Water Distribution Analysis for 1400 Baseline Road – Stoney Creek (Final)

City of Hamilton

Project number: 60663859

November 5 2021

Delivering a better world

Statement of Qualifications and Limitations

The attached Report (the "Report") has been prepared by AECOM Canada Ltd. ("AECOM") for the benefit of the Client ("Client") in accordance with the agreement between AECOM and Client, including the scope of work detailed therein (the "Agreement").

The information, data, recommendations and conclusions contained in the Report (collectively, the "Information"):

- is subject to the scope, schedule, and other constraints and limitations in the Agreement and the qualifications contained in the Report (the "Limitations");
- represents AECOM's professional judgement in light of the Limitations and industry standards for the preparation of similar reports;
- may be based on information provided to AECOM which has not been independently verified;
- has not been updated since the date of issuance of the Report and its accuracy is limited to the time period and circumstances in which it was collected, processed, made or issued;
- must be read as a whole and sections thereof should not be read out of such context;
- was prepared for the specific purposes described in the Report and the Agreement; and
- in the case of subsurface, environmental or geotechnical conditions, may be based on limited testing and on the assumption that such conditions are uniform and not variable either geographically or over time..

AECOM shall be entitled to rely upon the accuracy and completeness of information that was provided to it and has no obligation to update such information. AECOM accepts no responsibility for any events or circumstances that may have occurred since the date on which the Report was prepared and, in the case of subsurface, environmental or geotechnical conditions, is not responsible for any variability in such conditions, geographically or over time.

AECOM agrees that the Report represents its professional judgement as described above and that the Information has been prepared for the specific purpose and use described in the Report and the Agreement, but AECOM makes no other representations, or any guarantees or warranties whatsoever, whether express or implied, with respect to the Report, the Information or any part thereof.

Without in any way limiting the generality of the foregoing, any estimates or opinions regarding probable construction costs or construction schedule provided by AECOM represent AECOM's professional judgement in light of its experience and the knowledge and information available to it at the time of preparation. Since AECOM has no control over market or economic conditions, prices for construction labour, equipment or materials or bidding procedures, AECOM, its directors, officers and employees are not able to, nor do they, make any representations, warranties or guarantees whatsoever, whether express or implied, with respect to such estimates or opinions, or their variance from actual construction costs or schedules, and accept no responsibility for any loss or damage arising therefrom or in any way related thereto. Persons relying on such estimates or opinions do so at their own risk.

Except (1) as agreed to in writing by AECOM and Client; (2) as required by-law; or (3) to the extent used by governmental reviewing agencies for the purpose of obtaining permits or approvals, the Report and the Information may be used and relied upon only by Client.

AECOM accepts no responsibility, and denies any liability whatsoever, to parties other than Client who may obtain access to the Report or the Information for any injury, loss or damage suffered by such parties arising from their use of, reliance upon, or decisions or actions based on the Report or any of the Information ("improper use of the Report"), except to the extent those parties have obtained the prior written consent of AECOM to use and rely upon the Report and the Information. Any injury, loss or damages arising from improper use of the Report shall be borne by the party making such use.

This Statement of Qualifications and Limitations is attached to and forms part of the Report and any use of the Report is subject to the terms hereof.

AECOM: 2015-04-13

Quality information

Prepared by	Checked by	Verified by	Approved by
Poly Mitropoulou, M.Eng	Kevin Sze, P.Eng	Milan Kuljanin, B.Eng	Benny Wan, P.Eng

Revision History

Revision	Revision date	Details	Authorized	Name	Position
1	Sept 2021	Draft Report Submission v1			
2	Oct 2021	Draft Report Submission v2 (Addressed the City's comments received on Sept 28, 2021)			
3	Nov 2021	Final Report Submission			

Distribution List

# Hard Copies	PDF Required	Association / Company Name

AECOM Canada Ltd.
105 Commerce Valley Drive West, 7th Floor
Markham, ON L3T 7W3
Canada

T: 905.886.7022
F: 905.886.9494
www.aecom.com

Ms. Alissa Mahood, MCIP, RPP
Senior Project Manager - Community Planning & GIS
Planning and Economic Development
Planning City of Hamilton, ON
L8P 4Y

November 5, 2021

Project #
60663859

Subject: Water Distribution Analysis for 1400 Baseline Road – Stoney Creek, City of Hamilton (Final)

Dear Ms. Mahood,

AECOM is please to submit a Final Report for the “Water Distribution Analysis for 1400 Baseline Road – Stoney Creek”.

Should you need any further information, please contact let us know.

Sincerely,
AECOM Canada Ltd.

Milan Kuljanin, B.Eng
Project Manager
Milan.Kuljanin@aecom.com

Table of Contents

Figures

Tables

1 Introduction

1.1 Project Understanding

The City of Hamilton is initiating an amendment to the Urban Lakeshore Area Secondary Plan and a Zoning By-law amendment for the lands located at 1400 Baseline Road, Stoney Creek. The proposed population density (identified as Medium Density Residential 3) on the subject site exceeds the original design density assumptions (identified as Low Density Residential 2b). The City requires a hydraulic analysis using their current water distribution hydraulic model to evaluate the hydraulic impact of the proposed development on the City's PD1 water system under this proposed land use designation (Medium Density Residential 3).

The subject development, the location of which is shown in **Figure 1-1**, covers approximately 1.17 ha block of land, located within the City's Pressure District 1 (PD1). Water servicing for the subject lands could be provided by the following watermains in the vicinity of the site:

- Existing 300 mm diameter municipal watermain on Baseline Road.
- Existing 300 mm diameter municipal watermain on Lockport Way.
- Existing 400 mm diameter municipal watermain on North Service Road.

Figure 1-1: Site Location - 1400 Baseline Road, Stoney Creek

1.2 Scope of Work

The present study consists of the following tasks:

- Conduct two (2) fire hydrant flow tests along the existing watermains near the potential watermain connection by AECOM's sub-consultant, Vipond, to support model validation.
- Perform model validation to enhance the current hydraulic modelling accuracy by comparing modelling results with the fire flow testing results along the existing pipelines in the vicinity of the proposed development.
- Estimate water demands for the proposed development.
- Complete hydraulic analysis for existing (2021) and future (2031) scenarios to demonstrate serviceability for the proposed development under average day (ADD), maximum day (MDD) and peak hour (PHD) demand conditions, and confirm available fire flow (MDD plus FF scenario) for the development based on the supply boundary conditions and analysis criteria presented in **Section 5.2** and **Section 5.3**
- Review the hydraulic implications to the City's PD1 system under pre- and post- development conditions.
- Evaluate the impact to the PD1 system with the proposed development to demonstrate adequate services when no nodes in PD1 (excluding the pumping station suction pipelines from PD1 reservoirs) fall below 20 psi under maximum day plus fire condition.
- Identify any water infrastructure upgrades needed to meet the analysis criteria.

