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DESIGN BRIEF

FOR

MINTO COMMUNITIES–CANADA
BARRHAVEN TOWN CENTRE–STAGE 1
3265 JOCKVALE ROAD

CITY OF OTTAWA

PROJECT NO.: 15-816

OCTOBER 2023
REVISION 4

DESIGN BRIEF
FOR 3265 JOCKVALE ROAD
MINTO COMMUNITIES

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DESIGN BRIEF
FOR
3265 JOCKVALE ROAD
MINTO COMMUNITIES

JUNE 2023
CITY OF OTTAWA
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1.0 INTRODUCTION & BACKGROUND

David Schaeffer Engineering Limited (DSEL) has prepared this Design Brief in support of development of 3265 Jockvale Road on behalf of Minto Communities.

The study area is located within 3265 Jockvale Road in the City of Ottawa urban boundary, in the Ward 22 – Gloucester-South Nepean as illustrated in ***Figure 1.1***, the study area is bounded by Longfields Drive to the east, future Chapman Mills Drive to the south, an extension of Riocan Avenue to be completed as part of these works in the west, and a mix of existing commercial and residential to the north which is crossed by Glenroy Gilbert Drive which will also be extended as part of these works. The site is a 5.21-hectar parcel located within South Nepean Town Centre Community Design Plan (CDP (City of Ottawa, 2006).

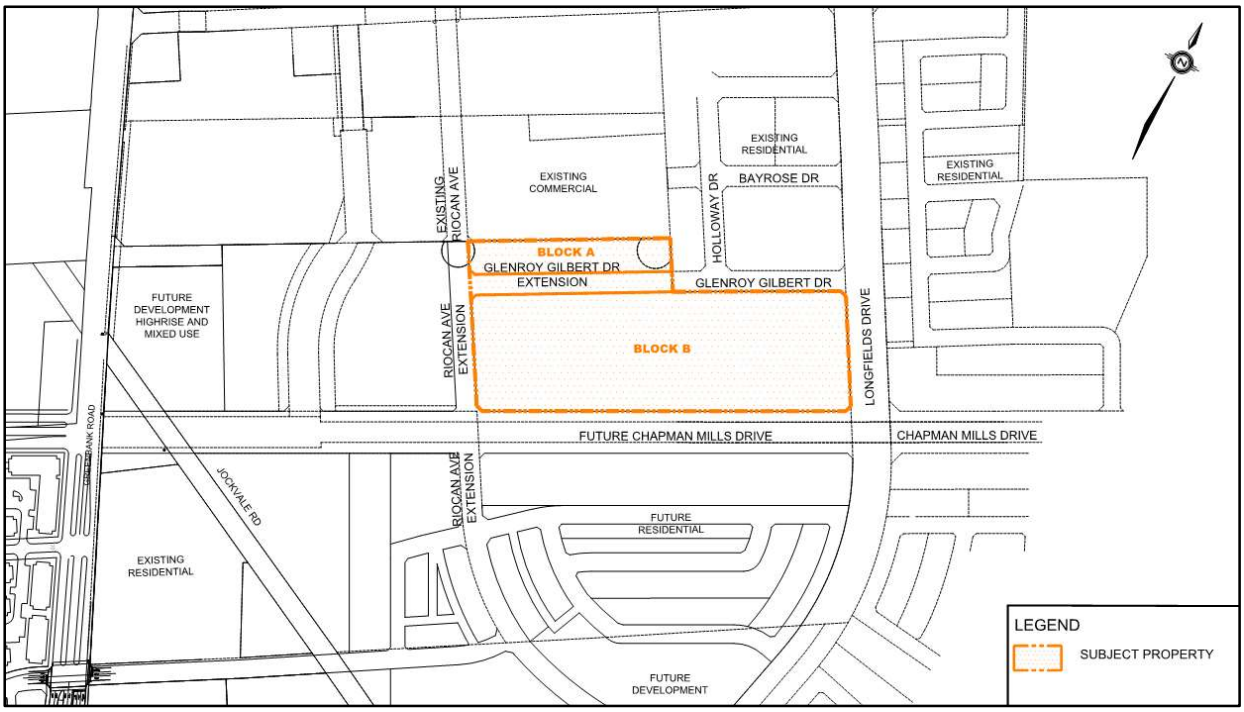


Figure 1.1: Site Location

The study area is governed by the broader *South Nepean Town Centre Community Design Plan* (CDP) (City of Ottawa, 2006) and its *Appendix I, South Nepean Town Centre Community Design Plan Preliminary Serviceability Report* (CCL, December 2005). The design plan and preliminary serviceability report were completed to prepare a preferred servicing strategy and cohesive development concept for the core of the South Nepean Town Centre Community (SNTC) development area (165 ha.). The reports identify existing infrastructure and environmental constraints, describe the neighborhood-level trunk services that will service all properties within the study area, establish targets for future site-specific stormwater management plans, and identify required infrastructure upgrades to support the proposed development of the SNTC area.

Since the completion of the reports, many of the identified neighbourhood-level infrastructure projects have been completed, including the Nepean-South Chapman Mills stormwater management pond and associated trunk storm sewers, sanitary trunk sewers, and trunk watermain connections. Furthermore, the planning and design of Chapman Mills Drive have been recently completed via the Municipal Class Environmental Assessment (October 2000, as amended 2007 and 2011) Schedule C process, with the Environmental Study Report filed on 18 November 2016.

This Design Brief is provided to demonstrate conformance with the design criteria of the City of Ottawa, the Community Design Plan, background studies including the *MSS*, and general industry practice. It provides detailed water, sanitary sewer, stormwater management and grading design information to support the development of the study area. This report should be read in conjunction with the Engineering Drawings (DSEL, June 30, 2023).

This Design Brief and detailed engineering submission have been prepared by **David Schaeffer Engineering Ltd**., with site boundary conditions for the municipal water supply provided by the City of Ottawa, and geotechnical analysis prepared by **Paterson Group Inc**.

1.1 Development Concept

The site plan for the proposed development concept at 3265 Jockvale Road is presented in ***Appendix A***. The proposed development consists of a total of 604 stacked townhouse units. ***Table 1.1*** presented below provides a projected population count for the site. The site is comprised of two private blocks bounded by municipal right-of-ways (ROW). The north block, referred to as Block A, is located north of Glenroy Gilbert Drive between Riocan Ave and Sue Holloway Way. The south block, referred to as Block B, is located south of Glenroy Gilbert Drive between Riocan and Longfields Drive. DSEL has also been retained by Minto Group to undertake detailed design of Glenroy Gilbert Drive and Riocan Avenue. Detailed designs for both of these municipal ROWs are being submitted to the City in parallel with the site plan application for the private lands.

Table 1.1: Development Statistic Projections

Land Use	Total Area (ha)	Projected Residential Units	Residential Population per Unit *	Projected Population *
Block A (North) Stacked Townhouse Units	0.64	60	2.1	126
Block B (South) Stacked Townhouse Units	4.19	544	2.1	1142
Glenroy Gilbert Drive Extension	0.39	-	-	-
TOTAL	5.21	604		1268

** NOTE: Population projections may differ from population estimates used in background Transportation Studies, Planning Rationale, and other studies. Population projection and residential population per unit values are based on Ministry of Environment, Conservation and Parks guidelines for servicing demand calculations. Local Roads are included in Total Area estimates above.*

1.2 Existing Conditions

Under existing conditions, the study area consists of undeveloped vacant lands. The existing elevations within the study area generally range from 101.8 m in the northwest corner of the study area to 95 m where Chapman Mills Drive meets Longfields Drive.

Paterson Group conducted a geotechnical investigation for the entirety of the Barrhaven Town Centre which is summarized in the *Geotechnical Investigation – Proposed Mixed-Use Commercial and Residential Development – 3265 Jockvale Road* (Paterson Group, August 27, 2021). The investigation explains a layer of topsoil was found overlying stiff silty clay and dense glacial till. The bedrock and groundwater depths for the study area were reported to be roughly 5-15 m and 3-6 m below existing ground respectively.

1.3 Required Permits / Approvals

Development of the study area is expected to be subject to the following permits and approvals presented in ***Table 1.2***.

Table 1.2: Anticipated Permit/Approval Requirements

Agency	Permit/Approval Required	Trigger	Remarks
MECP/City of Ottawa	Environmental Compliance Approval	Construction of new sanitary sewers, storm sewers, and stormwater management works.	The City of Ottawa is expected to review all stormwater collection system, stormwater management, and wastewater collection system on behalf of the MECP by transfer of review authority.
MECP	Permit to Take Water (PTTW)	Construction of proposed land uses (e.g. basements for residential homes) and services.	Pumping of groundwater or surface water may be required during construction, given site conditions, proposed land uses, and on-site/off-site municipal infrastructure.
MECP/City of Ottawa	MECP Form 1 – Record of Watermains Authorized as a Future Alteration.	Construction of watermains.	The City of Ottawa is expected to review the watermains on behalf of the MECP through the Form 1 – Record of Watermains Authorized as a Future Alteration.
City of Ottawa	MOE Form 1 – Record of Watermains Authorized as a Future Alteration.	Construction of watermains.	The City of Ottawa is expected to review the watermains on behalf of the MECP through the Form 1 – Record of Watermains Authorized as a Future Alteration.
City of Ottawa	Commence Work Notification (CWN)	Construction of new sanitary and storm sewer throughout the subdivision.	The City of Ottawa will issue a commence work notification for construction of the sanitary and storm sewers once an ECA is issued by the MECP.

1.4 Pre-Consultation

Pre-application consultation was conducted on October 22, 2020, between the City of Ottawa and the developers as part of the Plan of Subdivision Application process. Various stakeholders provided written comments that were recorded and formalized in meeting minutes.

Per the City of Ottawa Transfer of Review Agreement No. TOR-OTT-E-2019-01, it is assumed that MECP pre-consultation is not required, as the City of Ottawa is expected to agree that the proposed works fall under Schedule A of the agreement. As such, the City of Ottawa is expected to review the proposed infrastructure on behalf of MECP as part of issuing Environmental Compliance Approval for the appropriate works.

2.0 GUIDELINES, PREVIOUS STUDIES, AND REPORTS

2.1 Existing Studies, Guidelines, and Reports

The following key studies were utilized in the preparation of this report:

- **Ottawa Sewer Design Guidelines**, City of Ottawa, *SDG002,* October 2012 *(Sewer Design Guidelines)*
- **Technical Bulletin ISDTB-2014-01**, Revisions to Ottawa Design Guidelines – Sewer, City of Ottawa, February 5, 2014. (ISDTB-2014-01)
- **Technical Bulletin PIEDTB-2016-01**, Revisions to Ottawa Design Guidelines – Sewer, City of Ottawa, September 6, 2016. (PIEDTB-2016-01)
- **Technical Bulletin ISTB-2018-01**, Revisions to Ottawa Design Guidelines – Sewer, City of Ottawa, March 21, 2018 (ISTB-2018-01)
- **Technical Bulletin ISTB-2019-02**, Revisions to Ottawa Design Guidelines – Sewer, City of Ottawa, July 8, 2019. (ISTB-2019-02)
- **Ottawa Design Guidelines – Water Distribution,** City of Ottawa, July 2010. *(Water Supply Guidelines)*
- **Technical Bulletin ISD-2010-2** City of Ottawa, December 15, 2010. *(*ISDTB-2010-2*)*
- **Technical Bulletin ISDTB-2014-02** City of Ottawa, May 27, 2014. *(*ISDTB-2014-02*)*
- **Technical Bulletin ISTB-2018-02** City of Ottawa, March 21, 2018 *(*ISDTB-2018-02*)*
- **Technical Bulletin ISTB-2021-03** City of Ottawa, August 18, 2021 *(*ISDTB-2021-03*)*
- **Fire Underwriters Survey**, 1999. *(FUS)*
- **Design Guidelines for Drinking-Water Systems**, Ministry of the Environment, 2008. *(MECP Water Guidelines)*

- **Design Guidelines for Sewage Works**, Ministry of the Environment, 2008. *(MECP Design Guidelines)*

- **Stormwater Planning and Design Manual**, Ministry of the Environment, 2003. *(SWMP Design Manual)*

- **Ontario Building Code Compendium,**
  Ministry of Municipal Affairs and Housing Building Development Branch, 2012 and as updated from time to time.
  (OBC)

- **Ontario Building Code Compendium,**
  Ministry of Municipal Affairs and Housing Building Development Branch, 2012 and as updated from time to time.
  (OBC)

- **South Nepean Town Centre Community Design Plan**
  City of Ottawa, July 2006. (CDP*)*

- **Kennedy Burnett Potable Water Master Servicing Study**
  Stantec Consulting Ltd, April 29, 2014.

- **South Nepean Collector: Phase 2, Hydraulics Review**, Technical Memorandum
  Novatech, August 20, 2015.

- **Kennedy-Burnett Stormwater Management Facility Functional Design Report**
  CH2M, February 17, 2017.

- **Nepean South Chapman Mills Stormwater Management Servicing**, Fourth Addendum, IBI Group, February 16, 2018.

- **Geotechnical Investigation** – Proposed Mixed-Use Commercial and Residential Development – 3265 Jockvale Road, Paterson Group, August 27, 2021

3.0 WATER SUPPLY SERVICING

3.1 Existing Water Supply Services

The subject property lies within the existing City of Ottawa 3SW pressure zone. To the northeast of the subject property, a 200mm diameter watermain exists within the Glenroy Gilbert Drive ROW, as well as a 300mm diameter watermain in the Chapman Mills Drive ROW which is capped at the study area boundary. To the northwest, a 200mm watermain is capped at the study area boundary running from the Chapman Mills Marketplace retail development and existing infrastructure on Riocan Avenue.

3.2 Water Supply Servicing Design

Per the 2006 *CDP* and *Kennedy Burnett Potable Water Master Servicing Study* (Stantec 2014), the subject lands were considered to be serviced a local network of watermains connecting to trunk watermains running within Longfields Drive and through the SNTC.

The study area is proposed to be serviced by a 150 mm diameter internal watermain network with three connections to the existing watermains within Glenroy Gilbert Drive, Chapman Mills Drive, and Riocan Avenue. Block A, to the north of Glenroy Gilbert, is serviced by a 150 mm watermain system with two connections to the 200 mm watermain being extended along Glenroy Gilbert Drive. 50mm services are extended from this 150mm system. The proposed watermain network is shown in ***Drawings 3-4.*** The units in Blocks A and B that do not have an underground garage will be equipped with individual water meters and have their own water service. The sizing of the proposed watermain network is based on the *Water Supply Guidelines* summarized in ***Table 3.1*** below.

Table 3.1: Water Supply Design Criteria

Design Parameter	Value
Residential – Stacked Townhouse	2.1 p/unit
Residential Average Daily Demand	280 L/d/p
Residential – Maximum Daily Demand	2.5 x Average Daily Demand 4.9 x Average Day Demand
Residential – Maximum Hourly Demand	5.5 x Maximum Daily Demand 7.4 x Average Day Demand
Minimum Watermain Size	150 mm diameter
Minimum Depth of Cover	2.4 m from top of watermain to finished grade
During normal operating conditions desired operating pressure is within	350 kPa and 480kPa
During normal operating conditions pressure must not drop below	275 kPa
During normal operating conditions pressure must not exceed	552 kPa
During fire flow operating pressure must not drop below	140 kPa

Notes:

- *Block A Peaking Factors based on MOE (MECP) Table 3-3 Design Guidelines For Drinking-Water Systems (2008)*
- *Block B Peaking Factors based on Section 4: Ottawa Design Guidelines, Water Distribution (July 2010), Table 4.1 – Per Unit Populations and Table 4.2 – Consumption Rates for Subdivisions of 501 to 3,000 Persons.*
- *No Outdoor Water Demand considered for residential uses.*
- *Residential Average Daily Demand assumed to be 280 L/d/P in accordance with 2018 changes to Sanitary Design Guidelines, see Section 4.0.*

A summary of the anticipated water demands for the study area are summarized in ***Table 3.2***. Boundary conditions have been provided by the City of Ottawa based on these demands, and can be found in ***Appendix B***.

Table 3.4: Summary of Water Demands

Dwelling Type	**Number of Units**	**Population per unit**	**Allocated Demand**	**Avg Day** (L/min)	**Max Day** 2.5 x Avg Day (L/min)	**Peak Hour** 5.5 x Max Day (L/min)	**Fire Flow Demand (L/min)**
Block B	544	2.1	280 L/d/P	222.3	555.6	1222.7	17000.0

Dwelling Type	**Number of Units**	**Population per unit**	**Allocated Demand**	**Avg Day** (L/min)	**Max Day** 4.9 x Avg Day (L/min)	**Peak Hour** 7.4 x Avg Day (L/min)	**Fire Flow Demand (L/min)**
Block A	60	2.1	280 L/d/P	24.5	120.1	181.3	17000.0

The fire flows are calculated in accordance with the Fire Underwriters Survey's Water Supply for Public Fire Protection Guideline (1999) as amended by ISTB-2014-02 & ISTB-2018-02.

- Type of construction: Wood Frame Construction;
- Sprinkler protection: non-sprinklered

The result of these parameters is an estimated fire flow of approximately 17,000 L/min. Detailed calculations are presented in ***Appendix B***.

The boundary conditions provided by the City of Ottawa for use in the hydraulic analysis related to the subject site are summarized in ***Table 3.3***. Correspondence with the City of Ottawa related to boundary conditions is included in ***Appendix B.***

Table 3.5: Boundary Conditions

Condition	**Connection 1** (Riocan Ave.) 102.2m Ground Elev.		**Connection 2** (Glenroy Gilbert Drive) 99.3m Ground Elev		**Connection 3** (Chapman Mills Drive) 94.7m Ground Elev	
	HGL (m)	**Pressure (psi)**	**HGL (m)**	**Pressure (psi)**	**HGL (m)**	**Pressure (psi)**
Max HGL	147.9	64.9	147.9	69.1	147.9	69.1
Peak Hour	145.4	61.3	145.4	65.5	145.4	65.5
Max Day + Fire 1 (283.33 L/s)	129.0	38.1	138.7	56.0	144.9	71.2

3.2.1 Watermain Modelling

The fire flows presented in Table 3.2 consider a case where there are no sprinklered units. Since then, Minto Communities has asked DSEL to evaluate and report on two distinct scenarios:

Scenario 1: Central blocks with underground garages, specifically Blocks 2, 3, 4, 5, 12, 13, 14, 15, 17, 18, 19, and 20, are fully sprinklered.

Scenario 2: Minto Communities furnished a detailed sketch indicating which units within the central blocks would have sprinklers and which won't. Units situated more than 45m away from fire truck access would be furnished with sprinklers in Blocks 2, 3, 4, 5, 12, 13, 14, 15, 17, 18, 19, and 20. The sketch provided by Minto can be found in ***Appendix B*****.**

It's our understanding that Minto Communities had a discussion with the Ottawa Fire Department. During this meeting, it was suggested that units more than 45m from a fire truck access point should have sprinklers installed. Conversely, units within a 45m range from a fire truck access point and within 90m of a fire hydrant would not require sprinklers. It's important to note that, to the best of our knowledge, this arrangement does not align with section 3.10.3.4 of the OBC. Coordination between Minto Communities and the fire department is essential in this regard.

A comprehensive analysis, encompassing both scenarios and inclusive of the watermain network configuration and sizing, is available in ***Appendix B***.

Modelling was carried out for minimum hour, peak hour and maximum day plus fire flow. Modelling results shown in ***Table 3.4*** indicate that the development can be adequately serviced for minimum hour and peak hour criteria.

Table 3.6: Summary of Available Service Pressures

Average Day Demand Maximum Pressure	Peak Hour Demand Minimum Pressure
55.50 m (544.27 kPa)	46.31 m (454.15 kPa)

The results presented in the table above indicate that the pressures during average day demand are not quite within the OSDG best practices for new water distribution systems to operate between 350 kPa and 480 kPa however, they are below the maximum allowable pressure of 552 kPa. The use of pressure reducing valves may be recommended during construction should the actual pressure in the watermain exceed what has been used for the boundary conditions.

Per ***Table 3.1,*** the minimum allowable pressure under fire flow conditions is 140 kPa (20 psi) at the location of the fire. A summary of available fire is shown below in ***Table 3.5***. Further details can be found in ***Appendix B****.*

Table 3.7: Summary of Available Fire Flows

Required Fire Flow Scenario 1	Required Fire Flow Scenario 2	Minimum Pressure Scenario 2 Governs
15000 (L/min)	17000 (L/min)	25.47m (249.77kPa)

As the most demanding fire flow requirements are made by Scenario 2 a hydraulic analysis was completed for only Scenario 2 to explore serviceability in the event that the client decided to pursue a partially sprinklered solution to the development. Under this scenario, only the units above underground parking that are not within 45m reach of a fire access route are sprinklered. The critical results in ***Table 3.5*** demonstrate that the site is serviceable under these demands. As Scenario 1 is a less demanding fire flow scenario the pressures under that scenario will also satisfy service standards.

3.3 Fire Hydrant location

Fire hydrants were arranged to respect minimum spacing. All hydrants were placed to be within 90m of front doors to all units.

3.4 Water Supply Conclusion

The proposed watermain network conforms to all relevant City and MECP *Water Supply Guidelines*. The hydraulic analysis of the proposed watermain network, concludes that all required domestic and fire flows can be met throughout the study area upon full buildout of the development. Anticipated fire flow requirements can be met throughout the development lands according to City Guidelines and ISTB-2018-02.

4.0 WASTEWATER SERVICING

4.1 Existing Wastewater Services

The study area lies within the South Nepean Collector Sewer (SNC) catchment. The SNC sewer operates at the intersection of Jockvale Road and Longfields Drive before conveying wastewater under the Jock River. A 200 mm diameter sanitary sewer exists within the Glenroy Gilbert Drive ROW and a 250 mm diameter sanitary sewer exists in the Longfields Drive ROW.

4.2 Wastewater Design

The *South Nepean Town Centre Community Design Plan Preliminary Serviceability Report* (CCL, December 2005) and the *South Nepean Collector: Phase 2, Hydraulics Review, Technical Memorandum* (Novatech, August 2015) identify the outlet for the development area as the South Nepean Collector Trunk sanitary sewer.

In March 2018, the City of Ottawa provided DSEL with the latest sanitary drainage information for the Longfields Drive sanitary sewer. This information includes conceptual drainage area plans for the Barrhaven Town Centre prepared by David McManus Engineering in February 2010 and a sanitary design sheet prepared by the City of Ottawa in October 2016. We have since been made aware of updates to the March 2018 sanitary drainage areas as zoning by-law amendments have been updated to reflect higher density developments. An amalgamated design sheet has been therefore been provided in ***Appendix C*** to include the new drainage plans and updated population count. The spreadsheet indicates that there is still sufficient in the existing Longfields sanitary sewer to accept the projected peak flows from the Barrhaven Town Centre development.

The proposed development area is to be serviced by two internal gravity sewer systems directing flows to the existing Longfields Drive sanitary sewer. The block to the north will be serviced by 200 mm dia. sewers directed to the extended Glenroy Gilbert Drive and connecting to the existing sewer that connects to Longfields Drive. The block to the south will be serviced by 250 m dia. sewers directed to the future Chapman Mills Drive (CMD) and connecting to existing sewers on future CMD. The proposed sanitary sewer network is presented in ***Drawings 3-4.***

The sanitary sewer network was designed in accordance with the wastewater design parameters from ISTB-2018-01 and the *Sewer Design Guidelines*, summarized in ***Table 4.1*** below.

Table 4.1: Wastewater Design Criteria

Design Parameter	Value
Residential Stacked Townhouse	2.1 p/unit
Average Daily Demand	280 L/d/per
Peaking Factor	Harmon's Peaking Factor. Max 4.0, Min 2.0 Harmon Correction Factor 0.8
Infiltration and Inflow Allowance	0.33 L/s/ha
Sanitary sewers are to be sized employing the Manning's Equation	$Q = \frac{1}{n} AR^{2/3} S^{1/2}$
Minimum Sewer Size	200 mm diameter
Minimum Manning's 'n'	0.013
Minimum Depth of Cover	2.5 m from crown of sewer to grade
Minimum Full Flowing Velocity	0.6 m/s
Maximum Full Flowing Velocity	3.0 m/s
Extracted from Sections 4 and 6 of the City of Ottawa Sewer Design Guidelines, October 2012, Technical Bulletins, and recent residential subdivisions in the City of Ottawa.	

