TATHAM ENGINEERING

Enhancing our communities

Lora Greens

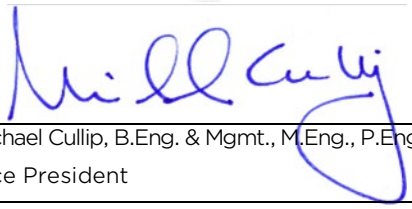
FUNCTIONAL SERVICING REPORT

1290337 Ontario Inc. & 10 Keith Avenue Inc.

File 121172 | November 24, 2022

Document Control

File:	Prepared by:	Prepared for:
121172	**Tatham Engineering Limited** 115 Sandford Fleming Drive, Suite 200 Collingwood, Ontario L9Y 5A6	**1290337 Ontario Inc. & 10 Keith Avenue Inc.** 10 Keith Avenue Collingwood, Ontario L9Y 0W5
Date: **November 24, 2022**	**T** 705-444-2565 **tathameng.com**	

Authored by:	Reviewed by:
	 
John Birchard, B.E.Sc., EIT. Engineering Intern	Michael Cullip, B.Eng. & Mgmt., M.Eng., P.Eng. Vice President

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	November 24, 2022	Final report

Document Contents

Tables

Figures

Appendices

1 Introduction

Tatham Engineering Limited was retained by 1290337 Ontario Inc. and 10 Keith Avenue Inc. to address servicing strategies associated with the proposed residential development legally described as Part of Lots 35 and 36, Concession 10, Town of The Blue Mountains (formerly Township of Collingwood). The location of the development site is illustrated in Figure 1.

1.1 STUDY PURPOSE

The purpose of this study is to address the servicing requirements of the Town of The Blue Mountains and Grey County with respect to the following:

- sanitary servicing;
- water supply for domestic use;
- stormwater drainage and management;
- safe vehicular access to the site; and
- utilities common to support a residential development (phone, hydro, cable, TV, gas, etc.).

Several other reports as well as engineering drawings have been prepared in conjunction with this report in support of the proposed residential development and are summarized below:

- *Preliminary Stormwater Management Report*, prepared by Tatham Engineering Limited (September 14, 2022);
- *Traffic Impact Study*, prepared by Tatham Engineering Limited (August 29, 2022);
- *Draft Hydrogeological Assessment Report – Highway 26 and 10th Line, Town of The Blue Mountains, ON, prepared by Cambium Inc. (August 15, 2022);* and
- *Draft Geotechnical Investigation Report – Highway 26 & 10th Line, The Blue Mountains, Ontario*, prepared by Cambium Inc. (March 4, 2022).

1.2 REPORT STRUCTURE

The report is structured as follows:

- Chapter 1: introduction and study purpose;
- Chapter 2: proposed Lora Greens development and existing site conditions;
- Chapter 3: water supply and distribution;
- Chapter 4: sanitary sewer collection system;

- Chapter 5: highlights and summary of the stormwater management plan;
- Chapter 6: highlights and summary of the traffic study;
- Chapter 7: servicing of common utilities; and
- Chapter 8: overall summary.

2 Lora Greens Development

2.1 SITE LOCATION

The proposed Lora Greens residential development site is located on the north side of Highway 26, east of 10th Line, in the Town of The Blue Mountains (refer to Figure 1). It is bordered by Peel Street North to the east, the Georgian Trail to the north, Highway 26 to the south and 10th Line to the west. The legal description of the site refers to Part Lot 35-36, Concession 10, Town of The Blue Mountains (formerly the Township of Collingwood), in the County of Grey.

2.2 SITE CONDITIONS

The development site consists of approximately 7.1 ha of undeveloped land, which historically has been used for agricultural activities; the surrounding area has been used as a mix of residential, agricultural and recreational activities. The former Old Meaford Road divides the site into an approximately 6.1 ha area in the west and an approximately 1.0 ha area in the east. The western 6.1 ha area is zoned for Development (D) with an existing channel passing through it zoned Hazard (H). The eastern 1.0 ha area is zoned (H) Hazard.

Existing site topography, ground cover, land use and drainage patterns were established through site visitation, interpretation of topographic maps, aerial photography and a site survey. The development site generally slopes from north to south with approximately 4 metres of fall across the property. Stormwater runoff from the site is conveyed as overland flow to an existing channel running from west to east immediately north of Highway 26, this channel is a tributary of Little Beaver Creek within Grey Sauble Conservation Authority (GSCA) jurisdiction, eventually flowing into Georgian Bay.

Ontario Soil Survey Report No. 17 (Grey County North) defines the site to be Brighton sand (Brs).

2.3 LAND USE

The western 6.1 ha area is to be developed, whereas the eastern 1.0 ha area will remain undeveloped as it is zoned Hazard. The proposed development, as shown on the Overall Site Plan (Figure 2), consists of 38 lots for single-detached residential dwellings. The proposed lots will have a minimum lot depth of 29.2 metres and a minimum frontage of 21.4 metres. The channel passing through the western parcel will be relocated to a 30 metre wide floodway channel along the south border of the parcel to allow for development. A stormwater management wet pond will be located at the eastern extent of the 6.1 ha area within a separate block.

2.4 ACCESS & INTERNAL CIRCULATION

The proposed development will be accessed by a road connection to the 10th Line. The road will be constructed to an urban road cross-section in accordance with Town standards, within a 20 metre right-of-way (Figure 4). The road will be approximately 465 metres in length and will terminate at the east end with an offset cul-de-sac. A secondary access restricted to emergency use only is proposed from Peel Street via the Georgian Trail and along the south side of the stormwater management pond to the end of the cul-de-sac. To facilitate this, the Georgian Trail will be increased in width to a minimum of 6 metres where the access is proposed, with gates installed at each end to restrict vehicular access to emergency use only.

3 Water Servicing

3.1 EXISTING WATER DISTRIBUTION SYSTEM

The proposed development will be serviced by the Town's water distribution system. The development is in Pressure Zone 1, between Highway 26 to the south and the Georgian Trail to the north, and immediately east of the 10th Line. The nearest municipal watermain is a 300 mm diameter pipe on High Bluff Lane that extends from Peel Street to the 10th Line, where it feeds into the 10th Line Booster Pumping Station in Pressure Zone 2.

3.2 PROPOSED WATER SERVICING

To service the site, a 200 mm diameter municipal watermain will be installed along the proposed Street A. It will cross the Georgian Trail and connect to the 10th Line watermain to the west, and to the High Bluff Lane watermain to the east through Block 50 of Plan 16M-48, creating a watermain loop. The proposed water distribution plan is shown on Figure 2.

As an alternative to the proposed connection at High Bluff Lane, it would also be possible to extend the new watermain along the Georgian Trail to connect to the 300 mm diameter watermain on Peel Street, also creating a watermain loop.

The proposed single detached lots will be serviced with 25 mm diameter service connections.

3.3 WATER DEMANDS ASSESSMENT

3.3.1 Water Demands

Domestic Use

Water demands for domestic use for the proposed development were calculated based on Town design standards as noted in Table 1.

Table 1: Water Demand Design Criteria

DESIGN CRITERIA	DESIGN VALUE
Residential Occupancy	2.3 persons/unit
Average water consumption	450 L/person/day
Maximum daily demand factor	2.0
Peak hourly demand factor	4.5

The resulting water demands for 38 single detached units are calculated as follows (corresponding calculations are within Appendix B):

Design Population (P)	= 38 units x 2.3 persons per unit = 87 persons
Average Day Demand (ADD)	= 87 persons x 450 L/p/day = 39,150 L/day = 39.15 m^3/day (0.45 L/s)
Maximum Day Demand (MDD)	= ADD x Maximum day factor = 39.15 m^3/day x 2.0 = 78.3 m^3/day (0.9 L/s)
Peak Hour Demand	= ADD x Peak hour factor = 39.15 m^3/day x 4.5 = 176.2 m^3/day (2.0 L/s)

Fire Flows

The minimum required fire flow for the single detached homes has been estimated to be 100 L/s, based on the *Fire Underwriter's Survey (FUS) Guideline, Water Supply for Public Fire Protection* (1999) and as detailed in Appendix B. These calculations will be revised, if required, during the detailed design stage of the project based on the final building designs.

3.3.2 Water Supply Capacity

The total Town water supply capacity is 16,390 m^3/day as per the Town's *2021 Year End Water & Wastewater Capacity Assessment* staff report. This capacity is equivalent to 16,439 units based on the five-year rolling average MDD of 0.997 m^3/unit/day. Of the total system capacity:

- a total demand of 10,494 m^3/day (10,526 units) is currently connected or allocated; and
- a further demand of 2,582 m^3/day (2,590 units) is reserved for approved development or existing un-serviced development.

In consideration of the above, there remains 3,314 m^3/day of available supply capacity, equivalent to 3,324 units. This residual capacity exceeds the calculated Maximum Day Demand (MDD) of 78.3 m^3/day for the 38 units of Lora Greens.

3.3.3 Pumping & Storage

Water to the Lora Greens development will be supplied by the Thornbury WTP, the Victoria Street Water Tower and the Thornbury Reservoir and Booster Pumping Station. As per the

October 2021 *West Side Water Storage and Pumping Class EA*, no storage and pumping capacity upgrades are required to service Pressure Zone 1 at build out. Therefore, it is assumed that the existing system storage and pumping capacity are adequate to service the Lora Greens development.

3.3.4 Water Pressures

Acceptable pressure ranges for different demand scenarios based on Town design standards are presented in Table 2 and hydraulic boundary conditions generated from the Town's water model are presented in Table 3, along with representative pressures for Lora Greens calculated based on elevation. The model results and hydraulic calculations are included in Appendix B for both watermain configurations considered. Table 3 also presents the model results and calculated pressures for the alternative watermain connection to High Bluff Lane. As noted, the water system pressures are expected to be within the acceptable ranges under all demand scenarios.

