RGH Developments

Rocky Acres Subdivision
Servicing Report

Prepared by:

FOREFRONT Engineering Inc. **613.634.9009 tel**
1329 Gardiners Road, Suite 210
Kingston, ON, Canada K7P 0L8

Date: April 2021

Statement of Qualifications and Limitations

The attached Report has been prepared by Forefront Engineering Inc. (Consultant) for the benefit of the Client in accordance with their Agreement.

The information, data, recommendations and conclusions contained in the Report:

1. is subject to the scope, schedule, and other constraints and limitations in the Agreement and the qualifications contained in the Report;
2. represents Consultant's judgement in light of the limitations and industry standards for the preparation of similar reports;
3. may be based on information provided to Consultant which has not been independently verified;
4. has not been updated since the date of issuance of the Report and its accuracy is limited to the time and circumstances in which it was prepared; and
5. must be read as a whole and sections should not be read out of context.

Consultant 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. Consultant accepts no responsibility for any events or circumstances that may have occurred since the date on which the Report was prepared.

Any estimates or opinions regarding expected construction costs or construction schedule provided by Consultant represent Consultant's judgement in light of its experience and the knowledge and information available to it at the time of preparation. Consultant does not make any representations, with respect to such estimates or opinions, and accepts no responsibility for any loss or damage arising from them. Persons relying on such estimates or opinions do so at their own risk.

Except as agreed to in writing by Consultant and Client; as required by law; or 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.

Consultant accepts no responsibility 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, except to the extent those parties have obtained the prior written consent of Consultant 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.

Forefront Engineering Inc

1329 Gardiners Road, Suite 210
Kingston, ON, Canada K7P 0L8

613 634 9009 tel
888.884.9392 fax

April 19, 2021

RGH Developments
190 Pauline Tom Avenue
Kingston, ON
K7K 0G1

Regarding: **Rocky Acres Subdivision**
Servicing Report

Dear Mr. Haynes

The enclosed report details the existing water and sanitary infrastructure and our recommendations for water and sanitary services for the proposed Rocky Acres Subdivision located in the Town of Gananoque.

The proposed Rocky Acres Subdivision fronts Garfield Street, is approximately 2.81 ha, consisting of 27 single-detached lots and 2 semi-detached lots (4 units) for a total of 31 units. The development will include a new street with two connections to Garfield Street.

Water and sanitary services are proposed throughout the development.

Two water main connections are proposed at Garfield Street.

Detailed calculations demonstrate that the existing water infrastructure is capable of supplying adequate fire flow and pressure to the proposed development.

Two sanitary sewer connections are proposed to connect to the existing sanitary sewer on Garfield Street.

Detailed calculations find that existing downstream sanitary sewers and proposed sanitary sewers are capable of and will effectively service the proposed development.

This Report demonstrates that adequate water and sanitary sewer servicing is available for the proposed development.

If you have any enquiries or wish to discuss further, please contact this office.

Sincerely,
FOREFRONT Engineering Inc.

Kyle Nielissen, P.Eng.
Kyle.Nielissen@Forefronteng.ca

FOREFRONT Signatures

Report Prepared By:

Jeff Homer, P.Eng.

Report Reviewed By:

Kyle Nielissen, P.Eng.

Table of Contents

Statement of Qualifications and Limitations
Letter of Transmittal

Appendices

1. Introduction

Forefront has assembled relevant supporting information for the proposed residential development at Part of Lots 2 and 71, Part of Old Kingston Road, Registered Plan 86 in the Town of Gananoque in the County of Leeds.

The proposed Rocky Acres Subdivision is located in the Town of Gananoque east of Garfield Street and west of Maple Street. The property is bounded by existing residential dwellings to the north, east, west and south. The property includes frontage on Garfield Street.

Figure 1: Location Plan

The subject site is currently zoned Residential within the Town of Gananoque. The property is currently vacant with no existing structures.

The proposed Rocky Acres Subdivision fronts Garfield Street, is approximately 2.81 ha, consisting of 27 single-detached lots and 2 semi-detached lots (4 units) for a total of 31 units. The development will include a new street with two connections to Garfield Street.

It is recommended that water services and sanitary sewer services be installed along the proposed street with connections to Garfield Street.

Development of the Rocky Acres Subdivision will result in an increase in municipal water consumption and sewerage discharge. This Servicing Report proposes a plan to provide water and sanitary sewer services for the proposed development.

Refer to Appendix A for the proposed Concept Plan.

2. Water Supply

2.1 Existing Conditions

The Town of Gananoque's Water Treatment Plant (WTP) located at 110 Kate Street supplies potable water to the Charles Street North Elevated Storage Tank (EST), and the Town of Gananoque's water distribution system.

An existing 200mm diameter watermain on Garfield Street fronts the site, extending from the existing 250mm diameter watermain on Kingston Street West.

Two existing 150mm watermain connections are extended from Garfield Street and stubbed at the property limit at the future Street A connections.

2.2 Proposed Development

The proposed Rocky Acres Subdivision fronts Garfield Street, is approximately 2.81 ha, consisting of 27 single-detached lots and 2 semi-detached lots (4 units) for a total of 31 units. The development will include a new street with two connections to Garfield Street.

A 200mm diameter watermain and two connection to Garfield Street are proposed. Fire hydrants are proposed at 150m spacing throughout the development.

25mm cross-linked high-density polyethylene (PEX) services are proposed throughout.

Please refer to Appendix A: Concept Plan and Figure 2: Proposed Water Infrastructure for further details.

Development of the Rocky Acres Subdivision will result in an increase in municipal water consumption.

The Town of Gananoque's Public Works Utilities Division and the Ministry of the Environment, Conservation and Parks (MECP) require that the system be assessed at the critical locations for peak hour flow, maximum day, and maximum day plus fire flow demand. MECP requires that the system maintain an operating pressure of 280-700 kPa under peak flow conditions and 140 kPa under maximum day plus fire flow conditions.

Design Flow Parameters	
Average Residential Flow	350 L/cap/day
Peak Day Factor	2.75
Peak Hour Factor	4.25

Population Density	
Single Family	4.00 people/unit
Semi-detached	4.00 people/unit
Multi-Unit	1.54 people/unit

Appropriate demands were assigned to the existing and proposed distribution system and are summarized in the appendix. EPA NET (Version 2.0) was used to model the following: Peak Hour pressure demand (kPa), Maximum Daily pressure demand (kPa), (L/min) at Maximum Day plus Fire demand maintaining 140 kPa. Refer to Appendix B, EPA NET for modeling results and the proposed water infrastructure schematic.

The Town of Gananoque's Public Works Utilities Division supplied hydrant flow data. Refer to Hydrant Flow Data Table in the Appendix for hydrant details. Analysis has been completed to demonstrate that the proposed development can be adequately serviced by the existing infrastructure.

