

Functional Servicing Report

**157 Ardagh Road
City of Barrie**

**WMI File #21-689
November 2021**

Prepared by

**WMI & Associates Limited
119 Collier Street, Barrie Ontario L4M 1H5**



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1.0 Background

1.1 General

WMI & Associates Limited has been retained by the owner of 157 Ardagh Road, Barrie, through Innovative Planning Solutions to prepare site servicing and grading designs in support of the proposed 2 lot severance.

This Functional Servicing Report presents our engineering work related to the proposed 2 lots and has been completed with regard to good engineering practices, City of Barrie Standards and in discussion with City of Barrie Development Services Department. Our proposed solutions focus on maintaining existing drainage patterns and perimeter elevations to suit adjacent properties, as well as proposing new services be extended from existing municipal infrastructure.

1.2 Site Description

The subject site comprises approximately 0.10ha and is located 24.0m east of the intersection of Snowshoe Trail and Ardagh Road. The general location of this property is illustrated on **FIG 1** in **Appendix A** (Site Location Plan) and will be referred to as the “site” within the context of this report. This report is based on the Site Plan prepared by Innovative Planning Solutions (October 7, 2021) and the topographic survey completed by Krcmar Surveyors Ltd (August 25, 2021).

The site currently contains one detached garage with associated driveway for Lot 159 Ardagh Road, accessed from Snowshoe Trail and an existing driveway from Ardagh Road. The subject site is bound by an existing residential property to the east, west and south, with Ardagh Road to the north.

The proposed development will create 2 single family lots with driveways connecting to Ardagh Road.

1.3 Existing Topography and Drainage Patterns

The site is currently drained via overland sheet flow towards the north property limits in keeping with the natural topography of the area. The existing topographic relief of the site is 5.0m. External drainage (0.06ha) from the wooded area to the south of the property contributes to the overall drainage of this development with a further topographic relief of 5.0m for a total elevation difference of the drainage area of 10.0m.

The overland sheet flow is from the south, flowing northerly at 6:1 slope until it reaches the existing garage and splits the flow around the west and east sides of the structure at 4-6%. The existing driveway from Ardagh Road slopes at 4-5% to the north with the surrounding unimproved lawn climbing 6:1 to the property lines and to the garage in the south.

Site drainage ultimately flows to the Ardagh Road ROW in the north where it connects with the existing major (roadway) and minor (sewer) storm systems on Ardagh Road.

The pre-development drainage patterns have been confirmed through a combination of topographic survey and the Simcoe County's Interactive GIS mapping.

2.0 Site Grading and Drainage

The grading design for the proposed single family lots will be rear to front drainage to match the existing site topography. External drainage south of the site flows onto the subject site. A rear yard apron swale with the high point at the property line between Lot #1 and #2 will direct drainage away from the proposed buildings to perimeter swales draining to Ardagh Road. A retaining wall running the length of the driveway is required for Lot #1 to meet the grading requirements at the side and front yard property lines. A portion of the existing retaining wall, including the fence, fronting Lot #1 is required to be removed and replaced

The following highlights the proposed grading features:

- Rear-to-front lot drainage.
- Foundation drain sump pumps to be directed to side yard swales and ultimately toward Ardagh Road.
- Roof drainage to be directed to down spouts at the front of the building into soak-away pits. Any overflow is directed to the north towards Ardagh Road.
- Property perimeter elevations will be maintained and therefore the proposed grading will not adversely impact or alter the adjacent properties.
- Rear yard drainage from the south will be redirected westerly for Lot #1 and easterly for Lot #2 by the apron swales to direct flow northerly to Ardagh Road with the swale high point at the property line between Lot #1 and #2.

The Site Servicing and Grading Plan is contained in **Appendix A**.

3.0 Sanitary Servicing

Background information for the surrounding areas notes there is an existing municipal sanitary sewer connection for the lot at 157 Ardagh Road from the Ardagh Road municipal sanitary main.

