TATHAM ENGINEERING

Enhancing our communities

Hinds Brook Residential Development

FUNCTIONAL SERVICING REPORT

Homefield Communities

File 123069 | September 12, 2024

Document Control

File:	Prepared by:	Prepared for:
123069	**Tatham Engineering Limited** 115 Sandford Fleming Drive, Suite 200 Collingwood, Ontario L9Y 5A6 **T** 705-444-2565 **tathameng.com**	**Homefield Communities** 45 St. Clair Avenue West, Unit 1202 Toronto , Ontario M4V 1K9
Date: **September 12, 2024**		

Authored by:	Reviewed by:
	
Kyle Latter, B.Eng., EIT Engineering Intern	Andrew Overholt, P.Eng. Engineer, Project Manager

Disclaimer	Copyright
The information contained in this document is solely for the use of the Client identified on the cover sheet for the purpose for which it has been prepared and Tatham Engineering Limited undertakes no duty to or accepts any responsibility to any third party who may rely upon this document.	This document may not be used for any purpose other than that provided in the contract between the Owner/Client and the Engineer nor may any section or element of this document be removed, reproduced, electronically stored or transmitted in any form without the express written consent of Tatham Engineering Limited.

Issue	Date	Description
1	September 12, 2024	Final Report

Document Contents

Tables

Figures

Appendices

1 Introduction

Tatham Engineering Limited was retained by Homefield Communities to prepare a Functional Servicing Report in support of the proposed development of 496857 Grey Road 2 in the Town of The Blue Mountains. The location of the development site is illustrated in Figure 1 enclosed at the back of this report.

1.1 REPORT OBJECTIVE

The objective of this report is to review the existing municipal infrastructure surrounding the site and present a functional servicing design for the proposed development. In particular, the following will be discussed:

- existing servicing infrastructure surrounding the site;
- the proposed servicing strategy for the site; and
- impacts that the development may have on surrounding municipal infrastructure.

1.2 REPORT STRUCTURE

The report is structured as follows:

- Chapter 1: introduction and report purpose;
- Chapter 2: existing conditions, detailing the condition of the site as it sits today;
- Chapter 3: proposed development, describing the development plan for the site;
- Chapter 4: water supply, discussing water servicing, domestic and fire demands and the ability of the existing system to supply the calculated water demands;
- Chapter 5: wastewater collection, outlining the wastewater collection and disposal strategy including commentary on the existing municipal system;
- Chapter 6: water/wastewater capacity, servicing strategy and development staging;
- Chapter 7: stormwater management, summarizing the findings of the *Preliminary Stormwater Management Report* prepared under separate cover;
- Chapter 8: site grading, describing the grading strategy and constraints for the site;
- Chapter 9: transportation, summarizing the findings of the *Transportation Impact Study* prepared under separate cover;
- Chapter 10: utilities; discussing the availability of hydro, gas and telecommunication servicing for the site;
- Chapter 11: other components, outlining the landscaping plans; and
- Chapter 12: summary of the report and key findings.

2 Existing Conditions

The location of the site is shown in Figure 1. The site is 37.37 ha and is located south of Highway 26 and east of Grey Road 2. The development property is legally described as Concession 8 Part of Lot 29 RP-16R2439 Part 1, Town of The Blue Mountains.

The site is generally bounded by an existing resort community and vacant land to the north, the Georgian Trail to the east, Grey Road 2 to the west and special agriculture, development and hazard land to the south. The subject property is designated as primary settlement area and hazard land in the Grey County Official Plan. The Town Official Plan designates the site as rural and hazard land. The site is zoned rural and hazard.

A significant portion of the site is regulated by the Grey Sauble Conservation Authority (GSCA) including a wetland on the site and erosion and flood hazards associated with Indian Brook which is present at the north extent of the property. The following reporting has been prepared to address the existing natural hazard and natural heritage constraints on site:

- *Hinds Brook Residential Development Existing Condition Natural Hazard Assessment* prepared by Tatham Engineering dated April 5, 2024 which evaluated the existing flood and erosion hazard limits across the site associated with Indian Brook; and
- *Hinds Brook Environmental Impact Assessment*, prepared by Birks Environmental which reviewed the natural heritage features across the site, including the noted wetland, to establish appropriate constraint areas and setbacks.

The southeast corner of the site is located in the Niagara Escarpment Plan area and is designated Escarpment Recreation Area. This area is outside of the development footprint and will remain undisturbed.

In reviewing the site survey, the site slopes from the southwest to the northeast at an average gradient of approximately 2.5% under existing conditions. Runoff ultimately drains to the south side of the Georgian Trail embankment and is directed under the trail via culverts and bridges north to Georgian Bay.

3 Proposed Development

The Hinds Brook Site Development Plan was prepared by Travis & Associates and is included with this report as Figure 2. The proposed development includes 9.8 ha of the development property's 37.37 ha total area as developable due to natural heritage and natural hazard constraints from existing wetland(s) on site and Indian Brook respectively.

Tatham has prepared a natural hazard assessment under separate cover to review the flood and erosion hazard limits associated with Indian Brook and Birks Natural Heritage Consultants Inc. has prepared an Environmental Impact Study (EIS) that evaluates the natural heritage features on site based on extensive field surveys which is provided under separate cover.

As a result of the natural hazards and natural heritage work completed to date, the development plan includes a 30 m setback from the Indian Brook permanent water level and a minimum 15 m setback to retained wetland vegetation communities as shown on the Site Development Plan. The development proposes 376 townhouse units fronting private urban section 8.0m wide condominium roads. Access to the proposed development will be from Grey Road 2.

A SWM facility (SWMF), as discussed in Chapter 7, will be constructed in the northeast corner of the proposed development and a neighbourhood park is included near the centre of the development. Three additional parkettes are also included in the development plan along with a linear park south of the SWMF and a trail network through the natural heritage constraint area as an amenity for the community.

4 Water Supply

4.1 EXISTING WATER INFRASTRUCTURE

The closest municipal watermain to the site is an existing 400 mm diameter watermain on the north side of Highway 26. The next closest watermain is an existing 250 mm diameter main located on the west side of Grey Road 2 approximately 330 m north of the proposed development's access from Grey Road 2. These two potential connection points are shown on the External Servicing Plans, drawings ESP.1 and ESP.2, enclosed at the back of this report as Figures 3 and 4.

4.2 WATER DEMAND

A detailed water demand and Fire Underwriter's Survey (FUS) fire flow demand calculations are enclosed with this report as Appendix A for reference.

Based on the proposed unit count of 376 units, a population density of 2.15 persons per unit and a per day flow of 350 L/day/person, the site will generate the following water demands:

- Average day demand 282.94 m^3/day;
- Max day demand 778.09 m^3/day;
- Peak hour demand 13.52 L/s;
- Required fire flow 133 L/s; and
- Max day plus fire flow 142.01 L/s.

4.3 WATER SUPPLY OPTIONS

We have identified two servicing options for the site as described below. An evaluation of the two servicing options is included in Chapter 6 below.

4.3.1 Option 1 Water Servicing

Option 1 for water servicing is shown on External Servicing Plan Option 1 and Concept Servicing Plan Option 1 which are enclosed at the back of this report as Figures 3 and 5 respectively. This option includes constructing a looped municipal watermain connecting to both the existing 250 mm diameter watermain on Grey Road 2 and the 400 mm diameter watermain on Highway 26 running through the site.

The connection to the Grey Road 2 watermain will be extended along the Grey Road 2 right of way while an easement through, or block dedication from, the adjacent GSCA owned land

between the site and Highway 26 will be required. Option 1 corresponds to Scenario 3 in the water system modelling described below. In this scenario, the municipal watermain crossing through the site would be separated from the private water system in accordance with Section 4.7.3 of the Town's Engineering Standards, and the private water system would provide all fire coverage and domestic water connections to the units. The municipal watermain would be within an easement and would generally follow the internal condo road network of the site (refer to Figure RD.1) to ensure suitable access for operations staff as needed.

4.3.2 Option 2 Water Servicing

Option 2 for water servicing is shown on External Servicing Plan Option 2 and Concept Servicing Plan Option 2 which are enclosed at the back of this report as Figures 4 and 6 respectively. This option includes a connection the existing 250 mm diameter watermain on Grey Road 2. The existing watermain along Grey Road 2 will be extended to the site along the Grey Road 2 right of way to the site entrance. Option 2 corresponds to Scenario 2 in the water system modelling described below. In accordance with Section 4.7.3 of the Town's engineering Standards, the private system, would be separated from the municipal system at the site entrance via a bulk water meter and backflow preventer.

4.4 WATER SUPPLY MODELLING

To evaluate if the connection points described above can supply the proposed development with potable water and fire suppression supply while maintaining acceptable pressures, we retained the Town's water model keeper, J.L. Richards & Associates Ltd., to provide boundary condition modelling. Three servicing scenarios for the proposed development under existing and future infrastructure conditions were modelled as described as follows for a total of 6 scenarios/conditions:

- Scenario 1, a connection to the 400 mm diameter watermain on Highway 26 (this scenario is not contemplated in this report);
- Scenario 2, a connection to the 250 mm diameter watermain on Grey Road 2 (shown on Drawing CSP.2); and
- Scenario 3, a looped connection to both the 400 mm diameter watermain on Highway 26 and the 250 mm diameter watermain on Grey Road 2 (shown on Drawing CSP.1).

4.4.1 Existing Conditions

Using the boundary condition results provided by J.L. Richards we have evaluated the head loss and pressures at critical nodes within the development for connection Scenario 2 (Option 2) under existing conditions. For the average day and peak hour demands, it was determined that

for Scenario 2 (Option 2), the maximum head loss and lowest pressure will occur at the development's high point which will be at the Grey Road 2 access, shown as node 1 on Drawings CSP.1 and CSP.2. For maximum day plus fire flow demand, the largest head loss and lowest pressure will be observed at the furthest hydrant from the connection and have therefore calculated the pressure at node 3. Detailed head loss and pressure calculations for scenario 2 (Option 2) are enclosed with this report in Appendix A and summarized in Table 1 below.

Table 1: Water Demands

DEMAND SCENARIO	SCENARIO 2 PRESSURE (CONNECTION TO GREY ROAD 2)
Average Day	70.4 psi/485.5 kPa (node 1)
Peak Hour	68.0 psi/468.7 kPa (node 1)
Maximum Day + Fire Flow	29.5 psi/202.7 kPa (node 3)

As demonstrated above, connecting to the existing 250 mm diameter watermain Grey Road 2 watermain and extending a 300 mm diameter watermain to the site entrance can supply the calculated water demand while maintaining acceptable pressures per MECP guidelines under existing conditions. Further, the J.L. Richards modelling shows that Scenario 3 (Option 1) can also supply the required fire flow while maintaining acceptable pressures under existing conditions.

4.4.2 Future Conditions

The J.L. Richards modelling confirmed that under future conditions, Scenario 3 (Option 1) can supply the site with the required fire flows while maintaining acceptable system pressure, but Scenario 2 (Option 2) will not. Should Scenario 2 (Option 2) be the preferred servicing solution for the Town, future water infrastructure planning will need to be revised to accommodate the development.

4.5 INTERNAL WATER DISTRIBUTION

Should the Town find Option 1 acceptable, the Town will need to maintain ownership of the trunk watermain through the site. To allow for proper backflow protection of the municipal system, the internal water distribution system will be separated from the municipal looping watermain with appropriate backflow protection and be bulk metered. This servicing plan is demonstrated on Drawing CSP.1. The private water system would provide all fire coverage and domestic water connections to the units. The municipal watermain would be within an easement and would

generally follow the internal condo road network of the site (refer to Figure RD.1) to ensure suitable access for operations staff as needed.

Should the looping connection not be desired by the Town, a 300 mm dimeter watermain will be extended from the existing 250 mm diameter watermain on Grey Road 2 to the site along Grey Road 2 as shown on Drawing CSP.2.

The Internal water distribution system will generally follow the internal private road network with individual 25 mm diameter water service connections to each unit. The preliminary head loss and pressure calculations show 250 mm diameter watermains will be required to form the main internal distribution system.

Fire Hydrants located along the internal roadways will provide fire protection and are shown with 45 m radii on drawings CSP.1 and CSP.2.

5 Wastewater Collection

5.1 EXISTING WASTEWATER INFRASTRUCTURE

The closest existing sanitary sewer to the site is an existing 450 mm diameter gravity sewer on the south side of Highway 26, shown on Drawing ESP.1 and ESP.2. The next closest sanitary outlet is an existing 250 mm diameter sanitary sewer near the intersection of Grey Road 2 and Highway 26.

5.2 WASTEWATER GENERATION

Detailed wastewater generation calculations are enclosed with this report in Appendix B for reference. Based on the proposed unit count of 376 units, a population density of 2.15 persons per unit, a per day flow of 350 L/day/person and a serviced area of 6.36 ha, the site will generate the following wastewater flows:

- Average day flow 282.94 m^3/day; and
- Peak flow 14.42 L/s.

5.3 WASTEWATER SUPPLY OPTIONS

We have identified two servicing options for the site as described below. An evaluation of the two servicing options is included in Chapter 6 below.

5.3.1 Option 1 Wastewater Servicing

Option 1 for wastewater servicing is shown on drawings ESP.1 and CSP.1. This option includes a gravity connection to the existing 450 mm diameter sanitary sewer on Highway 26. An easement through, or block dedication from, the adjacent GSCA owned land between the site and Highway 26 will be required. In accordance with The Town of the Blue Mountains Engineering Standards (2023) section 4.3.1, the Town discourages easements on private lands for new development but may consider them in unusual situations where dedicated blocks may be impractical. With this option, the private landowner would be a collaborating agency (GSCA), and any infrastructure would be installed by an approved trenchless methodology, with a design service life suitable to the Town and the GSCA such that access within the 90m spanning across the Georgian Trail and GSCA lands would not be required, as is the case for watercourse and highway crossings that currently exist in the Town.

5.3.2 Option 2 Wastewater Servicing

Option 2 for wastewater servicing is shown on drawings ESP.2 and CSP.2. This option includes an internal gravity sewer system that drains to a private pumping station at the east end of the site near the SWM pond (following the existing topography). The pumping station will connect to a forcemain that flows west across the site towards Grey Road 2. The forcemain will need to be extended north along Grey Road 2 and across Indian Brook where it can be outlet to a new gravity sewer extended from the existing 250 mm diameter sanitary sewer on Highway 26.

Both sanitary outlet points drain to the Lakeshore Pumping Station which pumps wastewater along the south side of Highway 26 to the Thornbury Wastewater Treatment Plant via a 250 mm diameter forcemain.

5.4 DOWNSTREAM CAPACITY

Both sanitary outlet points drain to the Lakeshore Pumping Station which pumps wastewater along the south side of Highway 26 to the Thornbury Wastewater Treatment Plant via a 250 mm diameter forcemain.

To confirm downstream capacity in the sanitary sewer system we retained J.L. Richards to include servicing Options 1 and 2 in their Town wide sewer system model. The modelling report is included in Appendix B for reference. The report notes that existing wet weather flows exceed the firm capacity at the Lakeshore Pumping Station and the proposed development will have “minimum impact”. The report does recommend upgrading the pumps at the station.

5.4.1 Option 1

The J.L. Richards report modeled Option 1 as connection point 1. The report concludes that under existing conditions the sanitary sewers downstream of connection point 1 have sufficient capacity to accommodate the proposed development.

5.4.2 Option 2

The J.L. Richards report modeled Option 2 as connection point 2. The report concludes that under existing conditions the sanitary sewers downstream of connection point 2 have sufficient capacity to accommodate the proposed development.

5.5 INTERNAL WASTEWATER CONVEYANCE

The proposed servicing strategy is displayed on drawings CSP.1 and CSP.2. Wastewater will be collected from each of the units by individual 125 mm diameter service connections. The internal sanitary sewer system, generally follows the internal road centreline network, will collect the

wastewater flows from the service connections and drain to one of the two proposed outlets as described above.

6 Water/Wastewater Capacity, Servicing Strategy and Development Staging

6.1 SERVICING OPTIONS ANALYSIS

Two servicing strategies for water and wastewater have been described above in Chapters 4 and 5 respectively. Below is a pros and cons table summarizing the advantages and disadvantages of each of the options.

Table 2: Servicing Options Pros & Cons List

	OPTION 1	OPTION 2
Pros	▪ Less up front installation cost. ▪ Less ongoing maintenance cost. ▪ Provides redundancy and additional conveyance for the trunk watermain along Highway 26 and improves pressure and flow along Grey Road 2 and Clark Street to accommodate future development. ▪ Reduced disturbance to Grey Road 2 and Highway 26. ▪ Gravity sewer connection is more reliable and less likely to fail compared with pump station. ▪ No new sewage crossings of Indian Brook required. ▪ More environmentally friendly, gravity connection uses no power. ▪ Can accommodate development under future conditions with no changes to infrastructure plans ▪ Lower inflow and infiltration to sanitary system.	▪ Sanitary sewer extended south along Grey Road 2 (north of Indian Brook) to service the urban employment lands to the north
Cons	▪ Easement or block will be required from GSCA owned land. ▪ Suboptimal access for maintenance through easement/block.	▪ More up front installation cost. ▪ More ongoing maintenance cost. ▪ Additional energy use.

	OPTION 1	OPTION 2
Cons (continued)	However, this would also apply to the crossing of Indian Brook with Option 2. ▪ Sanitary sewer not provided for urban employment lands to the north.	▪ New sewage crossing of Indian Brook required. ▪ Pumping station uses power which is less environmentally friendly. ▪ No looping of municipal water system provided. ▪ Future water system will need to be revised to accommodate development ▪ higher inflow and infiltration given longer sewer length.

Based on our analysis of the pros and cons of each of the two presented servicing strategies, we recommend Option 1 as the preferred servicing solution for the subject site. The primary con for Option 1 is the requirement for an easement/block through the GSCA lands. In accordance with The Town of the Blue Mountains Engineering Standards (2023) section 4.3.1, the Town discourages easements in new development but may consider them in unusual situations where dedicated blocks may be impractical. Based on the noted pros and cons we feel that the Town should consider permitting the installation of servicing in a servicing easement for this development.