A flow allocation of 1.71 L/s was allocated for the Glenroy Gilbert Drive extension and 18.54 L/s at the Longfields Drive Intersection with future Chapman Mills as per the Longfields drive sewer design sheet provided by the City and included in Appendix C.

Table 4.2: Wastewater Peak Flow

Area (Ha.)		Number of Units	Population		Allocated Demand (L/c/d)	Avg Day (L/s)	I/I (L/s)	Peak Factor	Peak Flow (L/s)
			Persons per unit	Population					
Block A & Glenroy Gilbert Extension	0.64	60	2.1	126	280 L/c/d	0.41	0.21	3.57	1.67
Block B	4.19	544	2.1	1142	280 L/c/d	3.70	1.38	3.21	13.26
Total	**5.21**	**604**							**14.93**

A wastewater peak flow for the proposed development 14.93 L/s was calculated based on the parameters presented in ***Table 4.1***. The peak flow is less than the allocated flow for the BTC Phase 1 lands based on the Longfields Drive sanitary design sheet. Based on the sanitary design sheet for Longfields Drive presented in ***Appendix C*** there is sufficient residual capacity in the receiving sewer system to accommodate the development.

4.3 Wastewater Servicing Conclusions

The proposed wastewater system for the development area is designed to conform to all relevant City Standards and MECP Guidelines. Two networks of local sanitary sewers are proposed to serve the study area directing flows towards the existing sanitary sewer in the Longfields Drive ROW. The South Nepean Collector sanitary sewer has been sized for the long-term development of the SNTC lands, which includes the study area.

5.0 STORMWATER MANAGEMENT

5.1 Existing Stormwater Drainage

The study area is considered to be within the planned catchment of the existing stormwater management facility (SWMF) east of Longfields Drive and south of Paul Metivier Drive. The existing storm sewers surrounding the study area are depicted in ***Drawings 3-4*** and can be summarized as:

- 600 mm diameter storm sewer within the Glenroy Gilbert Drive ROW,
- 1650 mm diameter trunk storm sewer within the future extension of the Riocan Avenue ROW,
- 1500 mm diameter trunk sewer within the Longfields Drive ROW running south of Glenroy Gilbert Drive, and,
- 750 mm diameter storm sewer at future Chapman Mills Drive.

5.2 Stormwater Management Criteria

Consistent with *Nepean South Chapman Mills Stormwater Management Servicing* (IBI Group, February 16, 2018), the study has been considered to be part of the tributary area of the existing SWMF east of Longfields Drive. Flows from the study area were considered to drain to the SWMF via existing sewers on Glenroy Gilbert Drive and Longfields Drive. Excerpts from the report can be found in ***Appendix D***.

The following criteria was considered as part of the stormwater management strategy within the study area and conveyance to the existing SWMF east of Longfields Drive, among other requirements:

Storm sewers on local roads are designed to provide a minimum 2-year level of service per the City's latest Technical Bulletin PIEDTB-2016-01. Collector and arterial roads are to provide a 5-year and 10-year level of service respectively.

Under full flow conditions, the allowable velocity in storm sewers is to be no less than 0.80 m/s and no greater than 6.0 m/s.

For the 100-year storm and for local and collector roads, the maximum depth of water (static and/or dynamic) on streets, rear yards, public space, and parking areas shall not exceed 0.35 m at the gutter. For arterial roads, no barrier curb overtopping is permitted.

No surface ponding on the subject site, or local roads, during the 2-year event.

The major system is designed with sufficient capacity to allow the excess runoff from storms above the 100-year storm to be conveyed within the public ROW or adjacent to the right-of-way provided that the water level must not touch any part of the building envelope, and must maintain 15 cm vertical clearance between spill elevation on the street and the ground elevation at the nearest building envelope.

The proposed stormwater management strategy for the study area is to respect the 100-year storm sewer capture rate of 784 L/s from the development area that is set out in the *Nepean South Chapman Mills Stormwater Management Servicing* (IBI Group, February 16, 2018) and summarized below.

- Block A & Glenroy Gilbert Drive: 147.0 L/s 100-year release rate to the proposed storm sewer in the Glenroy Gilbert Drive ROW
- Block B: 637 L/s 100-year release rate to the proposed storm sewer in the Chapman Mills Drive ROW

5.3 Stormwater Management Strategy

Stormwater runoff will be directed to a series of catch basins located at sags that will collect the runoff and discharge to the minor system. Underground storage tanks will be utilized to store excess runoff generated by larger storm events in order to respect the allocated release rate for the site set out by the Nepean South Chapman Mills Stormwater Management Servicing design brief.

5.3.1 Minor System

The study area is to be serviced by a storm sewer system designed in accordance with the amendment to the storm sewer and stormwater management elements of *PIETB-2016-01*. As described in ***Section 5.2***, the minor storm system is proposed to be designed for a minimum of the 5-year event as the site is comprised of private parking areas.

The proposed gravity storm sewer network within the private site ranges from 250 mm to 675 mm dia. To service the block B, a 750 mm dia. storm sewer will be installed and connected to the existing 750mm dia. storm sewer within the future Chapman Mills Drive ROW. Similarly, a 450 mm and 525 mm dia. storm sewer will be extended along the Glenroy Gilbert Drive extension ROW to service the Block B. The proposed sewers collect stormwater runoff from the Minto Barrhaven Town Centre – Stage 1 development and directs stormwater to Longfields Drive. There is an existing 1500 mm dia. storm sewer located in the Longfields Drive ROW, this sewer directs flow south to the existing SWMF east of Longfields Drive and north of the Jock River.

The South Nepean Chapman Mills hydraulic model was reviewed to establish 100-year HGL levels on the 1500 dia. storm sewer on Longfields drive near the BTC Stage 1 outlet locations. The review determined that the HGL levels are below the obvert at the connection locations of this site and a flow allocation was given to BTC stage 1. As the allocated release rate is being respected, the receiving sewer system is expected to remain free-flowing. Therefore, an on-site HGL analysis was not undertaken.

Table 5.1 summarizes the standards that have been employed in the detailed design of the storm sewer network, meeting the criteria described in ***Section 5.2***.

Table 5.1: Storm Sewer Design Criteria

Design Parameter	Value
Minor System Design Return Period	Per requirements in the *Nepean South Chapman Mills Stormwater Management Servicing* (IBI Group, February 16, 2018). Sewers to be sized per 2-Year (Local Streets), 5-Year (Collector Streets), 10-Year (Arterial Streets) – PIEDTB-2016-01
Major System Design Return Period	100-Year
Intensity Duration Frequency Curve (IDF) 2-year storm event: A = 723.951, B = 6.199, C = 0.810 5-year storm event: A = 998.071, B = 6.053, C = 0.814	$i = \frac{A}{(t_c + B)^C}$
Minimum Time of Concentration	10 minutes
Rational Method	$Q = CiA$
Runoff coefficient for paved and roof areas	0.90
Runoff coefficient for landscaped areas	0.20
Storm sewers are to be sized employing the Manning's Equation	$Q = \frac{1}{n} AR^{2/3} S^{1/2}$
Minimum Sewer Size	250 mm diameter
Minimum Manning's 'n'	0.013
Minimum Depth of Cover	2 m from crown of sewer to grade
Minimum Full Flowing Velocity	0.8 m/s
Maximum Full Flowing Velocity	6.0 m/s
Extracted from City of Ottawa Sewer Design Guidelines, October 2012, as amended by PIEDTB-2016-01, *and based on recently approved residential subdivision designs in City of Ottawa.*	

5.3.2 Quality Control

The storm outlets are tributary to the existing SWMF east of Longfields Drive and south of Paul Metivier Drive. This facility provides end of pipe quality control and as such, no quality control is provided on-site.

5.3.3 Quantity Control

Minor system allowable release rates were established for both outlets based the existing reports as described in ***Section 5.3***. Excess runoff during larger storm events will be stored in underground tanks where the flow will be directed to the minor system at a controlled rate.

Stormtech Chambers are being proposed to accomplish the required storage volumes. Street drainage will be directed towards catch basins that outlet to the storage chambers. The chambers will be connected upstream of maintenance holes that will be equipped with ICDs which will restrict the flow to the allowable release rates established in section 5.3. These storage chambers are “offline” to the network that collects the foundation drainage. As the storm sewer system that conveys foundation drainage is not upstream of any inlet control devices, basements will remain protected should the tank outlets become obstructed or plugged.

5.4 Stormwater Management Calculations

The modified rational method (MRM) was used to size the storage tanks and at-grade ponding to ensure that allowable release rates are respected. Any uncontrolled flow was subtracted to the total controlled flow rate to ensure the sum of the controlled and uncontrolled peak runoffs respect the allowable release rates. The tables below provide a summary of the MRM calculations, detailed calculations are provided in Appendix D.

Table 5.2: Stormwater Storage Requirements for Block A

Control Area	5-year Release Rate (L/s)	5-year Required Storage (m3)	100-Year Release Rate (L/s)	100-Year Required Storage (m3)	100-Year Available Storage (m3)
Unattenuated Areas (CB9 - CB14)	61.6	0.0	61.6	0.0	0.0
DCB 15	20.1	0.0	24.3	24.1	25.1
DCB 16	16.0	0.0	31.8	18.0	21.2
STM108	6.8	21.8	10.0	60.1	60.1
STM105	5.0	45.4	7.6	117.2	117.9
STM101	6.7	14.5	10.7	40.6	40.6
Total	**116.8**	**81.7**	**146.3**	**259.9**	**264.9**

As indicated in ***Table 5.2*** the allowable release rate of 147 L/s prescribed under the Nepean South Chapman Mills SWM servicing report has been respected. In order to achieve the allowable release a total storage volume of 259.9m^3 will be required. Three Stormtech chambers are being proposed in addition to surface storage to achieve this requirement as shown in ***Drawings 3 and 4***.

Table 5.3: Stormwater Storage Requirements for Block B

Control Area	5-year Release Rate (L/s)	5-year Required Storage (m3)	100-Year Release Rate (L/s)	100-Year Required Storage (m3)	100-Year Available Storage (m3)
Unattenuated Areas					
Glenroy Gilbert	29.7	0.0	50.8	0.0	0.0
Riocan	25.6	0.0	43.8	0.0	0.0
Chapman Mills	65.4	0.0	111.9	0.0	0.0
Longfields	26.0	0.0	44.5	0.0	0.0
Attenuated Areas					
STM115	46.6	41.4	69.5	134.6	135.1
STM126	10.9	38.2	21.7	103.2	105.5
STM124	7.6	104.8	9.5	272.7	275.1
STM134	86.5	6.9	141.3	76.2	79.7
STM164	6.5	78.3	11.3	200.0	203.5
STM159	6.7	81.5	13.0	206.4	210.3
STM149	54.3	19.0	119.1	74.4	74.8
Total	**365.9**	**370.1**	636.6	**1067.6**	**1084.1**

As indicated in ***Table 5.3*** the allowable release rate of 637 L/s prescribed under the Nepean South Chapman Mills SWM servicing report has been respected. In order to achieve the allowable release a total storage volume of 1067m^3 will be required. A number of Stormtech chambers are being proposed in order to achieve this requirement as shown in ***Drawings 3 and 4***.

The Modified Rational Method was originally intended to be used for above grade storage where the change in head applied through the orifice equation had little variation. As the release rates fluctuate from maximum peak flow for underground storage due to the varying head, the variation in head has been accounted for in the storage volume calculations. Average release rate calculated using the orifice equation were used to size the tanks. Maximum release rates were verified (maximum head) to ensure the maximum allowable was respected. Complete stormwater management calculations are presented in ***Appendix D***.

5.5 Grading & Drainage

The elevations drop significantly between Glenroy Gilbert and the future Chapman Mills. As such, terracing and retaining walls are being proposed at strategic locations across the site. The grading plan has been developed to provide adequate drainage and allow landscape features to be incorporated within the site. Detailed grading design is presented in ***Drawings 5 and 6***. Major overland flow routes have been designed to safely convey water to municipal ROWs should there be any blockages in drainage structures.

5.6 Stormwater Servicing Conclusions

A network of local gravity sewers is proposed within the study area to capture stormwater and convey the flows to the proposed trunk storm sewer network. The storm sewers have been sized by the rational method and inlet control devices and orifices are used to maintain the allowable release to the existing minor system. Quality control will be achieved via existing stormwater management facilities.

6.0 EROSION AND SEDIMENT CONTROL

Soil erosion occurs naturally and is a function of soil type, climate, and topography. The extent of erosion losses is exaggerated where vegetation has been removed during construction and the top layer of soil becomes agitated, and where increased stormwater runoff is directed to natural areas.

Prior to earthworks or underground construction, erosion and sediment controls will be implemented and will be maintained throughout construction.

The erosion and sediment controls will include (but are not limited to):

Minimize the area to be cleared and grubbed.

Plan construction at proper time to avoid flooding.

Provide sediment traps and basins during dewatering.

Silt fence to be installed around the perimeter of the site and to be cleaned and maintained throughout construction. Silt fence to remain in place until the working areas have been stabilized and re-vegetated. See ***Drawings 11 & 12.***

A mud mat to be installed at the construction access in order to prevent mud tracking onto adjacent roads.

Catch basins to have inserts installed under the grate during construction to protect from silt entering the storm sewer system.

Extent of exposed soils to be limited at any given time, and exposed areas will be re-vegetated as soon as possible.

Exposed slopes to be protected with plastic or synthetic mulches.

Stockpiles of cleared materials as well as equipment fueling and maintenance areas to be located away from swales, watercourses, and other conveyance routes.

Seepage barriers such as silt fencing, straw bale check dams and other sediment and erosion control measures to be installed in any temporary drainage stormwater conveyance channels and around disturbed areas during construction and stockpiles of fine material.

Filter inserts to remain on open surface structures such as manholes and catch basins until these structures are commissioned and put into use, streets are asphalted and curbed, and the surrounding landscape is stabilized.

The contractor will, at every rainfall, complete inspections and guarantee proper performance. The inspection is to include:

- Verification that water is not flowing under silt barriers.
- Clean and change inserts at catch basins.

A qualified Inspector will give recommendations related to the mitigation measures that are being implemented and maintained. Bulkhead barriers, filter clothes on open surface structures, silt fencing, and other E&SC measures may require removal of sediment and repairs. The City of Ottawa's Protocol for Wildlife Protection is to be followed during construction.

After build-out of the development, applicable sewers will be inspected and cleaned. All sediment and construction fencing should be removed following construction, providing there is no exposed soil or other potential sources of sedimentation.

7.0 CONCLUSIONS AND RECOMMENDATIONS

This Design Brief has been prepared on behalf of Minto Communities - Canada.

This Design Brief is to be read in conjunction with the first submission of the Minto Barrhaven Town Centre – Stage 1 detailed engineering drawing package, dated June 30, 2023

The key features of the detailed design of the proposed development are as follows:

- Three connections will be made to the existing watermains located on Riocan Avenue, Glenroy Gilbert Drive, and Chapman Mills Drive. The proposed watermain network conforms to all relevant City and MECP *Water Supply Guidelines*.
- Wastewater service will be provided through gravity sewers that have generally been designed in conformance with all relevant City of Ottawa and MECP Guidelines and Policies. A series of gravity sewers will direct wastewater to an existing sewer on Longfields Drive.
- Stormwater management will be achieved using a series of local storm sewers and retention tanks that collect surface water. Two connections to the existing Longfields Drive storm sewer will be made and established release rates for the system will be respected.

The infrastructure identified in this Design Brief is expected to require approval from the City of Ottawa, Ontario Ministry of the Environment, Conservation and Parks prior to construction.

Prepared by,
David Schaeffer Engineering Ltd.

Per: Alexandre Tourigny, P.Eng.

Reviewed by,
David Schaeffer Engineering Ltd.

Per: Laurence Coulson, P.Eng.

APPENDIX A

Legal Drawings, Site Plan, Pre-consult Notes, City checklist

Alex Tourigny

From: Michael Hanifi <MHanifi@minto.com>
Sent: February 28, 2023 3:20 PM
To: Alex Tourigny
Cc: Carl Furney
Subject: RE: Barrhaven Town Centre Unit types

Hi Alex,

As a follow up, I was able to retrieve this table from a colleague for the Metro Town product at BTC. The Metro Towns are 2-bedroom units. Hope this helps.

PRODUCT TYPE	MODEL NAME	UNIT TYPE	BUILDING # STOREYS	ELEV.	BED FLOOR SQ FT	MAIN FLOOR SQ FT	TOTAL SQ FT
Stacked	Yorkdale	Lower Interior	3.5 storey	2	581	481	1062
Stacked	Woodbine	Upper Interior	3.5 storey	2	580	679	1260
Stacked	Union	Lower End/ Corner	3.5 storey	2	590	490	1081
Stacked	Leaside	Upper End/ Corner	3.5 storey	2	587	686	1274
Stacked	Yorkdale	Lower Interior	3.5 storey	2	581	481	1062
Stacked	Woodbine	Upper Interior	3.5 storey	2	580	679	1260
Stacked	Union	Lower End/ Corner	3.5 storey	2	590	490	1081
Stacked	Leaside	Upper End/ Corner	3.5 storey	2	587	686	1274

Let me know if you need anything else.

Thanks,
Michael

Michael Hanifi
Land Development Project Coordinator
MINTO COMMUNITIES - CANADA
200 - 180 Kent Street, Ottawa, ON, K1P 0B6
T 343.961.2615
A division of The Minto Group
Join Our Team! Minto Career Opportunities

personal information. If you have received this communication in error, please reply by e-mail to the sender and delete or destroy all copies of this message. Any other distribution, disclosure or copying is strictly prohibited.

From: Michael Hanifi
Sent: Tuesday, February 28, 2023 1:53 PM
To: Alex Tourigny <ATourigny@dsel.ca>
Cc: Carl Furney <CFurney@minto.com>
Subject: RE: Barrhaven Town Centre Unit types

Hi Alex,

It is correct to assume they are 2-bedroom units. I've asked around about if we have a table (I'll get back to you with it if we do). Do you need the latest floor plans or anything else? I'll follow up with the Andrews about your request from yesterday as well.

Thanks,
Michael

From: Alex Tourigny <ATourigny@dsel.ca>
Sent: Tuesday, February 28, 2023 1:12 PM
To: Michael Hanifi <MHanifi@minto.com>
Cc: Carl Furney <CFurney@minto.com>
Subject: Barrhaven Town Centre Unit types

Hi Michael,

We assumed the units were mostly 2bedroom units when completing our supporting calculations for BTC. Does Minto have a table with a unit type description (1bed, 2bed, bachelors etc…)?

Thanks,

Alex Tourigny, P.Eng.

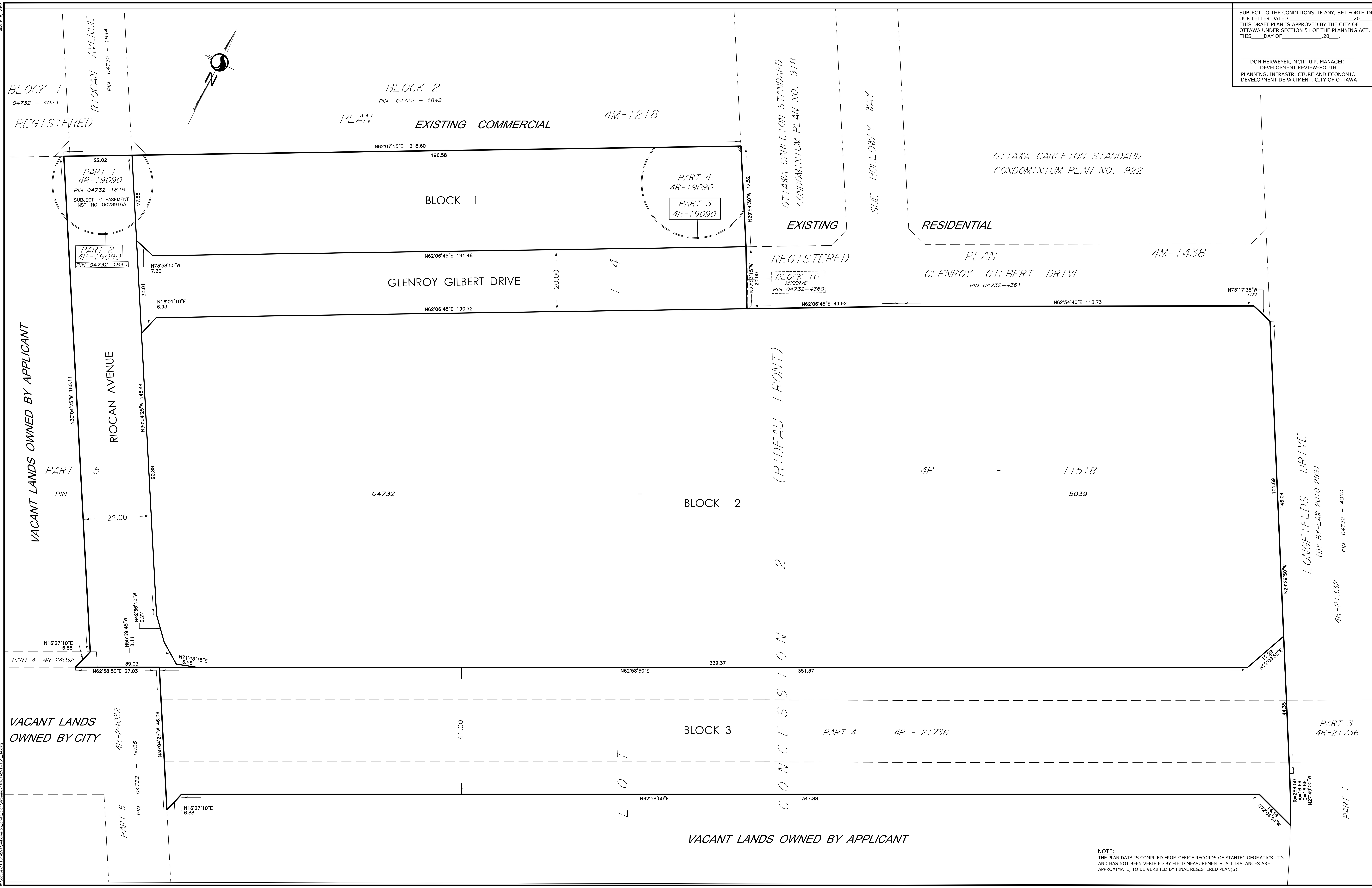
DSEL
david schaeffer engineering ltd.

120 Iber Road, Unit 103
Stittsville, ON K2S 1E9

phone: 613-845-2106 (NEW NUMBER)
cell: (343) 542-8847
e-mail: atourigny@dsel.ca

SUBJECT TO THE CONDITIONS, IF ANY, SET FORTH IN OUR LETTER DATED ____________________20____
THIS DRAFT PLAN IS APPROVED BY THE CITY OF OTTAWA UNDER SECTION 51 OF THE PLANNING ACT.
THIS____DAY OF____________,20___.

DON HERWEYER, MCIP RPP, MANAGER
DEVELOPMENT REVIEW-SOUTH
PLANNING, INFRASTRUCTURE AND ECONOMIC DEVELOPMENT DEPARTMENT, CITY OF OTTAWA



NOTE:
THE PLAN DATA IS COMPILED FROM OFFICE RECORDS OF STANTEC GEOMATICS LTD. AND HAS NOT BEEN VERIFIED BY FIELD MEASUREMENTS. ALL DISTANCES ARE APPROXIMATE, TO BE VERIFIED BY FINAL REGISTERED PLAN(S).

KEY PLAN

(NOT TO SCALE)

DRAFT PLAN OF SUBDIVISION

PART OF LOT 14
CONCESSION 2 (RIDEAU FRONT)

(GEOGRAPHIC TOWNSHIP OF NEPEAN)

CITY OF OTTAWA

Scale 1:500

10 0 10 20 30 METRES

METRIC CONVERSION

DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51 OF THE PLANNING ACT.