Due to proximity, it is proposed to use the existing sanitary connection for the proposed Lot #2. Although this service location and condition is not exactly known, it will be located and the condition confirmed during construction. This service will have a clean-out installed on the property line per OBC requirements.

A 100mm dia. service to the existing sanitary main on Ardagh Road is proposed for Lot #1 (connected by means of an Inserta-Tee). This service will have a clean-out for

the sanitary service at the property line per OBC requirements, and will be constructed to permit gravity drainage for the proposed home.

The Site Servicing and Grading Plan is contained in **Appendix A**.

4.0 Water Servicing and Fire Protection

A 19mm dia. water service for this property currently exists fronting Lot #1 and is connected to the 300mm diameter municipal watermain on Ardagh Road; it is proposed to use this existing service for Lot #1.

Lot #2 will be serviced with a new 25mm dia. water service to the existing 300mm diameter municipal watermain on Ardagh Road, complete with curb stop at the property line for domestic servicing.

A fire flow test was completed at the municipal fire hydrant at the intersection of Elizabeth Street and Ardagh Road, (approximately 40m east of Lot #2). Based on the City of Barrie Fire Flow requirements as detailed in Water Transmission and Distribution Policies and Design Guidelines (August 2021) residential fire flows of 100L/s at 20psi is required. This test result was used to confirm that fire suppression can be provided per City of Barrie and Fire Underwriters Survey (FUS) requirements. The fire flow testing results, City of Barrie fire flow and FUS calculations are included in **Appendix B**. The calculations indicate that the available fire flow within the municipal water distribution system (110.3L/s) is greater than both the required City of Barrie fire flow (100L/s) and the FUS fire flow (100L/s). The FUS calculation is based on a firewall between residence.

5.0 Summary

This Functional Servicing and Stormwater Management Report and associated figures and drawings illustrates how the proposed 2 lots can be serviced with municipal infrastructure and how the grading design can be complimentary to the adjacent properties while ensuring drainage is maintained.

Specifically:

- Lot #2 can be serviced with existing sanitary connection to the Ardagh Road sanitary main. Lot #1 will require a new 100mm dia. sanitary service to be connected by means of an Inserta-Tee at the sanitary main.
- The existing 19mm dia. water service fronting Lot #1 will be used. A new 25mm dia. water service is proposed for Lot #2 connected to the existing 300mm dia. watermain on Ardagh Road.
- Fire protection can be provided by the existing Fire Hydrant on Ardagh Road.
- The proposed lot grading will ensure no negative drainage impact on downstream or adjacent properties.

- Drainage for the site in the developed condition will improve upon the pre-development condition.

Should you have any questions, or require additional information, please contact the undersigned.