Table 2: Water Pressure Design Criteria

DEMAND SCENARIO	ACCEPTABLE PRESSURE RANGE	
	kPa	psi
Average and Maximum Day	350 to 550	50 to 80
Minimum and Peak Hour	275 to 700	40 to 100
Maximum Day plus Fire Flow	140 to 700	20 to 100

Table 3: Estimated Water Pressures for Lora Greens

DEMAND SCENARIO	MODEL BOUNDARY CONDITIONS				LORA GREENS (elev. 199.00 m)
	10th Line (elev. 199.90 m)		High Bluff Lane (elev. 197.03 m)		
	Pressure (kPa)	HGL (m)	Pressure (kPa)	HGL (m)	Pressure (kPa)
ADD	437	244.58	465	244.58	447
MDD + 100 L/s FF	272	227.70	335	231.27	281
PHD	431	243.92	459	243.92	440

4 Sanitary Servicing

4.1 EXISTING SANITARY COLLECTION SYSTEM

An existing 450 mm diameter sanitary sewer runs under High Bluff Lane, flowing west to east. The sanitary sewer continues south on Peel Street North and east along Highway 26, with an ultimate discharge location of the Thornbury Wastewater Treatment Plant (WWTP).

4.2 PROPOSED SANITARY SERVICING

Sanitary discharge will be received from individual units via a 200 mm diameter sanitary sewer on Street A draining from west to east, through the stormwater management block, southwest along the Georgian Trail, and connecting to the existing 450 mm sanitary sewer on Peel St. This requires a total length of 915 metres of new 200 mm diameter sanitary sewer. An additional maintenance structure will be required to tie into the existing sanitary sewer between Sanitary Maintenance holes 13A and 14A on Peel Street. The connection point to the trunk sewer was investigated and it was confirmed that the existing sanitary sewer is at sufficient depth for a sanitary service connection to the proposed buildings.

The proposed sanitary sewer system can be seen on the Sanitary Servicing Plan (Figure 3).

4.3 SANITARY DEMANDS ASSESSMENT

4.3.1 Sewage Demands

Water demands for domestic use for the proposed development were calculated based on Town design standards as noted in Table 1. Sanitary demand design criteria are presented in Table 4.

Table 4: Sanitary Demand Design Criteria

DESIGN CRITERIA	DESIGN VALUE
Residential Occupancy	2.3 persons/unit
Average day demand per person	450 L/p/day
Maximum day factor	2.0
Peak hour factor	4.5
Infiltration	0.23 L/s

The resulting sanitary demands for the 38 single detached units at Lora Greens are detailed below. With respect to infiltration, consideration has been given to the east and west portion of the site including the former Old Meaford Road (total area of 7.5 ha).

Design Population (P)	= 2.3 persons/unit x 38 units
	= 87 persons
Infiltration (I)	= Infiltration Flow x Site Area
	= 0.23 L/ha/s x 7.5 ha
	= 1.73 L/s
	= 149,040 L/day (149.0 m^3/day)
Average day flow (ADF)	= P x Average daily demand per person + I
	= 87 persons x 450 L/day + 149,040 L/day
	= 39,150 L/day + 149,040 L/day
	= 188,190 L/day (188.2 m^3/day)
	= 2.18 L/s
Maximum Day Flow	= (ADF-I) x PF + I
	= (188.2 m^3/day – 149.0 m^3/day) x 4.5 + 149.0 m^3/day
	= 325.2 m^3/day (325,215 L/day)
	= 3.8 L/s

4.3.2 Sewage Capacity

The total firm-built capacity at the Thornbury Wastewater Treatment Plant (WWTP) is 3,580 m^3/day or 3,687 units based on the historical five-year rolling average of 0.971 m^3/day as per the Town's *2021 Year End Water & Wastewater Capacity Assessment* staff report. Of the total system capacity:

- a total of 3,511 units (3,409 m^3/day) are allocated to the Thornbury WWTP (of which only 3,130 units are currently connected); and
- 231 units (224 m^3/day) are reserved.

It is noted that the Thornbury WWTP's five-year rolling Average Daily Flow (ADF) is 2,779 m^3/day which corresponds to 78% utilization of the current built capacity.

In 2017, the Town completed an Addendum to the 2006 Class Environmental Assessment (Class EA) for the Thornbury WWTP. Upon completion of the Class EA, the Town applied for and acquired an Environmental Compliance Approval (ECA) for the construction of Phase 1A of the Thornbury WWTP upgrades, which when completed will increase the average daily flow capacity of the WWTP to 5,330 m^3/day. Phase 1B of the upgrade will increase the average daily flow capacity in the Thornbury WWTP to 7,080 m^3/day and a peak daily flow capacity of 16,187 m^3/day. The Town has decided to proceed with Phase 1B expansion immediately after the completion of Phase 1A (the Construction of the proposed works portion of the new ECA expires October 1, 2023).

As the Town can reserve units based on the Phase 1A design expansion of 5,330 m^3/day, the Thornbury WWTP has a remaining total reservation of 1,752 units (1,701 m^3/day). This reservation capacity exceeds the proposed 38 units for Lora Greens.

5 Stormwater Management Plan

A *Preliminary Stormwater Management (SWM) Report* has been completed by Tatham Engineering Limited under separate cover, the intent of which was to review the existing and proposed stormwater conditions for the proposed Lora Greens subdivision as well as the surrounding area. The SWM report should be read in conjunction with this report, the study findings and conclusions are summarized below.

5.1 STORMWATER MANAGEMENT PLAN

The proposed stormwater management plan maintains existing drainage conditions at the existing site outlets by restricting post development peak flow rates to pre-development levels. The stormwater management plan provides the required Level 1 “Enhanced” water quality control for the site effluent at all site outlets. Safe conveyance of the Regulatory storm event peak flows through the site to the downstream drainage system is provided within the proposed drainage design (Figure 5).

5.2 STORMWATER MANAGEMENT FACILITY

The report concludes that an extended detention wet pond can provide both the necessary stormwater quantity and quality controls. The wet pond will provide the requisite Level 1 “Enhanced” protection and will discharge to the Little Beaver Creek Tributary.

5.3 NATURAL EROSION HAZARD LIMIT

A natural hazards analysis was conducted to relocate the existing watercourse passing through the project site to a 30 metre corridor along the southern border of the site.

5.4 SILTATION & EROSION CONTROL

Construction and maintenance of siltation and erosion control facilities and adherence to strict housekeeping measures during site servicing and building construction will reduce the transportation of sediment from the site, improving stormwater quality and mitigating environmental impacts during construction.

6 Traffic Impact Study

A Traffic Impact Study has been prepared by Tatham Engineering Limited under separate cover to address the traffic and transportation issues related to the Lora Greens development from the perspectives of external and internal road systems. The traffic study should be read in conjunction with this report, the study findings and conclusions are summarized below.

6.1 SITE TRAFFIC

Upon the completion, the 38-unit development is expected to generate 27 trips during the AM peak hour and 36 trips during the PM peak hour (total of inbound and outbound trips).

6.2 TRAFFIC ASSESSMENT

In addressing the study area traffic operations, the intersection of Highway 26 with Grey Road 113/10th Line was analysed under existing (2022) and future (2026, 2031 and 2036) horizon periods. The review included an assessment of intersection operations and a review of exclusive turn lane requirements. Based on the assessment of existing, background (without consideration for Lora Greens) and total conditions (with consideration for Lora Greens), the following improvements are recommended:

- 2031 Background Conditions (without Lora Greens)
    - install traffic signals to serve the Grey Road 113/10th Line intersection with Highway 26 (poor operations are projected under 2031 background conditions and thus the signals should be in place prior to 2031)
- 2031 Total Conditions
    - no further requirements beyond those required under 2026 background conditions
- 2036 Background & Total Conditions
    - no further requirements

As noted above, the traffic signals are required to service the future background traffic volumes (ie. without Lora Greens) and thus are not otherwise associated with, or the result of, the Lora Greens development (in that they would be required regardless).

No turn lanes are required on 10th Line at the site access given the minimal volumes on both roads.

While it is noted that traffic volumes on Highway 26 will reach close to the assumed planning capacity of 900 vehicles per hour per lane during the 2036 PM peak hour in the westbound

direction, such is not considered problematic in that acceptable operations will otherwise be provided through the study area intersections, which are considered the limiting factors in road capacity.

6.3 SIGHT LINE ASSESSMENT

The available sight lines along Highway 26 at Grey Road 113/10th Line and along 10th Line at the proposed site access are considered adequate to support the development.

7 Utilities

7.1 ELECTRICAL DISTRIBUTION

Hydro One was contacted to determine the availability of hydro services to the development area. Confirmation that the current system has capacity for the proposed units is still required.

7.2 GAS DISTRIBUTION

Enbridge Gas has confirmed that there is a natural gas distribution main along High Bluff Lane and Peet Street North which has adequate capacity and can be appropriately extended to service the proposed Lora Greens development. Confirmation of available capacity will have to be reconfirmed when the development is to proceed.

7.3 TELEPHONE & INTERNET

Bell Canada has confirmed they have a distribution system in the vicinity of the proposed Lora Greens subdivision and their intention to service the development site.

Rogers has infrastructure to the north of the proposed development along High Bluff Lane, to the east along Peel Street North to Highway 26, and to the south along Highway 26. Rogers has confirmed they will be able to extend this infrastructure to provide services to the proposed Lora Greens subdivision.

