EASTVIEW SUBDIVISION

SERVICEABILITY STUDY

809304 ONTARIO INC.

PROJECT No: 210604

PART OF LOT 18
CONCESSION 7

VILLAGE OF MOOSE CREEK

TOWNSHIP OF NORTH STORMONT

SEPTEMBER 6, 2022

ATREL Engineering Ltd Ltée
Engineers - Ingénieurs

TABLE OF CONTENTS

APPENDICES

Appendix "A"

210602-DP1 – Draft Plan
210602-PHM - Macro Phasing Plan

Appendix "B"

210602-WA1 – Watermain Layout and Demand
Table 1 - Hydrant Data - Firehall Hydrant No. 23
Table 2 - Hydrant Data - Valley Street South Hydrant No. 7
Table 3 - Node Data
Table 4 - Pipe Data
Table 5 - Average Day and Peak Hour Demand Results
Table 6 - Maximum Day Plus Fire-flow Results
Table 7 - Fire-flow Calculations Table F.U.S.

Appendix "C"

210602-SANM - Macro Sanitary Drainage Area Plan
Table 8 - Sanitary Sewer Design Sheet

Appendix "D"

210602-PRE – Pre-Development Drainage Conditions
210602-STMM - Macro Storm Drainage Area Plan
Table 9 - Storm Sewer Design Sheet (2 year)
Table 10 – Airport Method (Area 1 Pre-Development)
Table 11 – Airport Method (Area 2 Pre-Development)
Table 12 – Airport Method (Area 2 Pre-Development)
Table 13 – Modified Rational Method (Area 1)
Table 14 – Modified Rational Method (Area 2)
Table 15 – Modified Rational Method (Area 3)
Stormceptor EF Sizing Report (East)
Stormceptor EF Sizing Report (West)

Appendix "E"

210602-GRM - Macro Grading Plan
210602-ESCM - Macro Erosion and Sediment Control Plan

Appendix "F"

210602-N1 – Critical Setback – Living Day
210602-N2 – Critical Setback – Outdoor
VIA Rail Train data – Table 16
Sample Calculations

1.0 BACKGROUND

1.1 General

Atrel Engineering Ltd. has been retained by 809304 Ontario Inc. to complete a Serviceability Study in support of a Draft Plan of Subdivision application to develop approximately 11.99 ha. in the Village of Moose Creek in the Township of North Stormont.

The proposed development is situated on Part of Lot 18 – Concession 7. It is situated just east of Valley Street and north of the railway, as illustrated in ***Figure 1***.

Figure 1 – Location Map

The subject property is partially treed with an exiting man-made private pond located north-east. To the east, there's a vacant land being farmed. To the south, there's an existing Canadian National Railway and a Municipal Drain. To the west there's Valley Street with existing residential properties including single and semi-detached dwellings.

Eastview Subdivision is comprised of approximately 16 townhomes, 28 semi-detached and 33 single family units in total as well as approximately 1.45 ha. of green space.

The development is in the urban development boundary and is currently zoned R1, R1-3h, R1-4h, R2-2h, R2-6, R2-5 and R2-6 as per a previous draft plan application. The current zoning permits the proposed development.

The objective of this serviceability report is to provide clarifications and present the proposed servicing strategy to service the Eastview Subdivision.

1.2 Existing services

The site can physically be connected at the following locations:

- there is an existing 200mm diameter watermain on Valley Street.
- there is an existing 250mm diameter sanitary sewer on Valley Street.
- there is an existing municipal ditch south of the property along the railway which conveys runoff from the fore mentioned land which eventually discharges to the Moose Creek
- there is an existing road side ditch along Valley Street
- road connections are available on Valley Street
- Hydro, communications, and Gas was not part of this preliminary serviceability study; it will be verified during the draft plan circulation.

1.3 Design constraints

i) As previously stated, there is a watermain connection available along Valley Street. As shown in the next section, the project was analysed to confirm the project satisfy minimum requirements (See Appendix 'A' - 210602-PHM - Macro Phasing Plan).

ii) Due to the site's topography the site will be assessed as 4 distinct areas in terms of storm water management. The lots facing Valley Street drains towards the roadside ditch and storage will be provided using the available storage within the proposed roadside subdrain system. Most of the site will be designed to convey the minor and major flow to a dry stormwater management facility located south of the site.

iii) The sanitary sewer system will connect directly to the existing system on Valley Street. Phase 1 will be serviced by the existing sanitary sewer on Valley Street. Phase 2, 3 and 4 will be serviced by extending the sanitary sewer and connection to the existing sewer on Valley Street. The single family lots illustrated in yellow on Figure 1 in section 1.1 are too low to service the sanitary by gravity and will be on water only with a private septic system (Refer to Figure 1).

2.0 PROPOSED SERVICES

2.1 Watermain

Water supply to the Eastview Subdivision development will be provided through the installation of watermain pipes.

OCWA provided monitored flows and residual pressures data from the existing hydrants in the Village of Moose Creek. The hydrants of interest located in proximity of the development, hydrant No. 7 on Valley Street and hydrant No. 23 at the Firehall, were used as boundary condition for the watermain analysis. The hydrant data was then interpreted into a curve for the existing system which was used as the boundary condition for the proposed site. The hydrant tests and data interpretation tables, Table 1 and Table 2 are attached to this report in Appendix "E".

The Phase 1 will be serviced via the existing watermain along Valley Street.

A 200 mm diameter watermain pipe will serve the proposed development and the watermain will connect onto the Valley Street watermain at nodes J122 and looped and connected to Valley Street at node J110 (see Appendix 'B' - 210602-WA1 for watermain layout).

The projected water consumption rate for average day conditions was calculated using the City of Ottawa's Design Guidelines – Water Distribution. A population density of 2.7 persons/unit was used for the proposed semi-detached and townhouses and 3.4 person/unit for single dwellings. Daily consumption rates were taken at 350 l/cap./day. Maximum day and peak hour demands were calculated by multiplying the average demand by factors 2.5 and 5.5 respectively. The following table summarizes the demands imposed on the system.

The following table summarizes the anticipated water demand for the proposed development.

Water Demands

Type of Development	Average Daily Demand	Maximum Daily	Peak Hour
Residential	350 l/c.d	2.5 x Average Day	5.5 x Average Day
Eastview Subdivision	1.0459 l/s	2.6149 l/s	5.7526 l/s

The above flows were individually tabulated and are shown in Appendix "B".

The analysis shows that the proposed system will provide adequate flow and pressure during average day and peak hour demands. The system was also verified in order to satisfy residual pressure requirements from the City of Ottawa's Design Guidelines for Water Distribution which ranges from 276 kPa to 552 kPa during average day and peak hour demands. Refer to appendix "B" table 3 to 5 for the different scenario simulation results.

The water supply system was verified for fire protection as well, the Fire Underwriters Survey (FUS) provides guidance for the calculation of required fire flows, refer to Appendix "B" Table 7 for fire flow detailed calculations. All relevant fire flow calculations and results are found in Table 6 in Appendix "B"

The system was designed and verified to withstand fire flow demands while satisfying minimum residual pressure requirements of 140 kPa.

2.2 Sanitary Sewer

The sanitary sewer for the Eastview Subdivision will discharge directly into the existing sanitary sewer on Valley Street. There are two sanitary sewers on Valley Street, one flowing south from St. Joseph Street and the other flowing north from St, Joseph Street. Most of the development will be connected to the south sanitary sewer while a small portion to the north will connect to the north Valley Street sewer. To service the lots along Valley Street, approximately 100m of sewers is proposed.

The future lots which are too low to service by gravity are proposed to be serviced by individual septic system.

The following table summarizes design parameters used throughout the design process.

Design Parameters

Population Density	3.4 person/single family home 2.7 person per townhouse/semi-detached
Manning's Roughness Coefficient	0.013
Residential Average Flow	280 L/day/cap.
Infiltration Rate	0.33 L/s/ha.
Minimum Velocity	0.6 m/s
Maximum Velocity	3.0 m/s

Sanitary flows were calculated using the above variables while Peaking Factors were calculated using Harmon's Peaking Factor Equation.

A design sheet, Table 8, for the proposed development is present in Appendix 'C' of this report. Furthermore, plan 210602-SANM in Appendix 'C' offers details regarding the sanitary sewer alignments.

It is understood that the Village of Moose Creek has limited remaining capacity and that 17 services were allocated for this development. It is proposed to develop the first phase along Valley Street. The development of the other phases may proceed once it can be demonstrated by the municipality that additional capacity is available in the sewage treatment lagoon.

2.3 Storm Sewer and Stormwater Management

2.3.1 Design Constraints

Based on the Ministry of Environment and Climate Change (MOECC) design criteria, quantity control will be provided in order to limit the post-development flows to pre-development levels for storms ranging from a 1:5 year to a 1:100 year storm event.

2.3.2 Pre-Development Conditions

The existing topography of the proposed development has a good difference in ground elevations ranging from 88 to 100 metres across the site. The site is generally cleared with some sections forested, refer to the below Figure 2 for aerial site view.

Figure 2 – Aerial Site View

The majority of the site currently sheet drains in a southerly direction to reach the ditch along the Canadian National Railway while a small area north-west of the site sheet

drains towards the Valley Street roadside ditch. The watershed for the proposed development includes the east portion of Valley Street and 3 existing dwellings including a private pond located northeast of the development for a total of 12.80 ha. Refer to drawing 210602-PRE in Appendix A showing the pre-development drainage conditions of the proposed development.

The pre-development time of concentration for each of the 3 areas was found using the Airport method and was then used to calculate the pre-development flows of each respective areas. The calculations can be found in Appendix "D", Tables 10 to 12.

For the 100 year storm event, 25% is added to the C value as per MOE design guidelines. The pre-development flows for the 5 year event for Area 1 to Area 3 are 29.8 l/s, 137.4 l/s and 108.0 l/s, respectively. The pre-development flows for the 100 year event for Area 1 to Area 3 are 63.4 l/s, 291.5l/s and 229.3 l/s, respectively.

2.3.3 Tributary Area Characteristics

The storm drainage area was calculated as shown on the storm drainage plan (see plan 210602-STM1). Most of the site's runoff will be conveyed using roadside perforated pipe drainage system and will be sized to convey the 1:5 year storm event. Some of the site will be serviced by surface ditch due to the site's characteristics. An average runoff coefficient was calculated for each area using factors of 0.20 for grass covered areas and 0.90 for asphalt and the roof covered areas.

2.3.4 Theoretical Flows and Storage

The storm flows are calculated using the Intensity Duration Frequency (IDF) curve from the City of Ottawa. The five (5) and one hundred (100) year curves were used to calculate the required storage for the various storm events as well.

2.3.5 Strom Water Quantity Control

The control of post-development peak flows to pre-development levels will be achieved by means of a dry pond SWM facility and also using storage within the proposed roadside perforated pipe drainage system using the available storage within the voids of the clear stone to accommodate the 1:5 and 1:100 year storm event.

Using the modified rational method and the corresponding pre-development release rates, the required storage volume can be determined, refer to Appendix D tables 13 to 15 for details.

2.3.6 Storm Water Quality Control

Urban stormwater runoff can be a significant source of pollutant if no measures are implemented to mitigate the change in pollutant loading to the receiving effluent. For this development the pollutants will mostly be in the form of suspended solids. One of the most effective removal mechanisms for suspended solids in urban runoff is by way of controlling the first flush.

An Oil Grit Seperator (OGS) is a pollution prevention technology that removes oil and sediment from stormwater runoff. The OGS System is compatible with standard infrastructure components.

The key advantage of the OGS System compared to other water quality controls in storm sewer is the patented high flow bypass that prevents the re-suspension and scouring of captured pollutants during subsequent storm events.

The Stormceptor (or equivalent) will be used to improve the water quality prior to entering the storm sewer system. It meets the recommended TSS (Total Suspended Solids) removal efficiency of 70% in accordance with the 2003 MOE Stormwater Management Practices Planning and Design Manual. A PCSWMM for stormceptor software was used to size the proposed unit. Refer to output data enclosed in Appendix "D" while the following table summarizes important characteristics of the stormceptor.

Oil/Grit Separator Manhole Sizing

Location	Area	Runoff Coefficient	Stormceptor Model	Total TSS Removal (including by-passing)
STC 228	9.28 ha	0.35	EFO8	75%
STC 122	1.93 ha	0.38	EFO4	77%

2.3.7 Maintenance Program

The storm water quality will be controlled by the Oil Grit Seperator installed on the storm system. In order to meet the anticipated performance, a regular maintenance program must be implemented for this site. In other words the following is recommended in order to meet the Ministry of the Environment guidelines:

1) The Oil Grit Seperator should be periodically verified for clogging.

2) Sediments shall be removed from the Oil Grit Separator once a year, preferable in the fall, and will need to be disposed of according to regulations administered by the Ontario Ministry of Environment.

3) A logbook should be available and include as a minimum, the dates of inspection, depth of sediments and details of the way cleaning took place, including the name of the company doing the maintenance, type of truck or equipment, etc.

2.4 Macro Grading

A macro grading plan was prepared and shows that at least 0.1% slope is provided for the major flow. Most of the site's major flow will be directed to the dry pond while a portion will be directed to Valley Street. At the detail design stage, the detailed grading plan will be forwarded to the geotechnical consultant for review and recommendations.

2.5 Sediment and Erosion Control

Straw bales will be placed on-site at every definable swale in order to control runoff. These controls will be cleaned and maintained during the course of the construction. Before construction, silt fence barriers will be installed along the perimeter of the site as well as along the perimeter of the existing stormwater management facility (See plan 210602-ESCM in Appendix 'E' for details).

Although a preliminary erosion and sediment control plan is submitted at this stage, an updated plan will be prepared at each construction phase and be subject to the approval of all governing authorities.

2.6 Noise Control Study

A preliminary noise control study was conducted to determine the noise impact resulting from the railroad traffic. The existing traffic volume on the railroad was obtained from Via Rail's web site and Canadian National Railway. The railroad's existing traffic volume is 1 Freight trains and 6 passenger trains per 16 hour period and no trains at night. The train speed is variable along this corridor, however we have modelled the railway noise based on train speeds of 120 km/h for VIA trains and 80 km/h for freight trains (see Table 16, Appendix 'F').

Outdoor, ventilation and warning clause requirements are summarized in the following table;

Assessment Location	L_{eq} (8 or 16 hrs as noted) (dBA)	Ventilation Requirements	Outdoor Control Measures	Warning Clause
OUTDOOR LIVING AREA (OLA)	$Leq_{16\ hr}$ Less than or equal to 55 dBA	N/A	None required	Not required
	$Leq_{16\ hr}$ Greater than 55 dBA to less than or equal to 60 dBA	N/A	Control measures (barriers) may not be required but should be considered	Required if resultant L_{eq} exceeds 55 dBA Type A
	$Leq_{16\ hr}$ Greater than 60 dBA	N/A	Control measures (barriers) required to reduce the L_{eq} to below 60 dBA and as close to 55 dBA as technically, economically and administratively feasible	Required if resultant L_{eq} exceeds 55 dBA Type B
PLANE OF LIVING ROOM WINDOW	$Leq_{16\ hr}$ Less than or equal to 55 dBA	None required	N/A	Not required
	$Leq_{16\ hr}$ Greater than 55 dBA to less than or equal to 65 dBA	Forced air heating with provision for central air conditioning	N/A	Required Type C
	$Leq_{16\ hr}$ Greater than 65 dBA	Central air Conditioning	N/A	Required Type D
PLANE OF BEDROOM WINDOW	$Leq_{8\ hr}$ Greater than 50 dBA to less than or equal to 60 dBA	Forced air heating with provision for central air conditioning	N/A	Required Type C
	$Leq_{8\ hr}$ Greater than 60 dBA	Central air conditioning	N/A	Required Type D

Plan 210602-N1 and 210602-N2 in Appendix 'F' shows the noise level thresholds and their respective distances. The following table summarizes the different clauses at different distances from the railway.

Day (Living)		
dBa	Clause	Distance (m)
< 55	'OK'	87.35
≤ 60	'C'	42.35
> 65	'D'	< 20.33
Day (Outside)		
dBa	Clause	Distance (m)
< 55	'OK'	84.15
≤ 60	'A'	41.29
> 60	'B'	< 20.06
Night		
dBa	Clause	Distance (m)
< 50	'OK'	N/A
≤ 60	'C'	N/A
> 60	'D'	N/A

Based on the above clauses, no noise barrier is required but noise clauses will be required for some residential dwellings located adjacent to the railway. Furthermore, forced air heating or central air conditioning clauses may be required in some dwellings.

3.0 CONCLUSION

This site can be serviced as proposed above. The dwellings will be drained with adequate protection to the site and the environment. A sanitary sewer with adequate depth will be available to provide a proper outlet for this development.

Finally, the following engineering issues should be verified:

1. The proposed watermain layout will adequately service the development..
2. The sanitary sewer has been kept at a minimum slope by sizing the pipes in order to minimize the grade raise.
3. It was determined that the existing sanitary sewers have sufficient remaining capacity in order to accommodate the development but that upgrades will be required by the Village of Moose Creek to develop phase 2 to 4.
4. A dry stormwater management pond will be sized for Phase 2 to 4.
5. The proposed stormwater management scheme for Phase 1 will have to be approved in principal by the conservation authority and the Township prior to proceeding with the final design.
6. The utilities have not been approached but nearby development have been serviced without complications; comments are expected through the draft plan application process.

Prepared by:

ATREL ENGINEERING LTD

André Sauvé, P.Eng.
Project Manager

APPENDIX "A"

210602-DP1 – Draft Plan
210602-PHM - Macro Phasing Plan

AG

N28°23'00"W - 152.40m

N28°24'50"W - 103.15m

N28°18'50"W - 463.02m

N28°18'50"W 21.38m

N20°38'00"W 28.26m

EXISTING RESIDENTIAL

N61°12'09"E 75.35m

N61°12'09"E 75.29m

N28°24'15"W - 152.40m

STREET NO. 1

STREET NO. 3

STREET NO. 2

STREET NO. 1

SWM POND

BLOCK 58
0.82ha/2.03ac

PARK

BLOCK 57
0.63ha/1.55ac

N64°50'55"W - 304.20m

CANADIAN NATIONAL RAILWAY

N61°12'09"E 11.06m

N28°24'15"W 43.00m

BLOCK 59 BLOCK 60

N61°11'20"E 30.00m

N61°11'20"E 30.00m

N29°17'00"W 88.69m

N28°24'15"W - 83.71m

N28°24'15"W - 103.00m

N28°24'15"W - 43.00m

N28°24'15"W - 223.55m

VALLEY STREET

ST. JOSEPH STREET

SABOURIN STREET

R1

R2-15

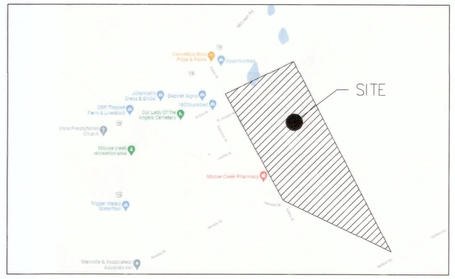
R2-5

CG

R2-7

R4

R1



KEY PLAN N.T.S.

DRAFT PLAN OF SUBDIVISION OF
PART OF LOT 18
CONCESSION 7
TOWNSHIP OF ROXBOROUGH
(IN THE HAMLET OF MOOSE CREEK)
COUNTY OF STORMONT
2022

SCALE 1 : 1250

1 : 1 250
10m 0 10 20 30 40m
HORIZONTAL

Surveyor's Certificate

I hereby certify that lands to be subdivided and their relationship to the adjacent lands are correctly shown.

