject Property

..\images\key map.jpg

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)	1-2,6-21	173-232	7.14
Street Townhouses	22-26	74-105	2.05
Multiple Residential	27,28	160-268	2.37
School	29		3.22
Park	30		1.41
Open Space	31,32		4.84
Stormwater Management	33		1.17
Walkway	34		0.01
Trail	35		0.43
Road Widening	36		0.53
0.3m Reserve	37,38		0.00
Roads			4.83
Total		404-610	28.0

STAGE 2

DESCRIPTION	LOTS/BLKS.	UNITS	AREA (ha.)
Residential (single detached)	3-5	10-13	0.56
Future Development	39,40		0.08
Total		10-13	0.65

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 l 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.

2115881 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.
MacDonald Tamblyn Lord Surveying Limited — August 18, 2016 DATE

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	February 7,2024
March 15, 2020	July 29, 2024
March 19, 2020	August 15, 2024
August 19, 2021	August 26, 2024
May 24, 2023	

Date: July 29, 2015 | Drawn By: S.L./E.F. | Dwg. File Name: dp09009zv.dwg
Scale: 1:1250 metric | Project No.: 09009.40

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.

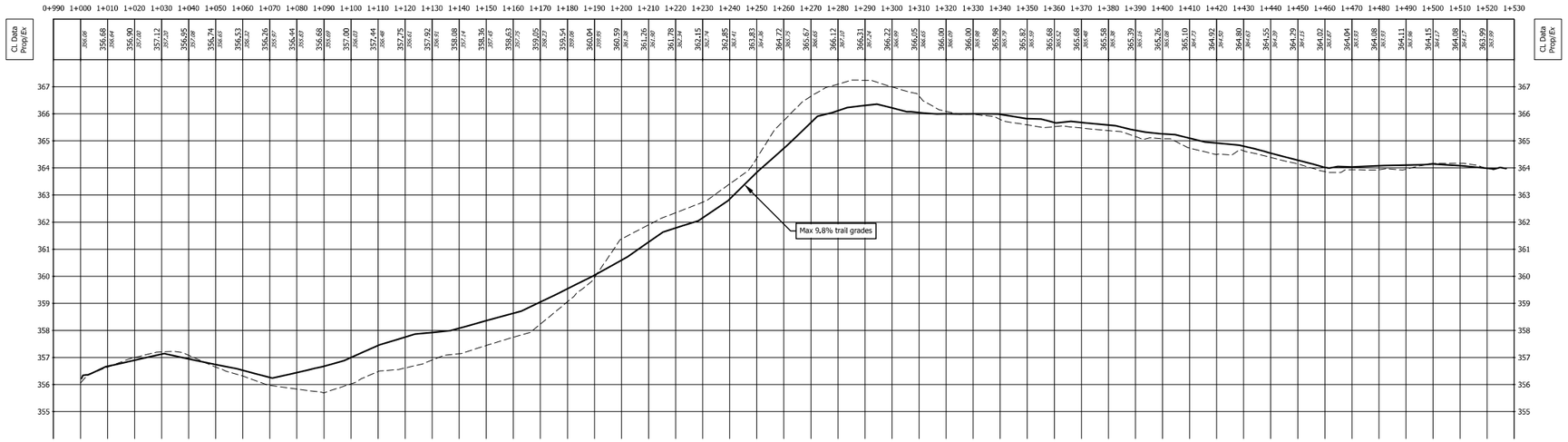
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MERITECH engineering
1150 Morrison Dr., Suite 202, Ottawa, ON
T 613.823.1240 F 613.823.2334 www.meritech.ca

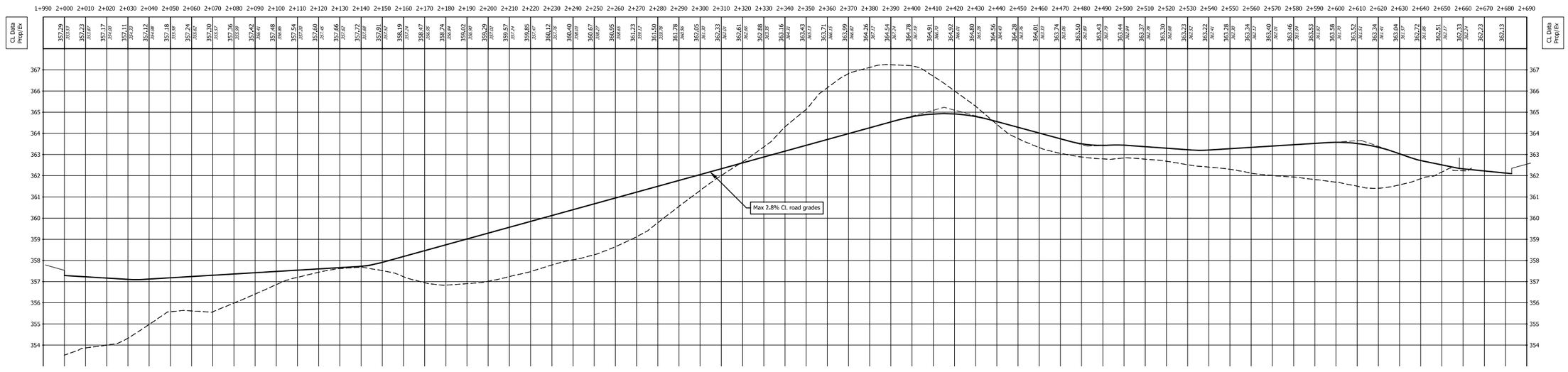
DRAWING: Conceptual Trail Grading - Option 1
556 & 576 Conservation Drive

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

Trail



Rideau River Street



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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

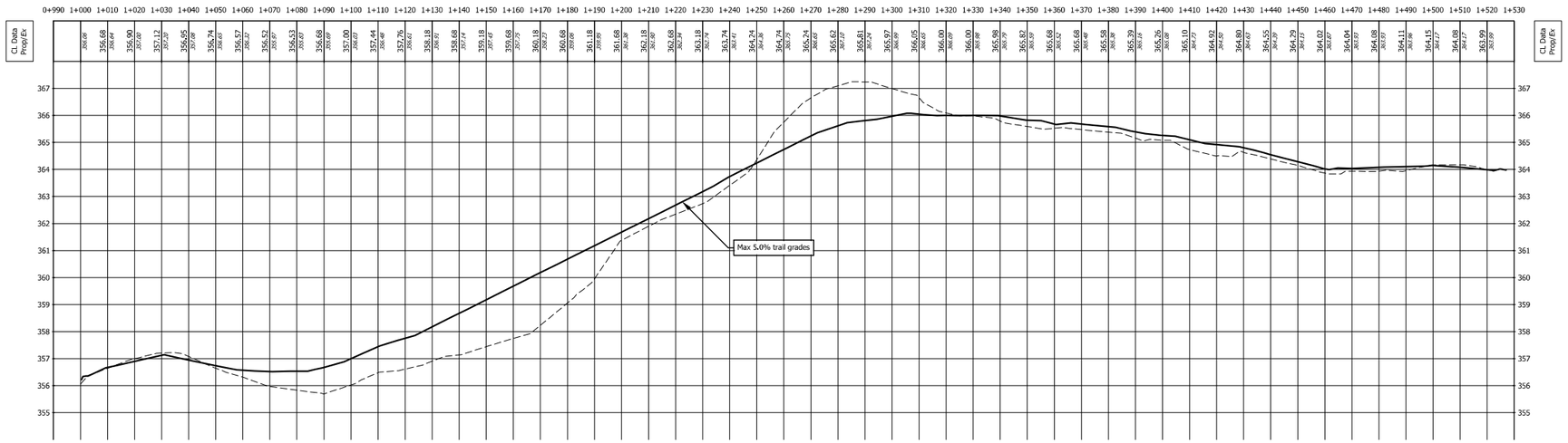
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SCALE:	1:500		
	1279-XSect2		