Further, the private landowner would be a collaborating agency (GSCA), and any infrastructure would be installed by an approved trenchless methodology, with a design service life suitable to the Town and the GSCA such that access within the 90m spanning across the Georgian Trail and GSCA lands would not be required, as is the case for watercourse and highway crossings that currently exist in the Town.

6.2 WATER TREATMENT PLANT CAPACITY

Per the 2023 Year End Water and Wastewater Capacity Assessment, the Town's water system had an available capacity of 2,554 units indicating that potable water supply can be provided for the proposed development based on current availability.

6.3 WASTEWATER TREATMENT PLANT CAPACITY

Per the 2023 Year End Water and Wastewater Capacity Assessment, the Thornbury Wastewater Treatment Plant had an available capacity of 2,215 units (accounting for the Phase 1A upgrades)

indicating that wastewater treatment capacity at the plant can be provided for the proposed development based on current availability and once the Phase 1A upgrades are complete.

6.4 DEVELOPMENT STAGING

The proposed development is currently deemed stage 5 under the Town of The Blue Mountains staging categories, water and sanitary sewer servicing strategy. The objectives of the servicing strategy are as follows:

- Ensure that public health and safety is protected;
- Ensure that all development has a safe and adequate water supply, sewage services and stormwater management practices;
- Encourage the progressive extension and economic utilization of municipal sewer and water services; and
- Identify the preferred means of servicing in the Town.

The proposed development demonstrates advanced staging priority that is both necessary and appropriate in the public interest and as such is proposing to move to stage 4. The proposed development addresses the following with respect to an amendment to the Town's Plan:

- The dedication of property for municipal servicing infrastructure;
- The extension of logical and orderly planned development in keeping with the overall staging priorities established by Council;
- The participation in a municipal servicing project to establish new extended trunk lines and improve water and wastewater conveyance systems to accommodate future development.; and
- The advancement of desired community objectives and public benefits such as attainable housing, as discussed on the planning justification report submitted under separate cover, and protection of significant Natural Heritage area which represents approximately 78% of the site area when accounting for the retained natural heritage areas.

7 Stormwater Management

A preliminary stormwater management report has been prepared by Tatham Engineering under separate cover which reviews the existing and proposed surface drainage conditions and outlines a stormwater management plan to mitigate drainage impacts from the development. The following is a summary of the report.

- Under existing conditions, the site drains to Indian Brook.
- A wetland SWM facility (SWMF) will be constructed on site as shown on Drawing CSP.1 and CSP.2. The SWMF will provide post to pre peak flow matching for the 1:2 through 1:100 year return frequency storm events.
- Minor storm drainage, less than or equal to the 1:5 year return frequency storm, will be collected and conveyed to the SWMFs via a storm sewer system with major drainage, greater than the 1:5 year return frequency storm, conveyed to each outlet via overland flow generally following the internal road network.
- The SWMF will provide enhanced level water quality control, corresponding to 80% total suspended solids (TSS) removal, for site drainage.
- Strict adherence to erosion and sediment control best practices will be implemented during construction to limit sediment transport off site.

8 Site Grading

Concept Grading Plans, Drawings CSG.1, CSG.2 and CSG.3 are enclosed at the back of this report as Figures 7,8 and 9. The grading plans demonstrate the conceptual grading design. The internal road rights-of-way will be constructed following an 8 meter urban road section shown on Drawings RD.1 and RD.2 enclosed at the back of this report as Figures 10 and 11. Lot grading will be in accordance with Municipal Standards; yard areas are to be designed with 2% to 5% grades with a maximum grade of 3H:1V. Rear and side yard swales shall be minimum 1% longitudinal slope, 0.3 m deep and 3H:1V maximum side slopes.

Overall, grading will generally follow the existing topography of the site draining in a northeast direction towards the proposed SWMF. A cut off swale along the south boundary of the development limit will collect upstream flows and convey them through or around the site. Tie in grading to existing grade along property lines or at applicable natural hazard and natural heritage setbacks will be attainable under existing conditions and maximum slope grading constraints.

To maintain the existing roadside ditch on the east side of Grey Road 2, a road crossing culvert will be required across the proposed entrance roads.

We note that to construct the stormwater management pond, a small amount of grading will be required within the regulatory floodplain. At detailed design it will be demonstrated that we achieve a cut fill balance so as not to take away flood storage.

9 Transportation

A transportation impact study has been prepared by Tatham Engineering under separate cover which reviews the background, future background and future conditions (with the proposed development) traffic volumes and operations around the site. The study evaluated if any road infrastructure improvements are required due to the increased traffic associated with the development; the following is a summary of the study's findings:

- the development is expected to generate 181 trips during the AM peak hour and 214 trips during the PM peak hour.
- the intersection of Highway 26 with Grey Road 2 will provide poor operations under 2030 background horizon and as such, the improvements per *Highway 26/Grey Road 2 Intersection Improvements – Municipal Class EA* will need to be implemented.
- area road intersections will provide good operations (LOS C or better with average delays) through the 2040 horizon under the background and total conditions, if the improvements for the intersection of Highway 26 with Grey Road 2 are implemented.
- The available sight lines along Grey Road 2 at the site access point were reviewed in consideration of TAC and County sight and intersection distance requirements. In all instances, the available sight lines exceed the requirements.
- An MTO warrants analysis of the site entrance shows that a dedicated left turn lane is marginally warranted, however, a dedicated left turn lane is not recommended given good operations and the low traffic volumes on Grey Road 2 and accessing the site.

10 Utilities

10.1 EXISTING INFRASTRUCTURE

10.1.1 Hydro One

Hydro One has existing aerial distribution power lines on both Highway 26 directly east of the subject site and Grey Road 2 directly west of the subject site.

10.1.2 Enbridge

Enbridge has an existing gas line on Highway 26 directly east of the subject site. There is also existing Enbridge gas distribution at the intersection of Grey Road 2 and 40 and the intersection of Grey Road 2 and Highway 26. Gas main can be extended along Grey Road 2 from either of these intersections to service the site should natural gas servicing be considered for the site in lieu of electrification/geothermal heating.

10.1.3 Telecommunications

Both Bell and Rogers have existing telecommunications infrastructure surrounding the site on Highway 26 and Grey Road 2.

10.2 PROPOSED UTILITY SERVICING

At detailed design, the respective utility companies will be contacted to confirm their internal distribution designs to service the proposed development.

11 Other Components

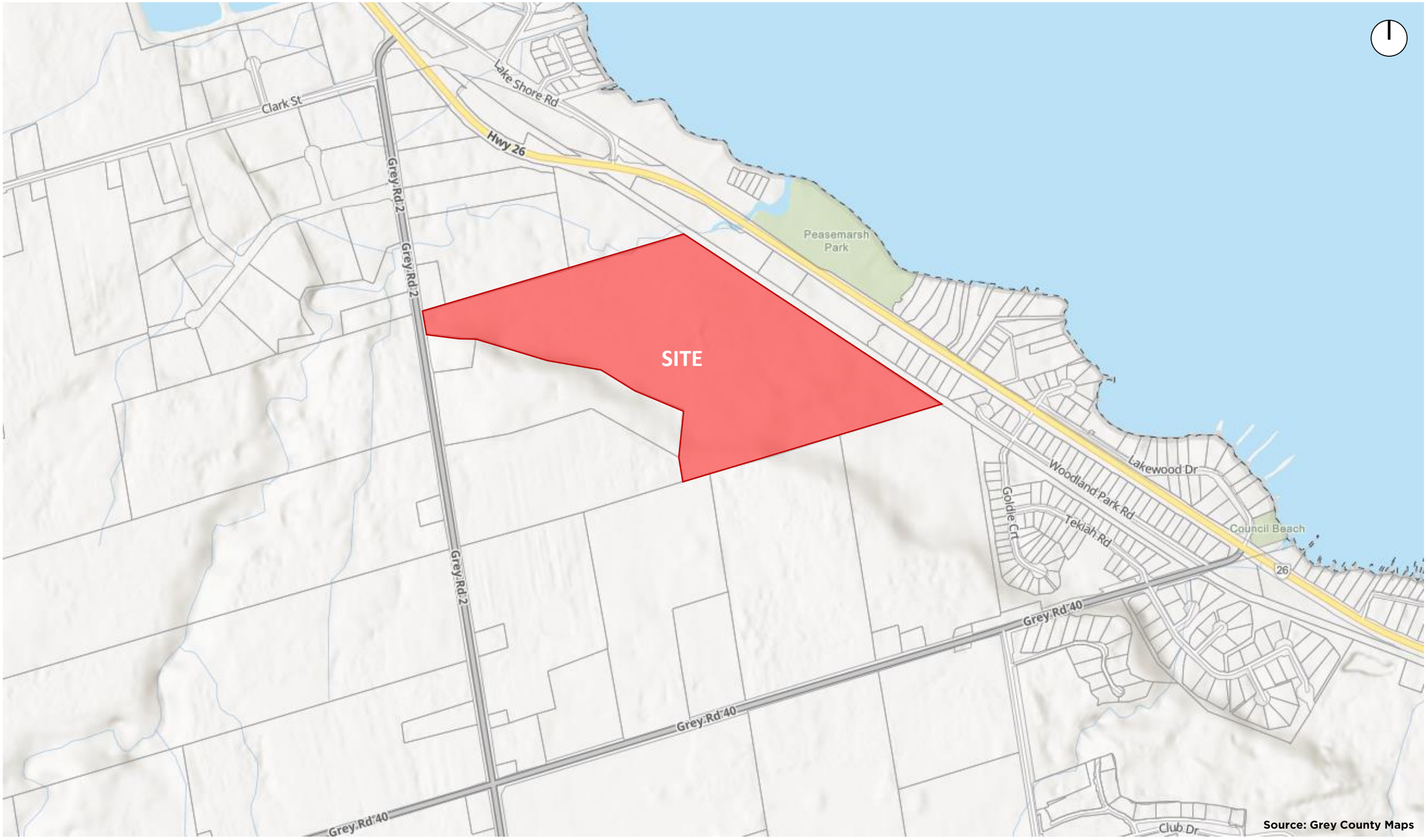
11.1 LANDSCAPING

A landscape analysis report has been prepared by Envision Tatham outlining the landscape plan for the development. This report should be referenced for additional details on landscaping protection and enhancement to be implemented with the proposed development.

12 Summary

As detailed in this report, the proposed 496857 Grey Road 2 Development can be serviced as follows:

- Servicing Option 1 is recommended which includes water supply via new connections to the existing 400 mm diameter watermain on Highway 26 and a 250 mm diameter watermain on Grey Road 2. An internal distribution system will provide water services to each lot/unit. Fire suppression flows will be provided by fire hydrants installed along the internal watermain. As an alternative, a connection can be made to the 250 mm diameter watermain on Grey Road 2 which can service the site under existing conditions.
- Servicing Option 1 is recommended which includes outletting sanitary flows to the existing 450 mm diameter gravity sewer on Highway 26 via an easement/block across the GSCA property between the site and Highway 26. Individual sanitary service connections will be extended to each lot that will drain by am internal gravity sewer system to the noted sanitary outlet. Alternately, the internal gravity sewer could drain to a private pumping station that outlets to a forcemain connected to the gravity sewer on Grey Road 2.
- A SWMF will control proposed condition peak flows to existing condition levels at the site's stormwater outlet for the 1:2 through 1:100-year return frequency design storms. The SWMF will also provide enhanced water quality protection for site runoff.
- The traffic impacts surrounding the site have been reviewed to the 2040 horizon and no road upgrades are required to service the proposed development.
- Hydro One, Enbridge, Bell and Rogers all have existing utility infrastructure on Highway 26 and/or Grey Road 2 that can be extended to services the site. Utility servicing plans will be provided at detailed design.



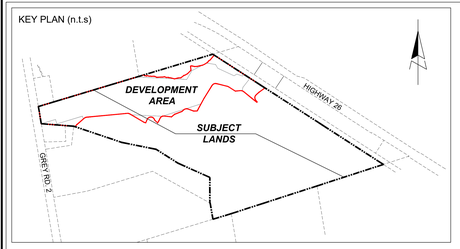
496857 GREY ROAD 2 – TRANSPORTATION IMPACT STUDY

Figure 1: Site Location

HINDS BROOK
SITE DEVELOPMENT PLAN

496857 GREY RD. 2
PART OF LOT 29
CONCESSION 8
TOWN OF THE BLUE MOUNTAINS
COUNTY OF GREY

KEY PLAN (n.t.s)



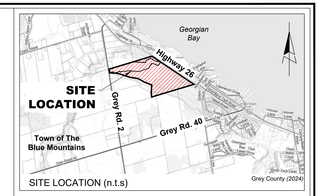
SITE DEVELOPMENT CONCEPT SUMMARY

TOTAL SITE AREA:	+/- 37.37 HA
TOTAL DEVELOPMENT AREA:	+/- 9.8 HA
TOTAL NUMBER OF DWELLINGS:	376 ROWHOUSE DWELLINGS

DENSITY PER TOTAL DEVELOPMENT AREA: APPROX. **39 DWELLINGS / HA**

RESIDENTIAL ROWHOUSE DWELLINGS

ROWHOUSE TYPE 1	- ROWHOUSE STANDARD (6.1m Frontage)	- 54 Units
ROWHOUSE TYPE 1A	- ROWHOUSE STANDARD (6.1m Frontage) (reduced rear yard setback from min. 7.5m to min. 5.5m)	- 46 Units
ROWHOUSE TYPE 2	- ROWHOUSE STANDARD (7.4m Frontage) (reduced rear yard setback from min 7.5m to min 5.5m)	- 42 Units
ROWHOUSE TYPE 3	- ROWHOUSE BACK TO BACK (6.7m Frontage)	- 156 Units
ROWHOUSE TYPE 4	- ROWHOUSE (4.95m Frontage)	- 62 Units
ROWHOUSE TYPE 4A	- ROWHOUSE (4.95m Frontage) (increased rear yard setback to min. 5.5m)	- 16 Units



SITE LOCATION (n.t.s)

LEGEND

- Property Boundary (+/-37.37 ha)
- Development Area (+/-9.8 ha) - per Natural Features Constraints
- Residential Rowhouse - Standard / Type 1 & 1A (100 Dwelling Units)
- Residential Rowhouse - Standard / Type 2 (46 Dwelling Units)
- Residential Rowhouse - Back To Back / Type 3 (156 Dwelling Units)
- Residential Rowhouse - Narrow / Type 4 & 4A (78 Dwelling Units)
- Neighbourhood Park & Parkette Areas (+/-1.24 ha or 12.6% of the Total Development Area)
- Retained Natural Heritage Areas - No Disturbance (+/-1.43 ha or 14.6% of the Total Development Area)
- SWM Pond (+/- 0.77 ha or 7.7% of the Total Development Area)
- Natural Heritage Constraint Area
- Natural Heritage Setback Area
- Temporary Snow Storage Areas
- Watercourse
- Natural Heritage Constraint Area Limit
- 15m Natural Heritage Area Setback
- Recreational Trail *(Alignment to be confirmed during construction)*
- 8m Wide Condominium Road
- Condominium Road Centerline *(6m R.O.W. 12m Radius on Curb Centerline)*
- Sidewalk *(1.5m)*

Additional On-Site Parking 55 Spaces *(Min. 2.75m x 5.5m)*

travis & associates
planning consultants
approvals facilitators
development managers
PO Box 323
Thornbury, ON
N0H 2P0
T.705-446-9917

homefield COMMUNITIES

SCALE 1:750 *(24" x 60" Page Format)*

0 10 20 40 60 80 Metres

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

Revision #	Date D/M/Y	Description / Notes
1.	31/01/2024	PRELIMINARY DRAFT / ISSUED FOR REVIEW
2.	07/02/2024	REVISED DRAFT / ISSUED FOR REVIEW
3.	23/02/2024	REVISED DRAFT / ISSUED FOR REVIEW
4.	04/06/2024	REVISED DRAFT / ISSUED FOR REVIEW
5.	14/08/2024	REVISED DRAFT / ISSUED FOR REVIEW
6.	30/08/2024	REVISED DRAFT / ISSUED FOR REVIEW
7.	04/09/2024	REVISED DRAFT / ISSUED FOR REVIEW

File/CAD: T&A_HindsBrook-SitePlan.dwg

Date(d/m/y): 04/09/2024 Drafted by: D.C. Checked by: A.H./R.A./C.T.