A fire hydrant NFPA color rated blue is located in close proximity to the existing subject site on King Street W. Hydrant number FH108 was used to model the flows of the existing flow on Garfield Street and the proposed flows on Coachmen's Court. Given the hydrant and modelling junctions proximity to the existing modeling area, the model flows will be utilized for assessing the available fire flows.

Based on the modelling completed, under peak flow conditions and maximum day flow conditions exceed the minimum required pressure of 280 kPa and are below the maximum pressure of 700 kPa.

Proposed development pressures are within the normal operation range of 280 kPa to 700 kPa.

Fire Flows

Water supply requirements for fire suppression in municipal water works systems are based on the "Water Supply for Public Fire Protection, 1999" by Fire Underwriters Survey (FUS). The proposed development includes semi-detached and townhouse units.

Minimum requirements for water suppression are not less than 1,000 L/min for two hours or 2,000 L/min for one hour in addition to any domestic consumption at the maximum daily rate. Using the short method within the FUS guidelines, in general single and small two-family dwellings require a minimum of 4,000 L/min with 3.0 meters of separation between exposures (1.5m side yards).

According to the modelling fire flow available at maximum daily flow demand plus fire flow demand for the proposed subdivision is 6,000 L/min. The system was assessed at the minimum operating pressure of 140 kPa and the available maximum daily flow plus fire flow. Fire flows are adequate for the proposed single detached and semi-detached residential dwellings.

The additional Peak Hour Flow Demand is approximately 2.07 L/s based on a peaking factor of 4.25. Maximum Daily Flow demand is approximately 1.34 L/s based on a peak day factor of 2.75. Refer to Appendix B for demand calculations.

A 200mm diameter watermain and two connection to Garfield Street are proposed. Fire hydrants are proposed at 150m spacing throughout the development.

The proposed development meets the recommended minimum standards by FUS and the MECP requirements.

Based on the infrastructure review, there will be no negative impact on the local water distribution system. There is adequate water pressure and flow available for the proposed development.

3. Sanitary Sewer

3.1 Existing Conditions

Sewage flow from the west end of Gananoque flows by gravity sewer to the east towards the Main Street pumping station. The Town of Gananoque is serviced by municipal sanitary sewers that flow to the East End Pumping Station located on King Street East and eventually pumped to the Gananoque Sewage Lagoons north of Highway 401.

An existing 200mm diameter sanitary sewer extends along the centreline of Garfield Street at approximately 0.40%.

Two existing 200mm sanitary sewer connections are extended from Garfield Street and stubbed at the property limit at the future Street A connections.

In order to service the proposed Rocky Acres Subdivision, existing downstream sanitary sewers were reviewed to the existing 600mm diameter sanitary sewer main located on First Street.

It is understood Totten Sims Hubicki (TSH) Associates Ltd. completed an inflow and infiltration study in 2007 for the Town of Gananoque. The Town has experienced greater than normal infiltration within the existing Victaulic clay pipe which does not have leak tight joints. The infiltration allowance can be revised to reflect the findings of the study if the Town of Gananoque's Public Work's department supplies the infiltration study.

3.2 Proposed Development

The proposed Rocky Acres Subdivision fronts Garfield Street, is approximately 2.81 ha, consisting of 27 single-detached lots and 2 semi-detached lots (4 units) for a total of 31 units. The development will include a new street with two connections to Garfield Street.

Below are the proposed design parameters.

Design Flow Parameters	
Average Residential Flow	350 L/cap/day
Peak Residential Factor	Harmon Formula
Infiltration Allowance	0.14 L/s/ha
Minimum Pipe Size Diameter	200mm Diameter

Population Density	
Single Family	4.00 people/unit
Semi-detached	4.00 people/unit
Multi-Unit	1.54 people/unit
Institutional/Commercial	28m^3/ha/day (MECP)

The existing sanitary sewerage area and sanitary sewers peak flows reviewed as part of the analysis include sanitary sewers on Garfield Street, King Street West, Elm Street, and First Street. Sanitary sewer peak flows from local side streets include Maple Street, Osborne Street, Birch Street, Second Street and Victoria Avenue. Existing peak flow within the 300mm sanitary sewer main on First Street is approximately 26.5 L/s having a capacity of 52.9 L/s. Refer to the Existing Sanitary Sewer Design sheet in Appendix C for further details.

The proposed Rocky Acres Subdivision will have an approximate population of 128 residents that generate an additional peak sanitary flow of 2.14 L/s. Refer to the Proposed Sanitary Sewer Design sheet in Appendix C for further details.

Detailed calculations find that existing downstream sanitary sewers and proposed sanitary sewers are capable of and will effectively service the proposed Rocky Acres Subdivision. The proposed subdivision will have no negative downstream effects on the sanitary sewer infrastructure.

Residential lots are proposed with 125mm diameter services and manufactured wye connections. It is proposed that all areas will drain by gravity sewer. The sanitary sewers are proposed to extend along the centreline of the proposed road.

It is recommended that the proposed 200mm diameter sanitary sewer connect to the two existing 200mm diameter sanitary sewer stubs located on Garfield Street.

The Town of Gananoque has confirmed there is sufficient capacity at the downstream pumping station for the development.

Refer to Appendix A: **Figure 2 and Figure 3** Existing and Proposed Sanitary Sewerage Areas for further details

4. Conclusions

Detailed calculations demonstrate that the existing water infrastructure is capable of supplying adequate fire flow and pressure to the proposed development.

Two water main connections are proposed at Garfield Street.

Two sanitary sewer connections are proposed at Garfield Street.

Detailed calculations find that existing downstream sanitary sewers and proposed sanitary sewers are capable of and will effectively service the proposed development.

Sanitary sewers and the water network shall be designed in accordance with Ministry of the Environment, Conservation and Parks Guidelines.