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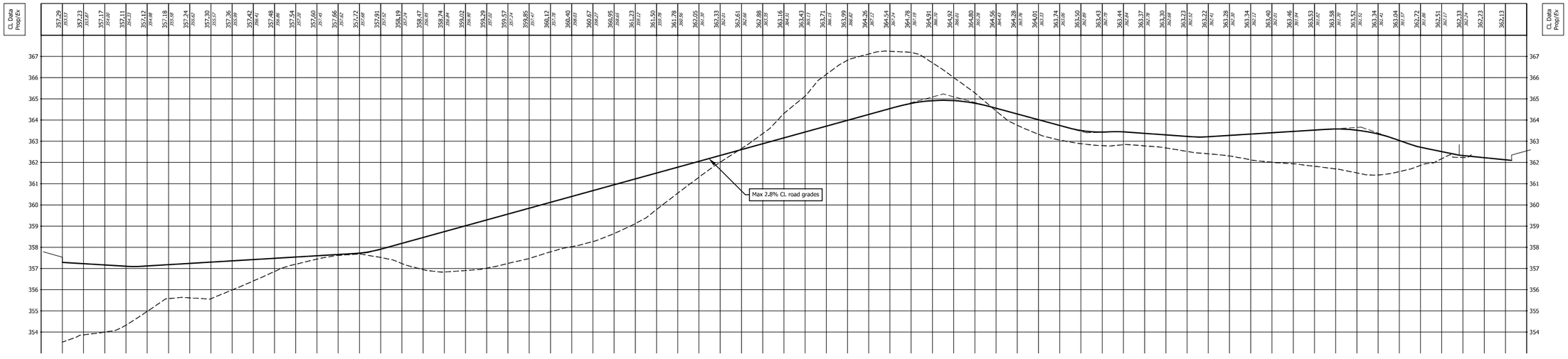
DRAWING: Conceptual Trail Grading - Option 2
556 & 576 Conservation Drive

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

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 519.623.2334 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)

