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3636 Innes Road Development

Serviceability Report

Prepared for: Glenview Homes

3636 INNES ROAD DEVELOPMENT
OTTAWA, ONTARIO

SERVICEABILITY REPORT

Prepared by:

NOVATECH
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario
K2M 1P6

Issued: August 4, 2023
Revised: December 20, 2023

Ref: R-2023-116
Novatech File: 123094

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Engineers, Planners & Landscape Architects

December 20, 2023 BY EMAIL

City of Ottawa
Planning and Growth Management Department
110 Laurier Avenue West, 4th Floor
Ottawa, Ontario
K1P 1J1

Attention: Kelsey Charie, Project Manager (Development Review)

Dear Kelsey Charie:

Re: 3636 Innes Road Development
Serviceability Report
Our File No.: 123094

Please find enclosed the revised report entitled "3636 Innes Road Development – Serviceability Report" dated December 20, 2023. This report outlines the preliminary servicing design for the proposed development with respect to water, sanitary and storm servicing, and stormwater management. This report is submitted in support of a Zoning By-law Amendment Application.

If you have any questions, please contact the undersigned.

Yours truly,

NOVATECH

Drew Blair, P.Eng.
Senior Project Manager

cc: Melissa Pettem, Glenview Homes

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1.0. INTRODUCTION

Novatech has been retained to prepare a Serviceability Report for the property located at 3636 Innes Road within the City of Ottawa. **Figure 1** – Key Plan highlights the site location. The purpose of this report is to demonstrate that the proposed development can be serviced with the existing Municipal infrastructure surrounding the property.

2.0. EXISTING DEVELOPMENT

The site (3636 Innes Road) is approximately 0.12 hectares in size and is currently occupied by a temporary sales office. The property is bound by an existing U-Haul development to the west, undeveloped land to the east, undeveloped land to the south, and Innes Road to the North. The topography of the site gradually slopes away from Innes Road (north to south). Refer to **Figure 2** – Existing Conditions / Aerial Plan View.

3.0. PROPOSED DEVELOPMENT

It is proposed to develop one (1) 4-storey apartment building consisting of a 1-storey podium including 148m^2 of commercial retail space and an underground parking garage. The proposed apartment building will host 30 units consisting of a combination of one-bedroom and two-bedroom units. The proposed development will include a single vehicle access point from Innes Road. **Figure 3** – Concept Plan shows an overview of the proposed development plan.

4.0. WATER SERVICING

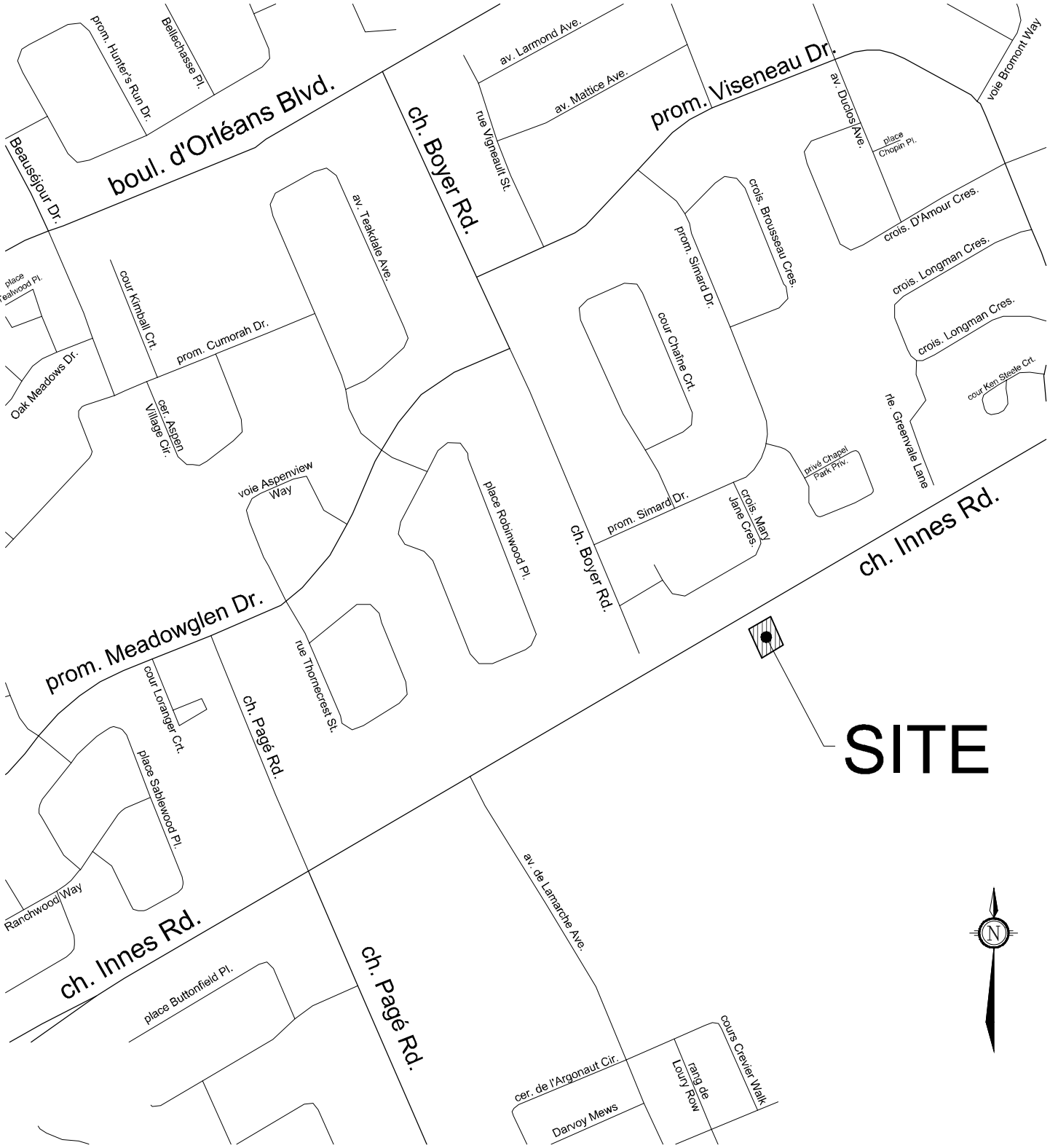
The property has an existing 25mm dia. watermain service connecting to the existing 400mm dia. watermain within the Innes Road right-of-way. There are two (2) existing fire hydrants along the south side of Innes Road which are available to service the proposed development. Profile drawings of the Innes Road Widening that illustrates the existing watermain network are included in **Appendix A** for reference.

To service the development, it is proposed to connect a 150mm dia. watermain to the existing 400mm dia. watermain and extend the 150mm dia. watermain into the proposed apartment building. A second water service providing a looped system to the site is not required as the daily water demand is less than 50 cubic meters. **Figure 4** – Conceptual Servicing Design shows the conceptual servicing options for the development.

Water demand and fire flow calculations have been prepared based on the concept plans for the development which proposes 30 units, resulting in a total population of 54. As the projected population of the proposed development is under 500 people, the residential water demands are calculated based on design criteria from MOE Design Guidelines for Drinking Water Systems 2008 (Table 3-3). The commercial water demands are calculated from criteria in Section 4 of the City of Ottawa Design Guidelines for Water Distribution. Fire flows are calculated using the Fire Underwriters Survey method using assumptions on building construction and sprinkler requirements. Preliminary water demand and fire flows are summarized in **Table 4.1** below with detailed calculations included in **Appendix B**.

Table 4.1: Water Demand Summary

Demand Type	Avg. Daily Demand (L/s)	Max. Daily Demand (L/s)	Peak Hour Demand (L/s)	FUS Fire Flow (L/s)
Residential	0.175	0.86	1.30	150
Commercial	0.005	0.01	0.01	
Total	0.180	0.87	1.31	150



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Facsimile (613) 254-5867
Website www.novatech-eng.com

3636 INNES ROAD

KEY PLAN

SCALE: NOT TO SCALE

DATE: DEC 2023 | JOB: 123094 | FIGURE: FIGURE 1

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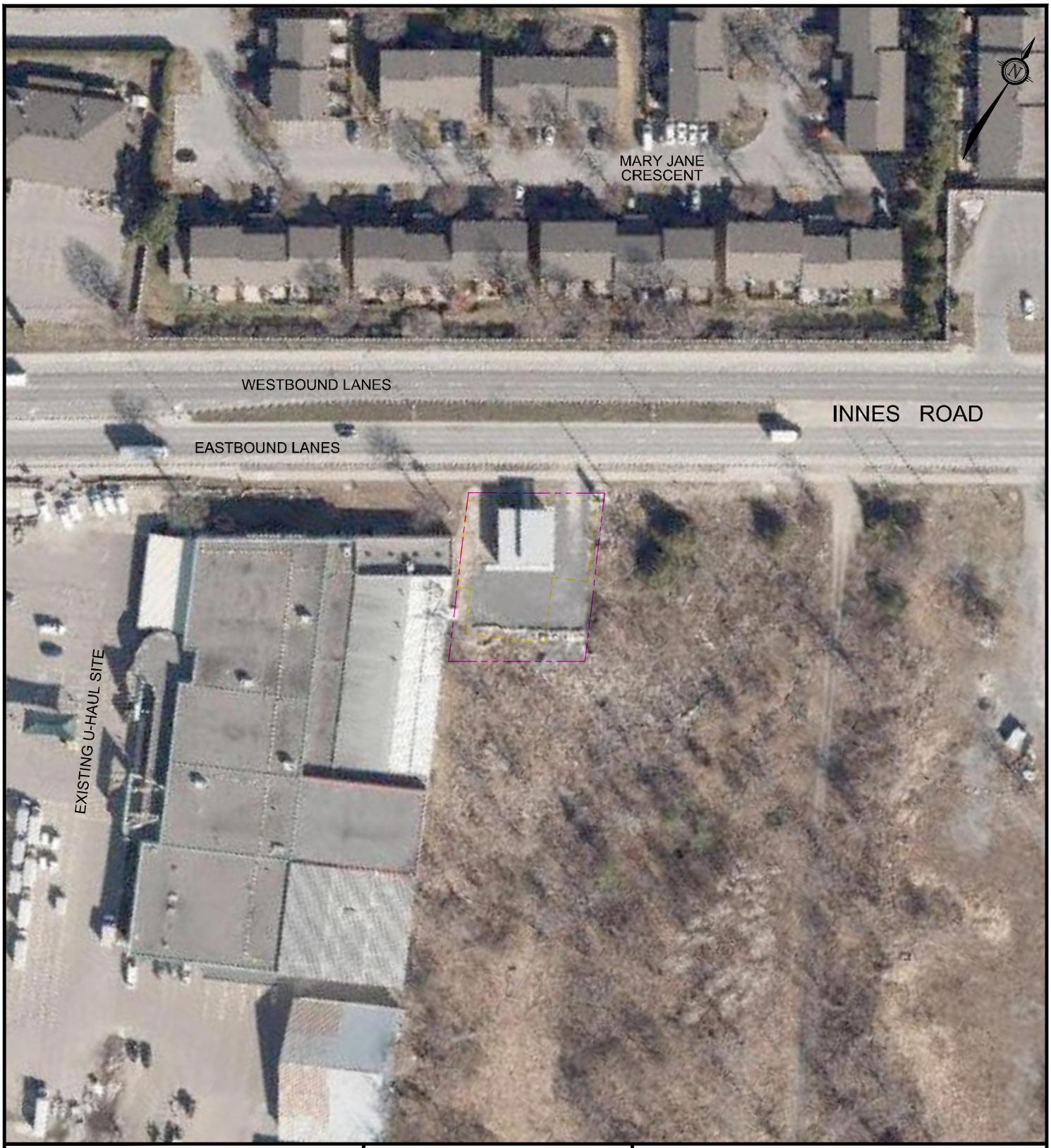