Approval by the Town of Gananoque's Public Works for the proposed watermain network is required. An application for watermain additions, modifications, replacements and extensions for the watermain system will be required. Approval by the Town of Gananoque's Public Works for the proposed sanitary sewer network is required. An Environmental Compliance Approval (ECA) from the Ministry of the Environment for the sanitary sewer system is required

Appendix A

- Concept Plan
- Figure 2 – Proposed Water Infrastructure
- Figure 3 – Existing Sanitary Sewerage Areas
- Figure 4 – Proposed Sanitary Sewerage Areas

0 12.5 25 m H=1:500

Benchmark

No.	Revision/Issue	Date

Forefront Engineering Inc

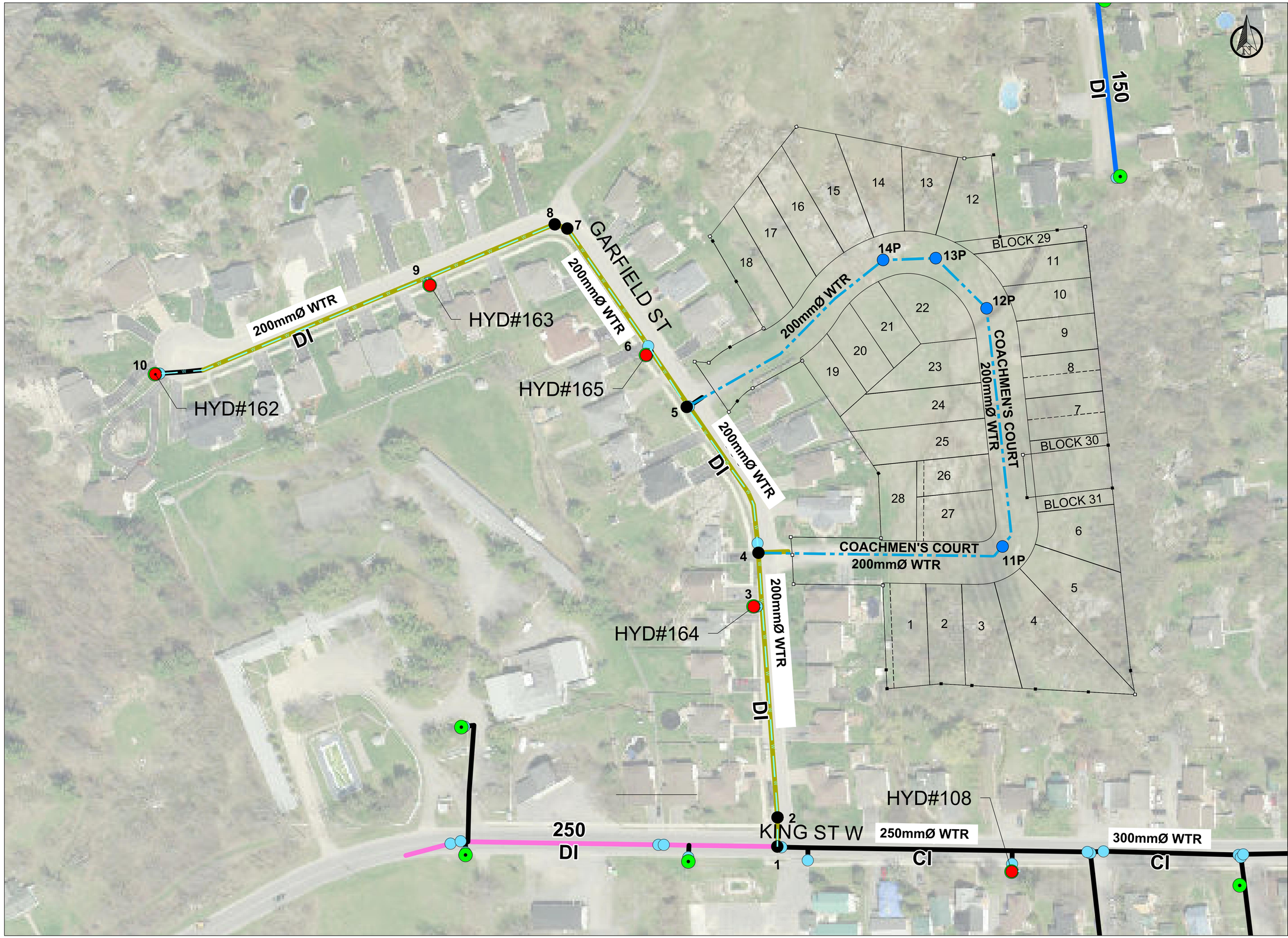
1329 Gardiners Road, Suite 210
Kingston, ON, Canada K7P 0L8
613.634.9009 tel.
1.888.884.9392 fax.

Client
RGH DEVELOPMENTS

Project
ROCKY ACRES DEVELOPMENT

Drawing
CONCEPT PLAN

Drawn by:	Checked by:	Project No.
CGD	JH	
Designed by:	Approved by:	Drawing No.
KMN	KMN	CP
Date: APRIL 2021		
Scale: 1:500		



Benchmark

No.	Revision/Issue	Date

Forefront Engineering Inc

1329 Gardiners Road, Suite 210
Kingston, ON, Canada K7P 0L8
613.634.9009 tel.
1.888.884.9392 fax.

Client
RGH DEVELOPMENTS

Project
ROCKY ACRES DEVELOPMENT

Drawing
PROPOSED WATER INFRASTRUCTURE

Drawn by:	Checked by:	Project No.
CGD	JH	
Designed by:	Approved by:	Drawing No.
KMN	KMN	FIG. 2
Date: APRIL 2021		
Scale: 1:750		

SUBJECT SITE

0.65 ha | 24 | SA42-43
0.52 ha | 28 | SA44-45
0.66 ha | 28 | SA46-50
0.73 ha | 32 | SA50-51
0.39 ha | 16 | SA51-55
0.30 ha | 12 | SA55-57
0.60 ha | 24 | SA57-59
0.44 ha | 16 | SA59-989
0.52 ha | 16 | 987-813
0.65 ha | 20 | 813-814
0.50 ha | 8 | 814-815
0.42 ha | 16 | 815-817
1.29 ha | 28 | 817-818
0.57 ha | 28 | 818-344
0.79 ha | 40 | 344-891
0.42 ha | 20 | 891-892
0.52 ha | 44 | 892-893
2.08 ha | 76 | 342-892
9.12 ha | 336 | North
10.5 ha | 352 | South
0.21 ha | 12 | 989-987
3.03 ha | 104 | 811-989

1042 200 PVC 1044 200 PVC 1046 200 PVC 1050 200 PVC 1051 200 PVC 1055 200 PVC 1057 200 PVC 1059 200 PVC 811 200 PVC 812 200 PVC 989 200 PVC 987 200 PVC 813 200 PVC 814 200 PVC 815 250 PVC 816 250 PVC 817 250 PVC 818 1161 KING ST W 1 300 PVC 819 300 PVC 820

887 200 OTHER 888 225 VC 2ND ST 885 225 VC 883 225 VC 708 657
886 200 OTHER
889 200 OTHER BIRCH ST 200 VC
884 100 OTHER ELM ST 225 VC
881 225 VC
893 200 VC
894 OAK ST 225 VC
869 225 VC
890 225 OTHER 891 300 OTHER 892 600 AC 1ST ST 895 600 AC 897 600 AC 898 600 AC 1ST ST
343 200 VC 344 300 PVC 346 225 VC 342 225 VC
896 225 VC
820 225 VC

338 250 OTHER 904 250 OTHER 905 250 OTHER 906 250 OTHER 339 250 OTHER
908 300 VC 907 300 VC STEEL ST 910 225 VC 903 200 VC
405 200 VC 406 200 VC 909 200 VC 902 200 VC
340 200 OTHER
341 200 OTHER WINDSOR ST