7.4 MAIL DELIVERY

Canada Post has reviewed the proposal for the Lora Greens development and has determined the site will be serviced by centralized mail delivery provided through Canada Post Community Mailboxes.

7.5 WASTE COLLECTION

The proposed development will provide for municipal waste collection.

8 Summary

Based on the preceding analysis, the development has adequate services available to support the draft plan of subdivision, for the proposed 38 units. Specifically, the proposed servicing includes:

1. an internal sanitary sewer collection system to convey sewage to the existing trunk sewer on Peel Street North and ultimately to the Thornbury Sewage Treatment Plant;
2. an internal water distribution system to supply the needs of the development without the need for external improvements;
3. an internal drainage system to convey surface water runoff to the proposed stormwater management facility that will provide the requisite stormwater quantity and quality controls for the development; and
4. electrical, telephone, cable and gas utilities.

Detailed design drawings will be completed for both internal services and the 10th Line access, for approval by the Town, County and relevant approval agencies as required in support of draft plan approval and registration of the associated Subdivision Agreement.

KEY PLAN

HIGH BLUFF LANE

GEORGIAN TRAIL

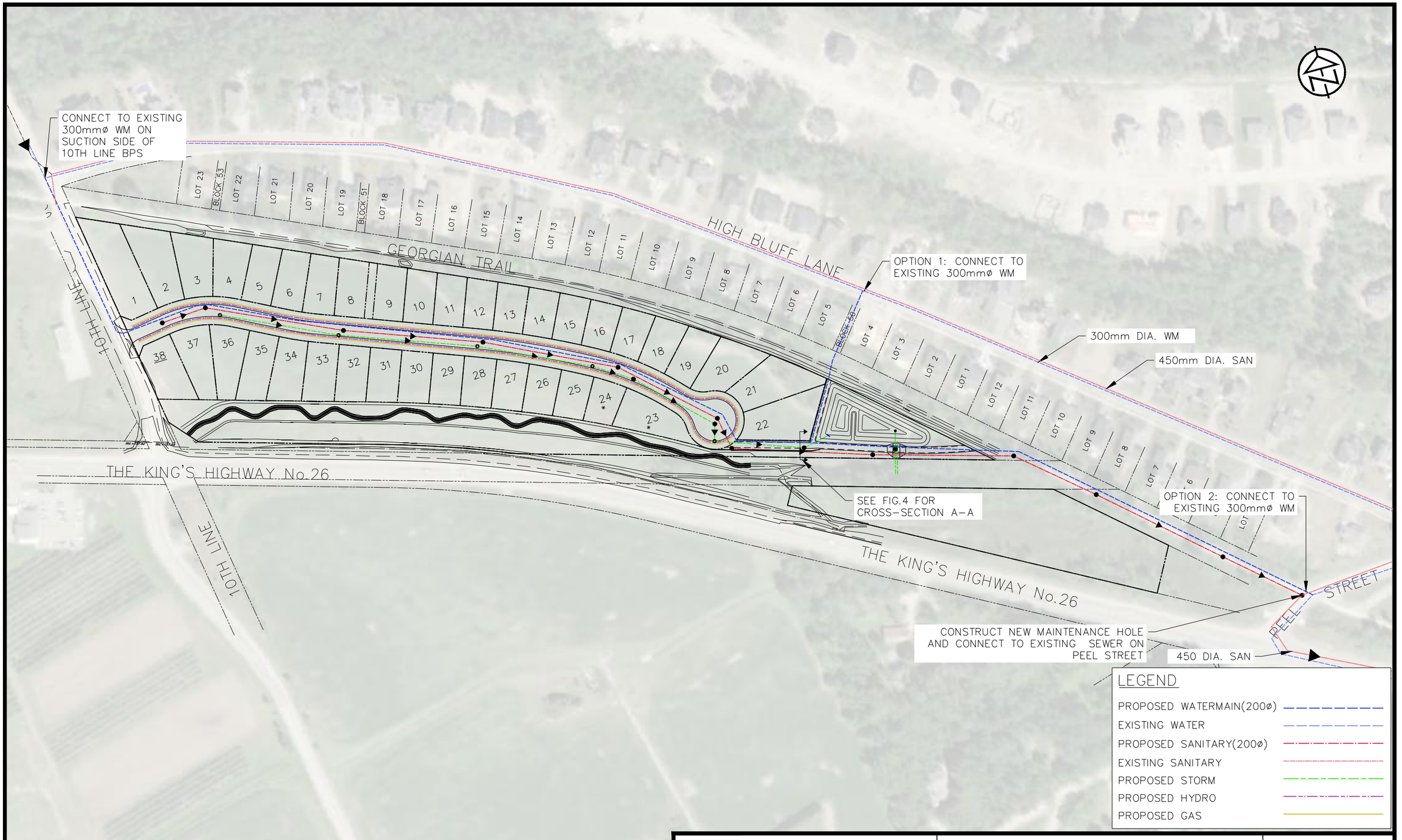
STREET A

10TH LINE

THE KING'S HIGHWAY No.26

TATHAM ENGINEERING	**LORA GREENS** **TOWN OF THE BLUE MOUNTAINS** **SITE LOCATION PLAN**		DWG. No. **FIG. 1**
	SCALE: 1:2000	DRAWN: KH	DATE: JUN 2022	JOB NO. 121172