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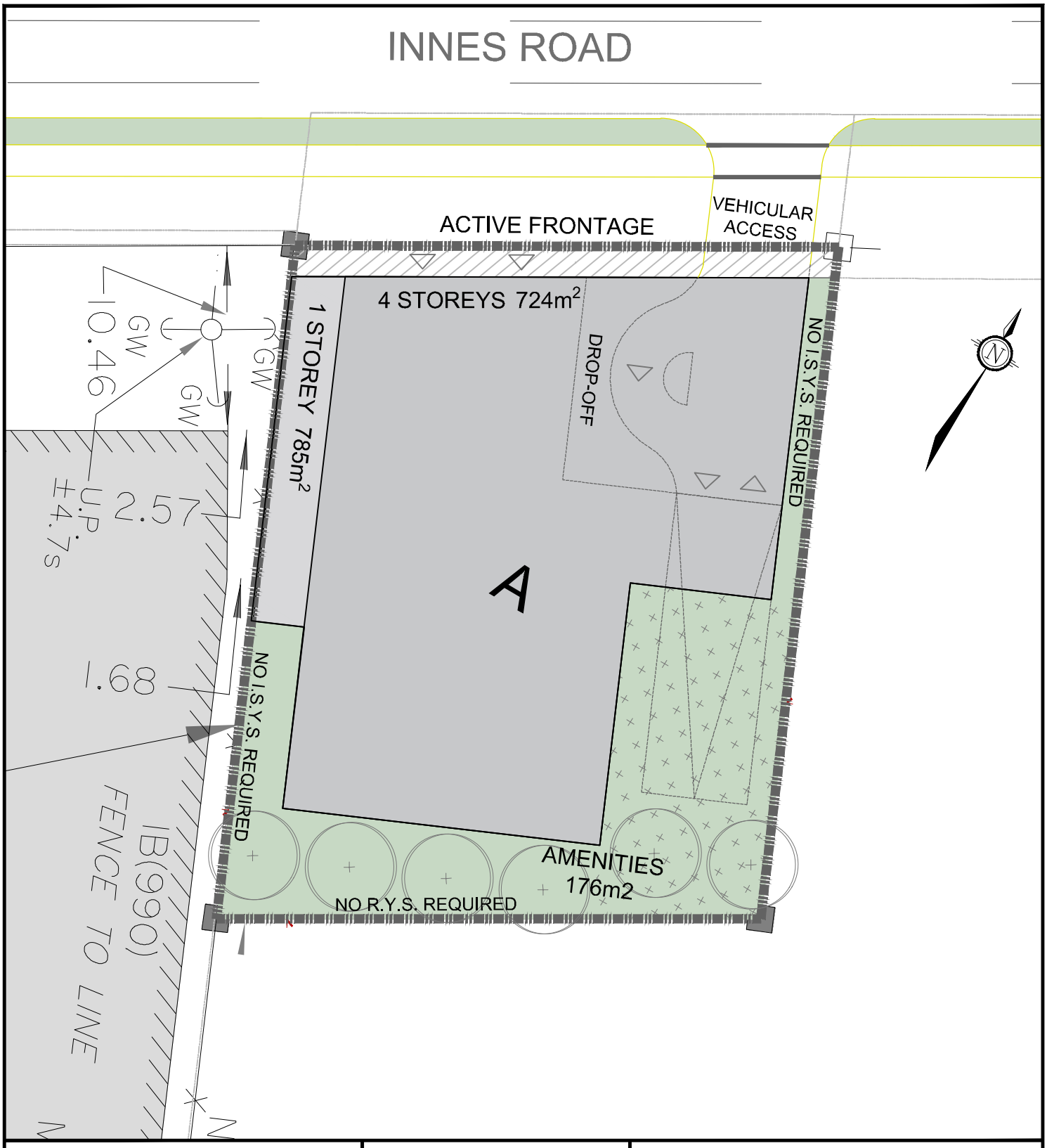
3636 INNES ROAD

EXISTING CONDITIONS / AERIAL PLAN VIEW

SCALE: NOT TO SCALE

DATE: DEC 2023 | JOB: 123094 | FIGURE: FIGURE 2



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3636 INNES ROAD

CONCEPT PLAN

SCALE 1 : 300 (0, 3, 6, 9, 12)

DATE DEC 2023 | JOB 123094 | FIGURE FIGURE 3

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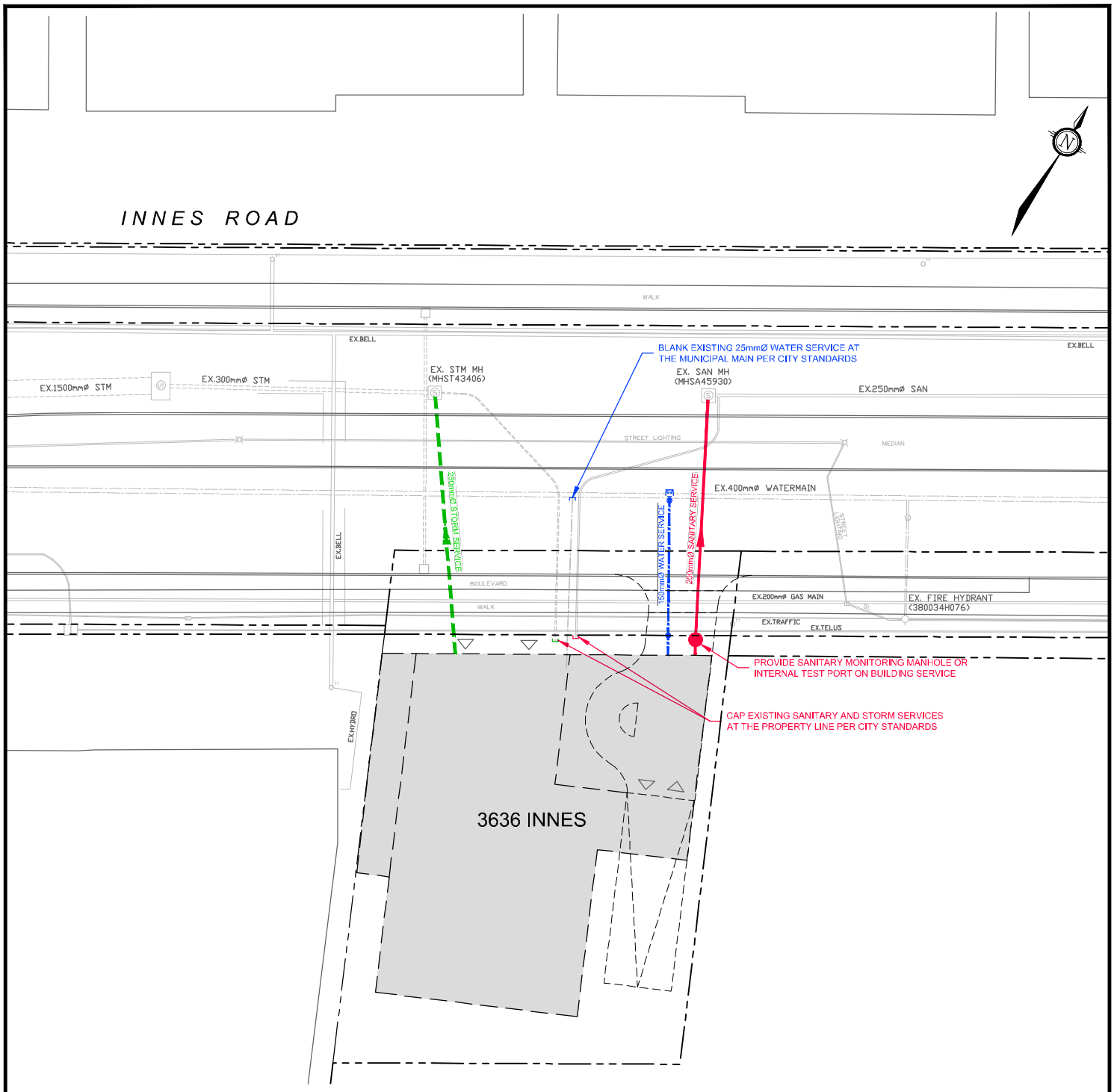

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Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

3636 INNES ROAD

CONCEPTUAL SERVICING DESIGN

SCALE 1 : 500 (0, 5m, 10m, 20m)

DATE DEC 2023 | JOB 123094 | FIGURE FIGURE 4

SHT8X11.DWG - 216mmx279mm

M:\2023\123094\CAD\Civil\Figures\Serviceability\123094-FIG4.dwg, FIG4-SERV, Dec 07, 2023 - 3:32pm, smatthews

The boundary conditions provided by the City of Ottawa are specific to one (1) connection point. The connection point is the existing 400mm dia. watermain north of the proposed development on Innes Road. The boundary conditions are based on the previous concept plan for the development which proposed 67 units and a total population of 121. The current proposed development is only 30 units with a total population of 54, therefore the water analysis results will be conservative as actual demands will be slightly lower than those used for the boundary condition request. Municipal watermain boundary conditions provided by the City of Ottawa can be found in **Appendix B**.

The following design criteria were taken from Section 4.2.2 – 'Watermain Pressure and Demand Objectives' of the City of Ottawa Design Guidelines for Water Distribution:

- Normal operating pressures are to range between 345 kPa (50 psi) and 483 kPa (70 psi) under Max Day demands
- Minimum system pressures are to be 276 kPa (40 psi) under Peak Hour demands
- Minimum system pressures are to be 140 kPa (20 psi) under Max Day + Fireflow demands

The hydraulic model EPANET was used to analyze the performance of the proposed watermain configuration for three (3) theoretical conditions:

- Maximum HGL
- Peak Hour
- Maximum Day + Fireflow Demand (150 L/s)

A schematic representation of the hydraulic network depicts the node and pipe numbers used in the model. The model is based on hydraulic boundary conditions provided by the City of Ottawa. Refer to **Appendix B** for the hydraulic modeling schematic and modeling results.

The hydraulic requirements and hydraulic model results are summarized in **Table 4.2** below.

Table 4.2: Hydraulic Analysis Results Summary

Operating Conditions	Domestic Demands (L/s)	Fire Flow (L/s)	Min/Max Allowable Pressures (kPa/psi)	Min/Max Operating Pressures (kPa/psi)
High Pressure (Max HGL)	0.18	N/A	690 / 80 (Max)	378.7 / 54.9
Peak Hour	1.31	N/A	276 / 40 (Min)	346.3 / 50.2
Max Daily + Fire Flow	0.86	150	138 / 20 (Min)	268.4 / 38.9

The proposed water distribution system was checked for high pressures during average daily demand using a hydraulic boundary condition provided by the City of Ottawa. As a result of the hydraulic analysis for the proposed development, it was found that operating pressures are within the allowable pressure ranges as specified by City of Ottawa guidelines. This indicates that the connection to the 400mm dia. municipal watermain within Innes Road will provide adequate fireflows and system pressures to service the site under each operating condition.