Prepared by:
WMI & Associates Limited



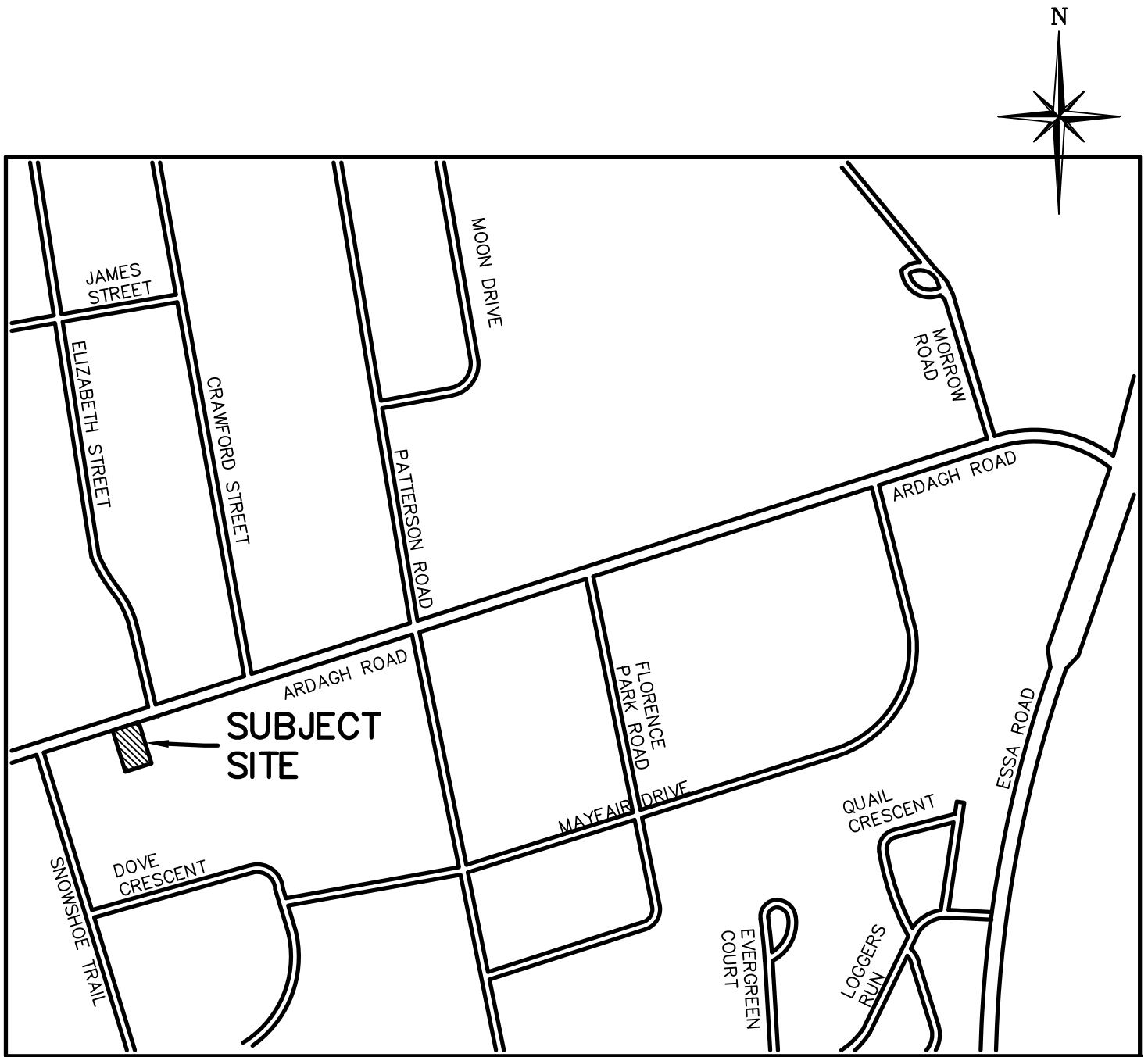
Chris Jungkunz, EIT



Dean A. Ives, P. Eng.

APPENDIX A

FIGURES/DRAWINGS



Drawing Title

SITE LOCATION PLAN

Project Title

157 ARDAGH ROAD



WMI & Associates Limited
119 Collier Street
Barrie, Ontario
L4M 1H5
705-797-2027
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Drawn By

CJ

Checked By

DAI

Figure No.

