TULLOCH

Planners | Surveyors | Biologists | Engineers

July 26, 2024
241011

Ontario Aboriginal Housing Services
500 Bay St.
Sault Ste. Marie ON P6A 1X5

Attn: Ms. Paula Benford, Development Coordinator
pbenford@oahssc.ca

Re: Preliminary Servicing Study
243 River Road

Dear Ms. Benford,

Enclosed with this correspondence, please find the Preliminary Servicing Study for 243 River Road. This document has been prepared following an investigation to provide a comprehensive analysis of the servicing requirements for the aforementioned property. The study is intended for distribution to Ontario Aboriginal Housing Services and the Canada Mortgage and Housing Corporation.

We respectfully request your review of the enclosed study. Should you have any questions or require further information regarding the details of the study, please do not hesitate to contact the undersigned.

Yours truly,

Josh Lelievre, P.Eng.
Project Manager

Encl.

cc. Gail Obediah; gobediah@oahssc.ca
Cathy Connor; cconnor@oahssc.ca

243 River Road-Preliminary Servicing Study

Project #241011

Ontario Aboriginal Housing Services

500 Bay Street

July 2024

DISTRIBUTION LIST

# of Hard Copies	PDF Required	Association / Company Name
1	1	Ontario Aboriginal Housing Services

REVISION LOG

Revision #	Revised By	Date	Issue / Revision Description
1	NN	2024/07/25	Issued for Client Review

TULLOCH SIGNATURES

Report Prepared By:

Niraj Neupane
Engineering Intern

Report Reviewed By:

Josh Lelievre, P. Eng.
Project Manager

LICENSED PROFESSIONAL ENGINEER
J. M. LELIEVRE
100189656
Jul. 25/24
PROVINCE OF ONTARIO

Statement of Qualifications and Limitations

The attached Report (the "Report") has been prepared by Tulloch Engineering Inc. ("Consultant") for the benefit of the client ("Client") in accordance with the agreement between Consultant and Client, including the scope of work detailed therein (the "Agreement").

The information and data contained in the Report:

- are subject to the scope, schedule, and other constraints and limitations in the Agreement and the qualifications contained in the Report (the "Limitations")
- represent Consultant's professional judgement in light of the Limitations and industry standards for the preparation of similar reports
- may be based on information provided to Consultant which has not been independently verified
- have not been updated since the date of issuance of the Report and their accuracy is limited to the time period and circumstances in which they were collected, processed, made or issued
- must be read as a whole and sections thereof should not be read out of such context
- were prepared for the specific purposes described in the Report and the Agreement
- 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

Unless expressly stated to the contrary in the Report or the Agreement, Consultant:

- shall not be responsible for any events or circumstances that may have occurred since the date on which the Report was prepared or for any inaccuracies contained in information that was provided to Consultant
- agrees that the Report represents its professional judgement as described above for the specific purpose described in the Report and the Agreement, but Consultant makes no other representations with respect to the Report or any part thereof
- in the case of subsurface, environmental or geotechnical conditions, is not responsible for variability in such conditions geographically or over time

The Report is to be treated as confidential and may not be used or relied upon by third parties, except:

- as agreed by Consultant and Client
- as required by law
- for use by governmental reviewing agencies

Any use of this Report is subject to this Statement of Qualifications and Limitations. Any damages arising from improper use of the Report or parts thereof shall be borne by the party making such use.

This Statement of Qualifications and Limitations is attached to and forms part of the Report.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF APPENDICES

1. Introduction

1.1. General

TULLOCH has been retained by Ontario Aboriginal Housing Services to complete a preliminary servicing study in support of the proposed development located at 243 River Road, Sault Ste. Marie, Ontario.

The site has a total area of approximately 0.52 hectares. The site is located approximately 65 meters southwest of Dacey Road and borders the south side of River Road as shown in **Figure 1-1**. To our understanding, the site is intended to be developed as 30 studio units with office space, program space and building storage areas.

Figure 1-1: Site Location

1.2. Objective

The main objective of this study is to review the municipal services in the area required to support the proposed development. The components associated with this study are as follows:

1. Sanitary Sewer Capacity Study

    a. Objective: To investigate the downstream capacity of the existing municipal sanitary sewer system to determine if there is adequate capacity for flows generated by the proposed development.

2. Water Distribution System Fire Flow Capacity Study

    a. Objective: To investigate the capacity of the existing municipal water distribution system to determine if there is adequate capacity for both domestic and fire flows.

3. Storm Water Management

    a. Objective: To provide commentary regarding stormwater management criteria for both quality and quantity control.