5.0. SANITARY SERVICING

The property is currently serviced by an existing 135mm dia. sanitary sewer which conveys sanitary flows to the existing 250mm dia. sanitary sewer within the Innes Road right-of-way. The sanitary sewer within Innes Road flows to the east and connects into the sanitary trunk sewer within Frank Bender Street. A profile of the Innes Road Widening which displays the existing sanitary service to the site is included in **Appendix A** for reference.

It is proposed to replace the existing 135mm dia. with a 200mm dia. service and outlet sanitary flows from the proposed development to the existing 250mm dia. sanitary sewer east of municipal manhole (SAN MH 49120) within Innes Road. Refer to **Figure 4** – Conceptual Servicing Design for details.

The total theoretical peak sanitary flow from the proposed development was calculated based on the following criteria from Section 4 of the City of Ottawa Sewer Design Guidelines and are based on a total population of 54 people from a total of 30 units:

- Total Site Area = 0.12 ha
- Average Apartment = 1.8 persons/unit
- Residential Average Flow = 280 L/c/day
- Commercial Average Flow = 28,000 L/ha/day
- Residential Peaking Factor = 4.0
- Commercial Peaking Factor = 1.5
- Infiltration Rate = 0.33 L/s/ha
- Minimum Velocity = 0.6 m/s
- Manning's n = 0.013

Preliminary sanitary flows for the proposed development are summarized in **Table 5.1** below with detailed calculations included in **Appendix C**.

Table 5.1: Peak Sanitary Flows Summary

Flow Type	Population	Area (ha)	Sanitary Peak Flows (L/s)
Residential	54	-	0.70
Commercial	-	0.015	0.01
Infiltration	-	0.120	0.04
		Overall Sanitary Peak Flow	**0.75**

Preliminary calculations determined the peak sanitary flow produced by the proposed development to be 0.75 L/s. The full flow capacity of the proposed 200mm dia. sanitary sewer at minimum grade is calculated to be 19.4 L/s. Based on preliminary calculations, the proposed 200mm dia. pipe can adequately service the proposed development.

Due to the minimal amount of sanitary discharge from the proposed development, it is expected that there will be no net negative impacts on the downstream sanitary sewer system.

6.0. STORM SERVICING & STORMWATER MANAGEMENT

Currently, stormwater sheet drains across the site away from Innes Road and is collected by a series of rear-yard catchbasins. Stormwater is collected by an existing temporary rear-yard catchbasin at the southeast corner of the property which outlets to the existing 300mm dia. storm sewer and municipal manhole ST 43406 within Innes Road. Refer to **Appendix A** for the existing Servicing, Grading and Erosion Control Plan. Ultimately, the municipal storm sewer system outlets to the West Bilberry Creek approximately 1.5 km northwest of the site. This creek eventually spills into the Ottawa River.

Storm servicing and stormwater management for the proposed development will include an underground stormwater storage tank and and/or a combination of flow-controlled roof drains and rooftop storage with a 250mm dia. storm sewer outletting to the existing municipal manhole (ST MH 43406) within Innes Road. Refer to **Figure 4** – Conceptual Servicing Design for details.

As described in the pre-consultation notes, flows to the existing municipal storm sewer greater than the 5-year pre-development storm release rate, up to and including the 100-year storm event, must be detained on site. There are two possible design options which effectively attenuate and convey stormwater runoff from the site to the outlet storm sewer, as described below:

- **Option 1 –** The Site's stormwater runoff is to be conveyed to an underground storage tank by means of perimeter deck drains and uncontrolled roof drains. The underground storage tank will provide quantity control for the proposed development. The controlled flow from the underground tank is to be released via an orifice or a pump. Furthermore, this option will feature an internal emergency overflow from the underground tank to the outlet storm sewer in the event of an orifice blockage, or a disruption to the pump(s).
- **Option 2 –** The Site's flow-controlled roof drains would utilize a combination of rooftop storage, and an underground storage tank that would attenuate perimeter drains to meet the allowable release. Stormwater captured in the controlled rooftop storage is to be released downstream of the underground storage tank-controlled flows to meet the allowable release rate.

The preferred stormwater management design option will be determined during the Site Plan Approval stage, upon availability of building architectural / mechanical plans, and further modelling.

Preliminary stormwater management calculations have been completed for the proposed development. The allowable release rate for the site has been calculated to be 16.0 L/s (based on a pre-development C-value of 0.47). Quantity control measures will be provided by the proposed underground storage tank. The preliminary stormwater management calculations are summarized below in **Table 6.1** and detailed preliminary stormwater management calculations can be found in **Appendix D**.

Table 6.1: Stormwater Management Summary

Area ID	Area (ha)	100-Year Weighted C_{100}	100-Year Storm Event	
			Flow (L/s)	Required Volume (cu.m)
DR-0	0.017	0.74	6.2	N/A
R-1	0.100	1.00	9.0	39.8
Allowable Stormwater Flow Released			**16.0**	
Total Stormwater Flow Released			**15.2**	

During storms in excess of the 100-year storm event, site grading will provide an overland flow route to the existing storm sewer system within Innes Road and ultimately to the West Bilberry Creek.

As the site is located within the jurisdiction of the Rideau Valley Conservation Authority (RVCA), an 'enhanced' level of protection, equivalent to a long-term average removal of 80% Total Suspended Solids (TSS) is required for stormwater leaving the site. The proposed development will capture over 90% of the total rainfall within the property. Rainwater runoff from rooftop drainage and landscaped areas are typically considered clean for the purpose of protecting water quality for aquatic habitat.

In summary, the existing storm sewer infrastructure can service the proposed development and appropriate stormwater management methods can be used to meet the allowable release rate and RVCA stormwater quality requirements. A complete SWM analysis will be provided as part of the Site Plan Control application to the City of Ottawa.

7.0. EROSION AND SEDIMENT CONTROL MEASURES

Temporary erosion and sediment control measures will be required on-site during construction in accordance with the Best Management Practices for Erosion and Sediment Control. This includes the following temporary measures:

- Filter bags/socks will be placed in existing catchbasins and manholes, and will remain in place until vegetation has been established and construction is completed;
- Silt fencing will be placed along the surrounding construction limits;
- Mud mats will be installed at the site entrances;
- The contractor will be required to perform regular street sweeping and cleaning as required, to suppress dust and to provide safe and clean roadways adjacent to the construction site;

The erosion and sediment control measures will be required prior to construction and will remain in place during all phases of construction. Regular inspection and maintenance of the erosion control measures will be undertaken.

8.0. CONCLUSIONS AND RECOMMENDATIONS

This revised Serviceability Report has evaluated the serviceability (water, sanitary and storm servicing) and stormwater management for the proposed 3636 Innes Road development within Ottawa, Ontario.

The principal findings and conclusions of this report are as follows:

- Water servicing, including both domestic and fire protection, can be provided by connecting to the existing 400mm dia. watermain infrastructure within Innes Road.
- Sanitary servicing can be provided by installing the proposed 200mm dia. sanitary service and outletting to the existing sanitary sewer infrastructure within Innes Road.
- Storm servicing can be provided for the proposed development utilizing an on-site stormwater storage tank and/or flow-controlled roof drains outletting to the existing storm sewer infrastructure within Innes Road.
- Quantity control of stormwater can be provided through storage of stormwater in the proposed underground storage tank and a combination of flow-controlled roof drains with rooftop storage.
- Stormwater runoff from rooftop drainage and landscaped areas is generally considered clean, thus the proposed development will not require additional quality control measures.
- Temporary erosion and sediment control measures will be required during construction.

9.0. CLOSURE

This revised report entitled "3636 Innes Road Development – Serviceability Report" is submitted in support of a zoning by-law amendment application for review and approval.

Please contact the undersigned should you have any questions or require additional information.

NOVATECH

Prepared by:

Billy McEwen, B.A.Sc.
EIT

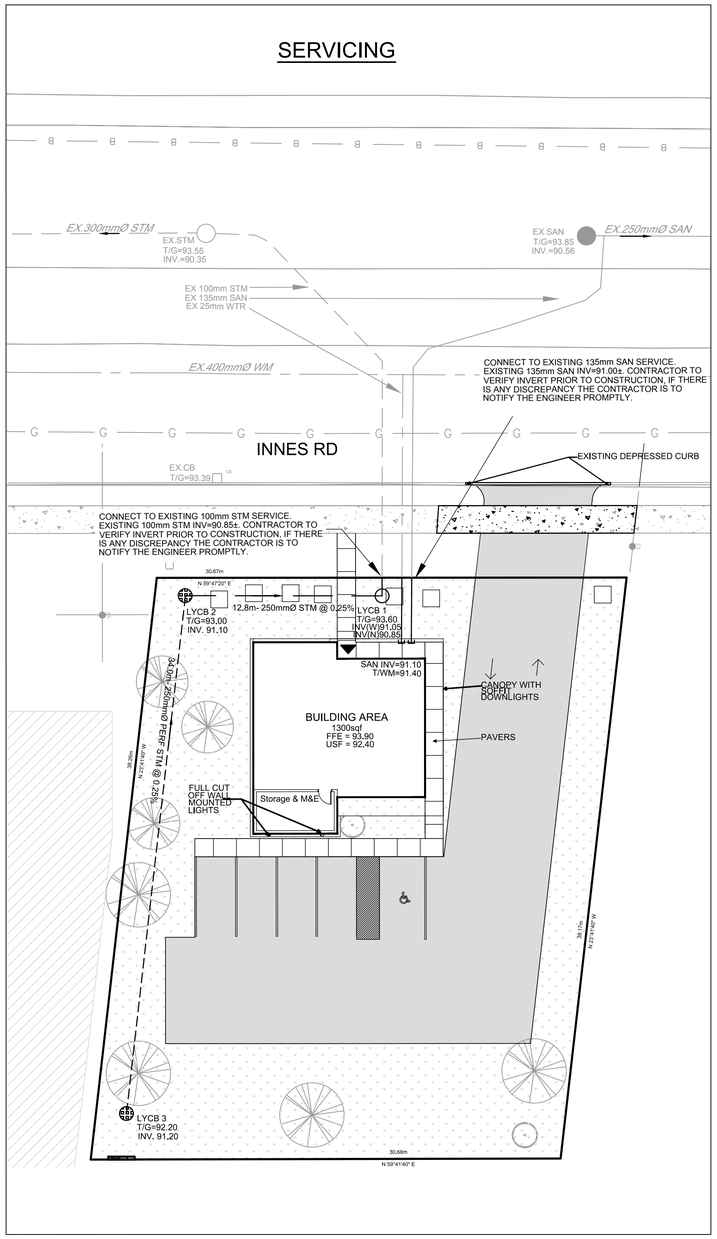
Stephen Matthews, B.A.(Env)
Senior Design Technologist

Reviewed by:

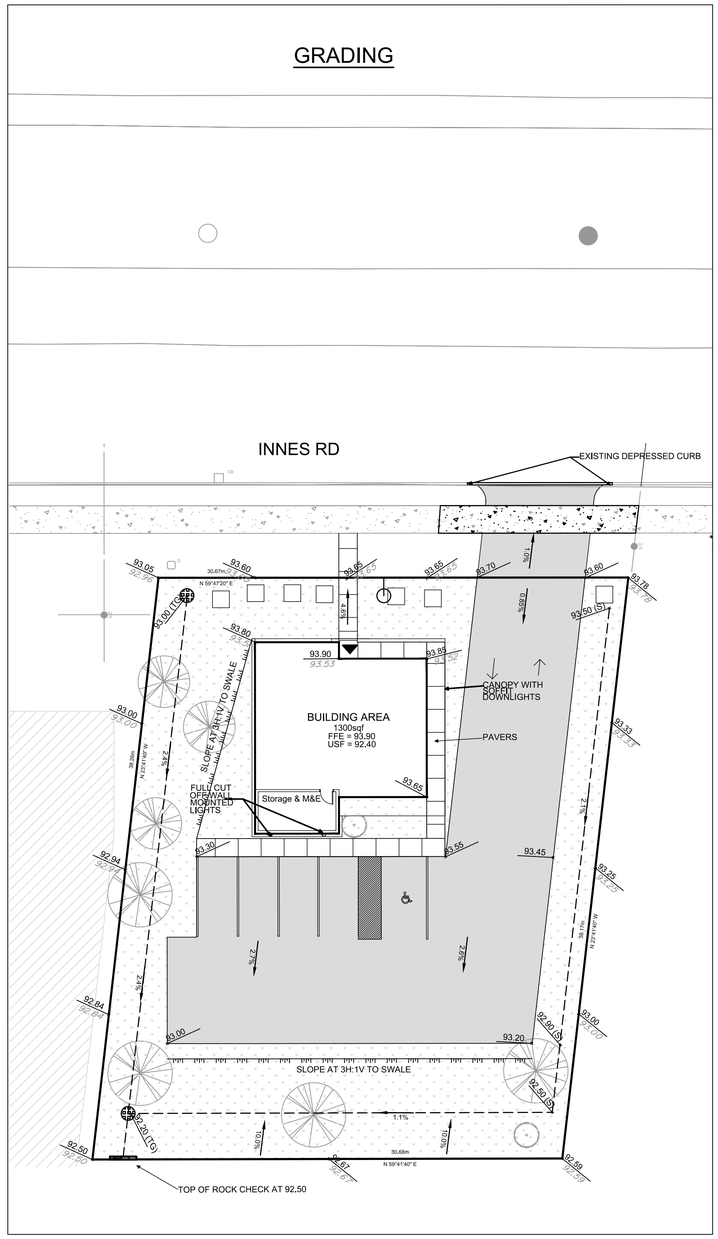
Drew Blair, P.Eng.
Senior Project Manager

APPENDIX A
Existing Infrastructure and Site Information

SERVICING



GRADING



GENERAL NOTES:

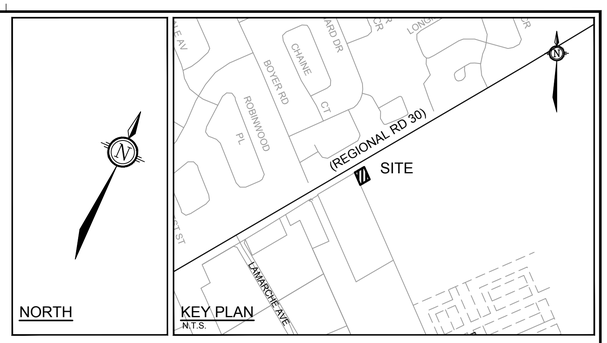
1) COORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
2) DETERMINE THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCING CONSTRUCTION. PROTECT AND ASSUME RESPONSIBILITY FOR ALL EXISTING UTILITIES WHETHER OR NOT SHOWN ON THIS DRAWING.
3) OBTAIN ALL NECESSARY PERMITS AND APPROVALS FROM THE CITY OF OTTAWA BEFORE COMMENCING CONSTRUCTION.
4) ALL DIMENSIONS AND INVERTS MUST BE VERIFIED PRIOR TO CONSTRUCTION, IF THERE IS ANY DISCREPANCY THE CONTRACTOR IS TO NOTIFY THE ENGINEER PROMPTLY.
5) ALL UNDERGROUND SERVICES MATERIALS AND INSTALLATIONS TO BE IN ACCORDANCE WITH THE CURRENT STANDARDS AND CODES OF THE CITY.
6) WHEREVER PIPES ARE PASSING THROUGH UNCOMPACTED FILL AREA, THE BEDDING TRENCH SHALL BE EXCAVATED TO THE UNDISTURBED GROUND LEVEL AND BACKFILLED WITH GRANULAR MATERIAL PER 802.031 FOR RIGID AND 802.010 FOR FLEXIBLE PIPES.
7) REFER TO ARCHITECT'S DRAWING FOR BUILDING DIMENSIONS AND LAYOUT INFORMATION. IT SHALL BE CONFIRMED PRIOR TO COMMENCEMENT OF CONSTRUCTION.
8) SAW CUT AND KEY GRIND ASPHALT AT ALL ROAD CUTS AND ASPHALT TIE IN POINTS AS PER OPSD 509.010.

SEWER NOTES:

1) INSULATE ALL PIPES (SAN/STM) THAT HAVE LESS THAN 2.0m COVER WITH 50mmX1200mm HI-40 INSULATION. PROVIDE 150mm CLEARANCE BETWEEN PIPE AND INSULATION.
2) PIPE BEDDING, COVER AND BACKFILL ARE TO BE COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY. THE USE OF CLEAR CRUSHED STONE AS A BEDDING LAYER SHALL NOT BE PERMITTED.

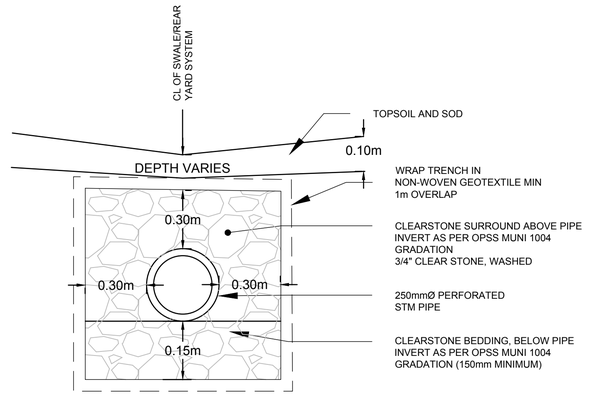
WATERMAIN NOTES:

1) INSULATE ALL WATERMAIN THAT HAVE LESS THAN 2.4m COVER WITH 50mmX1200mm HI-40 INSULATION. PROVIDE 150mm CLEARANCE BETWEEN PIPE AND INSULATION.



LEGEND

- PROPOSED WATERMAIN / EXISITNG WATERMAIN
- PROPOSED SANITARY MH & SEWER / EXISITNG SANITARY MH & SEWER
- PROPOSED STORM MH & SEWER / EXISITNG STORM MH & SEWER
- CB — PROPOSED ROAD CATCHBASIN / CB — EXISITNG ROAD CATCHBASIN
- DIRECTION OF FLOW
- LYCB — PROPOSED LANDSCAPE ELBOW CATCHBASIN & PERFORATED SUBDRAIN PER S29, S30, S31
- LYCB — PROPOSED LANDSCAPE MANHOLE WITH SOLID COVER
- SERVICE CONNECTION STUB (SINGLE)
  - 100mm STORM @1.0% MIN, 2.0% DESIRED
  - 25mm WATER
  - 135mm SANITARY @1.0% MIN, 2.0% DESIRED
- EXISTING1.8m CONCRETE SIDEWALK
- SIDEWALK REINSTATEMENT
- EXISTING BELL INFRASTRUCTURE
- EXISTING GAS MAIN AND SERVICE
- 93.72 / 93.72 — PROPOSED GRADE / EXISTING GRADE
- 49.70 (S) — SWALE ELEVATION
- 49.70 (TG) — TOP OF GRATE ELEVATION
- PROPOSED TERRACE GRADING
- PROPOSED SWALE
- ROCK CHECK DAM



PERFORATED STM PIPE CROSS-SECTION (TYP)
N.T.S

PRELIMINARY

NOTE:
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.

ALL DIMENSIONS AND INVERTS MUST BE VERIFIED PRIOR TO CONSTRUCTION, IF THERE IS ANY DISCREPANCY THE. CONTRACTOR IS TO NOTIFY THE ENGINEER PROMPTLY

No.	REVISION	DATE	BY
2.	ISSUED FOR BUILDING PERMIT APPLICATION	MAY 22/20	BHB
1.	ISSUED FOR INFORMATION	MAY 7/19	BHB

SCALE 1:200 (1:200 0 2 4 6 8)

DESIGN BR | CHECKED BHB | DRAWN BR | CHECKED BHB | APPROVED BHB

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER — B. H. BAHIA 100164647 — PROVINCE OF ONTARIO

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Website www.novatech-eng.com