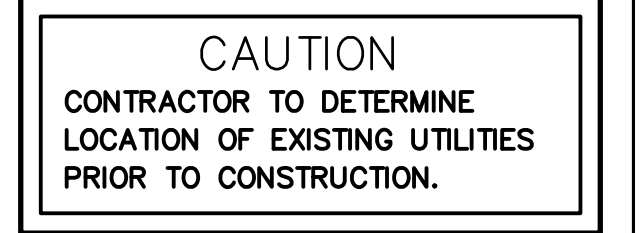
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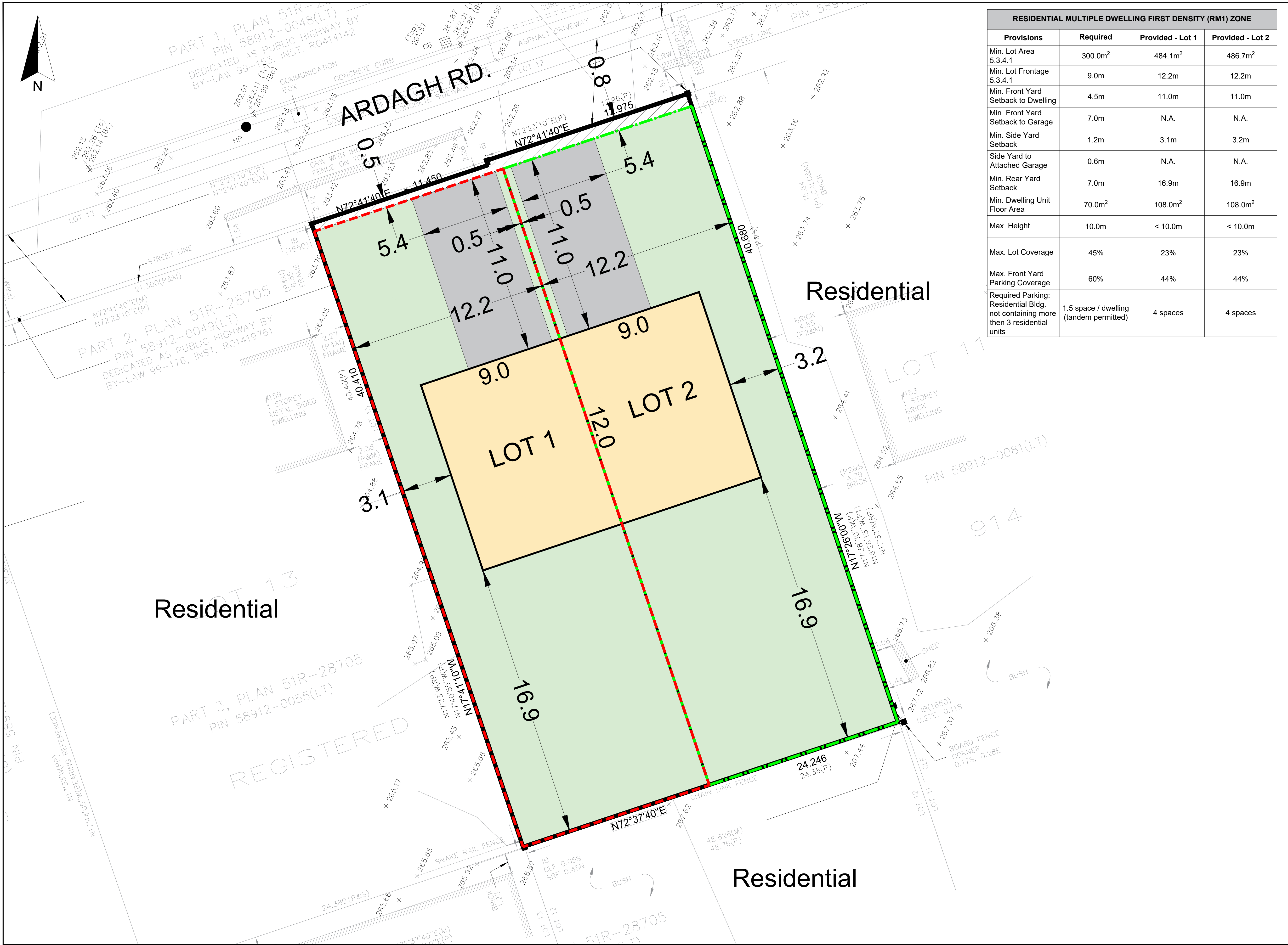
Project No.