(A)-AS SHOWN ON DRAFT PLAN
(B)-AS SHOWN ON DRAFT PLAN
(C)-AS SHOWN ON DRAFT AND KEY PLANS
(D)- SEE PROPOSED LAND USE SCHEDULE (BELOW)
(E)-AS SHOWN ON DRAFT PLAN
(F)-AS SHOWN ON DRAFT PLAN
(G)-AS SHOWN ON DRAFT PLAN
(H)-CITY WATER AVAILABLE
(I)-SEE SOIL REPORT
(J)-SEE TOPOGRAPHICAL INFORMATION
(K)-ALL CITY SERVICES AVAILABLE
(L)-AS SHOWN ON DRAFT PLAN

SCHEDULE OF LAND USE

LOT/BLOCK	USE	UNITS	AREA (Ha/ac)
1	TERRACE UNITS (CONDO)	56	0.637/1.57
2	TERRACE UNITS (CONDO)	544	4.180/10.35
3	STREET		1.501/3.69
GLENROY GILBERT DRIVE	STREET		0.394/0.98
RIOCAN AVENUE	STREET		0.369/0.90
TOTAL		600	7.080/17.49

OWNER'S CERTIFICATE

I HEREBY AUTHORIZE STANTEC GEOMATICS LTD. TO SUBMIT THIS DRAFT PLAN OF SUBDIVISION ON MY BEHALF

DATE

BRONWYN ANDERSON
VICE-PRESIDENT, LAND DEVELOPMENT
MINTO COMMUNITIES INC.
I HAVE THE AUTHORITY TO BIND THE CORPORATION

DATE

BRENT STRACHAN
DIVISION PRESIDENT, LAND DEVELOPMENT
MINTO COMMUNITIES INC.
I HAVE THE AUTHORITY TO BIND THE CORPORATION

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE SUBJECT LANDS AND THEIR RELATIONSHIP TO ADJOINING LANDS HAVE BEEN ACCURATELY AND CORRECTLY SHOWN.

DATE

FRANCIS LAU
ONTARIO LAND SURVEYOR

Stantec

DRAWN: ME	CHECKED: *	PM: FL	August 8, 2023	PROJECT No.: 161614291-131

Braden Kaminski

From: Moore, Sean <Sean.Moore@ottawa.ca>
Sent: Thursday, November 5, 2020 12:07 PM
To: Carl Furney; Bronwyn Anderson
Cc: Shillington, Jeffrey; Krabicka, Jeannette; Young, Mark; Rehman, Sami; Gervais, Josiane; Neermul, Dhaneshwar; Richardson, Mark; Siddique, Jabbar
Subject: Minto Barrhaven Town Centre preconsult
Attachments: 201023_BTC-Minto_PFP preconsult comments.pdf; SNTC - Minto Pre-Consult - Illustration.pdf; SNC-Sanitary Drainage Areas.pdf; SWM-DrainagePlan.pdf; Minto_BTC_design_brief_submission requirements.pdf

Carl and Bronwyn,

Regarding our pre-consultation meeting on October 22, 2020 for a plan of subdivision and rezoning on our lands in the Barrhaven Town Centre please find the submission requirements and preliminary comments below:

List of required Plans/Reports with your Plan of Subdivision and Zoning By-law Amendment applications:

Required Plans/Studies:

- Draft Plan of Subdivision
- Survey Plan
- Planning Rationale, with Integrated Environmental Review – please include a Parks rationale for the park location, size, configuration and how it meets the parks policies / guidelines of the City of Ottawa
- Urban Design Brief – see ToR attached
- Stormwater Management Report / Brief
- Serviceability Study
- Transportation Impact Assessment
- Noise Feasibility Study - should also address proximity of residential to the LRT tail track south of Chapman Mills Drive
- Vibration Study – should address the proximity of residential to the LRT tail track south of Chapman Mills Drive
- Geotechnical Study
- Phase 1 ESA – to conformity with OReg 153/04 (and subsequent Phase 2 and or 3 ESA's – if required)
- Tree Conservation Report
- Archaeological Resource Assessment
- Roadway Modification Plan – for functional design of any road mods / intersections / medians etc
- Concept Plan – ultimate use of lands
- Environmental Impact Statement – please address the water course shown below and butternut trees in your EIS

Watercourse to address in EIS:

All required plans & reports are to be provided in digital format (.pdf through an FTP site) at application submission and sent to planningcirculations@ottawa.ca and cc'd to myself. Please ensure the application forms for plan of subdivision and zoning are also scanned and sent as a pdf to this email. Once received we will create the file numbers for you and advise of them, so you can make payment at a Client Service Centre.

Link to Planning Application process
https://ottawa.ca/en/planning-development-and-construction/developing-property/development-application-review-process

Link to development application forms:
https://ottawa.ca/en/planning-development-and-construction/developing-property/development-application-review-process/development-application-submission/development-application-forms

Preliminary Staff Comments:

Parks Planning

1. See attached comments entitled 'BTC Minto PFP preconsult comments'

Urban Design:

2. Proposed units facing Riocan Avenue should be designed to allow for additional at grade uses in the future (home based business) or local scale commercial given the "active frontage" designation in the Secondary Plan.
3. Consider re-aligning the access street from Riocan Avenue to allow for a larger multi-residential block at the north end of the subject site.
4. Sidewalks should be provided on local streets as directed in the Secondary Plan. Please review cross-section widths to ensure that adequate space is provided for sidewalks and tree planting.
5. Please ensure building setbacks allow for tree planting in accordance with the 2017 Sensitive Clay Soils direction.

6. PRUD supports the comments provided by Parks and Facilities Planning as it relates to the size and contiguous shape for the Linear Park proposed on the western end of the lands.
7. Additional analysis should be undertaken to ensure that the design for a bus-loop and park and ride do not hinder future development opportunities on Minto's abutting lands. It is suggested that a public or "private" north/south street be introduced as a division between the proposed park and ride and the future development block to the west. This new street could also serve as access to the bus-loop which could be located along the northern edge of the site (mid-block)
8. Illustration provided in attachment entitled 'SNTC Minto Pre-Consult – illustration'

Engineering:

9. For SWM the latest document produced was the Nepean South-Chapman Mills SWM Servicing Addendum. See the excerpt showing the Drainage Area Plan for the area. It shows an existing trunk storm sewer within future Riocan Drive just north of the existing pond. This storm sewer will need to be extended into their subdivision. Major Overland Flow is be conveyed through the City owned lands just south of the subject lands and continue through the Minto built Riverbend subdivision and Major Overland Flow outfall to the Jock River.
10. For Sanitary, South Nepean Collector: Phase 2 Hydraulic Review/Assessment completed by Novatech was completed in August 2015. I've attached an excerpt that shows the South Nepean Collector extending just north of the Jock River. There is a 1050 mm on Longfields that extends from the SNC up to the future RioCan ROW. Minto can connect to the 1050 mm dia. at Longfield's and future Riocan (capacity subject to review by Infrastructure Policy).
11. For water, Minto is to construct a 305 mm dia. watermain within the Chapman Mills Road corridor.

General Planning comments:

1. Please ensure a signalized intersection is planned for Riocan Ave and Chapman Mills Drive and removed from Sue Holloway Drive and Chapman Mills.
2. On your concept plan please illustrate a park on the 'civic block' lands, representing the urban public square
3. On your concept plan please illustrate the park and ride on the lands west of the civic block
4. Please follow the Barrhaven Downtown Secondary Plan on the general placement of Park #6 – do not create any road patterns that force its location along Longfields Drive
5. The City will be looking for the dedication of the re-aligned BRT/LRT corridor as per the EA that went to Committee on Nov 2nd 2020
6. The City will engage Minto on discussions concerning the proposed park and ride lot, and the civic block.
7. We need to assess the viability of tree planting with soil types, proposed zoning setbacks, and street cross sections (please speak to soils in this Geotech as it relates to tree planting and make recommendations in the Planning Rationale concerning this)

Transportation:

- Follow Traffic Impact Assessment Guidelines
    - Traffic Impact Assessment will be required. Please proceed to submitting Screening/Scoping at your earliest convenience.
    - Start this process asap. The application will not be deemed complete until the submission of the draft step 1-4, including the functional draft RMA package (if applicable), draft functional plans (if applicable) and/or monitoring report (if applicable).
    - Request base mapping asap if RMA is required. Contact Engineering Services (https://ottawa.ca/en/city-hall/planning-and-development/engineering-services)

- All new collector streets within the subdivision should be designed following the City's Collector Guidelines (desired 26m ROW for collector Roads).
- All new local residential streets should be designed with a target operating speed of 30km/h per the new Strategic Road Safety Action Plan Update. A 30 km/h Design Guideline with further guidance on how to achieve a 30km/h target for new roadways is being developed. TES may be contacted for interim guidance on how to achieve a 30km/h design speed on local streets.
- Corner triangles as per OP Annex 1 - Road Classification and Rights-of-Way at the following locations on the final plan will be required:
    - Local Road to Local Road: 3 m x 3 m
    - Local Road to Collector Road: 5 m x 5 m
    - Collector Road to Collector Road: 5 m x 5 m
    - Collector Road to Arterial Road: 5 m x 5 m
- ROW protection on Greenbank between Strandherd and Chapman Mills is 37.5m even and from Chapman Mills to Cambrian is 41.5m (Subject to varying widening requirements of Greenbank Road ESR).
- ROW on Longfields between Strandherd and Jockvale is 37.5m even.
- The Greenbank Road realignment construction is anticipated for post-2031.
- RMA is underway at the Greenbank Rd/Street E intersection.
- Geometric Road Design drawings will be required with the first submission of underground infrastructure and grading drawings.
- Noise Impact Studies are required. Feasibility Study required before draft approval and Detailed Study required before registration. Both studies must assess:
    - Road
    - Rail, due to the proximity to the future LRT.
    - Aircraft, site falls within Airport Vicinity Development Zone.
    - Stationary (due to the proximity to neighbouring exposed mechanical equipment) or (if there will be any exposed mechanical equipment due to the proximity to neighbouring noise sensitive land uses)

Forestry

1. a Tree Conservation Report (TCR) must be supplied for review along with the suite of other plans/reports required by the City; an approved TCR is a requirement for Plan of Subdivision approval.
2. any removal of privately-owned trees 10cm or larger in diameter requires a tree permit issued under the Urban Tree Conservation Bylaw; the permit is based on the approved TCR
3. any removal of City-owned trees will require the permission of Forestry Services who will also review the submitted TCR
4. the TCR must list all trees on site by species, diameter and health condition
5. the TCR must list all trees on adjacent sites if they have a critical root zone that extends onto the development site
6. If trees are to be removed, the TCR must clearly show where they are, and document the reason they cannot be retained
7. the City encourages the retention of healthy trees; if possible, please seek opportunities for retention of trees that will contribute to the design/function of the site.
8. Please ensure newly planted trees have an adequate soil volume for their size at maturity. Here are the recommended soil volumes:

Tree Type/Size	Single Tree Soil Volume (m3)	Multiple Tree Soil Volume (m3/tree)
Ornamental	15	9

Columnar	15	9
Small	20	12
Medium	25	15
Large	30	18
Conifer	25	15

9. For more information on the process or help with tree retention options, contact Mark Richardson mark.richardson@ottawa.ca

Regards,

Sean Moore, RPP/MCIP
Senior Planner
Development Review South Unit
Planning, Infrastructure and Economic Development Dept.
City of Ottawa

Cell: 613-805-9804

- Please note I am working from home during this crisis until further notice

'

'

PRE-CONSULTATION COMMENTS
Parks & Facilities Planning

Project: **Barrhaven Town Centre - Minto**
Date: 23 October, 2020

---

1. Parkland Dedication

- The Parkland Dedication By-Law calls for the dedication calculation for the Barrhaven Town Centre to be 5% of the gross land area of the area
- The current plan shows land conveyance of 2.15% / 0.50 ha (according to the chart on the Concept Plan). Therefore, the land conveyance shown in the development concept is significantly under-dedicated.
- Based on a development area of 23.26 ha, and a calculation of 5% of the gross area, the parkland dedication needs to be a minimum of 1.161 ha
- Parks & Facilities Planning is looking for the parkland dedication to be wholly fulfilled through land conveyance for the gross development area within the currently proposed subdivision.

2. Park shape and location

- Please provide a contiguous park block with no road crossings.

3. Timing

- The park block shown as '8' on Schedule A: Land Use Plan of the Barrhaven Town Centre Secondary Plan is to be dedicated in the first Draft Plan of Subdivision for the property.

4. To be included in the 1st Submission

- Please show a revised park block
- Please show high level park grading on the on the subdivision Preliminary Grading plan – including key spot elevations, flow arrows and slope percentages. Keep in mind that:
  - Park is to be graded to subdivision levels
  - Show positive surface drainage towards the ROW
  - The park is to have no encumbrances or easements either below or above ground level. This includes any current or future LRT requirements, utilities, etc. It also includes any stormwater flows from neighbouring properties.
- Please include the parkland dedication as part of the Planning Rationale - provide an explanation of how the proposed development will address and meet the Parkland Dedication requirements.
- Please include the park block specifically as part of the Geotechnical Report - please include text that speaks to the suitability of the soils for construction and load bearing, and any potential required amendments to make it suitable (if needed).
- Confirmation that there are no existing or proposed encumbrances on the proposed park block.

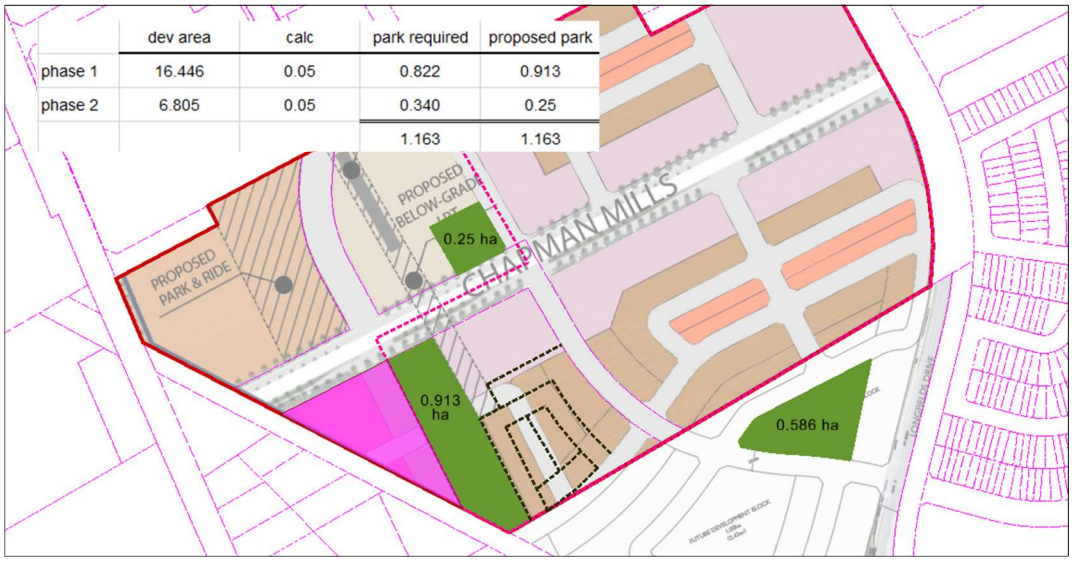
5. Developer Requirements for Land Conveyance of a Park Block

Please review the following reference documents which outline the requirements for parkland dedication and park block conveyance to the City:

- City of Ottawa Park Development Manual, 2nd edition
- City of Ottawa Parkland Dedication By-Law
- The standard parks Conditions of Draft Plan Approval

6. Concept revision for consideration

Please consider the following revision to the subdivision concept – or similar:

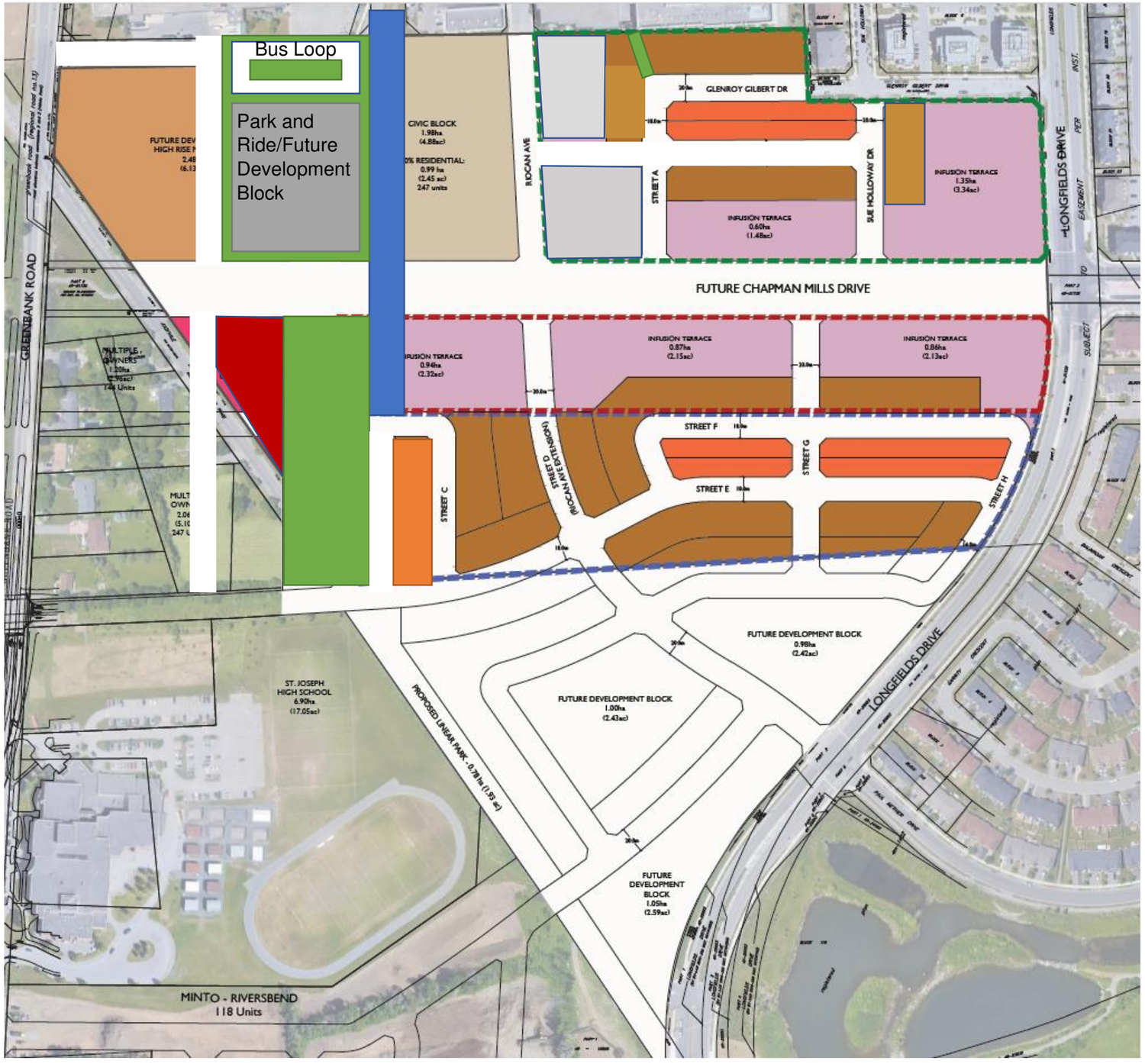


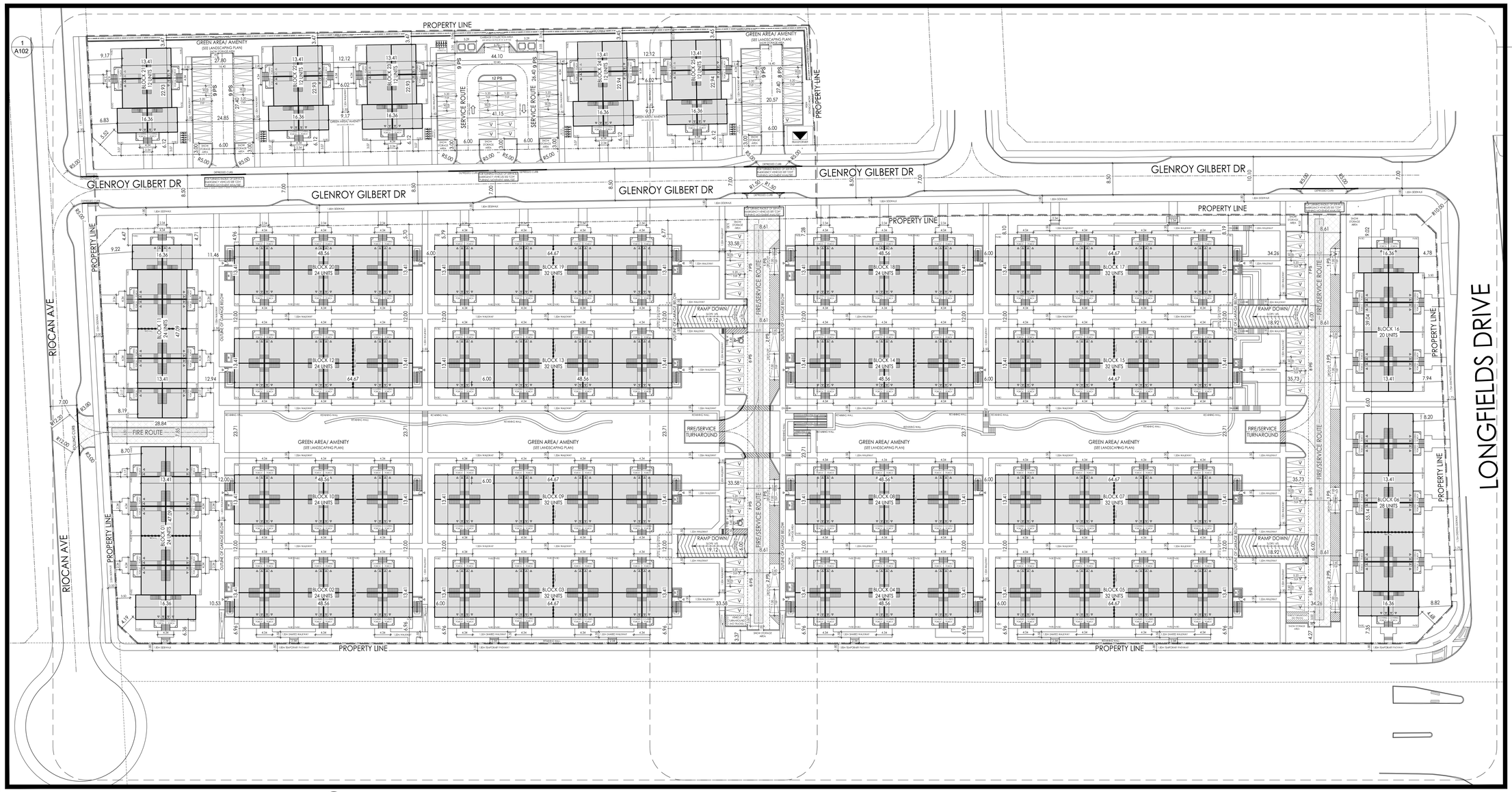
Benefits:

- Park block size is increased to meet dedication requirements
- Road crossing is eliminated
- Parkland dedication is balanced for the entirety of the Minto property
  - Phase 1 Draft Plan: 0.913 ha park
  - Phase 2 Draft Plan: 0.250 ha Civic Centre urban plaza or parkette
- Road frontage along the proposed park is increased
- Park block is adjacent to the LRT tail track. Therefore, the surface of those lands could blend into the park design.

Please don't hesitate to contact me if you have any questions.
Regards,
Jeannette.