348 200 VC 665 200 PVC 901 200 PVC

COUNTY RD 2
OLD KINGSTON ROAD
OSBORNE ST
BAY RD

0 30 60 m H=1:1500

Benchmark

No.	Revision/Issue	Date

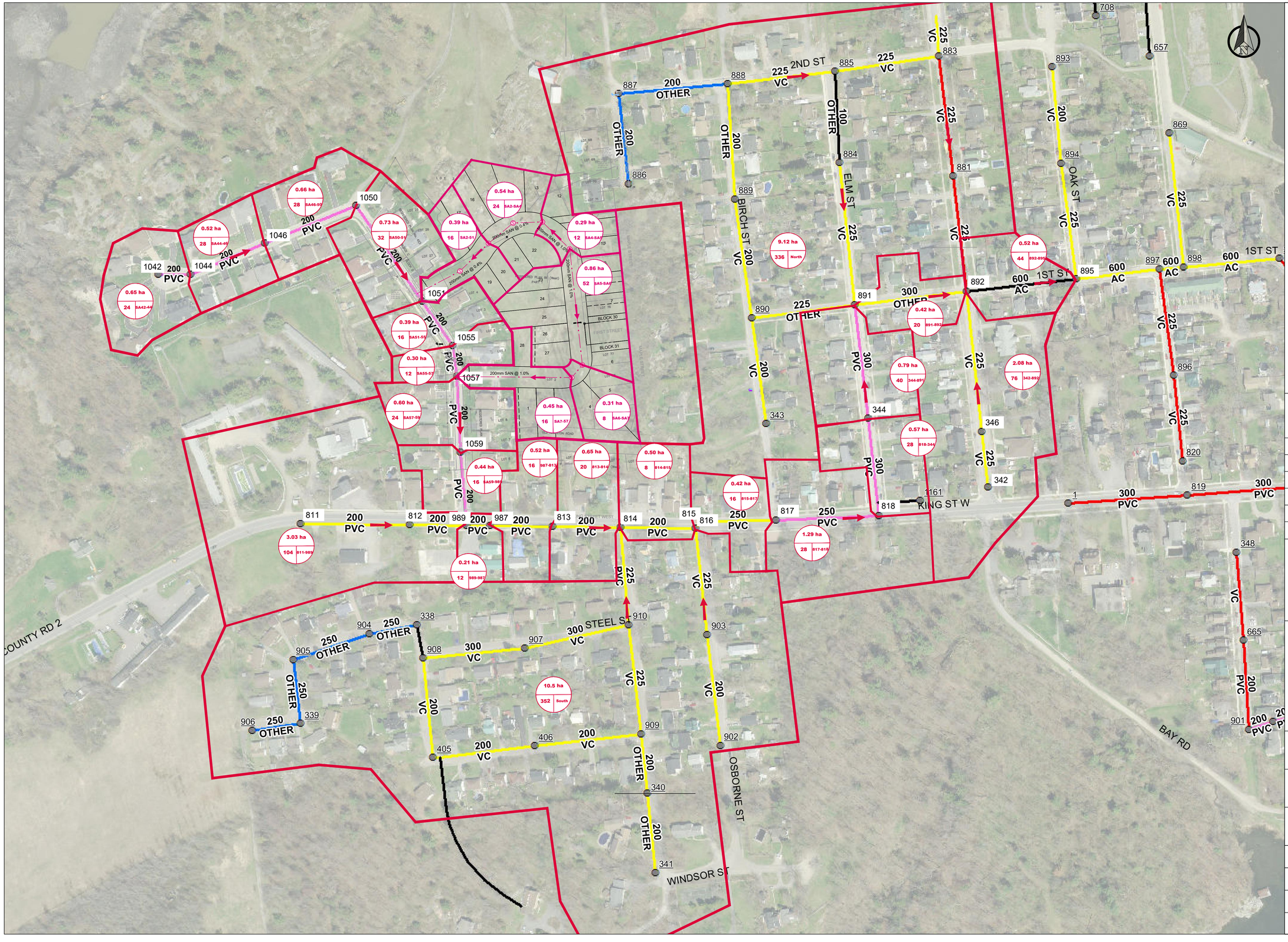
Forefront Engineering Inc
1329 Gardiners Road, Suite 210
Kingston, ON, Canada K7P 0L8
613.634.9009 tel.
1.888.884.9392 fax.

Client: RGH DEVELOPMENTS

Project: ROCKY ACRES DEVELOPMENT

Drawing: EXISTING SANITARY SEWERAGE AREAS

Drawn by:	Checked by:	Project No.
CSD	JH	
Designed by:	Approved by:	Drawing No.
KMN	KMN	FIG. 3
Date: APRIL 2021		
Scale: 1:1500		



Benchmark

No.	Revision/Issue	Date

Forefront Engineering Inc
1329 Gardiners Road, Suite 210
Kingston, ON, Canada K7P 0L8
613.634.9009 tel.
1.888.884.9392 fax.

Client
RGH DEVELOPMENTS

Project
ROCKY ACRES DEVELOPMENT

Drawing
PROPOSED SANITARY SEWERAGE AREAS

Drawn by:	Checked by:	Project No.
CSD	JH	
Designed by:	Approved by:	Drawing No.
KMN	KMN	FIG. 4
Date: APRIL 2021		
Scale: 1:1500		

Appendix B

- Hydrant Flow Data Table
- Distribution Demands
- EPA NET- Modeling Results
    - Water Distribution Schematic
    - Existing Maximum Day Plus Fire Flow – Water Model Results
    - Proposed Maximum Day Plus Fire Flow – Water Model Results
    - Existing Peak Hour Flow – Water Model Results
    - Proposed Peak Hour Flow – Water Model Results

Gananoque Hydrant Flow Data Table

Flushing Order	Hydrant Number	Location	Year	Date of Work	Make	Port Size	Turbidity - NTU	Free Chlorine (mg/L)	Static PSI	Residual Pressure	Fire Flow (GPM)	New Colour	Pitot Pressure	Time Flushed	Flow GPM	Repairs Required
24	FH108	615 King St W	2018	05/15/18	Century		1.31	+2.20	65	53	2167	Blue	40	10	1061	
34	FH109	King St W @ Gan Apts	2018	05/15/18	Century	3.5 31A	1.59	+2.20	59	47	1876	Blue	35	10	993	
36	FH164	40 Garfield	2018	05/15/18	Century	5 47A	1.07	+2.20	38	45	1772	Blue	35	10	993	
37	FH165	100 Garfield	2018	05/15/18	Century	5 47A	1.3	+2.20	61	45	1650	Blue	35	10	993	