LOCATION
CITY OF OTTAWA
3646 INNES ROAD

DRAWING NAME
SERVICING, GRADING AND EROSION CONTROL PLAN

PROJECT No. 118224-05
REV REV # 1
DRAWING No. 118224-GS-SC

D07-XX-XX-00XX #XXXXX

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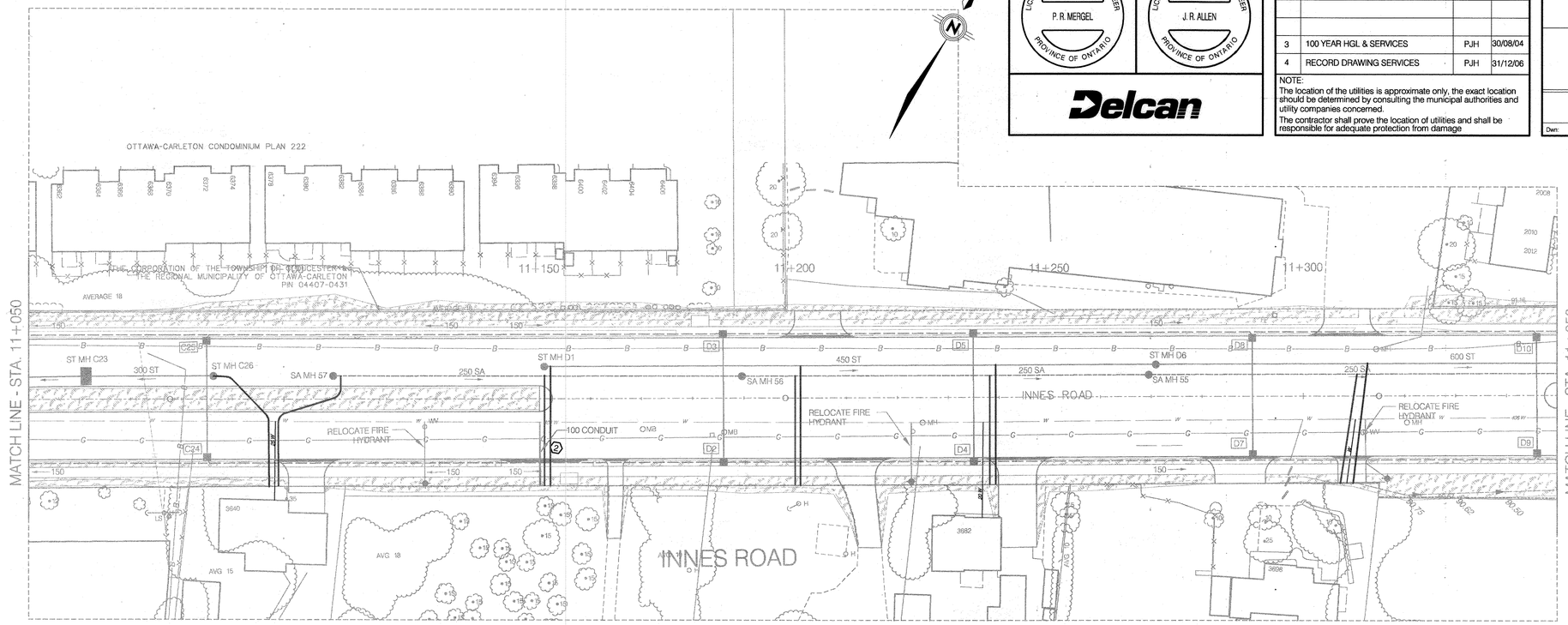
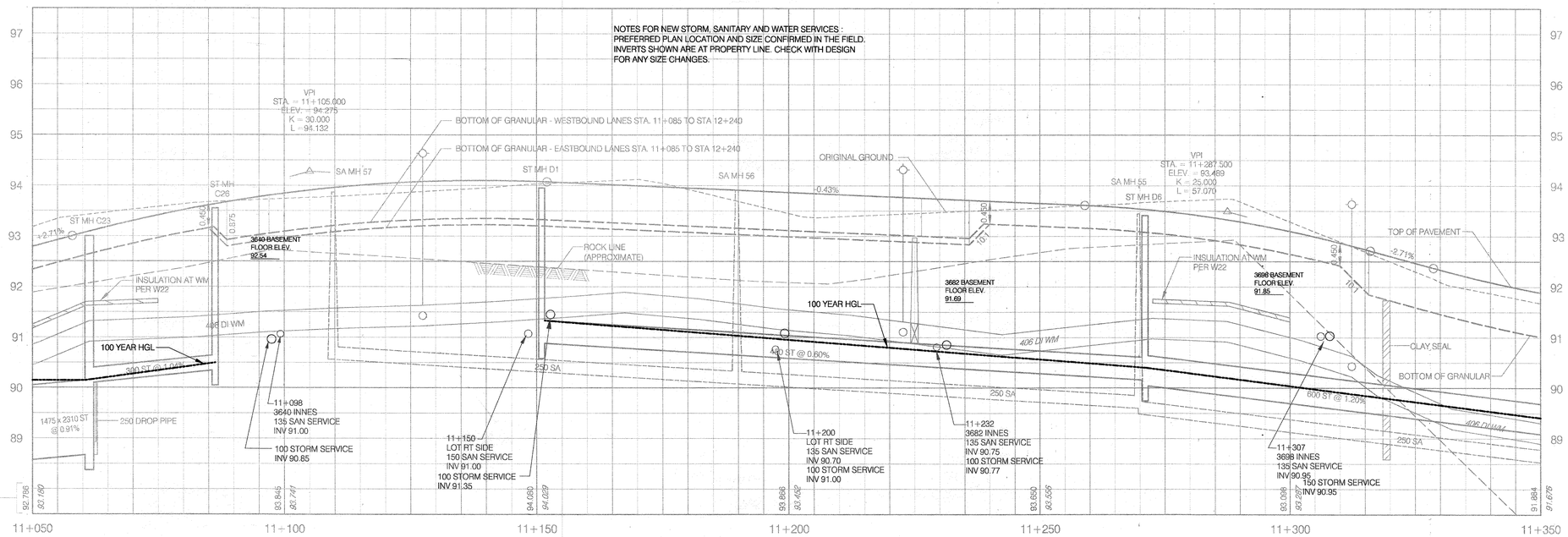
DWG. FRAME 790mm x 534mm RMOC-06/93-WG


OTTAWA-CARLETON CONDOMINIUM PLAN 222
THE CORPORATION OF THE TOWNSHIP OF GLOUCESTER & THE REGIONAL MUNICIPALITY OF OTTAWA-CARLETON
PIN 04407-0431
AVERAGE 18
11+150
11+200
11+250
11+300
MATCH LINE - STA. 11+050
MATCH LINE - STA. 11+350
ST MH C23
300 ST
ST MH C26
SA MH 57
250 SA
ST MH D1
450 ST
SA MH 56
ST MH D6
600 ST
SA MH 55
INNES ROAD
RELOCATE FIRE HYDRANT
100 CONDUIT
406 DI WM
AVG. 18
AVG. 15
3640
3682
3698



SANITARY SEWER												
			90.56	80 m 250 DIA SA @ 0.60%		90.08	80 m 250 DIA SA @ 0.60%		89.60 W 89.49 E	112 m 250 DIA SA @ 1.20%		
			+199.66			+199.65			+269.58			

NO.	REVISIONS	BY	DATE
3	100 YEAR HGL & SERVICES	PJH	30/08/04
4	RECORD DRAWING SERVICES	PJH	31/12/06

NOTE:
The location of the utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned.
The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage

LICENSED PROFESSIONAL ENGINEER P. R. MERGEL PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER J. R. ALLEN PROVINCE OF ONTARIO

Delcan

INNES ROAD WIDENING
ORLEANS BLVD
TO
TENTH LINE ROAD

SERVICES
STA. 11+050 TO STA. 11+350

R. G. HEWITT, P.ENG. Director Infrastructure Services		W. CLOUTHIER, P.ENG. Manager Construction Services	
Dwn: MDM	Chkd: DSG	Des: DSG	Chkd: DAH

Ottawa

CONTRACT NO.
ISB03-5202
DWG. NO.
R-ISB03-5202-239
SHEET 239 OF
Date: DEC 2006
Scale: HORIZONTAL
0m 5 10 20
0m 2
VERTICAL

STORM MANHOLES, CATCHBASINS AND DITCH INLET DATA

No.	STATION	OFFSET (m)*	TYPE OF STRUCTURE STD. No.	FRAME & GRATE STD. No.	ELEVATION	
					TOP OF GRATE**	LOW INVERT
C23	11+061.3	4.50 L	M-Con_Type M7	S24/S25	93.00	88.67
C24	11+085.0	11.31 R	705.010A	400.020/S19	93.39	91.94
C25	11+085.0	11.31 L	705.010A	400.020/S19	93.39	91.94
C26	11+086.3	4.50 L	701.010	S24/S25	93.55	91.35
D1	11+151.0	6.25 L	701.010	S24/S25	93.95	90.88
D2	11+186.0	11.75 R	705.010A	S22/S23	93.67	92.32
D3	11+186.0	11.75 L	705.010A	S22/S23	93.67	92.32
D4	11+235.0	11.75 R	705.010A	S22/S23	93.45	92.10
D5	11+235.0	11.75 L	705.010A	S22/S23	93.45	92.10
D6	11+271.0	6.25 L	701.010	S24/S25	93.41	90.04
D7	11+290.0	11.31 R	705.010A	400.020/S19	93.06	91.61
D8	11+290.0	11.31 L	705.010A	400.020/S19	93.06	91.61
D9	11+346.0	11.31 R	705.010A	400.020/S19	91.74	90.29
D10	11+346.0	11.31 L	705.010A	400.020/S19	91.74	90.29

* OFFSETS FOR CURB INLET CATCH BASINS ARE TO THE FACE OF CURB AND ELEVATIONS ARE THE FINISHED ASPHALT SURFACE AT THE GRATE. REFER TO STD. DWG. S22 FOR DETAIL OF LOCAL DEPRESSION OF ASPHALT IN FRONT OF THE GRATE.

** OFFSETS AND ELEVATIONS FOR FLAT GRATE CATCH BASINS ARE AT THE CENTER OF THE GRATE. REFER TO STD. DWG. S2. OFFSETS FOR O.I. (OPSD-705.030 & OPSD-705.040) ARE TO THE CENTER OF THE STRUCTURE; TOP OF GRATE ELEVATIONS ARE TO THE BOTTOM OF THE GRATE SLOPE.

STORM SEWER & CATCHBASIN LEAD DATA

LOCATION No. TO No.	DIA. SIZE (mm)	CLASS OF PIPE	LENGTH (m)	INVERT ELEVATION	
				UPSTREAM	DOWNSTREAM
MH C26 - MH C23	300	SDR 35	25	90.35	90.10
CB C24 - PIPE	200	SDR 35	16	91.94	91.38
CB C25 - PIPE	200	SDR 35	8	91.94	91.38
MH D1 - MH D6	450	100-D	120	90.88	90.16
MH D6 - MH D12	600	65-D	112	90.04	88.70
CB D2 - PIPE	200	SDR 35	19	92.32	90.87
CB D3 - PIPE	200	SDR 35	6	92.32	90.87
CB D4 - PIPE	200	SDR 35	19	92.10	90.57
CB D5 - PIPE	200	SDR 35	6	92.10	90.57
CB D7 - PIPE	200	SDR 35	18	91.61	90.16
CB D8 - PIPE	200	SDR 35	6	91.61	90.16
CB D9 - PIPE	200	SDR 35	18	90.29	89.49
CB D10 - PIPE	200	SDR 35	6	90.29	89.49

NOTES:

1. IN GENERAL, STORM AND SANITARY SERVICES ARE TO BE PROVIDED FROM THE SEWERS TO THE PROPERTY LINE FOR BUILDINGS THAT REMAIN. WATER SERVICES ARE TO BE PROVIDED FROM THE WATERMAIN TO THE PROPERTY LINE FOR SOME BUILDINGS. EXACT LOCATIONS AND ELEVATIONS TO BE DETERMINED DURING CONSTRUCTION.
2. GRAVITY CONNECTIONS FROM BUILDINGS TO STORM SEWER LATERALS AT THE PROPERTY LINE (BY OTHERS) ARE NOT PERMITTED. PROOF OF CHECK VALVE ON PRIVATE PROPERTY REQUIRED PRIOR TO SUMP PUMP CONNECTIONS.
3. SANITARY SEWERS SHALL BE PVC SDR 35. SANITARY MAINTENANCE HOLES PER OPSD 701.010 AND OPSD 1003.010, FRAME PER S24, CLOSED COVER PER S25.
4. PLUG ALL EXPOSED ENDS OF PIPES/CONDUITS, NOT BEING REMOVED, WITH 600 mm MINIMUM LENGTH OF 15 MPa MIN. STRENGTH CONCRETE.
5. LOCATE AND VERIFY LOCATION OF WATER SERVICES NO LONGER NEEDED, EXCAVATE, CLOSE MAIN STOP, CRIMP SHUT THE WATER SERVICE PIPE, BACKFILL AND REINSTATE.
6. LOCATE EXISTING SEWERS AND WATERMAINS FOR CONNECTIONS TO THEM. PROVIDE INVERT ELEVATIONS OF EXISTING SEWERS TO CONTRACT ADMINISTRATOR FOR ANY ADJUSTMENT IN DESIGN PRIOR TO NEW SEWER CONSTRUCTION.
7. RELOCATE EXISTING WATER SERVICE STANDPOSTS TO THE NEW PROPERTY LINE. ADJUST EXISTING WATER SERVICES UNDER OR OVER NEW SEWERS THAT CONFLICT.