Drawing Name: 121172-SP01.dwg, Plotted: Sep 13, 2022



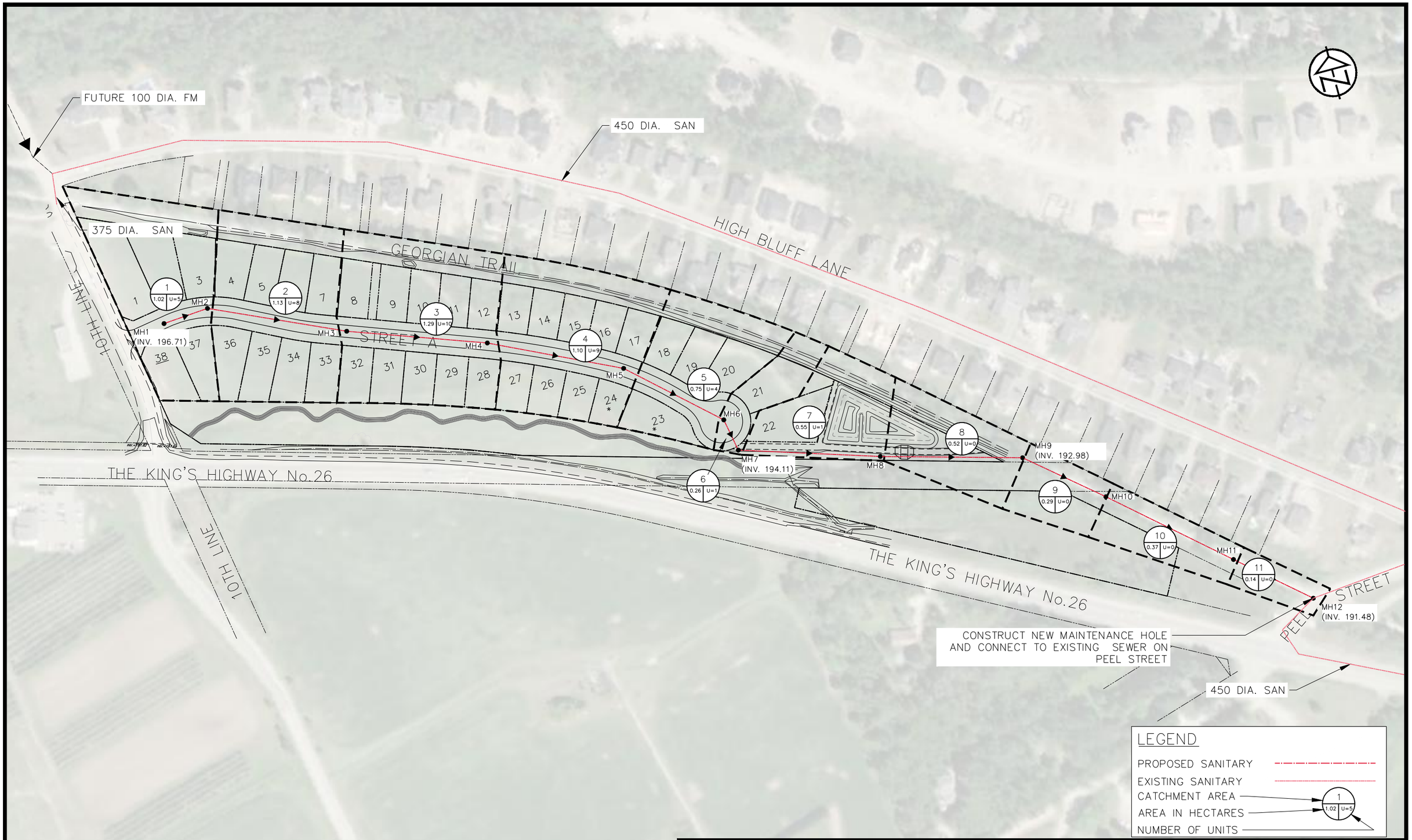
TATHAM ENGINEERING

LORA GREENS
TOWN OF THE BLUE MOUNTAINS
SITE SERVICING PLAN

DWG. No. **FIG. 2**

SCALE: 1:2500	DRAWN: KH	DATE: JUN 2022	JOB NO. 121172

Drawing Name: 121172-SS01.dwg, Plotted: Nov 29, 2022



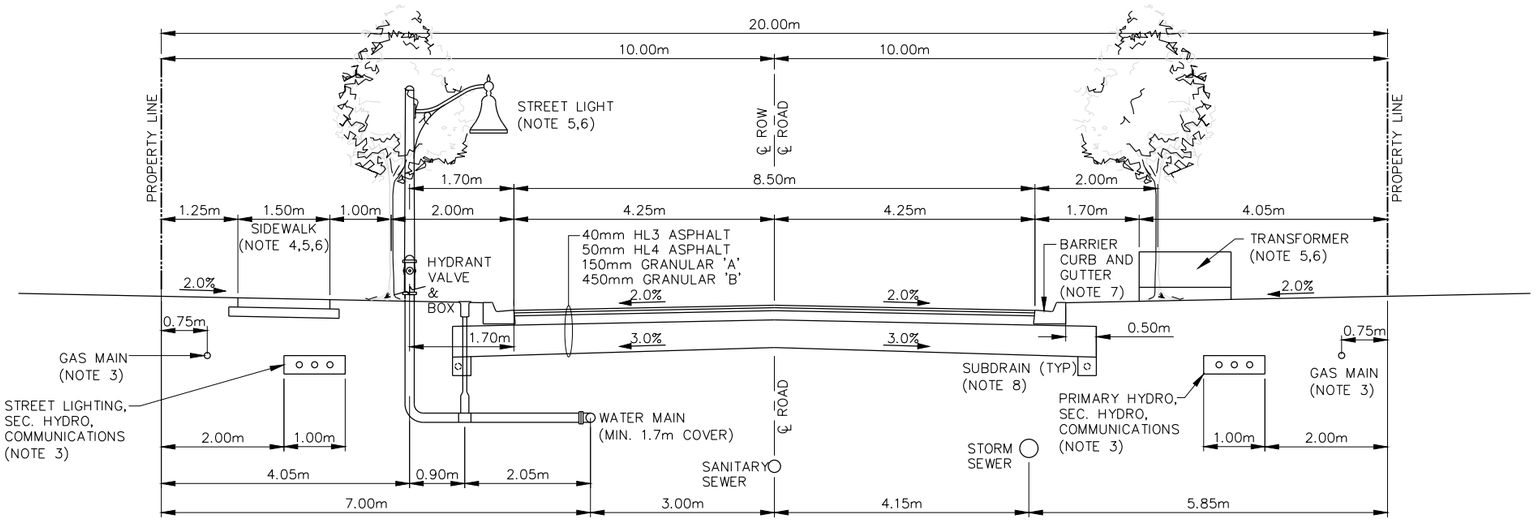
TATHAM ENGINEERING

LORA GREENS
TOWN OF THE BLUE MOUNTAINS
SANITARY SERVICING PLAN

DWG. No. **FIG. 3**

SCALE: 1:2500	DRAWN: KH	DATE: JUN 2022	JOB NO. 121172

Drawing Name: 121172-SAN01.dwg, Plotted: Nov 29, 2022

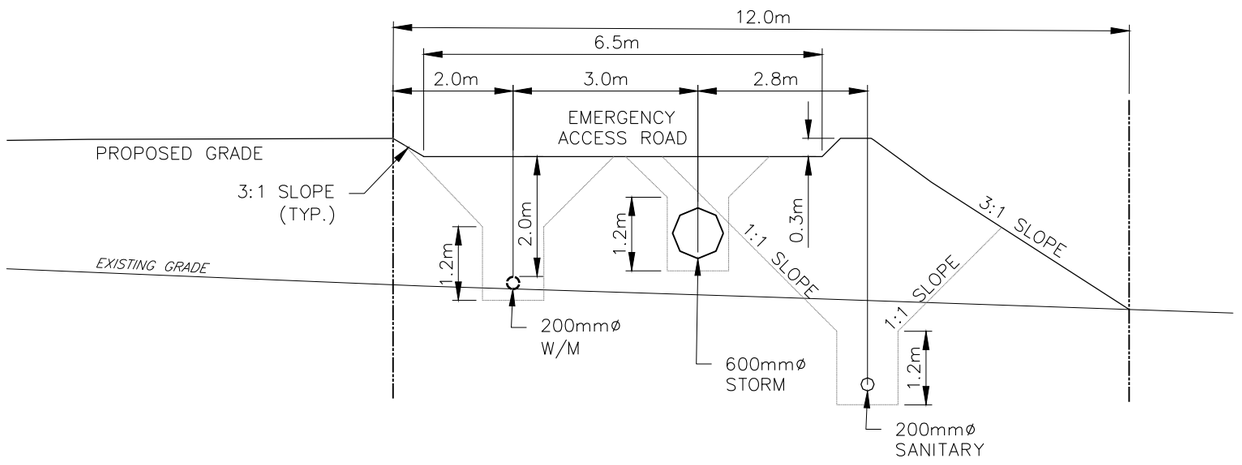


20m ROW – TYPICAL URBAN CROSS-SECTION

NTS

NOTES

1. TOPSOIL TO BE REMOVED TO ITS FULL DEPTH ALONG ENTIRE WIDTH OF ROAD ALLOWANCE BY CONTRACTOR.
2. BOULEVARD – 300mm TOPSOIL AND SOD.
3. DEPTH FOR ALL UTILITIES 0.9m MIN.
4. SIDEWALKS TO OPSD 310.010, COMPLETE WITH 150mm GRANULAR 'A' BASE.
5. SIDEWALK, STREET LIGHTS AND TRANSFORMERS ONE SIDE ONLY.
6. SIDEWALK AND STREET LIGHTS TO BE ON SAME SIDE OF ROAD AND TRANSFORMER TO BE ON OPPOSITE SIDE.
7. CONCRETE BARRIER CURB AND GUTTER TO OPSD 600.070 (TYP)
8. SUBDRAINS TO OUTLET TO CATCH BASINS AS PER OPSD 216.021.



SECTION A–A

TATHAM ENGINEERING

LORA GREENS

TOWN OF THE BLUE MOUNTAINS

DETAILS AND SECTIONS

DWG. No. **FIG. 4**

SCALE: 1:100 | DRAWN: KH | DATE: JUN 2022 | JOB NO. 121172

Drawing Name: 121172–DE01.dwg, Plotted: Sep 13, 2022

TATHAM ENGINEERING

LORA GREENS

TOWN OF THE BLUE MOUNTAINS
STORM SERVICING PLAN

DWG. No. **FIG. 5**

SCALE: 1:2000	DRAWN: KH	DATE: JUN 2022	JOB NO. 121172

Drawing Name: 121172-STM01.dwg, Plotted: Nov 25, 2022

Appendix A:
Sanitary Servicing

TATHAM ENGINEERING

Sanitary Sewer Design Sheet

Version Number: 1 **Version Date:** June 15, 2022

Project Information

Lora Greens	121172

Drawing Reference

SAN01	June 15-22

Prepared By

John Birchard	June 15-22

Reviewed By

Jeremy Acres	Nov. 23/22

Municipality

Town of The Blue Mountains

Population Density

Capita per Unit	Low	Medium	High
	2.30	2.30	2.30

Infiltration

Infiltration (L/s/ha)	0.23

Flow

Development Type	Average (L/cap/day)	Peaking Factor
Residential	450	Harmon
Development Type	**Average (L/ha/day)**	**Peaking Factor**
Institution	-	-
Commercial	-	-
Industrial High Intensity	55,000	-
Industrial Low Intensity	20,000	-

Manning's Coefficient

Pipe Material	Value
Concrete	0.013
PVC	0.013
Applied	0.013

Engineer Stamp

Street Name	Area Label/ID	Upstream Maintenance Hole	Downstream Maintenance Hole	Development Type	Population Density	Number of Units	Population (cap)	Accumulated Population (cap)	Peaking Factor	Area (ha)	Cumulative Area (ha)	Average Flow (L/s)			Peak Flow (L/s)			Proposed Sanitary Sewer							
												Development	Infiltration	Total	Development	Infiltration	Total	Sewer Length (m)	Sewer Slope (%)	Actual Sewer Diameter (mm)	Full Flow Velocity (m/s)	Full Flow Capacity (L/s)	Actual Velocity (m/s)	Calculated Sewer Diameter (mm)	Percentage of Full Flow Capacity (%)
Street A	1	1	2	Residential	Med.	5	11.5	11.5	4.41	1.02	1.02	0.06	0.23	0.29	0.26	0.23	0.50	32.3	1.0%	200	1.04	32.80	0.39	42	1.5%
Street A	2	2	3	Residential	Med.	8	18.4	29.9	4.35	1.13	2.15	0.16	0.49	0.65	0.68	0.49	1.18	99.2	0.5%	200	0.74	23.19	0.38	65	5.1%
Street A	3	3	4	Residential	Med.	10	23.0	52.9	4.31	1.29	3.44	0.28	0.79	1.07	1.20	0.79	1.99	99.2	0.5%	200	0.74	23.19	0.44	80	8.6%
Street A	4	4	5	Residential	Med.	9	20.7	73.6	4.28	1.10	4.54	0.38	1.04	1.43	1.66	1.04	2.70	97.5	0.5%	200	0.74	23.19	0.48	89	11.7%
Street A	5	5	6	Residential	Med.	4	9.2	82.8	4.27	0.75	5.29	0.43	1.22	1.65	1.86	1.22	3.08	79.2	0.5%	200	0.74	23.19	0.49	94	13.3%
Street A	6	6	7	Residential	Med.	1	2.3	85.1	4.26	0.26	5.55	0.44	1.28	1.72	1.91	1.28	3.19	23.6	0.5%	200	0.74	23.19	0.50	95	13.8%
Pond Block	7	7	8	Residential	Med.	1	2.3	87.4	4.26	0.55	6.10	0.46	1.40	1.86	1.97	1.40	3.37	100.0	0.5%	200	0.74	23.19	0.50	97	14.5%
Pond Block	8	8	9	Residential	Med.	0	0.0	87.4	4.26	0.52	6.62	0.46	1.52	1.98	1.97	1.52	3.49	100.0	0.5%	200	0.74	23.19	0.51	98	15.0%
Georgian Trail	9	9	10	Residential	Med.	0	0.0	87.4	4.26	0.29	6.91	0.46	1.59	2.04	1.97	1.59	3.55	64.6	0.5%	200	0.74	23.19	0.51	99	15.3%
Georgian Trail	10	10	11	Residential	Med.	0	0.0	87.4	4.26	0.37	7.28	0.46	1.67	2.13	1.97	1.67	3.64	100.0	0.5%	200	0.74	23.19	0.51	100	15.7%
Georgian Trail	11	11	12	Residential	Med.	0	0.0	87.4	4.26	0.14	7.42	0.46	1.71	2.16	1.97	1.71	3.67	100.0	0.5%	200	0.74	23.19	0.52	100	15.8%