Rocky Acres Water Distribution Demands April, 2020

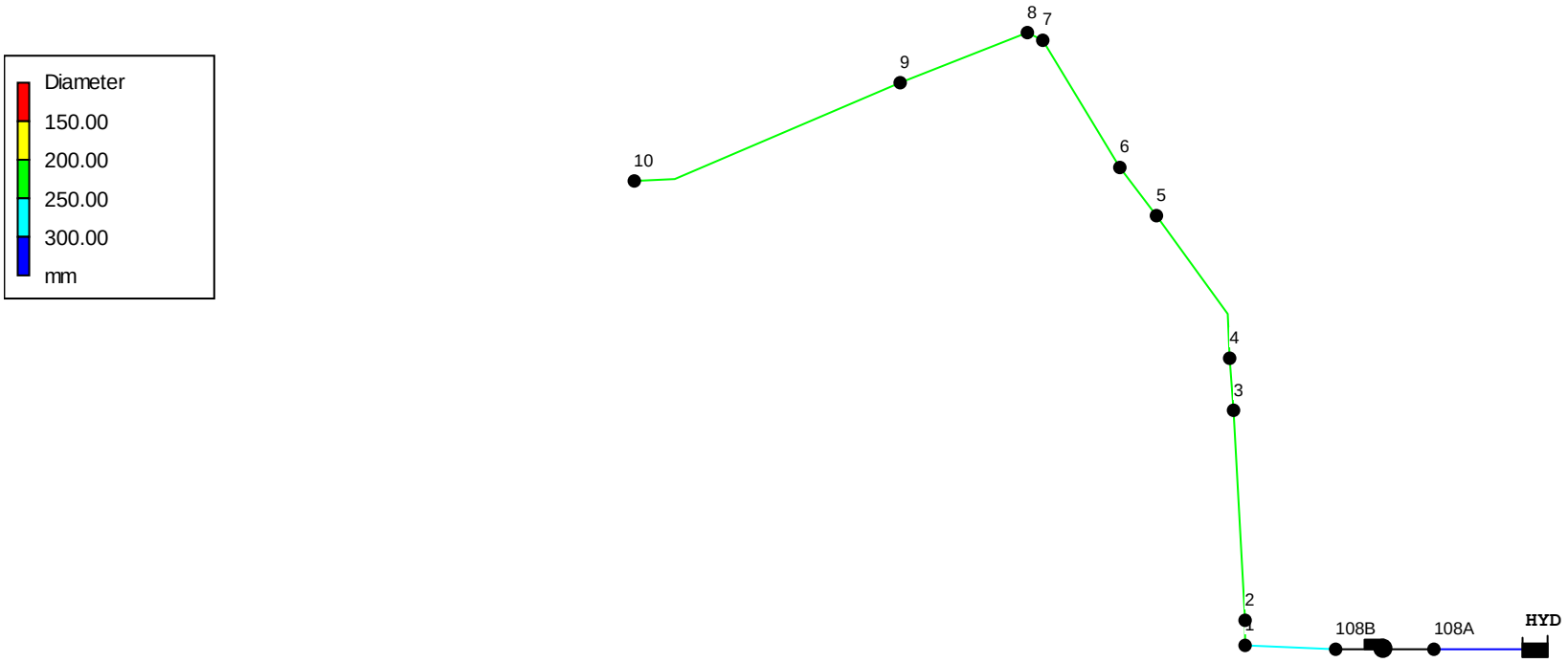
DESIGN NOTES:

Single Family Res.	350	L/cap. D
capita per dwelling unit		
- Single Family detached	4	pop/unit
-Semi-detached and Townhouse	4	pop/unit
-Multi- unit residential	1.54	pop/unit
-Commercial / Institutional Flow	28,000	L/ha-day (MOECC Water)
Peak Hour Flow Factor	4.25	
Maximum Day Flow Factor	2.75	

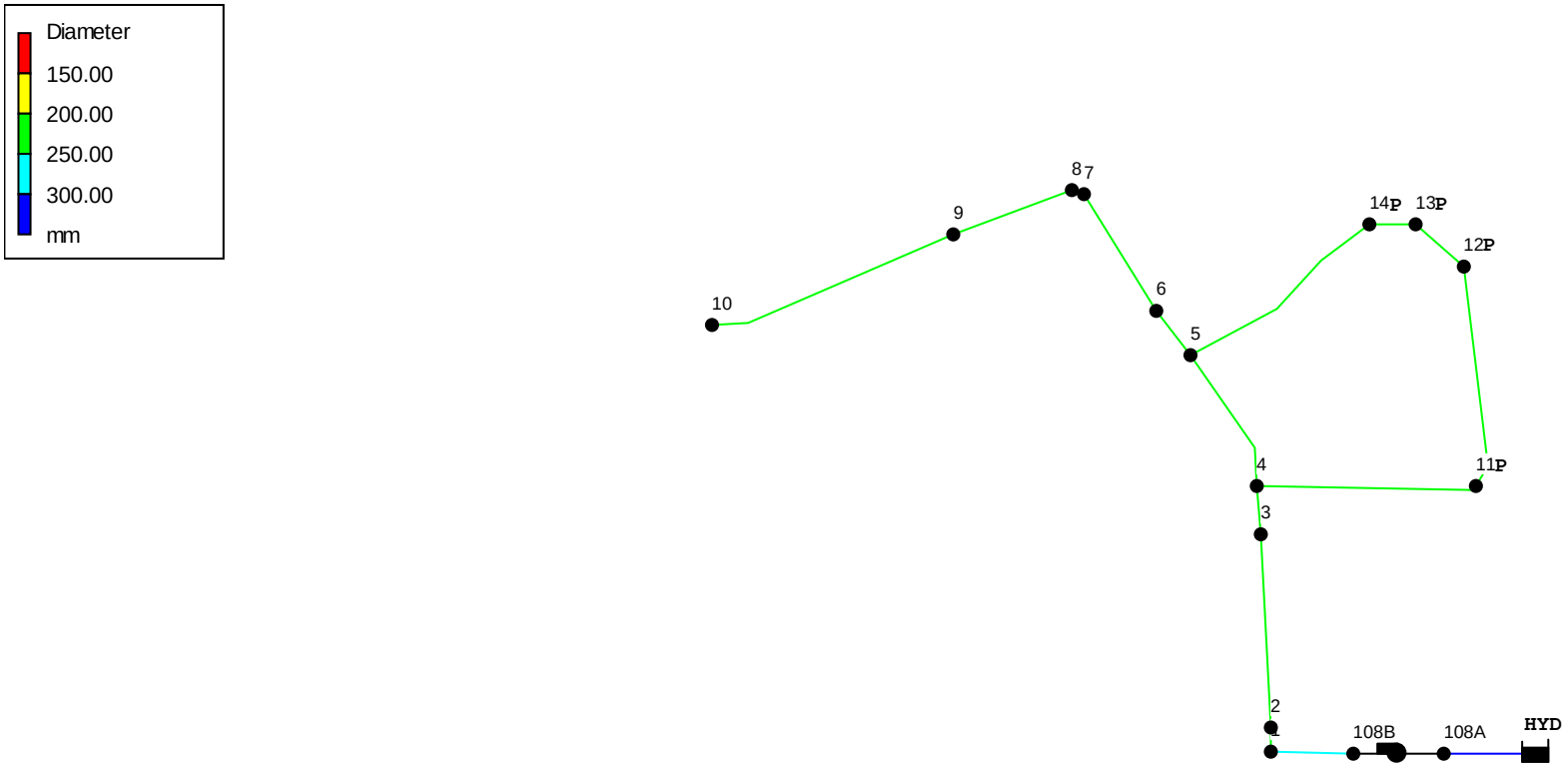
Single Family Homes	Semi-Detached	Townhouse	Multi -Unit Residential	Commercial Units	Street	Block	Nodes	No.	Unit	Rate	Unit	L/day	L/s	Peak Flow Demands	
														Peak Hour L/s	Maximum Day L/s
Existing Residential Outside Development															
5					King Street W		1	20.00	people	350	L/person/day	7000	0.08	0.34	0.22
9					Garfield Street		3	36.00	people	350	L/person/day	12600	0.15	0.62	0.40
2					Garfield Street		4	8.00	people	350	L/person/day	2800	0.03	0.14	0.09
6					Garfield Street		5	24.00	people	350	L/person/day	8400	0.10	0.41	0.27
2					Garfield Street		6	8.00	people	350	L/person/day	2800	0.03	0.14	0.09
6					Garfield Street		7	24.00	people	350	L/person/day	8400	0.10	0.41	0.27
5					Garfield Street		9	20.00	people	350	L/person/day	7000	0.08	0.34	0.22
15					Garfield Street		10	60.00	people	350	L/person/day	21000	0.24	1.03	0.67
					Total			200.00				70000.00	0.81	3.44	2.23
Proposed Residential															
5					***Coachmen's Court***		***11P***	***20.00***	***people***	***350***	***L/person/day***	***7000***	***0.08***	***0.34***	***0.22***
10	***4***				***Coachmen's Court***		***12P***	***56.00***	***people***	***350***	***L/person/day***	***19600***	***0.23***	***0.96***	***0.62***
4					***Coachmen's Court***		***13P***	***16.00***	***people***	***350***	***L/person/day***	***5600***	***0.06***	***0.28***	***0.18***
7					***Coachmen's Court***		***14P***	***28.00***	***people***	***350***	***L/person/day***	***9800***	***0.11***	***0.48***	***0.31***
					Total			120.00				42000.00	0.49	2.07	1.34