2 Water System Description

The subject development is located within the City's Pressure District 1 (PD1) of the Hamilton water supply system. PD1 receives water directly form the Woodward Avenue High Lift Pumping Station (HWHLP) and includes three balancing reservoirs: the Kenilworth Access Reservoir (HDR01), the Greenhill Avenue Reservoir (HDR1B) and the Dewitt Road and Ben Nevis Drive Reservoir (HDR1C), providing water storage and maintaining system pressure for PD1.

The top water level (TWL) is 133.4 m in these three (3) reservoirs. The low water level (LWL) is 122.6 at the HDR1B reservoir, and 124.7 at the HDR1C and HDR01 reservoirs.

3 Hydraulic Model Update

The current WaterCAD hydraulic model was provided by the City of Hamilton and used as a baseline model for this study. The model was updated to include the water demand for the proposed development. Water servicing for the subject lands was assumed to be provided by the following proposed watermain connections to the existing watermains in the vicinity of the site:

- Connection Point 1: Existing 300 mm diameter municipal watermain on Baseline Road.
- Connection Point 2: Existing 300 mm diameter municipal watermain on Lockport Way.

Water demands for the development were distributed and allocated among two modelling junctions (Connection Point No.1 and Connection Point No.2) along the above two watermain as shown in **Figure 3-1**. The Connection Point No. 2 junction was added to the model and assigned an elevation extracted from the City's contour information.

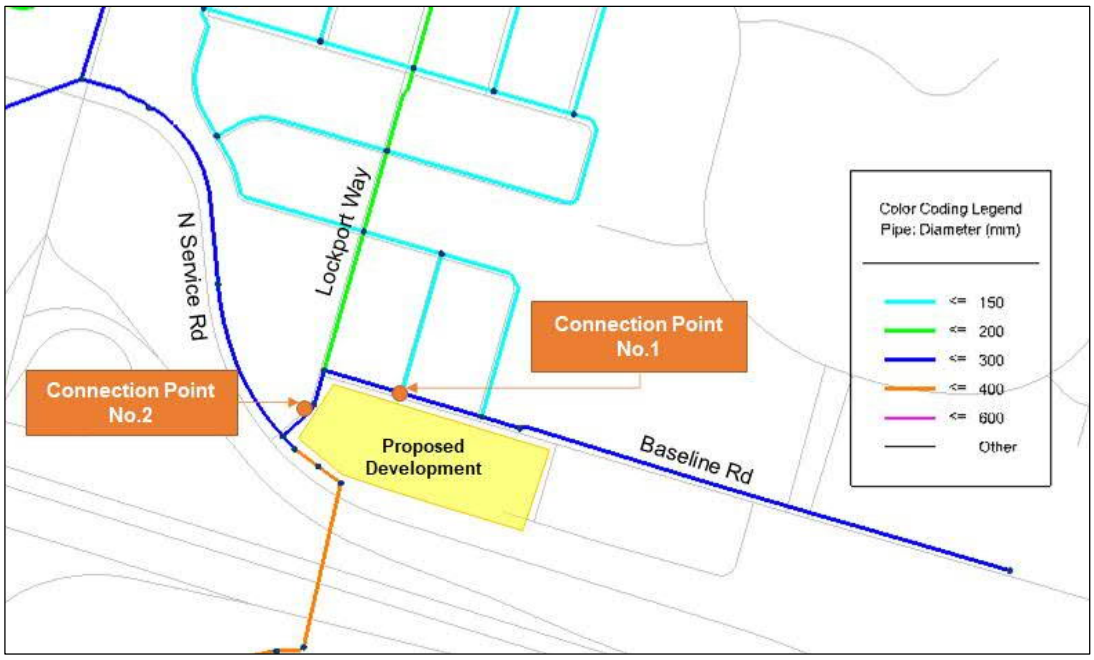


Figure 3-1: Model Layout for 1400 Baseline Road, Stoney Creek development

3.1 Water Demand

3.1.1 Design Criteria

As per the City of Hamilton Water and Wastewater Master Plan 2006, the water demands for the proposed development are based on the design parameters as summarized in **Table 3.1**.

Table 3.1: Design Criteria

Criterion	Value
Proposed Total Units (One 9 storey and townhouses/ maisonettes)	112 units*
Population Density	
Townhouse/Maisonette	2.44 persons/unit*
Apartment/Stacked Townhouses	1.66 persons/unit*
Average Day Demand (ADD) Consumption Rate	360 L/ca/day
Maximum Day Demand (MDD) Peaking Factor	1.9 x ADD
Peak Hour Demand (PHD) Peaking Factor	3 x ADD
Required Fire Flow (Residential Multi)	150 L/s*

Notes
* As per the Functional Servicing Report Scope and Details provided by the City

3.1.2 Demand Calculations

The average day demand for the proposed development area was calculated by multiplying the number of units with the population density and average day demand consumption rate, all provided in **Table 3.1**. The area includes a mix of townhouses / maisonettes and apartments/stacked townhouses. The peaking factors of 1.9 and 3 were used to estimate the maximum day demand and peak hour demand based on the average day demand, respectively.

The calculated water demands for the proposed development are summarized in **Table 3.2**. Detailed demand calculations are shown in **Appendix A**.

Table 3.2: Water Demand Summary

Demand Condition	Demand (L/s)
Average Day Demand (ADD)	0.9
Maximum Day Demand (MDD)	1.7
Peak Hour Demand (PHD)	2.7

4 Model Validation

In order to confirm the available system head / pressure along the existing pipelines in the vicinity of the development site, two (2) fire hydrant flow tests were carried out by Vipond Inc. at hydrants connected to the existing water pipelines along Baseline Road and North Service Road on August 12, 2021. The location of the hydrant flow tests and results are included in **Appendix B**.

Based on the fire flow test results, the detected static pressure was approximately 72 psi (or 496 kPa) corresponding to system head of approximately 133 m at the site location. The maximum pressure / system head dropped by approximately 9 psi (6 m), when the hydrant was flowing at a rate of 134 L/s.

The updated WaterCAD model was used to simulate the fire flow test results and system pressures. The modelling outputs were compared with the fire flow test results (as shown in **Appendix C**). The system head difference between the field measurements and simulated results at each of the two hydrant test locations is within 4.3 psi. The model results meet the general guideline for model calibration (HGL calibration within +/- 2.2 psi to 4.3 psi) as suggested by AWWA M32. The model was considered adequately reliable for simulating hydraulic performance for the existing and future development conditions.

It was assumed that system experienced maximum day demand condition at the time of field testing; therefore, model results under existing MDD condition was compared with the field data. The following existing system operations were used in the model calibration based on the review of SCADA data provided by the City during the fire flow tests:

- Three (3) PD1 reservoirs operating water levels:
  - 68% full water level (system head of 130.6 m) at the HDR1C reservoir.
  - 68% full water level (system head of 129.9 m) at the HDR1B reservoir.
  - 57% full water level (system head of 129.6 m) at the HDR01 reservoir.
- Two (2) pumps online (e.g., Pumps PMP-5 and PMP-6) at the Woodward Avenue High Lift Pumping Station.

