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24 Alfred Street Development

FUNCTIONAL SERVICING REPORT

Pheasant Run Realty Holdings Inc.

File 121108 | December 20, 2022

Document Control

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Issue	Date	Description
1	February 14, 2022	Draft Plan of Submission Application
2	May 27, 2022	Incorporating DRC Comments
3	December 20, 2022	Resubmission for Draft Plan

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1 Introduction

Tatham Engineering has been retained by Pheasant Run Realty Holdings Inc. to prepare a Functional Servicing Report to support a Draft Plan of Submission Application (or Approval) for the proposed 24 Alfred Street Development in the Thornbury, Town of The Blue Mountains.

1.1 OBJECTIVE

The primary objective of this report is to address the servicing requirements of the Town of the Blue Mountains and Grey County with respect to the existing and proposed sanitary servicing, water supply and distribution, drainage and stormwater management (SWM), safe vehicular access to the site and utilities common to support a residential development (phone, hydro, cable, TV, gas, etc.).

1.2 SUPPORTING REPORTS

This report was prepared recognizing municipal and provincial guidelines on water resources and the environment, including the following publications:

- *Design Guidelines for Drinking Water Systems, Ministry of Environment (2008);*
- *Design Guidelines for Sewage Works, Ministry of Environment (2008);*
- *The Blue Mountains Engineering Standards (2018);*
- *The Town of The Blue Mountains Year End Water and Wastewater Capacity Assessment (2020);*
- *Town of the Blue Mountains Water & Wastewater Capacity Assessment (2020); and*
- *Water Supply for Public Fire Protection, Fire Underwriters Survey (2020).*

Additional reports have been prepared in conjunction with this report in support of the proposed residential development, including:

- *24 Alfred Street Development Stormwater Management Report* prepared by Tatham Engineering (December 2022); and
- *24 Alfred Street Development Traffic Impact Brief* prepared by Tatham Engineering (May, 2022).

2 Development Site

2.1 SITE LOCATION & DESCRIPTION

The site is legally described as Lot 6/Part of Lot 5 of Registered Plan 107, and Part of Park Lots 5 and 6 NE of Alfred Street and is bounded by Alice Street West to the north, Bruce Street South to the east, Alfred Street West to the south and Elma Street South to the west. The subject property is zoned as R1-1 – *Residential One* and is not regulated by the Grey Sauble Conservation Authority (GSCA).

2.2 SURFACE CONDITIONS

A topographic survey of the subject property was completed by GM Blueplan Engineering Ltd. on June 5, 2018 and December 5, 2011. The high spot of the subject site (199.29m) is 126 m south-west of Alice Street West. The subject property generally slopes from the south-west to the north-east at an average gradient of 2.4% to a low point at the rear of 21 Alice Street West, where water ponds and infiltrates into the ground. 21 Alice Street slopes toward the rear yard low point at an average gradient of 0.5%. The remainder of the subject property generally slopes from the high point towards the west at an average gradient of 0.7%, ultimately discharging to the Elma Street storm system.

While adjacent to numerous residential units on all property lines, the 1.09 ha site is currently vacant, and is primarily grass covered with a sparse number of trees.

2.3 SUBSURFACE CONDITIONS

A geotechnical investigation, submitted under separate cover, was completed by Cambium Inc. dated November 19, 2021. Fieldwork was conducted on August 27, 2021, consisting of four exploratory sampled boreholes. The boreholes extended to a maximum depth of 5 meters below existing ground surface. Subsurface conditions are as follows:

- 100 mm of surficial topsoil;
- silty sand deposit with traces of clay extends to a depth of 0.8 m below surface at boreholes BH102-21 and BH103-21 (this layer extends 1.5 m below surface at boreholes BH101-21 and BH104-21); and
- a layer of silt extends beyond the termination depth of all boreholes ranging from 4.6 m to 6.1 m below grade.; the silt contains varying amounts of clay and trace sand and has a stiff to very hard consistency.

The geotechnical investigation established that all four borehole locations were dry upon drilling. Borehole BH102-21 was outfitted as a monitoring well and recorded a groundwater level 4 m below grade.

The soil has been classified as Brighton sand (Type A), as per the *Soil Survey of Grey County - Report No. 17 of the Ontario Soil Survey*, completed by the Ontario Department of Agriculture. This soil group has low runoff potential and high infiltration rates even when thoroughly wetted.

2.4 PROPOSED DEVELOPMENT

The proposed development will feature 9 single family detached homes and 8 semi-detached units fronting a 249 m long 7.5 m private road within a common element row, connecting Alice Street West and Alfred Steet West, between Elma Street South and Bruce Street South. Lots will have approximately 20 m frontages and varying depths around 30 m to 34 m. The proposed development is shown on the Site Grading Plan (SG01).

The existing municipal infrastructure along Alice Street, including the storm, sanitary and watermain networks are being replaced as part of the Thornbury Road Infrastructure Project and is scheduled to start in 2023. The proposed sanitary and storm sewers servicing the proposed through-street will discharge into the future Alice Street West sanitary and storm sewer mains, while the proposed watermain will tap into both the Alice Street West and Alfred Street West watermains to create a loop.

3 Water Supply & Distribution

3.1 EXISTING INFRASTRUCTURE

The subject site is adjacent to an existing 150 mm watermains running east-west on the north side of Alfred Street West and Alice Street West, across from the proposed 24 Alfred Street Development.