TOTAL AVERAGE DAY FLOW	0.5 L/s	
PEAK DAY FACTOR - 2.75		
MAXIMIUM DAY FLOW	80.2 L/min	1.34 L/s
PEAK HOUR FACTOR - 4.25		
PEAK HOUR FLOW	124.0 L/min	2.07 L/s

Rocky Acres Existing Development Water Network



Rocky Acres Proposed Development Water Network



Rocky Acres Development
Scenario: Existing Network Maximum Day Demand

	MD Demand	Head	Pressure	Pressure	Pressure	Fire Flow	Fire Flow
Node ID	LPS	m	m	kPa	psi	lps	lpm
Junc 1	0.22	133.16	44.87	440	64	120	7200
Junc 2	0.000	133.16	44.87	440	64	120	7200
Junc 3	0.400	133.16	44.37	435	63	110	6600
Junc 4	0.090	133.16	44.24	434	63	100	6000
Junc 5	0.270	133.15	44.82	440	64	100	6000
Junc 6	0.090	133.15	44.69	438	64	90	5400
Junc 7	0.270	133.15	42.90	421	61	90	5400
Junc 8	0.000	133.15	42.87	421	61	90	5400
Junc 9	0.220	133.15	42.54	417	61	80	4800
Junc 10	0.670	133.15	41.87	411	60	80	4800

Rocky Acres Development
Scenario: Proposed Network Maximum Day Demand

	MD Demand	Head	Pressure	Pressure	Pressure	Fire Flow	Fire Flow
Node ID	LPS	m	m	kPa	psi	lps	lpm
Junc 1	0.22	133.14	44.85	440	64	120	7200
Junc 2	0.000	133.14	44.85	440	64	120	7200
Junc 3	0.400	133.13	44.34	435	63	100	6000
Junc 4	0.090	133.12	44.20	434	63	100	6000
Junc 5	0.270	133.12	44.79	439	64	100	6000
Junc 6	0.090	133.12	44.66	438	64	90	5400
Junc 7	0.270	133.12	42.86	420	61	90	5400
Junc 8	0.000	133.12	42.83	420	61	90	5400
Junc 9	0.220	133.12	42.50	417	60	80	4800
Junc 10	0.670	133.12	41.83	410	60	80	4800
Junc 11P	0.220	133.12	43.71	429	62	100	6000
Junc 12P	0.620	133.12	43.04	422	61	100	6000
Junc 13P	0.180	133.12	43.18	424	61	100	6000
Junc 14P	0.310	133.12	43.32	425	62	100	6000

Rocky Acres Development
Scenario: Existing Network Peak Demand

Node ID	PK Demand	Head	Pressure	Pressure	Pressure
	LPS	m	m	kPa	psi
Junc 1	0.34	133.14	44.85	440	64
Junc 2	0.000	133.14	44.85	440	64
Junc 3	0.620	133.13	44.34	435	63
Junc 4	0.140	133.13	44.21	434	63
Junc 5	0.410	133.12	44.79	439	64
Junc 6	0.140	133.12	44.66	438	64
Junc 7	0.410	133.12	42.86	420	61
Junc 8	0.000	133.12	42.83	420	61
Junc 9	0.340	133.12	42.50	417	60
Junc 10	1.030	133.12	41.83	410	60

Rocky Acres Development
Scenario: Proposed Network Peak Demand

Node ID	PK Demand	Head	Pressure	Pressure	Pressure
	LPS	m	m	kPa	psi
Junc 1	0.34	133.08	44.80	439	64
Junc 2	0.000	133.08	44.79	439	64
Junc 3	0.620	133.06	44.27	434	63
Junc 4	0.140	133.05	44.14	433	63
Junc 5	0.410	133.05	44.72	439	64
Junc 6	0.140	133.05	44.59	437	63
Junc 7	0.410	133.04	42.79	420	61
Junc 8	0.000	133.04	42.76	419	61
Junc 9	0.340	133.04	42.43	416	60
Junc 10	1.030	133.04	41.76	410	59
Junc 11P	0.340	133.05	43.64	428	62
Junc 12P	0.960	133.05	42.97	422	61
Junc 13P	0.280	133.05	43.11	423	61
Junc 14P	0.480	133.05	43.25	424	62