2. Sanitary Sewer Capacity Study

2.1. Study Approach

The City of Sault Ste. Marie GIS data, and existing plans and profile drawings were used to develop and identify sanitary sewer drainage areas, pipe sizes, pipe lengths, etc. This data was utilized in our analysis of the downstream pipe capacities.

The upstream sewage drainage area extends north (and east) from Northland Trailer Park on Tecumseh Street where it is pumped within close proximity to the Dacey Road and Trunk Road intersection. The sanitary sewage drainage area extends east to the Queensgate and Parkinworth subdivisions.

The westerly drainage area is generally limited to the properties bordering Dacey Road until the sanitary sewer turns west down River Road. The sanitary sewer system on River Road generally receives all flows from south of Queen Street. The proposed development will discharge near manhole #3247.

The sanitary sewer analysis terminates at the River Road pumping station on Murphy Street. At this point, the sewage is pumped to the East End Wastewater Treatment Plant. According to the 2010 "River Road Sewage Pumping Station-Operation Manual" by Kresin Engineering Corporation (Refer to **Appendix A**), the pumping station consists of (3) three 75 HP dry pit vertical centrifugal, non-clog sewage pumps (two operational and one backup). Each pump is rated for 175 L/s at 20.5m TDH.

The analysis was based on the following assumptions:

1. At the intersection of Dacey Road and Chambers Avenue (MH#2833), sewage flow could split, flowing south down Dacey Road or west within Chambers Avenue. The invert elevation of the Chambers Avenue sewer pipe is 0.14 meters higher than the invert of the Dacey Road sewer pipe. For this analysis, we assumed 100% of the upstream flow passes through manhole #2833 and continues down Dacey Road without considering the possibility of a sanitary flow split.

2. No infiltration was considered between manhole #3019 and #3093 as this segment is a sanitary forcemain.

3. Residences located east of Talon Avenue along Queen Street are presumed to be serviced by septic systems and not connected to the City's sanitary sewer system.

4. In accordance with the Ministry of Environment sewage design guidelines, an infiltration allowance of 0.28L/s*ha was utilized in our calculation. Additionally, a residential flow rate of 350L/s/cap was utilized.

5. A commercial area of 0.5 ha was assumed to account for office space in the proposed development.

6. The proposed development at 68 Dacey Road and 207 Dacey Road were considered and accounted for in this analysis.

7. The new subdivision that is currently being constructed on the east side of Dacey Road, consisting of 3 single-family and 66 multi-family units was considered and accounted for within our analysis.

2.2. Existing Conditions

The analyzed downstream sanitary sewer system consists of pipe sizes ranging from 675 mm to 825 mm in diameter. The maximum pipe utilization is approximately 40.5% between manholes #2983 and #3308. The peak design flow at the River Road pump station was calculated at 107.55 L/s. Sanitary drainage area plans and design sheets are enclosed in **Appendix B**.

2.3. Post-Development Conditions

The proposed development is expected to consist of 30 studio-type units with an equivalent population of 54 persons (1.8 persons/unit). We have also included in our analysis an allowance for the office and program spaces. The analysis indicates a marginal increase in downstream flow. The peak design flow calculations are included in the enclosed design sheets in **Appendix B**.

Similar to the pre-development condition, the maximum pipe utilization of 40.90% occurs between manholes #2983 and #3308. The total peak design flow is estimated at 108.66 L/s at the River Road pump station.

2.4. Conclusion

The proposed development is expected to have a minimal impact on peak flow and downstream sanitary sewer system utilization. Therefore, the existing municipal infrastructure is adequate to support the proposed development.

3. Water Distribution System Fire Flow Capacity Study

3.1. Existing Conditions

An existing 150mm water main is located along the north side of River Road near the proposed development. A flow test was completed at hydrant D14-24 which indicated an available flow rate of approximately 174 L/s at a residual pressure of 140kPa (20Psi). Hydrant Flow Test Results are attached in **Appendix C**.

3.2. Proposed Water Servicing

The 2020 Fire Underwriters Survey (FUS) “Water Supply for Public Fire Protection” method of calculating the required fire flow allowance was used to determine the required supply to the property. Based on the information provided by the client, we have assumed wood construction and a sprinklered building. The FUS method determined a required fire flow of 183.33 L/s. Flow test results indicate that the water main distribution system in the area does not have adequate flow to provide fire protection for this flow rate.