The Town of The Blue Mountains Water Treatment Plant has a water supply capacity of 16,390 m^3/day (including the 1,250 m^3/day received from the Town of Collingwood), as per *The Town of The Blue Mountains 2020 Year End Water and Wastewater Capacity Assessment*. The report indicates that 2,345 m^3/day is available (86% of rated capacity).

3.2 WATER DEMANDS ASSESSMENT

3.2.1 Water Supply Demands

Water supply demands for the proposed development have been calculated based on the Ministry of the Environment Conservation and Parks (MECP) guidelines and the Town of The Blue Mountains (TOBM) design standards as noted below:

Table 1: Water Supply Design Criteria

DESIGN CRITERIA		SOURCE
Residential Population	2.30 persons/unit	TOBM
Average Daily Demand Per Person	450 L/person/day	TOBM
Maximum Daily Demand Factor	9.2	MECP
Peak Hourly Demand Factor	13.8	MECP
Minimum Fire Flow	133 L/s	FUS
Allowable Pressure Ranges		
Maximum Day Minimum Pressure	415 kPa (60 psi)	TOBM
Peak Hour Minimum Pressure	275 kPa (40 psi)	TOBM
Maximum Day Plus Fire Suppression Minimum Pressure	140 kPa (20 psi)	TOBM

Note that peaking factors were interpolated from Table 3-3 of the *Design Guidelines for Drinking-Water Systems* (MOE 2008) based on the design population. Minimum fire flows were calculated based on Table 7 of the Fire Underwriters Survey *Water Supply For Public fire Protection (FUS 2020).*

Water demands have been based on 17 units and are calculated as follows:

Design Population (P)	= 2.3 persons/unit x 17 units
	= 39.1 persons
Average day demand (ADD)	= P x Average daily demand per person
	= 39.1 persons x 450 L/person/day
	= 17,595 L/day
	= 17.6 m^3/day (0.20 L/s)
Peak Hour	= ADD x Peak hourly factor
	= 17.6 m^3/day x 13.8
	= 242.8 m^3/day (2.8 L/s)
Maximum day demand (MDD)	= ADD x Maximum daily factor
	= 17.6 m^3/day x 9.2
	= 161.9 m^3/day (1.9 L/s)
Maximum day plus fire flow	= MDD + Minimum fire flow
	= 1.9 L/s + 133 L/s
	= 134.9 L/s

3.3 PROPOSED INFRASTRUCTURE

The proposed water strategy for the 24 Alfred Street development includes connecting to the replaced 150 mm diameter watermain on the north side of Alice Street West and the existing 150 mm diameter watermain on the north side of Alfred Street West. 258 m of proposed 150 mm diameter watermain will run underneath the internal road splitting the subject site. By connecting to both the Alfred Street and Alice Street watermains, it creates a loop to eliminate dead ends. The proposed units fronting the internal road will have new service connections extended from the 150 mm diameter watermain. See the Site Servicing Plan (SS01) for the proposed water system details.

The watermain was sized to accommodate both the maximum day demand with a minimum system pressure of 415 kPa and the minimum fire flow requirements with a residual pressure of 140 kPa. The proposed 150 mm diameter watermain provides 85.8 L/s of flow at 275 kPa, which is sufficient to meet the peak hour water demand of 2.8 L/s. Refer to Appendix B for supporting calculations.

3.3.1 Water Service Connections

Each townhouse will connect to the proposed 150 mm diameter watermain via 19 mm diameter copper type K water service connections with curb stop valves as per the Town of The Blue Mountains Engineering Standards.

Water meters will be installed internal to each individual unit to record water consumption. The proposed buildings will be equipped with backflow prevention devices in accordance with the Ontario Building Code and the Town's water by-law. The backflow prevention devices will also be installed internal to the building to allow for testing and maintenance as may be required.

3.3.2 Fire Protection

Fire hydrants external to the site do not provide sufficient coverage of the proposed development. Two fire hydrants located along the internal road fronting Lots 1 and 4/5 are proposed to provide the requisite fire flows for the development. See drawing SS01 – Site Servicing Drawing for further details pertaining to hydrant location.

Table 2: Proposed Fire Hydrant Flow Rates

HYDRANT	LOCATION DESCRIPTION	MDD + FIRE FLOW (L/S)	REQUIRED PRESSURE (KPA)	PROVIDED FIRE FLOW (L/S)
North	Fronting Lots 4 and 5	134.9	140	145.5
South	East of Lot 1	134.9	140	168.4

As shown in Table 4, the proposed north and south fire hydrants are expected to provide 145.5 L/s and 168.4 L/s of flow to the internal fire hydrants at a residual pressure of 140 kPa (assumed static pressure in watermain on 415 kPa), which is sufficient to meet the minimum required fire flow of 134.9 L/s. Hydrant flow test should be conducted to confirm pressure at each fire hydrant. Refer to Appendix B for the supporting water service calculation.

3.3.3 Water Availability

As outlined above, the Town of The Blue Mountains drinking water treatment plant has a rated capacity of 16,390 m^3/day, with 2,345 m^3/day available. The drinking water treatment plant

could accommodate the 161.9 m^3/day maximum day demand of the proposed 24 Alfred Street Development.

The proposed watermain was sized assuming the minimum permissible pressure of 350 kPa in the watermain external to the property, as per Town of the Blue Mountains standards. The available flows in the existing watermain will need to be confirmed either by conducting a hydrant flow test or by purchasing the hydraulic boundary conditions from the Town's water model.