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DWG. FRAME 790mm x 534mm RMOC-06/93-WG

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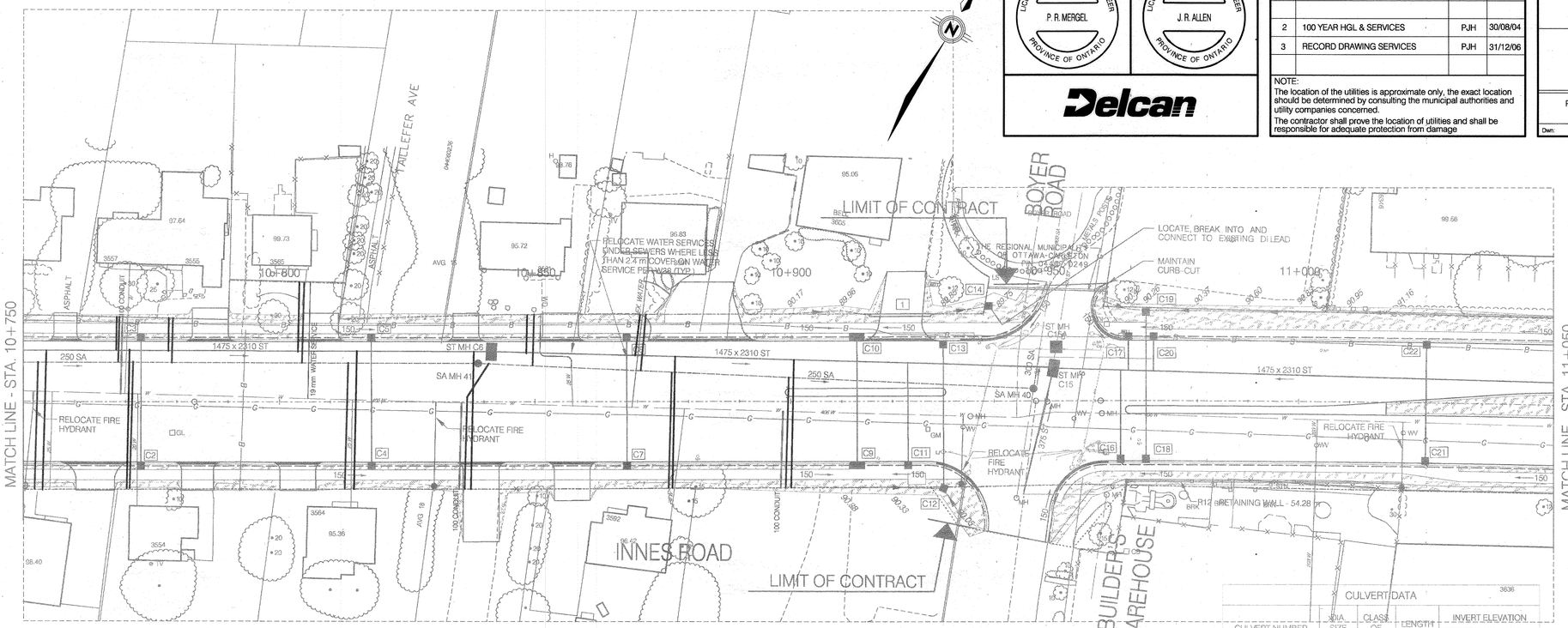

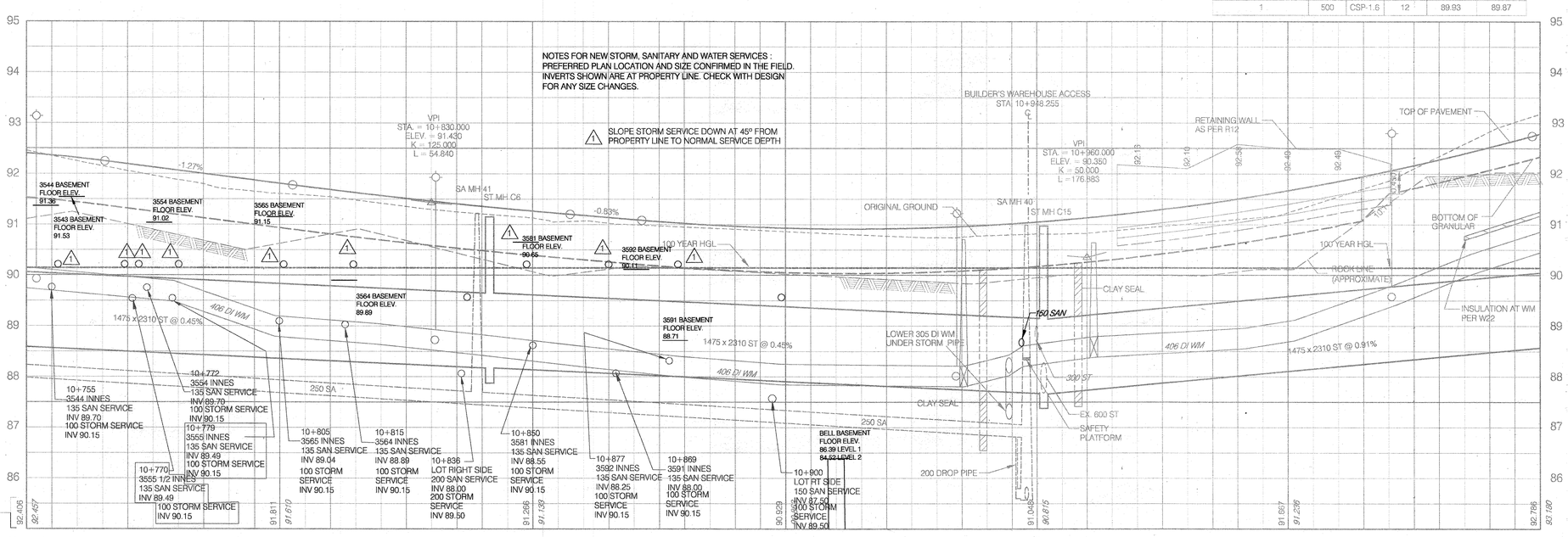

NO.	REVISIONS	BY	DATE
2	100 YEAR HGL & SERVICES	PJH	30/08/04
3	RECORD DRAWING SERVICES	PJH	31/12/06

NOTE:
The location of the utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned.
The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage

P. R. MERGEL — LICENSED PROFESSIONAL ENGINEER — PROVINCE OF ONTARIO

J. R. ALLEN — LICENSED PROFESSIONAL ENGINEER — PROVINCE OF ONTARIO

Delcan

INNES ROAD WIDENING
ORLEANS BLVD
TO
TENTH LINE ROAD

SERVICES
STA. 10+750 TO STA. 11+050

Ottawa

CONTRACT NO. ISB03-5202

DWG. NO. R-ISB03-5202-238

SHEET 238 OF

Date: DEC 2006

Scale: HORIZONTAL 0m 5 10 20; VERTICAL 0m 2

R. G. HEWITT, P.ENG. Director Infrastructure Services		W. CLOUTHIER, P.ENG. Manager Construction Services	
Dwn: MDM	Chkd: DSG	Des: DSG	Chkd: DAH

STORM MANHOLES, CATCHBASINS AND DITCH INLET DATA

No.	STATION	OFFSET (m)*	TYPE OF STRUCTURE STD. No.	FRAME & GRATE STD. No.	ELEVATION TOP OF GRATE**	ELEVATION LOW INVERT
C2	10+773.0	11.75 R	705.010A	S22/S23	91.89	90.54
C3	10+773.0	11.75 L	705.010A	S22/S23	91.89	90.54
C4	10+818.0	11.75 R	705.010A	S22/S23	91.33	89.98
C5	10+818.0	11.75 L	705.010A	S22/S23	91.33	89.98
C6	10+841.5	9.75 L	M-Con, Type M7	S24/S25	91.15	88.17
C7	10+868.0	11.75 R	705.010A	S22/S23	90.85	89.50
C8	10+868.0	11.75 L	705.010A	S22/S23	90.85	89.50
C9	10+913.0	11.75 R	705.020A	S22/S23 (2)	90.65	89.30
C10	10+913.0	11.75 L	705.020A	S22/S23 (2)	90.65	89.30
C11	10+923.0	11.75 R	705.010A	S22/S23	90.66	89.31
C12	10+930.0	17.00 R	705.030	403.010A	90.00	89.00
C13	10+930.0	11.75 L	705.010A	S22/S23	90.68	89.33
C14	10+939.0	18.50 L	705.030	403.010A	89.75	88.75
C15	10+951.3	6.35 L	M-Con, Type M7	S24/S25	90.97	87.67
C15A	10+952.3	10.48 L	M-Con, Type M8	S24/S25	90.86	87.68±
C16	10+965.0	11.31 R	705.010A	400.020/S19	90.96	89.51
C17	10+966.5	11.31 L	705.010A	400.020/S19	90.97	89.52
C18	10+970.0	11.31 R	705.010A	400.020/S19	91.01	89.56
C19	10+970.0	17.25 L	705.030	403.010A	90.25	89.25
C20	10+971.5	11.31 L	705.010A	400.020/S19	91.03	89.58
C21	11+025.0	11.31 R	705.010A	400.020/S19	91.94	90.49
C22	11+025.0	11.31 L	705.010A	400.020/S19	91.94	90.49

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** OFFSETS AND ELEVATIONS FOR FLAT GRATE CATCH BASINS ARE AT THE CENTER OF THE GRATE. REFER TO STD. DWG. S2. OFFSETS FOR D.I. (OPSD-705.030 & OPSD-705.040) ARE TO THE CENTER OF THE STRUCTURE, TOP OF GRATE ELEVATIONS ARE TO THE BOTTOM OF THE GRATE SLOPE.

CULVERT DATA

CULVERT NUMBER	DIA. SIZE (mm)	CLASS OF PIPE	LENGTH (m)	INVERT ELEVATION UPSTREAM	INVERT ELEVATION DOWNSTREAM
1	500	CSP-1.6	12	89.93	89.87

STORM SEWER & CATCHBASIN LEAD DATA

LOCATION No. TO No.	DIA. SIZE (mm)	CLASS OF PIPE	LENGTH (m)	INVERT ELEVATION UPSTREAM	INVERT ELEVATION DOWNSTREAM
MH C1 - MH C6	1475x2310	HE I	109	88.67	88.17
MH C6 - MH C15	1475x2310	HE I	110	88.17	87.67
CB C2 - PIPE	200	SDR 35	22	90.54	89.71
CB C3 - PIPE	200	SDR 35	3	90.54	89.71
CB C4 - PIPE	200	SDR 35	22	89.98	89.51
CB C5 - PIPE	200	SDR 35	3	89.98	89.51
CB C7 - PIPE	200	SDR 35	21	89.50	89.28
CB C8 - PIPE	200	SDR 35	4	89.50	89.28
CB C9 - PIPE	200	SDR 35	19	89.30	89.08
CB C10 - PIPE	200	SDR 35	6	89.30	89.08
CB C11 - PIPE	200	SDR 35	19	89.31	89.03
DI C12 - PIPE	200	SDR 35	23	89.00	88.52
CB C13 - PIPE	200	SDR 35	7	89.33	89.00
DI C14 - EXIST. LEAD	200	SDR 35	5	88.75	***
MH C23 - MH C15	1475x2310	HE II	110	88.67	87.67
CB C16 - PIPE	200	SDR 35	16	89.51	89.02
CB C17 - PIPE	200	SDR 35	7	89.52	89.03
CB C18 - PIPE	200	SDR 35	16	89.56	89.06
DI C19 - PIPE	200	SDR 35	13	89.25	89.06
CB C20 - PIPE	200	SDR 35	7	89.58	89.07
CB C21 - PIPE	200	SDR 35	16	90.49	89.56
CB C22 - PIPE	200	SDR 35	7	90.49	89.56

*** INVERT ELEVATIONS TO BE DETERMINED IN THE FIELD BY THE CONTRACT ADMINISTRATOR.

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SANITARY SEWER	110 m 250 DIA SA @ 0.60%		109 m 250 DIA SA @ 0.60%					
		+838.9 87.45			+947.8 86.60 W 85.57 N			

14559

APPENDIX B
Water Servicing Information

Boundary Conditions
3646 Innes Road

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	28	0.46
Maximum Daily Demand	135	2.25
Peak Hour	204	3.40
Fire Flow Demand #1	9,000	150.00

Location

Results

Connection 1 – Innes Road

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.6	56.0
Peak Hour	127.3	51.2
Max Day plus Fire Flow	128.2	52.5

[1] Ground Elevation = 91.3 m

Disclaimer

The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation. Fire Flow analysis is a reflection of available flow in the watermain; there may be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account.