Therefore, we recommend the building construction type be revised from wood frame to ordinary construction as defined by the 2020 FUS guide which consists of exterior walls with a minimum 1-hour fire resistance rating. This results in a required fire flow of 117 L/s which is available within the municipal system. FUS calculations are provided in **Appendix C**.

3.3. Conclusion

Provided the proposed building is sprinklered with a fully supervised system and consists of ordinary construction as defined by the 2020 FUS guide, there will be sufficient water available for fire protection.

4. Stormwater Management

The stormwater management plan will be addressed during the site plan control process. Due to the site location and proximity to the St. Marys river, there are no concerns regarding quantity and quality control requirements to meet Municipal Guidelines.

5. Report Limitations and Guidelines for Use

We have prepared this report exclusively for the client, Ontario Aboriginal Housing Services. The report is only applicable to the project scope provided and described herein. Any change to the project requires a review by TULLOCH.

6. Closure

We trust that the information and recommendations provided in this report will be found to be complete and adequate in support of the proposed development. Should further elaboration be required for any portion, we are pleased to provide further assistance.

APPENDIX A

River Road Sewage Pump Station Details

2.0 BASIC DESIGN DATA

Section 2 provides an overview of equipment specifications. Refer to Section 4 of this manual for detailed descriptions of facility components.

2.1 PUMPING FACILITIES

The River Road pumping station (also known as the Tarentorus II station) was originally constructed in 1968, with a maximum capacity of 197 L/s. The station was rebuilt in 1990 with a maximum capacity of 319 L/s. The station discharges by forcemain to the East End Water Pollution Control Plant (WPCP) which is located southwest of the pumping station

The River Road Pumping Station is equipped with three (3) 56 kW (75 HP) dry pit vertical centrifugal non-clog sewage pumps, two (2) duty and one (1) standby. Each pump is rated for 175 L/s at 20.5 m TDH and is driven by electric motors (variable speed). Sewage flow is metered by an electromagnetic flow meter in the common discharge header. Individual pump specifications are presented in Table 2.1. Figure 2.1 depicts the pump numbering system.

Table 2.1 Pump Specifications

Pump No.	Capacity (L/s)	TDH (m)	Power
1, 3, 4	175	20.5	56kW

Pumps and drivers start and stop automatically depending on water levels in the wet wells monitored by an ultrasonic level sensor located in each wet well.

2.2 STANDBY POWER FACILITIES

Standby power is provided at the pumping station by a single 300kW generator driven by a diesel engine with a generator control system, fuel supply system, and one (1) 2,273 litre indoor fuel tank. The genset is located in the diesel generator room. More information can be found in Section 4.5.

APPENDIX B

Sanitary Sewer Drainage Area Plans and Design Sheets

P:\2024\241011 Ontario Aboriginal Housing – 243 River Rd Site Servicing Study\CAD\04 Drawings\241011 Fig 1 Sanitary Drainage Areas.dwg

No.	DATE	BY	ISSUES / REVISIONS
0	28.06.2024	TP	ISSUED FOR SERVICING REPORT

TULLOCH

DRAWING: **SANITARY SUB-DRAINAGE AREA**

PROJECT: **243 RIVER ROAD**
SITE SERVICING STUDY

DRAWN BY:	CHECKED BY:	PROJECT No. :	
TP	JL	241011	
DESIGNED BY:	APPROVED BY:	DRAWING No.	REVISION No.
NN	JL	FIG 1	0
SCALE:	DATE:		
1:10000	JUNE 28, 2024		

SANITARY SEWER ANALYSIS
243 River Road Pre-development

Project#241011

Design: NN

Checked:

Date: June 21, 2024

Design Parameters:

Residential Flow Rate =	350	L/cap/day (MOE)
Industrial Flow Rate =	35,000	L/ha/day (MOE)
Commercial Flow Rate =	28,000	L/ha/day (MOE)
Institutional Flow Rate =	140	L/student/day (MOE)
Peak Extrenuous Flow (i) =	0.28	L/ha/sec (MOE)
Industrial/Commercial Peaking Factor =	2	(MOE)
Population =	3.2	persons per home (MEA)
Population =	1.8	persons per appartment (MEA)

$Q_d = Q_r + Q_{ind} + Q_c + Q_{inst} + Q_i$

Q_d = Peak Design Flow

Q_r = Peak Residential Flow

Q_{ind} = Peak Industrial Flow

Q_c = Peak Commercial Flow

Q_{inst} = Peak Institutional Flow

Q_i = Peak Extraneous Flow

Design Calculations:

M = 1+ 14/(4+P^0.5)