5 Hydraulic Modelling Analysis

5.1 Modelling Scenarios

The steady-state modelling analysis was completed for the existing (2021) and future (2031) system conditions under the following demand conditions:

- Average Day Demand scenario
- Maximum Day Demand scenario
- Peak Hour Demand scenario
- Maximum Day Demand plus Fire Flow scenario.

5.2 Supply Boundary Conditions

For each scenario the following two different supply boundary conditions were examined, provided by the City:

- **PD1 Supply Boundary Condition No. 1**
  - No pumps ON at PD1 Woodward Avenue High Lift pumping station (reservoir supply only).
  - 50% full water levels at PD1 Reservoirs (HDR01, HDR1B and HDR1C @ 129.0m, 128.0m and 129.0m respectively).
- **PD1 Supply Boundary Condition No. 2**
  - No pumps ON at PD1 Woodward Avenue High Lift pumping station (reservoir supply only).
  - 75% full water levels at PD1 Reservoirs (HDR01, HDR1B and HDR1C @ 131.2m, 130.7m and 131.2m respectively).

5.3 System Analysis Criteria

The following system pressure requirements were used to assess the system's capacity:

- Minimum Pressure under Normal Operating Conditions: 40psi/275kPa
- Maximum Pressure under Normal Operating Conditions: 100psi/700kPa
- Minimum Pressure under MDD plus Fire Flow Conditions: 20psi/140kPa

5.4 Network Analysis Results

The updated hydraulic network model was used to confirm the serviceability for the proposed development under various demand conditions (ADD, MDD, PHD for years 2021 and 2031) and confirm available fire flow (MDD plus FF scenario). In addition, the hydraulic Implications to the City's PD1 system were reviewed under the pre- and post-development conditions. Detailed results of the modelling analysis are presented in the following sections.

5.4.1 Proposed Development Serviceability

Normal Operating Conditions

The system pressures at the proposed Connection Points (No.1 and No.2) ranges between 51 psi (350 kPa) and 68 psi (470 kPa) under the normal system operating conditions for the existing (2021) and future (2031) conditions with the PD1 supply boundary conditions (No.1 and No.2). The modelling results showed

that the system pressure would meet the system pressure criteria for both under the existing and future system conditions.

The modelling results from the serviceability analysis for the proposed development are summarized in **Table 5-1**.

Table 5-1: Subdivision System Pressure

Modelling Scenario	System Pressure (psi / kPa)			
	Supply Boundary Condition No. 1		Supply Boundary Condition No. 2	
	Connection Point No.1	Connection Point No.2	Connection Point No.1	Connection Point No.2
2021 ADD	65.0 / 448.0	64.8 / 446.6	68.1 / 469.5	67.9 / 468.2
2021 MDD	60.4 / 416.2	60.2 / 414.9	63.5 / 437.7	63.3 / 436.4
2021 PHD	53.2 / 366.7	53.0 / 365.4	56.3 / 388.3	56.1 / 386.9
2031 ADD	64.7 / 446.0	64.5 / 444.6	67.8 /467.5	67.6 / 466.1
2031 MDD	59.3 / 409.0	59.1 / 407.6	62.4 / 430.5	62.2 / 429.2
2031 PHD	50.9 /350.8	50.7 / 349.5	54.0 / 372.4	53.8 / 371.0

Fire Flow Analysis

The Maximum Day Demand plus Fire Flow scenario was evaluated from the available fire flow at the two Connection Points for the development while maintaining the minimum pressure of 20 psi (140 kPa) for the junction nodes within the PD1 system (excluding nodes near the reservoir and pumping station facilities). The fire flow analysis results were compared with the required fire flow of 150 L/s for the residential development to determine the serviceability in the system.

Based on the fire flow simulations, the minimum available fire flows at the proposed Connection Points (No.1 and No.2) under the exiting and future water system with the PD1 supply boundary conditions were greater than the required fire flow of 150 L/s for residential development.

Table 5.2 summarizes the results of the fire flow analysis.

Table 5.2: Available Fire Flow Results

Modelling Scenario	Available Fire Flow (l/s)			
	Supply Boundary Condition No. 1		Supply Boundary Condition No. 2	
	Connection Point No.1	Connection Point No.2	Connection Point No.1	Connection Point No.2
2021 MDD plus Fire Flow	359	410	370	425
2031 MDD plus Fire Flow	348	365	364	416

5.4.2 PD1 Hydraulic Implications

Normal Operating Conditions

Based on the modelling results the minimum pressure in PD1 is expected to have minimal impact before and after the inclusion of the development area under both existing (2021) and future (2031) system conditions. The minimum pressure is observed at the junction with Model ID HB24T001 (near the PD boundary – the location of this junction is shown in **Appendix D**).

Detailed modelling results from this analysis are presented in **Table 5-3**.

Table 5-3: PD1 Minimum Pressure

Modelling Scenario	Min. Pressure in PD1 (psi / kPa)			
	Supply Boundary Condition No. 1		Supply Boundary Condition No. 2	
	Pre-Development	Post - Development	Pre-Development	Post - Development
2021 ADD	38.3 / 263.8	38.3 / 263.8	41.4 / 285.3	41.4 / 285.3
2021 MDD	36.2 / 249.5	36.2 / 249.4	39.3 / 271.0	39.3 / 271.0
2021 PHD	32.9 / 227.1	32.9 / 227.0	36.1 / 248.6	36.1 / 248.6
2031 ADD	38.2 / 263.3	38.2 / 263.3	41.3 / 284.8	41.3 / 284.8
2031 MDD	35.9 / 247.5	35.9 / 247.5	39.0 / 269.0	39.0 / 269.0
2031 PHD	32.3 / 222.6	32.3 / 222.5	35.4 / 244.1	35.4 / 244.0

Note:
* Minimum pressure observed at node with Model ID JCT HB24T001. Exclude the nodes close to facilities (water storage reservoirs and pumping stations) and along escarpment (or PD boundary) from the pressure comparisons.

In addition, a buffer area (e.g., 500 m radius) was created to establish the area of influence around the proposed development. The model results confirmed that the service pressure within the buffer area around the proposed development will not drop below 40 psi (275 kPa) as a result of the proposed development under the conservative modelling scenario (i.e., future 2031 PHD condition with PD1 supply boundary condition No.1). **Figure 5-1** shows a model screenshot for the graphical representation of minimum system pressures within the buffer area around the proposed development under the conservative modelling scenario run.