4 Sanitary Sewage Collection & Conveyance

4.1 EXISTING INFRASTRUCTURE

An existing 200 mm diameter sanitary sewer is located south of the proposed property, flowing east to west under Alfred Street West. The Thornbury West Reconstruction Project will replace the existing sanitary sewer with a 200 mm diameter sewer under Alice Street West, where discharge west of SAN MH5 (including Park Lane) will flow from east to west. All properties discharging into the Alice Street West sanitary sewer east of SAN MH5 will flow from west to east, where it connects to a 300 mm diameter sanitary sewer that flows north under Bruce Street. SAN MH5 is located 77 m northwest of the Bruce Street and Alice Street West intersection. The ultimate discharge location is the Thornbury Wastewater Treatment Plant (WWTP).

Reviewing the Town of the Blue Mountains *Water & Wastewater Capacity Assessment* for 2020, the Thornbury Wastewater Treatment Plant (WWTP) the plant has a firm-built capacity of 3,580 m^3/day. In 2020, the Thornbury WWTP influent flow was 3,115 m^3/day, 87% of the rated capacity. The Town has applied for and acquired an Environmental Compliance Approval (ECA) for the construction of Phase 1A of the Thornbury WWTP upgrades, which will increase the average daily flow capacity of the WWTP to 5,330 m^3/day. The Construction of the Proposed Works portion of the new ECA expires October 1, 2023. 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 is able to reserve units based on the Phase 1A design.

Currently the Thornbury Wastewater Treatment Plant has allocated 3,854 m^3/day and reserved another 352 m^3/day. After the Phase 1A upgrade is complete, the plant will be operating at 79% of its average day flow rated capacity.

4.2 SEWAGE ASSESSMENT

Design Population (P)	= 2.3 persons/unit x 17 units
	= 39.1 persons
Infiltration (I)	= Infiltration Flow x Site Area
	= 0.23 L/ha/s x 1.09 ha
	= 0.25 L/s = 21,660 L/day = 21.7 m^3/day
Average day flow (ADF)	= P x Average daily demand per person + I
	= 39.1 persons x 450 L/day + 21,660 L/day
	= 17,595 L/day + 21,660 L/day

= 39,255 L/day

= 39.3 m^3/day = 0.5 L/s

Harmon's Peaking Factor (M) = 1 + 14 ÷ (4 + √P)

= 1 + 14 ÷ (4 + √39.1)

= 2.37

Maximum Day Flow = (ADF-I) * M + I

= (39.3 m^3/day – 21.7 m^3/day) x 2.37 + 21.7 m^3/day

= 63.3 m^3/day = 63,280 L/day= 0.73 L/s

4.3 PROPOSED INFRASTRUCTURE

Sanitary discharge from the proposed units fronting the internal road will drain to the Alice Street sanitary sewer via 175 m of 200 mm diameter PVC sanitary sewer that originates southwest of Lot 1. The proposed sanitary sewer will generally flow northeast towards Alice Street West where it will connect to the future 200 mm diameter sanitary sewer, 35 m northwest of SAN MH5, where it will flow west towards Elma Street South. An additional maintenance structure will be required to tie into the existing sanitary sewer. 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 Site Servicing Plan (SS01). The sanitary design sheet can be found in Appendix A.

4.3.1 Sanitary Service Connections

Each unit will connect to the proposed 200 mm diameter sanitary sewer via 125 mm diameter PVC sanitary service as per the Town of the Blue Mountains Development Standards.

4.3.2 Downstream Sanitary Sewer Capacity

The existing sanitary sewer network that will collect sewage from the subject site, flowing from Alice Street to Elma Street, and Elma Street to Arthur Street, is being replaced as part of the Thornbury Road Infrastructure Project. This project is expected to proceed prior to the 24 Alfred Street Development and is scheduled to start in 2023. These segments of the future sanitary sewer were assessed as part of the Thornbury Road Infrastructure Project. It was determined that the future sanitary sewer is at maximum 17.8% of full flow capacity from the subject site to the intersection of Elma and Arthur Street. When including the sewage from the proposed 24 Alfred Street Development, the future sanitary sewer increases to 21.4% of full flow capacity, still

providing ample capacity for sewage from the proposed development to the intersection of Elma and Arthur Street.

Up-to-date sanitary design sheets of Arthur Street West to the Thornbury WWTP will be required from the Town to complete a sanitary downstream analysis.

4.3.3 Wastewater Treatment Plant Capacity

As noted above, after phase 1A upgrade, the Thornbury WWTP will have an average day flow capacity of 5,330 m^3/day, with 1,124 m^3/day of the average day flow unallocated. The proposed development average day flow of 39.3 m^3/day could be allocated by the Thornbury WWTP after phase 1A is complete. There was no indication in the 2020 *Water and Wastewater Capacity Assessment* what the current Peak Daily Flow and capacity are for the Thornbury WWTP, however the 2019 report indicates that 6,696 m^3/day of a 7,196 m^3/day capacity is being used (surplus of 473 m^3/day). Once upgraded, phase 1B Peak Flow Capacity will be 16,187 m^3/day. The proposed development will contribute 63.3 m^3/day, 0.4% of the future peak flow capacity of the plant.

Therefore, the Thornbury WWTP can accommodate the increased sanitary flows from the 24 Alfred Street Development.