Jeannette Krabicka
Planner, Parks & Facilities Planning
City of Ottawa


Bus Loop
Park and Ride/Future Development Block
GLENROY GILBERT DR
ROCAN AVE
STREET A
SUE HOLLOWAY DR
LONGFIELDS DRIVE
INFUSION TERRACE
1.35ha
(3.34ac)
INFUSION TERRACE
0.60ha
(1.48ac)
FUTURE CHAPMAN MILLS DRIVE
INFUSION TERRACE
0.87ha
(2.15ac)
INFUSION TERRACE
0.86ha
(2.13ac)
STREET F
STREET G
STREET E
STREET H
STREET C
STREET D
(ROCAN AVE EXTENSION)
FUTURE DEVELOPMENT BLOCK
0.98ha
(2.42ac)
FUTURE DEVELOPMENT BLOCK
1.00ha
(2.43ac)
FUTURE DEVELOPMENT BLOCK
1.05ha
(2.59ac)
PROPOSED LINEAR PARK - 0.78ha (1.93 ac)
ST. JOSEPH HIGH SCHOOL
6.90ha
(17.05ac)
GREENBANK ROAD
MINTO - RIVERSBEND
118 Units



1 100 SITE PLAN
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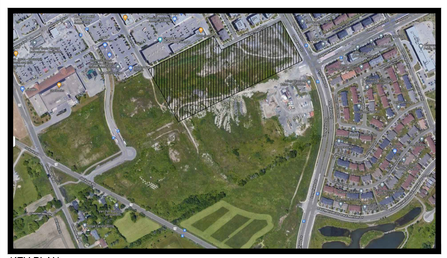
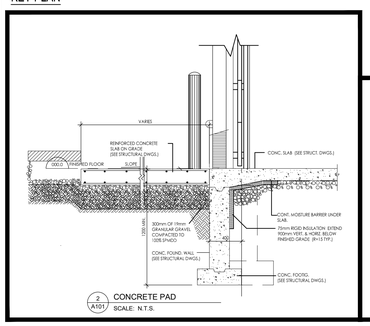
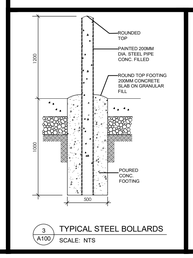


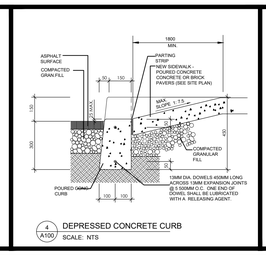
KEY PLAN



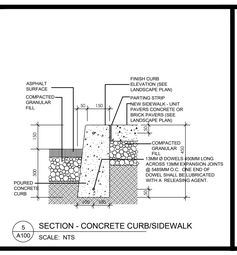
2 A101 CONCRETE PAD
SCALE: N.T.S.



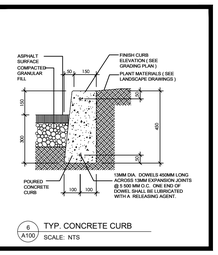
3 A100 TYPICAL STEEL BOLLARDS
SCALE: NTS



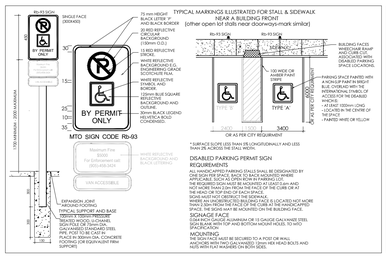
4 A100 DEPRESSED CONCRETE CURB
SCALE: NTS

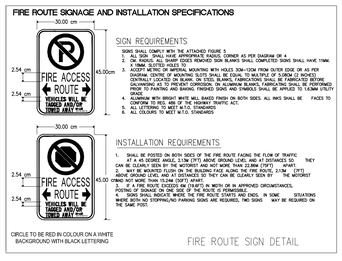


5 A100 SECTION - CONCRETE CURB/SIDEWALK
SCALE: NTS



6 A100 TYP. CONCRETE CURB
SCALE: NTS





SITE STATISTICS

ITEMS	REQUIRED	PROPOSED - NORTH LOT		PROPOSED - SOUTH LOT	
LOT AREA :	NO MINIMUM	6377.55 SM [68647.37 SF]		41841.63 SM [450379.59 SF]	
BUILDING AREA	NO MINIMUM	1636.78 SM [17618.15 SF]		14753.99 SM [158810.67 SF]	
LOT COVERAGE (lot area/building area) :	NO MINIMUM	25.53 %		35.26 %	
GROSS FLOOR AREA	NO MINIMUM	4884.84 SM 52579.98 SF		44261.97 SM 476432.01 SF	
F.S.I. (gross floor area/lot area):	NO MINIMUM	**0.77**		**1.06**	
SETBACKS :					
MIN. FRONT YARD:	NO MINIMUM	**6.80 M (Riocan)**		**4.7 M (Riocan)**	
MIN CORNER SIDE YARD:	NO MINIMUM	**5.50 M (Glenroy Gilbery)**		**4.10 M (Chapman Mills)**	
				4.4 M (Glenroy Gilbert)	
MIN INTERIOR SIDE YARD:	NO MINIMUM	**3.40 M**		**N/A**	
MIN REAR YARD:	NO MINIMUM	**23.50 M**		**4.78 M (LONGFIELDS)**	
NUMBER OF TOWNHOUSE UNITS :					
2 BED:		**60 SUITES**		**544 SUITES**	
TOTAL NUMBER OF UNITS :		**60 SUITES**		**544 SUITES**	
TOTAL PARKING SPACES :		**66 PS**	**RATIO**	**598 PS**	**RATIO**
RESIDENT PARKING SPACES:	**0.5 SPACES/UNIT**	SURFACE: 60 U/G: 0 TOTAL: **60**	1:1	SURFACE: 0 U/G: 544 TOTAL: **544**	1:1
VISITOR PARKING SPACES:	**0.1 SPACES/UNIT**	SURFACE: 6 U/G: 0 TOTAL: **6**	0.1:1	SURFACE: 52 U/G: 0 TOTAL: **52**	0.1:1
BARRIER FREE PARKING SPACES DEDICATED FOR VISITORS :	**NORTH LOT = 0 SOUTH LOT = 2**	SURFACE: 0 U/G: 0 TOTAL: **0**	N/A	SURFACE: 2 U/G: 0 TOTAL: **2**	N/A
BICYCLE SPACES :					
LONG-TERM BICYCLE SPACES :	**0.5 SPACES/UNIT**	**30**		**272**	
TOTAL LANDSCAPE :	**N/A**	2079.38 SM [22382.25 SF] (32.60 % OF LOT AREA)		16264.78 SM [175072.61 SF] (38.87 % OF LOT AREA)	
LANDSCAPED OPEN SPACE AREA :					
SOFT LANDSCAPE AREA :	**N/A**	1572.15 SM [16922.52 SF] (75.61 % OF LANDSCAPING)		11706.43 SM [126006.98 SF] (71.97 % OF LANDSCAPING)	
HARD LANDSCAPE AREA :	**N/A**	507.23 SM [5459.73 SF] (24.39 % OF LANDSCAPING)		4558.35 SM [49065.63 SF] (28.03 % OF LANDSCAPING)	
LOCKER SPACES :	**N/A**	**TBD**		**TBD**	
AMENITY AREA (TOTAL) :	**6 SM/UNIT**	1001.33 SM (MIN 360 SM)		########## (MIN 3624 SM)	
AMENITY AREA (COMMUNAL) :	**3 SM/UNIT**	296.33 SM (MIN 180 SM)		########## (MIN 1812 SM)	
PLANNED UNIT DEVELOPMENT:					
MIN. WIDTH OF PRIVATE WAY (WITHIN A PUD):	**6M**	**6M**		**8.6M**	
MIN. SEPARTION BETWEEN BUILDINGS (WITHIN A PUD):	**3M**	**9.1M**		**6M**	

THESE DRAWINGS ARE NOT TO BE SCALED:
ALL DIMENSIONS MUST BE VERIFIED BY CONTRACTOR PRIOR TO COMMENCEMENT OF ANY WORK. ANY DISCREPANCIES MUST BE REPORTED DIRECTLY TO SRN ARCHITECTS INC.

NO:	DATE:	ISSUED FOR:
11	07-SEP-22	REV. PER CLIENT
12	16-SEP-22	REV. PER CLIENT
13	11-OCT-22	REV. PER CLIENT
14	25-OCT-22	REV. PER SPA
15	14-DEC-22	REV. PER CLIENT
16	01-MAY-23	REV. PER CLIENT
17	17-MAY-23	REV. PER CLIENT
18	23-MAY-23	RE-ISSUED FOR SPA
19	26-JUN-23	REV. PER CLIENT
20	10-OCT-23	REV. PER CLIENT

ADDITIONAL NOTES:
PART OF LOT 14
CONCESSION 2 (RIDEAU FRONT)
GEOGRAPHIC TOWNSHIP OF NEPEAN
CITY OF OTTAWA
STANTEC GEOMATICS, 2021

LEGEND
- MAIN ENTRANCE
- BICYCLE PARKING, REFER TO LANDSCAPE DRAWINGS
- BARRIER FREE PARKING
- VISITOR PARKING
- RESIDENT PARKING
- TACTILE INDICATOR

FOR SITE GRADING AND SERVICING REFER TO CIVIL DRAWINGS

PRELIMINARY, NOT FOR CONSTRUCTION
ALL AREAS CALCULATIONS ARE PRELIMINARY

NO:	DATE:	REVISION COMMENT:

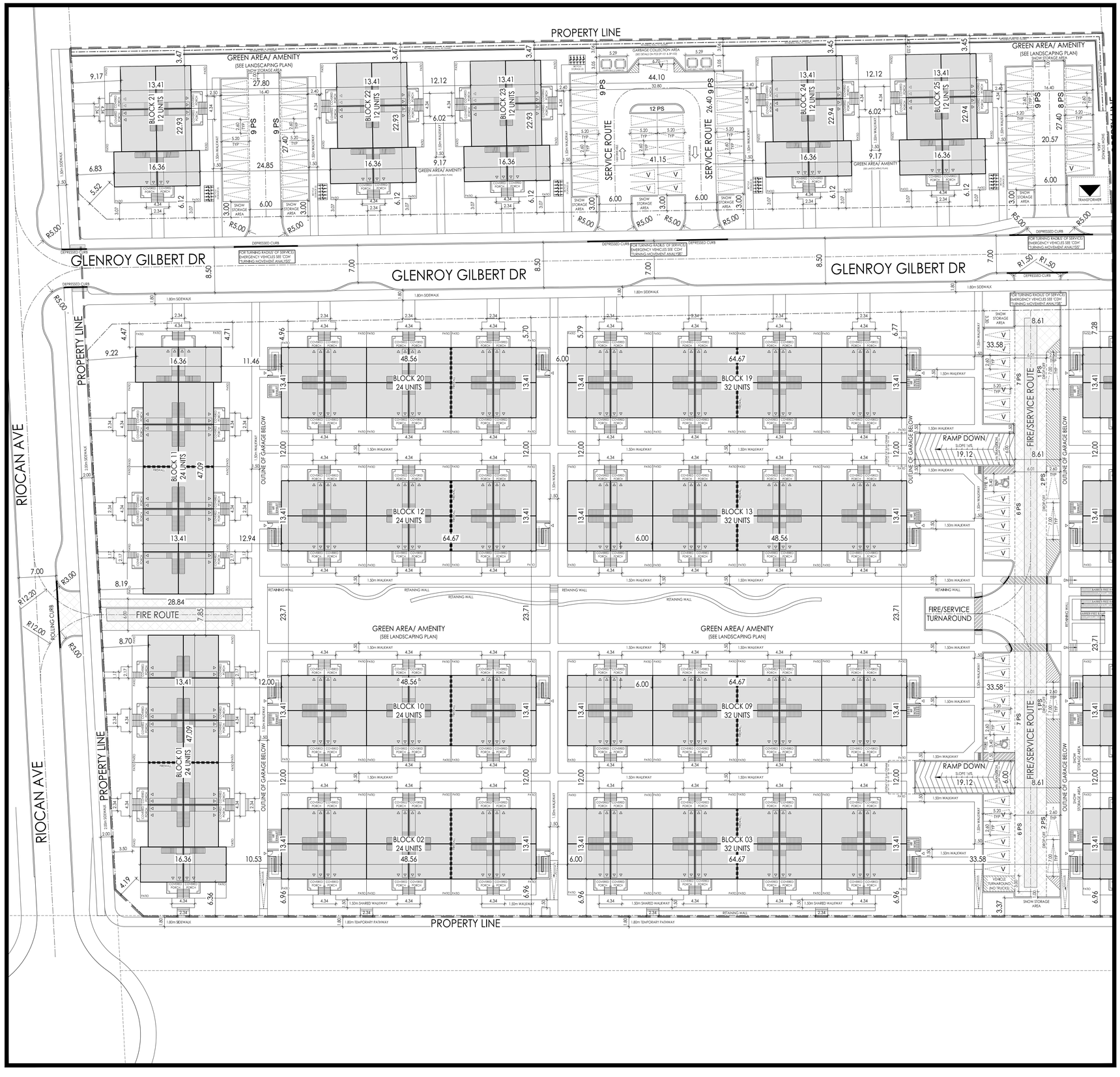
SRN ARCHITECTS
8395 JANE STREET, SUITE 203
VAUGHAN, ONTARIO. L4K 5Y2
PHONE: 905.417.5515 FAX: 905.417.5517

CLIENT:
Minto Communities Canada
200-180 Kent Street
Ottawa, Ontario K1P 0B6

PROJECT:
Barrhaven Town Centre - Anthem
Ottawa, Ontario

DRAWING TITTLE:
SITE PLAN

DATE: 2022-02-03	SCALE: 1:500
DRAWN BY: AB	CHECKED BY: GR
PROJECT NUMBER: S21001	DRAWING NUMBER: A101



1 / A101 SITE PLAN (EAST SIDE)
1:300

THESE DRAWINGS ARE NOT TO BE SCALED:
ALL DIMENSIONS MUST BE VERIFIED BY CONTRACTOR PRIOR TO COMMENCEMENT OF ANY WORK. ANY DISCREPANCIES MUST BE REPORTED DIRECTLY TO SRN ARCHITECTS INC.

NO.	DATE:	ISSUED FOR:
11	07-SEP-22	REV. PER CLIENT
12	16-SEP-22	REV. PER CLIENT
13	11-OCT-22	REV. PER CLIENT
14	25-OCT-22	REV. PER SPA
15	14-DEC-22	REV. PER CLIENT
16	01-MAY-23	REV. PER CLIENT
17	17-MAY-23	REV. PER CLIENT
18	23-MAY-23	RE-ISSUED FOR SPA
19	26-JUN-23	REV. PER CLIENT
20	10-OCT-23	REV. PER CLIENT

ADDITIONAL NOTES:
PART OF LOT 14
CONCESSION 2 (RIDEAU FRONT)
GEOGRAPHIC TOWNSHIP OF NEPEAN
CITY OF OTTAWA
STANTEC GEOMATICS, 2021

LEGEND
- MAIN ENTRANCE
- BICYCLE PARKING, REFER TO LANDSCAPE DRAWINGS
- BARRIER FREE PARKING
- VISITOR PARKING
- RESIDENT PARKING
- TACTILE INDICATOR

FOR SITE GRADING AND SERVICING REFER TO CIVIL DRAWINGS

PRELIMINARY, NOT FOR CONSTRUCTION
ALL AREAS CALCULATIONS ARE PRELIMINARY

NO.	DATE:	REVISION COMMENT:

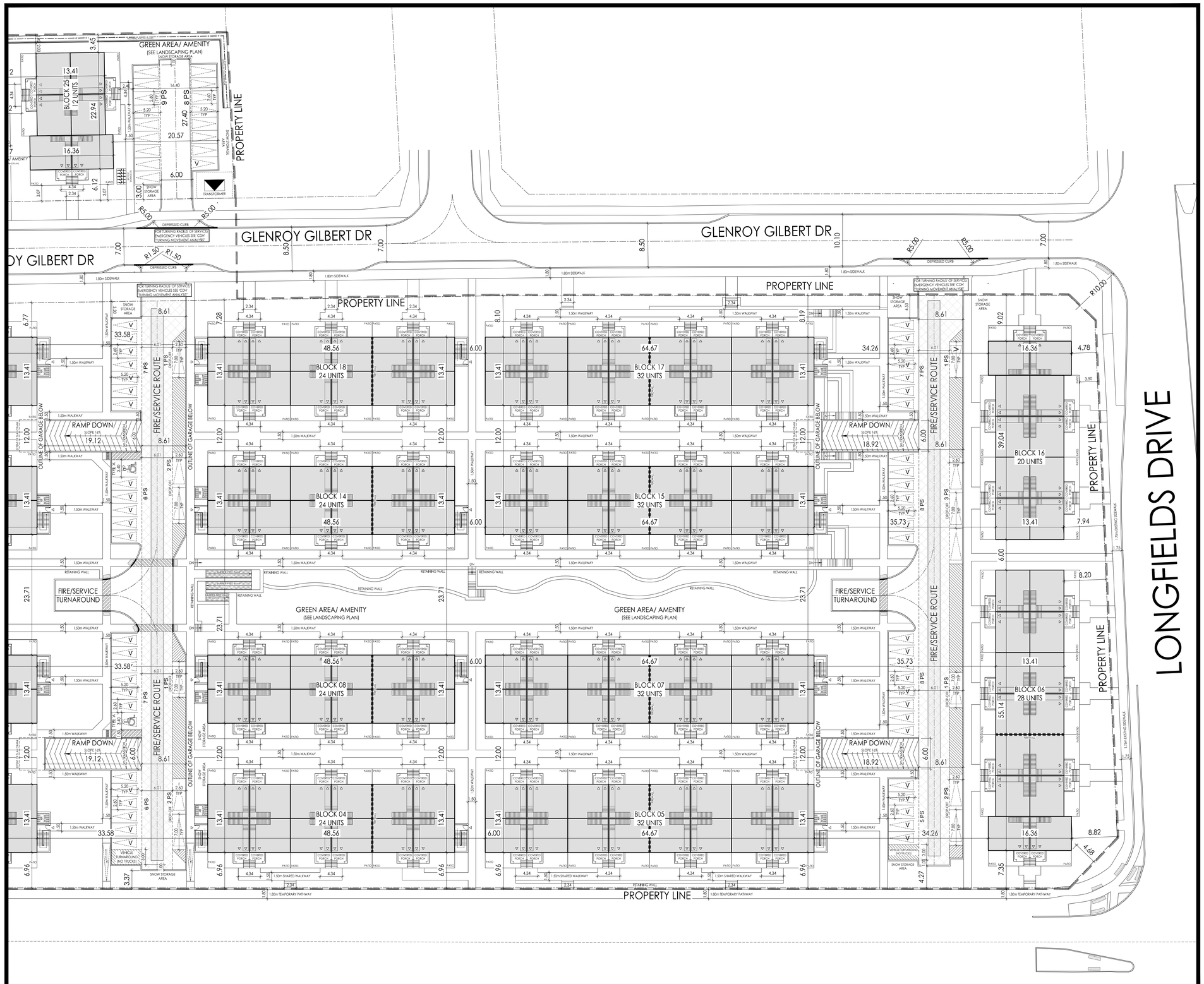
SRN ARCHITECTS
8395 JANE STREET, SUITE 203
VAUGHAN, ONTARIO L4K 5Y2
PHONE: 905.417.5515 FAX: 905.417.5517

CLIENT:
Minto Communities Canada
200-180 Kent Street
Ottawa, Ontario K1P 0B6

PROJECT:
Barrhaven Town Centre - Anthem
Ottawa, Ontario

DRAWING TITTLE:
SITE PLAN

DATE: 2022-02-03	SCALE: 1:500
DRAWN BY: AB	CHECKED BY: GR
PROJECT NUMBER: S21001	DRAWING NUMBER: A102



1 A102 SITE PLAN (WEST SIDE)
1:300

THESE DRAWINGS ARE NOT TO BE SCALED:
ALL DIMENSIONS MUST BE VERIFIED BY CONTRACTOR PRIOR TO COMMENCEMENT OF ANY WORK. ANY DISCREPANCIES MUST BE REPORTED DIRECTLY TO SRN ARCHITECTS INC.

NO:	DATE:	ISSUED FOR:
11	07-SEP-22	REV. PER CLIENT
12	16-SEP-22	REV. PER CLIENT
13	11-OCT-22	REV. PER CLIENT
14	25-OCT-22	REV. PER SPA
15	14-DEC-22	REV. PER CLIENT
16	01-MAY-23	REV. PER CLIENT
17	17-MAY-23	REV. PER CLIENT
18	23-MAY-23	RE-ISSUED FOR SPA
19	26-JUN-23	REV. PER CLIENT
20	10-OCT-23	REV. PER CLIENT

ADDITIONAL NOTES:
PART OF LOT 14
CONCESSION 2 (RIDEAU FRONT)
GEOGRAPHIC TOWNSHIP OF NEPEAN
CITY OF OTTAWA
STANTEC GEOMATICS, 2021

LEGEND
- MAIN ENTRANCE
- BICYCLE PARKING, REFER TO LANDSCAPE DRAWINGS
- BARRIER FREE PARKING
- VISITOR PARKING
- RESIDENT PARKING
- TACTILE INDICATOR

FOR SITE GRADING AND SERVICING REFER TO CIVIL DRAWINGS

PRELIMINARY, NOT FOR CONSTRUCTION
ALL AREAS CALCULATIONS ARE PRELIMINARY

NO:	DATE:	REVISION COMMENT:

SRN ARCHITECTS
8395 JANE STREET, SUITE 203
VAUGHAN, ONTARIO. L4K 5Y2
PHONE: 905.417.5515 FAX: 905.417.5517

CLIENT:
Minto Communities Canada
200-180 Kent Street
Ottawa, Ontario K1P 0B6

PROJECT:
Barrhaven Town Centre - Anthem
Ottawa, Ontario

DRAWING TITTLE:
SITE PLAN

DATE: 2022-02-03	SCALE: 1:500
DRAWN BY: AB	CHECKED BY: GR
PROJECT NUMBER: S21001	DRAWING NUMBER: A103

APPENDIX B

Hydraulic Network Analysis

BTC Stage 1 - Block A
Proposed Site Conditions

Water Demand Design Flows per Unit Count
City of Ottawa - Water Distribution Guidelines, July 2010

Domestic Demand

Type of Housing	Per / Unit	Units	Pop
Single Family	3.4	-	0
Semi-detached	2.7	-	0
Townhouse	2.7	-	0
Apartment			0
Bachelor	1.4	-	0
1 Bedroom	1.4	-	0
2 Bedroom	2.1	60	126
3 Bedroom	3.1	-	0
Average	1.8	-	0

	Pop	Avg. Daily		Max Day		Peak Hour	
		m^3/d	L/min	m^3/d	L/min	m^3/d	L/min
Total Domestic Demand	126	35.3	24.5	172.9	120.1	261.1	181.3

Institutional / Commercial / Industrial Demand

			Avg. Daily		Max Day		Peak Hour	
Property Type	**Unit Rate**	**Units**	m^3/d	L/min	m^3/d	L/min	m^3/d	L/min
Commercial floor space	2.5 $L/m^2/d$	-	0.00	0.0	0.0	0.0	0.0	0.0
Office	75 $L/9.3m^2/d$	-	0.00	0.0	0.0	0.0	0.0	0.0
Restaurant*	125 L/seat/d	-	0.00	0.0	0.0	0.0	0.0	0.0
Industrial - Light	35,000 L/gross ha/d	-	0.00	0.0	0.0	0.0	0.0	0.0
Industrial - Heavy	55,000 L/gross ha/d	-	0.00	0.0	0.0	0.0	0.0	0.0
Total I/CI Demand			0.0	0.0	0.0	0.0	0.0	0.0
Total Demand			**35.3**	**24.5**	**172.9**	**120.1**	**261.1**	**181.3**

* Estimated number of seats at 1 seat per $9.3m^2$

BTC Stage 1 - Block B
Proposed Site Conditions

Water Demand Design Flows per Unit Count
City of Ottawa - Water Distribution Guidelines, July 2010

Domestic Demand

Type of Housing	Per / Unit	Units	Pop
Single Family	3.4	-	0
Semi-detached	2.7	-	0
Townhouse	2.7	-	0
Apartment			0
Bachelor	1.4	-	0
1 Bedroom	1.4	-	0
2 Bedroom	2.1	544	1143
3 Bedroom	3.1	-	0
Average	1.8	-	0

	Pop	Avg. Daily		Max Day		Peak Hour	
		m^3/d	L/min	m^3/d	L/min	m^3/d	L/min
Total Domestic Demand	1143	320.0	222.3	800.1	555.6	1760.2	1222.4

Institutional / Commercial / Industrial Demand

			Avg. Daily		Max Day		Peak Hour	
Property Type	**Unit Rate**	**Units**	m^3/d	L/min	m^3/d	L/min	m^3/d	L/min
Commercial floor space	2.5 $L/m^2/d$	-	0.00	0.0	0.0	0.0	0.0	0.0
Office	75 $L/9.3m^2/d$	-	0.00	0.0	0.0	0.0	0.0	0.0
Restaurant*	125 L/seat/d	-	0.00	0.0	0.0	0.0	0.0	0.0
Industrial - Light	35,000 L/gross ha/d	-	0.00	0.0	0.0	0.0	0.0	0.0
Industrial - Heavy	55,000 L/gross ha/d	-	0.00	0.0	0.0	0.0	0.0	0.0
Total I/CI Demand			0.0	0.0	0.0	0.0	0.0	0.0
Total Demand			**320.0**	**222.3**	**800.1**	**555.6**	**1760.2**	**1222.4**