D-1

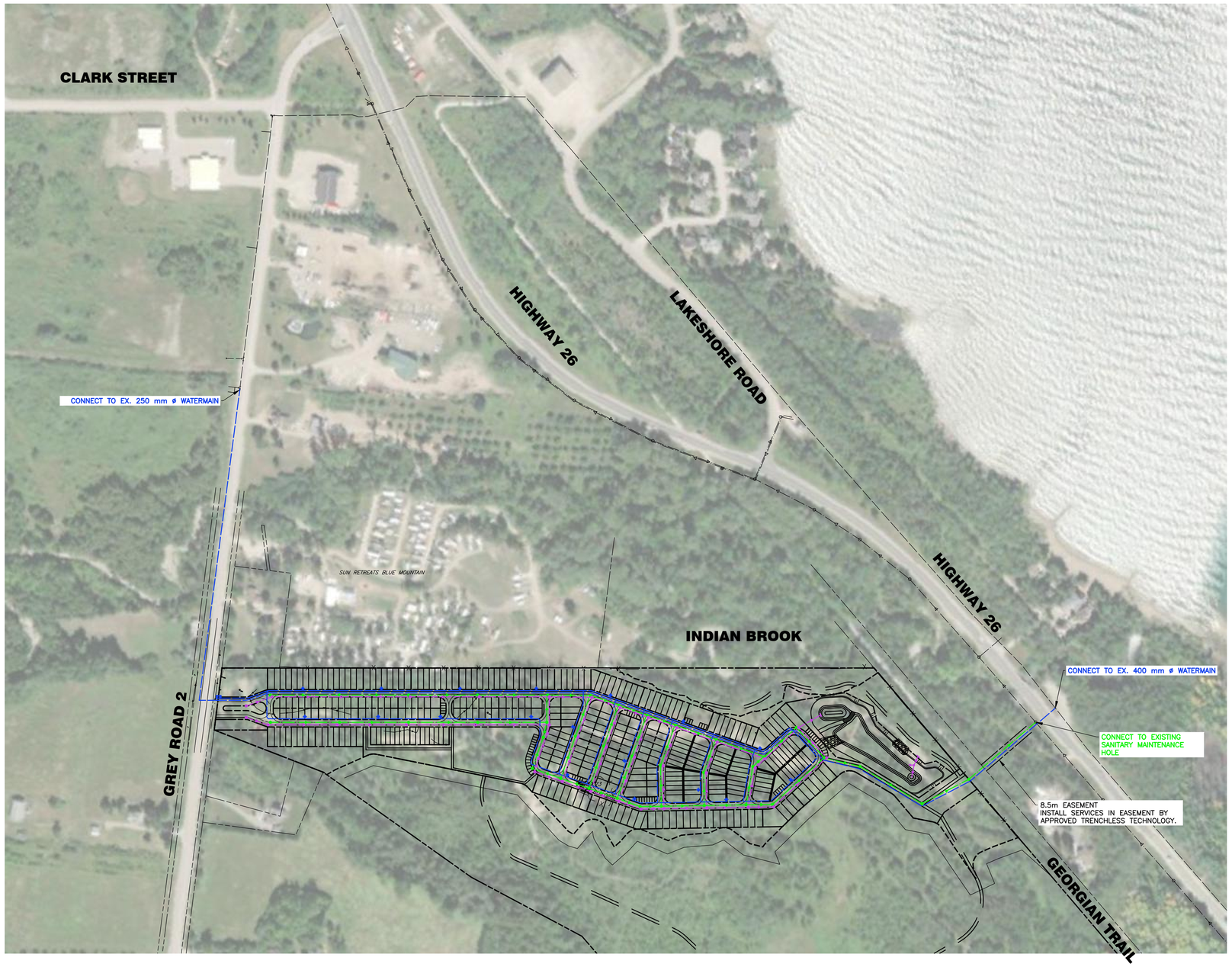
GENERAL NOTES

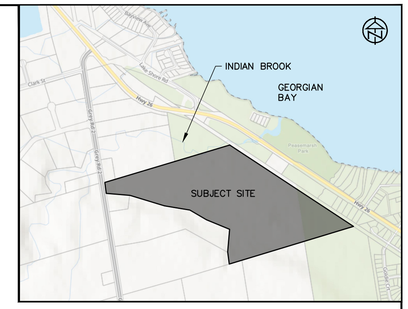
All site measurements are in Metric.
All proposed site development features and measurements are illustrated for project review and discussions.

Plan Drawing References:

- Zubek, Emo, Patten & Thomsen Ltd. O.L.S., Plan of Survey (2024)
- Tatham Engineering. Hinds Property, Conceptual Constraint Plan (2024)
- Birks Natural Heritage Consultant inc., Natural Heritage Constraints Study (2024)
- Town of The Blue Mountains, Zoning By-Law 2018-65

Date Plotted: September 4, 2024





KEY PLAN

LEGEND

	EXISTING	PROPOSED
SANITARY SEWER, STRUCTURE & DIRECTION		
SANITARY FORCEMAIN, STRUCTURE & DIRECTION		
STORM SEWER, STRUCTURE & DIRECTION		
WATERMAIN		
FIRE HYDRANT		

DISCLAIMER AND COPYRIGHT

CONTRACTOR MUST VERIFY ALL DIMENSIONS AND BE RESPONSIBLE FOR SAME. ANY DISCREPANCIES MUST BE REPORTED TO THE ENGINEER BEFORE COMMENCING WORK. DRAWINGS ARE NOT TO BE SCALED.

BENCHMARKS

TBM#1 TOP OF NORTH WEST PROPERTY BAR EL. 191.91

NOTES

DEVELOPMENT PLAN FROM HINDS BROOK SITE DEVELOPMENT PLAN PREPARED BY TRAVIS & ASSOCIATED DATED SEP. 4, 2024.

TOPOGRAPHIC SURVEY BY BETTER MEASURES DECEMBER 2023.

LEGAL BOUNDARY PLAN FROM PLAN OF SURVEY OF PARK OF LOT 29, CONCESSION 8, TOWN OF THE BLUE MOUNTAINS, COUNTY OF GREY PREPARED BY ZUBEK, EMO, PATTEN & THOMSEN.

No.	REVISION DESCRIPTION	DATE

ENGINEER STAMP

FUNCTIONAL SERVICING REPORT
SEPT. 12, 2024

HINDS BROOK RESIDENTIAL DEVELOPMENT

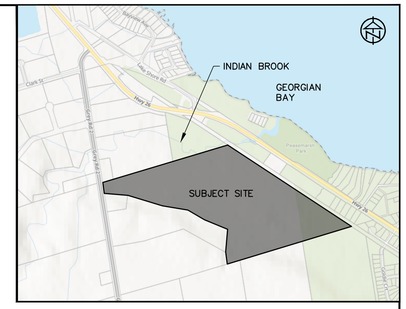
TOWN OF THE BLUE MOUNTAINS

EXTERNAL SERVICING PLAN OPTION 1

TATHAM ENGINEERING

DESIGN: KRL	FILE: 123069	DWG: **ESP.1**
DRAWN: KRL	DATE: SEPT 2024	
CHECK: AO	SCALE: 1:2500	

Drawing Name: 123069-CSP01.dwg, Plotted: Sep 12, 2024



KEY PLAN

LEGEND

	EXISTING	PROPOSED
SANITARY SEWER, STRUCTURE & DIRECTION		
SANITARY FORCEMAIN, STRUCTURE & DIRECTION		
STORM SEWER, STRUCTURE & DIRECTION		
WATERMAIN		
FIRE HYDRANT		

DISCLAIMER AND COPYRIGHT

CONTRACTOR MUST VERIFY ALL DIMENSIONS AND BE RESPONSIBLE FOR SAME. ANY DISCREPANCIES MUST BE REPORTED TO THE ENGINEER BEFORE COMMENCING WORK. DRAWINGS ARE NOT TO BE SCALED.

BENCHMARKS

TBM#1 TOP OF NORTH WEST PROPERTY BAR EL. 191.91

NOTES

DEVELOPMENT PLAN FROM HINDS BROOK SITE DEVELOPMENT PLAN PREPARED BY TRAVIS & ASSOCIATED DATED SEP. 4, 2024.

TOPOGRAPHIC SURVEY BY BETTER MEASURES DECEMBER 2023.

LEGAL BOUNDARY PLAN FROM PLAN OF SURVEY OF PARK OF LOT 29, CONCESSION 8, TOWN OF THE BLUE MOUNTAINS, COUNTY OF GREY PREPARED BY ZUBEK, EMO, PATTEN & THOMSEN.

No.	REVISION DESCRIPTION	DATE

ENGINEER STAMP

FUNCTIONAL SERVICING REPORT
SEPT. 12, 2024

HINDS BROOK RESIDENTIAL DEVELOPMENT

TOWN OF THE BLUE MOUNTAINS

TATHAM ENGINEERING

EXTERNAL SERVICING PLAN
OPTION 2

DESIGN: KRL	FILE: 123069	DWG: **ESP.2**
DRAWN: KRL	DATE: SEPT 2024	
CHECK: AO	SCALE: 1:2500	

Drawing Name: 123069-CSP01.dwg, Plotted: Sep 12, 2024

INDIAN BROOK

TBM 1 191.91m

45m FIRE HYDRANT RADIUS TYP.

SUN RETREATS BLUE MOUNTAIN

INSTALL BULK WATER METER AND BACKFLOW PREVENTER AT PROPERTY LINE

WATER ANALYSIS NODE 2

INTERNAL PRIVATE WATERMAIN FOR DOMESTIC SUPPLY AND FIRE SUPPRESSION.

MUNICIPAL WATERMAIN ISOLATED FROM INTERNAL PRIVATE WATERMAIN

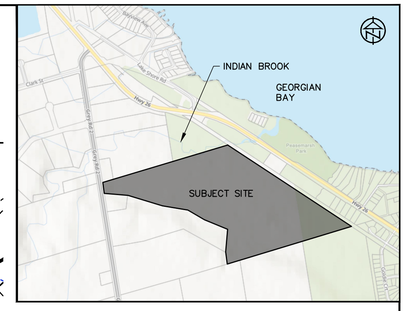
INTERNAL PRIVATE WATERMAIN FOR DOMESTIC SUPPLY AND FIRE SUPPRESSION.

MUNICIPAL WATERMAIN ISOLATED FROM INTERNAL PRIVATE WATERMAIN

WATER ANALYSIS NODE 1

GREY ROAD 2

SEE VIEW BELOW



KEY PLAN

INDIAN BROOK

SUN RETREATS BLUE MOUNTAIN

SEE VIEW ABOVE

INTERNAL PRIVATE WATERMAIN FOR DOMESTIC SUPPLY AND FIRE SUPPRESSION.

MUNICIPAL WATERMAIN ISOLATED FROM INTERNAL PRIVATE WATERMAIN

WATER ANALYSIS NODE 3

45m FIRE HYDRANT RADIUS TYP.

N INV. 174.80
E INV. 174.55
W INV. 174.52

450mmø PVC SAN

CONNECT TO EX. 400 mm ø WATERMAIN

SAN MH 13
E INV. 174.90
W INV. 174.87

CONNECT TO EXISTING SANITARY MAINTENANCE HOLE

GEORGIAN TRAIL

8.5m EASEMENT
INSTALL SERVICES IN EASEMENT BY APPROVED TRENCHLESS TECHNOLOGY.

LEGEND

	EXISTING	PROPOSED
SANITARY SEWER, STRUCTURE & DIRECTION		
SANITARY FORCEMAIN, STRUCTURE & DIRECTION		
STORM SEWER, STRUCTURE & DIRECTION		
WATERMAIN		
FIRE HYDRANT		

DISCLAIMER AND COPYRIGHT

CONTRACTOR MUST VERIFY ALL DIMENSIONS AND BE RESPONSIBLE FOR SAME. ANY DISCREPANCIES MUST BE REPORTED TO THE ENGINEER BEFORE COMMENCING WORK. DRAWINGS ARE NOT TO BE SCALED.

BENCHMARKS

TBM#1 TOP OF NORTH WEST PROPERTY BAR EL. 191.91

NOTES

DEVELOPMENT PLAN FROM HINDS BROOK SITE DEVELOPMENT PLAN PREPARED BY TRAVIS & ASSOCIATED DATED SEP. 4, 2024.

TOPOGRAPHIC SURVEY BY BETTER MEASURES DECEMBER 2023.

LEGAL BOUNDARY PLAN FROM PLAN OF SURVEY OF PARK OF LOT 29, CONCESSION 8, TOWN OF THE BLUE MOUNTAINS, COUNTY OF GREY PREPARED BY ZUBEK, EMO, PATTEN & THOMSEN.

No.	REVISION DESCRIPTION	DATE

ENGINEER STAMP

FUNCTIONAL SERVICING REPORT
SEPT. 12, 2024

HINDS BROOK RESIDENTIAL DEVELOPMENT

TOWN OF THE BLUE MOUNTAINS

CONCEPT SERVICING PLAN
OPTION 1

TATHAM ENGINEERING

DESIGN: KRL	FILE: 123069	DWG:	
DRAWN: KRL	DATE: SEPT 2024	**CSP.1**	
CHECK: AO	SCALE: 1:1000		

Drawing Name: 123069-CSP01.dwg, Plotted: Sep 12, 2024

INDIAN BROOK

TBM 1 191.91m

45m FIRE HYDRANT RADIUS TYP.

SUN RETREATS BLUE MOUNTAIN

INSTALL BULK WATER METER AND BACKFLOW PREVENTER AT PROPERTY LINE

WATER ANALYSIS NODE 2

INTERNAL PRIVATE WATERMAIN FOR DOMESTIC SUPPLY AND FIRE SUPPRESSION.

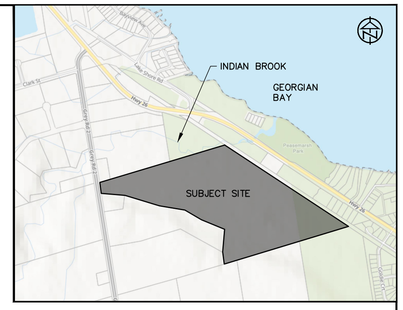
INTERNAL PRIVATE WATERMAIN FOR DOMESTIC SUPPLY AND FIRE SUPPRESSION.

PUMPING STATION

WATER ANALYSIS NODE 1

GREY ROAD 2

SEE VIEW BELOW



KEY PLAN

INDIAN BROOK

SUN RETREATS BLUE MOUNTAIN

SEE VIEW ABOVE

PUMPING STATION

SAN MH 12
N INV. 174.80
E INV. 174.55
W INV. 174.52

WATERMAIN

450mm Ø PVC SAN

SAN MH 13
E INV. 174.90
W INV. 174.87

450m Ø

GEORGIAN TRAIL

45m FIRE HYDRANT RADIUS TYP.

LEGEND

	EXISTING	PROPOSED
SANITARY SEWER, STRUCTURE & DIRECTION		
SANITARY FORCEMAIN, STRUCTURE & DIRECTION		
STORM SEWER, STRUCTURE & DIRECTION		
WATERMAIN		
FIRE HYDRANT		

DISCLAIMER AND COPYRIGHT

CONTRACTOR MUST VERIFY ALL DIMENSIONS AND BE RESPONSIBLE FOR SAME. ANY DISCREPANCIES MUST BE REPORTED TO THE ENGINEER BEFORE COMMENCING WORK. DRAWINGS ARE NOT TO BE SCALED.

BENCHMARKS

TBM#1 TOP OF NORTH WEST PROPERTY BAR EL. 191.91

NOTES

DEVELOPMENT PLAN FROM HINDS BROOK SITE DEVELOPMENT PLAN PREPARED BY TRAVIS & ASSOCIATED DATED SEP. 4, 2024.

TOPOGRAPHIC SURVEY BY BETTER MEASURES DECEMBER 2023.

LEGAL BOUNDARY PLAN FROM PLAN OF SURVEY OF PARK OF LOT 29, CONCESSION 8, TOWN OF THE BLUE MOUNTAINS, COUNTY OF GREY PREPARED BY ZUBEK, EMO, PATTEN & THOMSEN.

No.	REVISION DESCRIPTION	DATE

ENGINEER STAMP

FUNCTIONAL SERVICING REPORT
SEPT. 12, 2024

HINDS BROOK RESIDENTIAL DEVELOPMENT

TOWN OF THE BLUE MOUNTAINS

CONCEPT SERVICING PLAN OPTION 2

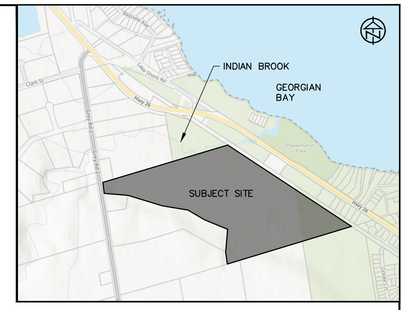
TATHAM ENGINEERING

DESIGN: KRL	FILE: 123069	DWG: CSP.2
DRAWN: KRL	DATE: SEPT 2024	
CHECK: AO	SCALE: 1:1000	

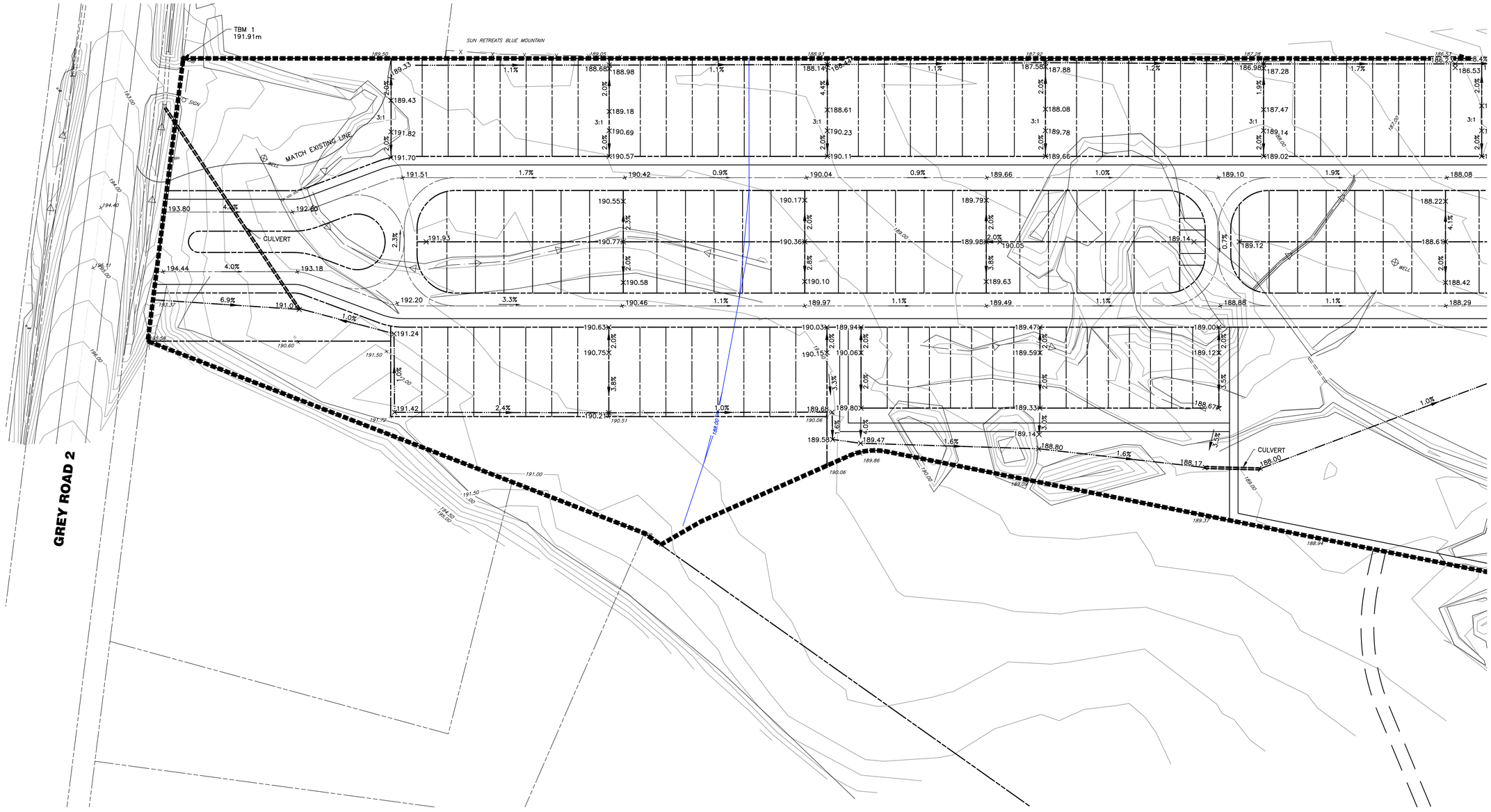
Drawing Name: 123069-CSP01.dwg, Plotted: Sep 12, 2024

LEGEND

PROPERTY LINE		
LOT LINE		
DITCH/DIRECTION OF FLOW		
DRAINAGE SWALE/DIRECTION OF FLOW		
CULVERT		
CONTOUR	179.00	179.00
SPOT ELEVATION	× 179.00	× 179.00
GRADING DIRECTION/GRADE PERCENTAGE	1.9%	1.9%



KEY PLAN



DISCLAIMER AND COPYRIGHT

CONTRACTOR MUST VERIFY ALL DIMENSIONS AND BE RESPONSIBLE FOR SAME. ANY DISCREPANCIES MUST BE REPORTED TO THE ENGINEER BEFORE COMMENCING WORK. DRAWINGS ARE NOT TO BE SCALED.