5 Stormwater Management

A separate Stormwater Management (SWM) Report has been prepared by Tatham Engineering to address drainage and stormwater management requirements for the development. A summary of the SWM servicing strategy is as follows:

- Stormwater management quantity control will be provided by an underground storage system in the north-east corner of the proposed site within the designated SWM block. Stormwater will be directed by an internal storm sewer network to the underground storage system that will attenuate major peak flows (up to and including the 100-year storm event) from the site to the 5-year design capacity of the Alice Street West storm sewer network.
- In the event of inlet blockage, emergency overland flow routes will flow towards the internal road, which will convey peak flows to a low point 10m south of Alice Street West. The maximum ponding depth will not exceed 250 mm before spilling onto Alice Street West.
- The combination of a Stormceptor EFO6 located downstream of the underground system and CB Shiels installed on all roadway catchbasins and catchbasin maintenance holes will achieve a minimum of 80% total solids removal and will treat 90% of the surface runoff generated from its contributing drainage area.

The Stormwater Management Report should be read in conjunction with this report.

6 Transportation

A Traffic Impact Brief has been completed by Tatham Engineering under separate cover. A summary of the conclusions and recommendations are as follows.

- Given the limited traffic volume to be generated by the development of the site and in considering the traffic volumes on the road system, such will not have any significant operational impacts on the operations of the local road system. The operational assessment of the site access points indicates that these intersections will experience excellent levels of service and minimal traffic delays for exiting traffic. Therefore, no operational improvements are required to support the development.
- The proposed locations of the site access points were also reviewed to ensure the provision of adequate spacing between adjacent intersections. In consideration of the road classifications, projected traffic volumes and the Transportation Association of Canada intersection spacing guidelines, the proposed locations are considered appropriate.
- The available sight lines on both Alice Street and Alfred Street to/from the east and west of the site access points are considered appropriate for a design speed of 60 km/h. Vehicles manoeuvring to and from the site can do so in a safe and efficient manner. As such, no further improvements are required to address sight line constraints.
- A turning analysis verifies that the proposed roadway can accommodate emergency vehicles (i.e. fire truck). Refer to drawing T01 – Turning Analysis.

The Traffic Impact Brief should be read in conjunction with this report.

7 Utilities

7.1 ELECTRICAL SERVICES

Electrical services fronting the proposed site are available along Alice Street West and Alfred Street West. Tatham Engineering will be reviewing the proposed development from an electrical servicing standpoint and will confirm if external plant upgrades are required to service the site following submission of an electrical distribution plan.

7.2 GAS SERVICES

Union Gas was contacted about their existing gas mains in the area and their ability to service the proposed development. Union gas have a high-pressure gas main adjacent to the proposed development, on the south side of Alice Street West, and another high-pressure gas main on the north side of Alfred Street West. Union Gas to confirm that these mains will provide sufficient capacity for the site.

7.3 TELEPHONE & INTERNET SERVICES

Bell has been contacted regarding available services in the area. Bell has confirmed the site can be serviced with fibre optic cable located on the north side of Alice Street West.

Rogers has been contacted regarding available services in the area.

7.4 POSTAL SERVICES AND DELIVERY

Canada Post has confirmed that a community mailbox on a concrete pad that is supplied by the developer is required for postal services. Refer to proposed location of the community mailbox within Block 16 on drawing SG01 – Site Grading Plan.

8 Summary

As outlined above, existing infrastructure surrounding the subject property can adequately service the development for sanitary sewage, potable water, hydro, natural gas, and telecommunications. Additionally, a Stormwater Management Plan submitted under separate cover confirms that applicable runoff, quantity, quality and erosion targets will be met. A Traffic Impact Study submitted under a separate cover confirms that the proposed development will not adversely affect the existing surrounding road network. A summary of the servicing strategy is as follows:

- Potable water will be provided by connecting into the existing 150 mm diameter watermain on the north side of Alfred Street West with a proposed 150 mm PVC watermain that extends into the subject site underneath the road corridor. The system will be looped by connecting the proposed watermain to a future 150 mm watermain on the north side of Alice Street West.
- Sanitary flows from the proposed development will drain to the existing 200 mm diameter sanitary sewer along Alice Street West, north of the proposed site and 35 m northwest of SAN MH5. An additional maintenance structure will be required to tie into the existing sanitary sewer.
- Stormwater management quantity control will be provided by an underground storage system in the north-east corner of the proposed site. Stormwater will discharge into the Alice Street West storm sewer system.
- Stormwater management quality control will by provided by a Stormceptor EFO6 and CB shields to provide at least 80% total solids removal and treat 90% of the surface runoff generated from its contributing drainage area.
- Electrical services fronting the proposed site are available along Alice Street West and Alfred Street West. Tatham Engineering will review electrical servicing and confirm if external plant upgrades are required to service the site. Capacity of the existing high pressure gas mains north and south of the development will require confirmation. Bell has confirmed the site can be serviced with fibre optic cable north of the site.

Additional details related to the various servicing components will be provided at the detailed design stage. Detailed drawings will be completed for approval by the Town and relevant regulatory agencies to clear the conditions of Draft Plan Approval and allow for registration of the Plan of Subdivision and the associated Subdivision Agreement.