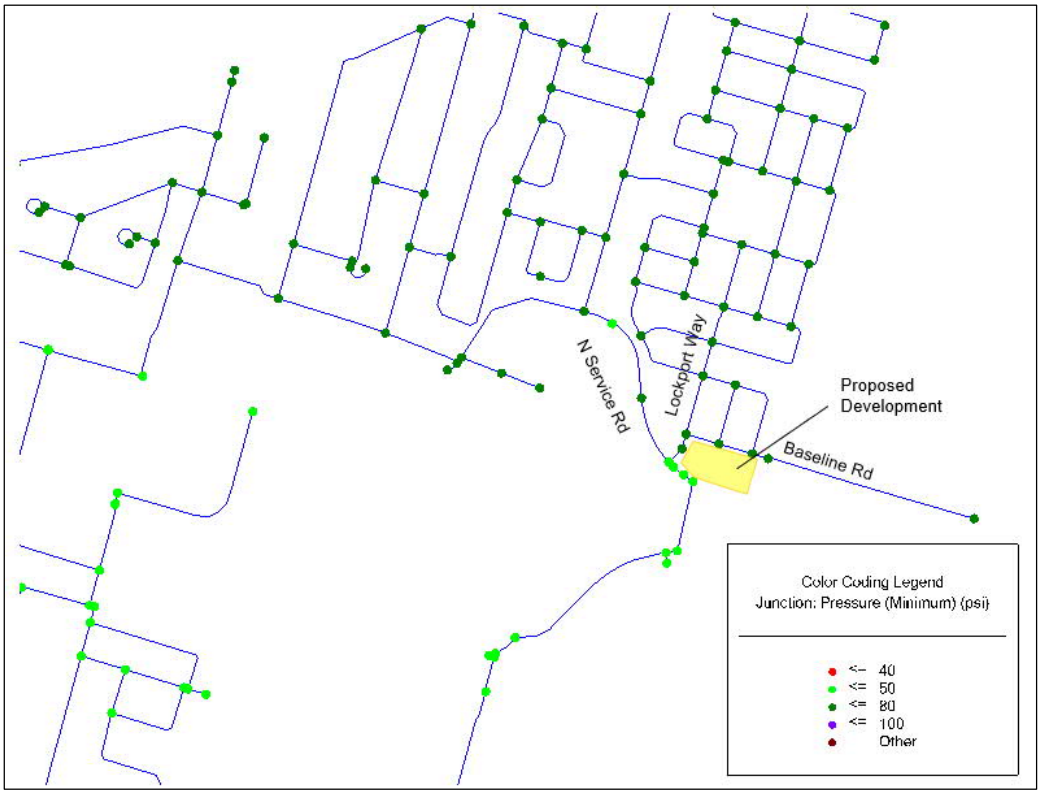


Figure 5-1: Minimum System Pressure under Future PHD with Boundary Condition No.1

Fire Flow Analysis

The simulation run was conducted to evaluate the impact to the PD1 distribution system with the proposed development for the existing and future MDD plus fire condition under the PD1 supply boundary conditions. The fire flow requirement of 150 L/s for the development was used for the evaluation.

Based on the modelling results presented in **Table 5.4** for the proposed development, the minimum system pressure of 20 psi (140 kPa) can be maintained within the PD1 distribution system (excluding the nodes near the pumping station and reservoir facilities) under the MDD plus required fire flow condition for the proposed development.

Table 5.4: PD1 Min. Pressure under MDD+FF conditions

Modelling Scenario	PD1 Min. Pressure (psi / kPa)	
	Supply Boundary Condition No. 1	Supply Boundary Condition No. 2
2021 MDD plus Fire Flow of 150 L/s	24.5 / 169.3	27.6 / 190.7
2031 MDD plus Fire Flow of 150 L/s	24.2 / 167.2	27.3 / 188.6

6 Conclusions / Recommendations

The completion of the hydraulic modelling analysis led to the following conclusions and recommendations:

- The modelling results indicate that the anticipated system pressures at the proposed Connection Points (No.1 and No.2) meet the pressure requirements between 275 kPa and 700 kPa for the normal operating conditions (i.e., average day, maximum day and peak hour) under the existing (2021) and future (2031) water system conditions. With the PD1 water network, adequate flow and pressure are available to service the proposed development (Medium Density Residential 3 designation) under the normal operating conditions.

- Fire flow analysis results show that the PD1 water network is sufficient to provide adequate fire flow and pressure for the proposed residential development under the existing and future water system conditions.

- Based on the modelling results, the proposed development does not impact the minimum pressure in the City's PD1 system under both existing and future water system conditions.

- Adequate water service was maintained where no nodes in PD1 system (excluding near the pumping station and reservoir facilities) fall below 20 psi (140 kPa) under the existing and future MDD plus fire condition for the proposed development.

Appendix A – **Water Demand Calculations**

Table 1: Design Criteria Used In Water Demand Calculations

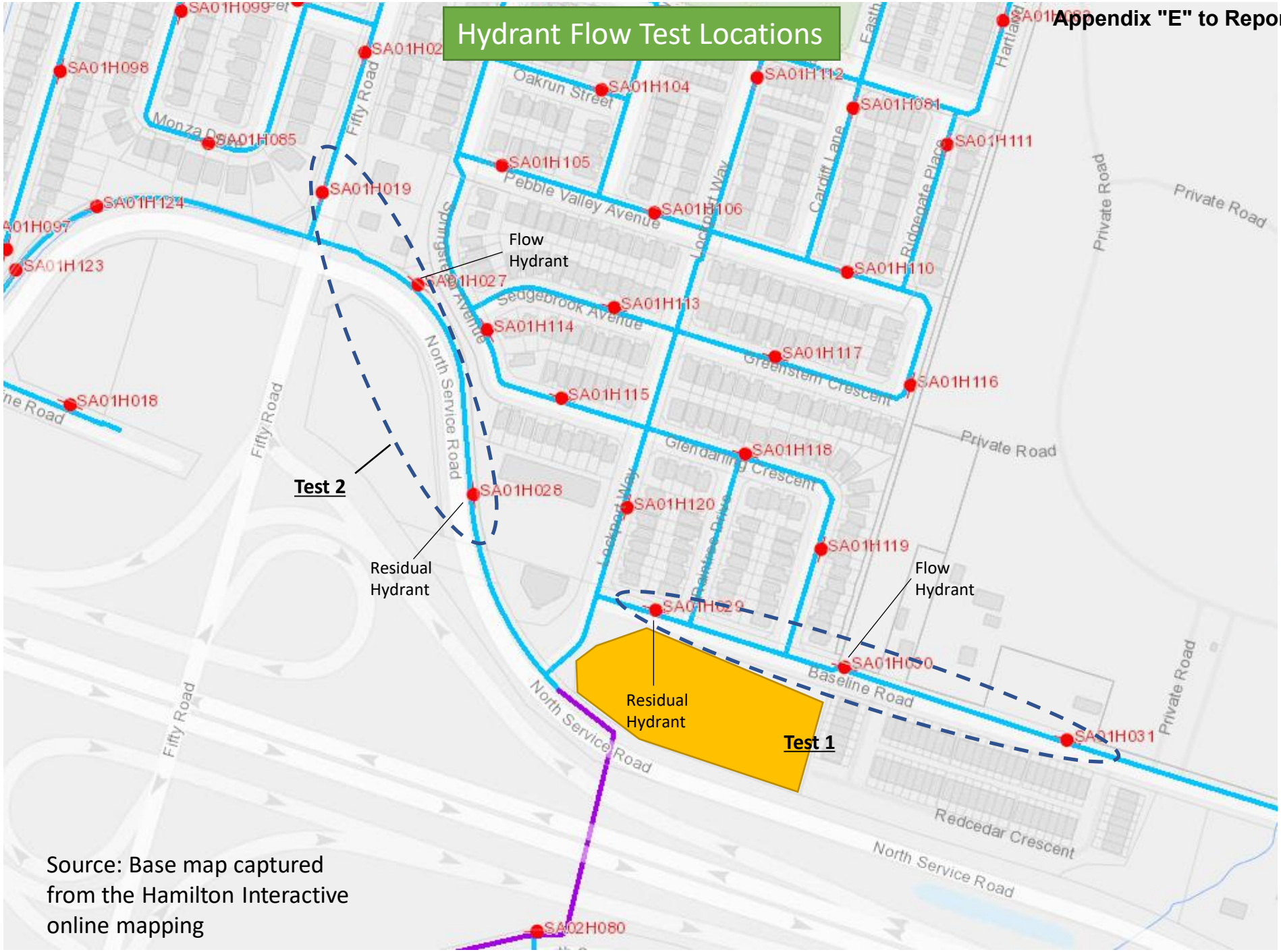
Criterion	Value	Unit
Average Day Demand (ADD) Consumption Rate	360	l/d/cap
Maximum Day Demand (MDD) Peaking Factor	1.9 x ADD	-
Peak Hour Demand (PHD) Peaking Factor	3.0 x ADD	-