* Estimated number of seats at 1 seat per $9.3m^2$

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 2020

Fire Flow Required

1. Base Requirement

$F = 220C\sqrt{A}$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Wood Frame

C	1.5		*Type of Construction Coefficient per FUS Part II, Section 1*
A	1301.0	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	11902.9	L/min	
	12000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%	
Fire Flow	**10200.0**	**L/min**

3. Reduction for Sprinkler Protection

Non-Sprinklered	0%	
Reduction	**0**	**L/min**

4. Increase for Separation Distance

	Cons. of Exposed Wall	S.D	Lw	Ha	LH	EC	
N	Wood Frame	20.1m-30m	33	3	99	10%	
S	Wood Frame	10.1m-20m	33	3	99	15%	
E	Wood Frame	0m-3m	13	3	39	23%	
W	Wood Frame	3.1m-10m	13	3	39	18%	
		% Increase				**66%**	*value not to exceed 75%*

Increase	**6732.0**	**L/min**

Lw = Length of the Exposed Wall
Ha = number of storeys of the adjacent structure. Max 5 stories
LH = Length-height factor of exposed wall. Value rounded up.
EC = Exposure Charge

Total Fire Flow

Fire Flow	16932.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	17000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by _____.
-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 2020

Fire Flow Required

1. Base Requirement

$F = 220C\sqrt{A}$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Wood Frame

C	1.5		*Type of Construction Coefficient per FUS Part II, Section 1*
A	1301.3	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	11904.3	L/min	
	12000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%	
Fire Flow	**10200.0**	**L/min**

3. Reduction for Sprinkler Protection

Non-Sprinklered	0%	
Reduction	**0**	**L/min**

4. Increase for Separation Distance

	Cons. of Exposed Wall	S.D	Lw	Ha	LH	EC
N	Wood Frame	3.1m-10m	16	3	48	18%
S	Wood Frame	0m-3m	13	3	39	23%
E	Wood Frame	>45m	32	3	96	0%
W	Wood Frame	30.1m-45m	32	3	96	5%
		% Increase				**46%** *value not to exceed 75%*

Increase	**4692.0**	**L/min**

Lw = Length of the Exposed Wall
Ha = number of storeys of the adjacent structure. Max 5 stories
LH = Length-height factor of exposed wall. Value rounded up.
EC = Exposure Charge

Total Fire Flow

Fire Flow	14892.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section*
	15000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by _____.
-Calculations based on Fire Underwriters Survey - Part II

Fig 1 – AVERAGE DAY

```
*************************************************************************
*                            E P A N E T                                *
*                      Hydraulic and Water Quality                      *
*                      Analysis for Pipe Networks                       *
*                            Version 2.0                                *
*************************************************************************
```

Input File: 2023-10-02_816_average-day.net

15-816: Minto - BTC Stage 1

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
12	4	7	25.0	200
13	5	6	9.0	200
16	8	9	83	200
17	9	10	6.6	200
18	10	11	2.5	200
19	11	CON-2	39.0	200
24	33	14	23.5	50
26	15	16	23.5	50
30	19	20	23.5	50
35	35	36	47.0	50
36	36	37	52.5	50
37	36	38	21.5	50
39	40	6	29.5	150
43	11	43	40	150
46	42	45	22.0	150
47	45	30	34.0	150
50	47	48	6.0	150
51	48	49	17.0	150
52	48	50	24.5	50
53	50	51	39.5	50
54	50	52	57.5	50
56	53	32	20.5	150
57	54	49	23.0	50
48	42	3	63.0	150
58	3	46	61	150
9	28	32	41	150
62	17	18	23.5	50
63	12	14	57.5	50
64	14	15	10	150
65	15	17	10	150
66	17	19	10	150
67	19	31	10	150
68	31	22	10	150
69	29	31	26.0	50
70	23	22	23.5	50
71	22	10	15.5	150
72	5	14	15.5	150

Link - Node Table: (continued)

Link ID	Start Node	End Node	Length m	Diameter mm
78	38	41	32.0	50
79	7	6	17.5	200
80	5	8	53.5	200
82	57	30	31.0	150
83	38	1	64	150
84	1	58	60	150

86	43	42	26.5	150
88	59	32	33.5	150
89	47	60	14.5	150
90	60	53	25.0	150
91	40	61	25.0	150
92	61	38	6.0	150
93	41	62	18.5	50
5	42	2	23.2	150
6	2	58	8.7	150
7	46	13	8.8	150
8	13	47	24	150
10	24	CON-1	10	200
11	24	4	9.5	200
14	4	25	55.5	200
15	25	21	56.8	200
20	21	26	22.4	200
21	28	CON-3	41	300

Node Results:

Node ID	Demand LPM	Head m	Pressure m	Quality
4	0.00	147.90	49.89	0.00
5	0.00	147.90	50.00	0.00
6	0.00	147.90	49.90	0.00
8	0.00	147.90	50.24	0.00
9	0.00	147.90	50.75	0.00
10	0.00	147.90	50.70	0.00
11	0.00	147.90	50.67	0.00
12	2.50	147.90	48.89	0.00
14	0.00	147.90	49.94	0.00
15	0.00	147.90	49.78	0.00
16	5.00	147.90	49.79	0.00
17	0.00	147.90	50.25	0.00
18	2.50	147.90	50.14	0.00
19	0.00	147.90	50.36	0.00
20	2.50	147.90	50.27	0.00
22	0.00	147.90	50.63	0.00
23	2.50	147.90	50.38	0.00
25	0.00	147.90	50.15	0.00

Node Results: (continued)

Node ID	Demand LPM	Head m	Pressure m	Quality
26	0.00	147.90	50.75	0.00
30	0.00	147.89	53.50	0.00
32	0.00	147.89	55.38	0.00
33	2.50	147.90	49.65	0.00
35	5.10	147.88	49.97	0.00
36	0.00	147.88	50.40	0.00
37	5.10	147.88	50.63	0.00
38	0.00	147.89	50.50	0.00
40	0.00	147.90	50.10	0.00
41	0.00	147.89	50.70	0.00
42	0.00	147.89	52.98	0.00
43	0.00	147.89	51.12	0.00
45	0.00	147.89	53.34	0.00
46	45.90	147.89	53.96	0.00
47	5.80	147.89	54.75	0.00
48	0.00	147.89	54.84	0.00
49	0.00	147.89	54.69	0.00
50	0.00	147.88	54.53	0.00
51	4.10	147.88	54.36	0.00

52	5.80	147.87	54.96	0.00	
53	0.00	147.89	55.12	0.00	
54	4.10	147.89	51.31	0.00	
1	0.00	147.89	51.36	0.00	
3	0.00	147.89	53.64	0.00	
28	0.00	147.90	55.50	0.00	
29	5.00	147.90	50.34	0.00	
31	0.00	147.90	50.26	0.00	
7	0.00	147.90	50.13	0.00	
57	45.90	147.89	52.62	0.00	
58	45.90	147.89	51.76	0.00	
59	45.90	147.89	54.66	0.00	
60	5.80	147.89	54.87	0.00	
61	5.10	147.90	50.39	0.00	
62	5.10	147.89	50.85	0.00	
2	0.00	147.89	51.89	0.00	
13	0.00	147.89	54.09	0.00	
21	0.00	147.90	51.00	0.00	
24	0.00	147.90	49.70	0.00	
CON-2	-92.70	147.90	0.00	0.00	Reservoir
CON-3	-94.93	147.90	0.00	0.00	Reservoir
CON-1	-64.47	147.90	0.00	0.00	Reservoir

Link Results:

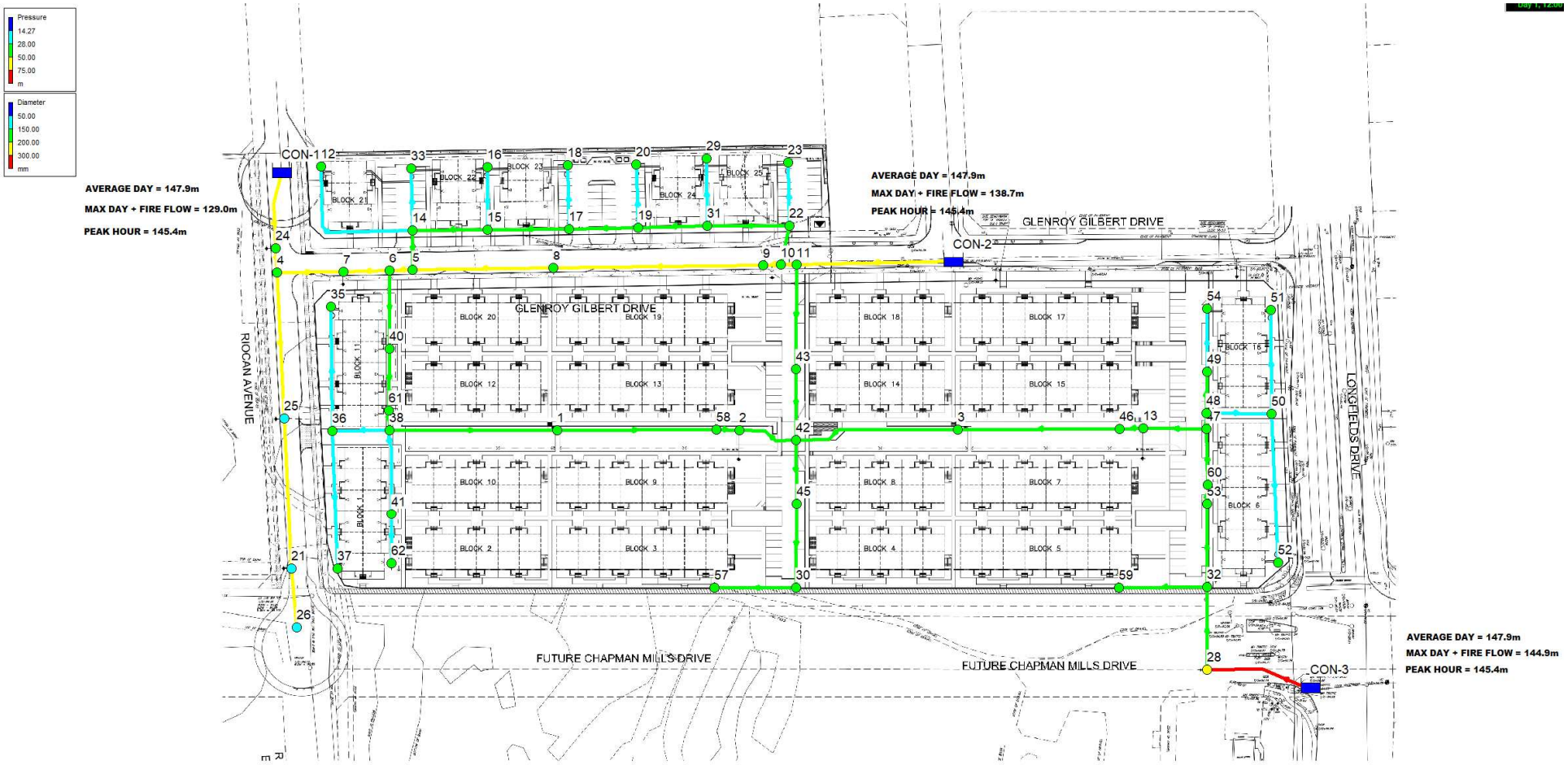
Link ID	Flow LPM	Velocity m/s	Unit Headloss m/km	Status
12	64.47	0.03	0.02	Open
13	-6.60	0.00	0.00	Open
16	-4.51	0.00	0.00	Open
17	-4.51	0.00	0.00	Open
18	-15.90	0.01	0.00	Open
19	-92.70	0.05	0.03	Open
24	-2.50	0.02	0.04	Open
26	5.00	0.04	0.14	Open
30	2.50	0.02	0.04	Open
35	-5.10	0.04	0.14	Open
36	5.10	0.04	0.14	Open
37	-10.20	0.09	0.52	Open
39	-57.87	0.05	0.07	Open
43	76.80	0.07	0.11	Open
46	45.90	0.04	0.04	Open
47	45.90	0.04	0.04	Open
50	14.00	0.01	0.00	Open
51	4.10	0.00	0.00	Open
52	9.90	0.08	0.49	Open
53	4.10	0.03	0.09	Open
54	5.80	0.05	0.17	Open
56	-49.03	0.05	0.05	Open
57	-4.10	0.03	0.09	Open
48	22.47	0.02	0.01	Open
58	22.47	0.02	0.01	Open
9	94.93	0.09	0.15	Open
62	2.50	0.02	0.04	Open
63	-2.50	0.02	0.04	Open
64	6.11	0.01	0.00	Open
65	1.11	0.00	0.00	Open
66	-1.39	0.00	0.00	Open
67	-3.89	0.00	0.00	Open
68	-8.89	0.01	0.00	Open
69	-5.00	0.04	0.13	Open
70	-2.50	0.02	0.04	Open
71	-11.39	0.01	0.00	Open
72	11.11	0.01	0.00	Open

78	5.10	0.04	0.14	Open
79	64.47	0.03	0.02	Open
80	-4.51	0.00	0.00	Open
82	-45.90	0.04	0.04	Open
83	37.47	0.04	0.03	Open
84	37.47	0.04	0.03	Open
86	76.80	0.07	0.10	Open
88	-45.90	0.04	0.04	Open
89	-43.23	0.04	0.04	Open
90	-49.03	0.05	0.04	Open

Link Results: (continued)

Link ID	Flow LPM	Velocity m/s	Unit Headloss m/km	Status
91	57.87	0.05	0.06	Open
92	52.77	0.05	0.06	Open
93	5.10	0.04	0.14	Open
5	8.43	0.01	0.00	Open
6	8.43	0.01	0.00	Open
7	-23.43	0.02	0.01	Open
8	-23.43	0.02	0.01	Open
10	-64.47	0.03	0.02	Open
11	64.47	0.03	0.02	Open
14	0.00	0.00	0.00	Open
15	0.00	0.00	0.00	Open
20	0.00	0.00	0.00	Open
21	-94.93	0.02	0.00	Open

Fig 2 – MAX DAY + FIRE FLOW



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*********************************************************************
*                            E P A N E T                            *
*                     Hydraulic and Water Quality                   *
*                     Analysis for Pipe Networks                    *
*                          Version 2.0                              *
*********************************************************************
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Input File: 2023-10-02_816_max-ff(blk10)_Scenario-2.net

15-816: Minto - BTC Stage 1

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
12	4	7	25.0	200
13	5	6	9.0	200
16	8	9	83	200
17	9	10	6.6	200
18	10	11	2.5	200
19	11	CON-2	39.0	200
24	33	14	23.5	50
26	15	16	23.5	50
30	19	20	23.5	50
35	35	36	47.0	50
36	36	37	52.5	50
37	36	38	21.5	50
39	40	6	29.5	150
43	11	43	40	150
46	42	45	22.0	150
47	45	30	34.0	150
50	47	48	6.0	150
51	48	49	17.0	150
52	48	50	24.5	50
53	50	51	39.5	50
54	50	52	57.5	50
56	53	32	20.5	150
57	54	49	23.0	50
48	42	3	63.0	150
58	3	46	61	150
9	28	32	41	150
62	17	18	23.5	50
63	12	14	57.5	50
64	14	15	10	150
65	15	17	10	150
66	17	19	10	150
67	19	31	10	150
68	31	22	10	150
69	29	31	26.0	50
70	23	22	23.5	50
71	22	10	15.5	150
72	5	14	15.5	150

Link - Node Table: (continued)

Link ID	Start Node	End Node	Length m	Diameter mm
78	38	41	32.0	50
79	7	6	17.5	200
80	5	8	53.5	200
82	57	30	31.0	150
83	38	1	64	150
84	1	58	60	150

86	43	42	26.5	150
88	59	32	33.5	150
89	47	60	14.5	150
90	60	53	25.0	150
91	40	61	25.0	150
92	61	38	6.0	150
93	41	62	18.5	50
5	42	2	23.2	150
6	2	58	8.7	150
7	46	13	8.8	150
8	13	47	24	150
10	24	CON-1	10	200
11	24	4	9.5	200
14	4	25	55.5	200
15	25	21	56.8	200
20	21	26	22.4	200
21	28	CON-3	41	300

Node Results:

Node ID	Demand LPM	Head m	Pressure m	Quality
4	0.00	126.18	28.17	0.00
5	0.00	126.98	29.08	0.00
6	0.00	126.61	28.61	0.00
8	3700.00	127.22	29.56	0.00
9	0.00	131.30	34.15	0.00
10	0.00	131.90	34.70	0.00
11	0.00	132.59	35.36	0.00
12	6.25	128.16	29.15	0.00
14	0.00	128.17	30.21	0.00
15	0.00	128.66	30.54	0.00
16	12.50	128.64	30.53	0.00
17	0.00	129.15	31.50	0.00
18	6.25	129.15	31.39	0.00
19	0.00	129.65	32.11	0.00
20	6.25	129.64	32.01	0.00
22	0.00	130.65	33.38	0.00
23	6.25	130.64	33.12	0.00
25	5700.00	122.62	24.87	0.00

Node Results: (continued)

Node ID	Demand LPM	Head m	Pressure m	Quality
26	0.00	122.62	25.47	0.00
30	0.00	130.48	36.09	0.00
32	0.00	142.32	49.81	0.00
33	6.25	128.17	29.92	0.00
35	12.75	126.37	28.46	0.00
36	0.00	126.41	28.93	0.00
37	12.75	126.37	29.12	0.00
38	0.00	126.47	29.08	0.00
40	0.00	126.54	28.74	0.00
41	0.00	126.45	29.26	0.00
42	0.00	130.49	35.58	0.00
43	0.00	131.28	34.51	0.00
45	0.00	130.49	35.94	0.00
46	114.75	136.45	42.52	0.00
47	14.50	138.57	45.43	0.00
48	0.00	138.57	45.52	0.00
49	0.00	138.57	45.37	0.00
50	0.00	138.50	45.15	0.00
51	10.25	138.48	44.96	0.00

52	14.50	138.45	45.54	0.00	
53	0.00	140.84	48.07	0.00	
54	10.25	138.55	41.97	0.00	
1	0.00	126.37	29.84	0.00	
3	0.00	133.73	39.48	0.00	
28	0.00	144.82	52.42	0.00	
29	12.50	130.13	32.57	0.00	
31	0.00	130.15	32.51	0.00	
7	3800.00	126.15	28.38	0.00	
57	114.75	130.48	35.21	0.00	
58	114.75	126.28	30.15	0.00	
59	114.75	142.32	49.09	0.00	
60	14.50	139.46	46.44	0.00	
61	12.75	126.49	28.98	0.00	
62	12.75	126.43	29.39	0.00	
2	3800.00	126.27	30.27	0.00	
13	0.00	137.00	43.20	0.00	
21	0.00	122.62	25.72	0.00	
24	0.00	127.29	29.09	0.00	
CON-2	-8970.31	138.70	0.00	0.00	Reservoir
CON-3	-2366.85	144.90	0.00	0.00	Reservoir
CON-1	-6293.09	129.00	0.00	0.00	Reservoir

Link Results:

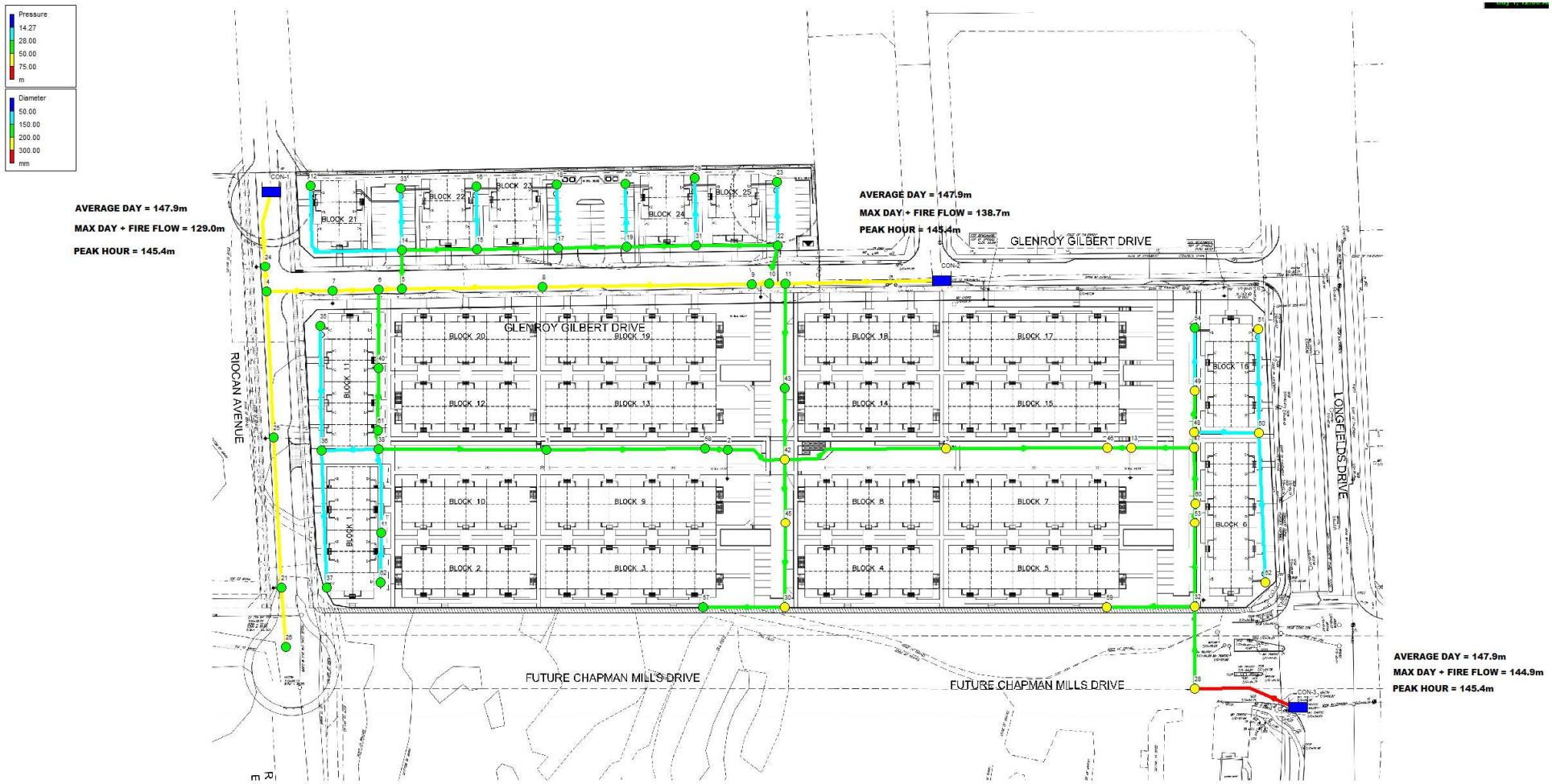
Link ID	Flow LPM	Velocity m/s	Unit Headloss m/km	Status
12	593.09	0.31	1.27	Open
13	3597.76	1.91	40.97	Open
16	-5083.71	2.70	49.11	Open
17	-5083.71	2.70	91.34	Open
18	-7354.01	3.90	278.07	Open
19	-8970.31	4.76	156.56	Open
24	-6.25	0.05	0.21	Open
26	12.50	0.11	0.75	Open
30	6.25	0.05	0.21	Open
35	-12.75	0.11	0.76	Open
36	12.75	0.11	0.75	Open
37	-25.50	0.22	2.88	Open
39	-390.85	0.37	2.41	Open
43	1616.30	1.52	32.86	Open
46	114.75	0.11	0.22	Open
47	114.75	0.11	0.24	Open
50	35.00	0.03	0.03	Open
51	10.25	0.01	0.00	Open
52	24.75	0.21	2.67	Open
53	10.25	0.09	0.50	Open
54	14.50	0.12	0.95	Open
56	-2252.10	2.12	72.21	Open
57	-10.25	0.09	0.51	Open
48	-2073.35	1.96	51.38	Open
58	-2073.35	1.96	44.64	Open
9	2366.85	2.23	60.78	Open
62	6.25	0.05	0.21	Open
63	-6.25	0.05	0.20	Open
64	-2226.54	2.10	48.75	Open
65	-2239.04	2.11	49.26	Open
66	-2245.29	2.12	49.51	Open
67	-2251.54	2.12	49.77	Open
68	-2264.04	2.14	50.28	Open
69	-12.50	0.11	0.74	Open
70	-6.25	0.05	0.20	Open
71	-2270.29	2.14	80.67	Open
72	-2214.04	2.09	76.90	Open