I:\2021 Projects\121172 - Highway 26 and 10th Line TOBM\Design\FSR\Sewer Design Sheet - Sanitary1

Appendix B:
Water Supply and Distribution

TATHAM ENGINEERING

PROJECT	Lora Greens Development	FILE	121172
		DATE	May 5, 2022
SUBJECT	Design Water Demands & Pressure Calculations	NAME	JRC
		PAGE	1 OF 1

Design Criteria

Residential occupancy	**2.3**	persons per unit
Average day demand per person	**450**	L/p/day
Maximum day factor	**2**	
Peak hour factor	**4.5**	

Water Demands

Water demands for **38** single detached units are calculated as follows:

Design Population (P) = 38 units x 2.3 persons per unit = 87 persons

Average Day Demand = 87 persons x 450 L/p/day = 39,150 L/day

= **39.2** **m^3/day**

= **0.5** **L/s**

Maximum Day Demand = 39.2 m^3/day x 2 = **78.3** **m^3/day**

= **0.9** **L/s**

Peak Hour Demand = 0.5 L/s x 4.5 = **2.0** **L/s**

Lora Greens Model Boundary Conditions & HGL for Alternative 1 - Connection to High Bluff Lane:

	10th Line Connection Model Results, Junction LB-500 (Elev. 199.90 m)			High Bluff Lane Connection Model Results, Juntion 1104 (Elev. 197.04 m)			Lora Greens Street 'A' Junction 1102 Calculated Pressures (Elev. 199.00 m)		
	Pressure		HGL	Pressure		HGL	Pressure		HGL
Demand Scenario	(kPa)	(psi)	(m)	(kPa)	(psi)	(m)	(kPa)	(psi)	(m)
ADD	**437**	63	**244.58**	**465**	67	**244.58**	447	65	244.58
MDD + 100 L/s FF	**272**	39	**227.70**	**335**	49	**231.27**	281	41	227.70
PHD	**431**	63	**243.92**	**459**	67	**243.92**	440	64	243.92

Lora Greens Model Boundary Conditions & HGL for Alternative 2 - Connection to Peel Street:

	10th Line Connection Model Results, Junction LB-500 (Elev. 199.90 m)			Peel StreetConnection Model Results, Juntion 1105 (Elev. 194.89 m)			Lora Greens Street 'A' Junction 1102 Calculated Pressures (Elev. 199.00 m)		
	Pressure		HGL	Pressure		HGL	Pressure		HGL
Demand Scenario	(kPa)	(psi)	(m)	(kPa)	(psi)	(m)	(kPa)	(psi)	(m)
ADD	**437**	63	**244.58**	**465**	67	**244.57**	446	65	244.57
MDD + 100 L/s FF	**288**	42	**229.37**	**335**	49	**237.49**	298	43	229.37
PHD	**431**	63	**243.92**	**459**	67	**243.92**	440	64	243.92

TOTBM Acceptable Pressure Ranges:

Average and Maximum Day Demand:	350 - 550 kPa (50 - 80 psi)
Minimum and Peak Hour:	275 - 700 kPa (40 - 100 psi)
Maximum Day plus Fire Flow:	140 - 700 kPa (20 - 100 psi)

TATHAM ENGINEERING

PROJECT	Lora Greens Development	FILE	121172
		DATE	5/5/2022
SUBJECT	FUS Fire Flow Calculations Single Detached Home	NAME	JRC
		CHECKED	ST
REVISIONS			

Fire Underwriters Survey Fire Flow Calculations - Long Method

Calculation Based on "Water Supply for Public Fire Protection" by Fire Underwriters Survey (FUS), 1999

Step	Description	Term	Options	Multiplier Associated With Option	Choose	Value Used	Unit	Total Fire Flow (L/min)
1	Frame Use for Construction of Unit	**Framing Material**						
		Coefficient related to type of construction (C)	Wood Frame	1.5	**Ordinary Construction**	**1**	-	N/A
			Ordinary Construction	1				
			Non-combustible construction	0.8				
			Fire resistive construction (<2 hrs)	0.7				
			Fire resistive construction (>2 hrs)	0.6				
2	Type of Occupancy	**Floor Space Area**						
		Type of Occupancy	Single Family	1	**Single Family**	**1**	Units	N/A
			Townhouse/Apartment-inform # of units	1				
			Other (Comm., Ind., etc.)	1				
2.1	No. of Storeys	Number of Floors/Storeys in the unit (do not include basement)				**2**	Storeys	
3	Floor Area	Total Floor Area (A) - for all storeys excluding basement			m^2	**139.4**	m^2	N/A
		Measurement Units	Square Feet (ft^2)	0.09290304	**278.7**			
			Square Metres (m^2)	1				
			Hectares (ha)	10000				
4	Required Fire Flow without Reductions or Increases	Required Fire Flow without Reductions or Increases per FUS: ($FF=220xCxA^{0.5}$)					L/min	4,000
5	Factors Affecting Burning	**Reductions / Increases Due to Factors Affecting Burning**						
5.1	Combustibility of Building Contents	Occupancy content hazard reduction or surcharge	Non-combustible	-0.25	**Non-combustible**	**-0.25**	N/A	-1,000
			Limited combustible	-0.15				
			Combustible	0				
			Free burning	0.15				
			Rapid burning	0.25				
5.2	Reduction Due to Presence of Sprinklers	Sprinkler reduction	Complete automatic strinkler protection	-0.3	**No Sprinklers**	**0**	N/A	0
			Standard hoses for both system & Fire Department	-0.1				
			Supervised system	-0.1				
5.3	Separation Distance Between Units	Exposure distance between units	North Side	21 m - 30 m	**0.10**	**0.7**	N/A	2,800
			East Side	0 m - 3 m	**0.25**			
			South Side	21 m - 30 m	**0.10**			
			West Side	0 m - 3 m	**0.25**			
6	Required Fire Flow, Duration and Volume	Total Required Fire Flow, rounded to nearest 1000 L/min, with max/min limits applied:						6,000
		Total Required Fire Flow (above) in L/s:						100
		Required Duration of Fire Flow of 6,000 L/min (hrs):						2
		Required Volume of Fire Flow of 6,000 L/min (m^3):						720

From: Annie Williams
To: Deanna Vickery
Cc: Mark Buchanan; Brian Worsley; John Birchard; Jeremy Acres; Jason Covey; Dylan Stoneman
Subject: RE: Lora Greens - Water Servicing - Hydraulic Boundary Conditions
Date: Wednesday, April 27, 2022 4:07:36 PM
Attachments: image001.png
image004.png
image006.png
image010.png
image011.png
image002.png
image007.png
0.png
21097 PWA Hwy26 DP-03a_2021-11-10 DraftPlan - JRC.pdf
27550-014 Lora Greens BC.pdf

Hello Deanna,

The proposed Development ("Lora Greens"), located between Georgian Trail and Highway 26 in the Town of the Blue Mountains (Town), was simulated using the Town's updated hydraulic water model (August 2021) to determine hydraulic boundary conditions based on theoretical water demands and fire flows provided by the Developer's Engineer (refer to below). Table 1 summarizes the theoretical water demands that were included in the model at junction node J-1102 (Elev 199.00 m). Table 2 summarizes the required fire flows as calculated by the Developer's Engineer.

Table 1: Theoretical Water Demands

Scenario	Demand (L/s)
Average Day	0.5
Maximum Day	0.9
Peak Hour	2.0

Table 2: Fire Flow Calculations

Fire Flow (L/s)	
FUS	100

A 200 mm diameter watermain loop was assumed within the proposed development. Two (2) alternative connection scenarios were also requested, as depicted on the attached sketch provided by the Developer's Engineer. The hydraulic boundary conditions have been generated at the requested connection locations and are summarized in Table 3 and Table 4 (refer to attached WaterCAD model outputs).

Table 3: Lora Greens Boundary Conditions – ALTERNATIVE 1

Demand Scenario	Connection 1		Connection 2	
	Junction Node LB-500 (Elev 199.90 m)		Junction Node J-1104 (Elev 197.04 m)	
	Pressure (kPa)	HGL (m)	Pressure (kPa)	HGL (m)
Average Day (0.5 L/s)	437	244.58	465	244.58
Max Day (0.9 L/s) + FUS Fire Flow (100 L/s)	272	227.70	335	231.27
Peak Hour (2.0 L/s)	431	243.92	459	243.92

Table 4: Lora Greens Boundary Conditions – ALTERNATIVE 2

Demand Scenario	Connection 1		Connection 2	
	Junction Node LB-500 (Elev 199.90 m)		Junction Node J-1105 (Elev 194.89 m)	
	Pressure (kPa)	HGL (m)	Pressure (kPa)	HGL (m)
Average Day (0.5 L/s)	437	244.58	486	244.57
Max Day (0.9 L/s) + FUS Fire Flow (100 L/s)	288	229.37	417	237.49
Peak Hour (2.0 L/s)	431	243.92	480	243.92

Note that the foregoing model results are for current conditions and are based on computer model simulation. We have not reviewed the adequacy of the domestic demand nor fire flow requirements for the proposed development, which remains the responsibility of the Developer's Engineer.