BENCHMARKS

TBM#1 TOP OF NORTH WEST PROPERTY BAR EL. 191.91

NOTES

DEVELOPMENT PLAN FROM HINDS BROOK SITE DEVELOPMENT PLAN PREPARED BY TRAVIS & ASSOCIATED DATED SEP. 4, 2024.

TOPOGRAPHIC SURVEY BY BETTER MEASURES DECEMBER 2023.

LEGAL BOUNDARY PLAN FROM PLAN OF SURVEY OF PARK OF LOT 29, CONCESSION 8, TOWN OF THE BLUE MOUNTAINS, COUNTY OF GREY PREPARED BY ZUBEK, EMO, PATTEN & THOMSEN.

No.	REVISION DESCRIPTION	DATE

ENGINEER STAMP

FUNCTIONAL SERVICING REPORT
SEPT. 12, 2024

HINDS BROOK RESIDENTIAL DEVELOPMENT

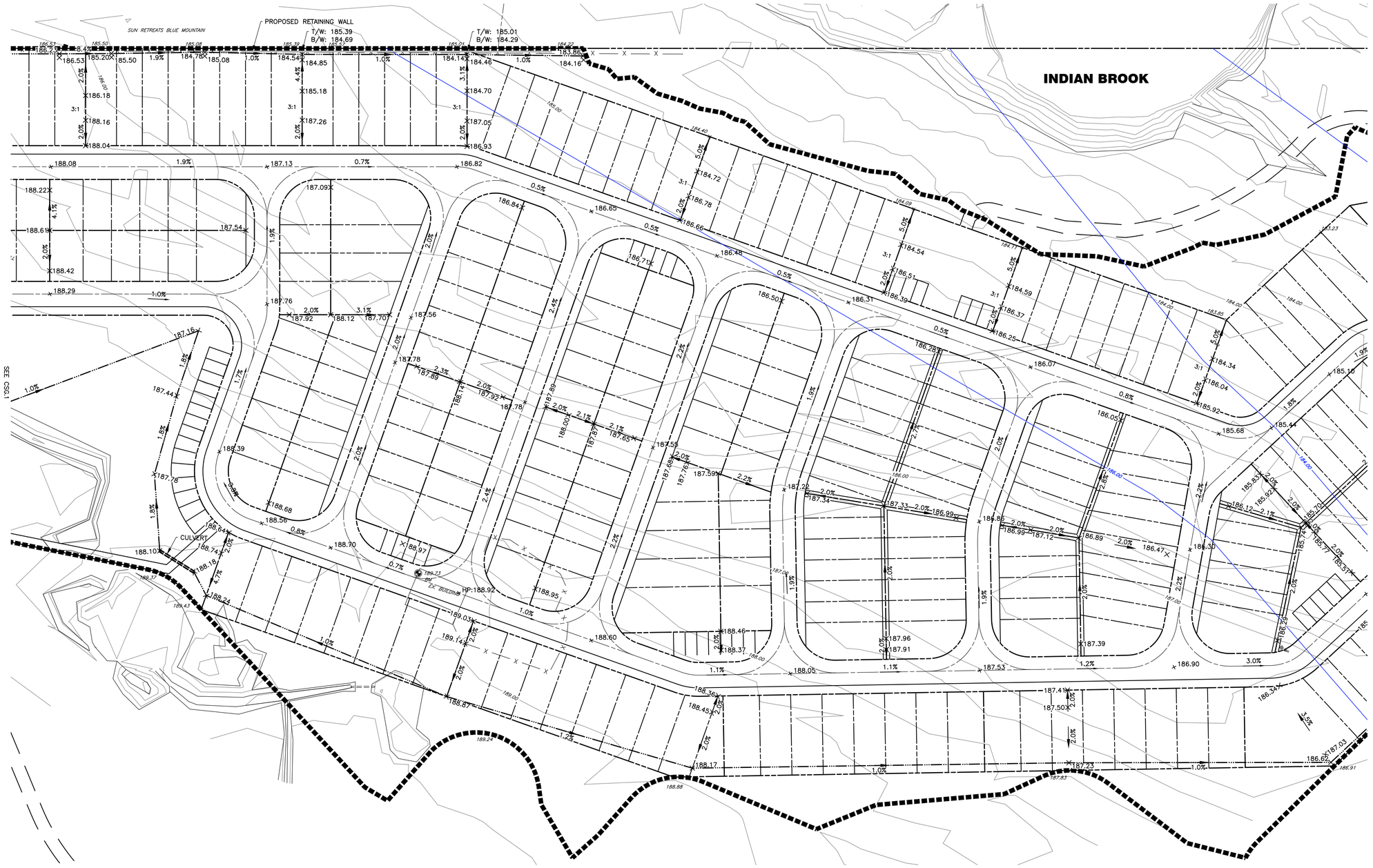
TOWN OF THE BLUE MOUNTAINS

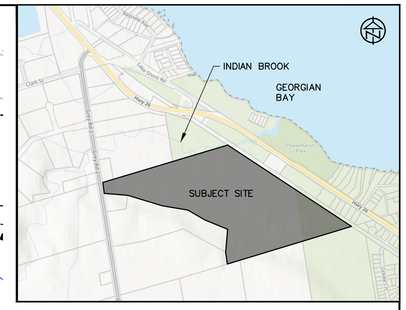
CONCEPT GRADING PLAN
SHEET 1

TATHAM ENGINEERING

DESIGN: KRL	FILE: 123069	DWG: CGP.1
DRAWN: KRL	DATE: AUG 2024	
CHECK: AO	SCALE: 1:500	

Drawing Name: 123069-CGP01.dwg, Plotted: Sep 12, 2024





KEY PLAN

LEGEND

PROPERTY LINE		
LOT LINE		
DITCH/DIRECTION OF FLOW		
DRAINAGE SWALE/DIRECTION OF FLOW		
CULVERT		
CONTOUR	179.00	179.00
SPOT ELEVATION	× 179.00	×179.00
GRADING DIRECTION/GRADE PERCENTAGE	1.9%	1.9%

DISCLAIMER AND COPYRIGHT

CONTRACTOR MUST VERIFY ALL DIMENSIONS AND BE RESPONSIBLE FOR SAME. ANY DISCREPANCIES MUST BE REPORTED TO THE ENGINEER BEFORE COMMENCING WORK. DRAWINGS ARE NOT TO BE SCALED.

BENCHMARKS

TBM#1 TOP OF NORTH WEST PROPERTY BAR EL. 191.91

NOTES

DEVELOPMENT PLAN FROM HINDS BROOK SITE DEVELOPMENT PLAN PREPARED BY TRAVIS & ASSOCIATED DATED SEP. 4, 2024.

TOPOGRAPHIC SURVEY BY BETTER MEASURES DECEMBER 2023.

LEGAL BOUNDARY PLAN FROM PLAN OF SURVEY OF PARK OF LOT 29, CONCESSION 8, TOWN OF THE BLUE MOUNTAINS, COUNTY OF GREY PREPARED BY ZUBEK, EMO, PATTEN & THOMSEN.

No.	REVISION DESCRIPTION	DATE

ENGINEER STAMP

FUNCTIONAL SERVICING REPORT
SEPT. 12, 2024

HINDS BROOK RESIDENTIAL DEVELOPMENT

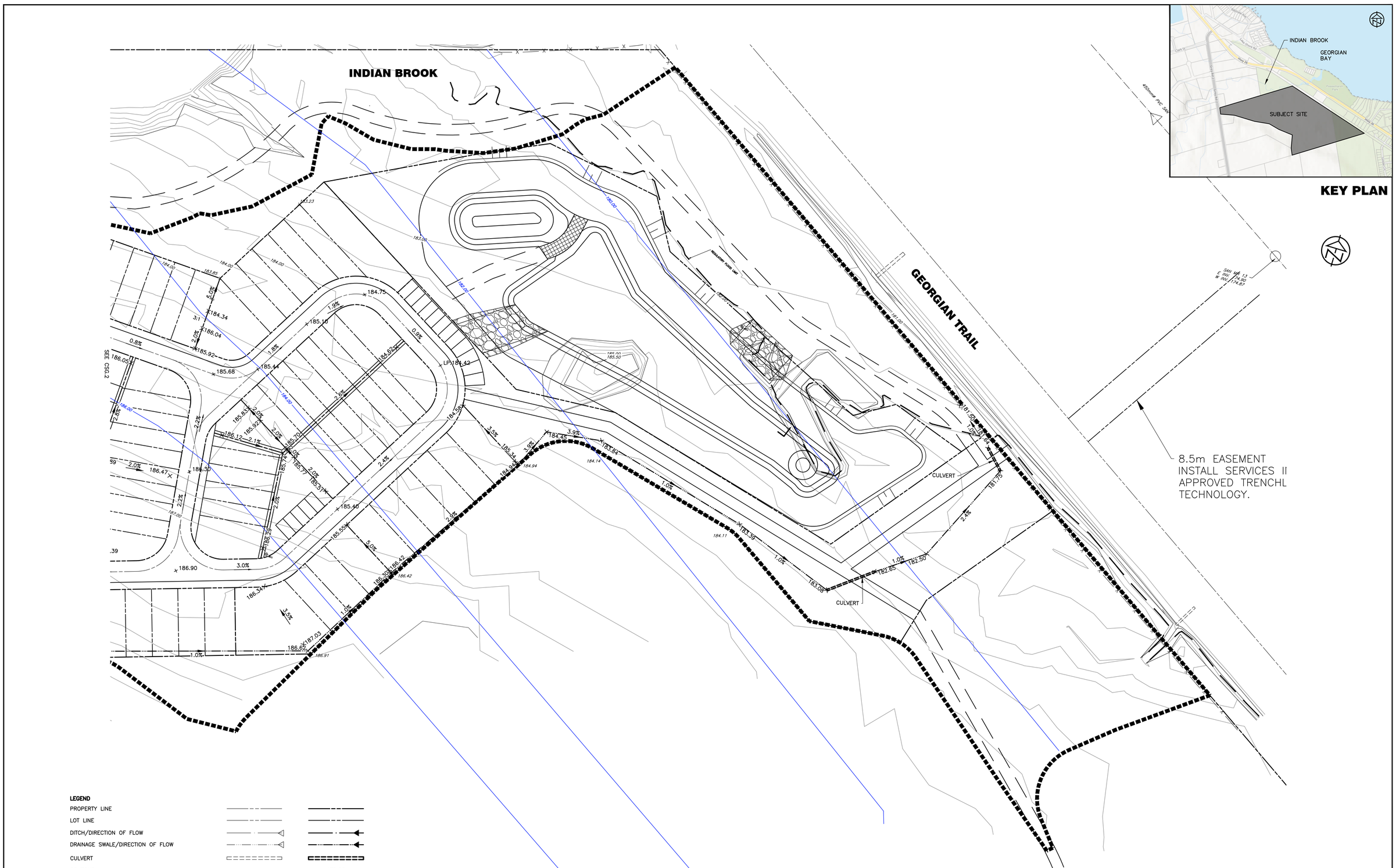
TOWN OF THE BLUE MOUNTAINS

CONCEPT GRADING PLAN
SHEET 2

TATHAM ENGINEERING

DESIGN: KRL	FILE: 123069	DWG: CGP.2
DRAWN: KRL	DATE: AUG 2024	
CHECK: AO	SCALE: 1:500	

Drawing Name: 123069-CGP01.dwg, Plotted: Sep 12, 2024



DISCLAIMER AND COPYRIGHT

CONTRACTOR MUST VERIFY ALL DIMENSIONS AND BE RESPONSIBLE FOR SAME. ANY DISCREPANCIES MUST BE REPORTED TO THE ENGINEER BEFORE COMMENCING WORK. DRAWINGS ARE NOT TO BE SCALED.

BENCHMARKS

TBM#1 TOP OF NORTH WEST PROPERTY BAR EL. 191.91

NOTES

DEVELOPMENT PLAN FROM HINDS BROOK SITE DEVELOPMENT PLAN PREPARED BY TRAVIS & ASSOCIATED DATED SEP. 4, 2024.

TOPOGRAPHIC SURVEY BY BETTER MEASURES DECEMBER 2023.

LEGAL BOUNDARY PLAN FROM PLAN OF SURVEY OF PARK OF LOT 29, CONCESSION 8, TOWN OF THE BLUE MOUNTAINS, COUNTY OF GREY PREPARED BY ZUBEK, EMO, PATTEN & THOMSEN.