3636 Innes Road Ottawa
Water Demand

	Number of Units	Area (ha)	Design Population	Average Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Hour Demand (L/s)
Multi-Unit Residential	30	-	54.00	0.175	0.86	1.30
Commercial Retail	-	0.015	-	0.005	0.01	0.01
Total	30	0.015	54.00	**0.180**	**0.86**	**1.31**

Water Demand Parameters

Multi-Unit Residential Apartments	1.8	persons/unit
Residential Demand	280.0	L/c/day
Residential Max Day	4.9	x Avg Day
Residential Peak Hour	7.4	x Avg Day
Commercial Demand	28000	L/gross ha/day
Commercial Max Day	1.5	x Avg Day
Commercial Peak Hour	1.8	x Max Day

Fireflow - Max Fire Flow (per FUS calculations) **150** L/s

Basic Demand (cubic meters per day) **15.54** m^3/day

Notes:
1) Residential water demand based on MOE Design Guidelines or Drinking Water Systems 2008 (<500 population) (Table 3-3)
2) Commercial water demand based on City of Ottawa Design Guidelines - Water Distribution 2010
3) Fireflows calculated as per 1999 Fire Underwriter's Survey Guidelines.

geoOttawa

FR

3636 INNES RD

Show search results for **3636 INNES Rd**

City Fire Hydrant ID:
380034H076 approximately 20m
from Proposed Development

Proposed Site Connection to Ex.
400mm dia. Mainline WM

City Fire Hydrant ID:
380034H075 approximately 60m
from Proposed Development

46.20 m

110.49 m

2.15 m

+45m

152mmØ - DI

102mmØ - UNK

406mmØ - DI

305mmØ - DI

203mmØ - UNK

ch. Innes Rd.

cros. Mary Jane Cres

2245

3682

6346

3615

20m

-8406558.462 5692664.031 Meters

Watermain Boundary Conditions Request

3636 Innes Road

June 2023

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

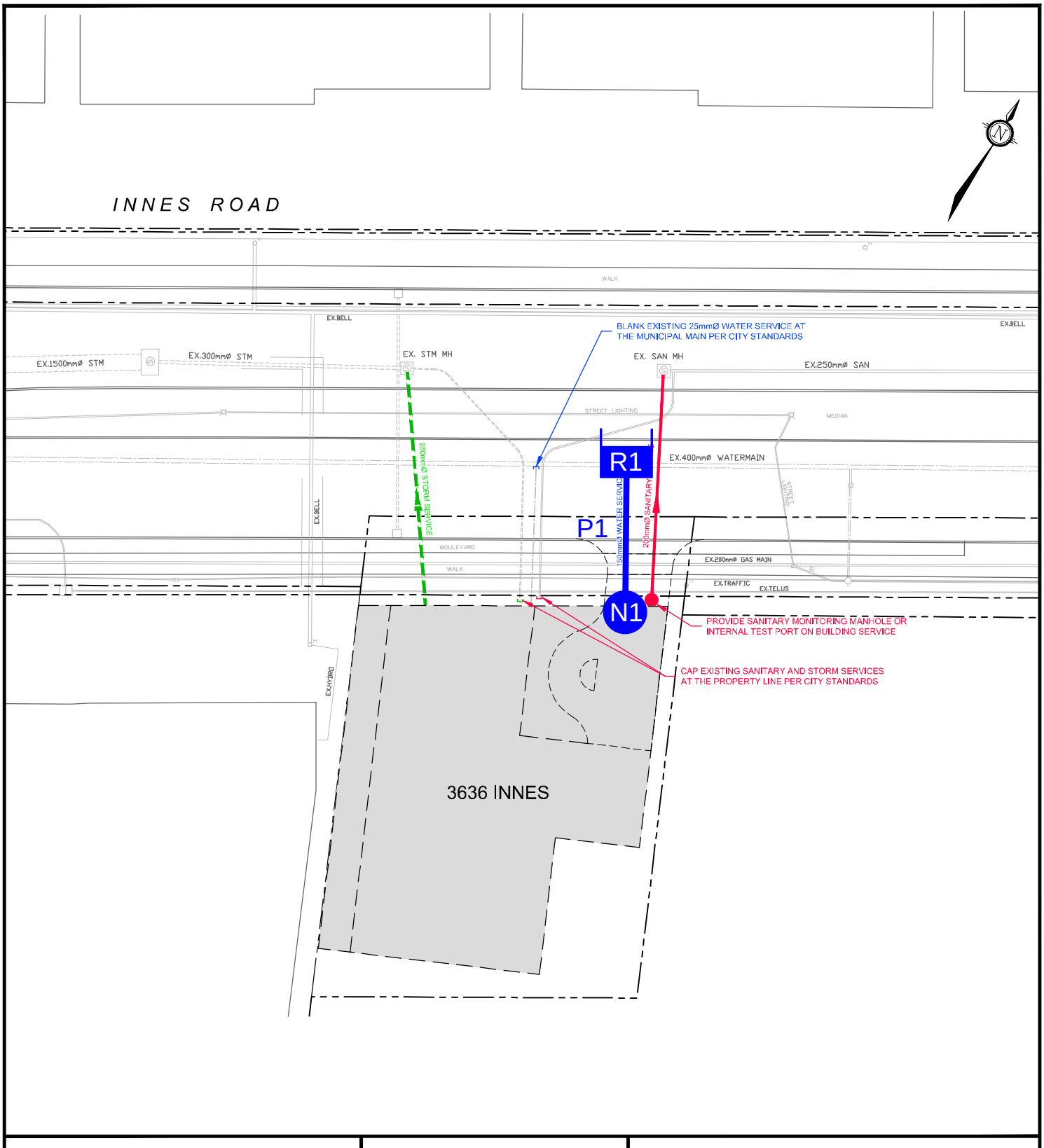
NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 123094
Project Name: 3636 Innes Road
Date: 6/12/2023
Input By: Billy McEwen
Reviewed By: D. Blair

Legend: Input by User; No Information or Input Required

Building Description: 9 Storey Building with 6 Storey Podium
Fire Resistive Construction

Step			Choose		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction C	Wood frame		1.5	0.8	
		Ordinary construction		1		
		Non-combustible construction	Yes	0.8		
		Modified Fire resistive construction (2 hrs)		0.6		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Podium Level Footprint (m^2)	890			
		Total Floors/Storeys (Podium)	6			
		Tower Footprint (m^2)	700			
		Total Floors/Storeys (Tower)	9			
		Protected Openings (1 hr)	No			
		Area of structure considered (m^2)			**4,960**	
	F	**Base fire flow without reductions**				**12,000**
		F = 220 C (A)$^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**10,200**
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**			**Reduction**		
	(2)	Adequately Designed System (NFPA 13)	Yes	-30%	-30%	**-4,080**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	No	-10%		
				Cumulative Total	**-40%**	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	> 45.1m		0%	**2,550**
		East Side	> 45.1m		0%	
		South Side	> 45.1m		0%	
		West Side	0 - 3 m		25%	
				Cumulative Total	**25%**	
Results						
6	(1) + (2) + (3)	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**9,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**150**
				or	USGPM	2,378
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	2
		Required Volume of Fire Flow (m^3)			m^3	1080



NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

3636 INNES ROAD

HYDRAULIC MODEL SCHEMATIC

SCALE 1 : 500 (0, 5m, 10m, 20m)

DATE JUL 2023 | JOB 123094 | FIGURE FIG-WM

SHT8X11.DWG - 216mmx279mm

AVERAGE DAY DEMAND / HIGH PRESSURE CHECK

Junction Report

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
Junc N1	92.0	0.18	130.60	38.60	378.67	54.92
Resvr R1	130.6	-0.18	130.60	0.00	0.00	0.00

Maximum Pressure

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe 1	13.5	150	100	0.18	0.01	0.00	0.078

Junction Report

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
Junc N1	92.0	1.31	127.30	35.30	346.29	50.23
Resvr R1	127.3	-1.31	127.30	0.00	0.00	0.00

Minimum Pressure

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe 1	13.5	150	100	1.31	0.07	0.10	0.054

MAXIMUM DAY + FIRE FLOW DEMAND AT N1

Junction Report

Node ID	Elevation m	Demand LPS	Total Head m	Pressure m	Pressure kPa	Pressure psi
Junc N1	92.0	150.86	119.36	27.36	268.40	38.93
Resvr R1	128.2	-150.86	128.20	0.00	0.00	0.00

Minimum Pressure
Applied Fire Flow

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe 1	13.5	150	100	150.86	8.54	654.65	0.026

MAXIMUM DAY + FIRE FLOW DEMAND SUMMARY

Maximum day plus fire flow demand was modeled for node N1.
The following is a summary of the minimum pressures that occurred for this operating condition.