SEPTEMBER 19, 2022
Dated

Ron M. Mason
Ontario Land Surveyor

Owner's Certificate

This is to certify that I am the owner of the lands to be subdivided and this plan was prepared in accordance with my instructions.

09/20/2022
Dated
809304 ONTARIO INC.
RICHARD THEORET

09/20/2022
Dated
RICHARD THEORET

09/20/2022
Dated
NICOLE THEORET

Additional Information required under Section 51-17, of the Planning Act.

A. as shown on plan
B. as shown on plan
C. as shown on plan
D. residential
E. as shown on plan
F. as shown on plan
G. as shown on plan
H. municipal water
I. glacial till
J. as shown on plan
K. Hydro, Telephone, Storm Sewers, Pipe water and Sanitary
L. as shown on plan

All elevations are Geodetic

Metric Note:

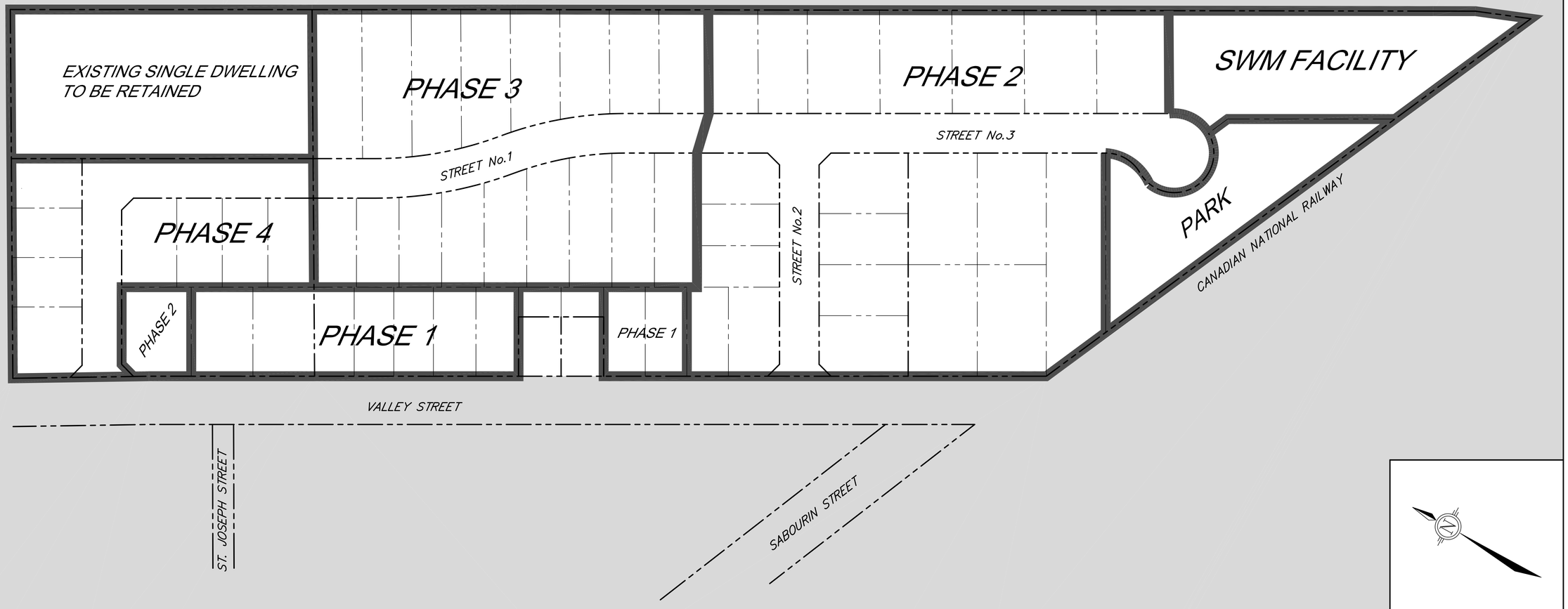
Distances shown hereon are in metres and can be converted to feet by dividing by 0.3048.

THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

SCALE	1 : 1 250 (10m 0 10 20 30 40m)
DESIGN	AGS
CHECKED	AGS
DRAWN	AG
CHECKED	AGS
APPROVED	AGS

ATREL Engineering Ltd
Engineers – Ingénieurs
1-2884 CHAMBERLAND STREET, ROCKLAND, ONTARIO K4K 1M6
TEL.: (613) 446-7423

VILLAGE OF MOOSE CREEK EASTVIEW SUBDIVISION	809304 ONTARIO INC	PROJECT No. 210602
PLAN DRAFT PLAN		DRAWING No. 210602-DP1



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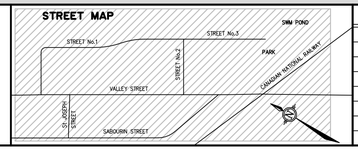
STREET MAP



No.	REVISION ⚠ -APPLIES WHEN DRAWING MODIFIED	DATE	BY
⚠	FIRST SUBMISSION	SEPT 6/22	AGS

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1 : 1000
10m 0 10 20 30m

DESIGN	AGS
CHECKED	AGS
DRAWN	AG
CHECKED	AGS
APPROVED	AGS

LICENSED PROFESSIONAL ENGINEER
A. G. Y. SAUVE
100142393
Sept 6, 2022
PROVINCE OF ONTARIO

ATREL Engineering Ltd.
Engineers - Ingénieurs
1-2884 CHAMBERLAND STREET, ROCKLAND, ONTARIO K4K 1M6
TEL.: (613) 446-7423

VILLAGE OF MOOSE CREEK
EASTVIEW SUBDIVISION

809304 ONTARIO INC.

PROJECT No. 210602

PLAN
MACRO PHASING PLAN

DRAWING No. 210602-PHI

APPENDIX "B"

210602-WA1 – Watermain Layout and Demand
Table 1 - Hydrant Data - Firehall Hydrant No. 23
Table 2 - Hydrant Data - Valley Street South Hydrant No. 7
Table 3 - Node Data
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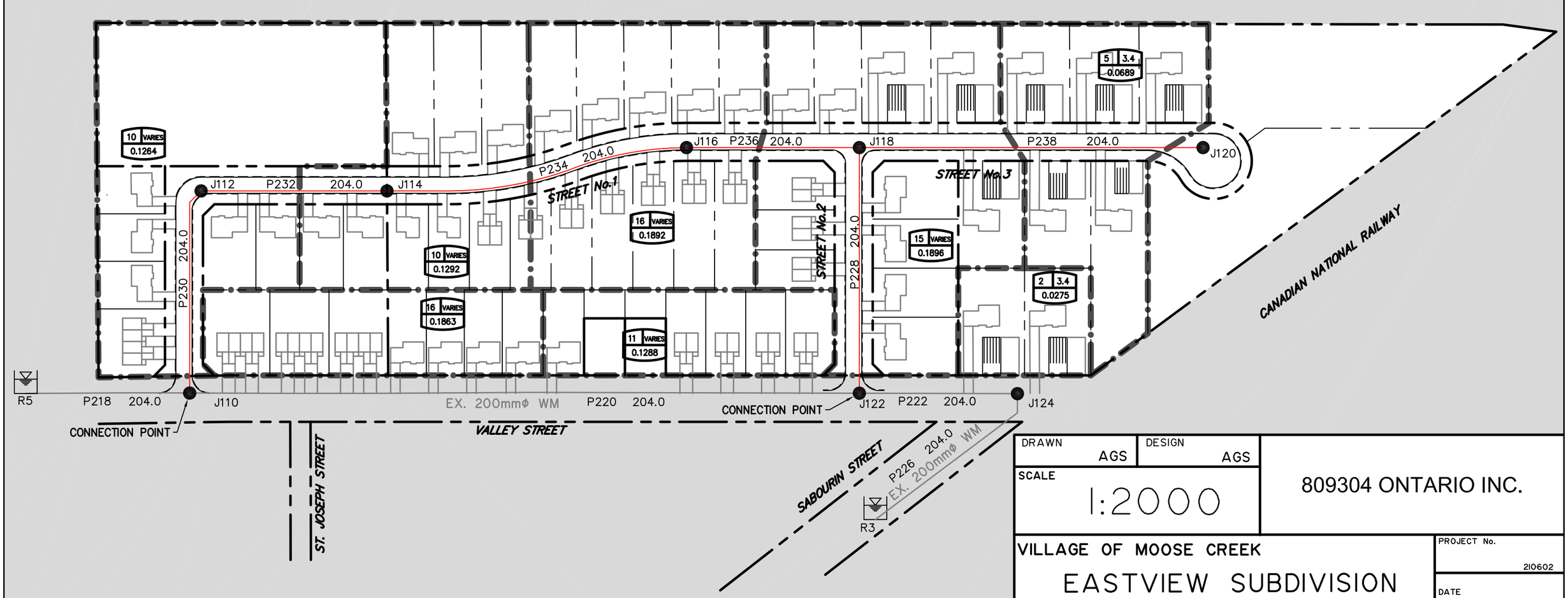
Table 6 - Maximum Day Plus Fire-flow Results
Table 7 - Fire-flow Calculations Table F.U.S.
Table 8 – Fire-flow Calculations Table O.B.C.

LEGEND

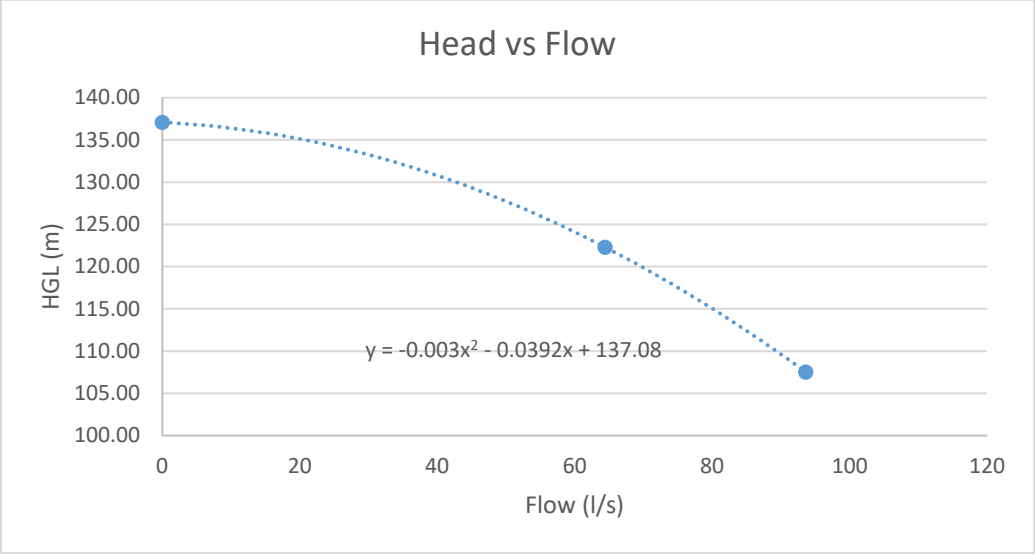
- 204.0 — PROPOSED 200mmø WATERMAIN
- 297.0 — PROPOSED 300mmø WATERMAIN
- 393.0 — PROPOSED 400mmø WATERMAIN
- J301 — NODE NUMBER
- NODE LOCATION
- P10235 — PIPE NUMBER
- DESIGN AREA BOUNDARY
- R1 — RESERVOIR LOCATION
- NUMBER OF UNITS IN SUB AREA
- 18 | 2.7 / 0.1531 — CAPITA PER UNITS / AVERAGE DAY DEMAND (L/S)
- OUTSIDE PROPOSED DEVELOPMENT



DRAWN: AGS	DESIGN: AGS
SCALE: 1:2000	809304 ONTARIO INC.
VILLAGE OF MOOSE CREEK EASTVIEW SUBDIVISION	PROJECT No.: 210602 DATE: SEPTEMBER 2022
PLAN WATERMAIN LAYOUT AND DEMAND	DRAWING No.: 210602-WAI

Hydrant Data Interpretation Tables and Graph - Firehall Hydrant No. 23

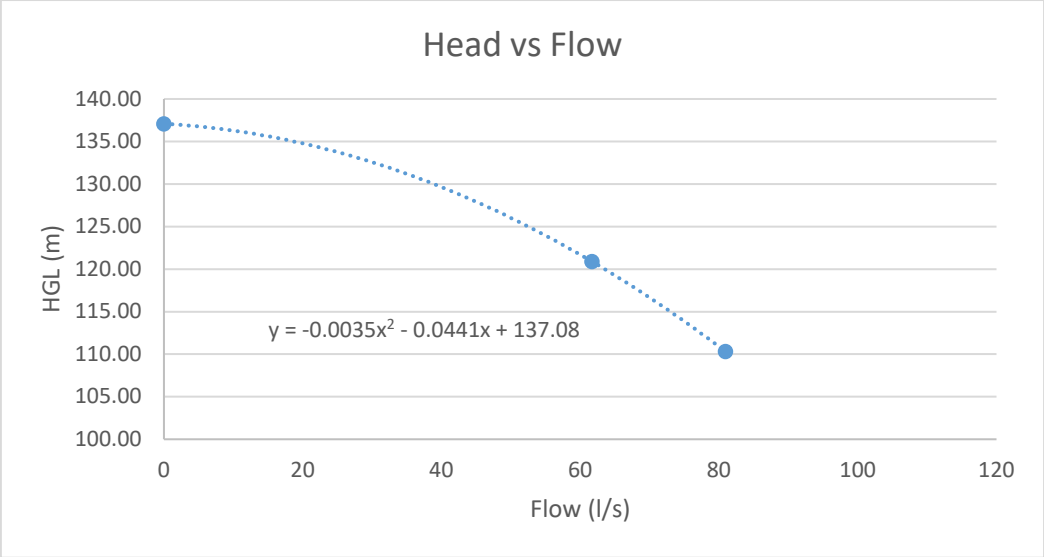
Location	Pressure		Flow		Head		Road Grade (m)	HGL (m)
	PSI	kPa	GMUS	L/s	(ft)	(m)		
Hydrant No. 23	62	427.47	0	0	143.22	43.65	93.43	137.08
Hydrant No. 23	41	282.69	1021	64.41509	94.71	28.87	93.43	122.30
Hydrant No. 23	20	137.90	1484	93.62586	46.20	14.08	93.43	107.51



Hydrant Flow Curve	
Flow (l/s)	Head (m)
0	43.65
5	43.38
10	42.96
15	42.40
20	41.68
25	40.82
30	39.81
35	38.66
40	37.35
45	35.90
50	34.30
55	32.56
60	30.66
65	28.62
70	26.43
75	24.09
80	21.60
85	18.97
90	16.19
93.6259	14.08

Hydrant Data Interpretation Tables and Graph - Valley Street South Hydrant No. 7

Location	Pressure		Flow		Head		Road Grade (m)	HGL (m)
	PSI	kPa	GMUS	L/s	(ft)	(m)		
Hydrant No. 7	58	399.90	0	0	133.98	40.84	96.24	137.08
Hydrant No. 7	35	241.32	978	61.70222	80.85	24.64	96.24	120.88
Hydrant No. 7	20	137.90	1283	80.94473	46.20	14.08	96.24	110.32



Hydrant Flow Curve	
Flow (l/s)	Head (m)
0	40.84
5	40.53
10	40.05
15	39.38
20	38.54
25	37.53
30	36.33
35	34.96
40	33.41
45	31.69
50	29.79
55	27.71
60	25.45
65	23.02
70	20.41
75	17.62
80	14.66
80.94	14.08

TABLE 3: NODE DATA

PROJECT: **Eastview Subdivison**

DATE: **September 6, 2022**

CLIENT: 809304 Ontario Inc.

DESIGNED BY: AGS

PROJECT #: 210602

CHECKED BY: AGS

BY: ATREL ENGINEERING LTD.

NODE. NO.	AVERAGE DAY DEMAND (l/s)	Street C.L. Elevation (m)	X COORDINATE (m)	Y COORDINATE (m)
J110	0.1863	98.20	425000.54	5014529.64
J112	0.1264	99.10	425096.70	5014572.56
J114	0.1292	98.70	425142.94	5014491.04
J116	0.1892	97.70	425236.23	5014372.35
J118	0.1896	94.10	425285.33	5014286.20
J120	0.0689	89.50	425376.01	5014126.31
J122	0.1288	93.20	425175.03	5014223.64
J124	0.0275	91.00	425213.23	5014156.30

TABLE 4: PIPE DATA

DATE: **September 6, 2022**
DESIGNED BY: AGS
CHECKED BY: AGS

PROJECT: **Eastview Subdivison**
CLIENT: 809304 Ontario Inc.
PROJECT #: 210602
BY: ATREL ENGINEERING LTD.

PIPE NO.	FROM	TO	LENGTH (m)	INSIDE DIAMETER (mm)	ROUGHNESS	AVERAGE DAY DEMAND				PEAK HOUR DEMAND			
						FLOW (L/S)	VELOCITY (m/s)	HEADLOSS (m)	HL/1000 (m/km)	FLOW (L/S)	VELOCITY (m/s)	HEADLOSS (m)	HL/1000 (m/km)
P216	RES5	U7	4.12	204	110	0.6658	0.0204	0.0000	0.0045	3.6542	0.1118	0.0005	0.1242
P218	U7	J110	80.12	204	110	0.6658	0.0204	0.0004	0.0053	3.6542	0.1118	0.01	0.1248
P220	J110	J122	352.25	204	110	0.1186	0.0036	0.0001	0.0002	0.647	0.0198	0.0018	0.0051
P222	J122	J124	77.42	204	110	-0.3526	0.0108	0.0001	0.0017	-1.947	0.0596	0.003	0.0389
P224	RES3	U5	10.99	204	110	0.3801	0.0116	0.0000	0.0017	2.0983	0.0642	0.0005	0.0449
P226	U5	J124	131.03	204	110	0.3801	0.0116	0.0002	0.0018	2.0983	0.0642	0.0059	0.0447
P228	J122	J118	126.80	204	110	0.3425	0.0105	0.0002	0.0015	1.8856	0.0577	0.0047	0.0367
P230	J112	J110	109.00	204	110	-0.3608	0.0110	0.0002	0.0017	-1.9826	0.0607	0.0044	0.0403
P232	J112	J114	93.73	204	110	0.2344	0.0072	0.0001	0.0008	1.2874	0.0394	0.0017	0.0181
P234	J114	J116	151.85	204	110	0.1052	0.0032	0.0000	0.0002	0.5768	0.0176	0.0006	0.0041
P236	J116	J118	99.15	204	110	-0.0840	0.0026	0.0000	0.0002	-0.4638	0.0142	0.0003	0.0027
P238	J118	J120	183.82	204	210	0.0689	0.0021	0.0000	0.0001	0.3790	0.0116	0.0001	0.0006

TABLE 5: AVERAGE DAY AND PEAK HOUR DEMAND RESULTS

PROJECT: **Eastview Subdivison**

DATE: **September 6, 2022**
CLIENT: 809304 Ontario Inc.

DESIGNED BY: AGS
PROJECT #: 210602

CHECKED BY: AGS
BY: ATREL ENGINEERING LTD.