21-689

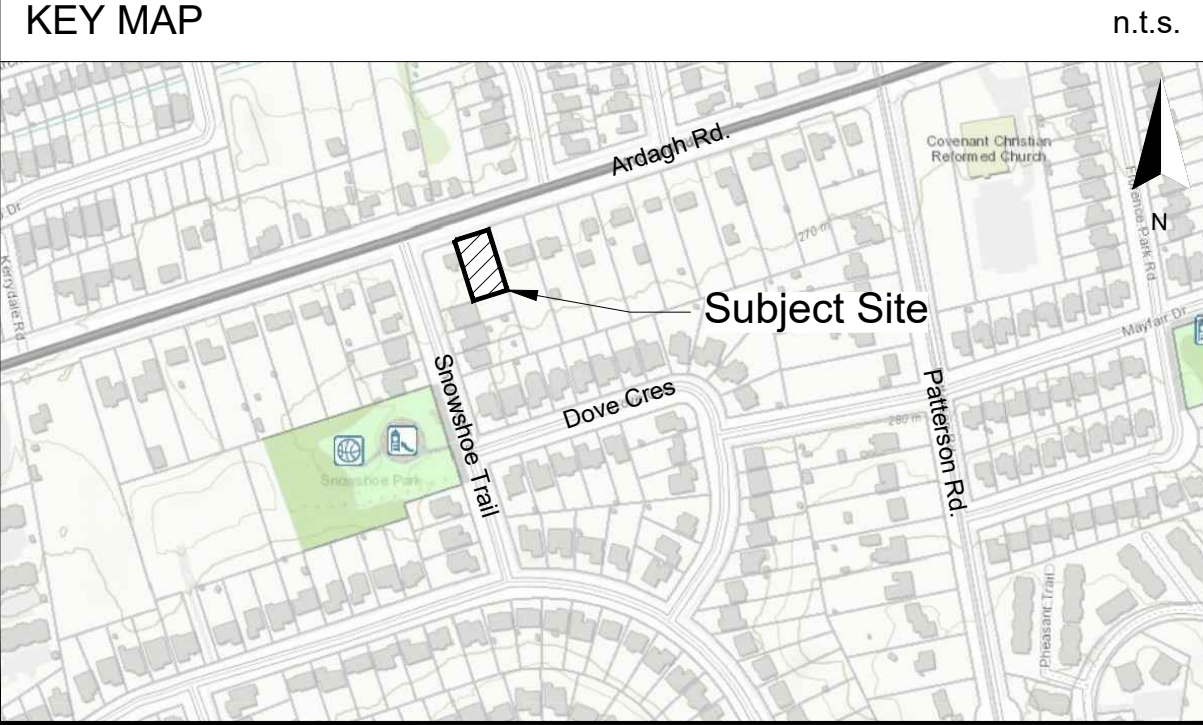
FIG1



<u>Client:</u> Innovative Planning Solutions 647 Welham Road, Unit 9 Barrie ON L4N 0B7	 WMI & Associates Limited 119 Collier Street Barrie, Ontario L4M 1H5 Ph 705-797-2027 www.wmiengineering.ca		SSG
	Drawn By CJ	Checked By DAI	
Scale 1:125	Project No. 21-689		

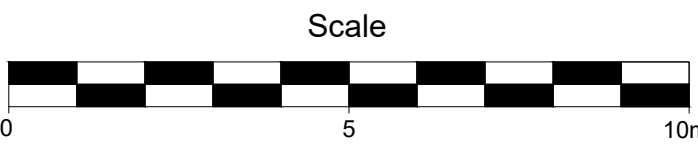


RESIDENTIAL MULTIPLE DWELLING FIRST DENSITY (RM1) ZONE			
Provisions	Required	Provided - Lot 1	Provided - Lot 2
Min. Lot Area 5.3.4.1	300.0m ²	484.1m ²	486.7m ²
Min. Lot Frontage 5.3.4.1	9.0m	12.2m	12.2m
Min. Front Yard Setback to Dwelling	4.5m	11.0m	11.0m
Min. Front Yard Setback to Garage	7.0m	N.A.	N.A.
Min. Side Yard Setback	1.2m	3.1m	3.2m
Side Yard to Attached Garage	0.6m	N.A.	N.A.
Min. Rear Yard Setback	7.0m	16.9m	16.9m
Min. Dwelling Unit Floor Area	70.0m ²	108.0m ²	108.0m ²
Max. Height	10.0m	< 10.0m	< 10.0m
Max. Lot Coverage	45%	23%	23%
Max. Front Yard Parking Coverage	60%	44%	44%
Required Parking: Residential Bldg. not containing more than 3 residential units	1.5 space / dwelling (tandem permitted)	4 spaces	4 spaces