Table 2: Water Demand Calculations

				Water Demand (L/s)		
Land Use	**Number of Units**	**Population Density (people per unit)**	**Population (people)**	**Average Day Demand (ADD)**	**Maximum Day Demand (MDD)**	**Peak Day Demand (MDD)**
Townhouses/ Maisonettes	40	2.44	98	0.4	0.8	1.2
One 9 storey Apartment	72	1.66	120	0.5	0.9	1.5
Total	**112**	**-**	**217**	**0.9**	**1.7**	**2.7**

Appendix B **- Fire Hydrant Flow Tests**

Hydrant Flow Test Locations



Source: Base map captured from the Hamilton Interactive online mapping

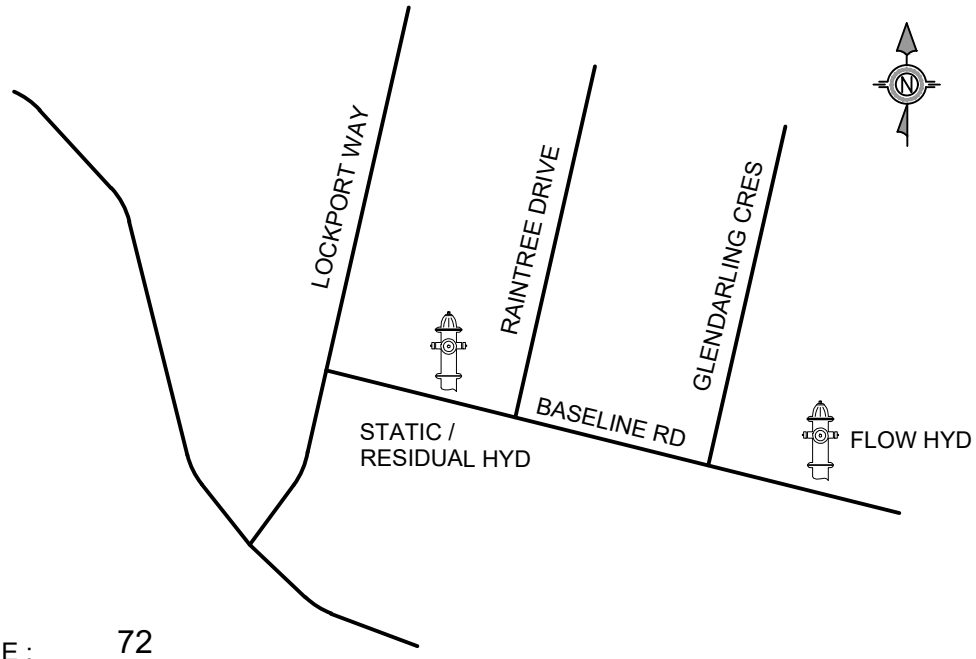
FIRST FOR FIRE PROTECTION
VIPOND INC
est. 1945

FLOW TEST RESULTS

DATE : AUGUST 12, 2021 TIME : 11:00 AM

LOCATION : 1400 BASELINE ROAD
STONEY CREEK, ONTARIO

TEST BY : VIPOND & P.U.C.