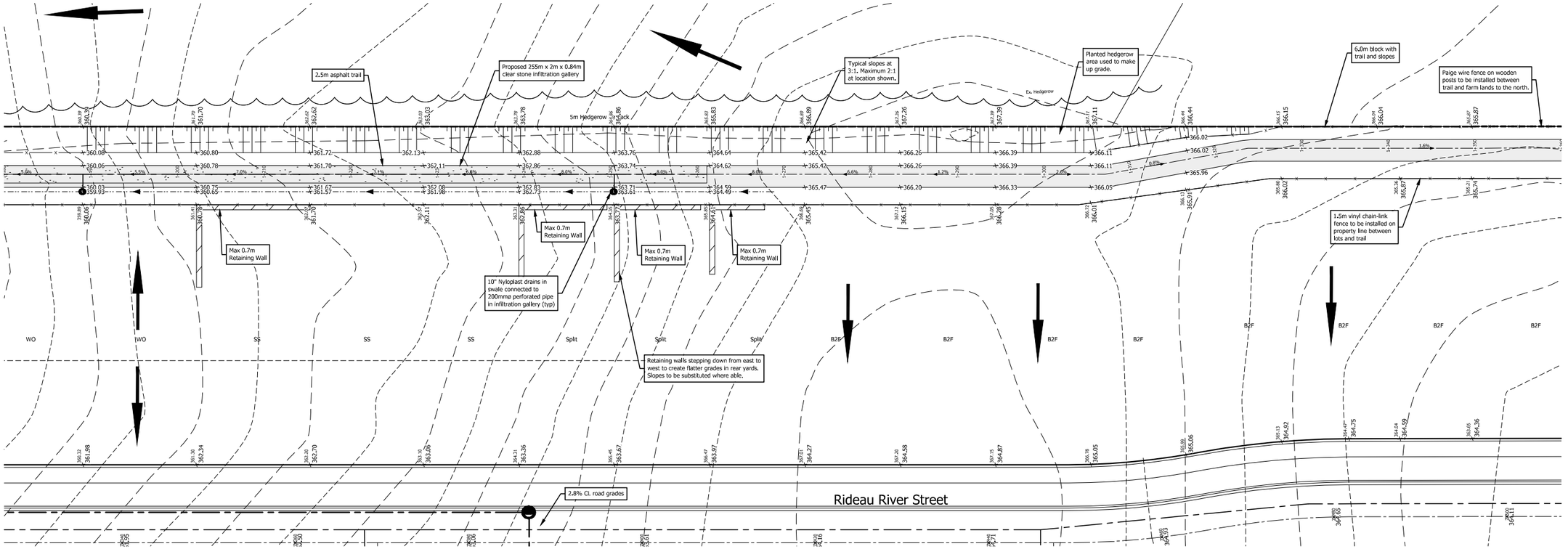
3.0m asphalt trail connection

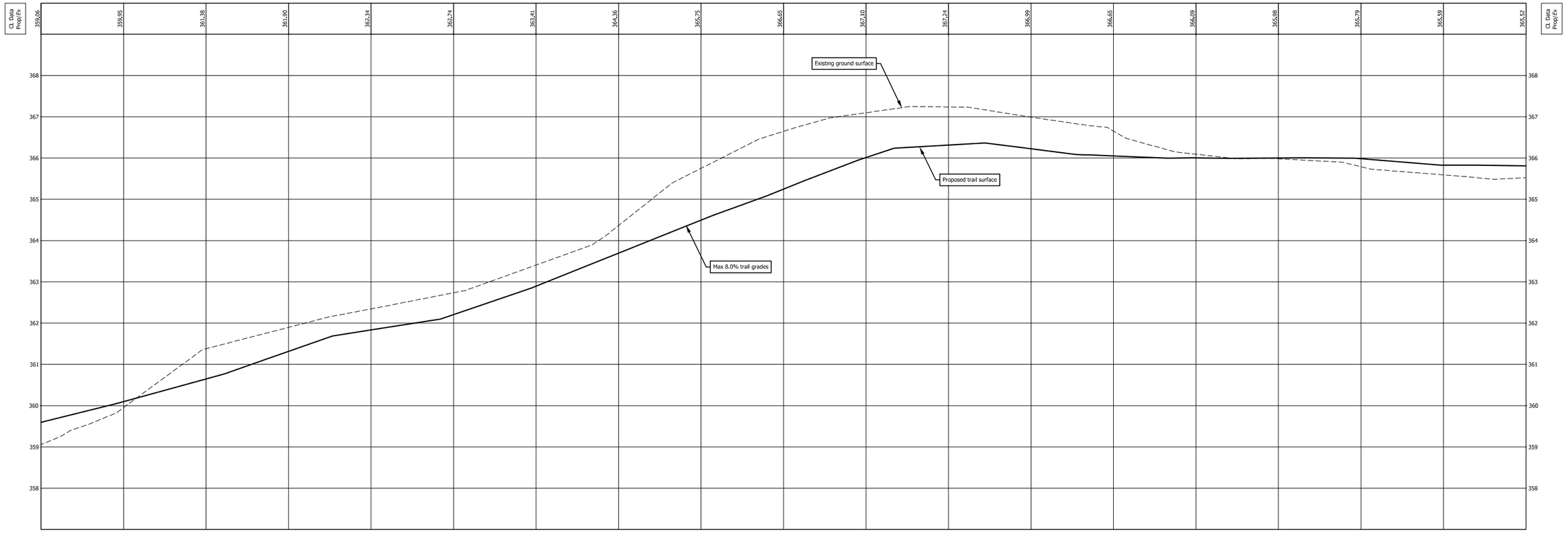
Max 3.0% CL road grades

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

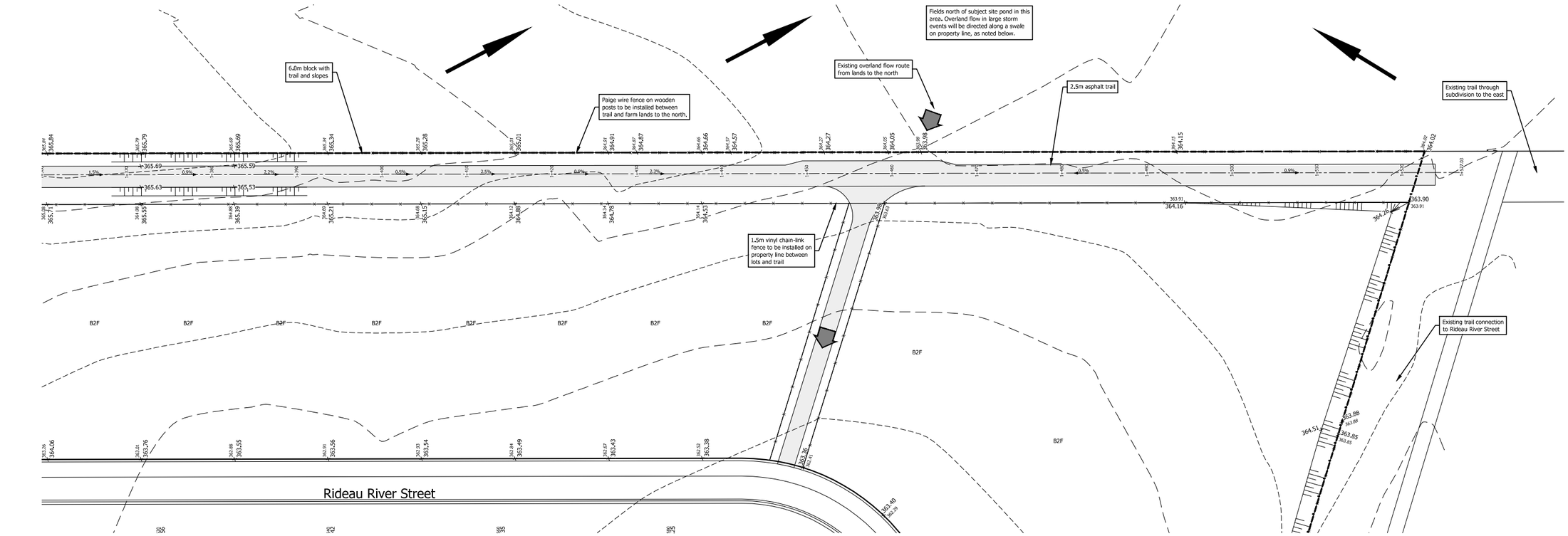


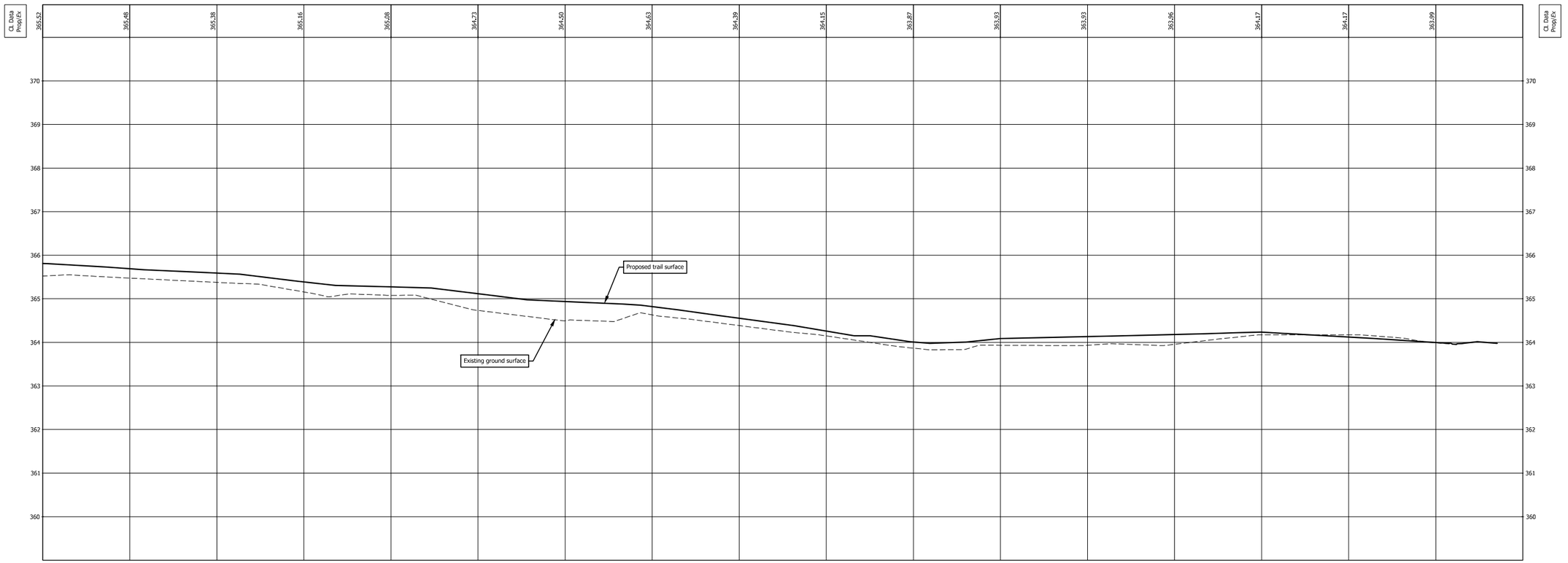


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T 613.521.1140 F 613.521.2304 www.meritech.ca