78	12.75	0.11	0.77	Open
79	-3206.91	1.70	26.52	Open
80	-1383.71	0.73	4.48	Open
82	-114.75	0.11	0.22	Open
83	339.85	0.32	1.57	Open
84	339.85	0.32	1.55	Open
86	1616.30	1.52	29.62	Open
88	-114.75	0.11	0.24	Open
89	-2237.60	2.11	61.72	Open
90	-2252.10	2.12	55.31	Open

Link Results: (continued)

Link ID	Flow LPM	VelocityUnit m/s	Headloss m/km	Status
91	390.85	0.37	2.11	Open
92	378.10	0.36	2.69	Open
93	12.75	0.11	0.74	Open
5	3574.90	3.37	182.06	Open
6	-225.10	0.21	0.86	Open
7	-2188.10	2.06	61.99	Open
8	-2188.10	2.06	65.28	Open
10	-6293.09	3.34	171.13	Open
11	6293.09	3.34	116.74	Open
14	5700.00	3.02	64.10	Open
15	0.00	0.00	0.00	Open
20	0.00	0.00	0.00	Open
21	-2366.85	0.56	2.03	Open

Fig 3 – PEAK HOUR



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*************************************************************************
*                            E P A N E T                                *
*                      Hydraulic and Water Quality                      *
*                      Analysis for Pipe Networks                       *
*                            Version 2.0                                *
*************************************************************************
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Input File: 2023-10-02_816_peak-hour.net

15-816: Minto - BTC Stage 1

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
12	4	7	25.0	200
13	5	6	9.0	200
16	8	9	83	200
17	9	10	6.6	200
18	10	11	2.5	200
19	11	CON-2	39.0	200
24	33	14	23.5	50
26	15	16	23.5	50
30	19	20	23.5	50
35	35	36	47.0	50
36	36	37	52.5	50
37	36	38	21.5	50
39	40	6	29.5	150
43	11	43	40	150
46	42	45	22.0	150
47	45	30	34.0	150
50	47	48	6.0	150
51	48	49	17.0	150
52	48	50	24.5	50
53	50	51	39.5	50
54	50	52	57.5	50
56	53	32	20.5	150
57	54	49	23.0	50
48	42	3	63.0	150
58	3	46	61	150
9	28	32	41	150
62	17	18	23.5	50
63	12	14	57.5	50
64	14	15	10	150
65	15	17	10	150
66	17	19	10	150
67	19	31	10	150
68	31	22	10	150
69	29	31	26.0	50
70	23	22	23.5	50
71	22	10	15.5	150
72	5	14	15.5	150

Link - Node Table: (continued)

Link ID	Start Node	End Node	Length m	Diameter mm
78	38	41	32.0	50
79	7	6	17.5	200
80	5	8	53.5	200
82	57	30	31.0	150
83	38	1	64	150
84	1	58	60	150

86	43	42	26.5	150
88	59	32	33.5	150
89	47	60	14.5	150
90	60	53	25.0	150
91	40	61	25.0	150
92	61	38	6.0	150
93	41	62	18.5	50
5	42	2	23.2	150
6	2	58	8.7	150
7	46	13	8.8	150
8	13	47	24	150
10	24	CON-1	10	200
11	24	4	9.5	200
14	4	25	55.5	200
15	25	21	56.8	200
20	21	26	22.4	200
21	28	CON-3	41	300

Node Results:

Node ID	Demand LPM	Head m	Pressure m	Quality
4	0.00	145.39	47.38	0.00
5	0.00	145.37	47.47	0.00
6	0.00	145.37	47.37	0.00
8	0.00	145.37	47.71	0.00
9	0.00	145.37	48.22	0.00
10	0.00	145.37	48.17	0.00
11	0.00	145.37	48.14	0.00
12	13.75	145.32	46.31	0.00
14	0.00	145.37	47.41	0.00
15	0.00	145.37	47.25	0.00
16	27.50	145.29	47.18	0.00
17	0.00	145.37	47.72	0.00
18	13.75	145.35	47.59	0.00
19	0.00	145.37	47.83	0.00
20	13.75	145.35	47.72	0.00
22	0.00	145.37	48.10	0.00
23	13.75	145.35	47.83	0.00
25	0.00	145.39	47.64	0.00

Node Results: (continued)

Node ID	Demand LPM	Head m	Pressure m	Quality
26	0.00	145.39	48.24	0.00
30	0.00	145.14	50.75	0.00
32	0.00	145.25	52.74	0.00
33	13.75	145.35	47.10	0.00
35	28.05	144.85	46.94	0.00
36	0.00	145.01	47.53	0.00
37	28.05	144.84	47.59	0.00
38	0.00	145.28	47.89	0.00
40	0.00	145.32	47.52	0.00
41	0.00	145.17	47.98	0.00
42	0.00	145.20	50.29	0.00
43	0.00	145.27	48.50	0.00
45	0.00	145.18	50.63	0.00
46	252.45	145.17	51.24	0.00
47	31.90	145.18	52.04	0.00
48	0.00	145.18	52.13	0.00
49	0.00	145.18	51.98	0.00
50	0.00	144.89	51.54	0.00
51	22.55	144.81	51.29	0.00

52	31.90	144.66	51.75	0.00	
53	0.00	145.22	52.45	0.00	
54	22.55	145.13	48.55	0.00	
1	0.00	145.24	48.71	0.00	
3	0.00	145.18	50.93	0.00	
28	0.00	145.40	53.00	0.00	
29	27.50	145.29	47.73	0.00	
31	0.00	145.37	47.73	0.00	
7	0.00	145.38	47.61	0.00	
57	252.45	145.12	49.85	0.00	
58	252.45	145.20	49.07	0.00	
59	252.45	145.21	51.98	0.00	
60	31.90	145.19	52.17	0.00	
61	28.05	145.29	47.78	0.00	
62	28.05	145.11	48.07	0.00	
2	0.00	145.20	49.20	0.00	
13	0.00	145.17	51.37	0.00	
21	0.00	145.39	48.49	0.00	
24	0.00	145.39	47.19	0.00	
CON-2	-514.75	145.40	0.00	0.00	Reservoir
CON-3	-522.25	145.40	0.00	0.00	Reservoir
CON-1	-349.55	145.40	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPM	Velocity m/s	Unit Headloss m/km	Status
12	349.55	0.19	0.47	Open
13	-30.98	0.02	0.01	Open
16	-29.09	0.02	0.00	Open
17	-29.09	0.02	0.00	Open
18	-92.77	0.05	0.06	Open
19	-514.75	0.27	0.75	Open
24	-13.75	0.12	0.89	Open
26	27.50	0.23	3.24	Open
30	13.75	0.12	0.89	Open
35	-28.05	0.24	3.30	Open
36	28.05	0.24	3.23	Open
37	-56.10	0.48	12.54	Open
39	-318.57	0.30	1.64	Open
43	421.98	0.40	2.64	Open
46	252.45	0.24	0.97	Open
47	252.45	0.24	1.03	Open
50	77.00	0.07	0.12	Open
51	22.55	0.02	0.01	Open
52	54.45	0.46	11.63	Open
53	22.55	0.19	2.18	Open
54	31.90	0.27	4.11	Open
56	-269.80	0.25	1.30	Open
57	-22.55	0.19	2.21	Open
48	123.45	0.12	0.26	Open
58	123.45	0.12	0.24	Open
9	522.25	0.49	3.63	Open
62	13.75	0.12	0.89	Open
63	-13.75	0.12	0.87	Open
64	32.57	0.03	0.02	Open
65	5.07	0.00	0.00	Open
66	-8.68	0.01	0.00	Open
67	-22.43	0.02	0.01	Open
68	-49.93	0.05	0.04	Open
69	-27.50	0.23	3.22	Open
70	-13.75	0.12	0.86	Open
71	-63.68	0.06	0.09	Open
72	60.07	0.06	0.08	Open

78	28.05	0.24	3.33	Open
79	349.55	0.19	0.41	Open
80	-29.09	0.02	0.00	Open
82	-252.45	0.24	0.94	Open
83	206.37	0.19	0.62	Open
84	206.37	0.19	0.61	Open
86	421.98	0.40	2.42	Open
88	-252.45	0.24	1.04	Open
89	-237.90	0.22	0.92	Open
90	-269.80	0.25	1.06	Open

Link Results: (continued)

Link ID	Flow LPM	Velocity m/s	Unit Headloss m/km	Status
91	318.57	0.30	1.44	Open
92	290.52	0.27	1.63	Open
93	28.05	0.24	3.21	Open
5	46.08	0.04	0.05	Open
6	46.08	0.04	0.04	Open
7	-129.00	0.12	0.30	Open
8	-129.00	0.12	0.31	Open
10	-349.55	0.19	0.64	Open
11	349.55	0.19	0.47	Open
14	0.00	0.00	0.00	Open
15	0.00	0.00	0.00	Open
20	0.00	0.00	0.00	Open
21	-522.25	0.12	0.12	Open

Boundary Conditions
Minto Barrhaven Town Centre – Stage 1

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	245	4.08
Maximum Daily Demand	668	11.13
Peak Hour	1,392	23.20
Fire Flow Demand #1	17,000	283.33

Location

Results – Existing Conditions

Connection 1 – Riocan Avenue

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	157.7	78.8
Peak Hour	140.9	54.9
Max Day plus Fire 1	130.0	39.5

Ground Elevation = 102.2 m

Connection 2 – Glenroy Gilbert Drive

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	157.7	83.0
Peak Hour	140.9	59.0
Max Day plus Fire 1	139.6	57.2

Ground Elevation = 99.3 m

Connection 3 – Chapman Mills Drive

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	157.7	89.5
Peak Hour	140.8	65.5
Max Day plus Fire 1	145.7	72.4

Ground Elevation = 94.7 m

Results – SUC Zone Reconfiguration

Connection 1 – Riocan Avenue

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	147.9	64.9
Peak Hour	145.4	61.3
Max Day plus Fire 1	129.0	38.1

Ground Elevation = 102.2 m

Connection 2 – Glenroy Gilbert Drive

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	147.9	69.1
Peak Hour	145.4	65.5
Max Day plus Fire 1	138.7	56.0

Ground Elevation = 99.3 m

Connection 3 – Chapman Mills Drive

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	147.9	69.1
Peak Hour	145.4	65.5
Max Day plus Fire 1	144.9	71.2

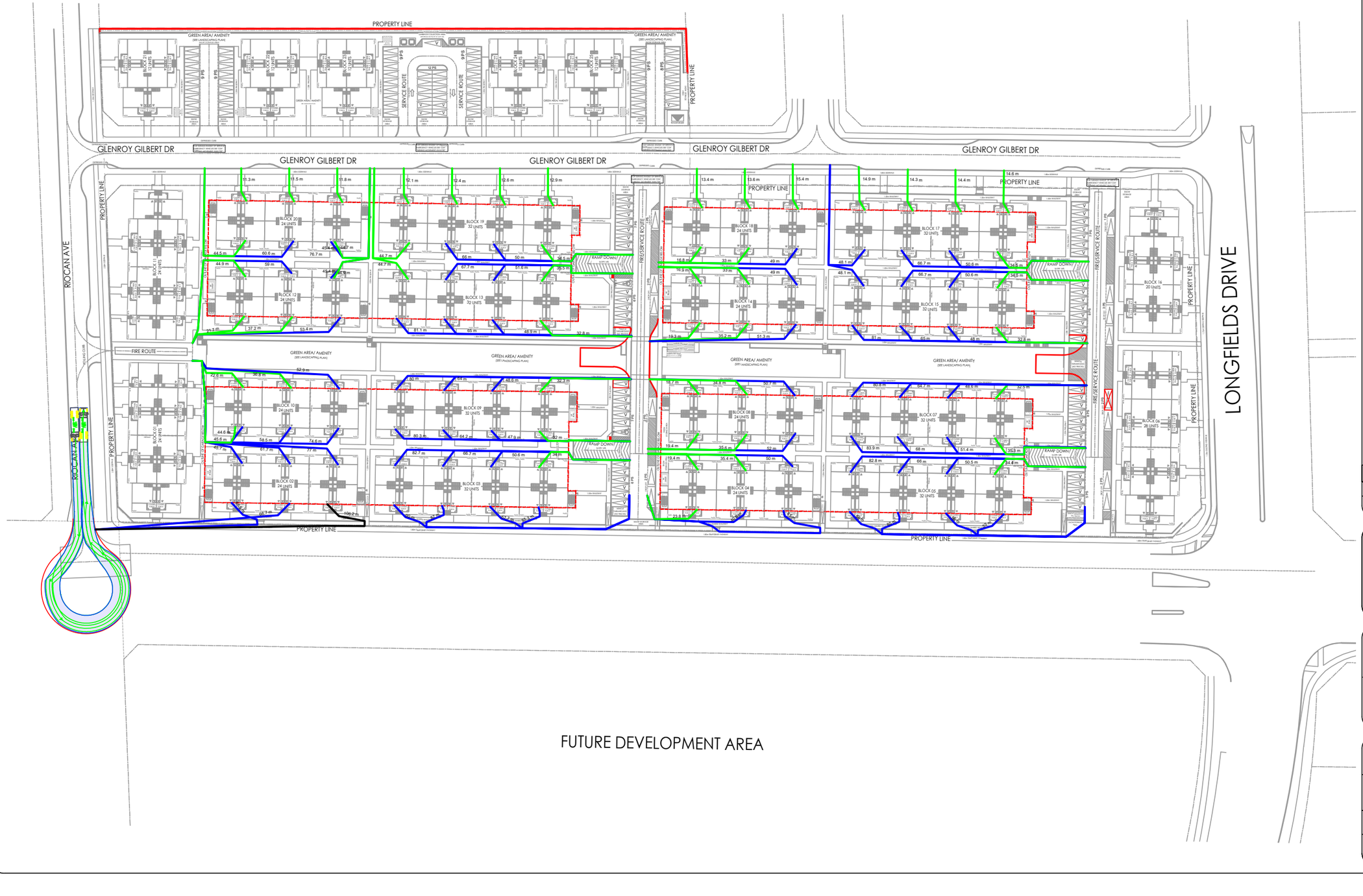
Ground Elevation = 94.7 m

Notes

1. As per the Ontario Building Code in areas that may be occupied, the static pressure at any fixture shall not exceed 552 kPa (80 psi.) Pressure control measures to be considered are as follows, in order of preference:
    a. If possible, systems to be designed to residual pressures of 345 to 552 kPa (50 to 80 psi) in all occupied areas outside of the public right-of-way without special pressure control equipment.
    b. Pressure reducing valves to be installed immediately downstream of the isolation valve in the home/ building, located downstream of the meter so it is owner maintained.

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.



Notes

Green = Within 45 metres
Blue = Within 90 metres
Black = Over 90 metres

REV:	DESCRIPTION:	BY:	DATE:
01	Issued for Review	MH	

STATUS:

Minto Communities

ARCHITECT:

SITE: Minto Town Centre

TITLE: Fire Distances (45 and 90 metres)

SCALE AT A3:	DATE:	DRAWN:	CHECKED:
NTS	2023-08-18		

PROJECT NO:	DRAWING NO:	REVISION:
	001	01

APPENDIX C

Sanitary Servicing Documents

SANITARY SEWER CALCULATION SHEET

Manning's n=0.013

LOCATION			RESIDENTIAL AREA AND POPULATION									COMM		INSTIT		PARK		C+I+I	INFILTRATION				PIPE						
STREET	FROM M.H.	TO M.H.	AREA (ha)	UNITS	UNITS Singles	UNITS Townhouse	POP.	CUMULATIVE AREA (ha)	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW (l/s)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	PEAK FLOW (l/s)	TOTAL AREA (ha)	ACCU. AREA (ha)	INFILT. FLOW (l/s)	TOTAL FLOW (l/s)	DIST (m)	DIA (mm)	SLOPE (%)	CAP. (FULL) (l/s)	RATIO Q act/Q cap	VEL. (FULL) (m/s)	VEL. (ACT.) (m/s)
SERVICING 6																												
	113A	114A	0.10	6	6		13	0.10	13	3.72	0.16		0.00		0.00		0.00	0.00	0.10	0.10	0.03	0.19	24.5	200	3.10	57.75	0.00	1.84	0.41
Contribution From SERVICING 1, Pipe 112A - 114A								0.52	117				0.00		0.00		0.00		0.52	0.62									
	114A	115A						0.62	130	3.57	1.50		0.00		0.00		0.00	0.00	0.00	0.62	0.20	1.71	11.0	200	0.35	19.40	0.09	0.62	0.38
To GLENROY GILBERT DR, Pipe 115A - 116A								0.62	130				0.00		0.00		0.00			0.62									
SERVICING 5																												
	111A	112A	0.08	12	12		26	0.08	26	3.69	0.31		0.00		0.00		0.00	0.00	0.08	0.08	0.03	0.34	27.0	200	0.65	26.44	0.01	0.84	0.28
To SERVICING 1, Pipe 112A - 114A								0.08	26				0.00		0.00		0.00			0.08									
SERVICING 5																												
	109A	110A	0.09	6	6		13	0.09	13	3.72	0.16		0.00		0.00		0.00	0.00	0.09	0.09	0.03	0.19	24.5	200	0.75	28.40	0.01	0.90	0.25
To SERVICING 1, Pipe 110A - 112A								0.09	13				0.00		0.00		0.00			0.09									
SERVICING 4																												
	107A	108A	0.09	6	6		13	0.09	13	3.72	0.16		0.00		0.00		0.00	0.00	0.09	0.09	0.03	0.19	24.5	200	0.65	26.44	0.01	0.84	0.23
To SERVICING 1, Pipe 108A - 110A								0.09	13				0.00		0.00		0.00			0.09									
SERVICING 3																												
	105A	106A	0.08	12	12		26	0.08	26	3.69	0.31		0.00		0.00		0.00	0.00	0.08	0.08	0.03	0.34	26.0	200	0.65	26.44	0.01	0.84	0.28
To SERVICING 1, Pipe 106A - 108A								0.08	26				0.00		0.00		0.00			0.08									
SERVICING 2																												
	103A	104A	0.13	12	12		26	0.13	26	3.69	0.31		0.00		0.00		0.00	0.00	0.13	0.13	0.04	0.35	24.5	200	1.75	43.39	0.01	1.38	0.40
To SERVICING 1, Pipe 104A - 106A								0.13	26				0.00		0.00		0.00			0.13									
SERVICING 1																												
	100A	101A						0.00					0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	22.0	200	2.85	55.37	0.00	1.76	0.10
	101A	102A						0.00	0				0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	5.5	200	3.60	62.23	0.00	1.98	0.11
	102A	104A	0.05	6	6		13	0.05	13	3.72	0.16		0.00		0.00		0.00	0.00	0.05	0.05	0.02	0.17	30.0	200	0.85	30.24	0.01	0.96	0.25
To SERVICING 1, Pipe 104A - 106A								0.05	13				0.00		0.00		0.00			0.05									
Contribution From SERVICING 1, Pipe 102A - 104A								0.05	13				0.00		0.00		0.00		0.05	0.05									
Contribution From SERVICING 2, Pipe 103A - 104A								0.13	26				0.00		0.00		0.00		0.13	0.18									
	104A	106A						0.18	39	3.67	0.46		0.00		0.00		0.00	0.00	0.00	0.18	0.06	0.52	33.5	200	0.35	19.40	0.03	0.62	0.26
Contribution From SERVICING 3, Pipe 105A - 106A								0.08	26				0.00		0.00		0.00		0.08	0.26									
	106A	108A						0.26	65	3.63	0.77		0.00		0.00		0.00	0.00	0.00	0.26	0.09	0.85	31.5	200	0.35	19.40	0.04	0.62	0.31
Contribution From SERVICING 4, Pipe 107A - 108A								0.09	13				0.00		0.00		0.00		0.09	0.35									
	108A	110A						0.35	78	3.62	0.91		0.00		0.00		0.00	0.00	0.00	0.35	0.12	1.03	20.5	200	1.60	41.49	0.02	1.32	0.55
Contribution From SERVICING 5, Pipe 109A - 110A								0.09	13				0.00		0.00		0.00		0.09	0.44									
	110A	112A						0.44	91	3.60	1.06		0.00		0.00		0.00	0.00	0.00	0.44	0.15	1.21	31.0	200	0.35	19.40	0.06	0.62	0.34
Contribution From SERVICING 5, Pipe 111A - 112A								0.08	26				0.00		0.00		0.00		0.08	0.52									
	112A	114A						0.52	117	3.58	1.36		0.00		0.00		0.00	0.00	0.00	0.52	0.17	1.53	32.0	200	0.40	20.74	0.07	0.66	0.38
To SERVICING 6, Pipe 114A - 115A								0.52	117				0.00		0.00		0.00			0.52									
GLENROY GILBERT DR																												
Contribution From SERVICING 6, Pipe 114A - 115A								0.62	130				0.00		0.00		0.00		0.62	0.62									
	115A	EX SAN118A	0.38				0	1.00	130	3.57	1.50		0.00		0.00		0.00	0.00	0.38	1.00	0.33	1.83	12.5	200	0.40	20.74	0.09	0.66	0.41

DESIGN PARAMETERS

Park Flow =	9300	L/ha/da	0.10764	l/s/Ha	Industrial Peak Factor = as per MOE Graph		
Average Daily Flow =	280	l/p/day			Extraneous Flow =	0.330	L/s/ha
Comm/Inst Flow =	28000	L/ha/da	0.3241	l/s/Ha	Minimum Velocity =	0.600	m/s
Industrial Flow =	35000	L/ha/da	0.40509	l/s/Ha	Manning's n = (Conc)	0.013 (Pvc)	0.013
Max Res. Peak Factor =	4.00				2 Bedroom coeff=	2.1	
Commercial/Inst./Park Peak Factor =	1.00						
Institutional =	0.32	l/s/Ha					

Designed: CPB	PROJECT: **Minto - Barrhaven Town Centre Stage 1**		
Checked: SLM	LOCATION: **City of Ottawa**		
Dwg. Reference: Sanitary Drainage Plan, Dwgs. No.	File Ref: 15-816	Date: **06 Oct 2023**	Sheet No. 1 of 4