M = Harmon Peaking Factor

P = Population in thousands

Sewer Capacity

$Q = 1/n*A*R^{2/3}*S^{1/2}$

Q = Sewer Capacity

n = Manning Roughness Coefficient

R = Hydraulic Radius

LOCATION				THEORETICAL FLOWS																				Pipe Analysis								
	Location			Residential Flows						Industrial Flows				Commercial Flows				Institutional Flows									Sewer Characteristics							
Area ID's	Road Name	From MH	To MH	Indiv. Pop.	Area (ha)	Cum. Pop.	Cum. Area (ha)	Peaking Factor - M	Peak Flow (L/s)	Area (ha)	Peaking Factor	Cum. Area (ha)	Peak Flow (L/s)	Area (ha)	Peaking Factor	Cum. Area (ha)	Peak Flow (L/s)	Indiv. Pop.	Area (ha)	Cum. Pop.	Peaking Factor	Cum. Area (ha)	Peak Flow (L/s)	Cum. Drainage Area (ha)	Cum. Ex. Flow (L/s)	Peak Design Flow (L/s)	Pipe Size (mm)	Pipe Material	Pipe Slope (%)	Pipe Length (m)	Sewer Capacity (L/s)	Full Flow Velocity (m/s)	Actual Velocity (%)	Time of Flow (min)	Pipe Utilization (%)
AA	River Rd.	n/a	3247	2945	144.6	2945	144.60	3.45	41.149	0	2.0	0.00	0	0.65	2.0	0.65	0.421	810	2.32	810	2	2.32	2.625	147.57	41.32	85.515									
A17	River Rd.	3247	2321	25.6	2.24	2906	146.84	3.45	40.667	0.56	2.0	0.56	0.454	0.56	2.0	1.21	0.784	0	0	810	2	2.32	2.625	150.93	42.26	86.790	825	Conc	0.12	94.49	497.249	0.93	0.707	2.23	**17.5**
A18	River Rd.	2321	2295	25.6	1.79	2932	148.63	3.45	40.987	0.26	2.0	0.82	0.664	0	2.0	1.21	0.784	0	0	810	2	2.32	2.625	152.98	42.834	87.894	825	Conc	0.18	91.14	609.004	1.139	0.866	1.75	**14.4**
A19	River Rd.	2295	2650	25.6	2.2	2958	150.83	3.45	41.306	0	2.0	0.82	0.664	0	2.0	1.21	0.784	0	0	810	2	2.32	2.625	155.18	43.45	88.829	825	Conc	0.14	98.76	537.091	1.005	0.764	2.15	**16.5**
A20	River Rd.	2650	2919	22.4	1.22	2980	152.05	3.44	41.586	0	2.0	0.82	0.664	0	2.0	1.21	0.784	0	0	810	2	2.32	2.625	156.40	43.792	89.451	825	Conc	0.14	94.49	537.091	1.005	0.764	2.06	**16.7**
A21	River Rd.	2919	3155	28.8	1.86	3009	153.91	3.44	41.944	0	2.0	0.82	0.664	0	2.0	1.21	0.784	0	0	810	2	2.32	2.625	158.26	44.313	90.330	825	Conc	0.08	94.79	406.003	0.76	0.654	2.42	**22.2**
A04	Willowdale		3155	349	8.93	349	8.93	4.05	5.725	0	2.0	0.00	0	0	2.0	0.00	0	0	0	0	2	0.00	0	8.93	2.5	8.225									
A22	River Rd.	3155	2326	22.4	1.34	3380	164.18	3.40	46.527	0	2.0	0.82	0.664	0	2.0	1.21	0.784	0	0	810	2	2.32	2.625	168.53	47.188	97.788	825	Conc	0.11	71.93	476.08	0.891	0.766	1.57	**20.5**
A23	River Rd.	2326	3194	22.4	1.62	3403	165.80	3.40	46.801	0	2.0	0.82	0.664	0	2.0	1.21	0.784	0	0	810	2	2.32	2.625	170.15	47.642	98.516	825	Conc	0.25	73.46	717.718	1.343	1.021	1.2	**13.7**
A24	River Rd.	3194	2983	16	1.06	3419	166.86	3.39	46.996	0	2.0	0.82	0.664	0	2.0	1.21	0.784	0	0	810	2	2.32	2.625	171.21	47.939	99.008	825	Conc	0.04	67.97	287.087	0.537	0.499	2.27	**34.5**
A25	Murphy Rd.	2983	3308	323	16.51	3742	183.37	3.36	50.915	0	2.0	0.82	0.664	0	2.0	1.21	0.784	0	0	810	2	2.32	2.625	187.72	52.562	107.550	675	AC	0.1	30.78	265.817	0.743	0.691	0.74	**40.5**