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		





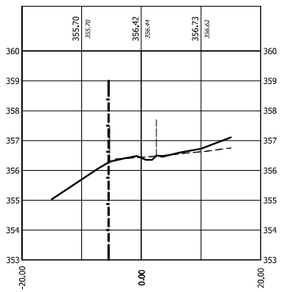
MERIDIAN Engineering
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T 613.823.1240 F 613.823.2304 www.meridian.ca

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

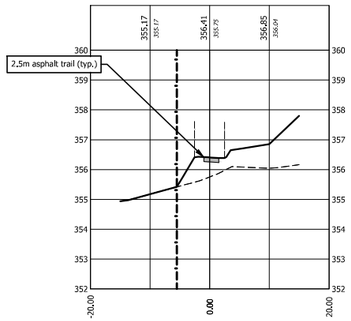
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		DATE:	Aug 2023

1279-NorthPL

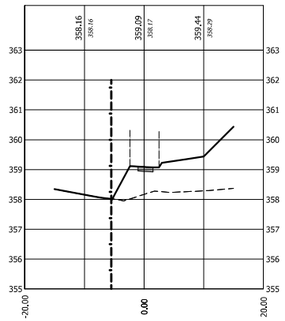
Trail, SL-1 1+005



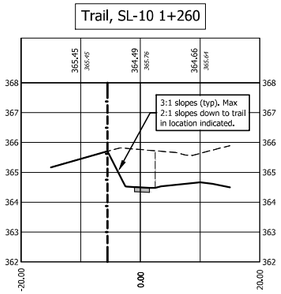
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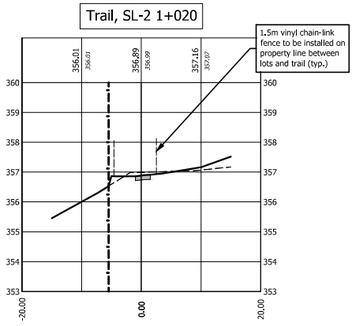
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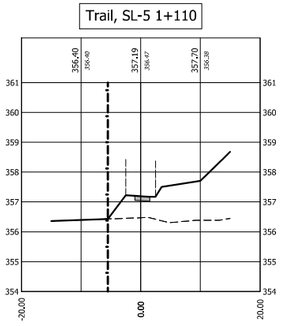
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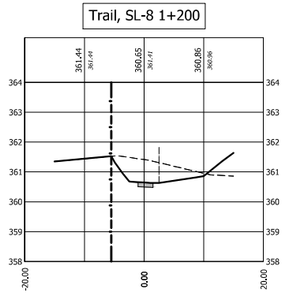
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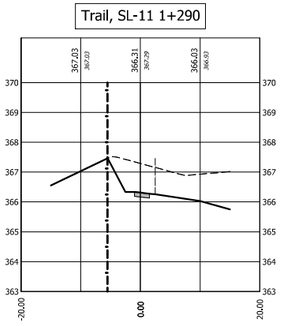
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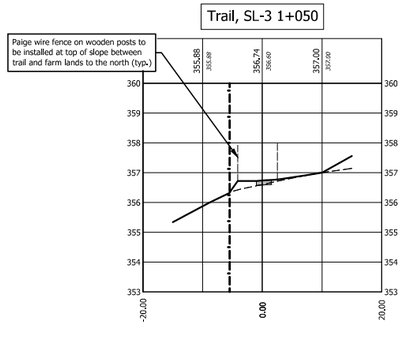
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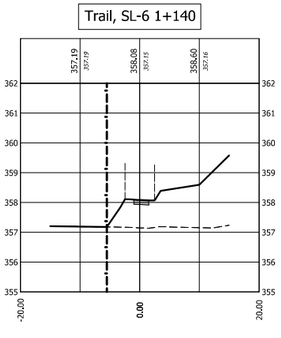
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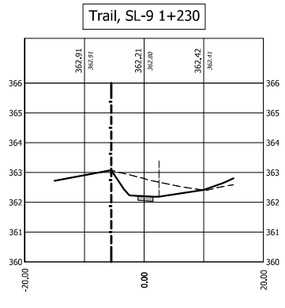
Trail, SL-3 1+050



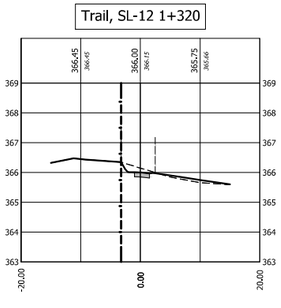
Trail, SL-6 1+140



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 water modelling reports

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

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Kitchener ON Canada N2G 4J3
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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.



Kevin Dolishny P.Eng.
Senior Project Engineer, Servicing and Development Planning
t. 519.575.4757 x 3862
e-mail: kdolishny@regionofwaterloo.ca