Appendix A:
Sanitary Design Sheets

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Sanitary Sewer Design Sheet

Version Number: 2 **Version Date:** December 13, 2022

Project Information

24 Alfred Street	121108

Drawing Reference

SAN01	December 13-22

Prepared By

Kyle Gowanlock	December 13-22

Reviewed By

Doris Casullo	December 13-22

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	101	SAN MH6B	SAN MH5B	Residential	Med.	2	4.6	4.6	4.44	0.20	0.20	0.02	0.05	0.07	0.11	0.05	0.15	26.7	1.0%	200	1.04	32.80	0.28	27	0.5%
Street A	102	SAN MH5B	SAN MH4B	Residential	Med.	2	4.6	9.2	4.42	0.11	0.31	0.05	0.07	0.12	0.21	0.07	0.28	12.6	0.8%	200	0.93	29.34	0.31	35	1.0%
Street A	103	SAN MH4B	SAN MH3B	Residential	Med.	10	23.0	32.2	4.35	0.51	0.82	0.17	0.19	0.36	0.73	0.19	0.92	84.0	0.8%	200	0.93	29.34	0.42	55	3.1%
Street A	104	SAN MH3B	SAN MH2B	Residential	Med.	2	4.6	36.8	4.34	0.15	0.97	0.19	0.22	0.41	0.84	0.22	1.06	22.6	0.8%	200	0.93	29.34	0.44	58	3.6%
Street A	105	SAN MH2B	SAN MH1B	Residential	Med.	0	0.0	36.8	4.34	0.15	1.12	0.19	0.26	0.45	0.84	0.26	1.09	33.7	0.5%	200	0.74	23.19	0.37	64	4.7%

Appendix B:
Water Supply Calculations

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Project:	24 Alfred Street
File No.:	121108
Date:	Dec. 2022
Design:	KG
Checked:	DC
Revision:	2

WATERMAIN

Calculation of Water Flow Rates for Different Pipe Sizes
(Hazen Williams Formula - S.I. units)

Pipe Material: PVC
Hazen Williams Coefficient, **C** = 150
Pressure drop over the pipe length, DP = Average Day Min. Pressure - Peak Hour Min. Pressure = 75 kN/m^2

Pipe Length (m)	**Water Flow Rate (m^3/hr) Pipe Diameter (mm)**									
	20	25	40	50	65	75	100	130	**150**	200
258	0.8	1.4	4.7	8.5	17.0	24.7	52.7	105.1	**153.1**	326.3

Flow rate provided by 150 mm dia. water service = 153.1 m^3/hr
= 42.53 L/s

Flow rate required (from peak flow water supply calculations)
Average Daily Demand = 17595 L/d
Peak Hour Factor = 13.8
Peak Hour Demand **= 2.81 L/s**

CHECK: Q_{req} = 2.8 L/s < Q_{pro} = 42.5 L/s **Acceptable**

Hazen Williams Equation as used in this spreadsheet:

$$Q = (3.763 \times 10^{-6})\, C\, D^{2.63} (DP/L)^{0.54}$$

where Q is the water flow rate in m^3/hr
D is the pipe diameter in mm
L is the pipe length in m
DP is the pressure difference across pipe length L in kN/m^2

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Project:	24 Albert Street
File No.:	121108
Date:	Dec. 2022
Design:	KG
Checked:	DC
Revision:	1

FIRE FLOW - WATERMAIN

Calculation of Water Flow Rates for Different Pipe Sizes
(Hazen Williams Formula - S.I. units)

Pipe Material: PVC
Hazen Williams Coefficient, **C** = 150
Pressure drop over the pipe length, DP = Max. Day Min. Pressure - Fire Sup. Min. Pressure = 260 kN/m^2

Hydrant Location	Pipe Length (m)	Water Flow Rate (L/s) Pipe Diameter (mm)								
		25	40	50	75	100	130	**150**	200	250
North	97	1.3	4.4	7.8	22.8	48.6	96.9	**141.1**	300.8	540.9
South	74	1.5	5.1	9.1	26.4	56.2	112.1	**163.4**	348.1	626.0