Disclaimer: The model results are based on current simulated operation of the Town's water distribution system. The computer model simulation is based on the best information available at this time. The operation of the water distribution system can change on a regular basis, resulting in a variation in the boundary conditions. It is further noted that the operational characteristics of the water supply system and physical properties of the watermains can change and/or deteriorate over time. These changes may affect the supply characteristics of the system and the assumptions made in developing the model, which in turn could lead to variations in the simulation results. This should be considered by any third party undertaking simulation of system upgrades.

Please do not hesitate to contact me should you have any questions regarding the foregoing.

Regards,
Annie

Annie Williams, P.Eng.
Civil Engineer

J.L. Richards & Associates Limited
700 - 1565 Carling Avenue, Ottawa, ON K1Z 8R1
Direct: 343-803-4523

From: Annie Williams
Sent: Tuesday, April 26, 2022 11:34 AM
To: Deanna Vickery <dvickery@thebluemountains.ca>
Cc: Mark Buchanan <mbuchanan@jlrichards.ca>; Brian Worsley <bworsley@thebluemountains.ca>; John Birchard <jbirchard@tathameng.com>; Jeremy Acres <jacres@tathameng.com>; Jason Covey <jcovey@tathameng.com>; Dylan Stoneman <dstoneman@thebluemountains.ca>
Subject: RE: Lora Greens - Water Servicing - Hydraulic Boundary Conditions

Hi Deanna,

We are aiming to submit these to you tomorrow.

Thank you,
Annie

From: Deanna Vickery <dvickery@thebluemountains.ca>
Sent: Tuesday, April 26, 2022 10:57 AM
To: Annie Williams <awilliams@jlrichards.ca>
Cc: Mark Buchanan <mbuchanan@jlrichards.ca>; Brian Worsley <bworsley@thebluemountains.ca>; John Birchard <jbirchard@tathameng.com>; Jeremy Acres <jacres@tathameng.com>; Jason Covey <jcovey@tathameng.com>; Dylan Stoneman <dstoneman@thebluemountains.ca>
Subject: RE: Lora Greens - Water Servicing - Hydraulic Boundary Conditions

Hi Annie,
Can you please give us a status update on the hydraulic boundary conditions noted below?
Thanks,
Deanna

Deanna Vickery, P.Eng. (she/her)
Development Engineering Supervisor
Town of The Blue Mountains, 32 Mill Street, P.O. Box 310, Thornbury, ON N0H 2P0
Tel: 519-599-3131 ext. 247 | Fax: 519-599-7723
Email: dvickery@thebluemountains.ca | Website: www.thebluemountains.ca

As part of providing accessible customer service, please let me know if you have any accommodation needs or require communication supports or alternate formats.

NEW: Development Engineering is **hiring**! Additional postings to come. Click **here**.

From: Deanna Vickery
Sent: Tuesday, April 12, 2022 11:44 AM
To: Annie Williams <awilliams@jlrichards.ca>
Cc: Mark Buchanan <mbuchanan@jlrichards.ca>; Brian Worsley <bworsley@thebluemountains.ca>; John Birchard <jbirchard@tathameng.com>; Jeremy Acres <jacres@tathameng.com>; Jason Covey <jcovey@tathameng.com>; Dylan Stoneman <dstoneman@thebluemountains.ca>
Subject: RE: Lora Greens - Water Servicing - Hydraulic Boundary Conditions

Hi Annie,
Please proceed with work as noted below. The Town's Finance Dept has confirmed they have received and successfully deposited the payment from the Developer.
Attached is the updated sketch showing the alternative connection point from Tatham Engineering.
If you have any questions, please feel free to reach out.
Thanks,
Deanna

Deanna Vickery, P.Eng. (she/her)
Development Engineering Reviewer
Town of The Blue Mountains, 32 Mill Street, P.O. Box 310, Thornbury, ON N0H 2P0
Tel: 519-599-3131 ext. 247 | Fax: 519-599-7723
Email: dvickery@thebluemountains.ca | Website: www.thebluemountains.ca

As part of providing accessible customer service, please let me know if you have any accommodation needs or require communication supports or alternate formats.

NEW: Development Engineering is **hiring**! Additional postings to come. Click **here**.

From: Annie Williams <awilliams@jlrichards.ca>
Sent: Monday, March 14, 2022 3:59 PM
To: Deanna Vickery <dvickery@thebluemountains.ca>
Cc: Mark Buchanan <mbuchanan@jlrichards.ca>; Brian Worsley <bworsley@thebluemountains.ca>; John Birchard <jbirchard@tathameng.com>; Jeremy Acres <jacres@tathameng.com>; Jason Covey <jcovey@tathameng.com>; Dylan Stoneman <dstoneman@thebluemountains.ca>
Subject: RE: Lora Greens - Water Servicing - Hydraulic Boundary Conditions

Good afternoon Deanna,

We have reviewed the information provided and we can do this work on a time basis to a total upset limit of **$4,200** (includes tax and disbursement).

We would also request that a second figure be provided to clarify the connection locations with the alternate connection at Peel St / Georgian Trail.

We can proceed with this work upon receiving approval from the Town.

Thank you,
Annie

Annie Williams, P.Eng.
Civil Engineer

J.L. Richards & Associates Limited
700 - 1565 Carling Avenue, Ottawa, ON K1Z 8R1
Direct: 343-803-4523

From: Annie Williams
Sent: Friday, March 11, 2022 12:20 PM
To: Deanna Vickery <dvickery@thebluemountains.ca>
Cc: Mark Buchanan <mbuchanan@jlrichards.ca>; Brian Worsley <bworsley@thebluemountains.ca>; John Birchard <jbirchard@tathameng.com>; Jeremy Acres <jacres@tathameng.com>; Jason Covey <jcovey@tathameng.com>; Dylan Stoneman <dstoneman@thebluemountains.ca>
Subject: RE: Lora Greens - Water Servicing - Hydraulic Boundary Conditions

Hi Deanna,

I'm sorry for the delay, I should be able to send you the quote on Monday.

Thank you,
Annie

From: Deanna Vickery <dvickery@thebluemountains.ca>
Sent: Friday, March 11, 2022 12:14 PM
To: Annie Williams <awilliams@jlrichards.ca>
Cc: Mark Buchanan <mbuchanan@jlrichards.ca>; Brian Worsley <bworsley@thebluemountains.ca>; John Birchard <jbirchard@tathameng.com>; Jeremy Acres <jacres@tathameng.com>; Jason Covey <jcovey@tathameng.com>; Dylan Stoneman <dstoneman@thebluemountains.ca>
Subject: RE: Lora Greens - Water Servicing - Hydraulic Boundary Conditions

Good afternoon Annie,

Can you advise when you might be able to provide the quote below?

Thanks,
Deanna

Deanna Vickery, P.Eng. (she/her)
Development Engineering Reviewer
Town of The Blue Mountains, 32 Mill Street, P.O. Box 310, Thornbury, ON N0H 2P0
Tel: 519-599-3131 ext. 247 | Fax: 519-599-7723
Email: dvickery@thebluemountains.ca | Website: www.thebluemountains.ca

As part of providing accessible customer service, please let me know if you have any accommodation needs or require communication supports or alternate formats.

From: Deanna Vickery
Sent: Friday, March 4, 2022 1:11 PM
To: Annie Williams <awilliams@jlrichards.ca>
Cc: Mark Buchanan <mbuchanan@jlrichards.ca>; Brian Worsley <bworsley@thebluemountains.ca>; John Birchard <jbirchard@tathameng.com>; Jeremy Acres <jacres@tathameng.com>; Jason Covey <jcovey@tathameng.com>; Dylan Stoneman <dstoneman@thebluemountains.ca>
Subject: Lora Greens - Water Servicing - Hydraulic Boundary Conditions

Hi Annie,

Could you please provide a quote (incl HST, disbursements, etc) for hydraulic boundary conditions at the two connection locations shown in the attached PDF, as well as an alternate connection at Peel St x Georgian Trail? This proposed development is called Lora Greens.

The following demands and fire flows have also been provided from the Consultant:

- "Preliminary design water demands for 38 single detached homes have been calculated as follows: ADD is 39.2 m^3/day (0.5 L/s), MDD is 78.3 m^3/day (0.9 L/s), and PHD is 2 L/s.
- Based on FUS Guidelines, preliminary fire flow requirements are 100 L/s. This is considered conservative and includes a number of assumptions as we do not yet have lot layouts or building designs."