NODE NO.	Street C.L. Elevation (m)	AVERAGE DAY DEMAND			PEAK HOUR DEMAND		
		Demand (l/s)	HGL (m)	Pressure (kPa)	Demand (l/s)	HGL (m)	Pressure (kPa)
J110	98.20	0.1863	137.01	380.30	1.0247	136.68	377.09
J112	99.10	0.1264	137.01	371.48	0.6952	136.68	368.23
J114	98.70	0.1292	137.01	375.40	0.7106	136.68	372.14
J116	97.70	0.1892	137.01	385.19	1.0406	136.68	381.93
J118	94.10	0.1896	137.01	420.47	1.0428	136.68	417.21
J120	89.50	0.0689	137.01	465.55	0.3790	136.68	462.28
J122	93.20	0.1288	137.01	429.29	0.7084	136.68	426.07
J124	91.00	0.0275	137.01	450.85	0.1513	136.68	447.66

TABLE 6: MAXIMUM DAY PLUS FIRE-FLOW RESULTS

DATE: **September 6, 2022**
DESIGNED BY: AGS
CHECKED BY: AGS

PROJECT: **Eastview Subdivison**
CLIENT: 809304 Ontario Inc.
PROJECT #: 210602
BY: ATREL ENGINEERING LTD.

NODE NO.	Static Demand (L/s)	Static Pressure (kPa)	Static Head (m)	Fire-Flow Demand (L/s)	Residual Pressure (kPa)	Available Flow @ Hydrant (L/s)	Available Flow Pressure (kPa)	Total Demand (L/s)	Available Flow @ Hydrant (L/s)	Critical NODE ID	Critical Node Pressure (kPa)	Critical Node Head (m)	Adjusted Available Flow (L/s)	Design Flow (L/s)
J110	0.4658	379.24	136.90	116.67	180.70	131.74	140.0	117.14	131.74	J112	136.0	112.98	130.32	130.32
J112	0.3160	370.41	136.90	66.67	273.31	117.07	140.0	66.99	117.07	J112	140.0	113.38	117.07	117.07
J114	0.3230	374.33	136.90	66.67	272.06	114.06	140.0	66.99	114.06	J114	140.0	112.98	114.06	114.06
J116	0.4730	384.13	136.90	66.67	280.99	116.51	140.0	67.14	116.51	J116	140.0	111.98	116.51	116.51
J118	0.4740	419.40	136.90	66.67	320.44	130.73	140.0	67.14	130.73	J116	118.0	109.75	123.91	123.90
J120	0.1723	464.48	136.90	66.67	350.74	129.00	140.0	66.84	129.00	J116	122.6	110.22	123.61	123.60
J122	0.3220	428.23	136.90	66.67	341.24	147.61	140.0	66.99	147.61	J114	110.5	109.98	136.91	136.89
J124	0.0688	449.80	136.90	66.67	363.36	156.16	140.0	66.74	156.16	J114	111.9	110.12	145.18	145.14

FIRE FLOW CALCULATIONS

Table 7

CONSULTANT: Atrel Engineering Ltd
BY: AGS
DATE: September 6 2022

CLIENT: 809304 Ontario Inc.
210602
PROJECT NAME: Eastview Subdivision

C = Coefficient related to type of construction

· wood frame	1.5	X
· ordinary construction	1.0	
· non-combustible construction	0.8	
· fire resistive construction (<2 hrs.)	0.7	
· fire resistive construction (>2 hrs.)	0.6	
· Interpolation		

A = Area of structure considered (m²)

Building No.	SINGLE	SEMI-DETACHED	TOWNHOUSE			
Location No.						
Combined ground floor area	185	150	180			
Number of storeys	1	2	2			
Total floor area	185	300	360			

(1) F = The required flow in litres per minutes (L/min)

= 220·C·(A)^½	4488	5716	6261	0	0	0

(2) Occupancy hazard reduction or surcharge (contents, L/min)

· non-combustible	- 25%					
· limited combustible	- 15%					
· combustible	- 0%	-15	-15	-15		
· free burning	+ 15%					
· rapid burning	+ 25%					
Required Flow (L/min)		3815	4859	5322	0	0	0

(3) Sprinkler protection reduction (entire building, % of (2), L/min)

· non-comb. - fire resistive construction with very low fire hazard (- 75%)						
· other	0	0	0			
Reduction (L/min)	0	0	0			

(4) Exposure surcharge (% of 2, L/min)

· PW(Unpierced boundary party wall)	10%	North	6.2	20	763	9.0	20	972	PW	10	532			0			0			0
· 0 to 3.0 m	25 %																			
· 3.1 to 10.0 m	20 %	East	>45	0	0	28.0	10	486	>45	0	0			0			0			0
· 10.1 to 20.0 n	15 %																			
· 20.1 to 30.0 n	10 %	South	6.2	20	763	9.0	20	972	4.1	20	1064			0			0			0
· 30.1 to 45.0 n	5 %																			
Maximum	75 %	West	6.2	20	763	40.0	5	243	40.0	5	266			0			0			0
Exposure surcharge total				2289			2672			1863			0			0			0

(5) Fire Flow

= (2) - (3) + (4)	6104	7531	7185	0	0	0

(6) Round off fire flow (L/min) Fc

· to nearest 1,000 L/min if less than 10,000 L/min.	6000	8000	7000	0	0	0
	(100.00 l/s)	(133.33 l/s)	(116.67 l/s)	(0.00 l/s)	(0 l/s)	(0 l/s)
Fire Flow Required	(66.67 l/s)	(66.67 l/s)	(116.67 l/s)	(0.00 l/s)	(0 l/s)	(0 l/s)

(7) Available Fire Flow Ft, (L/min)

Hyd No						
Hyd flow						
From						
To	7187	7187	8114	0	0	0
	(119.79 l/s)	119.79 l/s)	135.24 l/s)	l/s)	l/s)	l/s)
Comment	OK	OK	OK			

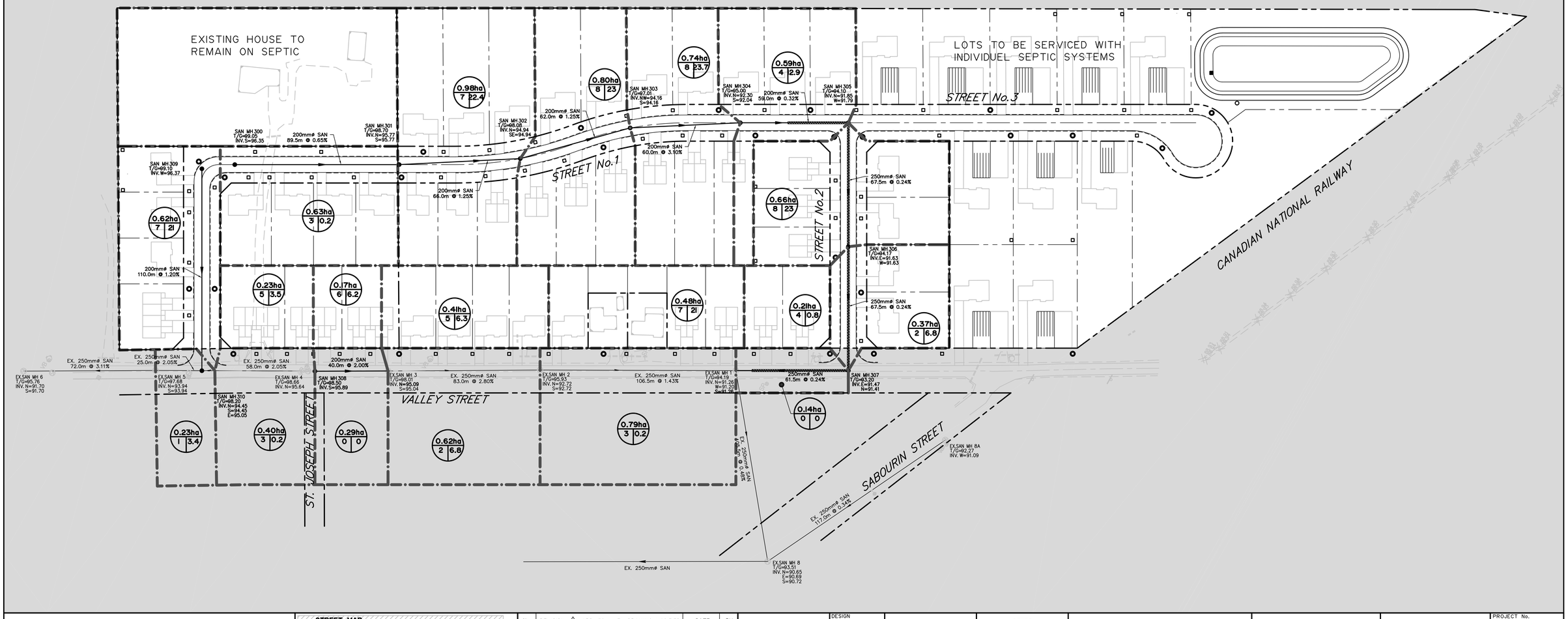
As per the FUS note J, detached one family and two family dwellings not exceeding 2 stories in height, the short method can be used if 4,000 L/min (66.67 L/s)

APPENDIX "C"

210602-SANM - Macro Sanitary Drainage Area Plan
Table 9 - Sanitary Sewer Design Sheet

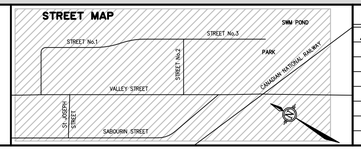
LEGEND

- 0.63ha / 10 | 40 — SANITARY DRAINAGE SUB AREA / POPULATION EQUIVALENT
- NUMBER OF UNITS IN SUB AREA
- DRAINAGE AREA BOUNDARY
- PROPOSED SANITARY SEWER
- EXISTING SANITARY SEWER
- PROPOSED INSULATION
- OUTSIDE PROPOSED DEVELOPMENT



THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

STREET MAP



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ATREL Engineering Ltd.
Engineers - Ingénieurs
1-2884 CHAMBERLAND STREET, ROCKLAND, ONTARIO K4K 1M6
TEL.: (613) 446-7423

VILLAGE OF MOOSE CREEK
EASTVIEW SUBDIVISION
809304 ONTARIO INC.

PROJECT No. 210602

PLAN
MACRO SANITARY DRAINAGE AREA PLAN

DRAWING No. 210602-SANM

SANITARY SEWER COMPUTATION FORM (DESIGN)

TABLE 8

DATE: **September 6, 2022**
DESIGNED BY AGS
CHECKED BY: AGS

PROJECT: **Eastview Subdivision**
CLIENT: 809304 Ontario Inc.
PROJECT #: 210602
BY: ATREL ENGINEERING LTD

q= 280 l/cap.day
I= 0.33 l/ha.s
PVC/CONC N= 0.013

AREA	LOCATION FROM (Up)		LOCATION TO (Down)		RESIDENTIAL INDIVIDUAL AREA (ha.)	INDIVIDUAL POP.	CUMULATIVE AREA (ha.)	CUMULATIVE POP.	PEAKING FACTOR M	FLOW Q(p) (L/S)	PEAK EXT.FLOW Q(i) (L/S)	**PEAK DES. Q(d) (L/S)**	SEWER DATA TYPE PIPE	DIA. (N0M) (mm)	(ACT) (MM)	SLOPE (%)	LENGTH (M)	CAP. (L/S)	Remaining Capacity (%)	VEL. (M/S)	Up Stream Obv. (M)	Up Stream Inv. (M)	Down Stream Obv. (M)	Down Stream Inv. (M)
SAMPLE	MH	300	MH	301	0.63	10.2	0.63	10	4.00	0.13	0.21	0.34	PVC	200	201.2	0.65	89.5	26.86	99%	0.84	96.55	96.35	95.97	95.77
SAMPLE	MH	301	MH	302	0.98	22.4	1.61	33	4.00	0.42	0.53	0.95	PVC	200	201.2	1.25	66.0	37.24	97%	1.17	95.97	95.77	95.14	94.94
SAMPLE	MH	302	MH	303	0.80	23.0	2.41	56	4.00	0.72	0.80	1.52	PVC	200	201.2	1.25	62.0	37.24	96%	1.17	95.14	94.94	94.36	94.16
SAMPLE	MH	303	MH	304	0.74	23.7	3.15	79	4.00	1.03	1.04	2.07	PVC	200	201.2	3.10	60.0	58.65	96%	1.85	94.36	94.16	92.50	92.30
SAMPLE	MH	304	MH	305	0.59	12.9	3.74	92	4.00	1.20	1.23	2.43	PVC	200	201.2	0.32	59.0	18.84	87%	0.59	92.24	92.04	92.05	91.85
SAMPLE	MH	305	MH	306	0.66	23.0	4.40	115	4.00	1.49	1.45	2.95	PVC	250	251.5	0.24	67.5	29.59	90%	0.60	92.04	91.79	91.88	91.63
SAMPLE	MH	306	MH	307	0.37	6.8	4.77	122	4.00	1.58	1.57	3.16	PVC	250	251.5	0.24	67.5	29.59	89%	0.60	91.88	91.63	91.72	91.47
SAMPLE	MH	307	MH	1	0.35	10.8	5.12	133	4.00	1.72	1.69	3.41	PVC	250	251.5	0.24	61.5	29.59	88%	0.60	91.66	91.41	91.51	91.26
SAMPLE	MH	308	MH	3	0.46	16.2	0.46	16	4.00	0.21	0.15	0.36	PVC	200	201.2	2.00	40.0	47.11	99%	1.48	96.09	95.89	95.29	95.09
SAMPLE	MH	3	MH	2	1.03	23.1	1.49	39	4.00	0.51	0.49	1.00	PVC	250	251.5	2.83	82.0	101.61	99%	2.05	95.29	95.04	92.97	92.72
SAMPLE	MH	2	MH	1	1.27	31.2	2.76	71	4.00	0.91	0.91	1.82	PVC	250	251.5	1.36	107.0	70.44	97%	1.42	92.97	92.72	91.51	91.26
SAMPLE	MH	1	MH	8			7.88	203	4.00	2.64	2.60	5.24	PVC	250	251.5	0.48	105.5	41.85	87%	0.84	91.45	91.20	90.94	90.69
SAMPLE	MH	4	MH	310	0.63	23.7	0.63	24	4.00	0.31	0.21	0.52	PVC	250	251.5	2.04	51.0	86.27	99%	1.74	95.74	95.49	94.70	94.45
SAMPLE	MH	309	MH	310	0.62	21.0	0.62	21	4.00	0.27	0.20	0.48	PVC	200	201.2	1.20	110.0	36.49	99%	1.15	96.57	96.37	95.25	95.05
SAMPLE	MH	310	MH	5	0.23	3.4	1.48	48	4.00	0.62	0.49	1.11	PVC	250	251.5	2.04	25.0	86.27	99%	1.74	94.70	94.45	94.19	93.94

Existing sanitary sewers
Proposed sanitary sewers

APPENDIX "D"

210602-PRE – Pre-Development Drainage Conditions
210602-STMM - Macro Storm Drainage Area Plan
Table 10 - Storm Sewer Design Sheet (2 year)
Table 11 – Airport Method (Area 1 Pre-Development)
Table 12 – Airport Method (Area 2 Pre-Development)
Table 13 – Airport Method (Area 2 Pre-Development)
Table 14 – Modified Rational Method (Area 1)
Table 15 – Modified Rational Method (Area 2)
Table 16 – Modified Rational Method (Area 3)

LEGEND

- 2 YEAR / 0.70ha. / R=0.20 — MINOR SYSTEM CAPTURE RATE
- FUTURE STORM DRAINAGE AREA
- RUNOFF COEFFICIENT
- DRAINAGE AREA BOUNDARY
- EXISTING STORM SEWER
- OUTSIDE PROPOSED DEVELOPMENT

AREA 1 — 0.7Ihq. — R=0.30

AREA 2 — 5.30ha. — R=0.25

AREA 3 — 6.79ha. — R=0.20

EX. 250mmø SAN 25.0m @ 2.05%

EX. 250mmø SAN 58.0m @ 2.05%

EX. 250mmø SAN 83.0m @ 2.80%

EX. 250mmø SAN 106.5m @ 1.43%

EX. 250mmø SAN 105.5m @ 0.95%

EX. 250mmø SAN 177.0m @ 0.54%

EX. 250mmø SAN

EX.SAN MH 6 T/G=95.76 INV. N=91.70 S=91.70

EX.STM MH 2 T/G=96.24

EX.SAN MH 5 T/G=97.68 INV. N=93.94 S=93.94

EX.STM MH 1 T/G=97.94

EX.SAN MH 4 T/G=98.66 INV. N=95.64

EX.SAN MH 3 T/G=98.01 INV. N=95.09 S=95.04

EX.SAN MH 2 T/G=95.93 INV. N=92.72 S=92.72

EX.SAN MH 1 T/G=94.19 INV. N=91.26 W=91.20 S=91.26

EX.SAN MH 8A T/G=92.27 INV. W=91.09

EX.SAN MH 8 T/G=93.51 INV. N=90.65 E=90.69 S=90.72

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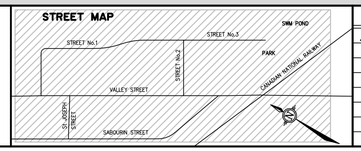
STREET MAP



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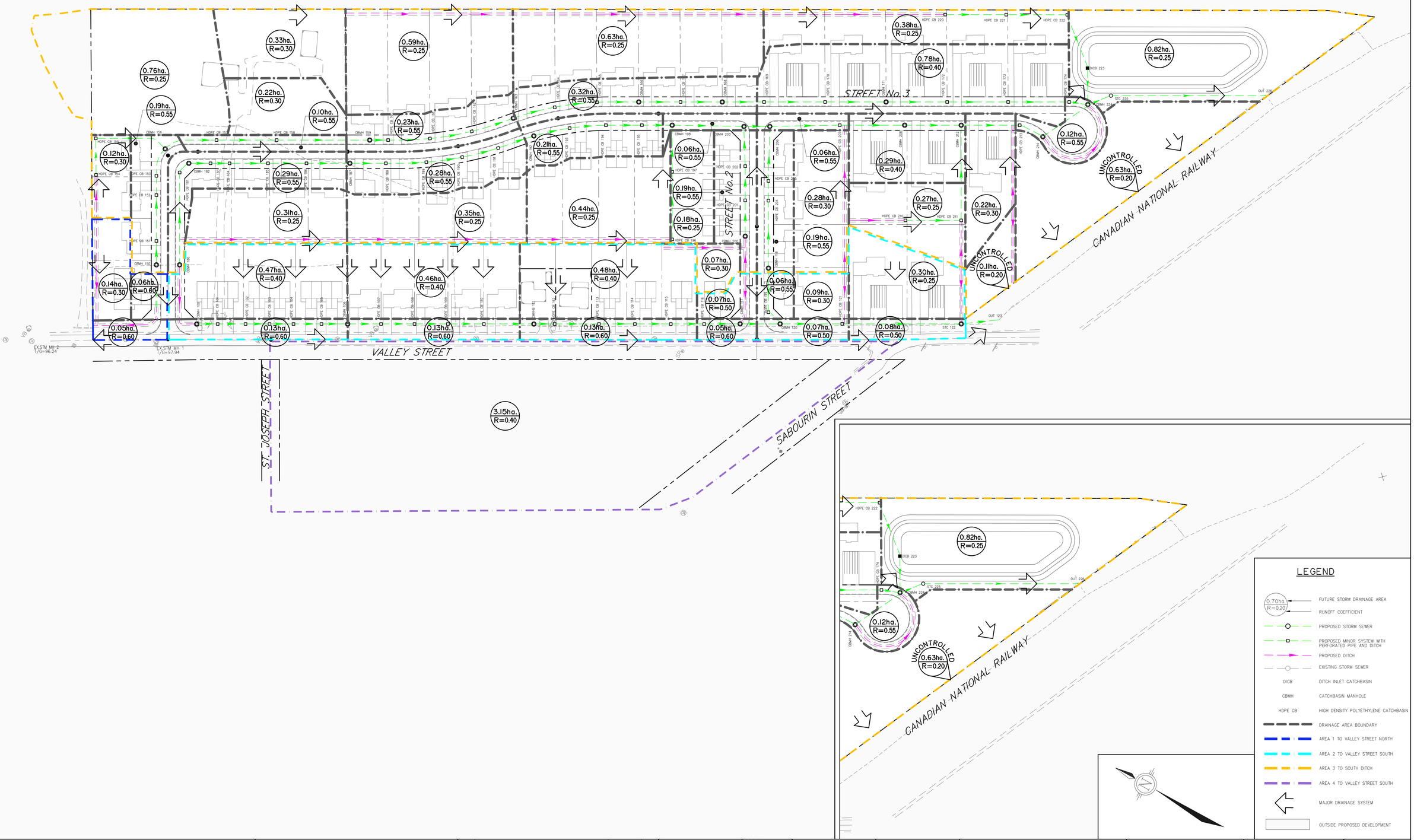
VILLAGE OF MOOSE CREEK
EASTVIEW SUBDIVISION