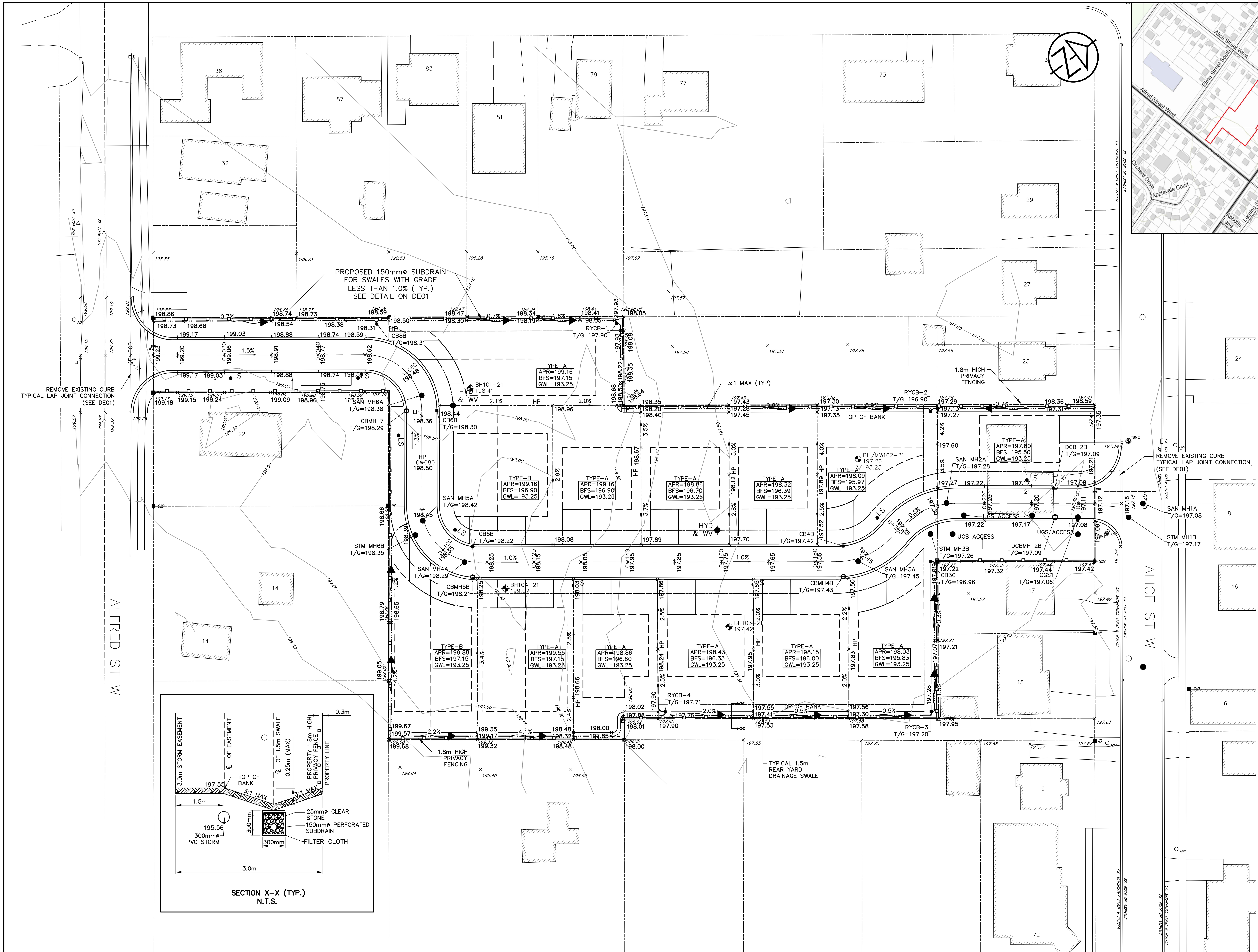
Minimum Required Fire Flow (from Section 3.2.1 Fire Protection)

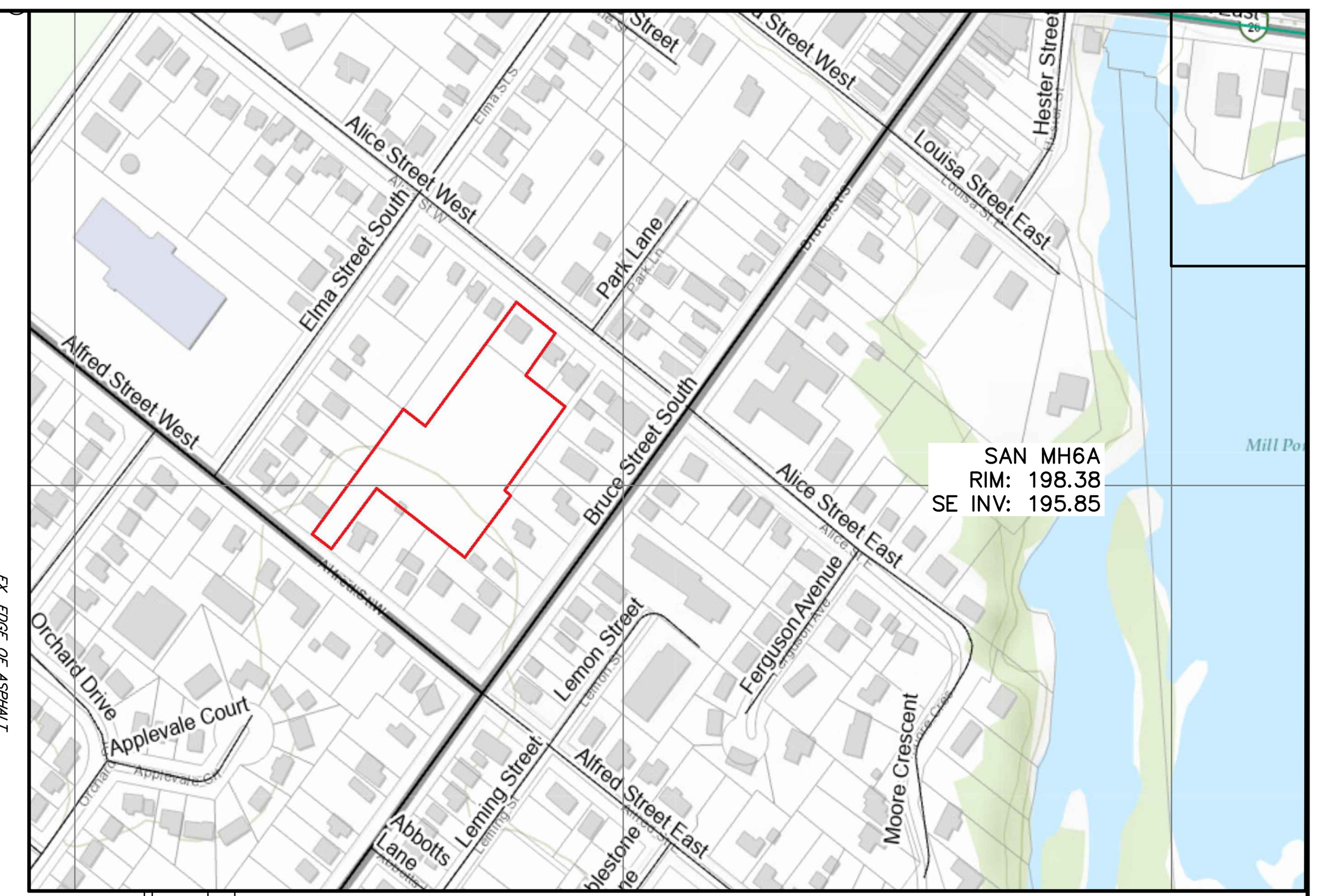
North Hydrant:	$Q_{req,N}$ =	134.9	L/s	<	$Q_{pro,N}$ =	141.1	L/s	**Acceptable**
South Hydrant:	$Q_{req,W}$ =	134.9	L/s	<	$Q_{pro,W}$ =	163.4	L/s	**Acceptable**