SANITARY SEWER CALCULATION SHEET

Manning's n=0.013

LOCATION			RESIDENTIAL AREA AND POPULATION									COMM		INSTIT		PARK		C+I+I	INFILTRATION				PIPE						
STREET	FROM M.H.	TO M.H.	AREA (ha)	UNITS	UNITS Singles	UNITS Townhouse	POP.	CUMULATIVE AREA (ha)	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW (l/s)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	PEAK FLOW (l/s)	TOTAL AREA (ha)	ACCU. AREA (ha)	INFILT. FLOW (l/s)	TOTAL FLOW (l/s)	DIST (m)	DIA (mm)	SLOPE (%)	CAP. (FULL) (l/s)	RATIO Q act/Q cap	VEL. (FULL) (m/s)	VEL. (ACT.) (m/s)
SERVICING 21																													
	Plug	150A	0.37	64	64		135	0.37	135	3.56	1.56		0.00		0.00		0.00	0.00	0.37	0.37	0.12	1.68	4.0	200	0.65	26.44	0.06	0.84	0.47
	150A	151A						0.37	135	3.56	1.56		0.00		0.00		0.00	0.00	0.00	0.37	0.12	1.68	29.0	200	2.05	46.96	0.04	1.49	0.69
To SERVICING 19, Pipe 151A - 152A								0.37	135				0.00		0.00		0.00			0.37									
SERVICING 16																													
	Plug	147A	0.57	64	64		135	0.57	135	3.56	1.56		0.00		0.00		0.00	0.00	0.57	0.57	0.19	1.75	11.0	200	0.65	26.44	0.07	0.84	0.47
To SERVICING 9, Pipe 147A - 148A								0.57	135				0.00		0.00		0.00			0.57									
SERVICING 20																													
	141A	143A	0.10	14	14		30	0.10	30	3.68	0.36		0.00		0.00		0.00	0.00	0.10	0.10	0.03	0.39	53.5	200	0.65	26.44	0.01	0.84	0.29
To SERVICING 17 SERVICING 18, Pipe 143A - 145A								0.10	30				0.00		0.00		0.00			0.10									
	142A	143A	0.07	10	10		21	0.07	21	3.70	0.25		0.00		0.00		0.00	0.00	0.07	0.07	0.02	0.28	43.5	200	0.65	26.44	0.01	0.84	0.27
To SERVICING 17 SERVICING 18, Pipe 143A - 145A								0.07	21				0.00		0.00		0.00			0.07									
SERVICING 18																													
Contribution From SERVICING 20, Pipe 141A - 143A								0.10	30				0.00		0.00		0.00		0.10	0.10									
Contribution From SERVICING 20, Pipe 142A - 143A								0.07	21				0.00		0.00		0.00		0.07	0.17									
	143A	145A	0.01				0	0.18	51	3.65	0.60		0.00		0.00		0.00	0.00	0.01	0.18	0.06	0.66	30.0	200	0.35	19.40	0.03	0.62	0.29
To SERVICING 19, Pipe 145A - 148A								0.18	51				0.00		0.00		0.00			0.18									
SERVICING 19																													
	144A	145A						0.00					0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	44.0	200	1.35	38.11	0.00	1.21	0.07
Contribution From SERVICING 18, Pipe 143A - 145A								0.18	51				0.00		0.00		0.00		0.18	0.18									
	145A	148A	0.16	10	10		21	0.34	72	3.62	0.85		0.00		0.00		0.00	0.00	0.16	0.34	0.11	0.96	6.0	200	0.35	19.40	0.05	0.62	0.32
Contribution From SERVICING 9, Pipe 147A - 148A								0.57	135				0.00		0.00		0.00		0.57	0.91									
	148A	151A	0.18	14	14		30	1.09	237	3.50	2.69		0.00		0.00		0.00	0.00	0.18	1.09	0.36	3.04	56.0	250	0.25	29.73	0.10	0.61	0.39
Contribution From SERVICING 21, Pipe 150A - 151A								0.37	135				0.00		0.00		0.00		0.37	1.46									
	151A	152A						1.46	372	3.43	4.13		0.00		0.00		0.00	0.00	0.00	1.46	0.48	4.62	12.0	250	0.25	29.73	0.16	0.61	0.44
To FUTURE CHAPMAN MILLS DR, Pipe 152A - 153A								1.46	372				0.00		0.00		0.00			1.46									
SERVICING 15																													
	Plug	135A	0.31	64	64		135	0.31	135	3.56	1.56		0.00		0.00		0.00	0.00	0.31	0.31	0.10	1.66	4.0	200	0.65	26.44	0.06	0.84	0.46
	135A	138A						0.31	135	3.56	1.56		0.00		0.00		0.00	0.00	0.00	0.31	0.10	1.66	26.5	200	6.00	80.34	0.02	2.56	0.99
To SERVICING 14, Pipe 138A - 139A								0.31	135				0.00		0.00		0.00			0.31									
	Plug	137A	0.24	48	48		101	0.24	101	3.59	1.18		0.00		0.00		0.00	0.00	0.24	0.24	0.08	1.26	3.5	200	0.65	26.44	0.05	0.84	0.43
	137A	138A						0.24	101	3.59	1.18		0.00		0.00		0.00	0.00	0.00	0.24	0.08	1.26	14.0	200	0.35	19.40	0.06	0.62	0.34
To SERVICING 14, Pipe 138A - 139A								0.24	101				0.00		0.00		0.00			0.24									
SERVICING 13																													
	Plug	132A	0.36	48	48		101	0.36	101	3.59	1.18		0.00		0.00		0.00	0.00	0.36	0.36	0.12	1.30	10.0	200	4.05	66.01	0.02	2.10	0.82
To SERVICING 9, Pipe 132A - 133A								0.36	101				0.00		0.00		0.00			0.36									

DESIGN PARAMETERS

Park Flow =	9300	L/ha/da	0.10764	l/s/Ha		
Average Daily Flow =	280	l/p/day			Industrial Peak Factor = as per MOE Graph	
Comm/Inst Flow =	28000	L/ha/da	0.3241	l/s/Ha	Extraneous Flow =	0.330 L/s/ha
Industrial Flow =	35000	L/ha/da	0.40509	l/s/Ha	Minimum Velocity =	0.600 m/s
Max Res. Peak Factor =	4.00				Manning's n = (Conc)	0.013 (Pvc) 0.013
Commercial/Inst./Park Peak Factor =	1.00				2 Bedroom coeff=	2.1
Institutional =	0.32	l/s/Ha				

Designed: CPB

Checked: SLM

Dwg. Reference: Sanitary Drainage Plan, Dwgs. No.

PROJECT: **Minto - Barrhaven Town Centre Stage 1**

LOCATION: **City of Ottawa**

File Ref: 15-816

Date: **06 Oct 2023**

Sheet No. 2 of 4

816_SAN.xlsx

SANITARY SEWER CALCULATION SHEET

Manning's n=0.013

LOCATION			RESIDENTIAL AREA AND POPULATION									COMM		INSTIT		PARK		C+I+I	INFILTRATION				PIPE						
STREET	FROM M.H.	TO M.H.	AREA (ha)	UNITS	UNITS Singles	UNITS Townhouse	POP.	CUMULATIVE AREA (ha)	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW (l/s)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	PEAK FLOW (l/s)	TOTAL AREA (ha)	ACCU. AREA (ha)	INFILT. FLOW (l/s)	TOTAL FLOW (l/s)	DIST (m)	DIA (mm)	SLOPE (%)	CAP. (FULL) (l/s)	RATIO Q act/Q cap	VEL. (FULL) (m/s)	VEL. (ACT.) (m/s)
SERVICING 11																													
	Plug	129A	0.47	64	64		135	0.47	135	3.56	1.56		0.00		0.00		0.00	0.00	0.47	0.47	0.16	1.71	11.5	200	6.00	80.34	0.02	2.56	1.03
To SERVICING 9, Pipe 129A - 130A								0.47	135				0.00		0.00		0.00			0.47									
SERVICING 10																													
	Plug	127A	0.59	96	96		202	0.59	202	3.52	2.30		0.00		0.00		0.00	0.00	0.59	0.59	0.19	2.50	11.5	200	6.00	80.34	0.03	2.56	1.15
To SERVICING 9, Pipe 127A - 129A								0.59	202				0.00		0.00		0.00			0.59									
	126A	127A						0.00					0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	10.5	200	0.95	31.97	0.00	1.02	0.06
To SERVICING 9, Pipe 127A - 129A								0.00	0				0.00		0.00		0.00			0.00									
SERVICING 8																													
	121A	124A	0.10	12	12		26	0.10	26	3.69	0.31		0.00		0.00		0.00	0.00	0.10	0.10	0.03	0.34	50.5	200	0.65	26.44	0.01	0.84	0.29
To SERVICING 9, Pipe 124A - 127A								0.10	26				0.00		0.00		0.00			0.10									
	122A	123A						0.00					0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	44.5	200	0.75	28.40	0.00	0.90	0.05
	123A	124A	0.10	12	12		26	0.10	26	3.69	0.31		0.00		0.00		0.00	0.00	0.10	0.10	0.03	0.34	5.5	200	3.45	60.92	0.01	1.94	0.50
To SERVICING 9, Pipe 124A - 127A								0.10	26				0.00		0.00		0.00			0.10									
SERVICING 7																													
	118A	120A	0.08	12	12		26	0.08	26	3.69	0.31		0.00		0.00		0.00	0.00	0.08	0.08	0.03	0.34	49.5	200	0.90	31.12	0.01	0.99	0.32
To SERVICING 9, Pipe 120A - 124A								0.08	26				0.00		0.00		0.00			0.08									
	119A	120A	0.08	12	12	\	26	0.08	26	3.69	0.31		0.00		0.00		0.00	0.00	0.08	0.08	0.03	0.34	39.5	200	0.65	26.44	0.01	0.84	0.28
To SERVICING 9, Pipe 120A - 124A								0.08	26				0.00		0.00		0.00			0.08									
SERVICING 9																													
Contribution From SERVICING 13, Pipe 131A - 132A								0.36	101				0.00		0.00		0.00		0.36	0.36									
	132A	133A						0.36	101	3.59	1.18		0.00		0.00		0.00	0.00	0.00	0.36	0.12	1.30	20.0	200	0.35	19.40	0.07	0.62	0.35
To SERVICING 14, Pipe 133A - 138A								0.36	101				0.00		0.00		0.00			0.36									
Contribution From SERVICING 16, Pipe 146A - 147A								0.57	135				0.00		0.00		0.00		0.57	0.57									
	147A	148A						0.57	135	3.56	1.56		0.00		0.00		0.00	0.00	0.00	0.57	0.19	1.75	29.0	200	1.65	42.13	0.04	1.34	0.65
To SERVICING 19, Pipe 148A - 151A								0.57	135				0.00		0.00		0.00			0.57									
Contribution From SERVICING 7, Pipe 118A - 120A								0.08	26				0.00		0.00		0.00		0.08	0.08									
Contribution From SERVICING 7, Pipe 119A - 120A								0.08	26				0.00		0.00		0.00		0.08	0.16									
	120A	124A	0.02				0	0.18	52	3.65	0.61		0.00		0.00		0.00	0.00	0.02	0.18	0.06	0.67	27.0	200	1.05	33.61	0.02	1.07	0.42
Contribution From SERVICING 8, Pipe 121A - 124A								0.10	26				0.00		0.00		0.00		0.10	0.28									
Contribution From SERVICING 8, Pipe 123A - 124A								0.10	26				0.00		0.00		0.00		0.10	0.38									
	124A	127A						0.38	104	3.59	1.21		0.00		0.00		0.00	0.00	0.00	0.38	0.13	1.34	46.5	200	0.35	19.40	0.07	0.62	0.35
Contribution From SERVICING 10, Pipe 125A - 127A								0.59	202				0.00		0.00		0.00		0.59	0.97									
Contribution From SERVICING 10, Pipe 126A - 127A								0.00	0				0.00		0.00		0.00		0.00	0.97									
	127A	129A						0.97	306	3.46	3.43		0.00		0.00		0.00	0.00	0.00	0.97	0.32	3.75	76.0	200	0.35	19.40	0.19	0.62	0.47
Contribution From SERVICING 11, Pipe 128A - 129A								0.47	135				0.00		0.00		0.00		0.47	1.44									
	129A	130A	0.01				0	1.45	441	3.40	4.86		0.00		0.00		0.00	0.00	0.01	1.45	0.48	5.34	12.5	200	0.35	19.40	0.28	0.62	0.52
	130A	133A	0.23				0	1.68	441	3.40	4.86		0.00		0.00		0.00	0.00	0.23	1.68	0.55	5.42	19.5	200	0.35	19.40	0.28	0.62	0.53
To SERVICING 14, Pipe 133A - 138A								1.68	441				0.00		0.00		0.00			1.68									

DESIGN PARAMETERS

Park Flow =	9300	L/ha/da	0.10764 l/s/Ha
Average Daily Flow =	280	l/p/day	
Comm/Inst Flow =	28000	L/ha/da	0.3241 l/s/Ha
Industrial Flow =	35000	L/ha/da	0.40509 l/s/Ha
Max Res. Peak Factor =	4.00		
Commercial/Inst./Park Peak Factor =	1.00		
Institutional =	0.32	l/s/Ha	

Industrial Peak Factor = as per MOE Graph
Extraneous Flow = 0.330 L/s/ha
Minimum Velocity = 0.600 m/s
Manning's n = (Conc) 0.013 (Pvc) 0.013
2 Bedroom coeff= 2.1

LICENSED PROFESSIONAL ENGINEER S. L. MERRICK 100186523 2023-10-06 PROVINCE OF ONTARIO

JOB # 15-816

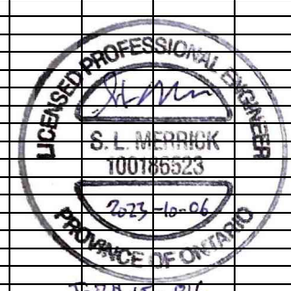
Designed:	CPB	PROJECT:	Minto - Barrhaven Town Centre Stage 1
Checked:	SLM	LOCATION:	City of Ottawa
Dwg. Reference: Sanitary Drainage Plan, Dwgs. No.		File Ref: 15-816	Date: 06 Oct 2023
			Sheet No. 3 of 4

816_SAN.xlsx

SANITARY SEWER CALCULATION SHEET

Manning's n=0.013

LOCATION			RESIDENTIAL AREA AND POPULATION									COMM		INSTIT		PARK		C+I+I	INFILTRATION				PIPE						
STREET	FROM M.H.	TO M.H.	AREA (ha)	UNITS	UNITS Singles	UNITS Townhouse	POP.	CUMULATIVE AREA (ha)	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW (l/s)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	PEAK FLOW (l/s)	TOTAL AREA (ha)	ACCU. AREA (ha)	INFILT. FLOW (l/s)	TOTAL FLOW (l/s)	DIST (m)	DIA (mm)	SLOPE (%)	CAP. (FULL) (l/s)	RATIO Q act/Q cap	VEL. (FULL) (m/s)	VEL. (ACT.) (m/s)
SERVICING 14																													
Contribution From SERVICING 9, Pipe 130A - 133A								1.68	441				0.00		0.00		0.00		1.68	1.68								
Contribution From SERVICING 9, Pipe 132A - 133A								0.36	101				0.00		0.00		0.00		0.36	2.04								
	133A	138A	0.15				0	2.19	542	3.36	5.91		0.00		0.00		0.00	0.00	0.15	2.19	0.72	6.63	42.0	200	0.75	28.40	0.23	0.90	0.73
Contribution From SERVICING 15, Pipe 135A - 138A								0.31	135				0.00		0.00		0.00		0.31	2.50								
Contribution From SERVICING 15, Pipe 137A - 138A								0.24	101				0.00		0.00		0.00		0.24	2.74								
	138A	139A						2.74	778	3.29	8.31		0.00		0.00		0.00	0.00	0.00	2.74	0.90	9.21	12.0	200	0.35	19.40	0.47	0.62	0.61
To FUTURE CHAPMAN MILLS DR, Pipe 139A - 140A								2.74	778				0.00		0.00		0.00			2.74									
FUTURE CHAPMAN MILLS DR																													
Contribution From SERVICING 14, Pipe 138A - 139A								2.74	778				0.00		0.00		0.00		2.74	2.74								
	139A	140A	1.06				0	3.80	778	3.29	8.31		0.00		0.00		0.00	0.00	1.06	3.80	1.25	9.56	80.5	250	0.25	29.73	0.32	0.61	0.54
	140A	152A	0.30				0	4.10	778	3.29	8.31		0.00		0.00		0.00	0.00	0.30	4.10	1.35	9.66	74.5	250	0.25	29.73	0.32	0.61	0.54
Contribution From SERVICING 19, Pipe 151A - 152A								1.46	372				0.00		0.00		0.00		1.46	5.56								
	152A	EX SAN 138A	0.13				0	5.69	1150	3.21	11.96		0.00		0.00		0.00	0.00	0.13	5.69	1.88	13.83	36.0	250	0.25	29.73	0.47	0.61	0.59



DESIGN PARAMETERS

Park Flow =	9300	L/ha/da	0.10764	l/s/Ha			
Average Daily Flow =	280	l/p/day			Industrial Peak Factor = as per MOE Graph		
Comm/Inst Flow =	28000	L/ha/da	0.3241	l/s/Ha	Extraneous Flow =	0.330	L/s/ha
Industrial Flow =	35000	L/ha/da	0.40509	l/s/Ha	Minimum Velocity =	0.600	m/s
Max Res. Peak Factor =	4.00				Manning's n = (Conc)	0.013 (Pvc)	0.013
Commercial/Inst./Park Peak Factor =	1.00				2 Bedroom coeff=	2.1	
Institutional =	0.32	l/s/Ha					

Designed: CPB	PROJECT: **Minto - Barrhaven Town Centre Stage 1**		
Checked: SLM	LOCATION: **City of Ottawa**		
Dwg. Reference: Sanitary Drainage Plan, Dwgs. No.	File Ref: 15-816	Date: **06 Oct 2023**	Sheet No. 4 of 4

SANITARY SEWER CALCULATION SHEET

CLIENT: **Minto Communities**
LOCATION: **Barrhaven Town Centre Phase 1**
FILE REF: **16-816**
DATE: **06-Mar-23**

DESIGN PARAMETERS

Avg. Daily Flow Res.	280	L/p/d	Peak Fact Res. Per Harmons: Min = 2.0, Max =4.0		Infiltration / Inflow	0.33	L/s/ha
Avg. Daily Flow Comm	28,000	L/ha/d	Peak Fact. Comm.	1	Min. Pipe Velocity	0.60	m/s full flowing
Avg. Daily Flow Instit.	28,000	L/ha/d	Peak Fact. Instit.	1	Max. Pipe Velocity	3.00	m/s full flowing
Avg. Daily Flow Indust	35,000	L/ha/d	Peak Fact. Indust. per MOE graph		Mannings N	0.013	
Harmens Corr Factor	0.8						

Location				Residential Area and Population									Commercial		Institutional		Industrial			Infiltration				Pipe Data								
Area ID	IDENTIFIER	Up	Down	Area	Number of Units by type				Pop.	Cumulative Area	Cumulative Pop.	Peak. Fact.	Q_{res}	Area	Accu. Area	Area	Accu. Area	Area	Accu. Area	Q_{C+I+I}	Total Area	Accu. Area	Infiltration Flow	Total Flow	DIA Nominal	DIA Actual	Slope	Length	$A_{hydraulic}$	R	Velocity	Q_{cap}	Q / Q full
				(ha)	Singles	Semi's	Town's	Apt's		(ha)		(-)	(L/s)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(L/s)	(ha)	(ha)	(L/s)	(L/s)	(mm)	(mm)	(%)	(m)	(m^2)	(m)	(m/s)	(L/s)	(-)
Longfields Drive	School on Longfieds	School	101	0.000					0.0	0.000	0.0	3.80	0.00		0.00	5.61	5.61		0.00	1.82	5.610	5.610	1.851	3.67	200	203.2	1.00	14.5	0.032	0.050	1.04	33.9	0.11
		101	102	0.600					0.0	0.600	0.0	3.80	0.00		0.00		5.61		0.00	1.82	0.600	6.210	2.049	3.87	250	254	0.50	58.0	0.051	0.063	0.86	43.4	0.09
Longfields Drive	Barrhaven Court Retirement Home	Retirementhome	102	0.000					0.0	0.000	0.0	3.80	0.00		0.00	1.42	1.42		0.00	0.46	1.420	1.420	0.469	0.93	200	203.2	2.43	28.0	0.032	0.050	1.63	52.8	0.02
Longfields Drive		102	103	2.720					174.1	3.320	174.1	3.54	1.99		0.00		7.03		0.00	2.28	2.720	10.350	3.416	7.69	250	254	0.74	49.0	0.051	0.063	1.04	52.8	0.15
Marketplace Ave	Dymon Storage	McGarry Terrace	121							0.000	0.0	3.80	0.00	0.603	0.60		0.00		0.00	0.20	0.603	0.603	0.199	0.39	200	203.2	0.65	96.0	0.032	0.050	0.84	27.3	0.01
	1012-McGarry Street	121	103	0.640					418.0	0.640	418.0	3.41	4.62		0.60		0.00		0.00	0.20	0.640	1.243	0.410	5.23	250	254	2.61	77.5	0.051	0.063	1.96	99.2	0.05
Marketplace Ave	1034 McGary Street & 117 Longfieds Tower	San Stub	103	0.960					618.0	0.960	618.0	3.34	6.69		0.00		0.00		0.00	0.00	0.960	0.960	0.317	7.01	200	203.4	0.65	18.5	0.032	0.050	0.84	27.3	0.26
Longfields Drive	ROW Only	103	5062	0.280					0.0	5.200	1210.1	3.20	12.53		0.60		7.03		0.00	2.47	0.280	12.833	4.235	19.24	250	254	0.70	91.0	0.051	0.063	1.01	51.4	0.37
Lindshade Drive	Waterford Community Centre + Minto Ampersand	Lindenshade	5062	1.590					642.2	1.590	642.2	3.33	6.94		0.00		0.00		0.00	0.00	1.590	1.590	0.525	7.46	200	203.4	1.00	18.0	0.032	0.050	1.04	33.9	0.22
																									200	203.4	2.75	89.0	0.032	0.050	1.73	56.3	0.00
Longfields	ROW	5062	5063B	0.090						6.880	1852.3	3.09	18.54		0.60		7.03		0.00	2.47	0.090	14.513	4.789	25.81	250	254	0.50	61.0	0.051	0.063	0.86	43.4	0.59
Longfields	ROW	5063B	5063-A	0.200						7.080	1852.3	3.09	18.54		0.60		7.03		0.00	2.47	0.200	14.713	4.855	25.87									
																									250	254	0.70	29.0	0.051	0.063	1.01	51.4	0.00
Bayrose Drive	Minto Ampersand	Bayrose Drive	5063-A	0.850					25.0	0.850	25.0	3.69	0.30		0.00		0.00		0.00	0.00	0.850	0.850	0.281	0.58	250	254	0.66	56.5	0.051	0.063	0.98	49.9	0.01
Longfields	ROW	5063-A	5063	0.220						8.150	1877.3	3.09	18.77		0.60		7.03		0.00	2.47	0.220	15.783	5.208	26.45	200	203.4	1.25	86.0	0.032	0.050	1.17	37.9	0.70
Longfields	ROW	5063	5063-B	0.130						8.280	1877.3	3.09	18.77		0.60		7.03		0.00	2.47	0.130	15.913	5.251	26.50	200	203.4	2.84	96.0	0.032	0.050	1.76	57.2	0.00
Sue Holloway	Minto Ampersand	Sue Holloway	Glenroy Gilbert	0.960					122.4	0.960	122.4	3.57	1.42		0.00		0.00		0.00	0.00	0.960	0.960	0.317	1.73	250	254	0.50	53.0	0.051	0.063	0.86	43.4	0.04
Glenroy Gilbert	Minto Ampersand	Glenroy Gilbert	5063-B	1.560					100.8	2.520	223.2	3.50	2.53		0.00		0.00		0.00	0.00	1.560	2.520	0.832	3.37									
																									200	203.4	1.10	102.0	0.032	0.050	1.09	35.6	0.00
Barrhaven TC Block 1	Barrhaven TC Block A		5063-B	0.640					126.0	0.640	126.0	3.57	1.46		0.00		0.00		0.00	0.00	0.640	0.640	0.211	1.67									
Longfields Drive	Logfields/Glenroy Gilbert	5063-B	5066	0.180					0.0	11.620	2226.5	3.04	21.93		0.6		7.0		0.0	2.47	0.180	19.253	6.353	30.76	250	254	0.70	53.0	0.051	0.063	1.01	51.4	0.60
		5066	5067	0.170					0.0	11.790	2226.5	3.04	21.93		0.60		7.03		0.00	2.47	0.170	19.423	6.410	30.81	250	254	0.70	45.0	0.051	0.063	1.01	51.4	0.60
		5067	5067-A							11.790	2226.5	3.04	21.93		0.60		7.03		0.00	2.47	0.000	19.423	6.410	30.81	250	254	0.70	37.5	0.051	0.063	1.01	51.4	0.60
Chapman Mills Drive Extension	Barrhaven TC Block B	13	5067-A	4.190					1142.0	4.190	1142.0	3.21	11.88		0.00		0.00		0.00	0.00	4.190	4.190	1.383	13.26	250	254	0.50	187.0	0.051	0.063	0.86	43.4	0.31
Longfields Drive		5067-A	5070	0.700					0.0	16.680	3368.5	2.92	31.87		0.60		7.03		0.00	2.47	0.700	24.313	8.023	42.37	250	254	0.62	65.0	0.051	0.063	0.95	48.3	0.88
		5070	5071	0.180					0.0	16.860	3368.5	2.92	31.87		0.60		7.03		0.00	2.47	0.180	24.493	8.083	42.43	250	254	0.70	49.0	0.051	0.063	1.01	51.4	0.83
		5071	5072	0.220					0.0	17.080	3368.5	2.92	31.87		0.60		7.03		0.00	2.47	0.220	24.713	8.155	42.50	250	254	0.70	60.0	0.051	0.063	1.01	51.4	0.83
		5072	5073	0.210					0.0	17.290	3368.5	2.92	31.87		0.60		7.03		0.00	2.47	0.210	24.923	8.225	42.57	250	254	0.70	55.0	0.051	0.063	1.01	51.4	0.83
		5073	5076	0.160					0.0	17.450	3368.5	2.92	31.87		0.60		7.03		0.00	2.47	0.160	25.083	8.277	42.62	250	254	0.70	43.5	0.051	0.063	1.01	51.4	0.83
		5076	5077	0.220					0.0	17.670	3368.5	2.92	31.87		0.60		7.03		0.00	2.47	0.220	25.303	8.350	42.69	250	254	1.56	59.5	0.051	0.063	1.51	76.7	0.56
Garrity Crescent		124	5077	7.690					623.7	7.690	623.7	3.34	6.75		0.00		0.00		0.00	0.00	7.690	7.690	2.538	9.29	200	203.4	0.50	24.3	0.032	0.050	0.74	24.0	0.39
Longfields Drive		5077	5051	0.280					0.0	25.640	3992.2	2.87	37.10		0.60		7.03		0.00	2.47	0.280	33.273	10.980	50.55	250	254	1.91	78.5	0.051	0.063	1.67	84.8	0.60
Paul Metivier Drive		101	5051	34.580					4954.3	34.580	4954.3	2.80	44.94		0.00	5.07	5.07		0.00	1.64	39.650	39.650	13.085	59.67	450	457.2	0.15	79.5	0.164	0.113	0.69	114.0	0.52
		100A	5051	1.430					89.1	1.430	89.1	3.61	1.04		0.00		0.00		0.00	0.00	1.430	1.430	0.472	1.51	200	203.4	0.32	3.4	0.032	0.050	0.59	19.2	0.08
Longfields Drive		5051	5079	0.160					0.0	61.810	9035.6	2.60	76.09		0.60		12.10		0.00	4.12	0.160	74.513	24.589	104.80	1050	1066.8	0.10	68.0	0.894	0.263	1.00	891.4	0.12
		5079	5080	0.160					0.0	61.970	9035.6	2.60	76.09		0.60		12.10		0.00	4.12	0.160	74.673	24.642	104.85	1050	1066.8	0.10	60.0	0.894	0.263	1.00	891.4	0.12
		5080	5081	0.210					0.0	62.180	9035.6	2.60	76.09		0.60		12.10		0.00	4.12	0.210	74.883	24.711	104.92	1050	1066.8	0.52	75.0	0.894	0.263	2.27	2032.7	0.05
		5081	5082	0.150					0.0	62.330	9035.6	2.60	76.09		0.60		12.10		0.00	4.12	0.150	75.033	24.761	104.97	1050	1066.8	0.02	55.0	0.894	0.263	0.45	398.6	0.26