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

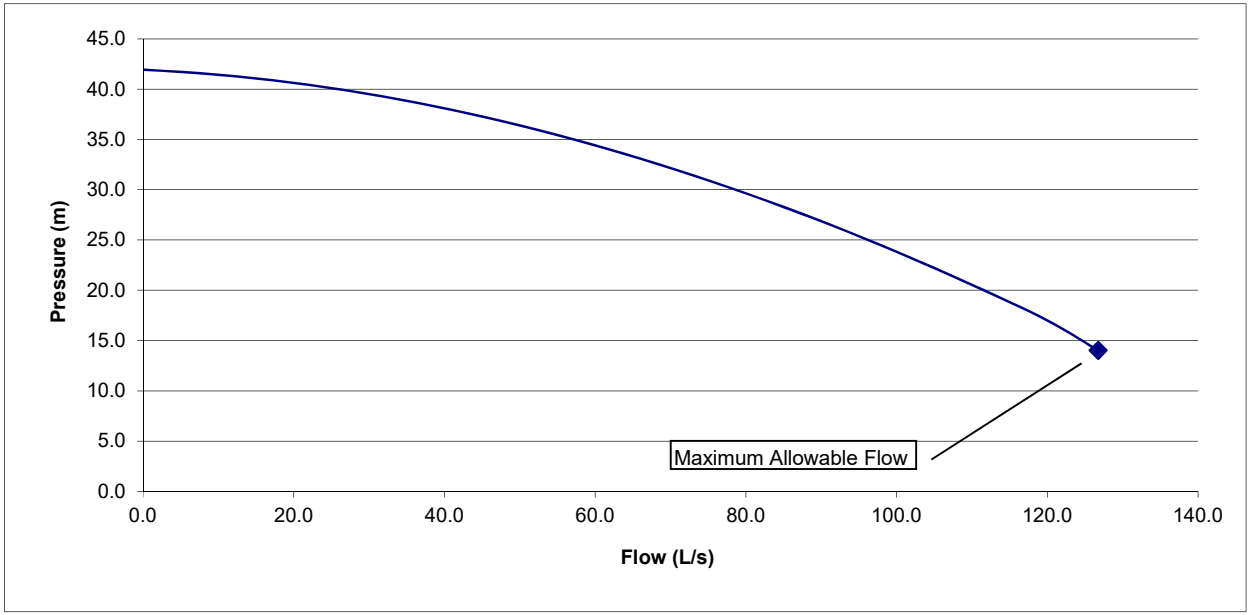
Fire Flow Analysis

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

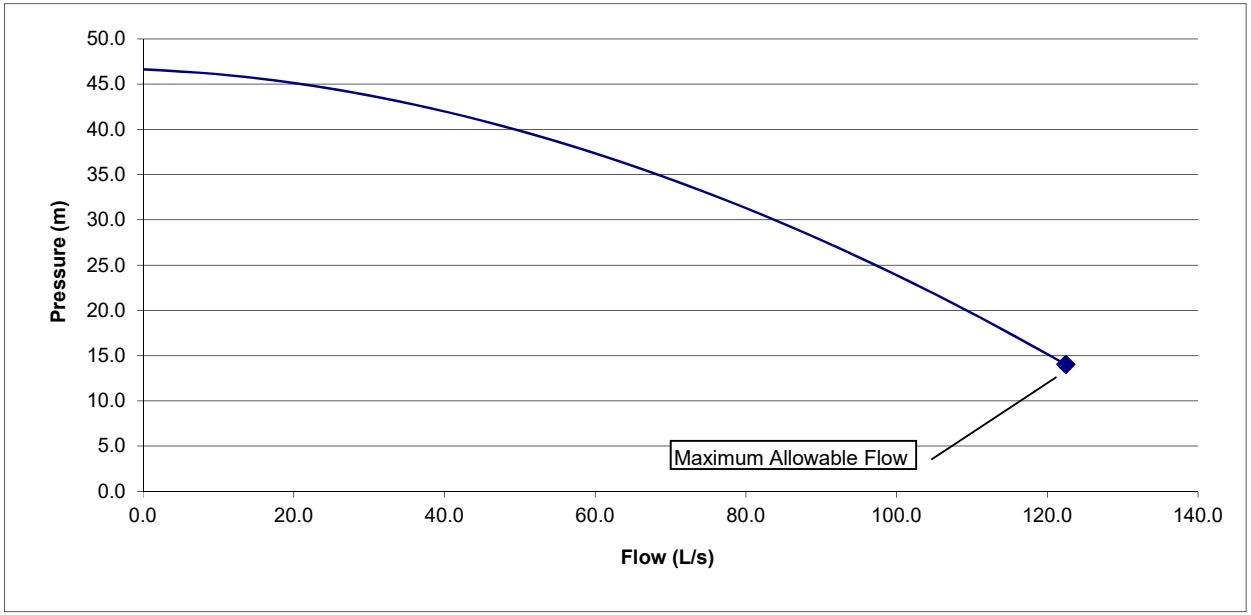
Fire Flow Analysis

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

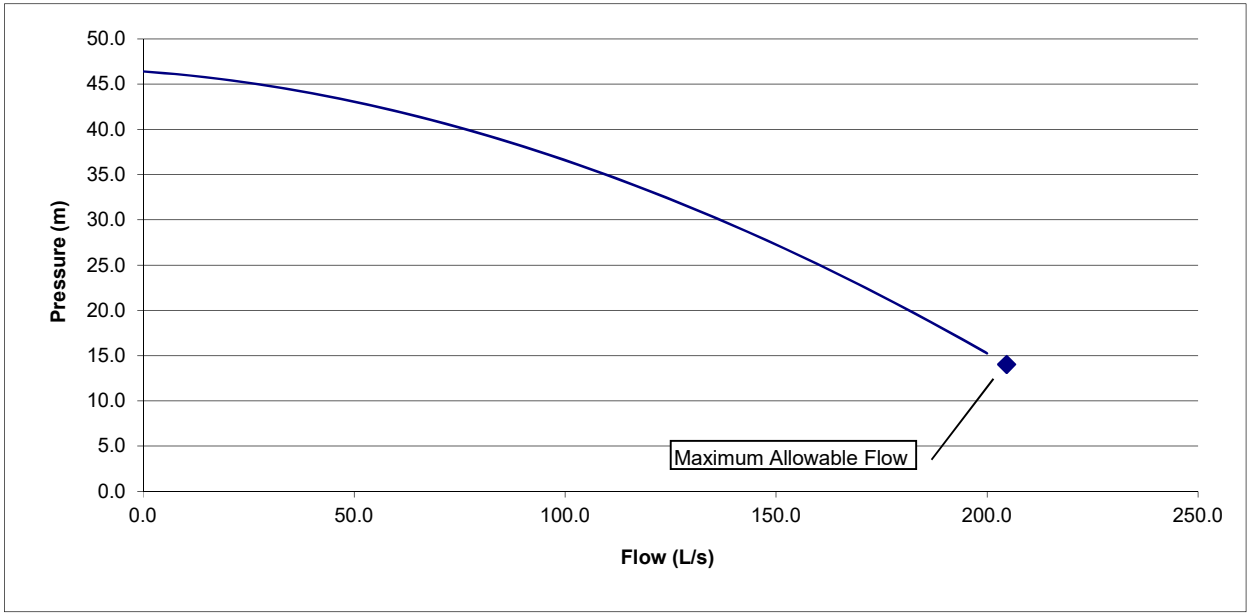
Fire Flow Analysis

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

Time: 3:19 PM Date: 7/19/2021 Author: dolkevin Document Path: I:\InfoWater\Modeling Requests\2021\Meritech\556-576 Conservation Dr WATAll_Pipes_20210114_pro_Conservation.aprx

Region of Waterloo

TRANSPORTATION AND ENVIRONMENTAL SERVICES

Water Services

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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