Hazen Williams Equation as used in this spreadsheet:

$$Q = (3.763 \times 10^{-6})\ C\ D^{2.63}(DP/L)^{0.54}$$

where Q is the water flow rate in m^3/hr
D is the pipe diameter in mm
L is the pipe length in m
DP is the pressure difference across pipe length L in kN/m^2





KEY PLAN

LEGEND

LOT GRADING TYPE (SEE SG02)	(A)
MINIMUM APRON GRADE (ONE LOCATION)	APR=192.00
MINIMUM BASEMENT FLOOR SLAB	BFS=189.70
SEASONAL HIGH GROUNDWATER LEVEL	GWL=189.40
EXISTING SPOT ELEVATION	× 191.50
PROPOSED SPOT ELEVATION	× 191.50
PROPOSED GRADING DIRECTION/SLOPE	2.0%
BOREHOLE/MONITORING WELL LOCATION	BH101 EL. 192.25 ▽ 189.8
PROPOSED PRIVACY FENCING (1.8m)	
EXISTING FENCING	
PROPOSED MAINTENANCE HOLE	
PROPOSED CATCH BASIN	CB
PROPOSED CATCH BASIN MAINTENANCE HOLE	CBMH
PROPOSED DOUBLE CATCH BASIN	DCB
PROPOSED LIGHT STANDARD	LS
PROPOSED FIRE HYDRANT	HYD & WV
TEMPORARY BENCHMARK	TBM

GENERAL NOTES:

1. THE GROUND WATER ELEVATIONS NOTED FOR LOTS 1–13 ARE BASED ON THE MONITORING WELL MEASUREMENTS AND TEST PIT INVESTIGATION FROM CAMBIUM INC. THE GROUND WATER LEVELS FOR EACH LOT IS TO BE CONFIRMED DURING THE INDIVIDUAL LOT GRADING PLANS AND PRIOR TO THE HOUSE CONSTRUCTION, TO ENSURE THE TOWN'S MINIMUM SEPARATION OF 0.3M BETWEEN THE SEASONAL HIGH GROUND WATER TABLE AND BASEMENT SLAB IS ACHIEVED.

BENCHMARKS

TBM1 – ELEVATION 197.30
BASE OF SIB ON WEST SIDE OF ALICE ST W

TBM2 – ELEVATION 197.28
TOP OF LID OF MHSA15 ON ALICE ST W

NOTES

LEGAL SURVEY INFORMATION AND LOT DIMENSIONS SHOWN ON THIS PLAN ARE TAKEN FROM A SURVEY PLAN PREPARED BY ZUBEK, EMO, PATTEN & THOMSEN LIMITED, DATED APRIL 3, 2012. WHICH MAY NOT BE FINAL AND ARE NOT GUARANTEED. THE FINAL REGISTERED PLAN OF SUBDIVISION SHALL BE REFERRED TO FOR CONFIRMATION OF THE DATA.

TOPOGRAPHIC INFORMATION SHOWN ON THIS PLAN FROM SURVEY PREPARED BY GM BLUEPLAN ENGINEERING LIMITED DATED JUNE 5, 2018 AND DECEMBER 5, 2011.

No.	REVISION DESCRIPTION	DATE
1.	1ST SUBMISSION	2022–02–09
2.	REVISED AS PER DRC COMMENTS	2022–05–27
3.	UPDATED 1ST SUBMISSION	2022–12–20