No.	REVISION DESCRIPTION	DATE

ENGINEER STAMP

FUNCTIONAL SERVICING REPORT
SEPT. 12, 2024

HINDS BROOK RESIDENTIAL DEVELOPMENT

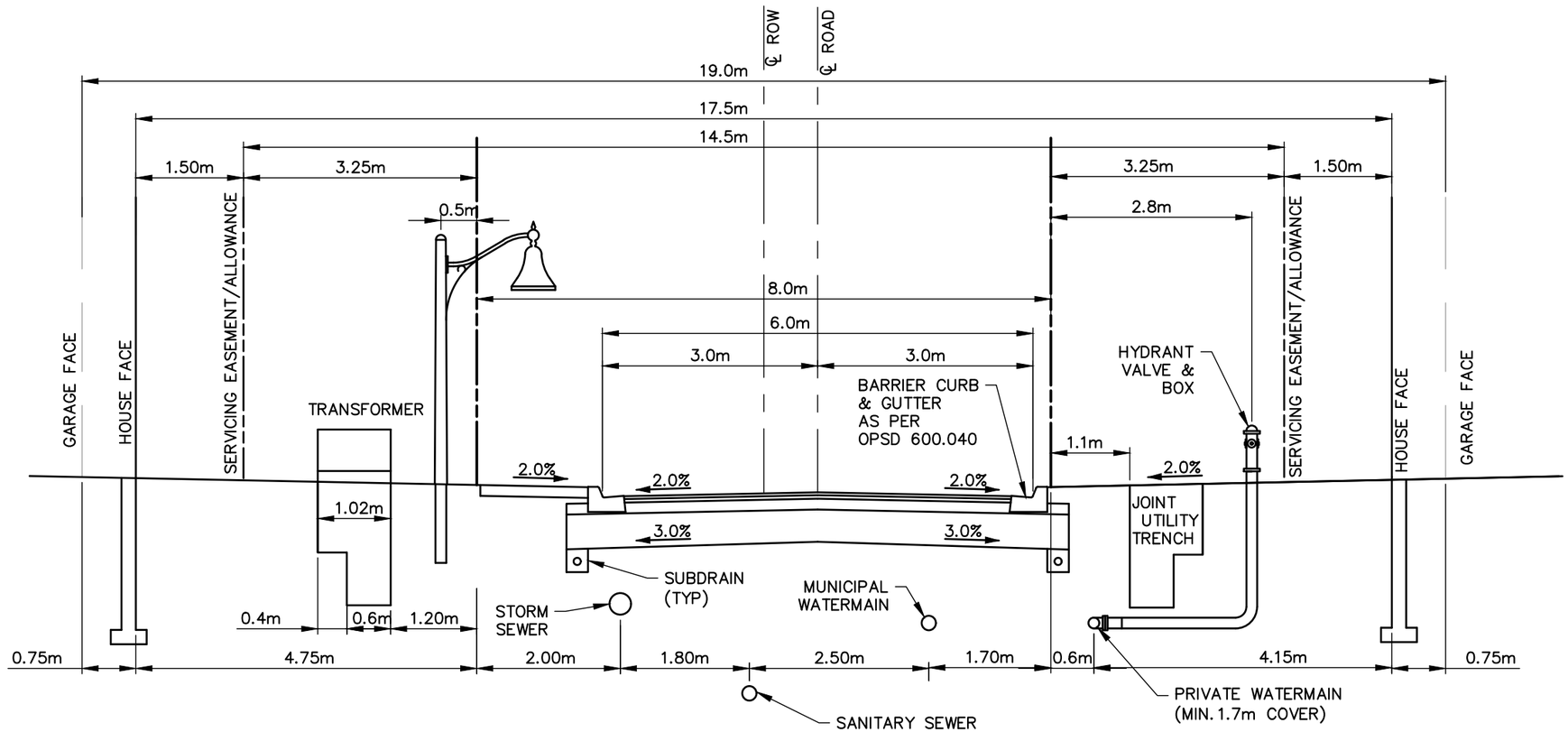
TOWN OF THE BLUE MOUNTAINS

TATHAM ENGINEERING

CONCEPT GRADING PLAN
SHEET 3

DESIGN: KRL	FILE: 123069	DWG: CGP.3
DRAWN: KRL	DATE: AUG 2024	
CHECK: AO	SCALE: 1:1000	

Drawing Name: 123069-CGP01.dwg, Plotted: Sep 12, 2024



HINDS BROOK ROAD CROSS-SECTION WITH MUNICIPAL WATERMAIN

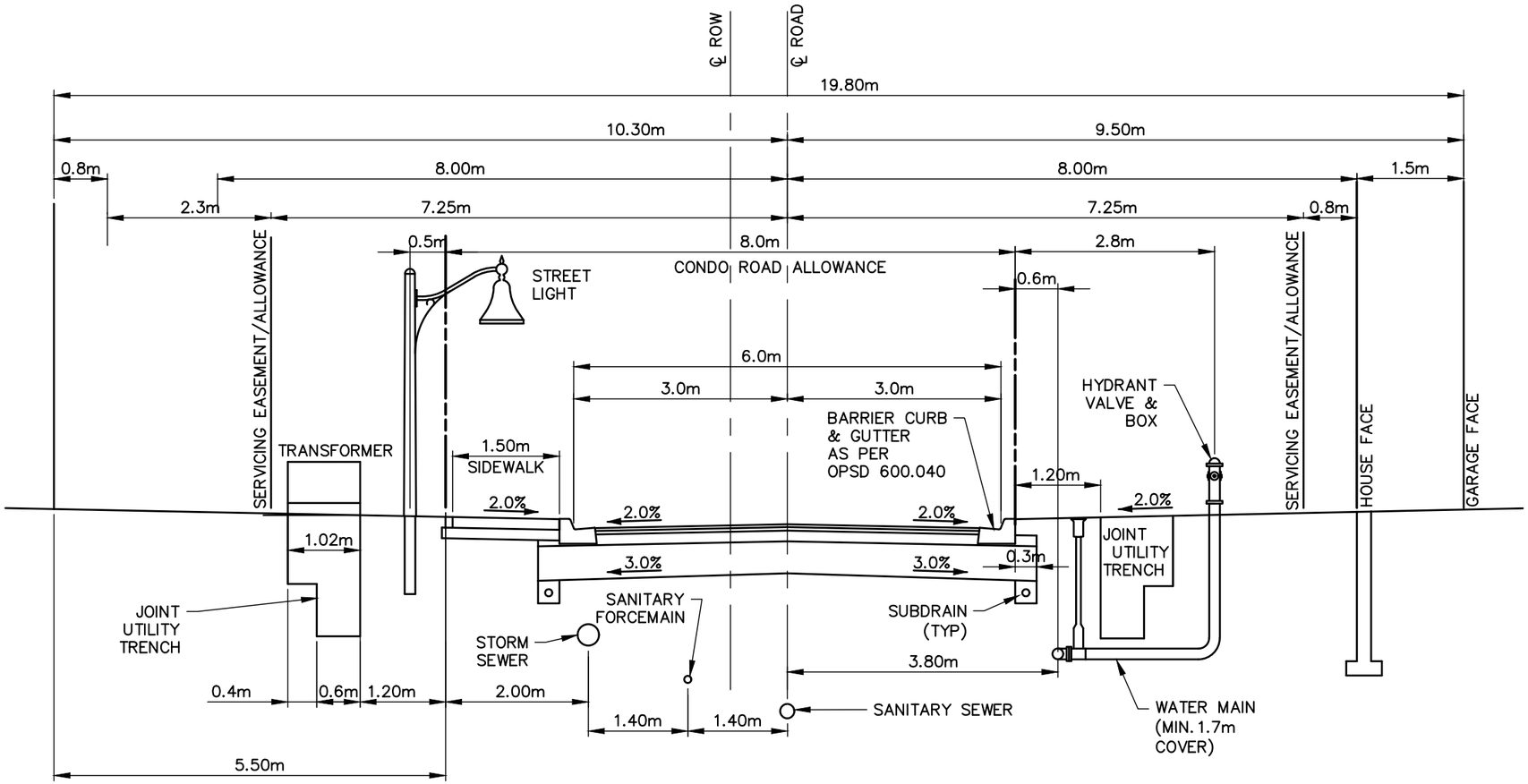
TATHAM ENGINEERING

HINDS BROOK
TOWN OF THE BLUE MOUNTAINS

DWG. No. **RD.1**

SCALE: 1:75	DRAWN: DEP	DATE: DEC. 2023	JOB NO. 123069

Drawing Name: 123069–FIG.–RD.dwg, Plotted: Sep 12, 2024



HINDS BROOK ROAD CROSS-SECTION

TATHAM ENGINEERING

HINDS BROOK
TOWN OF THE BLUE MOUNTAINS

DWG. No. **RD.2**

SCALE: 1:75	DRAWN: DEP	DATE: DEC. 2023	JOB NO. 123069

Drawing Name: 123069-FIG.-RD.dwg, Plotted: Sep 12, 2024

Appendix A:
Water Calculations

TATHAM ENGINEERING

Water Demand Calculations

Project Details		Prepared By	
Hinds Brook Residential Development	123069	AO	Sept. 10, 2024
Municipality		**Checked By**	
Town of The Blue Mountains			

Residential Demands

Unit Type	Single Family	Semi Detached	Townhouse	Apartment	Total
No. Units			376		376
Population Density (cap/unit)			2.15		-
Average Demand (L/day/cap)			350		-
Average Day Demand (m^3/day)	0.00	0.00	282.94	0.00	**282.94**

Commercial/Industrial/ Institutional Demands

Land Use	Commercial	Industrial	Institutional	Total
Area (ha)				0
Average Demand (m^3/day/ha)				-
Average Day Demand (m^3/day)	0.00	0.00	0.00	**0.00**

Fire Demand

Required Fire Demand (L/s)	133	Reference: FUS Calculation

Peaking Factors

Peaking Factors	Residential	Commercial	Industrial	Institutional
Maximum Day	**2.75**			
Peak Hour	**4.13**			

Total Design Flows

Maximum Day Demand (m^3/day)	**778.09**
Peak Hour Demand (L/s)	**13.52**
Maximum Day Plus Fire Demand (L/s)	**142.01**

References

Water demand and peaking factors from Per MOE Design Guidelines for Drinking Water Systems (2008) Section 3.4.2. Unit count based on Hinds Property Site Development Concept Prepared by Travis & Associates dated Feb.23, 2024

TATHAM ENGINEERING	Project:	Hinds Brook Residential Development	Date: Feb. 13, 2024
	File No.:	123069	Designed: AO
	Subject:	FUS Fire Flow Calculation	Checked

Required Fire Flow

Coefficient for Type of Construction (A)	=	1.0	Ordinary Construction	
Total Floor Area	=	145	m^2/unit	
Total Units		6	(assumes minimum 2 hr rated fire wall subdividing back to back 12 plex in half)	
Total Effective Floor Area (B)		870	m^2	
Required Fire Flow	=	220 C Area$^{0.5}$	(Based on formula from PART II of 2020 Water Supply for Fire protection)	
	=	6489	L/min	
Rounded to nearest 1000 (C)	=	6000	L/min	
Type of Occupancy (D)	=	Limited Combustible		15% Decrease
Sprinkling System (E)	=	No		0% Decrease

Exposure Adjustment

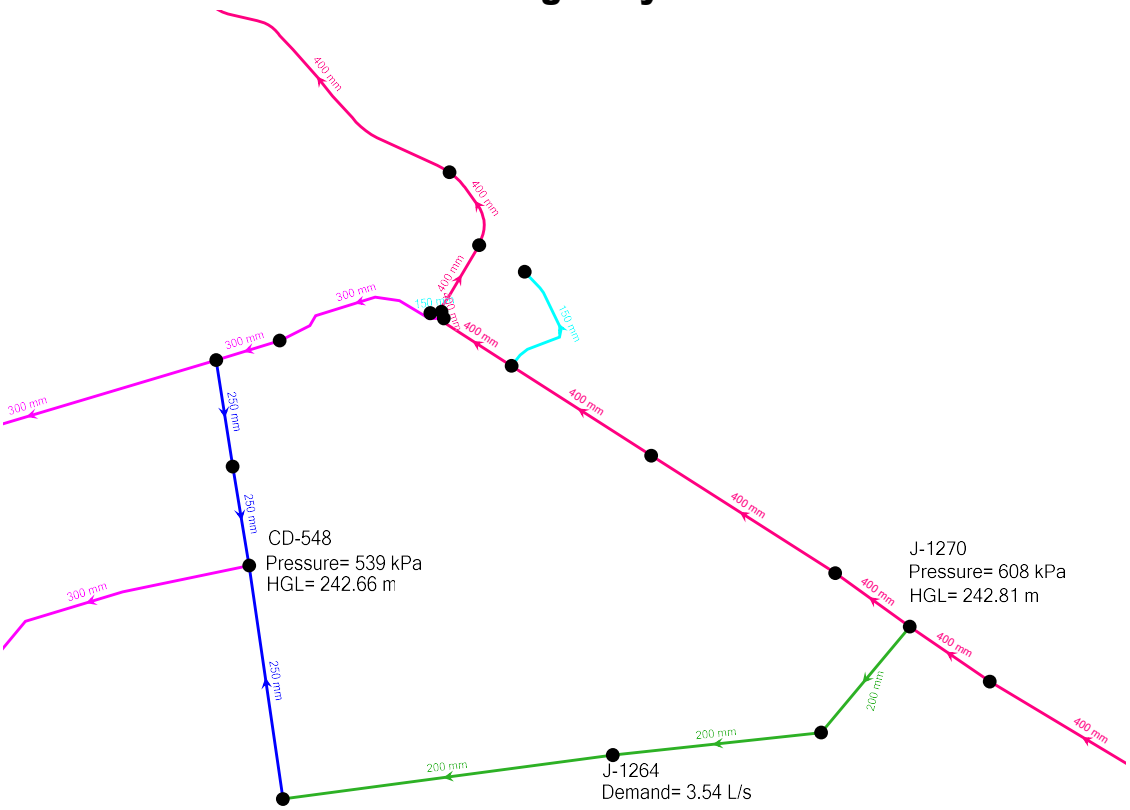
North	=	10.1-20	m	15%	(Type III Construction with Length-Height Factor >100)
East	=	10.1-20	m	15%	(Type III Construction with Length-Height Factor >100)
South	=	N/A	m	-	(2hr rated fire wall, therefore protected with no exposure charge)
West	=	10.1-20	m	15%	(Type III Construction with Length-Height Factor >100)

Increase / decrease due to Occupancy (D)	=	-900	L/min	
Sprinkler Reduction (E)	=	0	L/min	
Exposure Adjustment (F)	=	2700	L/min	
(C) + (D) + (E) + (F)	=	8000	L/min	(Rounded to the nearest 1000L/s)
	=	133	L/s	
	=	960.0	m^3	(2 Hours)

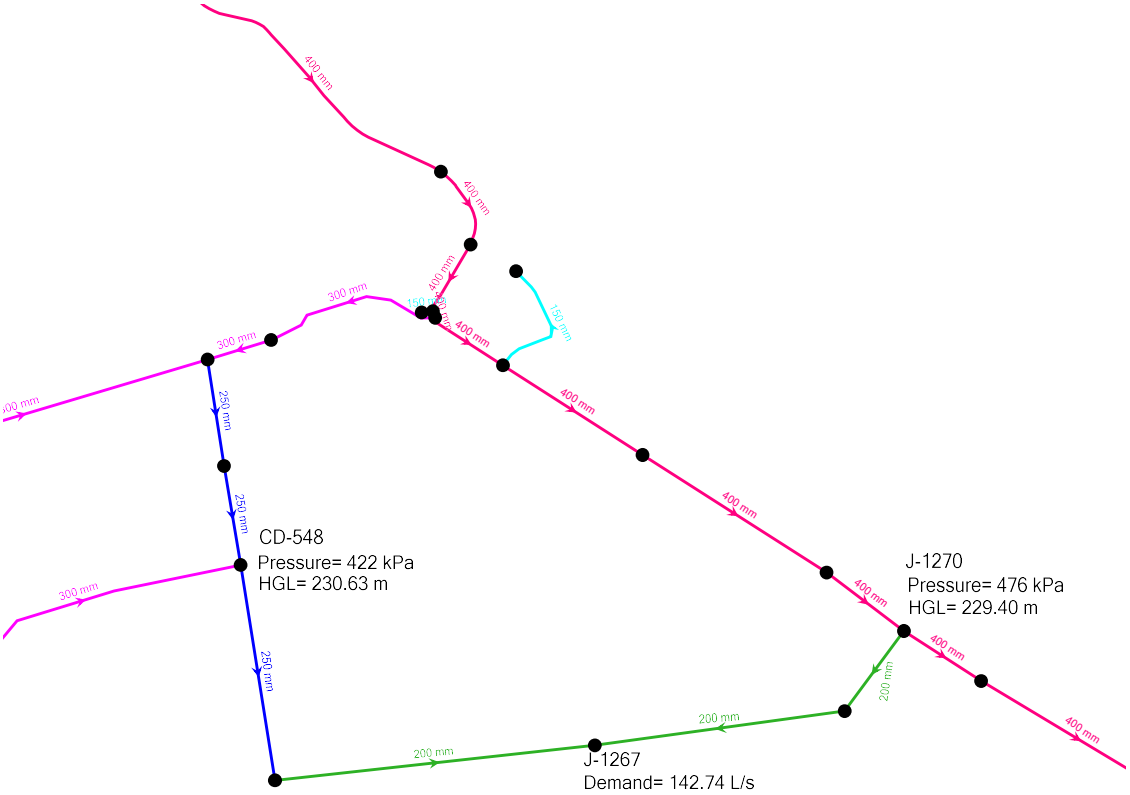
Assumptions

A. Construction coefficient = 1.0 for Ordinary Construction where exterior walls have a minimum 1 hr fire resistance rating.
B. Total effective floor area = 145 m^2/unit over 3 floors and including garage.
C. Residential use, limited combustible contents.
D. No sprinklers are assumed.
E. Exposure adjustment charges calculated based on Hinds Property Site Development Concept prepared by travis & associates dated Feb. 7, 2024

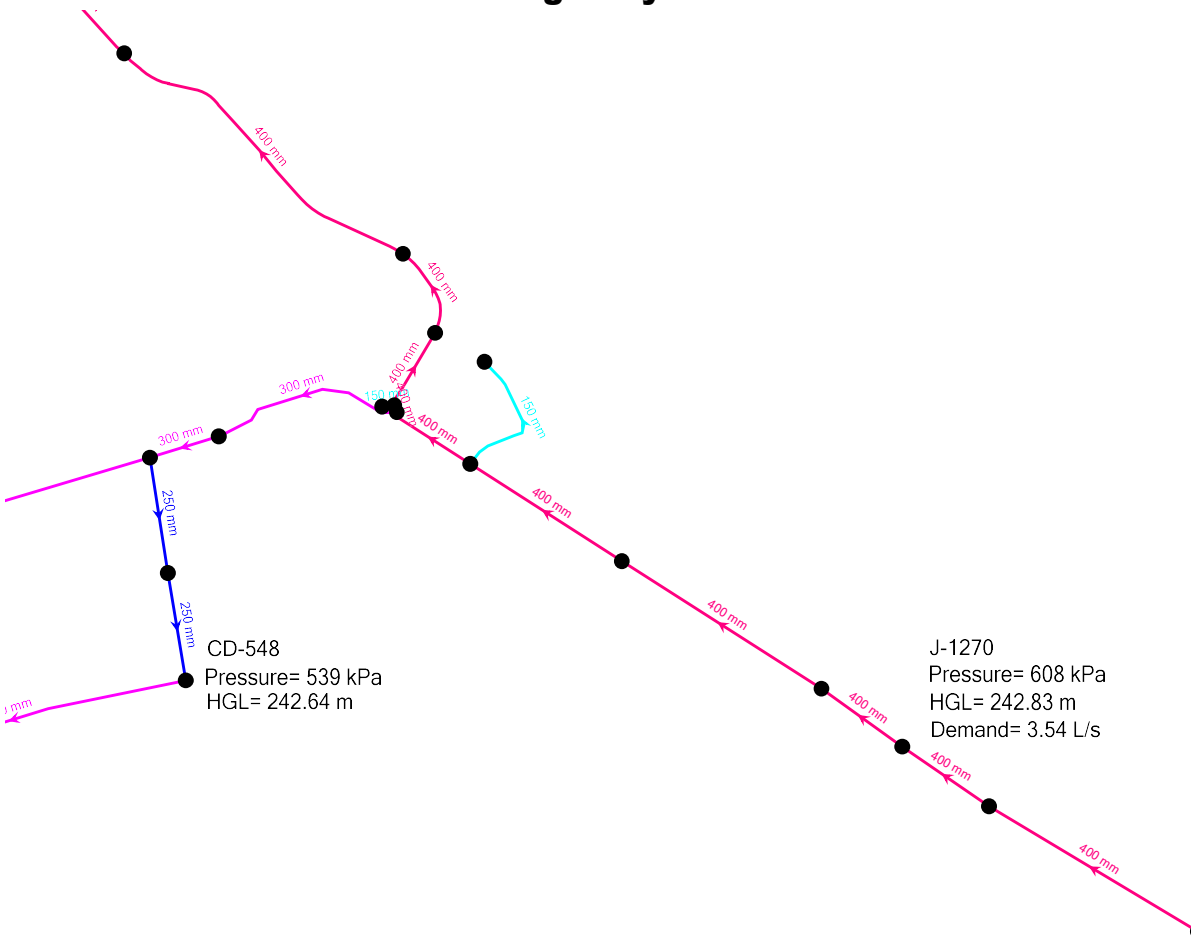
Town of The Blue Mountains
Grey Road 2 - Boundary Conditions - Scenario 3 - Future Conditions
Average Day Demand