Appendix C

- Existing Sanitary Sewer Design Sheet
- Proposed Sanitary Sewer Design Sheet

EXISTING SANITARY SEWER DESIGN SHEET
ROCKY ACRES SUBDIVISION

Date: April 2021
Project: Rocky Acres

Municipality: Gananoque

Drainage Area: 34.91 ha

q=average daily per capita flow (L/cap. d)	350
Maximum Pipe Capacity	85%
I=unit of peak extraneous flow (L/ha. s)	0.14
M=peaking factor 1+14/(4+(P/1000)^0.5) 4.0 MAX	
Q(p)=peak population flow (L/s)	
Q(i)=peak extraneous flow (L/s)	
Q(d)=peak design flow	
capita per dwelling unit	
- Single Family detached	4.00 pop/unit
-Semi-detached and Townhouse	4.00 pop/unit
-Multi-unit	1.54 pop/unit
Commercial / Institutional	28 m^3 day / ha (MOECC Sewer Guidelines)

EXISTING SANITARY DRAINAGE PLAN

LOCATION			INDIVIDUAL				CUMULATIVE										PIPE DATA							
Description	FROM	TO	Dwelling Units	Pop.	Commerical /Instituional Area (hectares)	Area A (hectares)	Dwelling Units	Pop.	Commerical /Instituional Area (hectares)	Area A (hectares)	Equiv.* Pop	Peaking factor M	Commerical /Instituional Q(p) (L/s)	Pop. flow Q(p) (L/s)	Peak Extraneous flow Q(i) (L/s)	Peak design flow Q(d) (L/s)	Length (m)	Pipe size (mm)	Type of Pipe	Grade %	Capacity (L/s) n=0.013	Full flow velocity (m/s)	Actual velocity at Q(d)	%Capacity
Garfiield St.	1042	1044	6	24.0		0.65	6	24.0		0.65	24	4.00		0.39	0.09	0.48	27.0	200	PVC					
Garfiield St.	1044	1046	7	28.0		0.52	13	52.0		1.17	52	4.00		0.84	0.16	1.01	68.5	200	PVC					
Garfiield St.	1046	1050	7	28.0		0.66	20	80.0		1.83	80	4.00		1.30	0.26	1.55	85.0	200	PVC					
Garfiield St.	1050	1051	8	32.0		0.73	28	112.0		2.56	112	4.00		1.81	0.36	2.17	98.5	200	PVC					
Connection Point 1	**1051**	1055	4	16.0		0.39	32	128.0		2.95	128	4.00		2.07	0.41	2.49	42.0	200	PVC	0.40	20.7	0.66	0.41	12%
Garfiield St.	1055	1057	3	12.0		0.30	35	140.0		3.25	140	4.00		2.27	0.46	2.72	26.5	200	PVC	0.40	20.7	0.66	0.41	13%
Garfiield St.	1057	1059	6	24.0		0.60	41	164.0		3.85	164	4.00		2.66	0.54	3.20	63.0	200	PVC	0.40	20.7	0.66	0.46	15%
Connection Point 2	**1059**	989	4	16.0		0.44	45	180.0		4.29	180	4.00		2.92	0.60	3.52	64.0	200	PVC	0.40	20.7	0.66	0.46	17%
King St W	811	989	26	104.0	1.78	3.03	26	104.0	1.78	3.03	246	4.00	2.31	1.69	0.42	4.42								
King St W	989	987	3	12.0		0.21	74	296.0	1.78	7.53	438	4.00	2.31	4.80	1.05	8.16	20.0	200	PVC	0.70	27.4	0.87	0.74	30%
King St W	987	813	4	16.0		0.52	78	312.0	1.78	8.05	454	4.00	2.30	5.05	1.13	8.48	53.0	200	PVC	0.90	31.1	0.99	0.83	27%
King St W	813	814	5	20.0		0.65	83	332.0	1.78	8.70	474	3.99	2.30	5.36	1.22	8.88	58.0	225	PVC	0.50	31.7	0.80	0.67	28%
King St W	814	815	2	8.0	0.20	0.50	85	340.0	1.98	9.20	498	3.97	2.55	5.47	1.29	9.31	65.0	225	PVC	0.60	34.8	0.87	0.74	27%
Maple St./Osborne St.	341	814-816	88	352.0		10.50	88	352.0		10.50	352	4.00	0.00	5.70	1.47	7.17								
King St W	815	817	4	16.0	0.07	0.42	177	708.0	2.05	20.12	872	3.84	2.55	11.01	2.82	16.37	62.0	250	PVC	0.75	51.5	1.05	0.88	32%
King St W	817	818	7	28.0	0.00	1.29	184	736.0	2.05	21.41	900	3.83	2.54	11.42	3.00	16.96	90.0	250	PVC	0.75	51.5	1.05	0.88	33%
Elm St.	818	344	7	28.0		0.57	191	764.0	2.05	21.98	928	3.82	2.54	11.82	3.08	17.44	83.0	300	PVC	0.40	61.1	0.87	0.73	29%
Elm St.	344	891	10	40.0		0.79	201	804.0	2.05	22.77	968	3.81	2.53	12.41	3.19	18.12	97.0	300	PVC	0.40	61.1	0.87	0.73	30%
Birch St./ 2nd St.	818	891	84	336.0		9.12	84	336.0	2.05	9.12	500	3.97	2.64	5.41	1.28	9.33								
Victoria Ave.	23	892	19	76.0		2.08	19	76.0	2.05	2.08	240	4.00	2.66	1.23	0.29	4.18								
First St.	891	892	5	20.0		0.42	309	1,236.0	2.05	32.31	1400	3.70	2.46	18.53	4.52	25.51	96.0	300	PVC	0.30	52.9	0.75	0.72	48%
First St.	892	895	11	44.0		0.52	320	1,280.0	2.05	34.91	1444	3.69	2.45	19.14	4.89	26.48	94.0	600	AC	0.30	336.3	1.19	0.69	8%

*Equivalent Population includes a calculation for population (Area * demand / 350 L.Cap.day)

Total Existing Peak Flow Incl. Infiltration 26.48 **L/s**

PROPOSED SANITARY SEWER DESIGN SHEET
ROCKY ACRES SUBDIVISION

Date: April 2021
Project: Rocky Acres

Municipality: Gananoque

Drainage Area: 37.75 ha

q=average daily per capita flow (L/cap. d)	350
Maximum Pipe Capacity	85%
I=unit of peak extraneous flow (L/ha. s)	0.14
M=peaking factor 1+14/(4+(P/1000)^0.5) 4.0 MAX	
Q(p)=peak population flow (L/s)	
Q(i)=peak extraneous flow (L/s)	
Q(d)=peak design flow	
capita per dwelling unit	
- Single Family detached	4.00 pop/unit
-Semi-detached and Townhouse	4.00 pop/unit
-Multi-unit	1.54 pop/unit
Commercial / Institutional	28 m^3 day / ha (MOECC Sewer Guidelines)