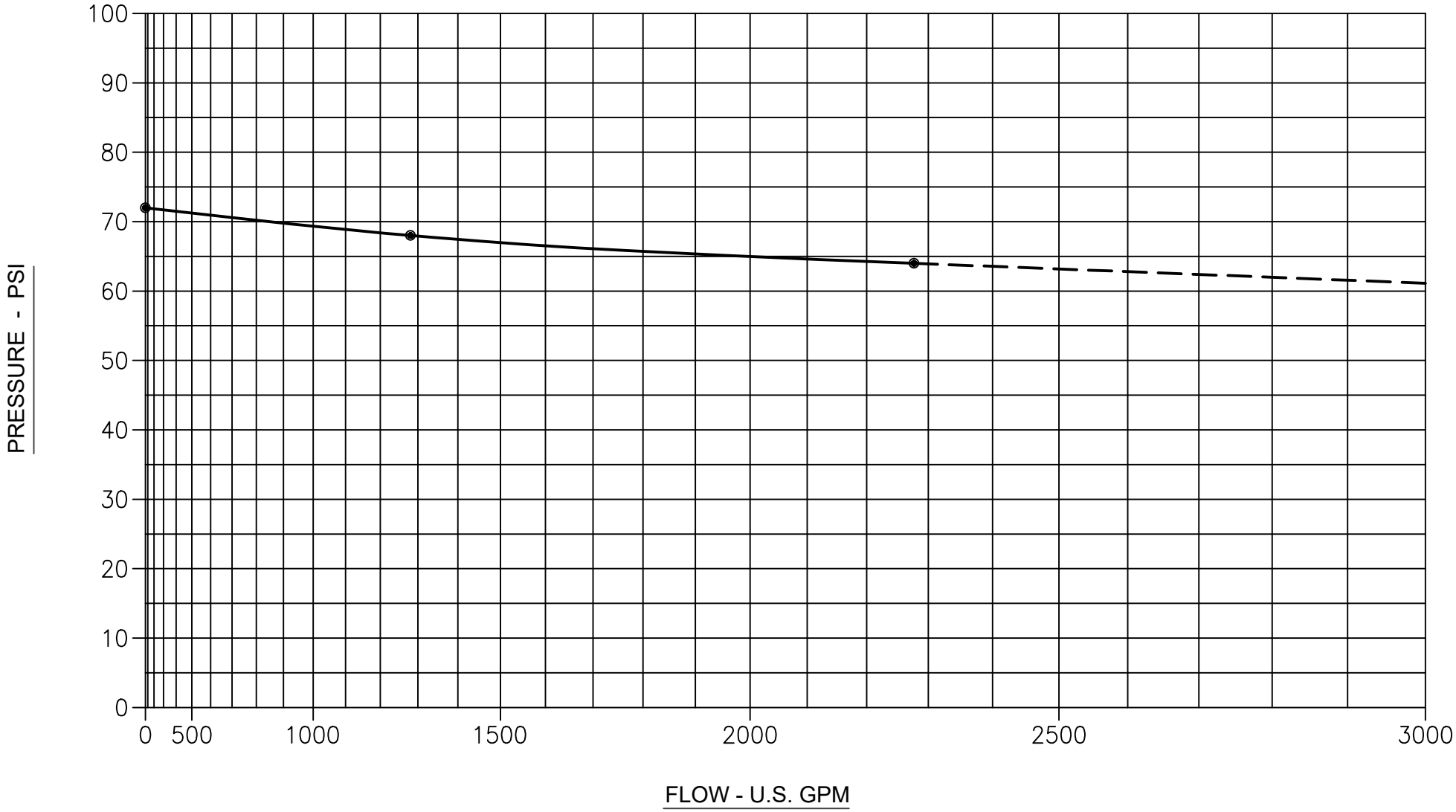
STATIC PRESSURE : 72

TEST NO.	NO. OF NOZZLES	NOZZLE DIAMETER (INCHES)	RESIDUAL PRESSURE (PSI)	PITOT PRESSURE (PSI)	DISCHARGE (U.S.GPM)
1	1	2-1/2"	68	58	1280
2	2	2-1/2"	64	46,46	2280

FIRST FOR FIRE PROTECTION
VIPOND INC
est. 1945

1400 BASELINE ROAD	BY : VIPOND	1 OF 1
STONEY CREEK, ONTARIO	OFFICE : STONEY CREEK	
	TEST BY : VIPOND & P.U.C.	
	DATE : AUGUST 12, 2021	11:00 AM

STATIC : 72 PSI
68 PSI @ 1280 GPM
64 PSI @ 2280 GPM



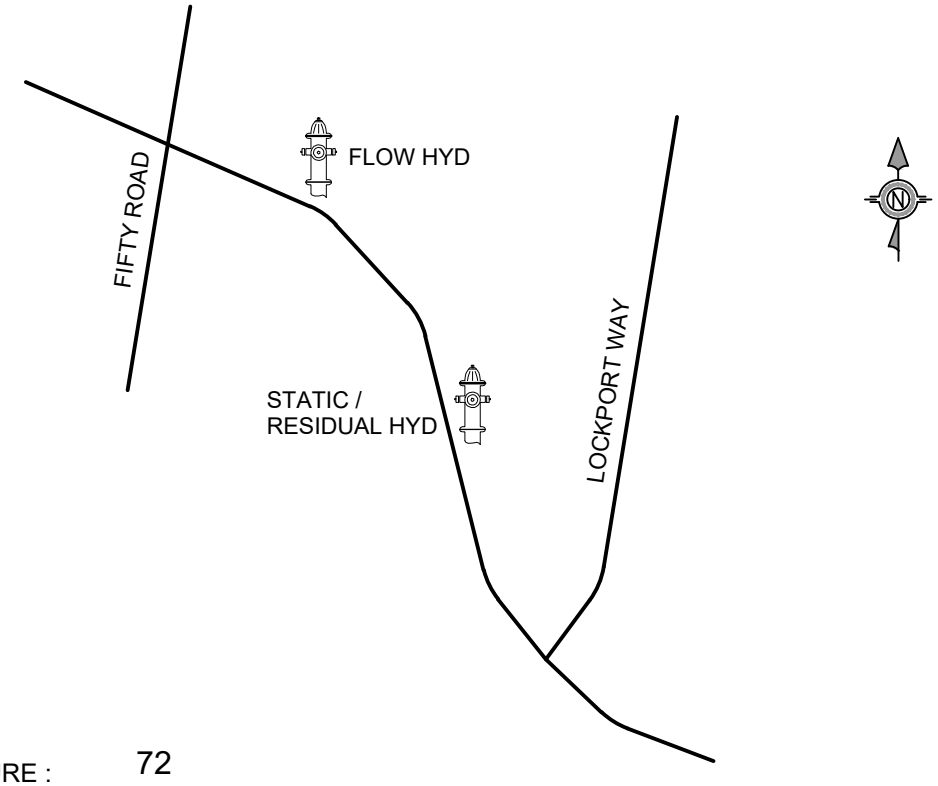
FIRST FOR FIRE PROTECTION
VIPOND INC
est. 1945

FLOW TEST RESULTS

DATE : AUGUST 12, 2021 TIME : 10:00 AM

LOCATION : N SERVICE ROAD & LOCKPORT WAY
STONEY CREEK, ONTARIO

TEST BY : VIPOND & P.U.C.