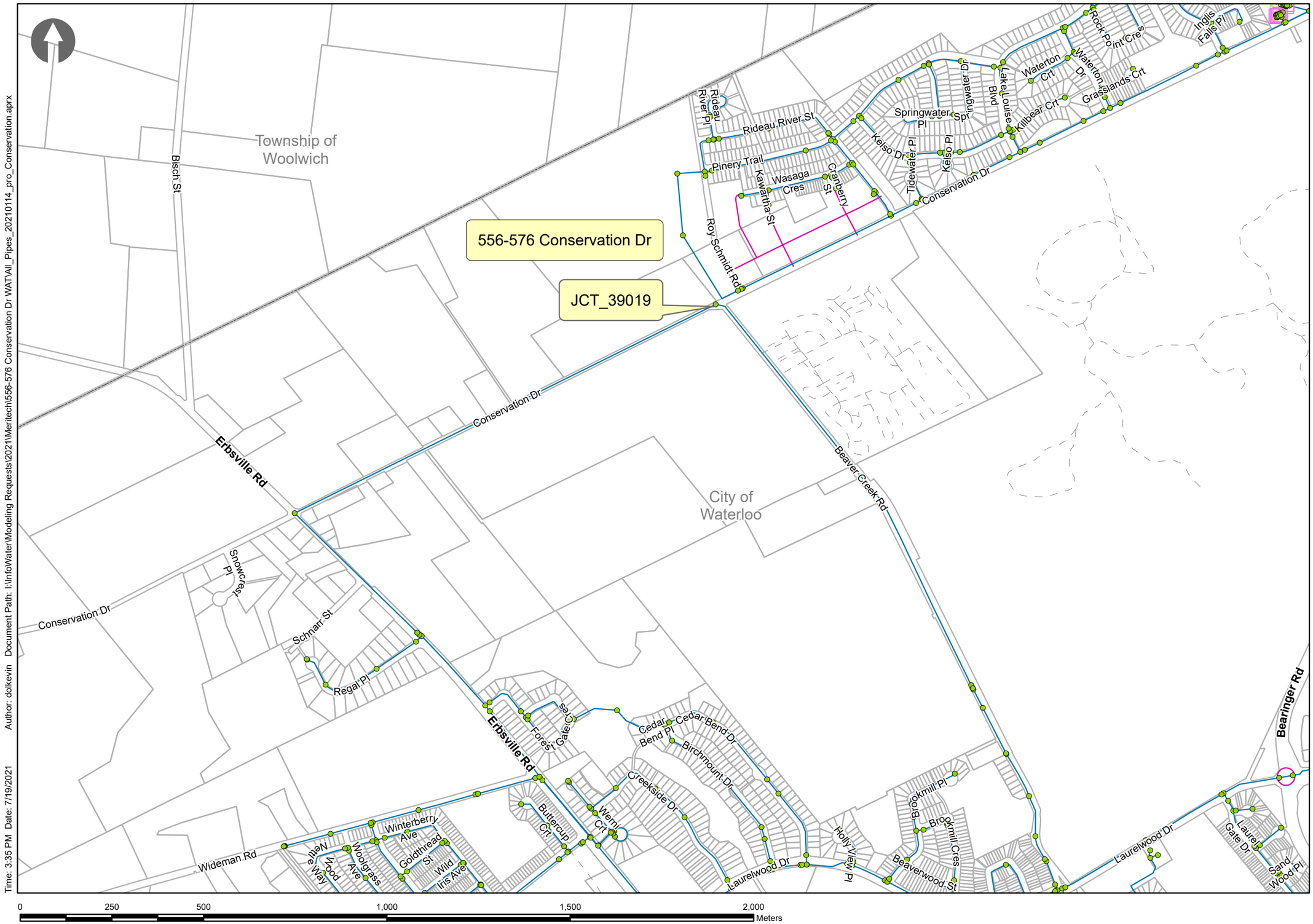
Pipe
Type
- Active
- Domain

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



Time: 3:35 PM Date: 7/19/2021 Author: dolkevin Document Path: I:\InfoWater\Modeling Requests\2021\Meritech\556-576 Conservation Dr WATVAll_Pipes_20210114_pro_Conservation.aprx

Region of Waterloo

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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

Region of Waterloo

TRANSPORTATION AND
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Water Services

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Date: October 14, 2022
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 ultimate boundary conditions. The results include a figure showing the locations of the current nodes from the Region's model. Only a comparison of available fire flow is presented in this letter. The Average Day and Maximum Day pressures remain relatively unchanged under the ultimate consolidation configuration.

The 2021 results reflect a partial looping of the distribution network and are described in detail in the 2021 model request letter. The 2022 results reflect the ultimate consolidation of Waterloo North Pressure Zone that is shown on the attached figure. A comparison of the results are summarized in Table 1 below.

Table 1 – Fire Flow Results

Node	**Elevation** (mASL)	**2021 Results (partial looping)**	**2022 Results (ultimate configuration)**
		Available Fire Flow (L/s)	Available Fire Flow (L/s)
JCT_20344/ JCT_MTC_01	364.0	126.8	199.4
JCT_24774/ JCT_39019	354.0	204.7	276.2

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.



Kevin Dolishny P.Eng.
Senior Project Engineer, Servicing and Development Planning
t. 519.575.4757 x 3862
e-mail: kdolishny@regionofwaterloo.ca

JCT_20344 **Average Day 24 Hour Simulation**

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs			
01:00 hrs			
02:00 hrs			
03:00 hrs			
04:00 hrs			
05:00 hrs			
06:00 hrs			
07:00 hrs			
08:00 hrs			
09:00 hrs			
10:00 hrs			
11:00 hrs			
12:00 hrs			
13:00 hrs			
14:00 hrs			
15:00 hrs			
16:00 hrs			
17:00 hrs			
18:00 hrs			
19:00 hrs			
20:00 hrs			
21:00 hrs			
22:00 hrs			
23:00 hrs			

Average Day HGL:	
Minimum Hour:	

JCT_20344 **Maximum Day 24 Hour Simulation**

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	0.02	404.37	57.40
01:00 hrs	0.01	404.63	57.75
02:00 hrs	0.01	404.54	57.63
03:00 hrs	0.02	404.49	57.56
04:00 hrs	0.02	404.54	57.64
05:00 hrs	0.01	404.63	57.76
06:00 hrs	0.02	404.02	56.90
07:00 hrs	0.05	401.70	53.59
08:00 hrs	0.06	400.38	51.72
09:00 hrs	0.04	401.82	53.76
10:00 hrs	0.03	402.65	54.94
11:00 hrs	0.03	402.79	55.14
12:00 hrs	0.03	403.01	55.46
13:00 hrs	0.03	402.67	54.97
14:00 hrs	0.04	402.85	55.23
15:00 hrs	0.04	403.43	56.05
16:00 hrs	0.05	402.08	54.13
17:00 hrs	0.05	402.46	54.67
18:00 hrs	0.06	401.51	53.33
19:00 hrs	0.06	400.79	52.30
20:00 hrs	0.06	400.67	52.12
21:00 hrs	0.06	401.36	53.11
22:00 hrs	0.04	403.07	55.55
23:00 hrs	0.03	404.00	56.86