Index:

= Current Population / Commercial Area

SANITARY SEWER ANALYSIS
243 River Road Post-development

Project#241011

Design: NN

Checked:

Date: June 21, 2024

Design Parameters:

Residential Flow Rate =	350	L/cap/day (MOE)
Industrial Flow Rate =	35,000	L/ha/day (MOE)
Commercial Flow Rate =	28,000	L/ha/day (MOE)
Institutional Flow Rate =	140	L/student/day (MOE)
Peak Extrenuous Flow (i) =	0.28	L/ha/sec (MOE)
Industrial/Commercial Peaking Factor =	2	(MOE)
Population =	3.2	persons per home (MEA)
Population =	1.8	persons per appartment (MEA)

$Q_d = Q_r + Q_{ind} + Q_c + Q_{inst} + Q_i$

Q_d = Peak Design Flow

Q_r = Peak Residential Flow

Q_{ind} = Peak Industrial Flow

Q_c = Peak Commercial Flow

Q_{inst} = Peak Institutional Flow

Q_i = Peak Extraneous Flow

Design Calculations:

M = 1+ 14/(4+P^0.5)

M = Harmon Peaking Factor

P = Population in thousands

Sewer Capacity

$Q = 1/n*A*R^{2/3}*S^{1/2}$

Q = Sewer Capacity

n = Manning Roughness Coefficient

R = Hydraulic Radius

LOCATION				THEORETICAL FLOWS																				Pipe Analysis								
	Location			Residential Flows						Industrial Flows				Commercial Flows				Institutional Flows									Sewer Characteristics							
Area ID's	Road Name	From MH	To MH	Indiv. Pop.	Area (ha)	Cum. Pop.	Cum. Area (ha)	Peaking Factor - M	Peak Flow (L/s)	Area (ha)	Peaking Factor	Cum. Area (ha)	Peak Flow (L/s)	Area (ha)	Peaking Factor	Cum. Area (ha)	Peak Flow (L/s)	Indiv. Pop.	Area (ha)	Cum. Pop.	Peaking Factor	Cum. Area (ha)	Peak Flow (L/s)	Cum. Drainage Area (ha)	Cum. Ex. Flow (L/s)	Peak Design Flow (L/s)	Pipe Size (mm)	Pipe Material	Pipe Slope (%)	Pipe Length (m)	Sewer Capacity (L/s)	Full Flow Velocity (m/s)	Actual Velocity (%)	Time of Flow (min)	Pipe Utilization (%)
AA	River Rd.	n/a	3247	2945	144.6	2945	144.60	3.45	41.149	0	2.0	0.00	0	0.65	2.0	0.65	0.421	810	2.32	810	2	2.32	2.625	147.57	41.32	85.515									
A17	River Rd.	3247	2321	79.6	2.24	2960	146.84	3.45	41.341	0.56	2.0	0.56	0.454	1.06	2.0	1.71	1.108	0	0	810	2	2.32	2.625	151.43	42.4	87.928	825	Conc	0.12	94.49	497.249	0.93	0.707	2.23	**17.7**
A18	River Rd.	2321	2295	25.6	1.79	2986	148.63	3.44	41.660	0.26	2.0	0.82	0.664	0	2.0	1.71	1.108	0	0	810	2	2.32	2.625	153.48	42.974	89.031	825	Conc	0.18	91.14	609.004	1.139	0.866	1.75	**14.6**
A19	River Rd.	2295	2650	25.6	2.2	3012	150.83	3.44	41.979	0	2.0	0.82	0.664	0	2.0	1.71	1.108	0	0	810	2	2.32	2.625	155.68	43.59	89.966	825	Conc	0.14	98.76	537.091	1.005	0.764	2.15	**16.8**
A20	River Rd.	2650	2919	22.4	1.22	3034	152.05	3.44	42.258	0	2.0	0.82	0.664	0	2.0	1.71	1.108	0	0	810	2	2.32	2.625	156.90	43.932	90.587	825	Conc	0.14	94.49	537.091	1.005	0.764	2.06	**16.9**
A21	River Rd.	2919	3155	28.8	1.86	3063	153.91	3.43	42.616	0	2.0	0.82	0.664	0	2.0	1.71	1.108	0	0	810	2	2.32	2.625	158.76	44.453	91.466	825	Conc	0.08	94.79	406.003	0.76	0.654	2.42	**22.5**
A04	Willowdale		3155	349	8.93	349	8.93	4.05	5.725	0	2.0	0.00	0	0	2.0	0.00	0	0	0	0	2	0.00	0	8.93	2.5	8.225									
A22	River Rd.	3155	2326	22.4	1.34	3434	164.18	3.39	47.187	0	2.0	0.82	0.664	0	2.0	1.71	1.108	0	0	810	2	2.32	2.625	169.03	47.328	98.912	825	Conc	0.11	71.93	476.08	0.891	0.766	1.57	**20.8**
A23	River Rd.	2326	3194	22.4	1.62	3457	165.80	3.39	47.460	0	2.0	0.82	0.664	0	2.0	1.71	1.108	0	0	810	2	2.32	2.625	170.65	47.782	99.639	825	Conc	0.25	73.46	717.718	1.343	1.021	1.2	**13.9**
A24	River Rd.	3194	2983	16	1.06	3473	166.86	3.39	47.655	0	2.0	0.82	0.664	0	2.0	1.71	1.108	0	0	810	2	2.32	2.625	171.71	48.079	100.131	825	Conc	0.04	67.97	287.087	0.537	0.499	2.27	**34.9**
A25	Murphy Rd.	2983	3308	323	16.51	3796	183.37	3.35	51.565	0	2.0	0.82	0.664	0	2.0	1.71	1.108	0	0	810	2	2.32	2.625	188.22	52.702	108.664	675	AC	0.1	30.78	265.817	0.743	0.743	0.69	**40.9**