809304 ONTARIO INC.

PROJECT No. 210602

PLAN
PRE DEVELOPMENT DRAINAGE CONDITIONS

DRAWING No. 210602-PRE

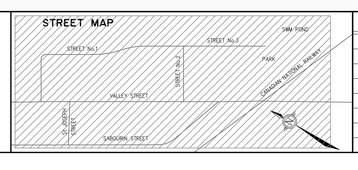


LEGEND

- 0.70ha. R=0.20 — FUTURE STORM DRAINAGE AREA
- RUNOFF COEFFICIENT
- PROPOSED STORM SEWER
- PROPOSED MINOR SYSTEM WITH PERFORATED PIPE AND DITCH
- PROPOSED DITCH
- EXISTING STORM SEWER
- DICB — DITCH INLET CATCHBASIN
- CBMH — CATCHBASIN MANHOLE
- HDPE CB — HIGH DENSITY POLYETHYLENE CATCHBASIN
- DRAINAGE AREA BOUNDARY
- AREA 1 TO VALLEY STREET NORTH
- AREA 2 TO VALLEY STREET SOUTH
- AREA 3 TO SOUTH DITCH
- AREA 4 TO VALLEY STREET SOUTH
- MAJOR DRAINAGE SYSTEM
- OUTSIDE PROPOSED DEVELOPMENT

THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

STREET MAP



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1 : 1000
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CHECKED	AGS
APPROVED	AGS

LICENSED PROFESSIONAL ENGINEER
A.G.Y. SAUVE
100142393
Sept 6, 2022
PROVINCE OF ONTARIO

ATREL Engineering Ltd. Ltée.
Engineers - Ingénieurs
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TEL.: (613) 446-7423

VILLAGE OF MOOSE CREEK
EASTVIEW SUBDIVISION

809304 ONTARIO INC.

PROJECT No. 210602

PLAN
MACRO STORM DRAINAGE AREA PLAN

DRAWING No. 210602-STMM

STORM SEWER COMPUTATION FORM

DESIGNED BY: AGS
CHECKED BY: AGS

Eastview Subdivision
809304 Ontario Inc.
210604
ATREL ENGINEERING LTD
September 6, 2022

STORM FREQUENCY : 5 YEAR
RATIONAL METHOD Q= 2.78 AIR
PVC/CONC N= 0.013
CSP N= 0.024
CORR N= 0.021

LOCATION				AREA (ha.) RUNOFF COEFFICIENT										RATIONAL METHOD		5 YEAR			ACTUAL	PIPE SEWER DATA											UpStream		DwStream	
														INDIV.	ACCUM.	TIME	RAINF.	FLOW	PIPE	TYPE	Roug	DIA.		SLOPE	LENGTH	CAP.	Remaining	VEL.	TIME OF	Obv.	Inv.	Obv.	Inv.
FROM (Up)		TO (Down)		0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60		2.78AR	2.78AR	CONC. (MIN)	INTENS. (MM/HR)	(L/S)	FLOW (L/S)		Coef "n"	(N0M) (mm)	(ACT)	(%)	(M)	(L/S)	Capacity (%)	(M/S)	FLOW (MIN)	(M)	(M)	(M)	(M)
CBMH	100	CB	101					0.47				0.13		0.74	0.74	10.00	104.19	77.05	77.05	HDPE	0.013	300	303.0	0.80	12.5	88.82	13%	1.23	0.17	97.13	96.83	97.03	96.73
CB	101	CB	102												0.74	10.17	103.31	76.40	76.40	HDPE	0.013	300	303.0	0.80	16.5	88.82	14%	1.23	0.22	97.03	96.73	96.90	96.60
CB	102	CB	103												0.74	10.39	102.16	75.55	75.55	HDPE	0.013	300	303.0	0.80	14.5	88.82	15%	1.23	0.20	96.90	96.60	96.78	96.48
CB	103	CB	104												0.74	10.59	101.18	74.82	74.82	HDPE	0.013	300	303.0	0.80	14.5	88.82	16%	1.23	0.20	96.78	96.48	96.66	96.36
CB	104	CB	105												0.74	10.78	100.22	74.11	74.11	HDPE	0.013	300	303.0	0.80	16.5	88.82	17%	1.23	0.22	96.66	96.36	96.53	96.23
CB	105	CB	106												0.74	11.01	99.15	73.32	73.32	HDPE	0.013	300	303.0	0.80	15.5	88.82	17%	1.23	0.21	96.53	96.23	96.41	96.11
CBMH	106	CB	107					0.46				0.13		0.73	1.47	11.22	98.17	144.10	144.10	HDPE	0.013	375	381.0	2.20	20.0	271.30	47%	2.38	0.14	96.49	96.11	96.05	95.67
CB	107	CB	108												1.47	11.36	97.53	143.16	143.16	HDPE	0.013	375	381.0	2.20	20.0	271.30	47%	2.38	0.14	96.05	95.67	95.61	95.23
CB	108	CB	109												1.47	11.50	96.89	142.22	142.22	HDPE	0.013	375	381.0	2.20	20.0	271.30	48%	2.38	0.14	95.61	95.23	95.17	94.79
CB	109	CB	110												1.47	11.64	96.27	141.31	141.31	HDPE	0.013	375	381.0	2.20	21.5	271.30	48%	2.38	0.15	95.17	94.79	94.70	94.32
CB	110	CBMH	111												1.47	11.79	95.61	140.34	140.34	HDPE	0.013	375	381.0	2.20	30.0	271.30	48%	2.38	0.21	94.70	94.32	94.04	93.66
CBMH	111	CB	112					0.48				0.13		0.75	2.22	12.00	94.70	210.09	210.09	HDPE	0.013	375	381.0	2.00	12.5	258.68	19%	2.27	0.09	94.04	93.66	93.79	93.41
CB	112	CB	113												2.22	12.09	94.31	209.22	209.22	HDPE	0.013	375	381.0	2.00	26.5	258.68	19%	2.27	0.19	93.79	93.41	93.26	92.88
CB	113	CB	114												2.22	12.29	93.50	207.42	207.42	HDPE	0.013	375	381.0	2.00	21.5	258.68	20%	2.27	0.16	93.26	92.88	92.83	92.45
CB	114	CB	115												2.22	12.44	92.84	205.96	205.96	HDPE	0.013	375	381.0	2.00	21.5	258.68	20%	2.27	0.16	92.83	92.45	92.40	92.02
CB	115	CB	116												2.22	12.60	92.20	204.54	204.54	HDPE	0.013	375	381.0	2.00	20.0	258.68	21%	2.27	0.15	92.40	92.02	92.00	91.62
CB	116	CBMH	117							0.07		0.05		0.18	2.40	12.75	91.62	219.81	219.81	HDPE	0.013	375	381.0	2.00	21.5	258.68	15%	2.27	0.16	92.00	91.62	91.57	91.19
CBMH	117	CBMH	120												2.40	12.91	91.00	218.32	218.32	HDPE	0.013	450	457.0	1.00	24.0	297.09	27%	1.81	0.22	91.34	90.89	91.10	90.65
																13.13																	
CBMH	118	CB	119													10.00	104.19			HDPE	0.013	250	251.0	3.50	26.5	112.44	100%	2.27	0.19	92.78	92.53	91.85	91.60
CB	119	CBMH	120								0.06			0.09	0.09	10.19	103.18	9.47	9.47	HDPE	0.013	250	251.0	3.50	10.0	112.44	92%	2.27	0.07	91.85	91.60	91.50	91.25
																10.27																	
CBMH	120	CB	121							0.07				0.10	2.59	13.13	90.14	233.30	233.30	HDPE	0.013	450	457.0	2.00	37.5	420.14	44%	2.56	0.24	91.10	90.65	90.35	89.90
CB	121	STC	122		0.30	0.09				0.08				0.39	2.98	13.37	89.22	266.14	266.14	HDPE	0.013	450	457.0	2.00	72.5	420.14	37%	2.56	0.47	90.35	89.90	88.90	88.45
STC	122	OUT	123												2.98	13.84	87.49	260.98	260.98	HDPE	0.013	450	457.0	0.95	21.5	289.56	10%	1.77	0.20	88.90	88.45	88.70	88.25
																14.05																	
CBMH	150	CB	151								0.19			0.29	0.29	10.00	104.19	30.27	30.27	HDPE	0.013	250	251.0	0.45	14.5	40.32	25%	0.81	0.30	97.94	97.69	97.87	97.62
CB	151	CB	152												0.29	10.30	102.65	29.82	29.82	HDPE	0.013	250	251.0	0.45	27.5	40.32	26%	0.81	0.56	97.87	97.62	97.75	97.50
CB	152	CB	153												0.29	10.86	99.86	29.01	29.01	HDPE	0.013	250	251.0	0.45	11.5	40.32	28%	0.81	0.24	97.75	97.50	97.70	97.45
CB	153	CBMH	156												0.29	11.09	98.75	28.69	28.69	HDPE	0.013	250	251.0	0.45	21.0	40.32	29%	0.81	0.43	97.70	97.45	97.61	97.36
																11.52																	
CB	154	CB	155			0.12								0.10	0.10	10.00	104.19	10.43	10.43	HDPE	0.013	250	251.0	0.45	22.0	40.32	74%	0.81	0.45	97.91	97.66	97.81	97.56
CB	155	CBMH	156												0.10	10.45	101.87	10.20	10.20	HDPE	0.013	250	251.0	0.45	45.0	40.32	75%	0.81	0.92	97.81	97.56	97.61	97.36
																11.37																	
CBMH	156	CB	157		0.76	0.22					0.10			0.86	1.26	11.52	96.78	121.48	121.48	HDPE	0.013	375	381.0	0.60	29.0	141.68	14%	1.24	0.39	97.74	97.36	97.57	97.19
CB	157	CB	158												1.26	11.91	95.07	119.33	119.33	HDPE	0.013	375	381.0	0.60	36.0	141.68	16%	1.24	0.48	97.57	97.19	97.35	96.97
CB	158	CBMH	159												1.26	12.40	93.04	116.78	116.78	HDPE	0.013	375	381.0	0.60	55.5	141.68	18%	1.24	0.74	97.35	96.97	97.02	96.64
CBMH	159	CB	160								0.23			0.35	1.61	13.14	90.09	144.76	144.76	HDPE	0.013	375	381.0	0.90	11.0	173.52	17%	1.52	0.12	97.02	96.64	96.92	96.54
CB	160	CB	161												1.61	13.26	89.63	144.02	144.02	HDPE	0.013	375	381.0	0.90	25.0	173.52	17%	1.52	0.27	96.92	96.54	96.69	96.31
CB	161	CB	162												1.61	13.53	88.61	142.38	142.38	HDPE	0.013	375	381.0	0.90	25.5	173.52	18%	1.52	0.28	96.69	96.31	96.46	96.08
CB	162	CBMH	163												1.61	13.81	87.60	140.76	140.76	HDPE	0.013	375	381.0	0.90	26.0	173.52	19%	1.52	0.28	96.46	96.08	96.23	95.85
CBMH	163	CB	164								0.32			0.49	2.10	14.10	86.59	181.50	181.50	HDPE	0.013	375	381.0	3.00	25.5	316.81	43%	2.78	0.15	96.23	95.85	95.46	95.08
CB	164	CB	165												2.10	14.25	86.06	180.39	180.39	HDPE	0.013	375	381.0	3.00	25.5	316.81	43%	2.78	0.15	95.46	95.08	94.69	94.31
CB	165	CBMH	166												2.10	14.40	85.53	179.28	179.28	HDPE	0.013	375	381.0	3.00	25.0	316.81	43%	2.78	0.15	94.69	94.31	93.94	93.56
CBMH	166	CB	167												2.10	14.55	85.03	178.23	178.23	HDPE	0.013	375	381.0	2.00	25.0	258.68	31%	2.27	0.18	93.94	93.56	93.44	93.06
CB	167	CBMH	168												2.10	14.74	84.41	176.93	176.93	HDPE	0.013	375	381.0	2.00	25.0	258.68	32%	2.27	0.18	93.44	93.06	92.94	92.56
CBMH	168	CB	169												2.10	14.92	83.81	175.68	175.68	HDPE	0.013	375	381.0	3.45	25.0	339.74	48%	2.98	0.14	92.94	92.56	92.08	91.70
CB	169	CB	170								0.78			1.19	3.29	15.06	83.36	274.15	274.15	HDPE	0.013	375	381.0	3.45	36.5	339.74	19%	2.98	0.20	92.08	91.70	90.82	90.44
CB	170	CBMH	171												3.29	15.27	82.71	272.01	272.01	HDPE	0.013	375	381.0	3.45	36.5	339.74	20%	2.98	0.20	90.32	89.94	89.06	88.68
CBMH	171	CB	172												3.29	15.47	82.07	269.91	269.91	HDPE	0.013	450	457.0	1.00	36.5	297.09	9%	1.81	0.34	89.13	88.68	88.76	88.31
CB	172	CB	173												3.29	15.81	81.04	266.52	266.52	HDPE	0.013	450	457.0	1.00	36.5	297.09	10%	1.81	0.34	88.76	88.31	88.39	87.94
CB	173	CB	174												3.29	16.14	80.04	263.23	263.23	HDPE	0.013	450	457.0	1.00	36.5	297.09	11%	1.81	0.34	88.39	87.94	88.02	87.57
CB	174	CBMH	224												3.29	16.48	79.07	260.04	260.04	HDPE	0.013	450	457.0	1.00	9.5	297.09	12%	1.81	0.09	88.02	87.57	87.92	87.47
																16.56																	
CBMH	180	CB	181								0.29			0.44	0.44	10.00	104.19	46.20	46.20	HDPE	0.013	300	303.0	0.45	55.0	66.61	31%	0.92	0.99	97.89	97.59	97.64	97.34
CB	181	CBMH	182												0.44	10.99	99.23	44.00	44.00	HDPE	0.013	300	303.0	0.45	8.0	66.61	34%	0.92	0.14	97.64	97.34	97.60	97.30
CBMH	182	CB	183												0.44	11.14	98.55	43.70	43.70	HDPE	0.013	300	303.0	0.45	13.0	66.61	34%	0.92	0.23	97.60	97.30	97.54	97.24
CB	183	CB	184												0.44	11.37	97.47	43.22	43.22	HDPE	0.013	300	303.0	0.45	11.5	66.61	35%	0.92	0.21	97.54	97.24	97.49	97.19
CB	184	CB	185												0.44	11.58	96.53	42.80	42.80	HDPE	0.013	300	303.0	0.45	23.0	66.61	36%	0.92	0.41	97.49	97.19	97.39	97.09
CB	185	CB	186												0.44	11.99	94.72	42.00	42.00	HDPE	0.013	300	303.0	0.45	23.0	66.61	37%	0.92	0.41	97.39	97.09	97.29	96.99
CB	186	CBMH	187												0.44	12.41	92.99	41.23	41.23	HDPE	0.013	300	303.0	0.45	26.0	66.61	38%	0.92	0.47	97.29	96.99	97.17	96.87
CBMH	187	CB	188								0.28			0.43	0.87	12.88	91.11	79.41	79.41	HDPE	0.013	300	303.0	0.90	21.5	94.21	16%	1.31	0.27	97.17	96.87	96.98	96.68
CB	188	CB	189												0.87	13.15	90.05	78.48	78.48	HDPE	0.013	300	303.0	0.90	24.0	94.21	17%	1.31	0.31	96.98	96.68	96.76	96.46
CB	189	CB	190												0.87	13.46	88.89	77.47	77.47	HDPE	0.013	300	303.0	0.90	21.5	94.21	18%	1.31	0.27	96.76	96.46	96.57	96.27
CB	190	CB	191												0.87	13.73	87.89	76.60	76.60	HDPE	0.013	300	303.0	0.90	22.0	94.21	19%	1.31	0.28	96.57	96.27	96.37	96.07
CB	191	CBMH	192												0.87	14.01	86.89	75.73	75.73	HDPE	0.013	300	303.0	0.90	22.5	94.21	20%	1.31	0.29	96.37	96.07	96.17	95.87
CBMH	192	CB	193								0.21			0.32	1.19	14.30	85.89	102.43	102.43	HDPE	0.013	300	303.0	3.00	22.0	171.99	40%	2.39	0.15	96.17	95.87	95.51	95.21
CB	193	CB	194												1.19	14.45	85.36	101.80	101.80	HDPE	0.013	300	303.0	3.00	22.0	171.99	41%	2.39	0.15	95.51	95.21	94.85	94.55
CB	194	CB	195												1.19	14.61	84.85	101.19	101.19	HDPE	0.013	300	303.0	3.00	21.5	171.99	41%	2.39	0.15	94.85	94.55	94.20	93.90
CB	195	CBMH	198												1.19	14.76	84.35	100.60	100.60	HDPE	0.013	300	303.0	3.00	18.0	171.99	42%	2.39	0.13	94.20	93.90	93.66	93.36
																14.88																	

STORM SEWER COMPUTATION FORM

DESIGNED BY: AGS
CHECKED BY: AGS

Eastview Subdivision
809304 Ontario Inc.
210604
ATREL ENGINEERING LTD
September 6, 2022