CONCEPTUAL SITE PLAN

Part Lot 12, Registered Plan 914
City of Barrie,
County of Simcoe



LEGEND

- Subject Site
 - Area: 986.9m²
- Proposed Semi-Detached Dwelling
 - Dwelling G.F.A.: 108.0m² (1,162.5ft²) / floor
- Lot 1: Lands to be Severed:
 - Area: 484.1m²
 - Frontage: 12.2m
- Lot 2: Lands to be Retained:
 - Area: 486.7m²
 - Frontage: 12.2m
- Proposed Road Widening

Source: Zoning By-Law 2009 - 141
Discover Barrie, 2020 Imagery
C.A. MacDonald Surveying Inc., November 19, 2018
Note: Information shown is approximate and subject to change.

CONCEPTUAL SITE PLAN

157 ARDAGH RD., BARRIE

SCHEDULE OF REVISIONS			
No.	Date	Description	By

IPS INNOVATIVE PLANNING SOLUTIONS
PLANNERS • PROJECT MANAGERS • LAND DEVELOPERS
647 WELHAM ROAD, UNIT 9A, BARRIE, ON, L4N 0B7
tel: 705 • 812 • 3281 fax: 705 • 812 • 3438 e: info@ipsconsultinginc.com www.ipsconsultinginc.com

Date: October 7, 2021 Drawn By: A.S.
File: 21-1079 Checked: G.B.