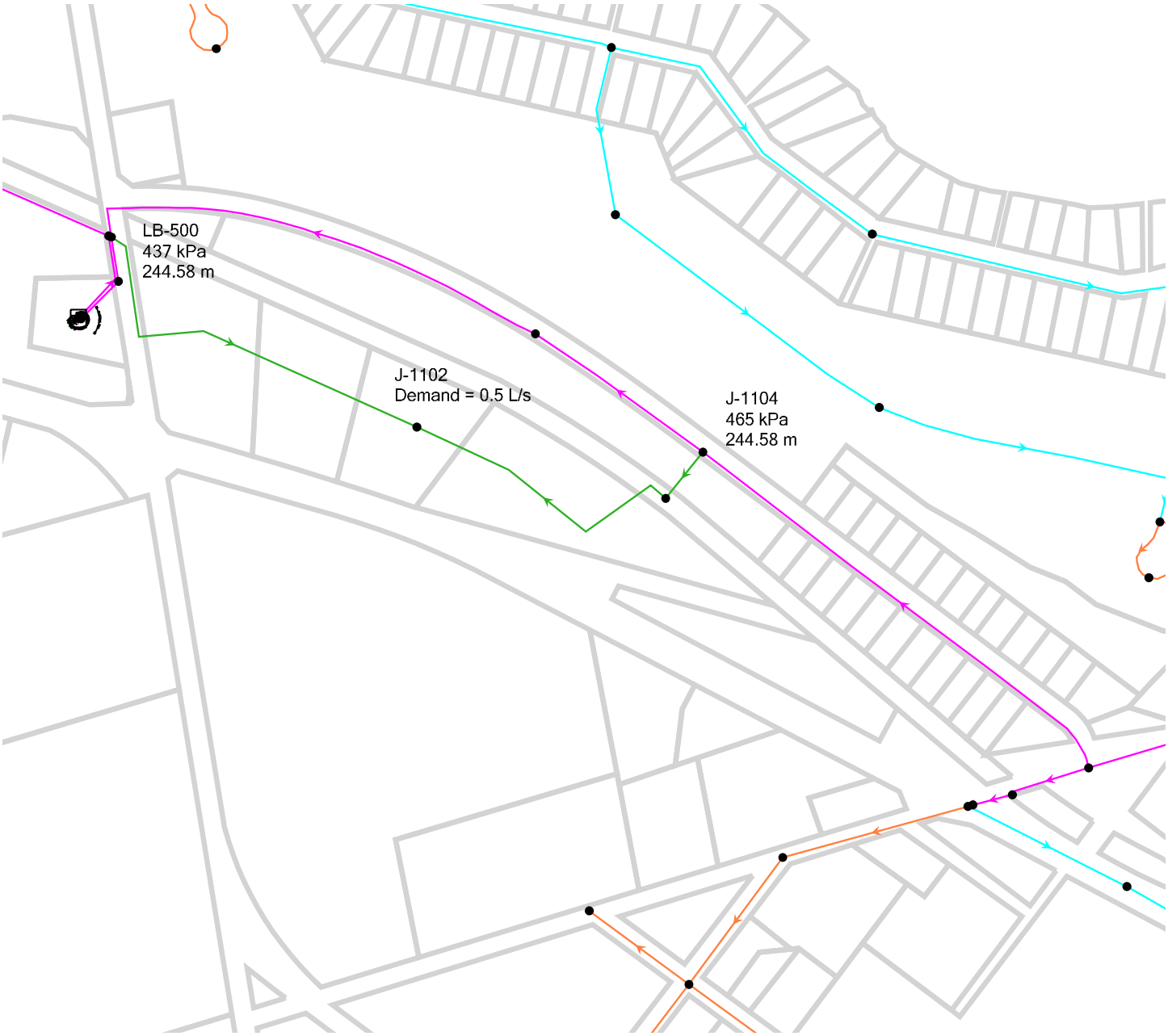
If you have any questions, feel free to reach out.

Thanks,
Deanna

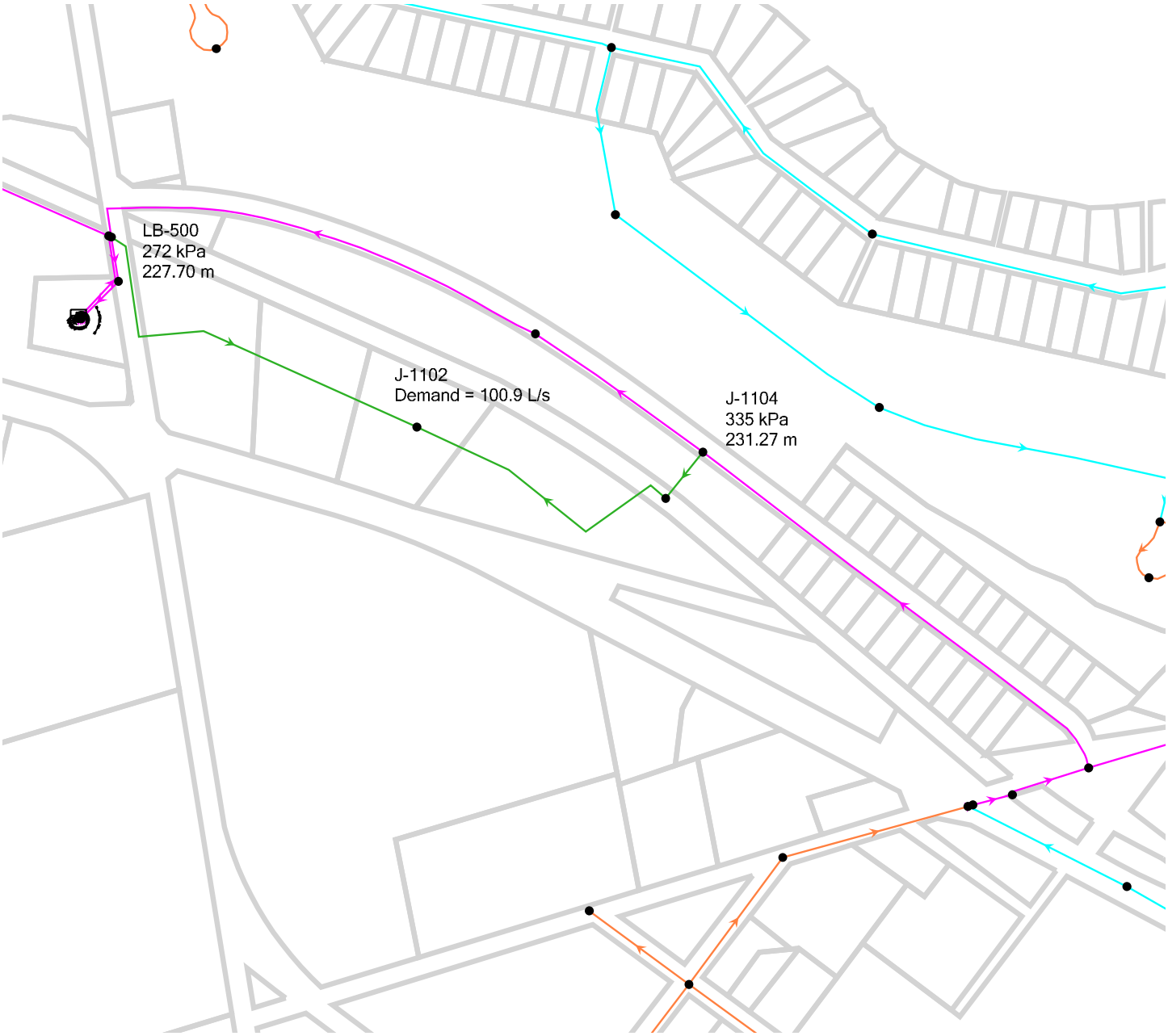
Deanna Vickery, P.Eng. (she/her)
Development Engineering Reviewer
Town of The Blue Mountains, 32 Mill Street, P.O. Box 310, Thornbury, ON N0H 2P0
Tel: 519-599-3131 ext. 247 | Fax: 519-599-7723
Email: dvickery@thebluemountains.ca | Website: www.thebluemountains.ca

As part of providing accessible customer service, please let me know if you have any accommodation needs or require communication supports or alternate formats.

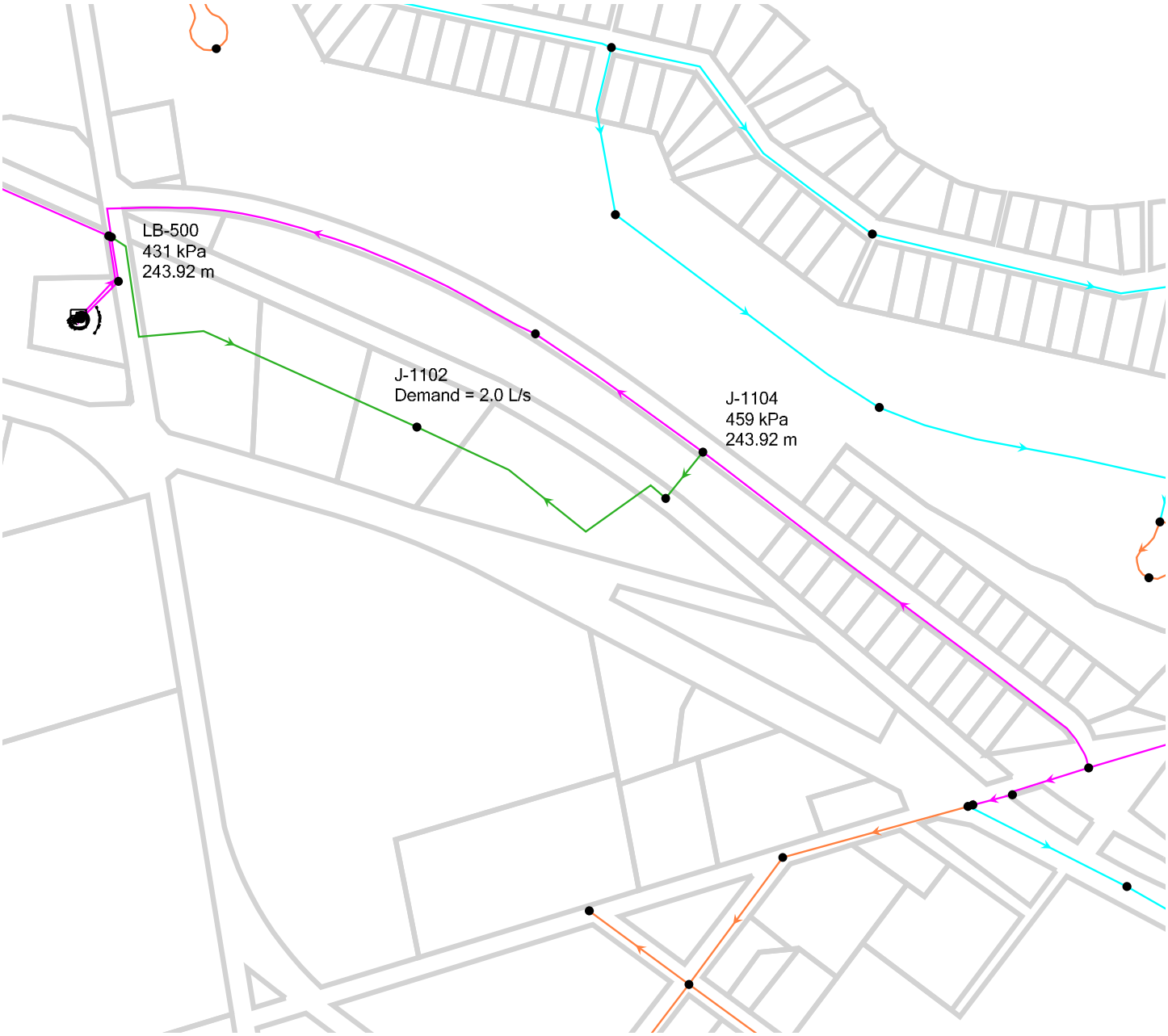
Lora Greens Boundary Conditions
Alternative 1 - Average Day