STORM FREQUENCY : 5 YEAR
RATIONAL METHOD Q= 2.78 AIR
PVC/CONC N= 0.013
CSP N= 0.024
CORR N= 0.021

LOCATION				AREA (ha.) RUNOFF COEFFICIENT									RATIONAL METHOD		5 YEAR TIME	5 YEAR RAINF.		ACTUAL	PIPE					SEWER DATA					UpStream		DwStream	
													INDIV.	ACCUM.	CONC.	INTENS.	FLOW	PIPE	TYPE	Roug	DIA.		SLOPE	LENGTH	CAP.	Remaining	VEL.	TIME OF	Obv.	Inv.	Obv.	Inv.
FROM		TO		0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	2.78AR	2.78AR				FLOW		Coef	(N0M)	(ACT)				Capacity		FLOW				
(Up)		(Down)													(MIN)	(MM/HR)	(L/S)	(L/S)		"n"	(mm)		(%)	(M)	(L/S)	(%)	(M/S)	(MIN)	(M)	(M)	(M)	(M)
CBMH	196	CB	197		1.28								0.89	0.89	10.00	104.19	92.69	92.69	HDPE	0.013	450	457.0	0.20	40.5	132.86	30%	0.81	0.83	93.95	93.50	93.87	93.42
CB	197	CBMH	198											0.89	10.83	99.99	88.95	88.95	HDPE	0.013	450	457.0	0.20	28.0	132.86	33%	0.81	0.58	93.87	93.42	93.81	93.36
															11.41																	
CBMH	198	CBMH	203								0.06		0.09	2.17	14.88	83.94	182.48	182.48	HDPE	0.013	450	457.0	2.50	43.0	469.74	61%	2.86	0.25	93.81	93.36	92.73	92.28
															15.13																	
CBMH	200	CB	201			0.07					0.19		0.35	0.35	10.00	104.19	36.35	36.35	HDPE	0.013	250	251.0	0.60	21.5	46.56	22%	0.94	0.38	93.07	92.82	92.94	92.69
CB	201	CB	202											0.35	10.38	102.22	35.66	35.66	HDPE	0.013	250	251.0	0.60	20.5	46.56	23%	0.94	0.36	92.94	92.69	92.82	92.57
CB	202	CBMH	203											0.35	10.74	100.42	35.04	35.04	HDPE	0.013	250	251.0	0.60	24.0	46.56	25%	0.94	0.43	92.82	92.57	92.68	92.43
															11.17																	
CBMH	203	CBMH	206											2.52	15.13	83.13	209.72	209.72	HDPE	0.013	450	457.0	1.30	15.5	338.73	38%	2.07	0.13	92.48	92.03	92.28	91.83
															15.26																	
CBMH	118	CB	204								0.19		0.29	0.29	10.00	104.19	30.27	30.27	HDPE	0.013	250	251.0	0.60	43.0	46.56	35%	0.94	0.76	92.72	92.47	92.46	92.21
CB	204	CB	205											0.29	10.76	100.33	29.15	29.15	HDPE	0.013	250	251.0	0.60	12.5	46.56	37%	0.94	0.22	92.46	92.21	92.38	92.13
CB	205	CBMH	206											0.29	10.98	99.27	28.84	28.84	HDPE	0.013	250	251.0	0.60	32.5	46.56	38%	0.94	0.58	92.38	92.13	92.18	91.93
															11.56																	
CBMH	206	CB	207								0.06		0.09	2.91	15.26	82.73	240.34	240.34	HDPE	0.013	450	457.0	2.70	42.0	488.16	51%	2.98	0.24	91.78	91.33	90.65	90.20
CB	207	CBMH	208			0.28		0.29					0.56	3.46	15.49	81.99	283.78	283.78	HDPE	0.013	450	457.0	2.70	39.0	488.16	42%	2.98	0.22	90.35	89.90	89.30	88.85
CBMH	208	CBMH	212											3.46	15.71	81.32	281.46	281.46	HDPE	0.013	450	457.0	1.10	35.5	311.59	10%	1.90	0.31	89.30	88.85	88.91	88.46
															16.02																	
CB	210	CB	211		0.27								0.19	0.19	10.00	104.19	19.55	19.55	HDPE	0.013	250	251.0	0.50	35.0	42.50	54%	0.86	0.68	89.18	88.93	89.00	88.75
CB	211	CBMH	212											0.19	10.68	100.74	18.90	18.90	HDPE	0.013	250	251.0	0.50	58.5	42.50	56%	0.86	1.14	89.00	88.75	88.71	88.46
															11.81																	
CBMH	212	CB	213			0.22							0.18	3.83	16.02	80.39	308.07	308.07	HDPE	0.013	450	457.0	1.30	33.5	338.73	9%	2.07	0.27	88.91	88.46	88.47	88.02
CB	213	CBMH	214											3.83	16.29	79.60	305.05	305.05	HDPE	0.013	450	457.0	1.30	15.5	338.73	10%	2.07	0.13	88.47	88.02	88.27	87.82
CBMH	214	CBMH	224											3.83	16.42	79.24	303.67	303.67	HDPE	0.013	600	603.0	0.30	32.5	340.81	11%	1.19	0.45	88.07	87.47	87.97	87.37
															16.87																	
CB	220	CB	221		1.60	0.33							1.39	1.39	10.00	104.19	144.53	144.53	HDPE	0.013	450	457.0	0.30	36.5	162.72	11%	0.99	0.61	88.13	87.68	88.02	87.57
CB	221	CB	222											1.39	10.61	101.06	140.19	140.19	HDPE	0.013	450	457.0	0.30	36.5	162.72	14%	0.99	0.61	88.02	87.57	87.91	87.46
CB	222	DICB	223											1.39	11.23	98.13	136.13	136.13	HDPE	0.013	450	457.0	0.30	34.0	162.72	16%	0.99	0.57	87.91	87.46	87.81	87.36
DICB	223	CBMH	224		0.82								0.57	1.96	11.80	95.57	187.04	614.03	HDPE	0.013	600	603.0	0.20	21.5	278.27	-121%	0.97	0.37	87.81	87.21	87.77	87.17
															12.17																	
CBMH	224	STC	225								0.12		0.18	9.26	16.87	77.96	722.03	108.00	HDPE	0.013	450	457.0	0.20	14.0	132.86	19%	0.81	0.29	87.62	87.17	87.59	87.14
STC	225	OUT	226											9.26	17.16	77.17	714.72	108.00	HDPE	0.013	450	457.0	0.20	94.0	132.86	19%	0.81	1.93	87.59	87.14	87.40	86.95
															19.10																	

Proposed Storm Sewers to Valley Street South
Proposed Storm Sewers to South Ditch
Storm water will back up to DICB 223 to be stored within the dry pond and released to the pre-development 5 year flow (108 l/s)

Table 10

Airport Method (Area 1 Pre-Development)

Section	Elevation (m)	Fall (m)	Section Length (m)	Slope Sw (%)	Sw ^ -0.5 (%)
	99.10				
1	98.80	0.30	24.70	0.0121	9.07
2	97.80	1.00	24.70	0.0405	4.97
3	97.55	0.25	24.70	0.0101	9.94
4	97.45	0.10	24.70	0.0040	15.72
5	97.30	0.15	24.70	0.0061	12.83
6	97.11	0.19	24.70	0.0077	11.40
6			148.20	Total	63.93
Sw=	0.88	%	Tc=	33.2	(min)
			Event	**5**	Yr
Cavg=	0.30			**100**	Yr
I (2yr) =	50	(mm/hr)			
I (100yr) =	86	(mm/hr)			
Area=	0.71	(ha)			
Qpre(site)=	**29.8**	(l/s)			
	63.4	(l/s)			

Table 11

Airport Method (Area 2 Pre-development)

Section	Elevation (m)	Fall (m)	Section Length (m)	Slope Sw (%)	Sw ^ -0.5 (%)
	100.24				
1	99.60	0.64	24.70	0.0259	6.21
2	98.90	0.70	24.70	0.0283	5.94
3	98.80	0.10	24.70	0.0040	15.72
4	98.30	0.50	24.70	0.0202	7.03
5	97.90	0.40	24.70	0.0162	7.86
6	97.60	0.30	24.70	0.0121	9.07
7	97.50	0.10	24.70	0.0040	15.72
8	96.85	0.65	24.70	0.0263	6.16
9	96.25	0.60	24.70	0.0243	6.42
10	95.60	0.65	24.70	0.0263	6.16
11	95.00	0.60	24.70	0.0243	6.42
12	94.20	0.80	24.70	0.0324	5.56
13	93.70	0.50	24.70	0.0202	7.03
14	93.10	0.60	24.70	0.0243	6.42
15	92.55	0.55	24.70	0.0223	6.70
16	91.95	0.60	24.70	0.0243	6.42
17	90.50	1.45	24.70	0.0587	4.13
18	90.35	0.15	24.70	0.0061	12.83
19	89.25	1.10	24.70	0.0445	4.74
19			469.30	Total	146.52
Sw=	1.68	%	Tc=	50.7	(min)
			Event	**5**	Yr
Cavg=	0.25			**100**	Yr
I (2yr) =	37	(mm/hr)			
I (100yr) =	63	(mm/hr)			
Area=	5.30	(ha)			
Qpre(site)=	**137.4**	(l/s)			
	291.5	(l/s)			

Table 12

Airport Method (Area 3 Pre-development)

Section	Elevation (m)	Fall (m)	Section Length (m)	Slope Sw (%)	Sw ^ -0.5 (%)
	100.42				
1	99.50	0.92	24.65	0.0373	5.18
2	99.20	0.30	24.65	0.0122	9.06
3	98.75	0.45	24.65	0.0183	7.40
4	98.55	0.20	24.65	0.0081	11.10
5	97.55	1.00	24.65	0.0406	4.96
6	97.30	0.25	24.65	0.0101	9.93
7	96.95	0.35	24.65	0.0142	8.39
8	96.40	0.55	24.65	0.0223	6.69
9	95.80	0.60	24.65	0.0243	6.41
10	95.10	0.70	24.65	0.0284	5.93
11	94.25	0.85	24.65	0.0345	5.39
12	93.20	1.05	24.65	0.0426	4.85
13	91.60	1.60	24.65	0.0649	3.93
14	90.65	0.95	24.65	0.0385	5.09
15	90.15	0.50	24.65	0.0203	7.02
16	89.85	0.30	24.65	0.0122	9.06
17	89.75	0.10	24.65	0.0041	15.70
18	88.85	0.90	24.65	0.0365	5.23
19	88.80	0.05	24.65	0.0020	22.20
20	88.75	0.05	24.65	0.0020	22.20
21	88.55	0.20	24.65	0.0081	11.10
22	88.35	0.20	24.65	0.0081	11.10
23	88.30	0.05	24.65	0.0020	22.20
24	88.25	0.05	24.65	0.0020	22.20
25	87.12	1.13	24.65	0.0458	4.67
25			616.25	Total	247.03
Sw=	1.02	%	Tc=	72.4	(min)
			Event	**5**	Yr
Cavg=	0.20			**100**	Yr
I (2yr) =	29	(mm/hr)			
I (100yr) =	49	(mm/hr)			
Area=	6.79	(ha)			
Qpre(site)=	**108.0**	(l/s)			
	229.3	(l/s)			

Modified Rational Method - Area 1

Table 13

5 Year Release Rate and Storage Requirement

Location	Area (ha)	Runoff Coef "C"	2.78AR	TIME (MIN)	I (mm/hr)	Q IN (L/S)	Q REL (L/S)	STOR RATE (L/S)	REQ STOR. (M3)	COMMENT	PEAK TIME (MIN)
Area No. 1	0.20	0.39	0.22	5	141.18	30.61	29.80	0.81	0.24	GOVERN	5
	0.20	0.39	0.22	10	104.19	22.59	29.80	0.00	0.00		
	0.20	0.39	0.22	15	83.56	18.12	29.80	0.00	0.00		
	0.20	0.39	0.22	20	70.25	15.23	29.80	0.00	0.00		
	0.20	0.39	0.22	25	60.90	13.21	29.80	0.00	0.00		
	0.20	0.39	0.22	30	53.93	11.69	29.80	0.00	0.00		
	0.20	0.39	0.22	35	48.52	10.52	29.80	0.00	0.00		
	0.20	0.39	0.22	40	44.18	9.58	29.80	0.00	0.00		
	0.20	0.39	0.22	45	40.63	8.81	29.80	0.00	0.00		
	0.20	0.39	0.22	50	37.65	8.16	29.80	0.00	0.00		
	0.20	0.39	0.22	55	35.12	7.62	29.80	0.00	0.00		

100 Year Release Rate and Storage Requirement

Location	Area	Runoff Coef "C"	2.78AR	TIME (MIN)	I (mm/hr)	Q IN (L/S)	Q REL (L/S)	STOR RATE (L/S)	REQ STOR. (M3)	COMMENT	PEAK TIME (MIN)
Area No. 1	0.20	0.49	0.27	5	242.70	65.78	63.40	2.38	0.72	GOVERN	5
	0.20	0.49	0.27	10	178.56	48.40	63.40	0.00	0.00		
	0.20	0.49	0.27	15	142.89	38.73	63.40	0.00	0.00		
	0.20	0.49	0.27	20	119.95	32.51	63.40	0.00	0.00		
	0.20	0.49	0.27	25	103.85	28.15	63.40	0.00	0.00		
	0.20	0.49	0.27	30	91.87	24.90	63.40	0.00	0.00		
	0.20	0.49	0.27	35	82.58	22.38	63.40	0.00	0.00		
	0.20	0.49	0.27	40	75.15	20.37	63.40	0.00	0.00		
	0.20	0.49	0.27	45	69.05	18.72	63.40	0.00	0.00		
	0.20	0.49	0.27	50	63.95	17.33	63.40	0.00	0.00		
	0.20	0.49	0.27	55	59.62	16.16	63.40	0.00	0.00		

Modified Rational Method - Area 2

Table 14

5 Year Release Rate and Storage Requirement

Location	Area (ha)	Runoff Coef "C"	2.78AR	TIME (MIN)	I (mm/hr)	Q IN (L/S)	Q REL (L/S)	STOR RATE (L/S)	REQ STOR. (M3)	COMMENT	PEAK TIME (MIN)
	1.93	0.38	2.04	5	141.18	287.85	137.40	150.45	45.13	GOVERN	5
	1.93	0.38	2.04	10	104.19	212.43	137.40	75.03	45.02		
	1.93	0.38	2.04	15	83.56	170.37	137.40	32.97	29.67		
	1.93	0.38	2.04	20	70.25	143.23	137.40	5.83	7.00		
	1.93	0.38	2.04	25	60.90	124.17	137.40	0.00	0.00		
Area No. 2	1.93	0.38	2.04	30	53.93	109.96	137.40	0.00	0.00		
	1.93	0.38	2.04	35	48.52	98.93	137.40	0.00	0.00		
	1.93	0.38	2.04	40	44.18	90.08	137.40	0.00	0.00		
	1.93	0.38	2.04	45	40.63	82.84	137.40	0.00	0.00		
	1.93	0.38	2.04	50	37.65	76.76	137.40	0.00	0.00		
	1.93	0.38	2.04	55	35.12	71.60	137.40	0.00	0.00		

100 Year Release Rate and Storage Requirement

Location	Area	Runoff Coef "C"	2.78AR	TIME (MIN)	I (mm/hr)	Q IN (L/S)	Q REL (L/S)	STOR RATE (L/S)	REQ STOR. (M3)	COMMENT	PEAK TIME (MIN)
	1.93	0.48	2.55	5	242.70	618.54	291.50	327.04	98.11		
	1.93	0.48	2.55	10	178.56	455.07	291.50	163.57	98.14	GOVERN	10
	1.93	0.48	2.55	15	142.89	364.16	291.50	72.66	65.40		
	1.93	0.48	2.55	20	119.95	305.70	291.50	14.20	17.04		
	1.93	0.48	2.55	25	103.85	264.67	291.50	0.00	0.00		
Area No. 2	1.93	0.48	2.55	30	91.87	234.14	291.50	0.00	0.00		
	1.93	0.48	2.55	35	82.58	210.46	291.50	0.00	0.00		
	1.93	0.48	2.55	40	75.15	191.52	291.50	0.00	0.00		
	1.93	0.48	2.55	45	69.05	175.98	291.50	0.00	0.00		
	1.93	0.48	2.55	50	63.95	162.98	291.50	0.00	0.00		
	1.93	0.48	2.55	55	59.62	151.95	291.50	0.00	0.00		

Modified Rational Method - Area 3

Table 15

5 Year Release Rate and Storage Requirement

Location	Area (ha)	Runoff Coef "C"	2.78AR	TIME (MIN)	I (mm/hr)	Q IN (L/S)	Q REL (L/S)	STOR RATE (L/S)	REQ STOR. (M3)	COMMENT	PEAK TIME (MIN)
	9.28	0.35	8.90	20	70.25	625.26	108.00	517.26	620.71		
	9.28	0.35	8.90	25	60.90	542.04	108.00	434.04	651.06		
	9.28	0.35	8.90	30	53.93	480.00	108.00	372.00	669.60		
	9.28	0.35	8.90	35	48.52	431.85	108.00	323.85	680.08		
	9.28	0.35	8.90	40	44.18	393.22	108.00	285.22	684.53		
Area No. 3	9.28	0.35	8.90	45	40.63	361.63	108.00	253.63	684.79	GOVERN	45
	9.28	0.35	8.90	50	37.65	335.10	108.00	227.10	681.31		
	9.28	0.35	8.90	55	35.12	312.58	108.00	204.58	675.13		
	9.28	0.35	8.90	60	32.94	293.18	108.00	185.18	666.65		
	9.28	0.35	8.90	65	31.04	276.27	108.00	168.27	656.25		
	9.28	0.35	8.90	70	29.37	261.41	108.00	153.41	644.31		

100 Year Release Rate and Storage Requirement

Location	Area	Runoff Coef "C"	2.78AR	TIME (MIN)	I (mm/hr)	Q IN (L/S)	Q REL (L/S)	STOR RATE (L/S)	REQ STOR. (M3)	COMMENT	PEAK TIME (MIN)
	9.28	0.43	11.13	65	52.65	585.76	108.00	477.76	1863.27		
	9.28	0.43	11.13	70	49.79	553.94	108.00	445.94	1872.95		
	9.28	0.43	11.13	75	47.26	525.79	108.00	417.79	1880.07		
	9.28	0.43	11.13	80	44.99	500.54	108.00	392.54	1884.19		
	9.28	0.43	11.13	85	42.95	477.84	108.00	369.84	1886.20		
Area No. 3	9.28	0.43	11.13	90	41.11	457.37	108.00	349.37	1886.61	GOVERN	90
	9.28	0.43	11.13	95	39.43	438.68	108.00	330.68	1884.88		
	9.28	0.43	11.13	100	37.90	421.66	108.00	313.66	1881.95		
	9.28	0.43	11.13	105	36.50	406.08	108.00	298.08	1877.92		
	9.28	0.43	11.13	110	35.20	391.62	108.00	283.62	1871.89		
	9.28	0.43	11.13	115	34.01	378.38	108.00	270.38	1865.62		

Stormceptor®

FORTERRA

Stormceptor® EF Sizing Report

STORMCEPTOR®
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

09/07/2022

Province:	Ontario
City:	Moose Creek
Nearest Rainfall Station:	OTTAWA CDA RCS
Climate Station Id:	6105978
Years of Rainfall Data:	20

Site Name:	Eastview East

Drainage Area (ha):	9.28
Runoff Coefficient 'c':	0.35

Particle Size Distribution:	Fine
Target TSS Removal (%):	70.0

Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	182.50
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	
Site Sediment Transport Rate (kg/ha/yr):	

Project Name:	Eastview Subdivision
Project Number:	210602
Designer Name:	Andre Sauve
Designer Company:	Atrel Engineering Ltd
Designer Email:	andresauve@atrel.com
Designer Phone:	613-446-7423
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	48
EFO6	64
EFO8	75
EFO10	82
EFO12	87

Recommended Stormceptor EFO Model: EFO8

Estimated Net Annual Sediment (TSS) Load Reduction (%): 75

Water Quality Runoff Volume Capture (%): > 90

imbrium

THIRD-PARTY TESTING AND VERIFICATION

►**Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

►**Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterwavs.