Index:

= Proposed Population / Commercial Area

APPENDIX C

Hydrant Flow Test Results and FUS Calculation

WATER FLOW TEST REPORT

PROJECT #:	241011
DATE (dd/mm/yr):	05-Jul-24
TIME OF DAY:	11:05 AM
WEATHER:	Rainy

TULLOCH ENGINEERING

TEST BY: KG

CHECKED BY:

TEST LOCATION: 243 River Road, Sault Ste. Marie, ON

WATER SUPPLIED BY: ☑ MUNICIPAL SYSTEM ☐ PRIVATE SYSTEM ☐ WELL ☐ Unknown

TEST TYPE: ☐ FIRE FLOW ☑ WATERMAIN CAPACITY ☐ HYDRANT CAPACITY

MAIN DIAMETER: ☐ 4 in. or less ☑ 6 in. ☐ 8 in. ☐ 10" ☐ 12" ☐ 16" or larg ☐ Unknown

PIPE MATERIAL ☐ PVC ☐ DUCTILE IRON ☐ CAST IRON ☑ Unknown

DATA - Flow Test #1

STATIC/RESIDUAL HYDRANT # ***D14-24***

FLOW HYDRANT(S)	***D14-13***	***C14-1***	***C14-1***
PITOT ORAFICE DIA.	3.05	2.50	2.00
COEFFICIENT:	1.355	0.906	1.310
PITOT READING:	12	9	10
USGPM:	1303	507	494

TOTAL FLOW DURING TEST: **2304** **USGPM**

STATIC READING: **80** **PSI**

RESIDUAL READING: **37** **PSI**

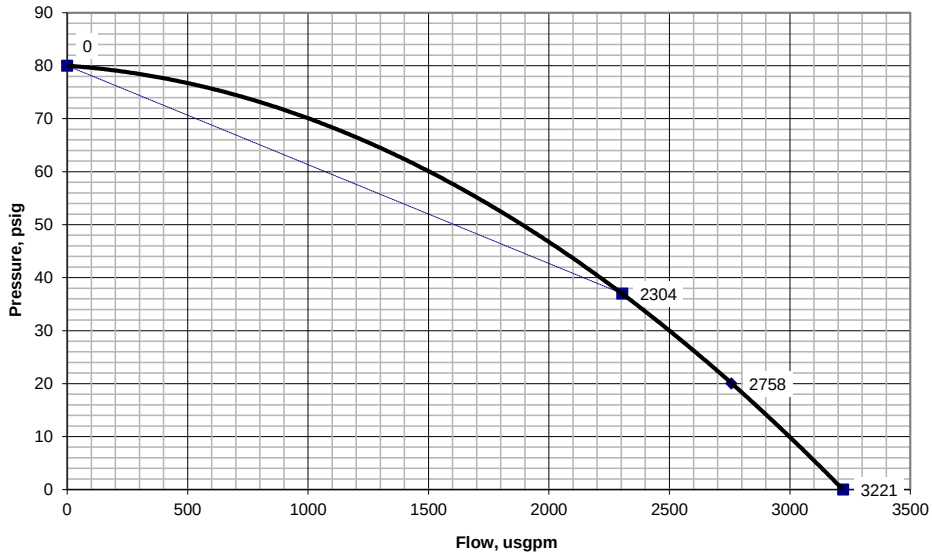
RESULTS:	***AT 20 PSI RESIDUAL***	**2758**	**USGPM**	***AT 0 PSI***	**3221**	**USGPM**

173.9788 L/s AT 20 PSI

MIN. OF FLOW: 3

ESTIMATED CONSUMPTION: 5428 USGAL.