Maximum Day HGL:	402.85
Peak Hour:	400.38

Available Flow (L/s)	Residual Pressure (m)
0.0	56.8
20.0	55.4
40.0	53.4
60.0	50.9
80.0	48.0
100.0	44.5
120.0	40.6
140.0	36.1
160.0	31.1
180.0	25.6
199.4	19.9

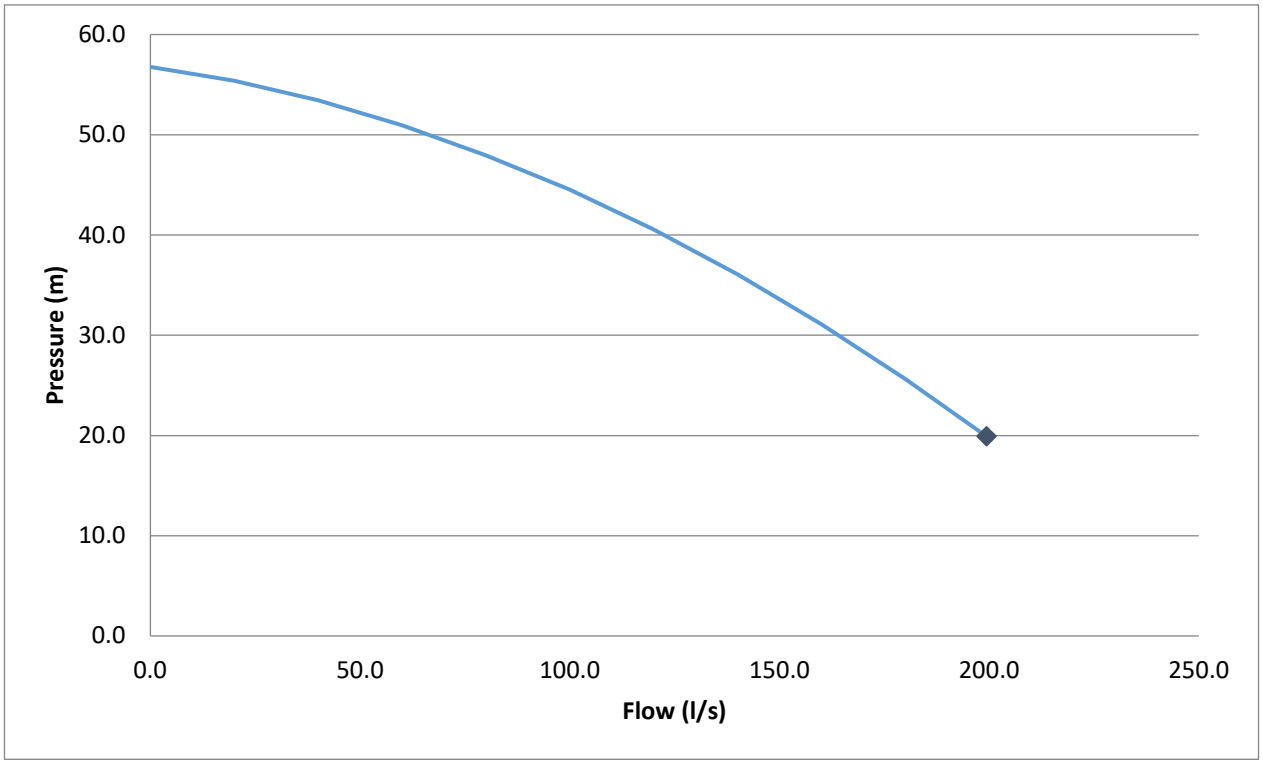
Fire Flow Analysis

Fire Flow Node:	JCT_20344
Design Flow (L/s):	199.4
Design Pressure (m):	19.9

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

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

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



JCT_24774 **Average Day 24 Hour Simulation**

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs			
01:00 hrs			
02:00 hrs			
03:00 hrs			
04:00 hrs			
05:00 hrs			
06:00 hrs			
07:00 hrs			
08:00 hrs			
09:00 hrs			
10:00 hrs			
11:00 hrs			
12:00 hrs			
13:00 hrs			
14:00 hrs			
15:00 hrs			
16:00 hrs			
17:00 hrs			
18:00 hrs			
19:00 hrs			
20:00 hrs			
21:00 hrs			
22:00 hrs			
23:00 hrs			

Average Day HGL:	
Minimum Hour:	

JCT_24774 **Maximum Day 24 Hour Simulation**

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	1.09	405.53	73.25
01:00 hrs	0.67	406.32	74.37
02:00 hrs	0.86	406.45	74.56
03:00 hrs	1.02	406.29	74.33
04:00 hrs	0.97	406.40	74.50
05:00 hrs	0.81	406.55	74.70
06:00 hrs	1.51	405.23	72.82
07:00 hrs	3.13	402.52	68.97
08:00 hrs	3.66	401.13	66.99
09:00 hrs	2.62	402.56	69.04
10:00 hrs	2.04	403.59	70.50
11:00 hrs	1.90	403.76	70.73
12:00 hrs	1.67	403.93	70.98
13:00 hrs	2.13	403.62	70.54
14:00 hrs	2.80	403.30	70.09
15:00 hrs	2.34	403.97	71.03
16:00 hrs	3.13	403.20	69.94
17:00 hrs	3.29	403.06	69.75
18:00 hrs	3.84	402.07	68.34
19:00 hrs	4.12	401.38	67.35
20:00 hrs	4.08	401.38	67.36
21:00 hrs	3.66	402.05	68.31
22:00 hrs	2.48	403.78	70.77
23:00 hrs	1.74	404.83	72.26

Maximum Day HGL:	403.87
Peak Hour:	401.13

Available Flow (L/s)	Residual Pressure (m)
0.0	71.1
20.0	70.0
40.0	68.7
60.0	67.2
80.0	65.4
100.0	63.5
120.0	61.3
140.0	58.9
160.0	56.2
180.0	53.3
200.0	50.1
220.0	46.8
240.0	43.2
260.0	39.3
276.2	36.1