PARTICLE SIZE DISTRIBUTION (PSD)

►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

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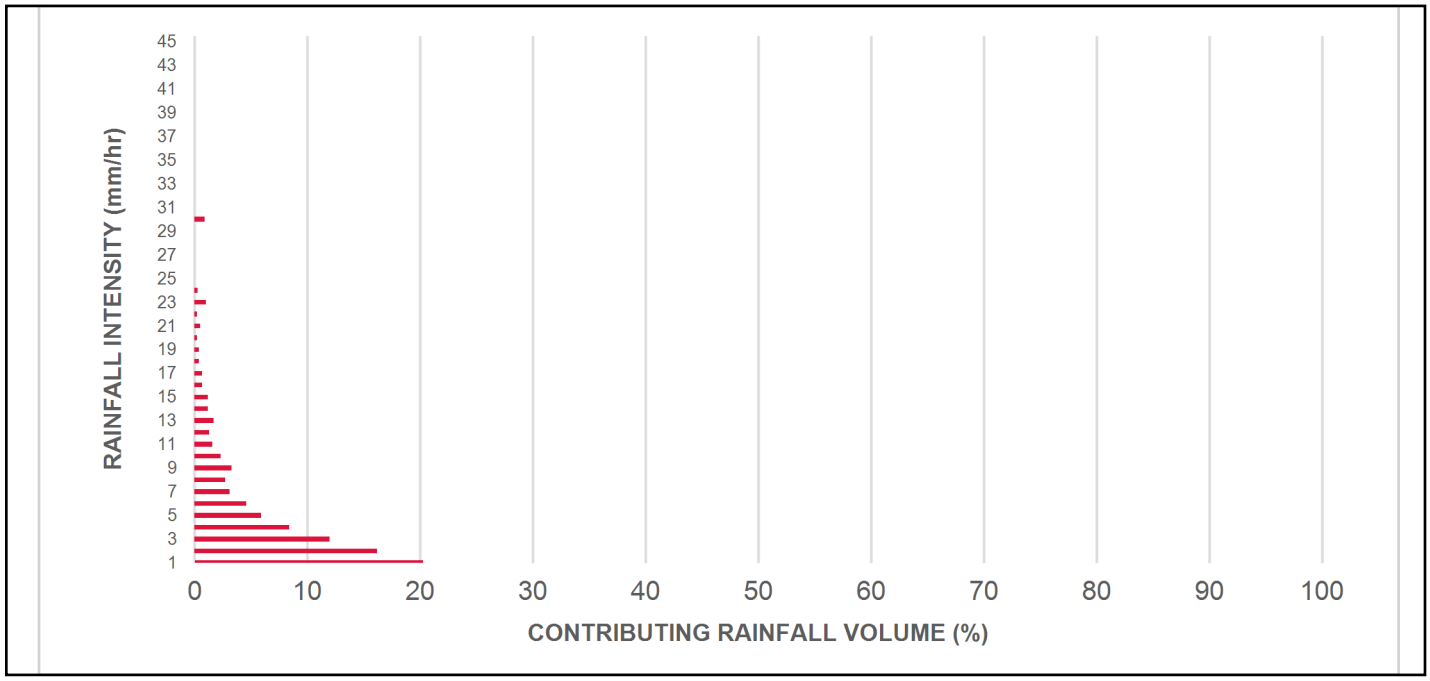
Stormceptor® EF Sizing Report

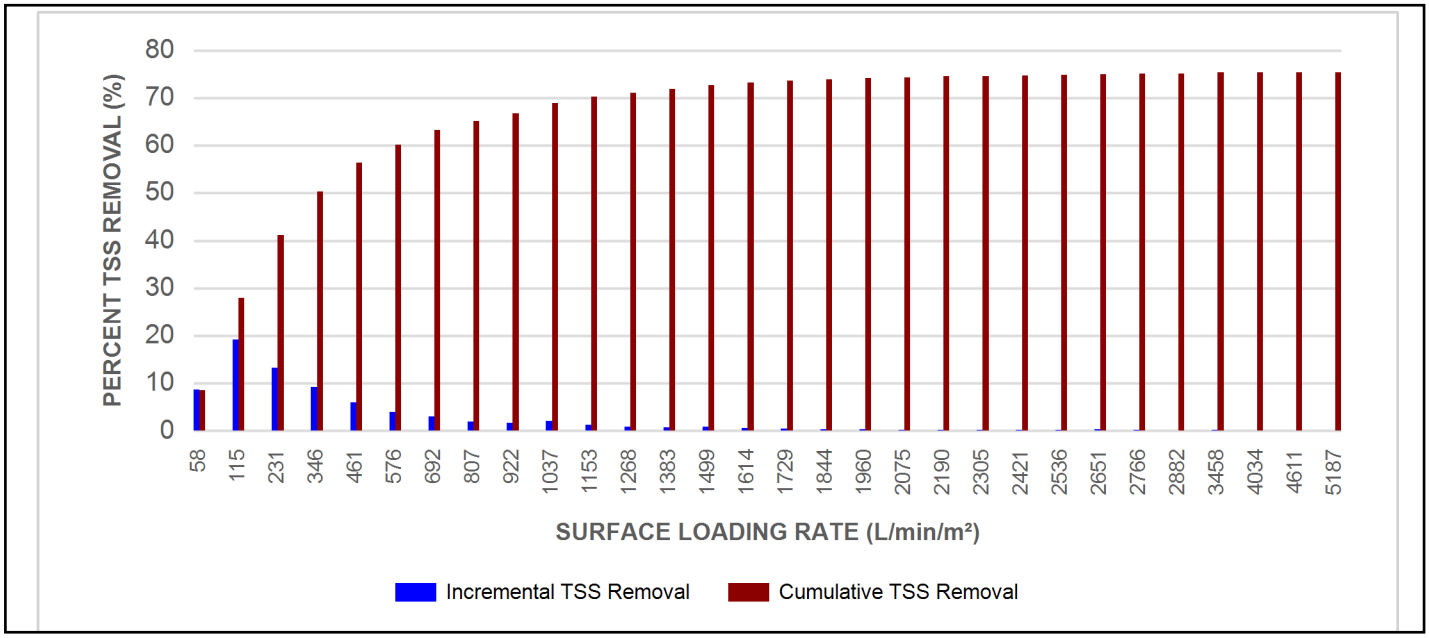
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.5	8.6	8.6	4.51	271.0	58.0	100	8.6	8.6
1	20.3	29.0	9.03	542.0	115.0	95	19.2	27.9
2	16.2	45.2	18.06	1084.0	231.0	82	13.3	41.1
3	12.0	57.2	27.09	1625.0	346.0	77	9.2	50.3
4	8.4	65.6	36.12	2167.0	461.0	71	6.0	56.3
5	5.9	71.6	45.15	2709.0	576.0	66	3.9	60.2
6	4.6	76.2	54.18	3251.0	692.0	64	3.0	63.2
7	3.1	79.3	63.21	3792.0	807.0	63	1.9	65.1
8	2.7	82.0	72.24	4334.0	922.0	62	1.7	66.8
9	3.3	85.3	81.26	4876.0	1037.0	61	2.0	68.9
10	2.3	87.6	90.29	5418.0	1153.0	58	1.3	70.2
11	1.6	89.2	99.32	5959.0	1268.0	56	0.9	71.1
12	1.3	90.5	108.35	6501.0	1383.0	53	0.7	71.8
13	1.7	92.2	117.38	7043.0	1499.0	49	0.8	72.6
14	1.2	93.5	126.41	7585.0	1614.0	45	0.6	73.2
15	1.2	94.6	135.44	8126.0	1729.0	42	0.5	73.6
16	0.7	95.3	144.47	8668.0	1844.0	40	0.3	73.9
17	0.7	96.1	153.50	9210.0	1960.0	37	0.3	74.2
18	0.4	96.5	162.53	9752.0	2075.0	35	0.1	74.3
19	0.4	96.9	171.56	10294.0	2190.0	33	0.1	74.5
20	0.2	97.1	180.59	10835.0	2305.0	32	0.1	74.6
21	0.5	97.5	189.62	11377.0	2421.0	30	0.1	74.7
22	0.2	97.8	198.65	11919.0	2536.0	29	0.1	74.8
23	1.0	98.8	207.68	12461.0	2651.0	28	0.3	75.0
24	0.3	99.1	216.71	13002.0	2766.0	27	0.1	75.1
25	0.0	99.1	225.74	13544.0	2882.0	26	0.0	75.1
30	0.9	100.0	270.88	16253.0	3458.0	22	0.2	75.3
35	0.0	100.0	316.03	18962.0	4034.0	18	0.0	75.3
40	0.0	100.0	361.18	21671.0	4611.0	16	0.0	75.3
45	0.0	100.0	406.32	24379.0	5187.0	14	0.0	75.3
Estimated Net Annual Sediment (TSS) Load Reduction =								**75 %**

Climate Station ID: 6105978 *Years of Rainfall Data*: 20

RAINFALL DATA FROM OTTAWA CDA RCS RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

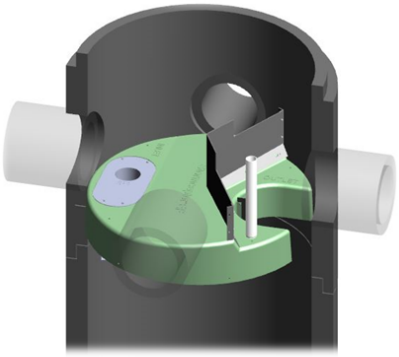
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

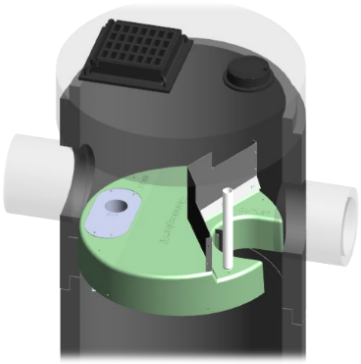
DESIGN FLEXIBILITY

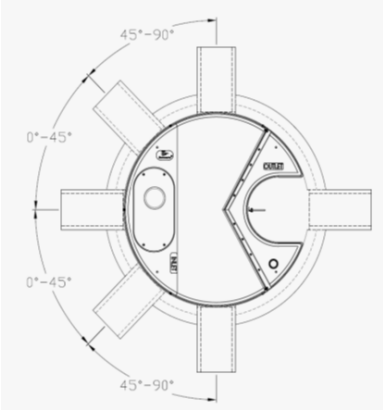
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

OIL CAPTURE AND RETENTION

►While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, **Stormceptor® EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.







INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.

0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.

45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1. For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft^3)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
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EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity

** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft^3)

Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

STANDARD STORMCEPTOR EF/EFO DRAWINGS

For standard details, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

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STANDARD PERFORMANCE SPECIFICATION FOR "OIL GRIT SEPARATOR" (OGS) STORMWATER QUALITY TREATMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit Separators**

1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The minimum sediment & petroleum hydrocarbon storage capacity shall be as follows:

2.1.1	4 ft (1219 mm) Diameter OGS Units:	1.19 m^3 sediment / 265 L oil
	6 ft (1829 mm) Diameter OGS Units:	3.48 m^3 sediment / 609 L oil
	8 ft (2438 mm) Diameter OGS Units:	8.78 m^3 sediment / 1,071 L oil
	10 ft (3048 mm) Diameter OGS Units:	17.78 m^3 sediment / 1,673 L oil
	12 ft (3657 mm) Diameter OGS Units:	31.23 m^3 sediment / 2,476 L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall

remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol Procedure for Laboratory Testing of Oil-Grit Separators, as follows:

3.2.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m^2 to 1400 L/min/m^2, and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.2.2 Sediment removal efficiency for surface loading rates between 40 L/min/m^2 and 1400 L/min/m^2 shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.2.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m^2 shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m^2. No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m^2.

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m^2 shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m^2, and shall be calculated using a simple proportioning formula, with 1400 L/min/m^2 in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m^2.

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m^2.

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid Re-entrainment Simulation Testing in accordance with the Canadian ETV **Program's Procedure for Laboratory Testing of Oil-Grit Separators,** with results reported within the Canadian ETV or ISO 14034 ETV verification. This re-entrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to

assess whether light liquids captured after a spill are effectively retained at high flow rates.

3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m^2 to 2600 L/min/m^2) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.** However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.

Stormceptor®

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Stormceptor® EF Sizing Report

STORMCEPTOR®
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

09/07/2022

Province:	Ontario
City:	Moose Creek
Nearest Rainfall Station:	OTTAWA CDA RCS
Climate Station Id:	6105978
Years of Rainfall Data:	20

Site Name:	Eastview West

Drainage Area (ha):	1.93
Runoff Coefficient 'c':	0.38

Particle Size Distribution:	Fine
Target TSS Removal (%):	70.0

Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	23.67
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	
Site Sediment Transport Rate (kg/ha/yr):	

Project Name:	Eastview Subdivision
Project Number:	210602
Designer Name:	Andre Sauve
Designer Company:	Atrel Engineering Ltd
Designer Email:	andresauve@atrel.com
Designer Phone:	613-446-7423
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	77
EFO6	88
EFO8	93
EFO10	96
EFO12	98

Recommended Stormceptor EFO Model: EFO4

Estimated Net Annual Sediment (TSS) Load Reduction (%): 77

Water Quality Runoff Volume Capture (%): > 90

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THIRD-PARTY TESTING AND VERIFICATION

►**Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

►**Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterwavs.

PARTICLE SIZE DISTRIBUTION (PSD)

►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

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Stormceptor® EF Sizing Report

Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.5	8.6	8.6	1.02	61.0	51.0	100	8.6	8.6
1	20.3	29.0	2.04	122.0	102.0	96	19.5	28.1
2	16.2	45.2	4.08	245.0	204.0	83	13.5	41.6
3	12.0	57.2	6.12	367.0	306.0	78	9.4	51.0
4	8.4	65.6	8.16	489.0	408.0	74	6.2	57.3
5	5.9	71.6	10.19	612.0	510.0	69	4.1	61.3
6	4.6	76.2	12.23	734.0	612.0	65	3.0	64.3
7	3.1	79.3	14.27	856.0	714.0	64	2.0	66.3
8	2.7	82.0	16.31	979.0	816.0	63	1.7	68.0
9	3.3	85.3	18.35	1101.0	917.0	62	2.1	70.1
10	2.3	87.6	20.39	1223.0	1019.0	61	1.4	71.5
11	1.6	89.2	22.43	1346.0	1121.0	59	0.9	72.4
12	1.3	90.5	24.47	1468.0	1223.0	56	0.7	73.1
13	1.7	92.2	26.51	1590.0	1325.0	54	0.9	74.1
14	1.2	93.5	28.54	1713.0	1427.0	52	0.6	74.7
15	1.2	94.6	30.58	1835.0	1529.0	48	0.6	75.3
16	0.7	95.3	32.62	1957.0	1631.0	45	0.3	75.6
17	0.7	96.1	34.66	2080.0	1733.0	42	0.3	75.9
18	0.4	96.5	36.70	2202.0	1835.0	40	0.2	76.1
19	0.4	96.9	38.74	2324.0	1937.0	38	0.2	76.2
20	0.2	97.1	40.78	2447.0	2039.0	36	0.1	76.3
21	0.5	97.5	42.82	2569.0	2141.0	34	0.2	76.4
22	0.2	97.8	44.85	2691.0	2243.0	33	0.1	76.5
23	1.0	98.8	46.89	2814.0	2345.0	31	0.3	76.8
24	0.3	99.1	48.93	2936.0	2447.0	30	0.1	76.9
25	0.0	99.1	50.97	3058.0	2549.0	29	0.0	76.9
30	0.9	100.0	61.17	3670.0	3058.0	24	0.2	77.1
35	0.0	100.0	71.36	4282.0	3568.0	21	0.0	77.1
40	0.0	100.0	81.55	4893.0	4078.0	18	0.0	77.1
45	0.0	100.0	91.75	5505.0	4587.0	16	0.0	77.1
Estimated Net Annual Sediment (TSS) Load Reduction =								**77 %**

Climate Station ID: 6105978 *Years of Rainfall Data*: 20

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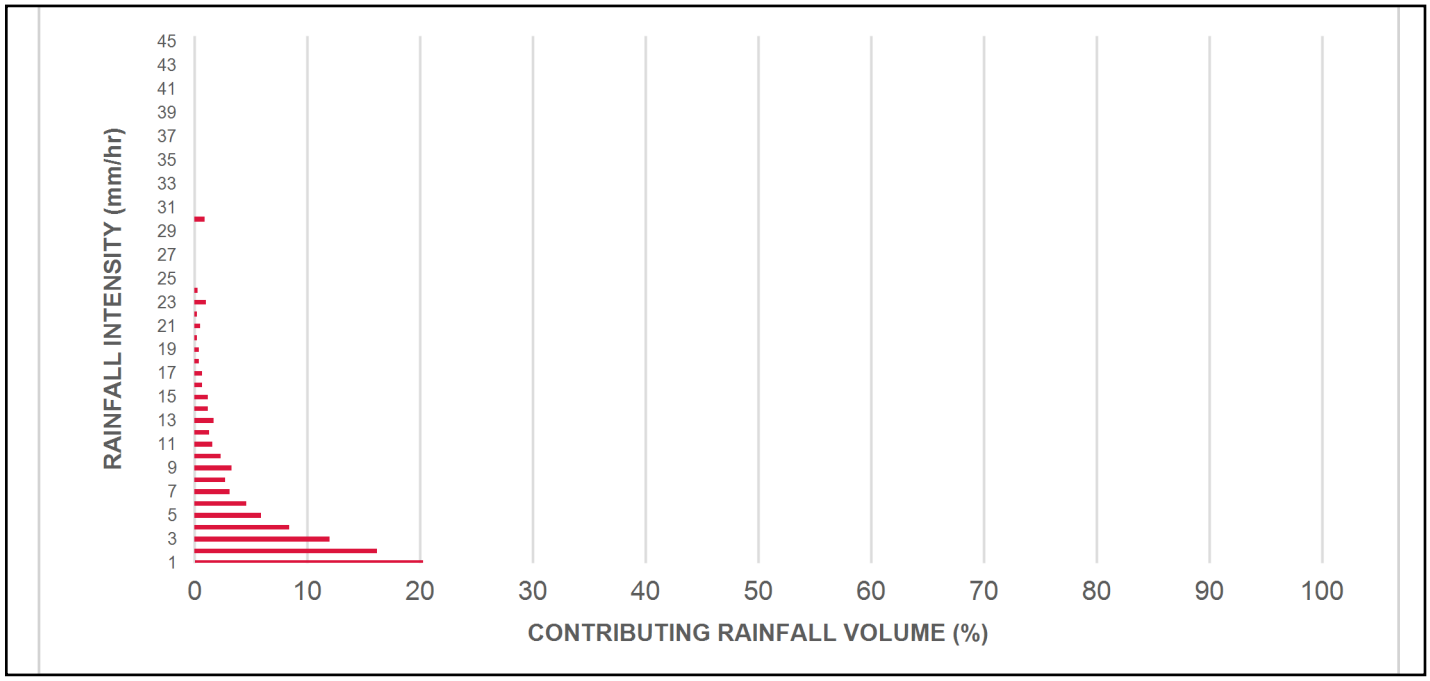
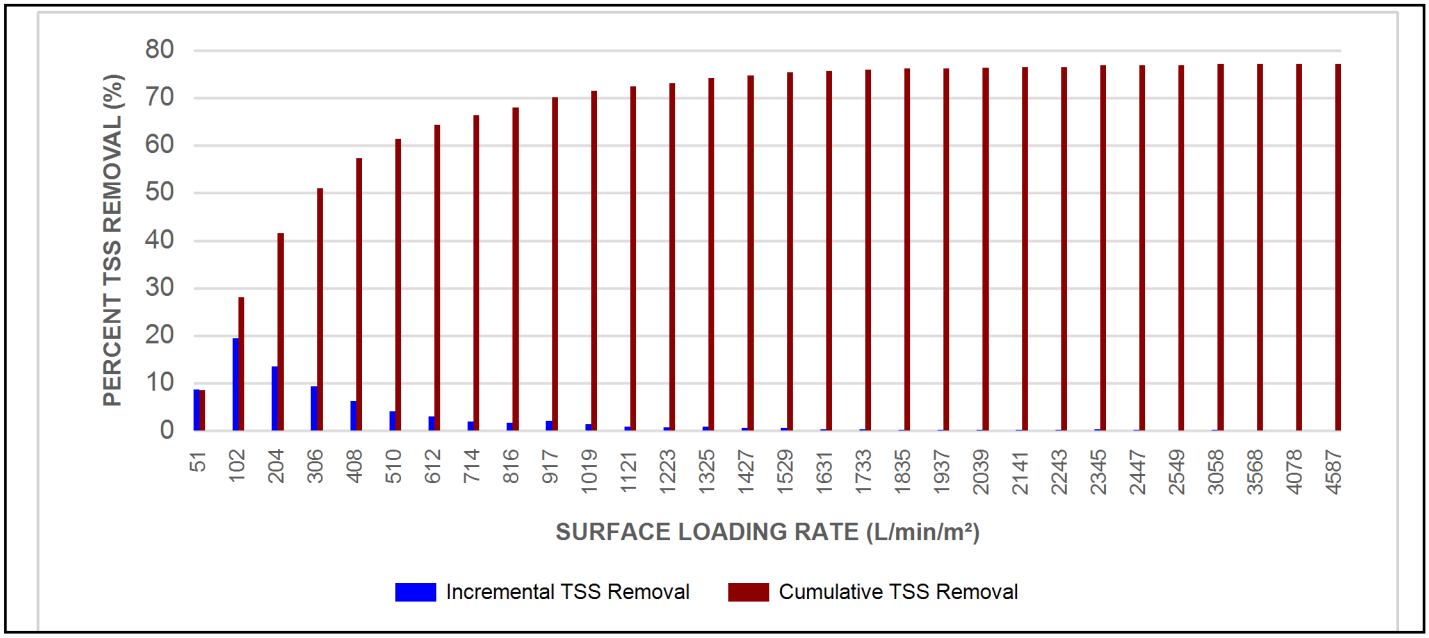
RAINFALL DATA FROM OTTAWA CDA RCS RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
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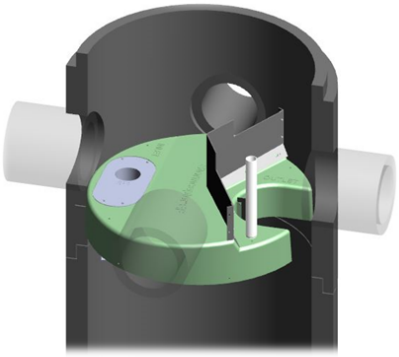