REMARKS: ☑ Test meets requirements of NFPA 291 ☐ Test achieves 10% practical pressure drop
☐ Test accuracy diminished due to inability to obtain satisfactory drop in system pressure



TULLOCH

71 Black Road
Unit 8
Sault Ste Marie, ON
P6B 0A3

T. 705 949.1457
F. 705 949.9606
866 806.6602
saultstemarie@tulloch.ca

www.TULLOCH.ca

TULLOCH has determined the preliminary fire flow requirement based on the Fire Underwriters Survey (FUS) 2020 for the proposed transitional building at 243 River Road. The required fire flows are computed as follows:

Summary of Recommendations

Option 1 – Wood Frame Construction

Based on a conservative approach regarding the proposed building design and fire performance, this letter makes the following recommendations and conclusions with respect to the FUS required fire flow:

- A Construction Coefficient, C, of 1.5 applies,
- The Total Effective Floor Area, A, is 2040 m^2,
- A 15% decrease for Occupancy and Contents Adjustment Factor applies,
- A 50% reduction applies for automatic sprinkler protection according to NFPA. The system is fully supervised and has a standard water supply for both the sprinklers and fire department hose lines and,
- A 33% Exposure Adjustment Charge applies.

TULLOCH has determined the minimum fire flow of **183 L/s** is required.

FUS Calculations

The following FUS calculations were based on the Water Supply for Public Protection, 2020.

A summary and discussion of the recommended factors are as follows:

- Construction Coefficient, C: Type V (Wood Frame Construction): C = 1.5

- Total Effective Floor Area, A: A = 2040 m^2

  The Total Effective Floor Area = 2040 m^2

- Contents Adjustment Factor: 0.85 (15% decrease)

  From Table 3: Residential Occupancies are considered ‘’Limited”.

- Automatic Sprinkler Protection Factor: 0.5 (50% decrease)

  The proposed buildings will include a sprinkler system according to NFPA.

- Exposure Adjustment Charge: 1.33 (33% increase)

  Side 1(North): Exposure Length =34 m, Exposure Type = V,
  Length to Height Factor = 32 m
  From Table 6: 0% Charge

71 Black Road
Unit 8
Sault Ste Marie, ON
P6B 0A3

T. 705 949.1457
F. 705 949.9606
866 806.6602
saultstemarie@tulloch.ca

www.TULLOCH.ca

Side 2(East): Exposure Length = 20 m, Exposure Type = V,
Length to Height Factor = 50 m
From Table 6: 12% Charge

Side 3(South): Exposure Length = 13 m, Exposure Type = V,
Length to Height Factor = 76 m
From Table 6: 13% Charge

Side 4(West): Exposure Length =26 m, Exposure Type = V,
Length to Height Factor = 87 m
From Table 6: 8% Charge

The sum of exposure charges for each side of the building = 33%

Based on the above discussion and recommended factors, and in accordance with the Outline of Procedure on page 19 of the 2020 FUS document, the required fire flow is calculated below:

1. Initial Fire Flow:
   F= 220C$\sqrt{A}$ = 220(1.5) $\sqrt{2040} = 1{,}4909\ \mathrm{L/min}$

2. Round to the nearest 1,000 L/min:
   $15{,}000\ \mathrm{L/min}$

3. Apply the Contents Adjustment Factor:
   15,000*0.85 = 12,750 L/min

4. Apply the decrease for the Automatic Sprinkler Protection Factor (to be subtracted from item 3):
   50% decrease
   12,750*0.5 = 6,375 L/min

5. Apply the increase for the Exposure Adjustment Factor (to be added to item 3):
   33% increase
   12,750*0.33 = 4,208 L/min

6. Add the results from 4 and 5 to the adjusted results of 3.
   12,750 – 6,375 + 4,208 = 10,583 L/min

7. Round to the nearest 1,000 L/min:
   11,000 L/min

Therefore, the required fire flow for the building addition is **11,000 L/min** or **183 L/s**.