	Demand (L/s)			Minimum Pressure			
Fire at Junction	Maximum Daily	Fire Flow	Max Day + Fire	(m)	kPa	psi	Node
N1	0.86	150.00	150.86	27.36	268.40	38.93	N1

APPENDIX C
Sanitary Servicing Information

Project No. 123094
Project Name: 3636 Innes Road
Project Location: Orleans, ON

NOVATECH
Engineers, Planners & Landscape Architects

Date: August 2023

Preliminary Peak Sanitary Flows

Daily Demands

Type of Use	Daily Demand Volume	
Residential	280	L/pers./day
Commercial (Retail)	28000	L/ha/day

Population Densities

Unit Type	Persons Per Unit
Apartments	1.8

Residential & Industrial/Commercial Sanitary Peaking Factors

Conditions	Peaking Factor
Residential	4.0
Commercial	1.5

Proposed Development Conditions

	No. Units	Population Equivalent	Peak Sanitary Flows (L/s)
Residential Flow	30	54	0.70
	Area (ha)		
Commercial Flow	0.015		0.01
Infiltration Flow (0.33 L/s/ha)	0.120		0.04
Total Peak Sanitary Flows (L/s)			**0.75**

APPENDIX D

Storm Servicing and Stormwater Management Calculations

Project #: 123094
Project Name: 3636 Innes
Location: Ottawa

NOVATECH
Engineers, Planners & Landscape Architects

Date Prepared: 7/5/2023

Proposed Mixed-Use Development
3636 Innes Road - 4 Storey Residential with Commerical/Retail on Ground Floor

Pre - Development Site Flows											
Description	Area (ha)	$A_{impervious}$ (ha) C=0.9	A_{gravel} (ha) C=0.6	$A_{pervious}$ (ha) C=0.2	Weighted C_{w5}	Weighted C_{w100}	Allowable C_w	1:2 Year Flow (L/s)	1:5 Year Flow (L/s)	1:100 Year Flow (L/s)	Allowable Site Flow (L/s)*
Total Site Area	0.117	0.020	0.045	0.052	0.47	0.57	0.47	11.8	16.0	33.1	16.0

* Allowable flows as stipulated in the City of Ottawa Pre-Consultation meeting

Post - Development Site Flows																
Area	Description	Area (ha)	A_{imp} (ha) C=0.9	A_{perv} (ha) C=0.2	C_5	C_{100}	Uncontrolled Flow (L/s)			Controlled Flow (L/s)			Storage Required (m^3)			Storage Provided (m^3)
							2-year	5-year	100-year	2-year	5-year	100-year	2-year	5-year	100-year	
DR-0	Direct Runoff to Innes Road	0.017	0.011	0.006	0.65	0.74	2.4	3.2	6.2	-	-	-	-	-	-	-
R-1	Controlled Flow from Building	0.100	0.100	0.000	0.90	1.00	-	-	-	6.5	7.0	9.0	12	18	40	> 40
	Totals :	0.117	-	-	-	-	**2.4**	**3.2**	**6.2**	**6.5**	**7.0**	**9.0**	**12**	**18**	**40**	**> 40**
							Total Stormwater Flows :			**8.9**	**10.2**	**15.2**	16 L/s (Total Post-Development Site Allowable)			

T_c = 10mins

Proposed Mixed-Use Development
Novatech Project No. 123094
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA DR-0 Direct Runoff to Innes Road

OTTAWA IDF CURVE

Area =	0.017	ha	Qallow =	2.4	L/s
C =	0.65		Vol(max) =	0.0	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	3.20	0.83	0.25
10	76.81	2.37	0.00	0.00
15	61.77	1.91	-0.46	-0.42
20	52.03	1.61	-0.76	-0.92
25	45.17	1.39	-0.98	-1.46
30	40.04	1.24	-1.13	-2.04
35	36.06	1.11	-1.26	-2.64
40	32.86	1.01	-1.36	-3.25
45	30.24	0.93	-1.44	-3.88
50	28.04	0.87	-1.50	-4.51
55	26.17	0.81	-1.56	-5.16
60	24.56	0.76	-1.61	-5.80
75	20.81	0.64	-1.73	-7.78
90	18.14	0.56	-1.81	-9.78
120	14.56	0.45	-1.92	-13.83
150	12.25	0.38	-1.99	-17.93
180	10.63	0.33	-2.04	-22.06
210	9.42	0.29	-2.08	-26.20

Proposed Mixed-Use Development
Novatech Project No. 123094
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA DR-0 Direct Runoff to Innes Road

OTTAWA IDF CURVE

Area =	0.017	ha	Qallow =	3.2	L/s
C =	0.65		Vol(max) =	0.0	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	4.36	1.14	0.34
10	104.19	3.22	0.00	0.00
15	83.56	2.58	-0.64	-0.57
20	70.25	2.17	-1.05	-1.26
25	60.90	1.88	-1.34	-2.00
30	53.93	1.66	-1.55	-2.79
35	48.52	1.50	-1.72	-3.61
40	44.18	1.36	-1.85	-4.44
45	40.63	1.25	-1.96	-5.30
50	37.65	1.16	-2.05	-6.16
55	35.12	1.08	-2.13	-7.03
60	32.94	1.02	-2.20	-7.92
75	27.89	0.86	-2.35	-10.60
90	24.29	0.75	-2.47	-13.31
120	19.47	0.60	-2.61	-18.82
150	16.36	0.50	-2.71	-24.39
180	14.18	0.44	-2.78	-30.00
210	12.56	0.39	-2.83	-35.63

Proposed Mixed-Use Development
Novatech Project No. 123094
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA DR-0 Direct Runoff to Innes Road

OTTAWA IDF CURVE

Area =	0.017	ha	Qallow =	6.2	L/s
C =	0.74		Vol(max) =	0.0	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	8.43	2.23	0.67
10	178.56	6.20	0.00	0.00
15	142.89	4.97	-1.24	-1.12
20	119.95	4.17	-2.04	-2.44
25	103.85	3.61	-2.60	-3.89
30	91.87	3.19	-3.01	-5.42
35	82.58	2.87	-3.34	-7.00
40	75.15	2.61	-3.59	-8.62
45	69.05	2.40	-3.81	-10.27
50	63.95	2.22	-3.98	-11.95
55	59.62	2.07	-4.13	-13.64
60	55.89	1.94	-4.26	-15.35
75	47.26	1.64	-4.56	-20.53
90	41.11	1.43	-4.78	-25.79
120	32.89	1.14	-5.06	-36.45
150	27.61	0.96	-5.25	-47.21
180	23.90	0.83	-5.37	-58.04
210	21.14	0.73	-5.47	-68.92

Proposed Mixed-Use Development
Novatech Project No. 123094
REQUIRED STORAGE - 1:100 YEAR + 20%
AREA DR-0 Direct Runoff to Innes Road

OTTAWA IDF CURVE

Area =	0.017	ha	Qallow =	7.4	L/s
C =	0.74		Vol(max) =	0.0	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	10.12	2.67	0.80
10	214.27	7.45	0.00	0.00
15	171.47	5.96	-1.49	-1.34
20	143.94	5.00	-2.44	-2.93
25	124.62	4.33	-3.12	-4.67
30	110.24	3.83	-3.62	-6.51
35	99.09	3.44	-4.00	-8.41
40	90.17	3.13	-4.31	-10.35
45	82.86	2.88	-4.57	-12.33
50	76.74	2.67	-4.78	-14.34
55	71.55	2.49	-4.96	-16.37
60	67.07	2.33	-5.12	-18.41
75	56.71	1.97	-5.48	-24.64
90	49.33	1.71	-5.73	-30.95
120	39.47	1.37	-6.07	-43.73
150	33.13	1.15	-6.29	-56.65
180	28.68	1.00	-6.45	-69.65
210	25.37	0.88	-6.56	-82.71

Proposed Mixed-Use Development Storage Calculations Using Average
Novatech Project No. 123094 Release Rate Equal to 50% of the Qpeak
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA R-1 Building Gravity SWM Tank

OTTAWA IDF CURVE
Area = 0.10 ha
C = 0.90
Qpeak = 6.5 L/s
Qavg = 3.3 L/s
Vol(max) = 12.2 m3
(Vol calculated for Qallow-avg)

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	25.91	22.66	6.80
10	76.81	19.22	15.97	9.58
15	61.77	15.45	12.20	10.98
20	52.03	13.02	9.77	11.72
25	45.17	11.30	8.05	12.08
30	40.04	10.02	6.77	12.18
35	36.06	9.02	5.77	12.12
40	32.86	8.22	4.97	11.93
45	30.24	7.57	4.32	11.65
50	28.04	7.02	3.77	11.30
55	26.17	6.55	3.30	10.88
60	24.56	6.14	2.89	10.42
75	20.81	5.21	1.96	8.81
90	18.14	4.54	1.29	6.96
105	16.13	4.04	0.79	4.96
120	14.56	3.64	0.39	2.83
150	12.25	3.07	-0.18	-1.66
180	10.63	2.66	-0.59	-6.39
210	9.42	2.36	-0.89	-11.27
240	8.47	2.12	-1.13	-16.27

Proposed Mixed-Use Development Storage Calculations Using Average
Novatech Project No. 123094 Release Rate Equal to 50% of the Qpeak
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-1 Building Gravity SWM Tank

OTTAWA IDF CURVE
Area = 0.10 ha
C = 0.90
Qpeak = 7.0 L/s
Qavg = 3.5 L/s
Vol(max) = 18.1 m3
(Vol calculated for Qallow-avg)

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	35.32	31.82	9.55
10	104.19	26.07	22.57	13.54
15	83.56	20.91	17.41	15.67
20	70.25	17.58	14.08	16.89
25	60.90	15.24	11.74	17.60
30	53.93	13.49	9.99	17.99
35	48.52	12.14	8.64	18.14
40	44.18	11.05	7.55	18.13
45	40.63	10.17	6.67	18.00
50	37.65	9.42	5.92	17.76
55	35.12	8.79	5.29	17.45
60	32.94	8.24	4.74	17.07
75	27.89	6.98	3.48	15.65
90	24.29	6.08	2.58	13.92
105	21.58	5.40	1.90	11.97
120	19.47	4.87	1.37	9.87
150	16.36	4.09	0.59	5.34
180	14.18	3.55	0.05	0.52
210	12.56	3.14	-0.36	-4.52
240	11.29	2.83	-0.67	-9.71

Proposed Mixed-Use Development Storage Calculations Using Average
Novatech Project No. 123094 Release Rate Equal to 50% of the Qpeak
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-1 Building Gravity SWM Tank

OTTAWA IDF CURVE
Area = 0.10 ha
C = 1.00
Qpeak = 9.0 L/s
Qavg = 4.5 L/s
Vol(max) = 39.8 m3
(Vol calculated for Qallow-avg)

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	67.47	62.97	18.89
10	178.56	49.64	45.14	27.08
15	142.89	39.72	35.22	31.70
20	119.95	33.35	28.85	34.62
25	103.85	28.87	24.37	36.55
30	91.87	25.54	21.04	37.87
35	82.58	22.96	18.46	38.76
40	75.15	20.89	16.39	39.34
45	69.05	19.20	14.70	39.68
50	63.95	17.78	13.28	39.84
55	59.62	16.58	12.08	39.85
60	55.89	15.54	11.04	39.74
75	47.26	13.14	8.64	38.87
90	41.11	11.43	6.93	37.42
105	36.50	10.15	5.65	35.57
120	32.89	9.14	4.64	33.44
150	27.61	7.68	3.18	28.58
180	23.90	6.64	2.14	23.17
210	21.14	5.88	1.38	17.36
240	19.01	5.28	0.78	11.28

Proposed Mixed-Use Development Storage Calculations Using Average
Novatech Project No. 123094 Release Rate Equal to 50% of the Qpeak
REQUIRED STORAGE - 1:100 YR + 20% IDF Increase
AREA R-1 Building Gravity SWM Tank

OTTAWA IDF CURVE
Area = 0.10 ha
C = 1.00
Qpeak = 9.5 L/s
Qavg = 4.8 L/s
Vol(max) = 50.0 m3
(Vol calculated for Qallow-avg)

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	80.97	76.22	22.86
10	214.27	59.57	54.82	32.89
15	171.47	47.67	42.92	38.63
20	143.94	40.02	35.27	42.32
25	124.62	34.64	29.89	44.84
30	110.24	30.65	25.90	46.62
35	99.09	27.55	22.80	47.88
40	90.17	25.07	20.32	48.76
45	82.86	23.04	18.29	49.37
50	76.74	21.34	16.59	49.76
55	71.55	19.89	15.14	49.96
60	67.07	18.65	13.90	50.03
75	56.71	15.76	11.01	49.56
90	49.33	13.71	8.96	48.41
105	43.80	12.18	7.43	46.78
120	39.47	10.97	6.22	44.81
150	33.13	9.21	4.46	40.15
180	28.68	7.97	3.22	34.82
210	25.37	7.05	2.30	29.03
240	22.81	6.34	1.59	22.90