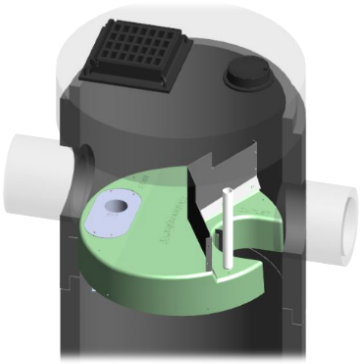

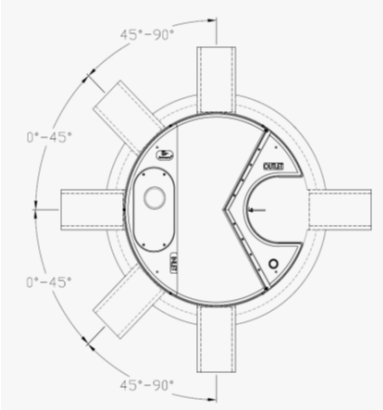

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** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft^3)

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Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

STANDARD STORMCEPTOR EF/EFO DRAWINGS

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3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall

remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol Procedure for Laboratory Testing of Oil-Grit Separators, as follows:

3.2.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m^2 to 1400 L/min/m^2, and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.2.2 Sediment removal efficiency for surface loading rates between 40 L/min/m^2 and 1400 L/min/m^2 shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.2.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m^2 shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m^2. No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m^2.

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m^2 shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m^2, and shall be calculated using a simple proportioning formula, with 1400 L/min/m^2 in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m^2.

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m^2.

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid Re-entrainment Simulation Testing in accordance with the Canadian ETV **Program's Procedure for Laboratory Testing of Oil-Grit Separators,** with results reported within the Canadian ETV or ISO 14034 ETV verification. This re-entrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to

assess whether light liquids captured after a spill are effectively retained at high flow rates.

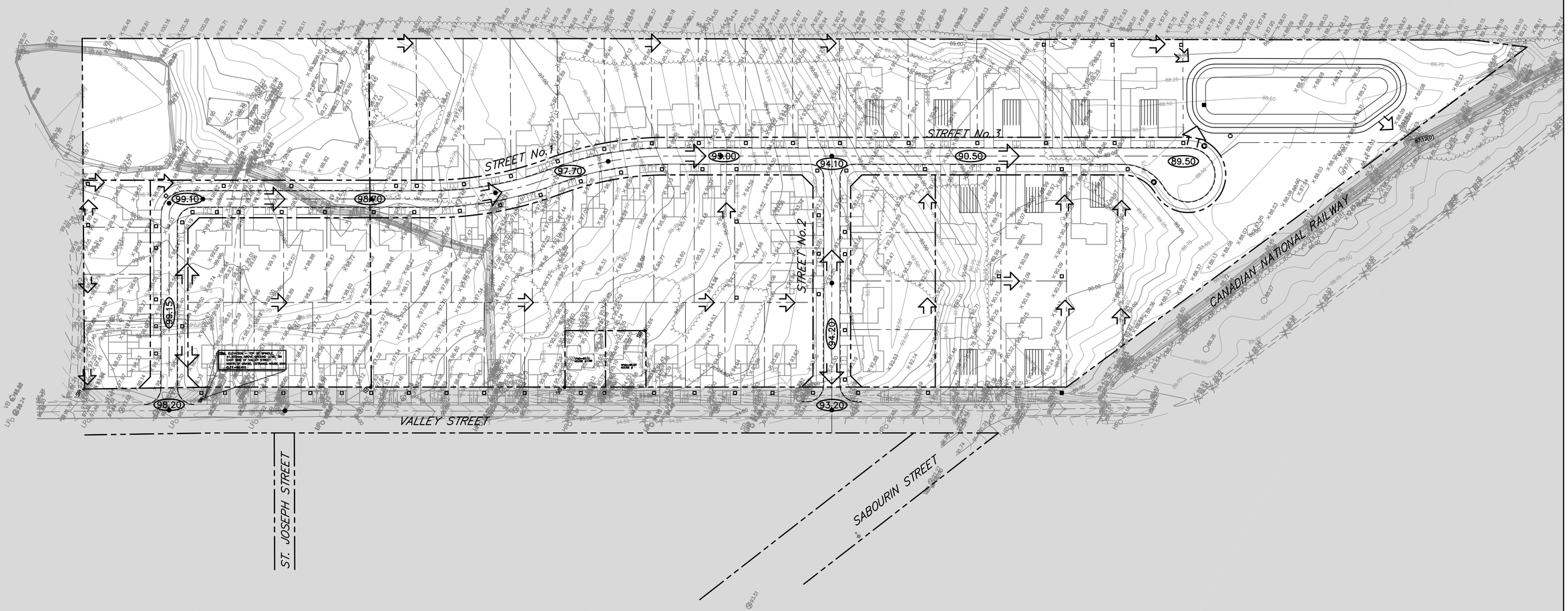
3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m^2 to 2600 L/min/m^2) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.** However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.

APPENDIX "E"

210602-GRM - Macro Grading Plan
210602-ESCM - Macro Erosion and Sediment Control Plan

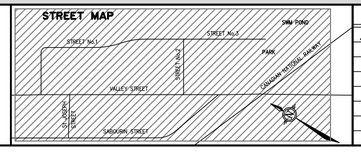
LEGEND

- 89.00 — CONTOURS AT 0.25m INTERVAL
- ×89.81 — EXISTING SPOT ELEVATION
- (87.09) — PROPOSED ELEVATION
- MAJOR DRAINAGE SYSTEM
- OUTSIDE PROPOSED DEVELOPMENT



THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

STREET MAP



No.	REVISION △ -APPLIES WHEN DRAWING MODIFIED	DATE	BY
1	FIRST SUBMISSION	SEPT 1/22	AGS

SCALE
1 : 1000
10m 0 10 20 30m

DESIGN	AGS
CHECKED	AGS
DRAWN	AG
CHECKED	AGS
APPROVED	AGS

LICENSED PROFESSIONAL ENGINEER
A. G. Y. SAUVE
100142393
Sept 1, 2022
PROVINCE OF ONTARIO

ATREL Engineering Ltd Ltée
Engineers - Ingénieurs
1-2884 CHAMBERLAND STREET, ROCKLAND, ONTARIO K4K 1M6
TEL.: (613) 446-7423

VILLAGE OF MOOSE CREEK
EASTVIEW SUBDIVISION

809304 ONTARIO INC.

PROJECT No. 210602

PLAN
MACRO GRADING PLAN

DRAWING No. 210602-GRM

LEGEND

- EXISTING DECIDUOUS TREE (DEC 300mm)
- EXISTING TREE LINE
- STRAW BALES AS PER OPSD 219.180
- SILT FENCE BARRIER AS PER OPSD 219.110
- EXISTING ELEVATION CONTOURS AT 0.25m INTERVAL (~89.00)
- EXISTING SPOT ELEVATION (× 89.81)
- PORTION OF DITCH TO BE FILLED
- OUTSIDE PROPOSED DEVELOPMENT

NOTES

1) ADDITIONAL TO THIS PLAN, THE CONTRACTOR SHALL IMPLEMENT THE "BEST MANAGEMENT PRACTICE" ALL ALONG CONSTRUCTION.
2) SUBDRAINS WITH FILTER CLOTH WILL BE INSTALLED ALONG SIDE OF THE ROAD DITCH. DURING SMALL RUNOFF EVENTS, THE WATER WILL SEEP THROUGH THE GROUND AND THE SUBDRAINS BEDDING PRIOR TO REACHING THE OUTLET.
3) DURING CONSTRUCTION, GEOSOCKS WILL BE PLACED UNDER ALL CATCHBASIN AND MANHOLE FRAMES AND COVERS AND STRAW BALES WILL BE PLACED WHERE WATER RUNOFF CAN CARRY EXCESSIVE SEDIMENTS INTO THE SEWER SYSTEM.
4) STRAW BALES SHALL BE INSTALLED AS PER OPSD 219.100 AND OPSD 219.120 AS APPROPRIATE. A DOUBLE ROW OF BALES WITH OFF-SET JOINTS SHOULD BE INSTALLED ALONG THE VARIOUS SWALES (MAN MADE OR EXISTING) WHERE JUDGED NECESSARY BY THE ENGINEER AND/OR THE CITY'S INSPECTOR.
5) STRAW BALES SHALL BE INSTALLED AT EVERY MAJOR POINT OF WATER ENTRY INCLUDING DITCH INLET CATCHBASINS AND CULVERTS.
6) ALL SEDIMENT CONTROL LOCATIONS MUST BE INSPECTED ON A DAILY BASIS ESPECIALLY FOLLOWING A RAINFALL EVENT. SEDIMENTS SHALL BE REMOVED AND CONTROLS REINSTALLED AS NECESSARY.
7) SHOULD IT BE IMPOSSIBLE TO PREVENT OVERLAND SHEET FLOW TO AN EXTERNAL AREA DURING THE CONSTRUCTION PHASE; SUCH AREA SHALL BE PROTECTED WITH A SILT FENCE AS PER OPSD 219.110 AND/OR FILTER CLOTH IN CATCHBASINS.
8) FILTER CLOTH IN CBs SHOULD BE INSTALLED WITH GENEROUS EXCESS OF MATERIAL AROUND PERIMETER TO FACILITATE REMOVAL.
9) ANY MATERIAL STOCKPILES SHOULD BE LOCATED ON FLAT AREAS WELL AWAY FROM ANY DRAINAGE INLETS.
10) NO SEDIMENT CONTROL STRUCTURES SHALL BE REMOVED UNLESS FOUND UNNECESSARY OR ANOTHER SEDIMENT CONTROL POINT IS INSTALLED ELSEWHERE TO REPLACE THE LATTER.
11) THE SEDIMENT AND EROSION CONTROL MEASURES MAY BE MODIFIED IN THE FIELD AT THE DISCRETION OF THE CITY SITE INSPECTOR OR CONSERVATION AUTHORITY.
12) THIS PLAN IS A "LIVING DOCUMENT" AND ANY MODIFICATION TO THE PLAN SHALL BE SUBMITTED TO THE SATISFACTION OF SNC AND MAY BE MODIFIED BY SNC STAFF.

SILT FENCE BARRIER

STRAW BALES

EX. 400mm∅ CONC CULVERT

REDIRECT DITCH

1.68%

STREET No.1

STREET No.3

STREET No.2

CANADIAN NATIONAL RAILWAY

EX. 250mm∅ CSP CULVERT

EX. 450mm∅ CSP CULVERT

VALLEY STREET

EX. 450mm∅ CSP CULVERT

EX. 450mm∅ HDPE CULVERT

EX. 450mm∅ CSP CULVERT

EX. 500mm∅ CSP CULVERT

EX. CULVERT

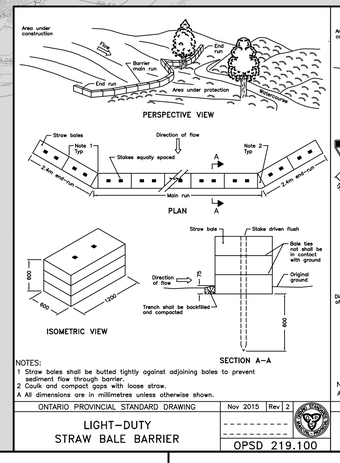
EX. CULVERT

EX. 450mm∅ CSP CULVERT

STRAW BALES

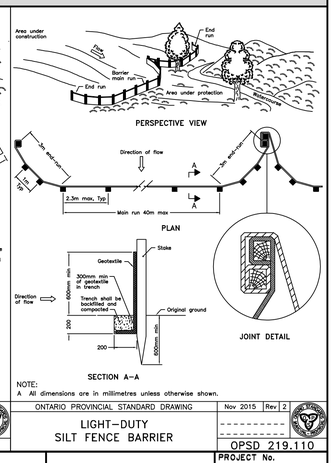
ST. JOSEPH STREET

SABOURIN STREET



NOTES:
1 Straw bales shall be butted tightly against adjoining bales to prevent sediment flow through barrier.
2 Caulk and compact gaps with loose straw.
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING | Nov 2015 | Rev 2
LIGHT-DUTY STRAW BALE BARRIER
OPSD 219.100

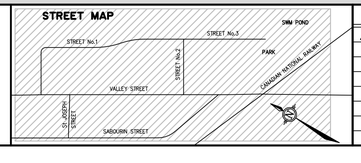


NOTE:
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING | Nov 2015 | Rev 2
LIGHT-DUTY SILT FENCE BARRIER
OPSD 219.110

THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

STREET MAP



No.	REVISION △ -APPLIES WHEN DRAWING MODIFIED	DATE	BY
1	FIRST SUBMISSION	SEPT 6/22	AGS

SCALE 1 : 1000 (10m 0 10 20 30m)

DESIGN	AGS
CHECKED	AGS
DRAWN	AG
CHECKED	AGS
APPROVED	AGS

LICENSED PROFESSIONAL ENGINEER — A.G.Y. SAUVE — 100142393 — Sept 6, 2022 — PROVINCE OF ONTARIO

ATREL Engineering Ltd Ltée
Engineers - Ingénieurs
1-2884 CHAMBERLAND STREET, ROCKLAND, ONTARIO K4K 1M6
TEL.: (613) 446-7425

VILLAGE OF MOOSE CREEK
EASTVIEW SUBDIVISION
809304 ONTARIO INC.

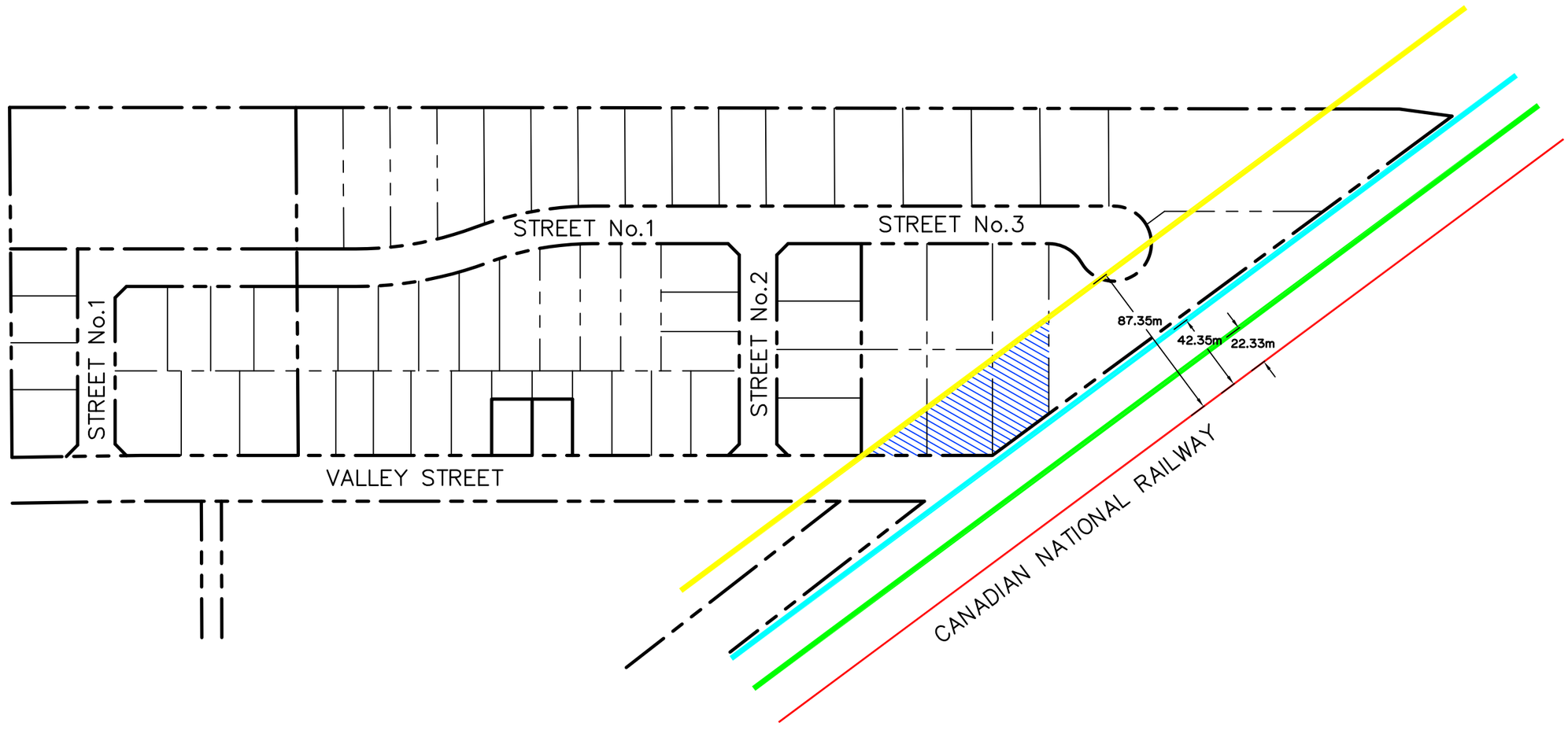
PROJECT No. 210602

PLAN
MACRO EROSION AND SEDIMENT CONTROL PLAN

DRAWING No. 210602-ESCM

APPENDIX "F"

210602-N1 – Critical Setback – Living Day
210602-N2 – Critical Setback – Outdoor
VIA Rail Train data – Table 17
Sample Calculations



LEGEND

RAILWAY CENTERLINE

GENERIC WARNING CLAUSE TYPE "C"

GENERIC WARNING CLAUSE TYPE "D"