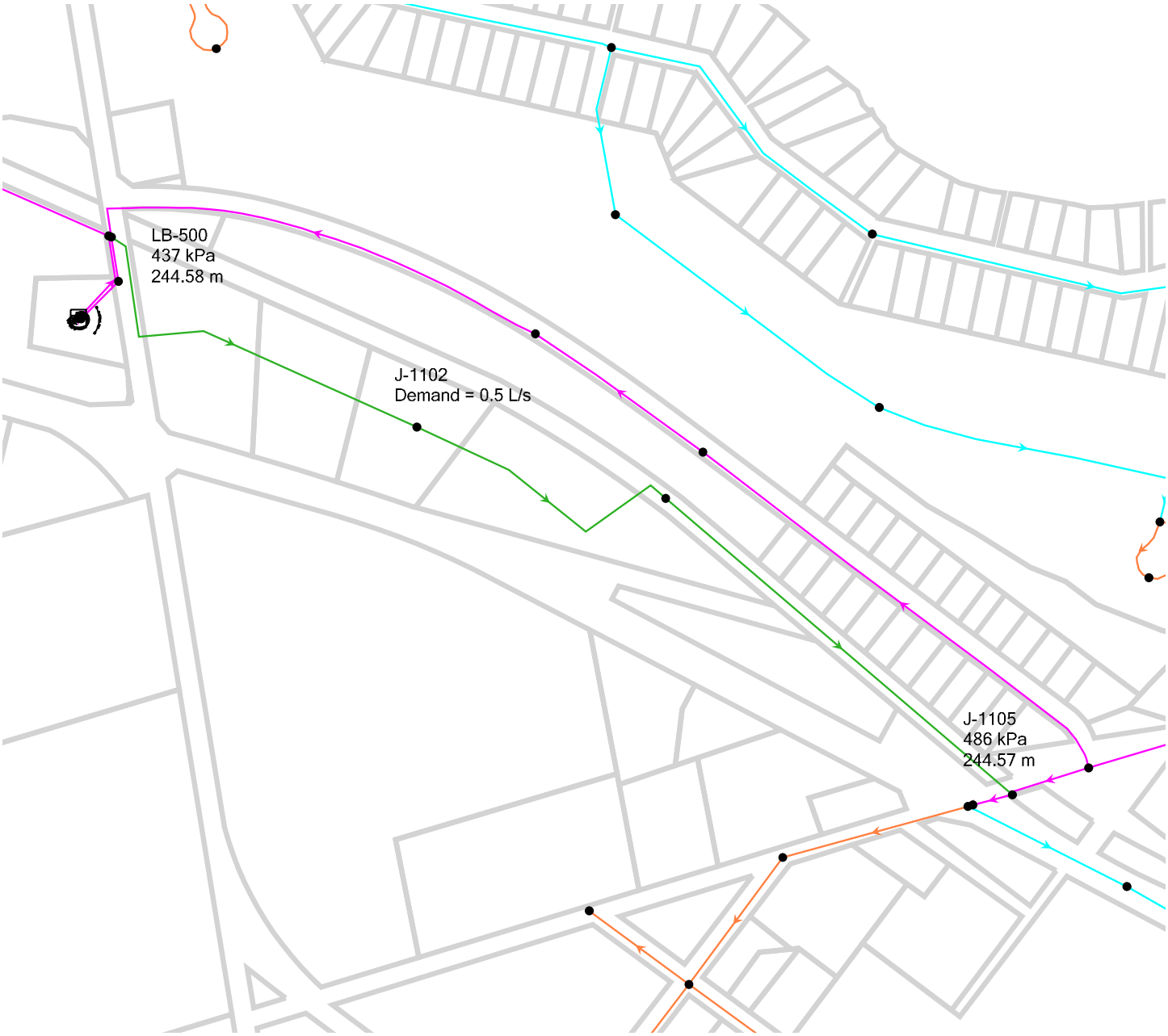
Lora Greens Boundary Conditions
Alternative 1 - Maximum Day + Fire Flow



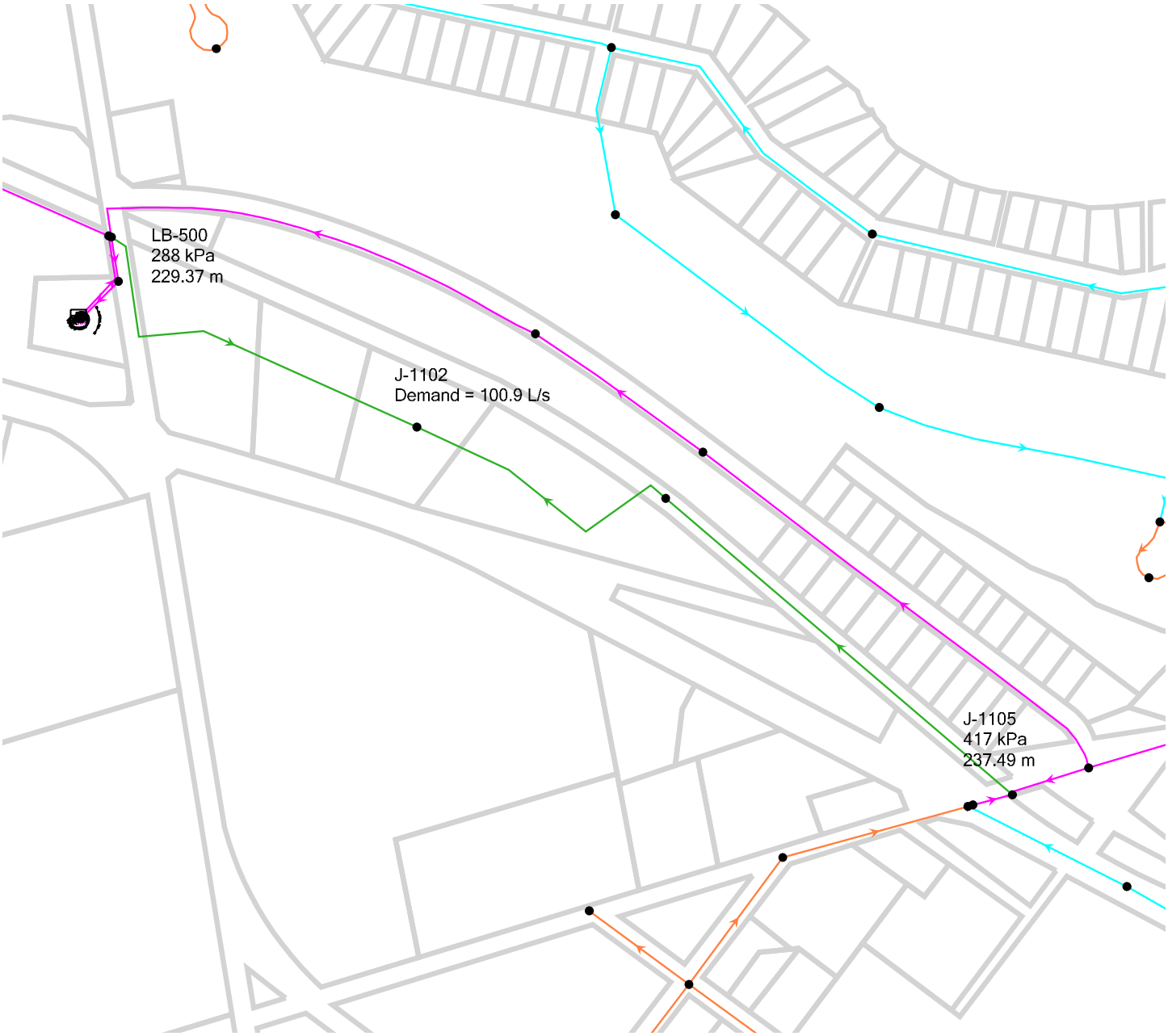
Lora Greens Boundary Conditions
Alternative 1 - Peak Hour



Lora Greens Boundary Conditions
Alternative 2 - Average Day



Lora Greens Boundary Conditions
Alternative 2 - Maximum Day + Fire Flow



Lora Greens Boundary Conditions
Alternative 2 - Peak Hour