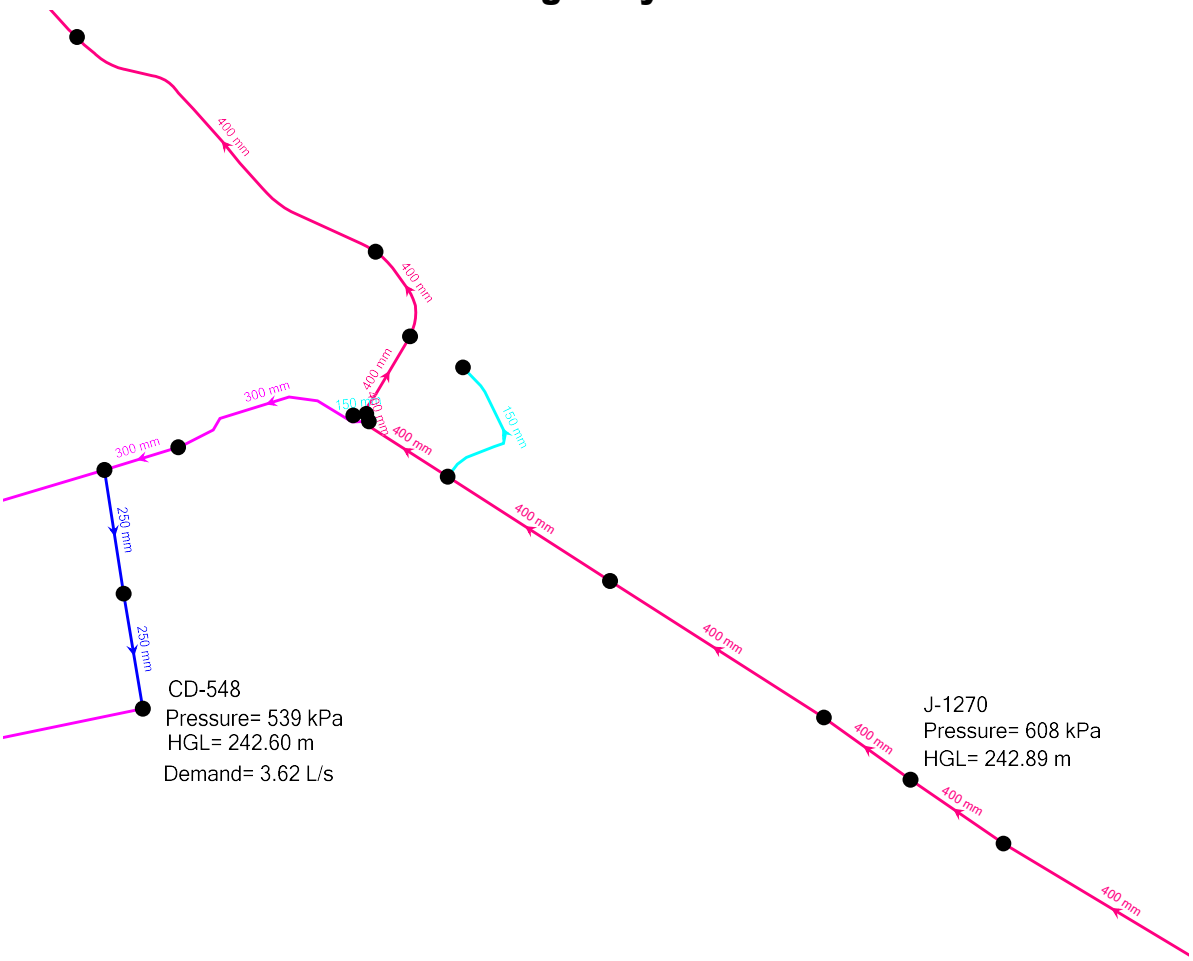
Town of The Blue Mountains
Grey Road 2 - Boundary Conditions - Scenario 3 - Future Conditions
Maximum Day + Fire Flow (133 L/s)



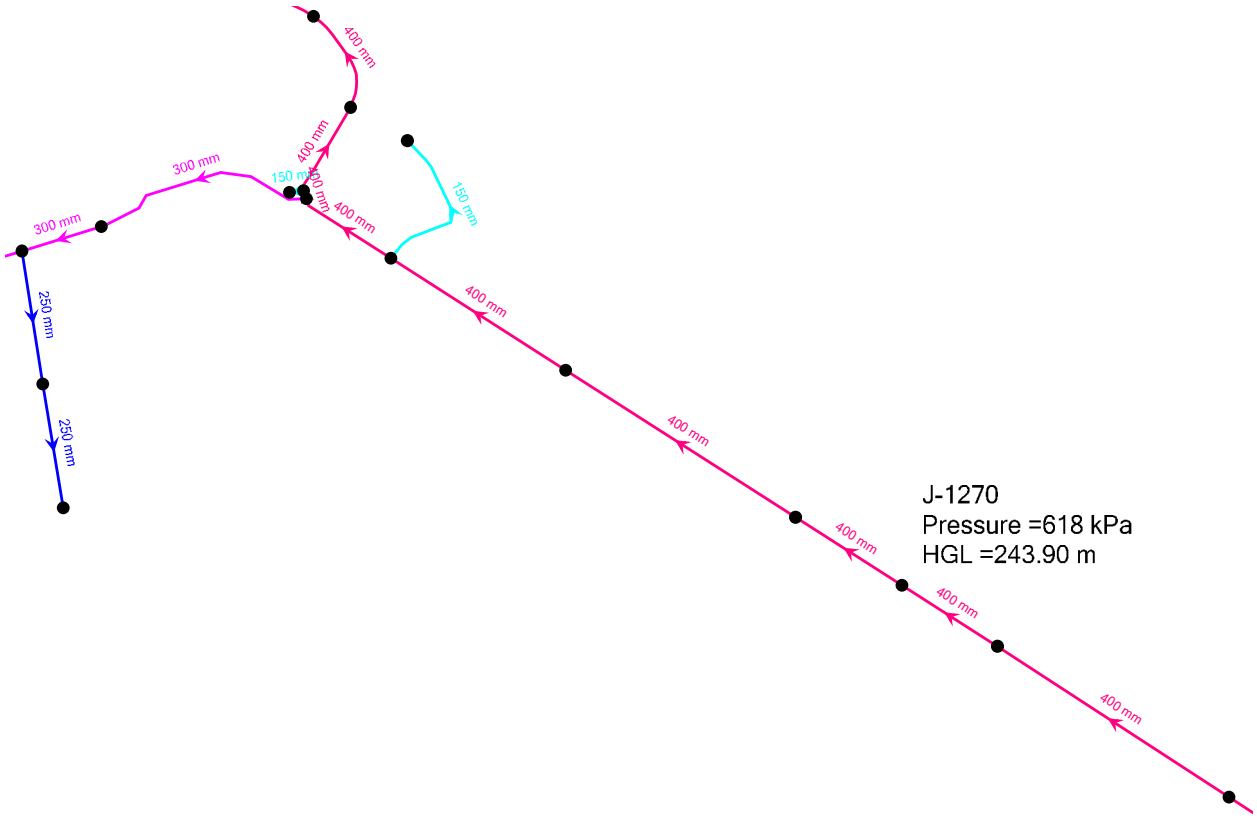
Town of The Blue Mountains
Grey Road 2 - Boundary Conditions - Scenario 1 - Future Conditions
Average Day Demand



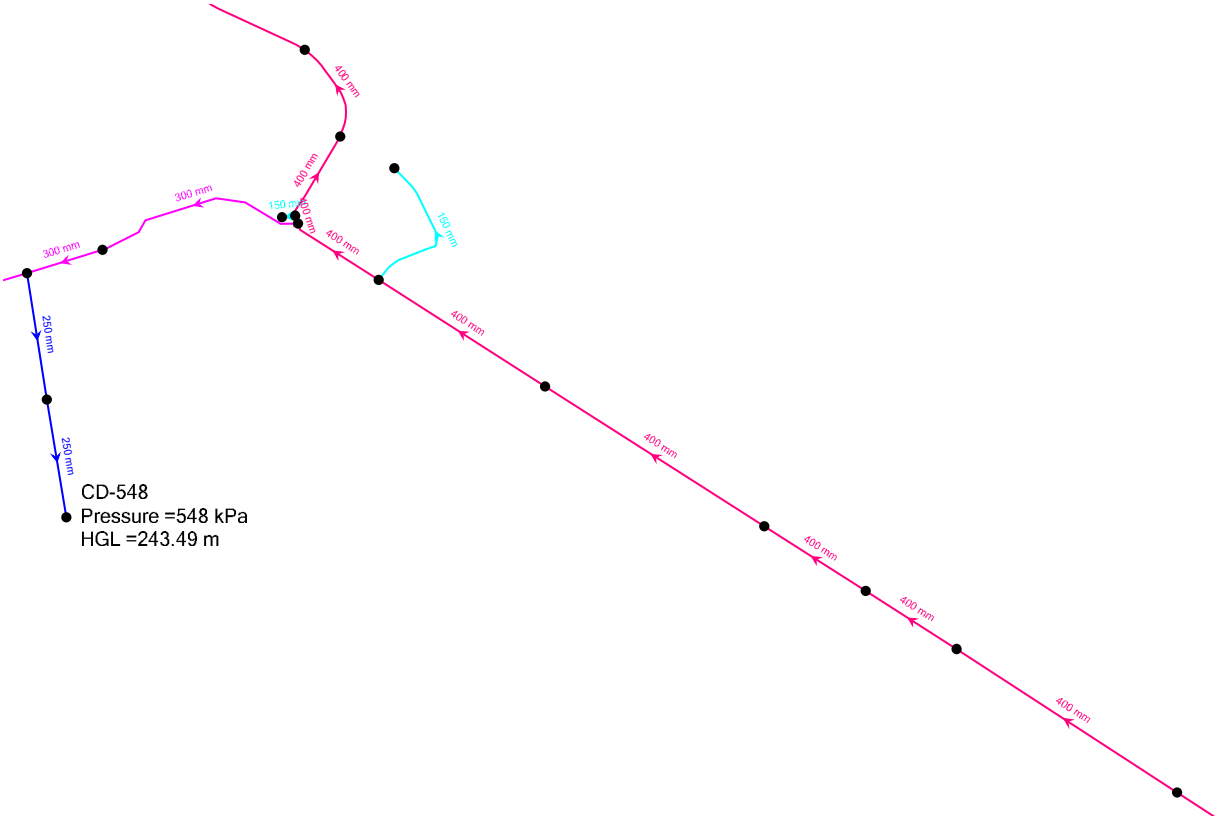
Town of The Blue Mountains
Grey Road 2 - Boundary Conditions - Scenario 2 - Future Conditions
Average Day Demand



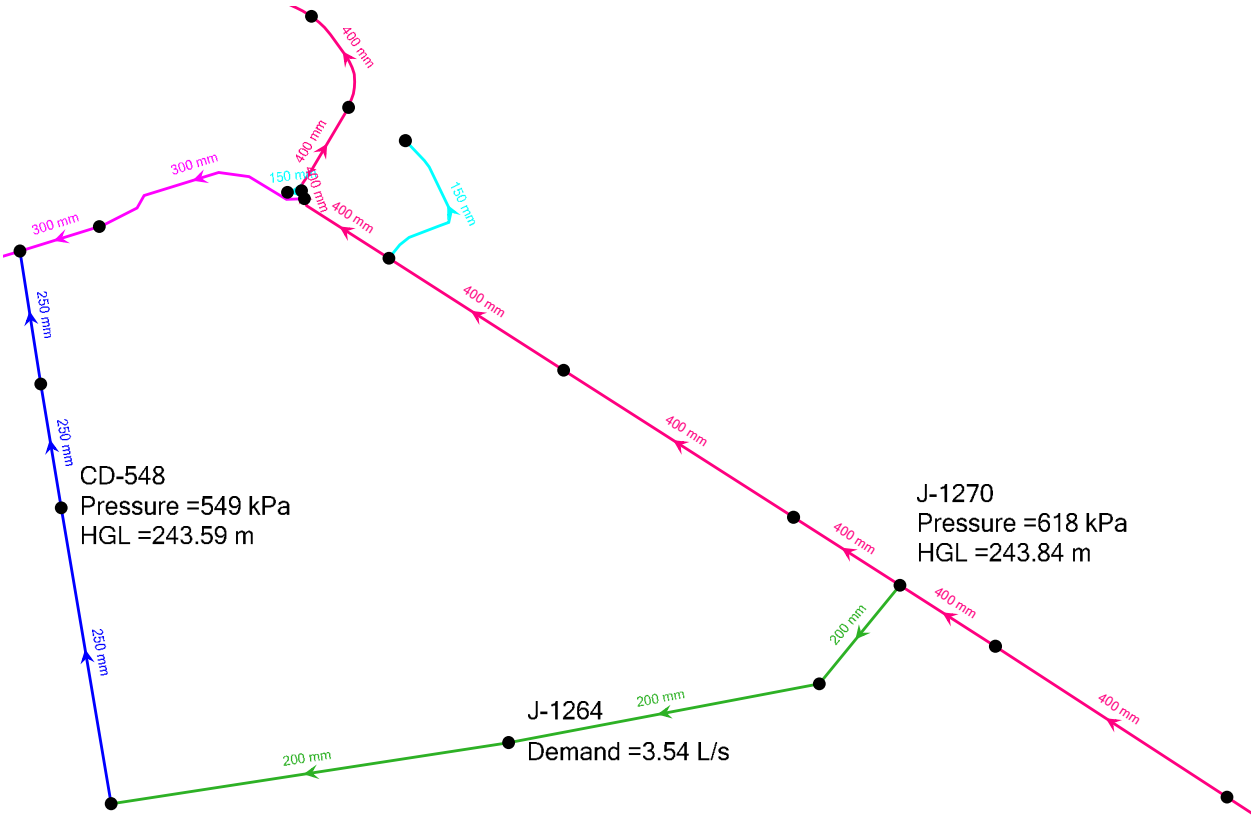
Town of The Blue Mountains
496857 Grey Road 2 Boundary Conditions
Average Day Demand
Scenario 1



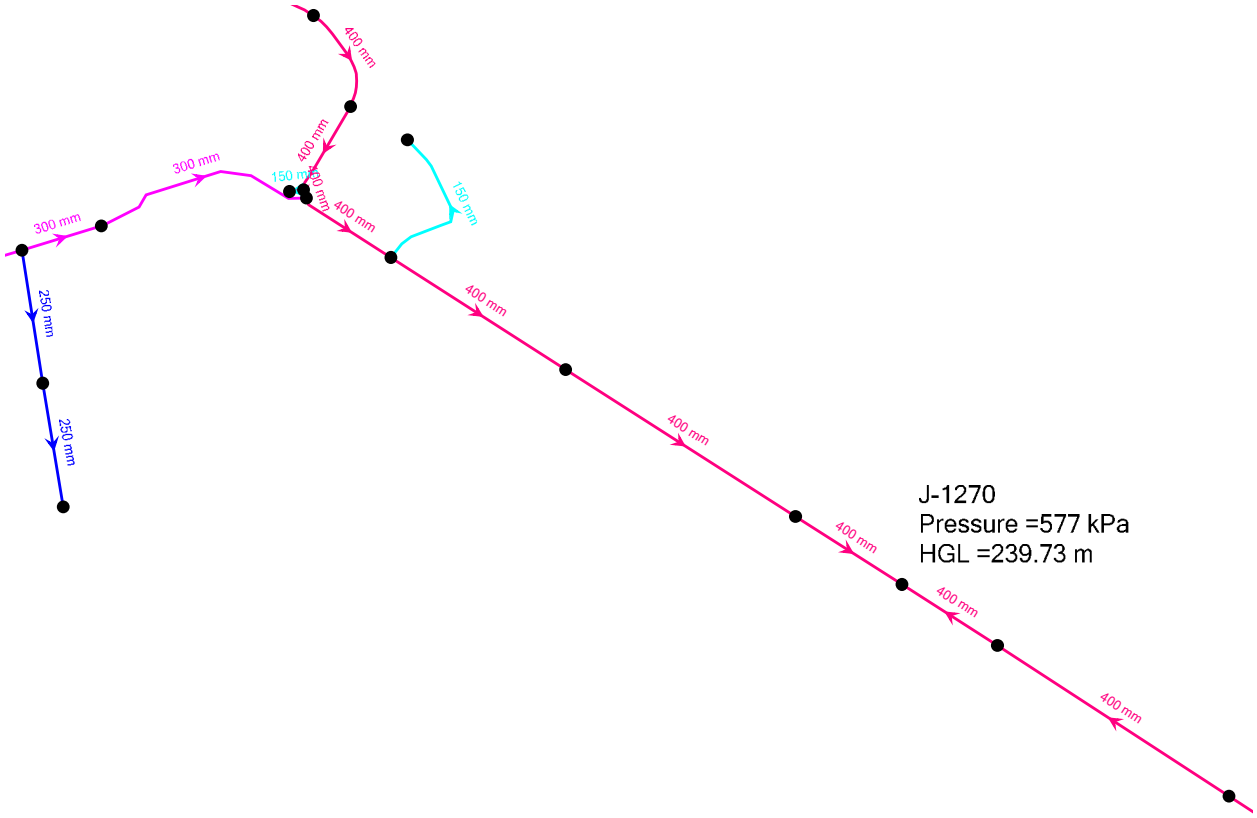
Town of The Blue Mountains
496857 Grey Road 2 Boundary Conditions
Average Day Demand
Scenario 2