APPENDIX B

Fire Flow Calculations and Fire Test Results

FLOW TEST RESULTS



DATE : SEPT 23, 2021 TIME : 11: 00 AM

LOCATION : 157 ARDAGH RD

CITY OF BARRIE

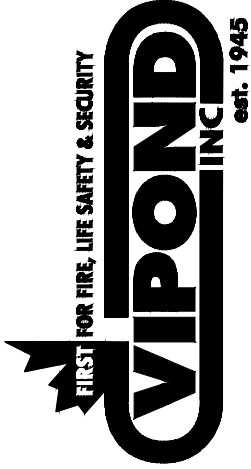
ONTARIO

TEST BY : VIPOND FIRE PROTECTION AND LOCAL PUC



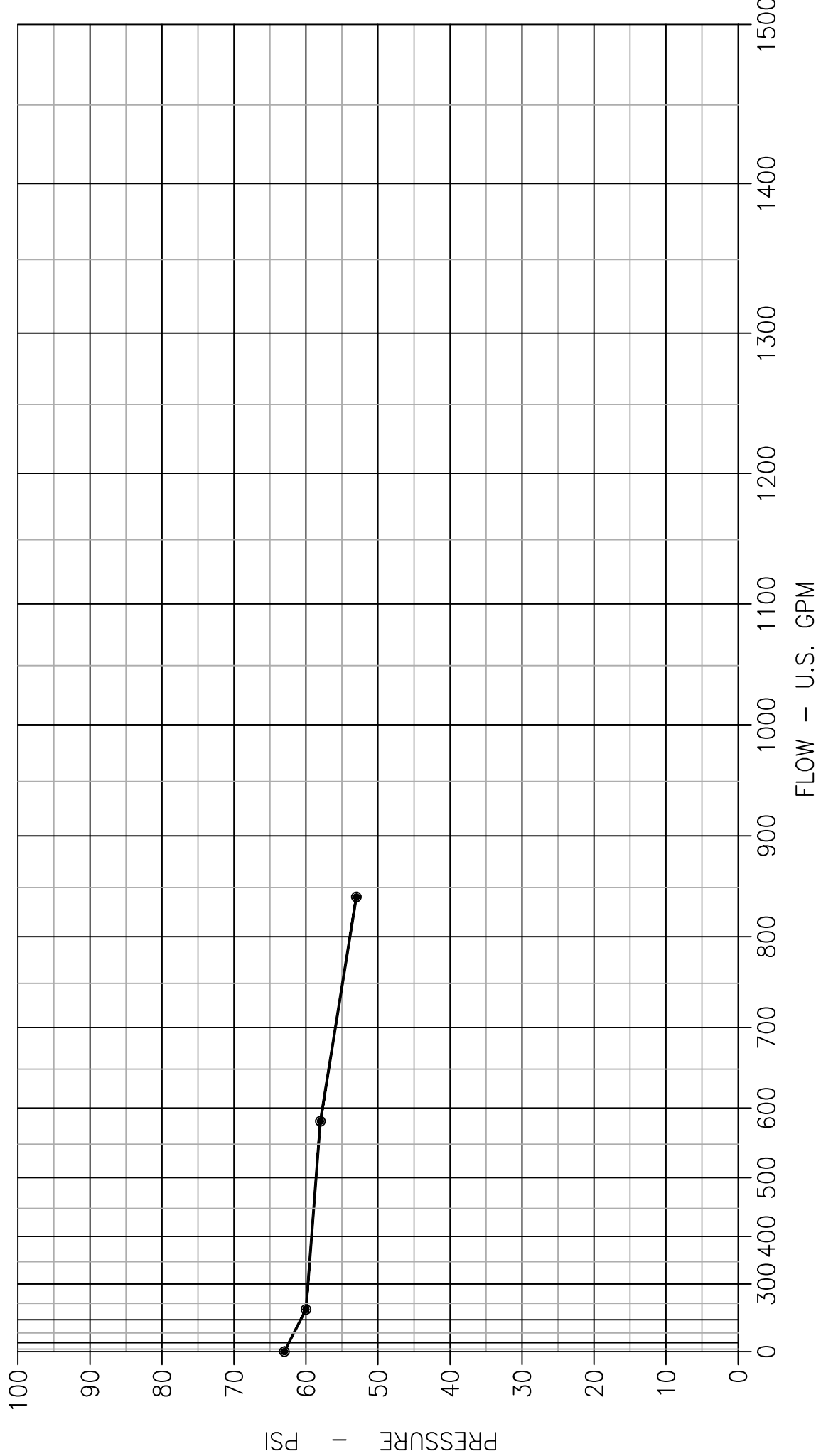
STATIC PRESSURE : 63 PSI

TEST NO.	NO. OF NOZZLES	NOZZLE DIAMETER (INCHES)	DISCHARGE CO-EFFICIENT	RESIDUAL PRESSURE (PSI)	PITOT PRESSURE (PSI)	DISCHARGE (U.S.GPM)
1	1	1-1/8	0.995	60	52	269
2	1	1-3/4	0.90	58	41	570
3	1	2-1/2	0.90	53	25	843



157 ARDAGH RD	BY : LEN K./KRYSTIAN K.
CITY OF BARRIE	OFFICE : BARRIE
ONTARIO	TEST BY : VIPOND & PUC
	DATE : SEPT 23, 2021

STATIC:	RESIDUAL:	FLOW:
63 PSI	TEST#1 60 PSI @ 269 GPM	
	TEST#2 58 PSI @ 570 GPM	
	TEST#3 53 PSI @ 843 GPM	





FIRE FLOW ANALYSIS CALCULATIONS

Ardagh Road: Snowshoe Trail/Elizabeth Street 2-1/2" Nozzle

Date: 26-Oct-21

Project No.: 21-689

Project: 157 Ardagh Road

Prepared By: CJ



<<< Elements Requiring Input Information

Fire Flow Calculations

Flow test data from Vipond and PUC at the municipal hydrant located on Ardagh Road dated September 23, 2021.