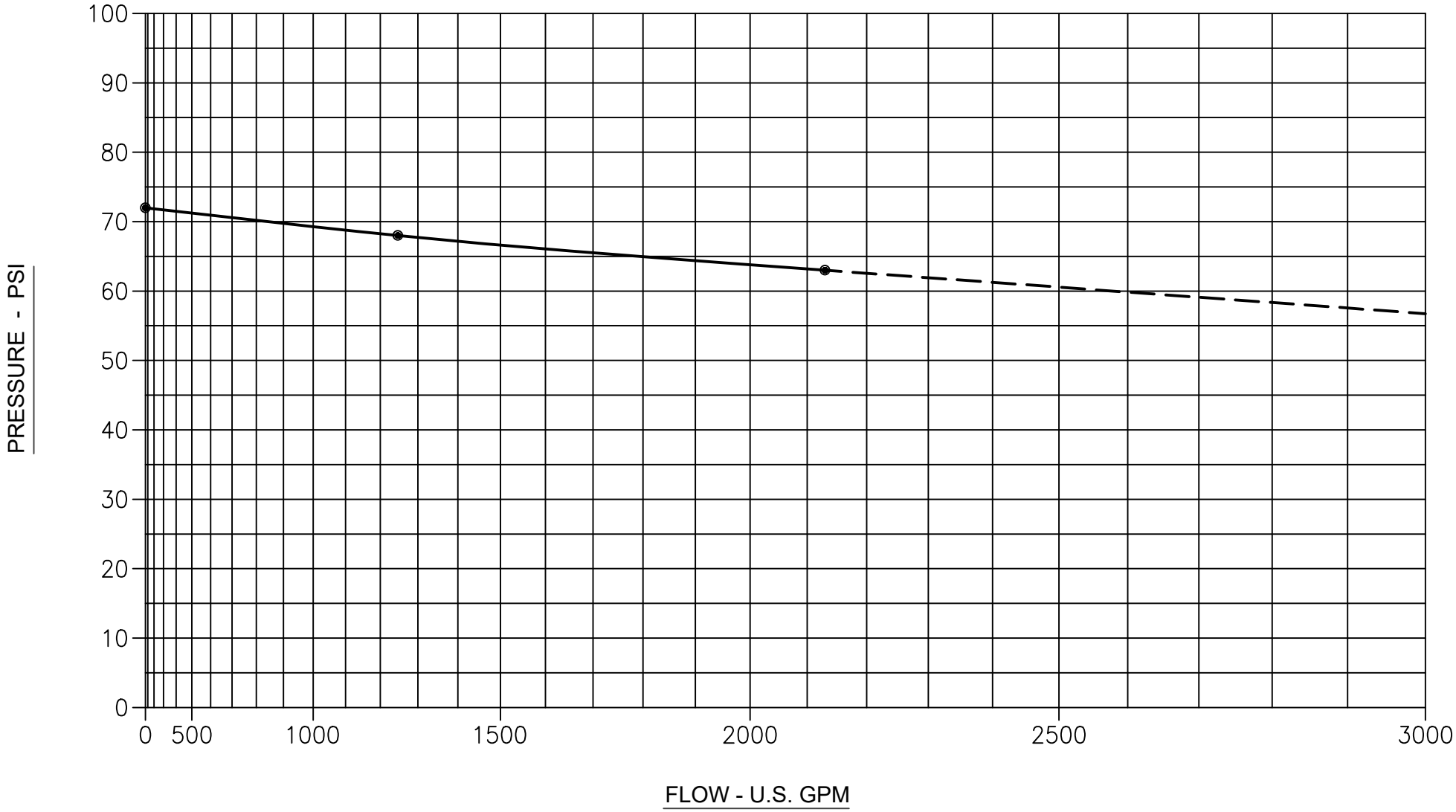
STATIC PRESSURE : 72

TEST NO.	NO. OF NOZZLES	NOZZLE DIAMETER (INCHES)	RESIDUAL PRESSURE (PSI)	PITOT PRESSURE (PSI)	DISCHARGE (U.S.GPM)
1	1	2-1/2"	68	54	1235
2	2	2-1/2"	63	40,40	2130

FIRST FOR FIRE PROTECTION
VIPOND INC
est. 1945

N SERVICE ROAD & LOCKPORT WAY	BY : VIPOND	1 OF 1
STONEY CREEK, ONTARIO	OFFICE : STONEY CREEK	
	TEST BY : VIPOND & P.U.C.	
	DATE : AUGUST 12, 2021	10:00 AM