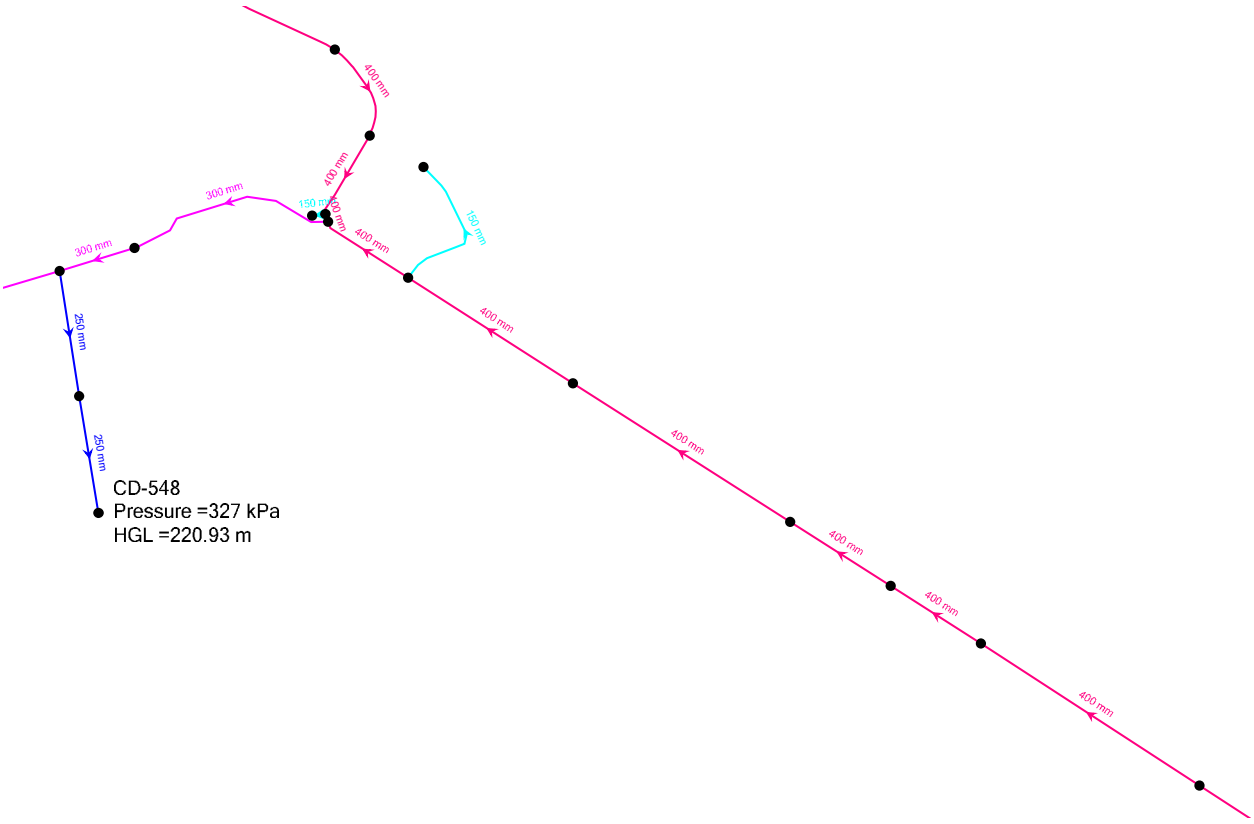
Town of The Blue Mountains
496857 Grey Road 2 Boundary Conditions
Average Day Demand
Scenario 3



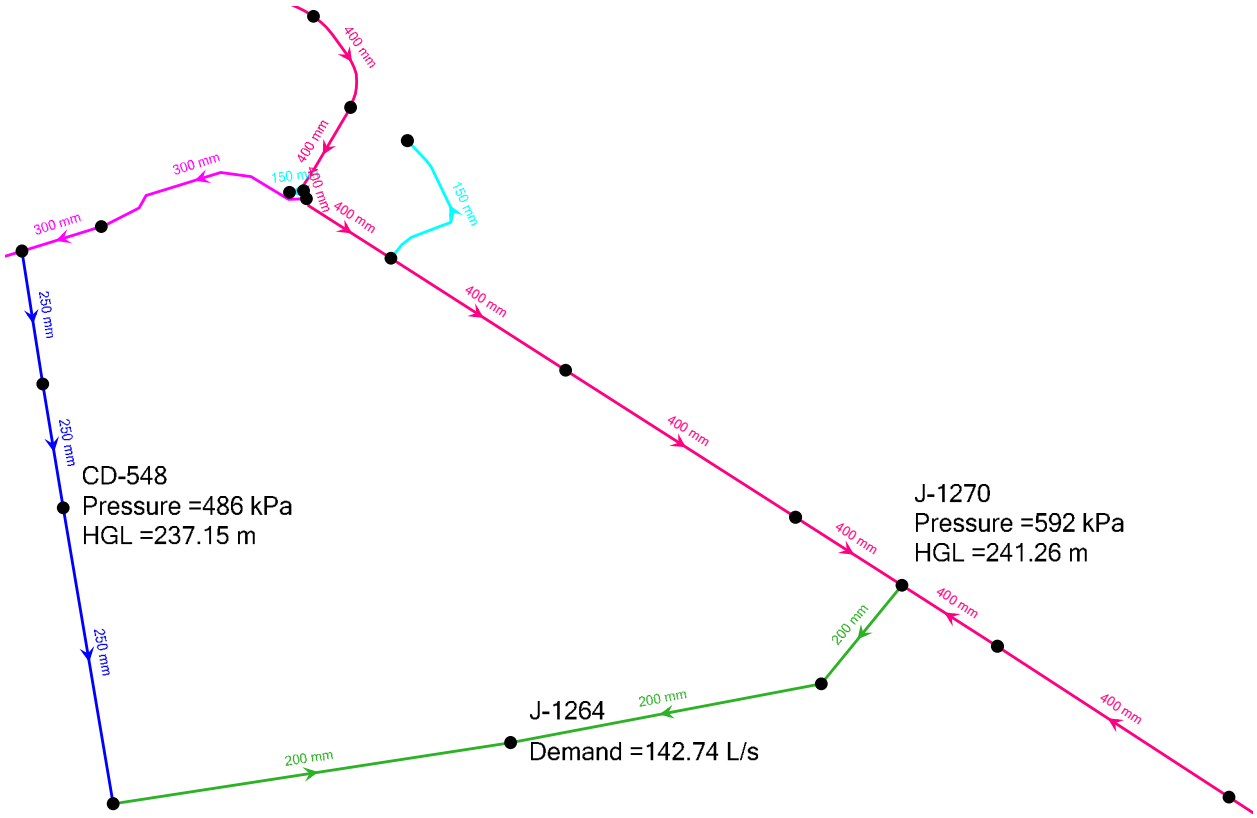
Town of The Blue Mountains
496857 Grey Road 2 Boundary Conditions
Maximum Day + Fire Flow (133 L/s)
Scenario 1



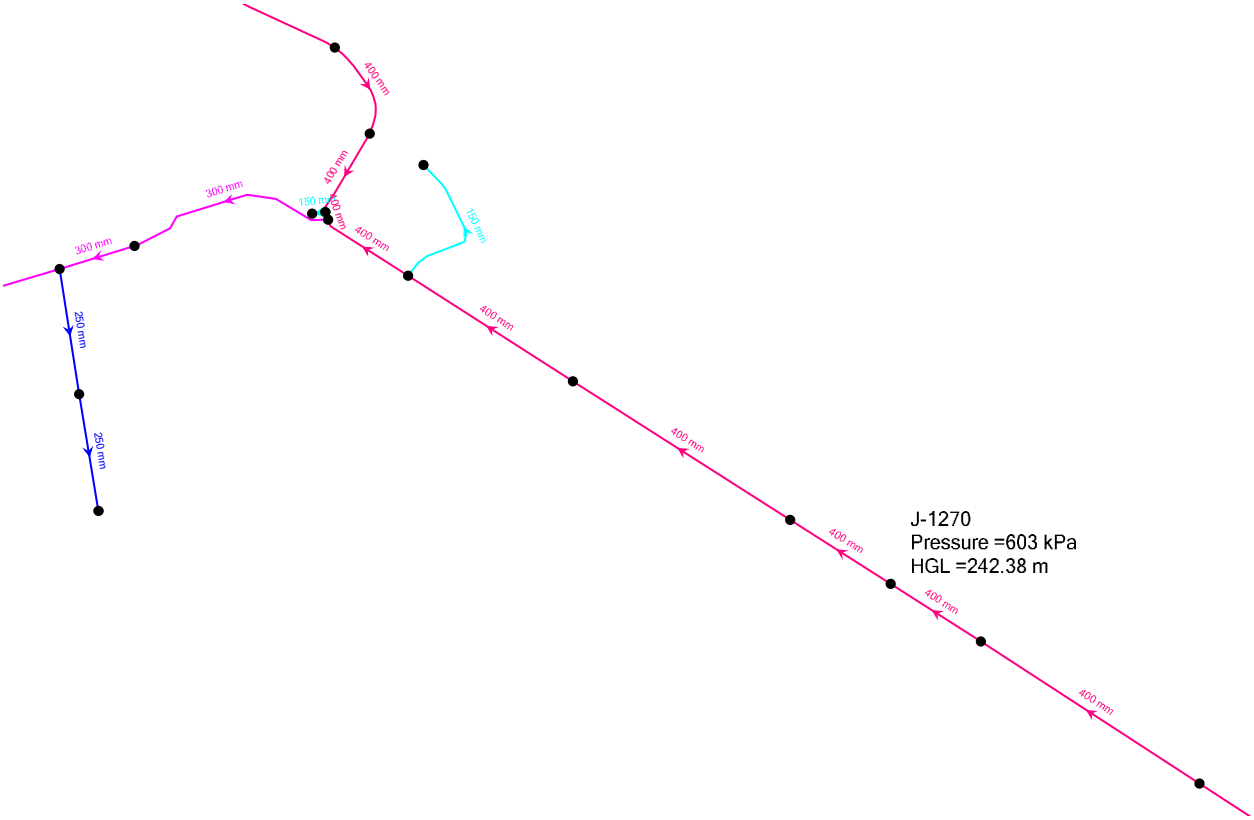
Town of The Blue Mountains
496857 Grey Road 2 Boundary Conditions
Maximum Day + Fire Flow (133 L/s)
Scenario 2



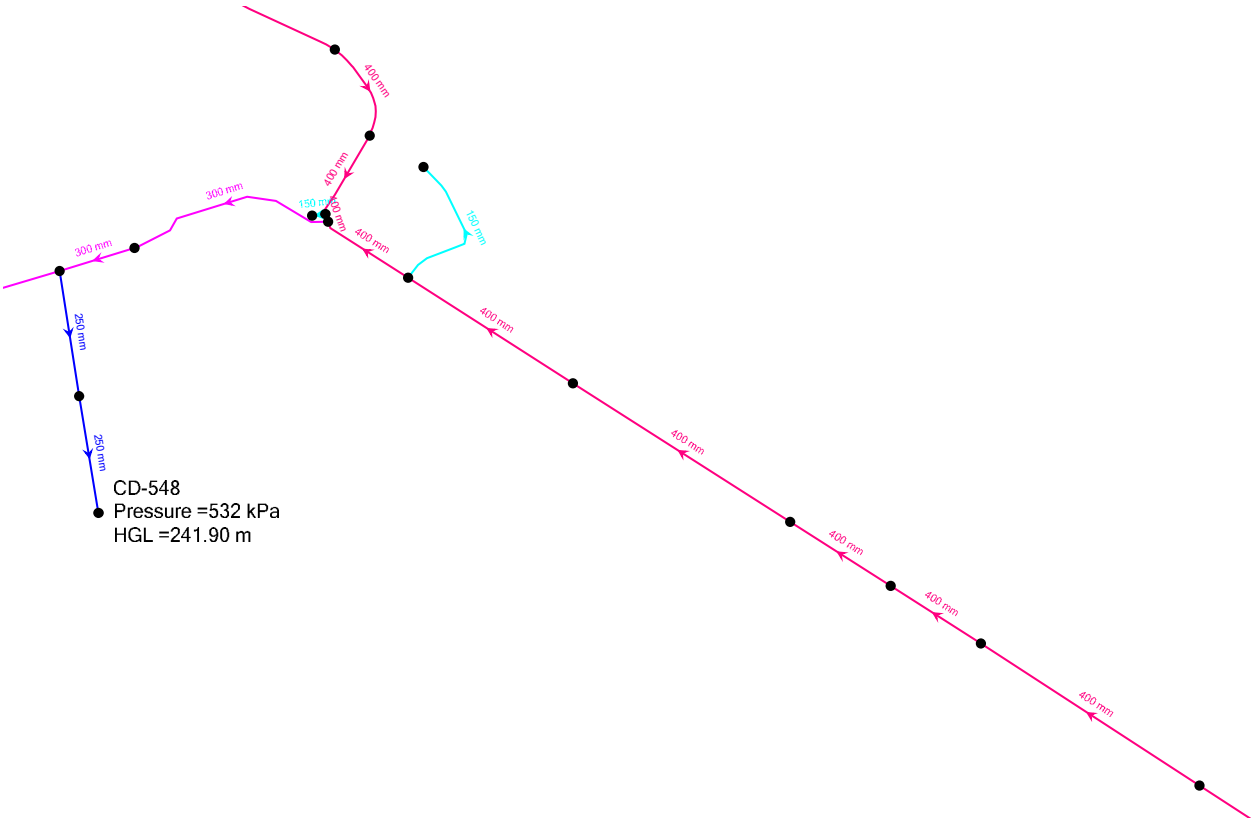
Town of The Blue Mountains
496857 Grey Road 2 Boundary Conditions
Maximum Day + Fire Flow (133 L/s)
Scenario 3



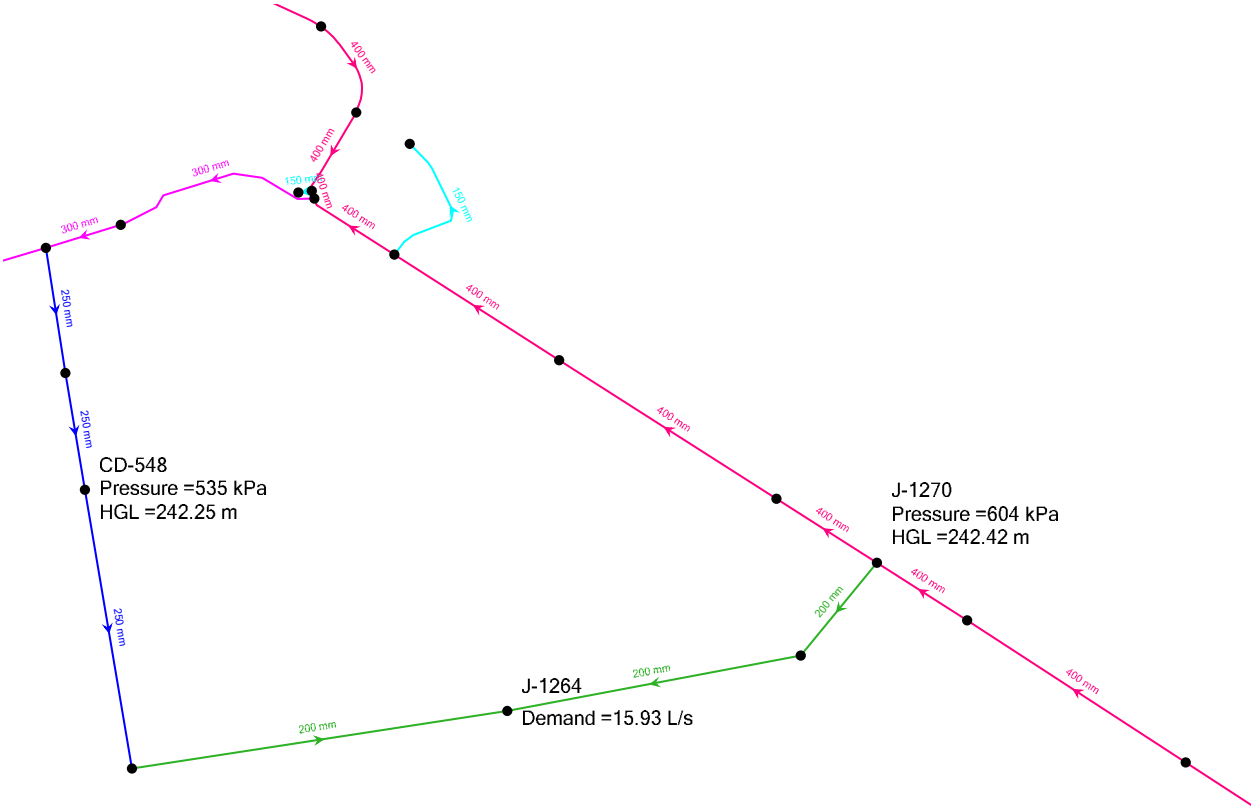
Town of The Blue Mountains
496857 Grey Road 2 Boundary Conditions
Peak Hour Demand
Scenario 1



Town of The Blue Mountains
496857 Grey Road 2 Boundary Conditions
Peak Hour Demand
Scenario 2



Town of The Blue Mountains
496857 Grey Road 2 Boundary Conditions
Peak Hour Demand
Scenario 3



TATHAM ENGINEERING

Watermain Head Loss & Pressure Calculations

Project Details

Hinds Brook Residential Development	123069

Municipality

Town of The Blue Mountains

Prepared By

AO	Sept. 10, 2024

Checked By

Friction Losses

Pipe Run From	Pipe Run To	Length (m)	Diameter (mm)	Friction Factor	Flow (m^3/s)	Cross Sectional Area (m^2)	Velocity (m/s)	Friction Losses (m)	Friction Losses (psi)	Friction Losses (kPa)
CD-548	Node 1	360	300	110	0.003	0.0707	0.04	0	0	0.0
							Total	**0**	**0**	**0**

Static Loss

Connection Point Road Centreline Elevation (m)	Node 1 Road Centreline Elevation (m)	Static Loss (m)	Static Loss (psi)	Static Loss (kPa)
187.43	193.80	6.37	9.1	62.5

Total Pressure

	(m)	(psi)	(kPa)
Pressure at Connection Point	55.86	79.5	548.0
Total Losses	6.37	9.1	62.5
Pressure at Analysis Point	**49.49**	**70.4**	**485.5**

Notes & References

1. Friction losses calculated using Hazen-Williams head loss equation $h_f=L(Q/(0.278xCxd^{2.63}))^{1.85}$
2. Analysis excludes minor losses.