PROPOSED SANITARY DRAINAGE PLAN

LOCATION			INDIVIDUAL				CUMULATIVE										PIPE DATA							
Description	FROM	TO	Dwelling Units	Pop.	Commerical /Instituional Area (hectares)	Area A (hectares)	Dwelling Units	Pop.	Commerical /Instituional Area (hectares)	Area A (hectares)	Equiv.* Pop	Peaking factor M	Commerical /Instituional Q(p) (L/s)	Pop. flow Q(p) (L/s)	Peak Extraneous flow Q(i) (L/s)	Peak design flow Q(d) (L/s)	Length (m)	Pipe size (mm)	Type of Pipe	Grade %	Capacity (L/s) n=0.013	Full flow velocity (m/s)	Actual velocity at Q(d)	%Capacity
Garfiield St.	1042	1044	6	24.0		0.65	6	24.0		0.65	24	4.00		0.39	0.09	0.48	27.0	200	PVC					
Garfiield St.	1044	1046	7	28.0		0.52	13	52.0		1.17	52	4.00		0.84	0.16	1.01	68.5	200	PVC					
Garfiield St.	1046	1050	7	28.0		0.66	20	80.0		1.83	80	4.00		1.30	0.26	1.55	85.0	200	PVC					
Garfiield St.	1050	1051	8	32.0		0.73	28	112.0		2.56	112	4.00		1.81	0.36	2.17	98.5	200	PVC					
Coachmens's Ct	SA5	SA4	3	12.0		0.29	3	12.0		0.29	12	4.00		0.19	0.04	0.24	32.6	200	PVC	1.00	32.8	1.04	0.30	1%
Coachmens's Ct	SA4	SA2	6	24.0		0.54	12	36.0		0.83	36	4.00		0.58	0.12	0.70	52.2	200	PVC	0.40	20.7	0.66	0.30	3%
Coachmens's Ct	SA2	1051	4	16.0		0.39	17	52.0		1.22	52	4.00		0.84	0.17	1.01	75.0	200	PVC	0.40	20.7	0.66	0.34	5%
Connection Point 1	**1051**	1055	4	16.0		0.39	32	180.0		4.17	180	4.00		2.92	0.58	3.50	42.0	200	PVC	0.40	20.7	0.66	0.46	17%
Garfiield St.	1055	1057	3	12.0		0.30	35	192.0		4.47	192	4.00		3.11	0.63	3.74	26.5	200	PVC	0.40	20.7	0.66	0.46	18%
Coachmens's Ct	SA5	SA6	13	52.0		0.86	25	52.0		0.86	52	4.00		0.84	0.12	0.96	99.0	200	PVC	1.00	32.8	1.04	0.44	3%
Coachmens's Ct	SA6	SA7	2	8.0		0.31	19	60.0		1.17	60	4.00		0.97	0.16	1.14	14.0	200	PVC	1.00	32.8	1.04	0.47	3%
Coachmens's Ct	SA7	1057	4	16.0		0.45	4	76.0		1.62	76	4.00		1.23	0.23	1.46	98.5	200	PVC	1.00	32.8	1.04	0.52	4%
Connection Point 2	**1057**	1059	6	24.0		0.60	41	292.0		6.69	292	4.00		4.73	0.94	5.67	63.0	200	PVC	0.40	20.7	0.66	0.56	27%
Garfield St.	1059	989	4	16.0		0.44	45	308.0		7.13	308	4.00		4.99	1.00	5.99	64.0	200	PVC	0.40	20.7	0.66	0.56	29%
King St W	811	989	26	104.0	1.78	3.03	26	104.0	1.78	3.03	246	4.00	2.31	1.69	0.42	4.42								
King St W	989	987	3	12.0		0.21	74	424.0	1.78	10.37	566	3.95	2.28	6.78	1.45	10.51	20.0	200	PVC	0.70	27.4	0.87	0.79	38%
King St W	987	813	4	16.0		0.52	78	440.0	1.78	10.89	582	3.94	2.27	7.02	1.52	10.82	53.0	200	PVC	0.90	31.1	0.99	0.89	35%
King St W	813	814	5	20.0		0.65	83	460.0	1.78	11.54	602	3.93	2.27	7.33	1.62	11.21	58.0	225	PVC	0.50	31.7	0.80	0.72	35%
King St W	814	815	2	8.0	0.20	0.50	85	468.0	1.98	12.04	626	3.92	2.52	7.44	1.69	11.64	65.0	225	PVC	0.60	34.8	0.87	0.74	33%
Maple St./Osborne St.	341	814-816	88	352.0		10.50	88	352.0		10.50	352	4.00		5.70	1.47	7.17								
King St W	816	817	4	16.0	0.07	0.42	177	836.0	2.05	22.96	1000	3.80	2.52	12.87	3.21	18.61	62.0	250	PVC	0.75	51.5	1.05	0.95	36%
King St W	817	818	7	28.0	0.00	1.29	184	864.0	2.05	24.25	1028	3.79	2.52	13.27	3.40	19.19	90.0	250	PVC	0.75	51.5	1.05	0.95	37%
Elm St.	818	344	7	28.0		0.57	191	892.0	2.05	24.82	1056	3.78	2.51	13.68	3.47	19.66	83.0	300	PVC	0.40	61.1	0.87	0.73	32%
Elm St.	344	891	10	40.0		0.79	201	932.0	2.05	25.61	1096	3.77	2.51	14.25	3.59	20.34	97.0	300	PVC	0.40	61.1	0.87	0.73	33%
Birch St./ 2nd St.	818	891	84	336.0		9.12	84	336.0	2.05	9.12	500	3.97	2.64	5.41	1.28	9.33								
Victoria Ave.	23	892	19	76.0		2.08	19	76.0	2.05	2.08	240	4.00	2.66	1.23	0.29	4.18								
First St.	891	892	5	20.0		0.42	309	1,364.0	2.05	35.15	1528	3.67	2.44	20.30	4.92	27.66	96.0	300	PVC	0.30	52.9	0.75	0.75	52%
First St.	892	895	11	44.0		0.52	320	1,408.0	2.05	37.75	1572	3.66	2.43	20.90	5.29	28.62	94.0	600	AC	0.30	336.3	1.19	0.71	9%

*Equivalent Population includes a calculation for population (Area * demand / 350 L.Cap.day)

Total Existing Peak Flow Incl. Infiltration 26.48 **L/s**
Rock Acres Subdivison Peak Flow 2.14 **L/s**