TULLOCH

71 Black Road
Unit 8
Sault Ste Marie, ON
P6B 0A3

T. 705 949.1457
F. 705 949.9606
866 806.6602
saultstemarie@tulloch.ca

www.TULLOCH.ca

Conclusion

Based on the forgoing discussion and calculations, per FUS fire flow methodology, TULLOCH has calculated a required fire flow of **183 L/s** for the proposed condominium development.

TULLOCH

71 Black Road
Unit 8
Sault Ste Marie, ON
P6B 0A3

T. 705 949.1457
F. 705 949.9606
866 806.6602
saultstemarie@tulloch.ca

www.TULLOCH.ca

TULLOCH has determined the preliminary fire flow requirement based on the Fire Underwriters Survey (FUS) 2020 for the proposed transitional building at 243 River Road. The required fire flows are computed as follows:

Summary of Recommendations

Option 2 – Ordinary Construction

Based on a conservative approach regarding the proposed building design and fire performance, this letter makes the following recommendations and conclusions with respect to the FUS required fire flow:

- A Construction Coefficient, C, of 1.0 applies,
- The Total Effective Floor Area, A, is 2040 m^2,
- A 15% decrease for Occupancy and Contents Adjustment Factor applies,
- A 50% reduction applies for automatic sprinkler protection according to NFPA. The system is fully supervised and has a standard water supply for both the sprinklers and fire department hose lines and,
- A 33% Exposure Adjustment Charge applies.

TULLOCH has determined the minimum fire flow of **117 L/s** is required.

FUS Calculations

The following FUS calculations were based on the Water Supply for Public Protection, 2020.

A summary and discussion of the recommended factors are as follows:

- Construction Coefficient, C: Type III (Ordinary Construction): C = 1.0

- Total Effective Floor Area, A: A = 2040 m^2

  The Total Effective Floor Area = 2040 m^2

- Contents Adjustment Factor: 0.85 (15% decrease)

  From Table 3: Residential Occupancies are considered ‘’Limited”.

- Automatic Sprinkler Protection Factor: 0.5 (50% decrease)

  The proposed buildings will include a sprinkler system according to NFPA.

- Exposure Adjustment Charge: 1.33 (33% increase)

  Side 1(North): Exposure Length =34 m, Exposure Type = V,
  Length to Height Factor = 32 m
  From Table 6: 0% Charge

71 Black Road
Unit 8
Sault Ste Marie, ON
P6B 0A3

T. 705 949.1457
F. 705 949.9606
866 806.6602
saultstemarie@tulloch.ca

www.TULLOCH.ca

Side 2(East): Exposure Length = 20 m, Exposure Type = V,
Length to Height Factor = 50 m
From Table 6: 12% Charge

Side 3(South): Exposure Length = 13 m, Exposure Type = V,
Length to Height Factor = 76 m
From Table 6: 13% Charge

Side 4(West): Exposure Length =26 m, Exposure Type = V,
Length to Height Factor = 87 m
From Table 6: 8% Charge

The sum of exposure charges for each side of the building = 33%

Based on the above discussion and recommended factors, and in accordance with the Outline of Procedure on page 19 of the 2020 FUS document, the required fire flow is calculated below:

1. Initial Fire Flow:
   F= 220C$\sqrt{A}$ = 220(1.0) $\sqrt{2040} = 9{,}936\ \mathrm{L/min}$

2. Round to the nearest 1,000 L/min:
   $10{,}000\ \mathrm{L/min}$

3. Apply the Contents Adjustment Factor:
   10,000*0.85 = 8,500 L/min

4. Apply the decrease for the Automatic Sprinkler Protection Factor (to be subtracted from item 3):
   50% decrease
   8,500*0.5 = 4,250 L/min

5. Apply the increase for the Exposure Adjustment Factor (to be added to item 3):
   33% increase
   8,500*0.33 = 2,805 L/min

6. Add the results from 4 and 5 to the adjusted results of 3.
   8,500 – 4,250 + 2,805 = 7,055 L/min

7. Round to the nearest 1,000 L/min:
   7,000 L/min

Therefore, the required fire flow for the building addition is **7,000 L/min** or **117 L/s**.

71 Black Road
Unit 8
Sault Ste Marie, ON
P6B 0A3

T. 705 949.1457
F. 705 949.9606
866 806.6602
saultstemarie@tulloch.ca

www.TULLOCH.ca

Conclusion

Based on the forgoing discussion and calculations, per FUS fire flow methodology, TULLOCH has calculated a required fire flow of **117 L/s** for the proposed condominium development.