TATHAM ENGINEERING

Watermain Head Loss & Pressure Calculations

Project Details

Hinds Brook Residential Development	123069

Municipality

Town of The Blue Mountains

Prepared By

AO	Sept. 10, 2024

Checked By

Friction Losses

Pipe Run From	Pipe Run To	Length (m)	Diameter (mm)	Friction Factor	Flow (m^3/s)	Cross Sectional Area (m^2)	Velocity (m/s)	Friction Losses (m)	Friction Losses (psi)	Friction Losses (kPa)
CD-548	Node 1	360	300	110	0.014	0.0707	0.2	0.08	0.1	0.8
							Total	**0.08**	**0.1**	**0.8**

Static Loss

Connection Point Road Centreline Elevation (m)	Node 1 Road Centreline Elevation (m)	Static Loss (m)	Static Loss (psi)	Static Loss (kPa)
187.43	193.80	6.37	9.1	62.5

Total Pressure

	(m)	(psi)	(kPa)
Pressure at Connection Point	54.23	77.2	532.0
Total Losses	6.45	9.2	63.3
Pressure at Analysis Point	**47.78**	**68.0**	**468.7**

Notes & References

1. Friction losses calculated using Hazen-Williams head loss equation $h_f=L(Q/(0.278xCxd^{2.63}))^{1.85}$
2. Analysis excludes minor losses.

TATHAM ENGINEERING

Watermain Head Loss & Pressure Calculations

Project Details

Hinds Brook Residential Development	123069

Municipality

Town of The Blue Mountains

Prepared By

AO	Sept. 10, 2024

Checked By

Friction Losses

Pipe Run From	Pipe Run To	Length (m)	Diameter (mm)	Friction Factor	Flow (m^3/s)	Cross Sectional Area (m^2)	Velocity (m/s)	Friction Losses (m)	(psi)	(kPa)
CD-548	Node 1	360	300	110	0.142	0.0707	2.01	6.08	8.6	59.6
Node 1	Node 2	50	250	110	0.142	0.0491	2.89	2.05	2.9	20.1
Node 2	Node 3	700	250	110	0.071	0.0491	1.45	7.97	11.3	78.2
							Total	**16.1**	**22.8**	**157.9**

Static Loss

Connection Point Road Centreline Elevation (m)	Node 3 Road Centreline Elevation (m)	Static Loss (m)	(psi)	(kPa)
187.43	184.00	-3.43	-4.9	-33.6

Total Pressure

	(m)	(psi)	(kPa)
Pressure at Connection Point	33.33	47.4	327.0
Total Losses	12.67	17.9	124.3
Pressure at Analysis Point	**20.66**	**29.5**	**202.7**

Notes & References

1. Friction losses calculated using Hazen-Williams head loss equation $h_f=L(Q/(0.278xCxd^{2.63}))^{1.85}$
2. Analysis excludes minor losses.
3. Flow for head losses of looped section have been halved to account for looping.

Appendix B:
Wastewater Calculations

TATHAM ENGINEERING

Wastewater Generation Calculations

Project Details

Hinds Brook Residential Development	123069

Municipality

Town of The Blue Mountains

Prepared By

AO	Sept 10, 2024

Checked By

Residential Flow

Unit Type	Single Family	Semi Detached	Townhouse	Apartment	Total
No. Units			376		376
Population Density (cap/unit)			2.15		-
Average Demand (L/day/cap)			350		-
Average Day Demand (m^3/day)	0.00	0.00	282.94	0.00	**282.94**

Commercial/Industrial/ Institutional Flow

Land Use	Commercial	Industrial	Institutional	Total
Area (ha)				0.00
Average Demand (m^3/day/ha)				-
Average Day Flow (m^3/day)	0.00	0.00	0.00	**0.00**

Peaking Factors

Land Use	Residential (Harmon)	Commercial	Industrial	Institutional
Peaking Factor	3.86			

Infiltration Flow

Serviced Area (ha)	Infiltration Flow (L/s/ha)	Infiltration Flow (L/s)
6.36	0.28	1.78

Total Design Flows

Average Day Flow (m^3/day)	**282.94**
Peak Flow (L/s)	**14.42**

References/Notes

Calculations completed in accordance with Town of The Blue Mountains Engineering Standards (May 29, 2023)

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

MEMO

Date: August 22, 2024

To: Mr. Brian Worsley
Manager of Development Engineering
Town of The Blue Mountains

From: Ivan Dzeparoski, P.Eng., Senior Water Resources Engineer

CC: Jane Wilson, P. Eng., Municipal Infrastructure and Planning Market Chief

Subject: 496857 Grey Road 2 – Wastwater System Capacity Review

JLR No.: 27550-027

INTRODUCTION

A new development of approximately 9 ha is proposed on a parcel, adjacent to 496857 Grey Road 2 within the municipal boundary of the Town of The Blue Mountains (the Town). From the provided background information, site servicing will be provided for 403 townhome units. The expected sanitary peak flow of 15.91 L/s was calculated by Tatham Engineering as part of the preliminary engineering for Hinds Brook development. The calculated peak flow consists of the dry weather base loading of 13.48 L/s, plus the estimated infiltration inflow of 2.43 L/s.

The Town wishes to assess if there is sufficient capacity in the sanitary sewer system downstream of the proposed development for the generated wastewater flows. The assessment undertaken incorporates the flows into the PCSWMM models of the sanitary sewer network developed by Civica Infrastructure Inc. (Civica) for the Town's ongoing Master Servicing Plan (MSP). The proposed development has not been included in the models developed for the MSP. The development flow will be added to an existing condition model using the existing population and existing sanitary sewer infrastructure.

The flow specified by the proponent will be added to the model under dry weather flow conditions (DWF) and wet weather flow (WWF) conditions. There are two alternative locations for the development to connect into the existing system and the assessment will compare the impacts of applying the flow at either of the two specified locations:

- Connection Point 1 (Model node 'WWSTR342') – an existing 450 mm diameter gravity sewer on the south side of Highway 26; and
- Connection Point 2 (Model node 'WWSTR336') – an existing 200 mm diameter sanitary stub near the intersection of Grey Road 2 and Highway 26 where the stub connects into an existing 250 mm diameter gravity sewer.

Note that the models are being used 'as-is' as received from Civica and review of the models should be undertaken in the MSP project.

MODEL RESULTS AND DISCUSSION

The following tables below provide a summary of the simulation results for the above-described scenarios and compare the results with the modeling results without the addition of sanitary peak flow of 15.91 L/s. The results are shown for the pipe sections downstream of the location where the additional wastewater flow was added to the system.

Table 1: Simulation Results of Existing Condition for Dry Weather Flow Condition – Gravity Sewer Capacity Downstream of Connection Point 1 ('WWSTR342')

Sewer Dia. (mm)	Slope (%)	MSP Peak Flows (L/s)	MSP Max/Full Flow (%)	with Peak Flows (L/s)	with Peak Flow Max/Full Flow (%)
450	0.37	28.52	11	44.42	18
450	0.13	28.32	19	44.41	30
450	0.10	28.32	22	44.35	34
450	0.08	28.18	25	44.23	39
450	0.11	28.32	20	45.03	32
450	0.28	50.55	23	64.47	29
450	0.23	63.57	32	69.9	35
450	0.24	94.99	47	94.57	47

The analysis of the pipe sections downstream of the Connection Point 1 ('WWSTR342') for DWF conditions shows that under the existing condition population scenario, sewer pipes have sufficient capacity to accept the flows from the proposed residential development. With the additional loading there is a reduction in residual capacity available in each sewer section, however the pipes remain operating under the free flow capacity condition.

In the absence of underside of footing (USF) information, the capacity of the sewer system during the WWF conditions was analyzed based on the available freeboard between the surface (ground) elevation and maximum simulated HGL elevations in manhole structures for the three simulated storm events. Based on typical industry assumptions, the minimum freeboard requirement of 1.8 m was used as a criterion in this analysis, which represents a typical basement connection elevation. The summary of the simulated HGL results downstream of Connection Point 1 ('WWSTR342') is presented in Table 2 below:

Table 2: Simulation Results of Existing Condition for Wet Weather Flow (1:10 year Event) Conditions – Maximum HGL Elevation in Manhole Structures Downstream of Connection Point 1 ('WWSTR342')

MH ID	MH Cover Elevation (m)	MSP Max HGL (m)	Freeboard to Surface Elevation (m)	with Peak Flow Max HGL (m)	Freeboard to Surface Elevation (m)
WWSTR342	179.89	174.97	4.92	175.00	4.89
12	179.38	174.66	4.72	174.69	4.69
11	180.37	174.51	5.86	174.55	5.82
10	180.63	174.42	6.21	174.46	6.17
9	180.34	174.32	6.02	174.36	5.98
WWSTR341	181.01	174.29	6.72	174.30	6.71
XXXX000196	182.24	174.29	7.95	174.30	7.94
XXXX000114	180.07	174.28	5.79	174.29	5.78

Table 3: Simulation Results of Existing Condition for Wet Weather Flow (1:25 year Event) Conditions – Maximum HGL Elevation in Manhole Structures Downstream of Connection Point 1 ('WWSTR342')

MH ID	MH Cover Elevation (m)	MSP Max HGL (m)	Freeboard to Surface Elevation (m)	with Peak Flow Max HGL (m)	Freeboard to Surface Elevation (m)
WWSTR342	179.89	174.98	4.91	175.00	4.89
12	179.38	174.67	4.71	174.70	4.68
11	180.37	174.52	5.85	174.56	5.81
10	180.63	174.43	6.20	174.47	6.16
9	180.34	174.33	6.01	174.37	5.97
WWSTR341	181.01	174.30	6.71	174.31	6.70
XXXX000196	182.24	174.30	7.94	174.30	7.94
XXXX000114	180.07	174.29	5.78	174.31	5.76

Table 4: Simulation Results of Existing Condition for Wet Weather Flow (1:100 year Event) Conditions – Maximum HGL Elevation in Manhole Structures Downstream of Connection Point 1 ('WWSTR342')

MH ID	MH Cover Elevation (m)	MSP Max HGL (m)	Freeboard to Surface Elevation (m)	with Peak Flow Max HGL (m)	Freeboard to Surface Elevation (m)
WWSTR342	179.89	174.99	4.90	175.01	4.88
12	179.38	174.68	4.70	174.71	4.67
11	180.37	174.54	5.83	174.57	5.80
10	180.63	174.45	6.18	174.48	6.15
9	180.34	174.35	5.99	174.37	5.97
WWSTR341	181.01	174.30	6.71	174.30	6.71
XXXX000196	182.24	174.30	7.94	174.30	7.94
XXXX000114	180.07	174.29	5.78	174.31	5.76

The results in the above tables show that the impact of the additional flow in the sewer is negligible when the maximum HGL elevations are compared. In the simulation a maximum increase of 40 mm was observed in the 1:10-year and 1:25-year storm events, while for the 1:100-year the maximum increase in HGL was 30 mm. Based on the minimum freeboard value of approximately 4.70 m, it can be considered that under WWF conditions the sewer reaches downstream of the WWSTR342 connection point do not have any capacity constraints with the proposed development in place.

Downstream of Connection Point 2 ('WWSTR336') the sewer sections do not receive any flows under the existing population scenario until the connection with a 450 mm pipe at the Highway 26 / Lake Shore Road intersection. At this location all the flow entering the Lakeshore pump station originates from areas east of the SPS. Refer to Table below for the summary of simulated flows.

Table 5: Simulation Results of Existing Condition for Dry Weather Flow Condition – Gravity Sewer Capacity Downstream of Connection Point 2 ('WWSTR336')

Sewer Dia. (mm)	Slope (%)	MSP, Peak Flows(L/s)	MSP, Max/Full Flow(%)	With Peak, Flows(L/s)	With Peak, Max/Full Flow(%)
250	0.27	0	0	13.48	30
250	0.32	0	0	13.48	28
250	0.25	0	0	13.48	31
250	0.22	0	0	13.48	34
250	0.16	0	0	13.48	39
250	2.60	0	0	13.48	10
250	0.99	0	0	13.48	16
450	0.28	35.46	16	44.94	20
450	0.23	51.56	26	55.79	28
450	0.24	86.98	43	94.80	47

The results of the analysis of the additional loading under DWF conditions shows that the pipe sections downstream of 'WWSTR336' have sufficient capacity to accept the increase in flows from the proposed residential development. The impact on the residual capacity of the 450 mm diameter sewer leading into Lakeshore pump station is limited and residual capacity remains above 50% of the pipe capacity.

As per the connection point 'WWSTR342', the analysis of WWF conditions downstream of the manhole structure 'WWSTR336' was carried out based on the change in HGL and available freeboard in manhole structures. The summary of the analysis is presented in Table 6 below:

Table 6: Simulation Results of Existing Condition for Wet Weather Flow (1:10 year Event) Conditions– Maximum HGL Elevation in Manhole Structures Downstream of Connection Point 2 ('WWSTR336')

MH ID	MH Cover Elevation (m)	MSP Max HGL (m)	Freeboard to Surface Elevation (m)	with Peak Flow Max HGL (m)	Freeboard to Surface Elevation (m)
WWSTR336	184.405	181.00	3.41	181.10	3.31
MH_2	182.740	180.62	2.12	180.72	2.02
WWSTR338	183.592	180.32	3.27	180.43	3.16
WWSTR337	183.382	180.14	3.24	180.25	3.13
MH_5	183.430	179.90	3.53	180.02	3.41
WWSTR340	180.954	179.65	1.30	179.71	1.24

MH ID	MH Cover Elevation (m)	MSP Max HGL (m)	Freeboard to Surface Elevation (m)	with Peak Flow Max HGL (m)	Freeboard to Surface Elevation (m)
WWSTR339	181.443	177.37	4.07	177.44	4.00
WWSTR341	181.010	174.29	6.72	174.30	6.71
XXXX000196	182.239	174.29	7.95	174.30	7.94
XXXX000114	180.072	174.28	5.79	174.29	5.78

Table 7: Simulation Results of Existing Condition for Wet Weather Flow (1:25 year Event) Conditions– Maximum HGL Elevation in Manhole Structures Downstream of Connection Point 2 ('WWSTR336')

MH ID	MH Cover Elevation (m)	MSP Max HGL (m)	Freeboard to Surface Elevation (m)	with Peak Flow Max HGL (m)	Freeboard to Surface Elevation (m)
WWSTR336	184.405	181.00	3.41	181.10	3.31
MH_2	182.740	180.62	2.12	180.72	2.02
WWSTR338	183.592	180.32	3.27	180.43	3.16
WWSTR337	183.382	180.14	3.24	180.25	3.13
MH_5	183.430	179.90	3.53	180.02	3.41
WWSTR340	180.954	179.65	1.30	179.71	1.24
WWSTR339	181.443	177.37	4.07	177.44	4.00
WWSTR341	181.010	174.30	6.71	174.31	6.70
XXXX000196	182.239	174.30	7.94	174.30	7.94
XXXX000114	180.072	174.29	5.78	174.31	5.76

Table 8: Simulation Results of Existing Condition for Wet Weather Flow (1:100 year Event) Conditions– Maximum HGL Elevation in Manhole Structures Downstream of Connection Point 2 ('WWSTR336')

MH ID	MH Cover Elevation (m)	MSP Max HGL (m)	Freeboard to Surface Elevation (m)	with Peak Flow Max HGL (m)	Freeboard to Surface Elevation (m)
WWSTR336	184.405	181.00	3.41	181.10	3.31
MH_2	182.740	180.62	2.12	180.72	2.02
WWSTR338	183.592	180.32	3.27	180.43	3.16
WWSTR337	183.382	180.14	3.24	180.25	3.13
MH_5	183.430	179.90	3.53	180.02	3.41
WWSTR340	180.954	179.65	1.30	179.71	1.24
WWSTR339	181.443	177.37	4.07	177.44	4.00
WWSTR341	181.010	174.30	6.71	174.31	6.70
XXXX000196	182.239	174.30	7.94	174.30	7.94
XXXX000114	180.072	174.29	5.78	174.31	5.76

Based on the simulation results, the additional flow in the sewer has negligible impact on HGL elevations. The maximum increase in HGL elevation of 120 mm was observed in all events at manhole structure MH_5, which reduces the available freeboard from 3.5 m to 3.4 m with additional peak flow in the system. The critical manhole along this reach is 'WWSTR340' where the available freeboard reduces from 1.3 m to 1.2 m, however at this location the sanitary sewer is shallow with manhole depth of 1.3 m and typically would already be above basement elevations, if present.

However, it should be noted that once the review of the sanitary sewer model is completed as part of the MSP process, the capacity analysis of the sanitary sewer under a future condition scenario should be undertaken to confirm the capacity of the sewer system downstream of the proposed connection points.

In addition to the above analysis, the new sanitary peak flows entering the Lakeshore sanitary pump station (SPS) were compared to its rated and firm capacity. The Table 9 below provides summary comparison of the SPS rated capacity and the approached increase sanitary peak flow.

Table 9: Sanitary Peak Flows and Rated Capacity of Lakeshore SPS

Scenario	Sanitary Peak Flow MSP 1:10-year Inflows (L/s)[1]	Sanitary Peak Flow MSP 1:25-year Inflows (L/s)[1]	Sanitary Peak Flow MSP 1:100-year Inflows (L/s)[1]	Sanitary Peak Flow with New Development 1:10-year Inflows (L/s)	Sanitary Peak Flow with New Development 1:25-year Inflows (L/s)	Sanitary Peak Flow with New Development 1:100-year Inflows (L/s)	Lakeshore SPS Rated Capacity	Lakeshore SPS Firm Capacity (L/s)
Existing Condition	95.0	98.2	94.3	94.6	112.9	111.6	164	82

Note 1: The MSP flows received from Civica Infrastructure Inc.

Based on the simulation results presented in the above table, the flows entering the Lakeshore sanitary pump station under the existing condition are above the pump station firm capacity of 82 L/s. Since the pump station is already operating beyond capacity the increase in loading due to the proposed development will have minimal impact however actions to upgrade the pump stations should be considered as part of the MSP process.

J.L. RICHARDS & ASSOCIATES LIMITED

Prepared by:

Ivan Dzeparoski, P. Eng
Senior Water Resources Engineer

Reviewed by:

Bobby Pettigrew, P. Eng
Associate, Senior Water Resources Engineer
Water Resources Practice Lead