STATIC : 72 PSI
68 PSI @ 1235 GPM
63 PSI @ 2130 GPM



Appendix C - **Model Validation Summary**

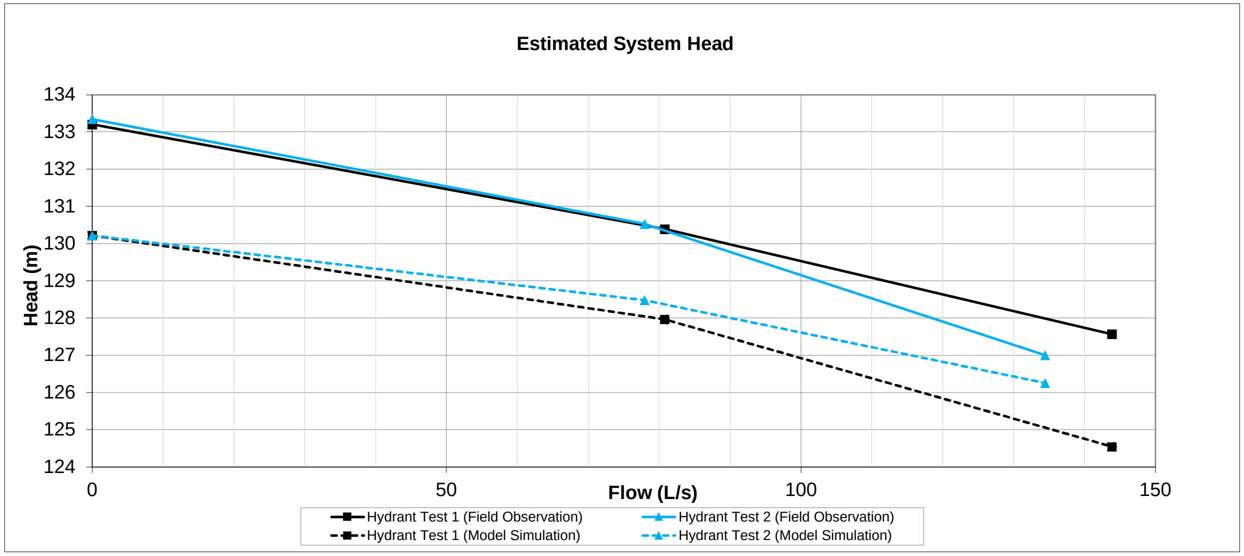
Model Validation Results

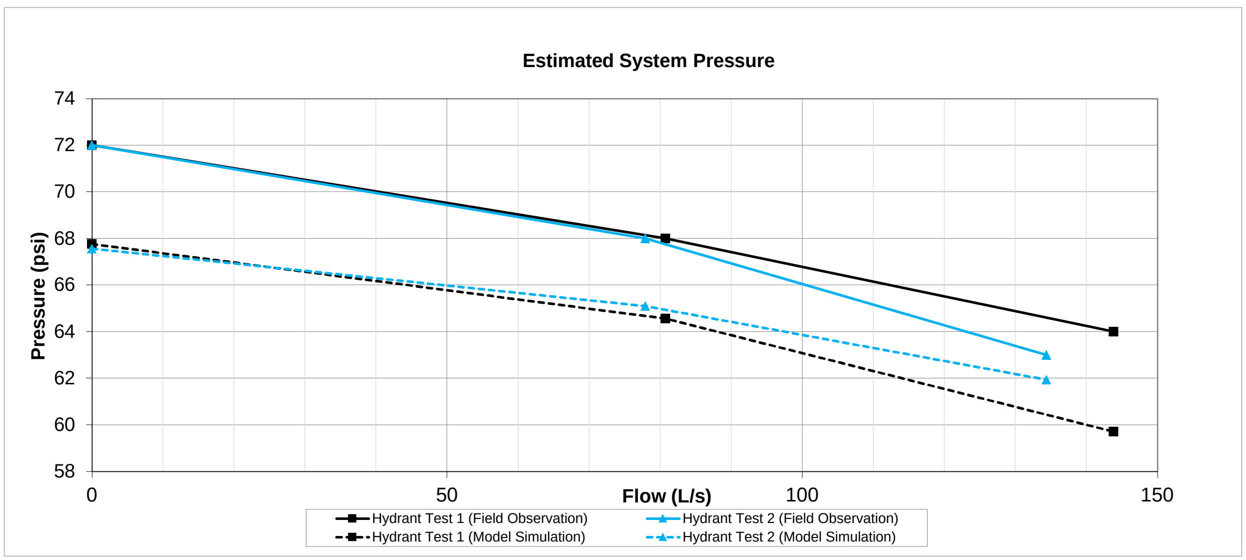
Test 1

Location of Residual Hydrant (for Pressure Measurement)	Location of Flow Hydrant (for Flow Measurement)	Date/Time	Elevation (m)	Flow USGPM	Flow L/s	Pressure (Field Observation) (psi)	Pressure (Field Observation) (m)	Pressure (Field Observation) kPa	Head (Field Observation) (m)	Head (Model Simulation) (m)	Pressure (Model Simulation) (psi)	Model Boundary Condition
1400 Baseline Road	1401 Baseline Road	August 12, 2021	82.5	0	0	72	51	496	133.2	130.2	68	2 pumps ON @ HLPS;
		11:00 AM		1280	81	68	48	468	130.4	128.0	65	68% full at HDR1B, HDR1C
Residual Hydrant Model ID	**Flow Hydrant Model ID**			2280	144	64	45	441	127.6	124.6	60	& 57% at HDR01
SA01T066	J-457											

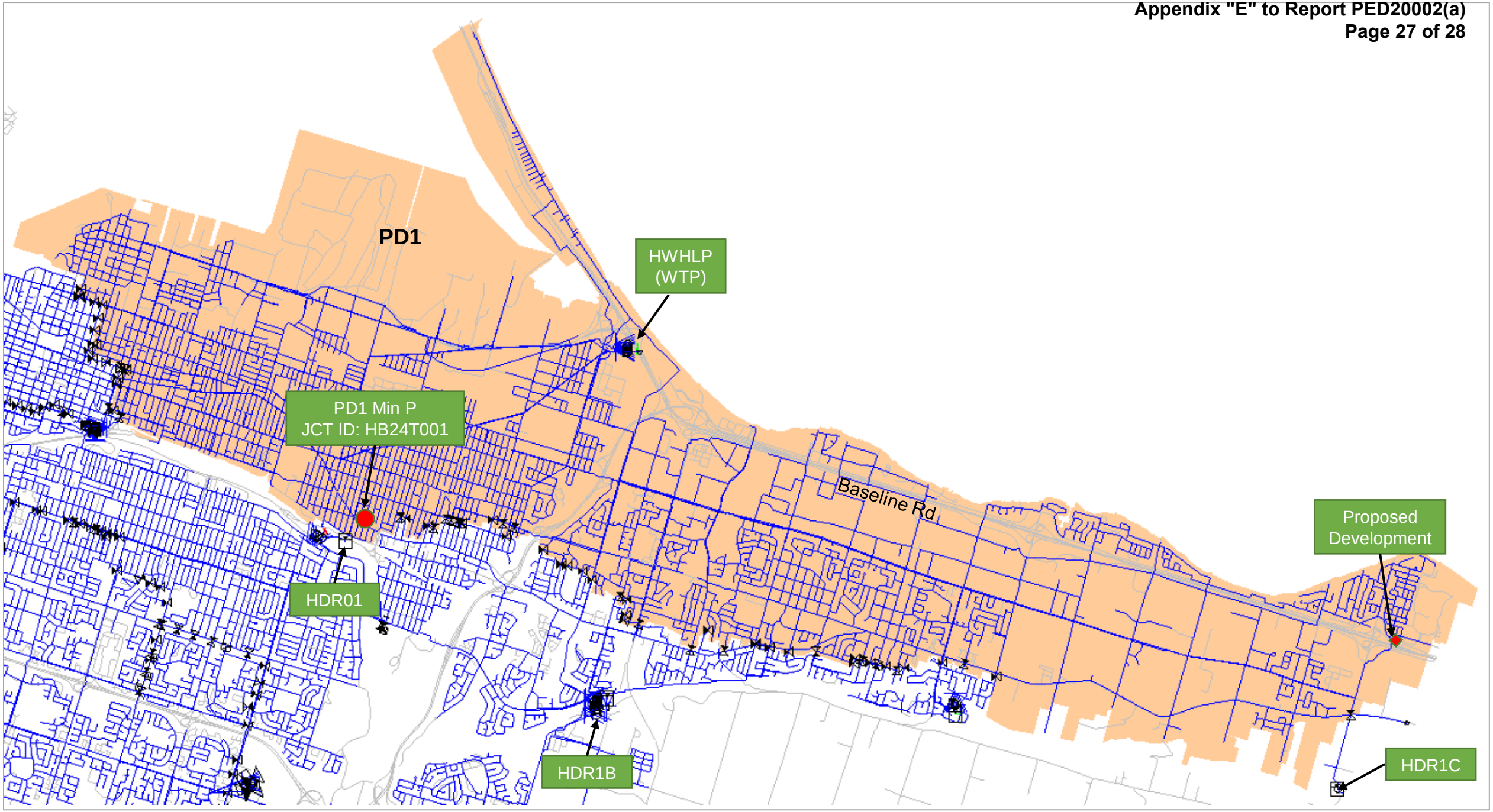
Test 2

Location of Residual Hydrant (for Pressure Measurement)	Location of Flow Hydrant (for Flow Measurement)	Date/Time	Elevation (m)	Flow USGPM	Flow L/s	Pressure (Field Observation) (psi)	Pressure (Field Observation) (m)	Pressure (Field Observation) kPa	Head (Field Observation) (m)	Head (Model Simulation) (m)	Pressure (Model Simulation) (psi)	Model Boundary Condition
N Service Road & Lockport	N Service Road & Lockport	August 12, 2021	82.6	0	0	72	51	497	133.3	130.2	68	2 pumps ON @ HLPS;
		10:00 AM		1235	78	68	48	470	130.5	128.5	65	68% full at HDR1B, HDR1C
Residual Hydrant Model ID	**Flow Hydrant Model ID**			2130	134	63	44	435	127.0	126.3	62	& 57% at HDR01
J-459	J-458											





Appendix D **- PD1 Minimum Pressure Location Map**


PD1
HWHLP
(WTP)
PD1 Min P
JCT ID: HB24T001
HDR01
Baseline Rd
Proposed
Development
HDR1B
HDR1C

AECOM Canada Ltd.
105 Commerce Valley Drive West
7th Floor
Markham, ON L3T 7W3
Canada

T: 905.886.7022
F: 905.538.8076
aecom.com