ENGINEER STAMP

LICENSED PROFESSIONAL ENGINEER
2022.12.20
D. M. CASULLO
PROVINCE OF ONTARIO

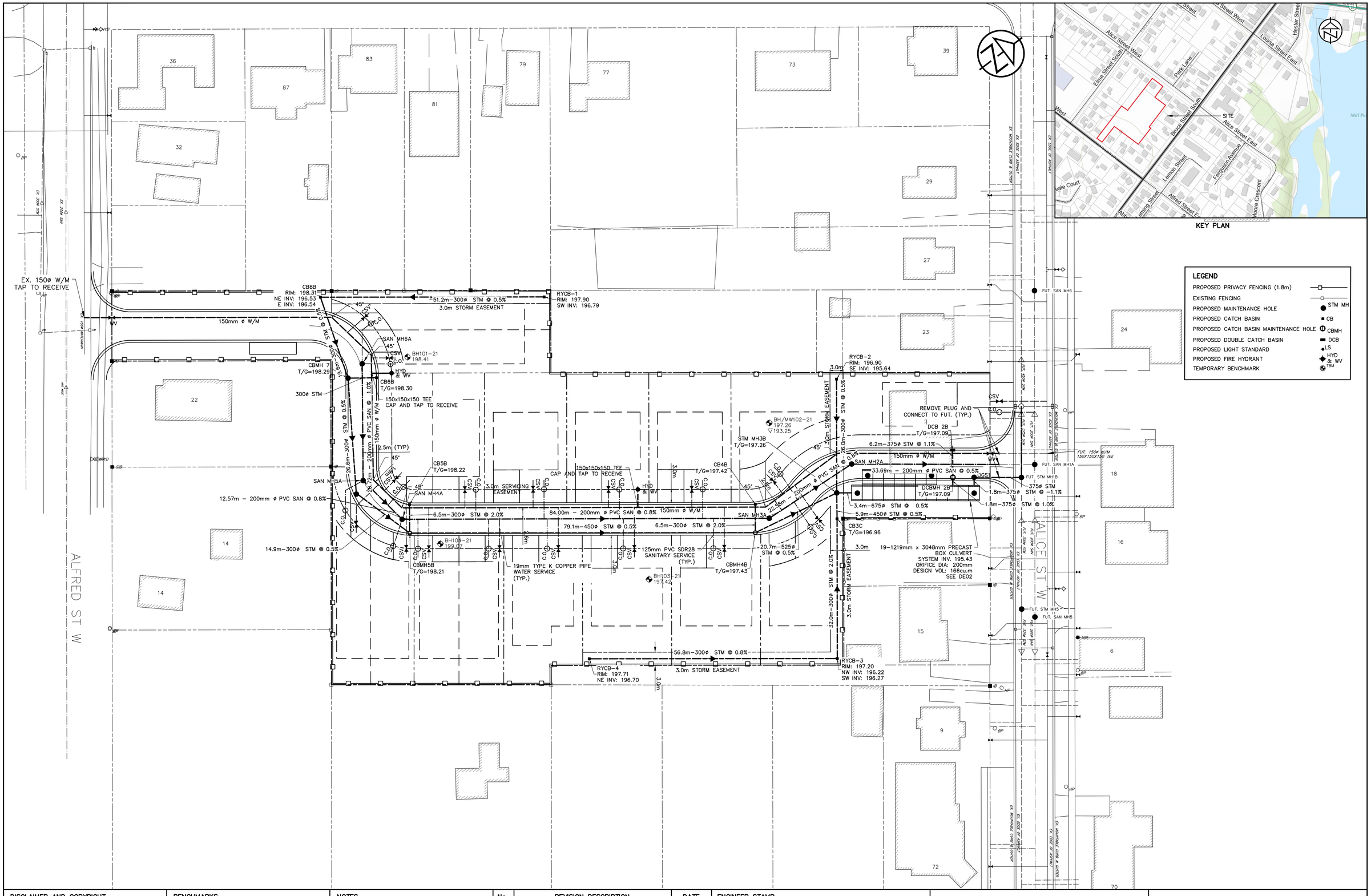
24 ALFRED STREET
TOWN OF THE BLUE MOUNTAINS

SITE GRADING PLAN

TATHAM ENGINEERING

DESIGN: ADM/KG	FILE: 121108	DWG: SG01
DRAWN: ADM	DATE: FEB 2022	
CHECK: DC	SCALE: 1:400	

Drawing Name: 121108–SG01.dwg, Plotted: Dec 21, 2022



KEY PLAN

LEGEND

- PROPOSED PRIVACY FENCING (1.8m)
- EXISTING FENCING
- PROPOSED MAINTENANCE HOLE — STM MH
- PROPOSED CATCH BASIN — CB
- PROPOSED CATCH BASIN MAINTENANCE HOLE — CBMH
- PROPOSED DOUBLE CATCH BASIN — DCB
- PROPOSED LIGHT STANDARD — LS
- PROPOSED FIRE HYDRANT — HYD & WV
- TEMPORARY BENCHMARK — TBM

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.

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2.	REVISED AS PER DRC COMMENTS	2022–05–27
3.	UPDATED 1ST SUBMISSION	2022–12–20

ENGINEER STAMP

LICENSED PROFESSIONAL ENGINEER
2022.12.20
D. M. CASULO
PROVINCE OF ONTARIO

24 ALFRED STREET
TOWN OF THE BLUE MOUNTAINS

TATHAM ENGINEERING

SITE SERVICING PLAN

DESIGN: KG	FILE: 121108	DWG: SS01
DRAWN: ADM	DATE: FEB 2022	
CHECK: DC	SCALE: 1: 400	

Drawing Name: 121108–SS01.dwg, Plotted: Dec 22, 2022

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TOPOGRAPHIC INFORMATION SHOWN ON THIS PLAN FROM SURVEY PREPARED BY GM BLUEPLAN ENGINEERING LIMITED DATED JUNE 5, 2018 AND DECEMBER 5, 2011.

No.	REVISION DESCRIPTION	DATE
1.	1ST SUBMISSION	2022-12-20

ENGINEER STAMP

24 ALFRED STREET
TOWN OF THE BLUE MOUNTAINS

TATHAM ENGINEERING

TURNING ANALYSIS

DESIGN: KG	FILE: 121108	DWG:
DRAWN: KH	DATE: DEC 2022	T01
CHECK: DC	SCALE: 1:350	

Drawing Name: 121108-Turning Analysis.dwg, Plotted: Dec 19, 2022