Static Pressure	63 psi	434 kPa
Residual Pressure (residual during single port test flow)	53 psi	365 kPa
Flow (single port test flow on hydrant)	843 USGPM	53 L/s

City of Barrie Water Transmission and Distribution Policies and Design Guidelines (Aug. 2021)

4.3. Watermain Design Criteria

- Section 4.3.1. Fire Flows shall meet the following criteria:
- Large Residential Lots: minimum 70 L/s @ 20 psi
 - Residential: 100 L/s @ 20 psi
 - Townhouse: 155 L/s @ 20 psi
 - Apartment: 200 L/s @ 20 psi
 - High Rise Residential/Downtown/Mixed: Calculations required to be provided
 - Institutional: 200 L/s @ 20 psi
 - Commercial: 283 L/s @ 20 psi
 - Industrial: 333 L/s @ 20 psi

Hydrant Flow Calculations

$$Q_A = Q_T \sqrt{(h_a/h_t)}$$

where,

Q_A = Flow at 20 psi (138kpa)
 Q_T = Flow at Test
 h_a = Pressure Drop Available (static - min. allowable)
 h_t = Pressure Drop at Test (static - residual at tested flow)

$Q_A =$	843	√	((63	-	20) / (63	-	53)
$Q_A =$	1748	USGPM	@	20	psi						
$Q_A =$	110.3	L/s	@	20	psi						

Since the available fire flow within the existing municipal water distribution system is greater than the minimum required fire flow of 100L/s @ 20psi for residential areas, the existing water distribution system is considered to adequately service the proposed development from a fire protection requirements perspective.

The fire flow required from the Fire Underwriters Survey is 100L/s which the existing water distribution system meets requirements.



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FIRE PROTECTION WATER DEMAND DESIGN CALCULATIONS
FIRE UNDERWRITERS SURVEY METHOD

Date: 26-Oct-21

Project No.: 21-689

Project: 157 Ardagh Road

Prepared By: CJ

Fire Protection Water Storage

<<< Elements Requiring Input Information

Reference: Part II Water Supply for Public Fire Protection, Fire Underwriters Survey, 1999

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

where F=the required fire flow in litre per minute

C=coefficient related to type of construction

1.5 for wood frame construction

1.0 for ordinary construction - brick or other masonry wall, combustible floor and interior

0.8 for non-combustible construction - unprotected metal structure components masonry or metals walls

0.6 for fire resistive - fully protected frame floors, roof

A= the total floor area in square metres - incl. all storeys excluding basements 50% below grade

*C=	1.0	
*A=	432	
F=	4573	
**Apply reduction for low contents fire hazard	-25	%
F=	3429	
***Apply reduction for automatic sprinklers designed to NFPA 13 (30%), systems with water supply (10%) and systems with electronic supervision (10%)	0	%
F=	3429	litres/min
F=	57.2	litres/sec
****Add to flow for separation <u>per side</u> where separation is less than 45m. Max increase is 75%	75	%
F=	6002	litres/min
F=	100.0	litres/sec

Note:

*Floor area and 'C' coefficient have been assumed based on building envelopes and residential construction with firewall between residences. The building envelope areas have been combined into one area as they attached

**A reduction of 25% has been provided due to the building containing low fire contents.

***Buildings are not sprinklered therefore no reduction has been added.

****Max 75% increase for separation was assumed based on surrounding lots.



<<< Elements Requiring Input Information

Date: 22-Oct-21
Project No: 21-689
Prepared by: CJ

where,

- V = mean velocity (m/s)
- k = 0.85 for SI units
- C = Roughness Coefficient
- R = hydraulic radius (m)

Prepared by: CJ

NOTES:

- Loss Coefficient:	1 - 90° Bends @ K=1	1 - 90° Bends @ K=1
	2 - Valves @ K=0.12	2 - Valves @ K=0.12

-The City of Barrie's watermain design criteria of 3.25 people per unit and 225 Litres/Capita/Day have been used to calculate the required flow. Total flow equals 731.25L/D (0.01L/s), per lot.
-The starting pressure for the proposed watermain has been taken from the Vipond Inc. fire flow test results dated September 23, 2021 having a static pressure of 63psi.