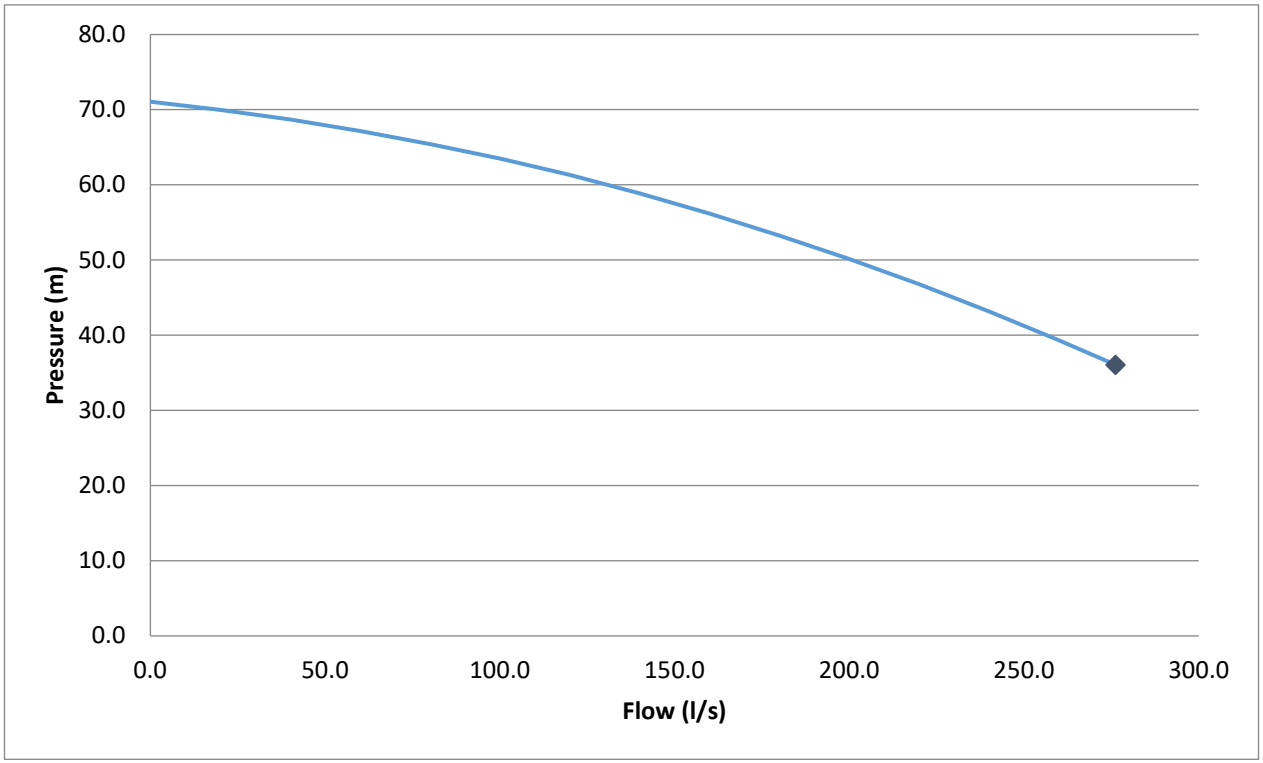
Fire Flow Analysis

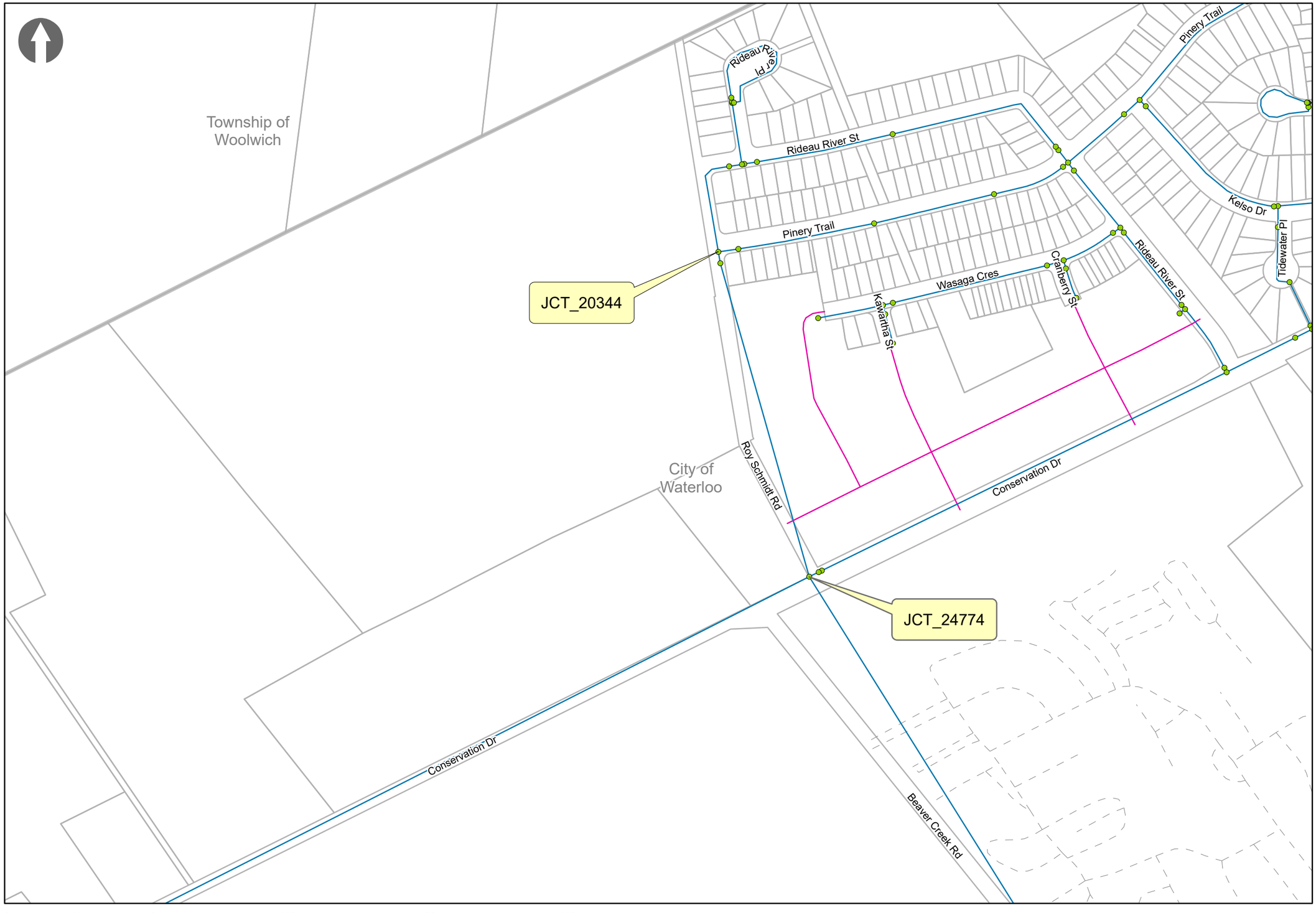
Fire Flow Node:	JCT_24774
Design Flow (L/s):	276.2
Design Pressure (m):	36.1

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

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

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





Region of Waterloo

TRANSPORTATION AND ENVIRONMENTAL SERVICES

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Junction
- Active

Pipe
- Active

Roads
- Highway
- Arterial/Collector
- Local
- Private
- Proposed Roads
- Assessment Parcels (MPAC)
- Regional Municipal Boundaries

Conservation Dr at Beaver Creek Rd