NOISE LEVEL

55dBA

60dBA

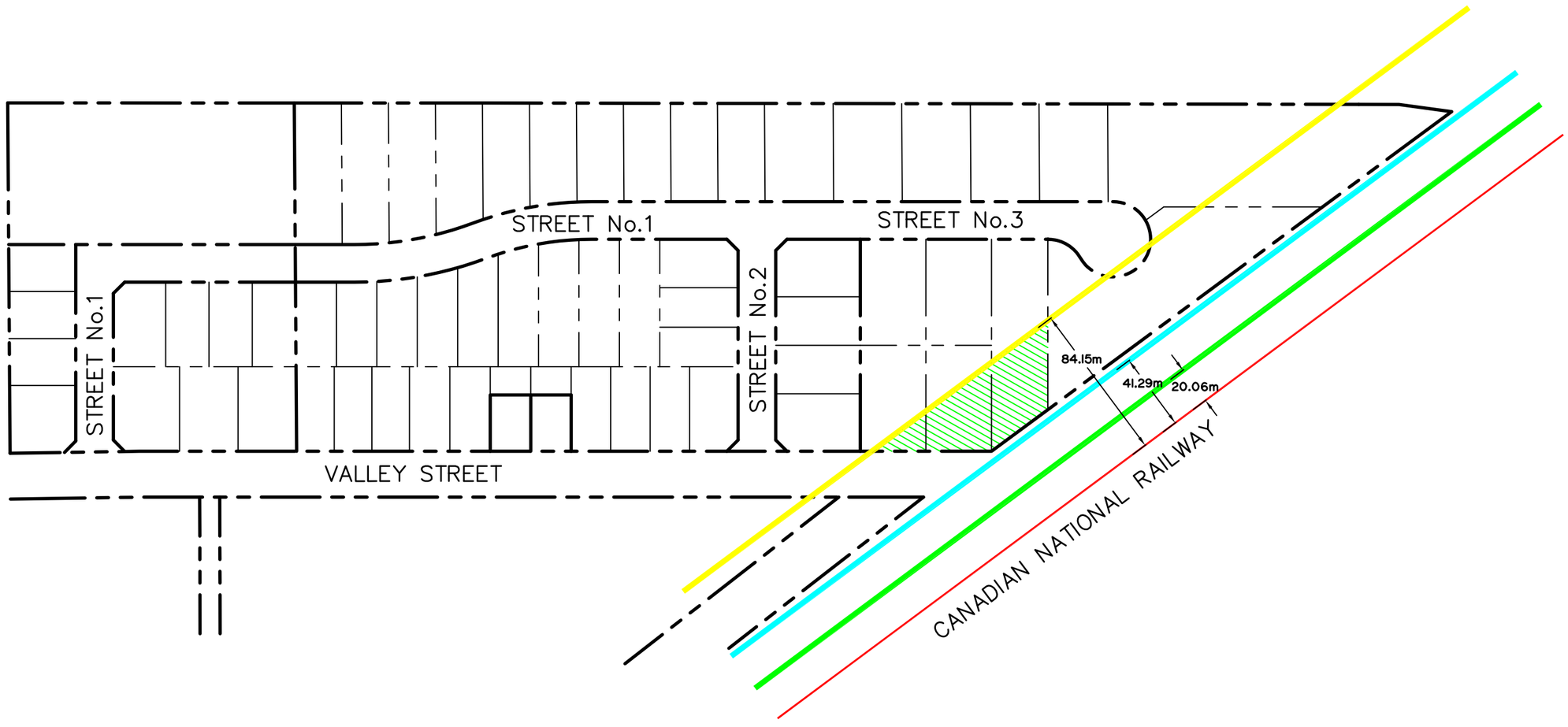
65dBA

ATREL Engineering Ltd.
Engineers - Ingénieurs

EASTVIEW SUBDIVISION

CRITICAL SETBACK - LIVING DAY

SCALE: 1:2500 | AUG. 2022 | 210602-NI



LEGEND

RAILWAY CENTERLINE

GENERIC WARNING CLAUSE TYPE "A"

EXTENSIVE MITIGATION OUTDOOR - TYPE "B"

NOISE LEVEL

55dBA

60dBA

65dBA

ATREL Engineering Ltd.
Engineers - Ingénieurs

EASTVIEW SUBDIVISION

CRITICAL SETBACK - OUTDOOR

SCALE:		
1:2500	AUG. 2022	210602-N2

Railway Traffic Volume

TABLE 16						
	DAY			NIGHT		
TRAIN TYPE:	FREIGHT	PASSENGER	TRANSFER	FREIGHT	PASSENGER	TRANSFER
NUMBER OF TRAINS:	1	6	0	0	0	0
NUMBER OF LOCOMOTIVES PER TRAIN	1	1	0	0	0	0
NUMBER OF CARS PER TRAIN:	20	4	0	0	0	0
TRAIN SPEED (Km/h):	80	120	0	0	0	0
WHISTLE (Y/N) AT PROJECT:	Y	Y	N/A	N/A	N/A	N/A

STAMSON 5.0 NORMAL REPORT Date: 12-08-2022 09:47:08
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: train.te Time Period: Day/Night 16/8 hours
Description:

Rail data, segment # 1: RAILWAY (day/night)

Train Type	Trains (Left)	Trains (Right)	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
1. PASSENGER	3.0/0.0	3.0/0.0	120.0	1.0	4.0	Diesel	Yes
2. FREIGHT	0.5/0.0	0.5/0.0	80.0	1.0	20.0	Diesel	Yes

Data for Segment # 1: RAILWAY (day/night)

Angle1 Angle2	-90.00 deg	90.00 deg
Wood depth	0	(No woods.)
No of house rows	0 / 0	
Surface	1	(Absorptive ground surface)
Receiver source distance	87.35 / 87.35	m
Receiver height	2.50 / 4.50	m
Topography	1	(Flat/gentle slope; no barrier)
Whistle Angle	0 deg	Track 1
Reference angle	0.00	

Results segment # 1: RAILWAY (day)

LOCOMOTIVE (0.00 + 49.91 + 0.00) = 49.91 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.56	63.08	-11.90	-1.28	0.00	0.00	0.00	49.91

WHEEL (0.00 + 39.49 + 0.00) = 39.49 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	53.64	-12.70	-1.46	0.00	0.00	0.00	39.49

LEFT WHISTLE (0.00 + 50.20 + 0.00) = 50.20 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-78	0	0.56	66.61	-11.90	-4.51	0.00	0.00	0.00	50.20

RIGHT WHISTLE (0.00 + 50.20 + 0.00) = 50.20 dBA

```
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
     0     78   0.56  66.61 -11.90  -4.51   0.00   0.00   0.00  50.20
-------------------------------------------------------------------------

Segment Leq : 55.00 dBA

Total Leq All Segments: 55.00 dBA

↟
Results segment # 1: RAILWAY (night)
-----------------------------------

LOCOMOTIVE (0.00 + -12.60 + 0.00) = 0.00 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90     90   0.50   0.00 -11.44  -1.17   0.00   0.00   0.00 -12.60
-------------------------------------------------------------------------

WHEEL (0.00 + -13.60 + 0.00) = 0.00 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90     90   0.60   0.00 -12.24  -1.35   0.00   0.00   0.00 -13.60
-------------------------------------------------------------------------

LEFT WHISTLE (0.00 + 50.20 + 0.00) = 0.00 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -78      0   0.56   0.00 -11.90  -4.51   0.00   0.00   0.00  50.20
-------------------------------------------------------------------------

Segment Leq : 0.00 dBA

Total Leq All Segments: 0.00 dBA

↟



TOTAL Leq FROM ALL SOURCES (DAY): 55.00
                           (NIGHT):  0.00
↟
↟
```

STAMSON 5.0 NORMAL REPORT Date: 12-08-2022 09:47:37
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: train.te Time Period: Day/Night 16/8 hours
Description:

Rail data, segment # 1: RAILWAY (day/night)

Train Type	Trains (Left)	Trains (Right)	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
1. PASSENGER	3.0/0.0	3.0/0.0	120.0	1.0	4.0	Diesel	Yes
2. FREIGHT	0.5/0.0	0.5/0.0	80.0	1.0	20.0	Diesel	Yes

Data for Segment # 1: RAILWAY (day/night)

Angle1 Angle2	-90.00 deg	90.00 deg
Wood depth	0	(No woods.)
No of house rows	0 / 0	
Surface	1	(Absorptive ground surface)
Receiver source distance	42.35 / 42.35	m
Receiver height	2.50 / 4.50	m
Topography	1	(Flat/gentle slope; no barrier)
Whistle Angle	0 deg	Track 1
Reference angle	0.00	

Results segment # 1: RAILWAY (day)

LOCOMOTIVE (0.00 + 54.80 + 0.00) = 54.80 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.56	63.08	-7.01	-1.28	0.00	0.00	0.00	54.80

WHEEL (0.00 + 44.70 + 0.00) = 44.70 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	53.64	-7.48	-1.46	0.00	0.00	0.00	44.70

LEFT WHISTLE (0.00 + 55.24 + 0.00) = 55.24 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-84	0	0.56	66.61	-7.01	-4.36	0.00	0.00	0.00	55.24

RIGHT WHISTLE (0.00 + 55.24 + 0.00) = 55.24 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	84	0.56	66.61	-7.01	-4.36	0.00	0.00	0.00	55.24

Segment Leq : 60.00 dBA

Total Leq All Segments: 60.00 dBA

↟

Results segment # 1: RAILWAY (night)

LOCOMOTIVE (0.00 + -7.90 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.50	0.00	-6.74	-1.17	0.00	0.00	0.00	-7.90

WHEEL (0.00 + -8.57 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.60	0.00	-7.21	-1.35	0.00	0.00	0.00	-8.57

LEFT WHISTLE (0.00 + 55.24 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-84	0	0.56	0.00	-7.01	-4.36	0.00	0.00	0.00	55.24

Segment Leq : 0.00 dBA

Total Leq All Segments: 0.00 dBA

↟

TOTAL Leq FROM ALL SOURCES (DAY): 60.00
(NIGHT): 0.00

↟
↟

STAMSON 5.0 NORMAL REPORT Date: 12-08-2022 09:47:54
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: train.te Time Period: Day/Night 16/8 hours
Description:

Rail data, segment # 1: RAILWAY (day/night)

Train Type	Trains (Left)	Trains (Right)	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
1. PASSENGER	3.0/0.0	3.0/0.0	120.0	1.0	4.0	Diesel	Yes
2. FREIGHT	0.5/0.0	0.5/0.0	80.0	1.0	20.0	Diesel	Yes

Data for Segment # 1: RAILWAY (day/night)

Angle1 Angle2	-90.00 deg	90.00 deg
Wood depth	0	(No woods.)
No of house rows	0 / 0	
Surface	1	(Absorptive ground surface)
Receiver source distance	20.33 / 20.33	m
Receiver height	2.50 / 4.50	m
Topography	1	(Flat/gentle slope; no barrier)
Whistle Angle	0 deg	Track 1
Reference angle	0.00	

Results segment # 1: RAILWAY (day)

LOCOMOTIVE (0.00 + 59.76 + 0.00) = 59.76 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.56	63.08	-2.05	-1.28	0.00	0.00	0.00	59.76

WHEEL (0.00 + 50.00 + 0.00) = 50.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	53.64	-2.19	-1.46	0.00	0.00	0.00	50.00

LEFT WHISTLE (0.00 + 60.25 + 0.00) = 60.25 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-87	0	0.56	66.61	-2.05	-4.31	0.00	0.00	0.00	60.25

RIGHT WHISTLE (0.00 + 60.25 + 0.00) = 60.25 dBA

```
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
     0     87   0.56  66.61  -2.05  -4.31   0.00   0.00   0.00  60.25
-------------------------------------------------------------------------

Segment Leq : 65.00 dBA

Total Leq All Segments: 65.00 dBA

↟
Results segment # 1: RAILWAY (night)
-----------------------------------

LOCOMOTIVE (0.00 + -3.14 + 0.00) = 0.00 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90     90   0.50   0.00  -1.97  -1.17   0.00   0.00   0.00  -3.14
-------------------------------------------------------------------------

WHEEL (0.00 + -3.47 + 0.00) = 0.00 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90     90   0.60   0.00  -2.11  -1.35   0.00   0.00   0.00  -3.47
-------------------------------------------------------------------------

LEFT WHISTLE (0.00 + 60.25 + 0.00) = 0.00 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -87      0   0.56   0.00  -2.05  -4.31   0.00   0.00   0.00  60.25
-------------------------------------------------------------------------

Segment Leq : 0.00 dBA

Total Leq All Segments: 0.00 dBA

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TOTAL Leq FROM ALL SOURCES (DAY): 65.00
                           (NIGHT):  0.00
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STAMSON 5.0 NORMAL REPORT Date: 12-08-2022 09:48:21
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: train.te Time Period: Day/Night 16/8 hours
Description:

Rail data, segment # 1: RAILWAY (day/night)

Train Type	Trains (Left)	Trains (Right)	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
1. PASSENGER	3.0/0.0	3.0/0.0	120.0	1.0	4.0	Diesel	Yes
2. FREIGHT	0.5/0.0	0.5/0.0	80.0	1.0	20.0	Diesel	Yes

Data for Segment # 1: RAILWAY (day/night)

Angle1 Angle2	-90.00 deg	90.00 deg
Wood depth	0	(No woods.)
No of house rows	0 / 0	
Surface	1	(Absorptive ground surface)
Receiver source distance	84.15 / 84.15	m
Receiver height	1.50 / 4.50	m
Topography	1	(Flat/gentle slope; no barrier)
Whistle Angle	0 deg	Track 1
Reference angle	0.00	

Results segment # 1: RAILWAY (day)

LOCOMOTIVE (0.00 + 49.88 + 0.00) = 49.88 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	63.08	-11.87	-1.33	0.00	0.00	0.00	49.88

WHEEL (0.00 + 39.75 + 0.00) = 39.75 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	53.64	-12.43	-1.46	0.00	0.00	0.00	39.75

LEFT WHISTLE (0.00 + 50.20 + 0.00) = 50.20 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-78	0	0.58	66.61	-11.87	-4.54	0.00	0.00	0.00	50.20

RIGHT WHISTLE (0.00 + 50.20 + 0.00) = 50.20 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	78	0.58	66.61	-11.87	-4.54	0.00	0.00	0.00	50.20

Segment Leq : 55.00 dBA

Total Leq All Segments: 55.00 dBA

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Results segment # 1: RAILWAY (night)

LOCOMOTIVE (0.00 + -12.36 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.50	0.00	-11.20	-1.17	0.00	0.00	0.00	-12.36

WHEEL (0.00 + -13.34 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.60	0.00	-11.98	-1.35	0.00	0.00	0.00	-13.34

LEFT WHISTLE (0.00 + 50.20 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-78	0	0.58	0.00	-11.87	-4.54	0.00	0.00	0.00	50.20

Segment Leq : 0.00 dBA

Total Leq All Segments: 0.00 dBA

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TOTAL Leq FROM ALL SOURCES (DAY): 55.00
(NIGHT): 0.00

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STAMSON 5.0 NORMAL REPORT Date: 12-08-2022 09:48:44
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: train.te Time Period: Day/Night 16/8 hours
Description:

Rail data, segment # 1: RAILWAY (day/night)

Train Type	Trains (Left)	Trains (Right)	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
1. PASSENGER	3.0/0.0	3.0/0.0	120.0	1.0	4.0	Diesel	Yes
2. FREIGHT	0.5/0.0	0.5/0.0	80.0	1.0	20.0	Diesel	Yes

Data for Segment # 1: RAILWAY (day/night)

Angle1 Angle2	-90.00 deg	90.00 deg
Wood depth	0	(No woods.)
No of house rows	0 / 0	
Surface	1	(Absorptive ground surface)
Receiver source distance	41.29 / 41.29	m
Receiver height	1.50 / 4.50	m
Topography	1	(Flat/gentle slope; no barrier)
Whistle Angle	0 deg	Track 1
Reference angle	0.00	

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Results segment # 1: RAILWAY (day)

LOCOMOTIVE (0.00 + 54.79 + 0.00) = 54.79 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	63.08	-6.97	-1.33	0.00	0.00	0.00	54.79

WHEEL (0.00 + 44.89 + 0.00) = 44.89 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	53.64	-7.30	-1.46	0.00	0.00	0.00	44.89

LEFT WHISTLE (0.00 + 55.23 + 0.00) = 55.23 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-84	0	0.58	66.61	-6.97	-4.40	0.00	0.00	0.00	55.23

RIGHT WHISTLE (0.00 + 55.23 + 0.00) = 55.23 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	84	0.58	66.61	-6.97	-4.40	0.00	0.00	0.00	55.23

Segment Leq : 60.00 dBA

Total Leq All Segments: 60.00 dBA

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Results segment # 1: RAILWAY (night)

LOCOMOTIVE (0.00 + -7.74 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.50	0.00	-6.57	-1.17	0.00	0.00	0.00	-7.74

WHEEL (0.00 + -8.39 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.60	0.00	-7.04	-1.35	0.00	0.00	0.00	-8.39

LEFT WHISTLE (0.00 + 55.23 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-84	0	0.58	0.00	-6.97	-4.40	0.00	0.00	0.00	55.23

Segment Leq : 0.00 dBA

Total Leq All Segments: 0.00 dBA

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TOTAL Leq FROM ALL SOURCES (DAY): 60.00
(NIGHT): 0.00

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STAMSON 5.0 NORMAL REPORT Date: 12-08-2022 09:49:07
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: train.te Time Period: Day/Night 16/8 hours
Description:

Rail data, segment # 1: RAILWAY (day/night)

Train Type	Trains (Left)	Trains (Right)	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
1. PASSENGER	3.0/0.0	3.0/0.0	120.0	1.0	4.0	Diesel	Yes
2. FREIGHT	0.5/0.0	0.5/0.0	80.0	1.0	20.0	Diesel	Yes

Data for Segment # 1: RAILWAY (day/night)

Angle1 Angle2	-90.00 deg	90.00 deg
Wood depth	0	(No woods.)
No of house rows	0 / 0	
Surface	1	(Absorptive ground surface)
Receiver source distance	20.06 / 20.06	m
Receiver height	1.50 / 4.50	m
Topography	1	(Flat/gentle slope; no barrier)
Whistle Angle	0 deg	Track 1
Reference angle	0.00	

Results segment # 1: RAILWAY (day)

LOCOMOTIVE (0.00 + 59.75 + 0.00) = 59.75 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	63.08	-2.00	-1.33	0.00	0.00	0.00	59.75

WHEEL (0.00 + 50.09 + 0.00) = 50.09 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	53.64	-2.10	-1.46	0.00	0.00	0.00	50.09

LEFT WHISTLE (0.00 + 60.25 + 0.00) = 60.25 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-87	0	0.58	66.61	-2.00	-4.36	0.00	0.00	0.00	60.25

RIGHT WHISTLE (0.00 + 60.25 + 0.00) = 60.25 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	87	0.58	66.61	-2.00	-4.36	0.00	0.00	0.00	60.25

Segment Leq : 65.00 dBA

Total Leq All Segments: 65.00 dBA

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Results segment # 1: RAILWAY (night)

LOCOMOTIVE (0.00 + -3.05 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.50	0.00	-1.89	-1.17	0.00	0.00	0.00	-3.05

WHEEL (0.00 + -3.37 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.60	0.00	-2.02	-1.35	0.00	0.00	0.00	-3.37

LEFT WHISTLE (0.00 + 60.25 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-87	0	0.58	0.00	-2.00	-4.36	0.00	0.00	0.00	60.25

Segment Leq : 0.00 dBA

Total Leq All Segments: 0.00 dBA

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TOTAL Leq FROM ALL SOURCES (DAY): 65.00
(NIGHT): 0.00

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