BARRHAVEN COURT
RETIREMENT CENTRE
Retirement Home -102
1.42 ha. institutional
SCHOOL ON
LONGFIELDS
School-101
5.61 ha. institutional
DYMOND STORAGE
McGary Terrace - 121
0.603 ha Commercial
1012 McGARY STREET
121-103
0.64 ha - 418pers.
1034 McGARY TERRACE & 117 LONGFIEDS DRIVE
San Stub - 103
0.96ha. - 618 pers.
WATERFORD
RETIREMENT
CENTRE
Lindenshade 5062
0.92 ha - 526 pers.
MINTO
AMPERSAND
MINTO
BTC BLOCK A
5063-B
0.64 ha. - 126 pers.
MINTO
BTC BLOCK B
13 -5067-A
0.65ha. - 1142 pers.
prom. Chapman Mills Dr.

Dymon Self Stroage - 1000 McGarry Terrace

Wastewater Design Calculations

Calculation Method 1 (City of Ottawa Design Guidelines):

Total Gross Area =	0.603	ha
Theoritical Unit Rate =	28,000	L/ha/day - per City of Ottawa Design Guidelines
Average Wastewater Flow =	16884	L/day
Average Wastewater Volume =	0.39	L/s (assuming 12 hour operation)
Peaking Factor =	1.5	
Infiltration 0.33 L/s/ha=	0.20	L/s
Peak Design Flow =	0.79	L/s

Calculation Method 2 (Mechanical Fixture Count):

Proposed 5-Storey Building Sani. Flow =	75 GPM	= 4.73 L/s
Proposed Floor Drains of Building =	10 GPM	= 0.63 L/s
Anticipated Total Peak Flow =	85 GPM	= 5.36 L/s
Peak Design Flow =	5.36	L/s

Use the most conservative method; Q = 5.36 L/s

The proposed 150 mm diameter sanitary service with a slope of ± 0.5% has a capacity of 11.2 L/s and a full flow velocity of 0.62 m/s. Therefore, the proposed sanitary service has sufficient capacity to accommodate the Peak Design Flow of 5.36 L/s.

1012-1024 McGarry Terrace
Proposed Site Conditions

Wastewater Design Flows per Unit Count
City of Ottawa Sewer Design Guidelines, 2004

Site Area	0.640	**ha**

Extraneous Flow Allowances

Infiltration / Inflow (Dry)	**0.03**	**L/s**
Infiltration / Inflow (Wet)	**0.16**	**L/s**
Infiltration / Inflow (Total)	**0.21**	**L/s**

Domestic Contributions

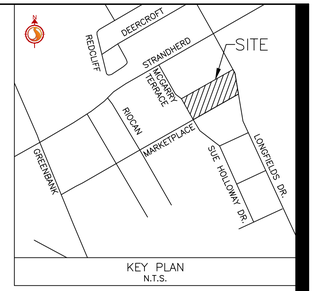
Unit Type	**Unit Rate**	**Units**	**Pop**
Single Family	3.4		0
Semi-detached and duplex	2.7		0
Townhouse	2.7		0
Stacked Townhouse	2.3		0
Apartment			
Bachelor	1.4		0
1 Bedroom	1.4		0
2 Bedroom	2.1		0
3 Bedroom	3.1		0
Average	1.8	232	418

Total Pop	**418**	
Average Domestic Flow	**1.35**	**L/s**
Peaking Factor	**3.41**	
Peak Domestic Flow	**4.62**	**L/s**

Total Estimated Average Dry Weather Flow Rate	**1.39**	**L/s**
Total Estimated Peak Dry Weather Flow Rate	**4.65**	**L/s**
Total Estimated Peak Wet Weather Flow Rate	**4.86**	**L/s**

1012 McGARY STREET
121-103
0.64 ha - 418pers.

1034 McGARY TERRACE & 117 LONGFIELDS DRIVE
0.96ha. - 618 pers.



KEY PLAN
N.T.S.

LILY XU, MCIP, RPP
(A) MANAGER, DEVELOPMENT REVIEW - SOUTH
PLANNING, INFRASTRUCTURE & ECONOMIC
DEVEVELOPMENT DEPARTMENT, CITY OF OTTAWA

APPROVED
By Lily Xu at 7:29 pm, Jul 11, 2019

MCGARRY TERRACE

EX 111
1.49 | 89

EX. SAN 115 (1200ø)
T/G=102.66
SE INV=97.76
NE INV=97.76
NW INV=97.81

EX. 6.4m–250mmø SAN @ 0.65%

EX. SAN 114 (1200ø)
T/G=99.95
SE INV=96.86
SW INV=96.91

EX. SAN 113 (1200ø)
T/G=99.75
SE INV=96.77
NW INV=96.82

EX. 95.8m–200mmø SAN @ 0.89%

SAN-3
0.10 | 0

72.1m–200mmø SAN @ 0.85%

SAN-1
0.42 | 148

SAN-2
0.44 | 470

EX. 135mm SAN SERVICE

EX. 100.5m–250mmø SAN @ 0.85%

EX. 84.5m–250mmø SAN @ 2.64%

EX. SAN 1 (1200ø)
T/G=101.25

EX. MH117 (1200ø)
T/G=101.68
NE INV=97.18
NW INV=97.29

EX. SAN 112 (1200ø)
T/G=99.44
NE INV=96.28
SE INV=96.23
SW INV=96.33

EX. SAN 111 (1200ø)
T/G=97.12
SW INV=94.05

8.9m–200mmø SAN SERVICE @ 1.0% MIN.
INV @ BLDG=96.21
INV @ CONNECTION=95.23±
INV @ EX. 250mmø SAN=95.20±

SANITARY SERVICE CLEAN OUT & BACKWATER VALVE TO BE INSTALLED AS PER DETAIL S14.2

FFE = 100.20
FFE = 98.40
FFE = 100.20
FFE = 100.20
FFE = 100.30
FFE = 100.30
FFE = 100.30
FFE = 99.50
FFE = 99.25
FFE = 98.80
FFE = 98.40
FFE = 98.40 WATER ENTRY

EXISTING GARAGE FF ELEVATION=103.54 PER PLAN TO ADV
EXISTING WALMART STORE FFE=102.04±
TRASH COMPRESSOR
TRANSFORMER
MH/SAN T/G=101.51
=101.36
EDGE OF PAVEMENT
CONCRETE CURB
CONCRETE SIDEWALK
CHAIN LINK FENCE
REMAINING WALL
ASPHALT LANE WAY
BUILDING DEBRIS PILE
BUILDING FOUNDATION AND CONCRETE PAD
POST
BUS SHELTER
CONCRETE SIDEWALK
CONCRETE CURB
APPROXIMATE CROWN OF ROAD
EDGE OF PAVEMENT
MARKETPLACE AVENUE
LONGFIELDS DRIVE
CONCRETE SIDEWALK
CONCRETE CURB

Stantec

Stantec Consulting Ltd.
1331 Clyde Avenue - Suite 400
Ottawa ON Canada
Tel. 613.722.4420
www.stantec.com

SAINT JOSEPH DEVELOPMENTS

Legend

SAN-1 / 1.82 | 470 — SANITARY DRAINAGE AREA ID# / POPULATION
SANITARY DRAINAGE AREA ha.
SANITARY DRAINAGE AREA
PROPOSED SANITARY SEWER
EXISTING SANITARY SEWER
EXISTING ASPHALT LIMITS

7	REVISED AS PER CITY COMMENTS	MJS	KS	19.05.14
6	REVISED AS PER CITY COMMENTS	AJ	KS	19.03.01
5	UPDATED AS PER CITY COMMENTS	JP	KS	18.09.24
4	UPDATED AS PER REVISED SITE PLAN	JP	KS	18.06.14
3	CORRECTED RELOCATION OF FH	DJC	KS	18.06.04
2	REVISED AS PER CITY COMMENTS	DJC	KS	18.06.01
1	ISSUED FOR SPA	MJS	KS	18.02.02
Revision		By	Appd.	YY.MM.DD
File Name: 160401399-		MJS	KS	MJS 18.01.26
		Dwn.	Chkd.	Dsgn. YY.MM.DD

SA
Permit-Seal

Client/Project
1879369 ONTARIO INC. COB AS SAINT JOSEPH DEVELOPMENTS

MARKETPLACE AVENUE

OTTAWA ON CANADA

Title
SANITARY DRAINAGE PLAN

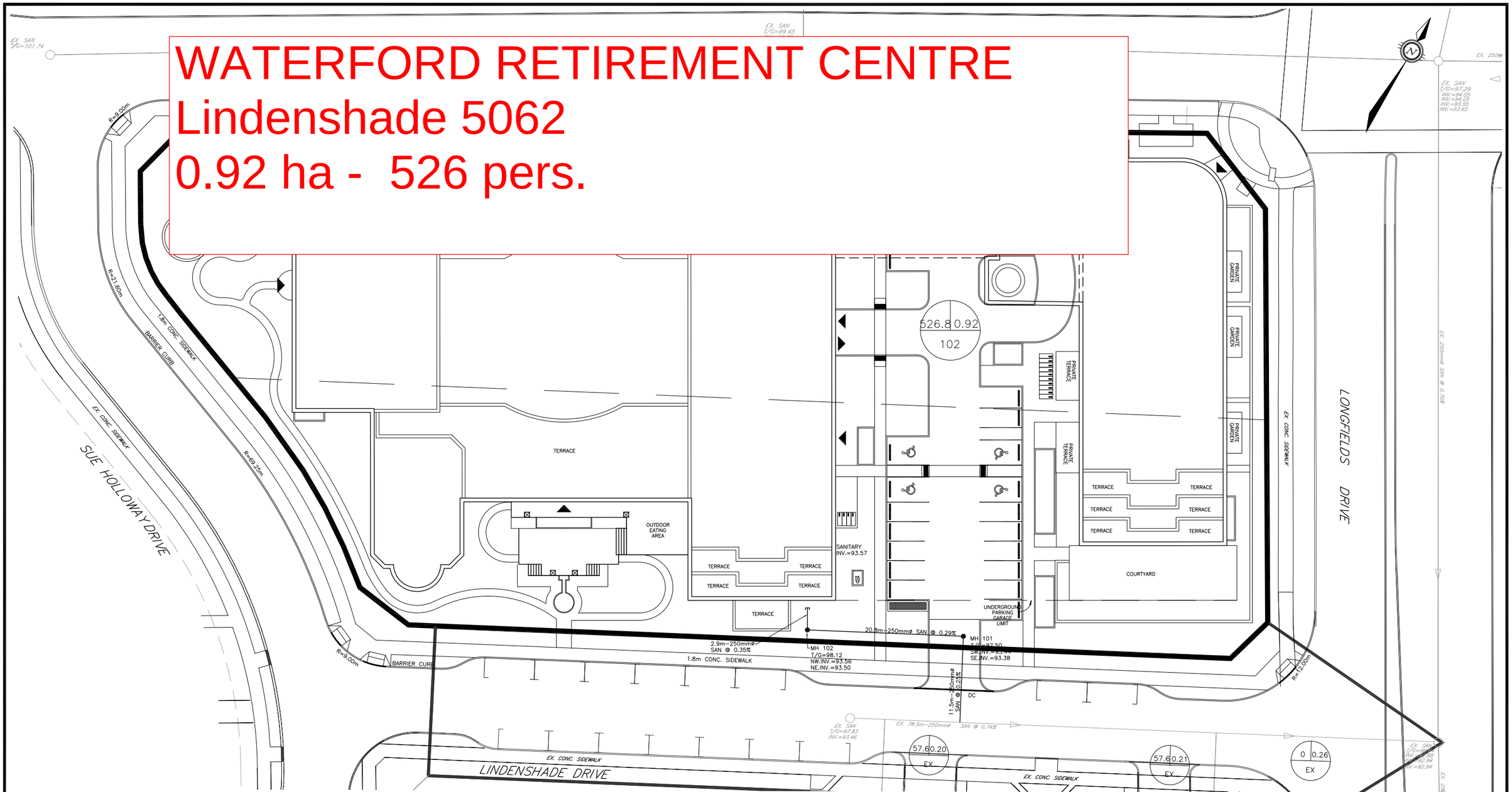
Project No. 160401399
Scale 1:300 (0 3 9 15m)
Drawing No. SA-1
Sheet 7 of 7
Revision 7

D07-12-18-0014
17615

V:\01-HDA\active\160401053_Targ_Marketplace\design\drawing\160401053-SA.dwg
2019/07/10 8:56 AM By Sharps, Mike

ORIGINAL SHEET - ARCH D

WATERFORD RETIREMENT CENTRE
Lindenshade 5062
0.92 ha - 526 pers.



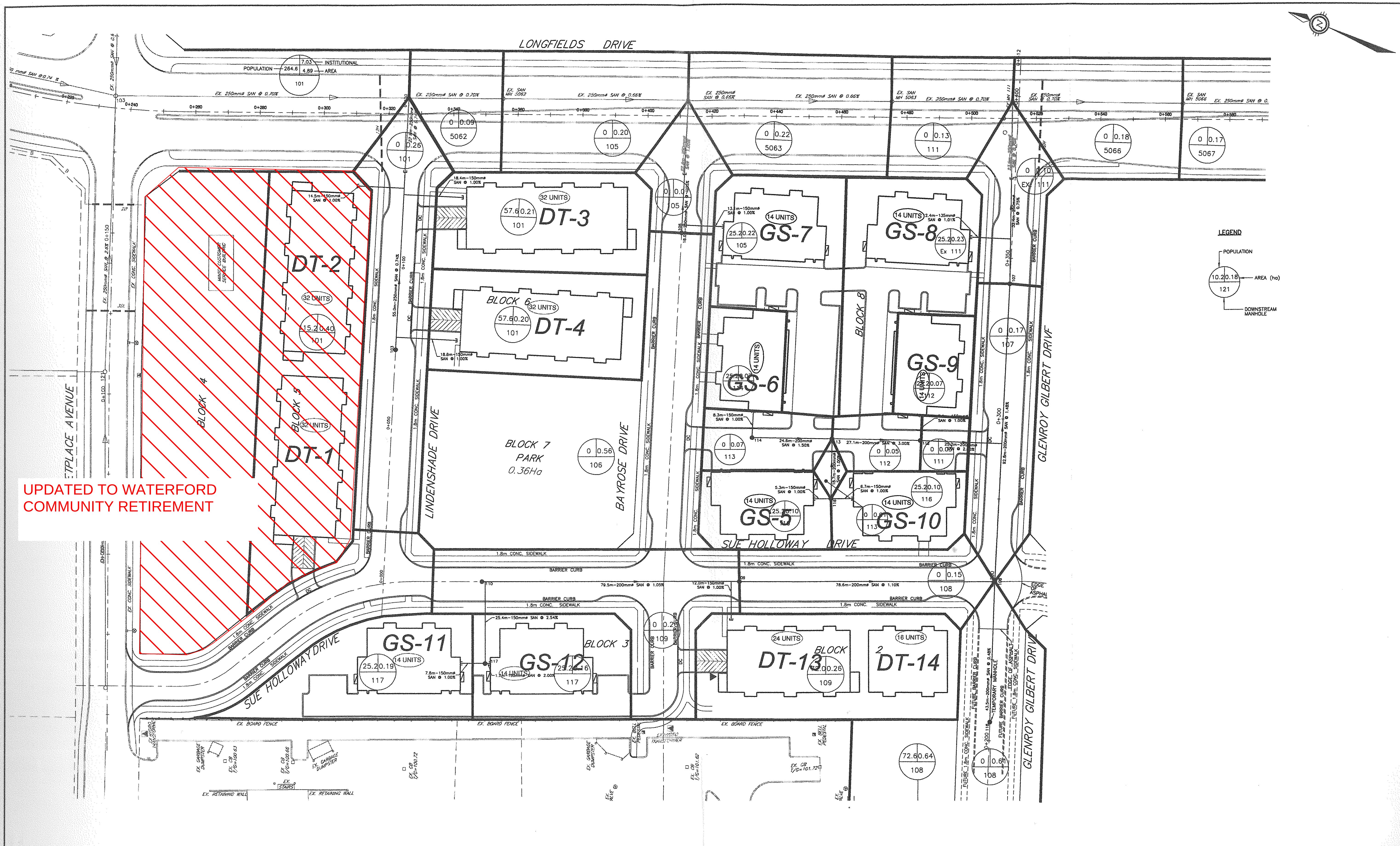
LEGEND

SANITARY DRAINAGE AREA BOUNDARY

POPULATION
57.8 | 0.86 — AREA (ha)
128
DOWNSTREAM MANHOLE

Robinson Land Development

scale 1:500	CLIENT: WATERFORD RETIREMENT	project no. 16065
date 30/11/16	TITLE: SANITARY DRAINAGE AREA PLAN	SAN–1
drawn by JHB		



NOTES

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.

PRELIMINARY
NOT FOR CONSTRUCTION

NO.	REVISION DESCRIPTION	DATE	BY	APPD
5	ISSUED FOR MOE APPROVAL	23/09/10	KLM	KLM
4	REVISED PER CITY COMMENTS	24/08/10	KLM	KLM
3	REVISED PER CITY COMMENTS, REVISED SITE PLAN	16/07/10	KLM	KLM
2	ISSUED FOR APPROVAL	26/05/10	KLM	KLM
1	ISSUED FOR SITE PLAN APPLICATION	26/03/10	KLM	KLM

SCALE
HORZ 1:500
0 5 10 15 20

minto
CANADA'S MOST HONOURED BUILDER

REVIEWED BY
LICENSED PROFESSIONAL ENGINEER
K.L. MURPHY
PROVINCE OF ONTARIO

CLIENT
MINTO COMMUNITIES INC.

DME
David McManus Engineering
A Trow Global Company
100-2650 Queensview Drive Ottawa, Ontario, K2B 8H6
E-mail: mcmanus@dmei.on.ca Ph.613-585-1899 Fax. 613-225-7330

BASEPLAN: DME
DESIGN: JHB
CHECKED: KLM
CAD: JHB
PROJ. MAN: KLM
APPROVED: KLM

PROJECT
AMPERSAND IN
CHAPMAN MILLS TOWN CENTRE

TITLE
SANITARY DRAINAGE AREA PLAN

PROJ NO. 2884
SURVEY DME
DATE MARCH 2010
DRAWING NO. SAN1

Drawing name: W:\Projects\2800\2884 – Barrhaven Towncentre\2641-Longfields SAN-101.dwg

Date of plot: Feb 12, 2010 – 2:16pm

LEGEND

POPULATION / AREA (ha) / DOWNSTREAM MANHOLE

57.80.86 — 128

- EXISTING SANITARY SEWER
- PROPOSED SANITARY SEWER
- FUTURE SANITARY SEWER
- 97.11 PROPOSED ROAD ELEVATION
- 1.4 % PROPOSED ROAD GRADE

MARKETPLACE AVE.

LONGFIELDS DRIVE

LINDENSHADE DRIVE

BAYROSE DRIVE

CHAPMAN MILLS DRIVE

GREENBANK ROAD

RICCAN AVENUE

FUTURE TRANSITWAY – BLOCK 14

BLOCK 1 (UPDATED TO WATERFORD COMMUNITY RETIREMENT)

BLOCK 2 (UPDATED TO MINTO AMPERSAND IN CHAPMAN MILLS TOWN CENTRE)

BLOCK 3 (UPDATED TO BARRHAVEN TOWN CENTRE BLOCK 2)

BLOCK 4

BLOCK 5

BLOCK 6

BLOCK 7 PARK 0.35ha

BLOCK 8

BLOCK 9

BLOCK 10 PARK

BLOCK 12

BLOCK 13

BLOCK 14

UPDATED TO BARRHAVEN TOWN CENTRE BLOCK 1

STREET NO. 1 (101.39)

STREET NO. 2 (101.19)

STREET NO. 3

STREET NO. 4

STREET NO. 5

STREET NO. 2

INSTITUTIONAL ROADWAY AREA 7.03 / 0.77 / 103

GLENROY GILBERT

PROPOSED 200mmø SANITARY CONNECTION

SANITARY SEWER ON GREENBANK ROAD TO FLOW TO SOUTH NEPEAN COLLECTOR SEWER EXACT LOCATION AND SIZE TO BE DETERMINED ONCE A ROAD NETWORK HAS BEEN CONFIRMED

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.

No.	REVISION	DATE	BY
3.	REVISED PER CITY COMMENTS	FEB 9/10	KLM
2.	REVISED PER CITY COMMENTS	DEC 14/09	KLM
1.	ISSUED FOR SERVICING BRIEF	JUNE 2/09	SMC

LICENSED PROFESSIONAL ENGINEER — K.L. MURPHY — PROVINCE OF ONTARIO

David McManus Engineering Ltd.
400 – 30 Camelot Drive
Nepean Ontario, K2G 5X8
E-mail: mcmanus@dmel.on.ca
Ph. 225-1929 Fax 225-7330

BASEPLAN	DME
DESIGN	JHB
CHECKED	SWB/JHB
CAD	SWB/JHB
PROJ. MGR.	SMC
APPROVED	SMC

SCALE 1:1000 (0 10 20 30 40)

MINTO COMMUNITIES INC.
BARRHAVEN TOWN CENTRE
CITY OF OTTAWA
CONCEPTUAL SANITARY DRAINAGE AREA PLAN

PROJECT No.	2884
SURVEY BY	DME
DATE	MAY 2009
DRAWING No.	2884-SAN-101

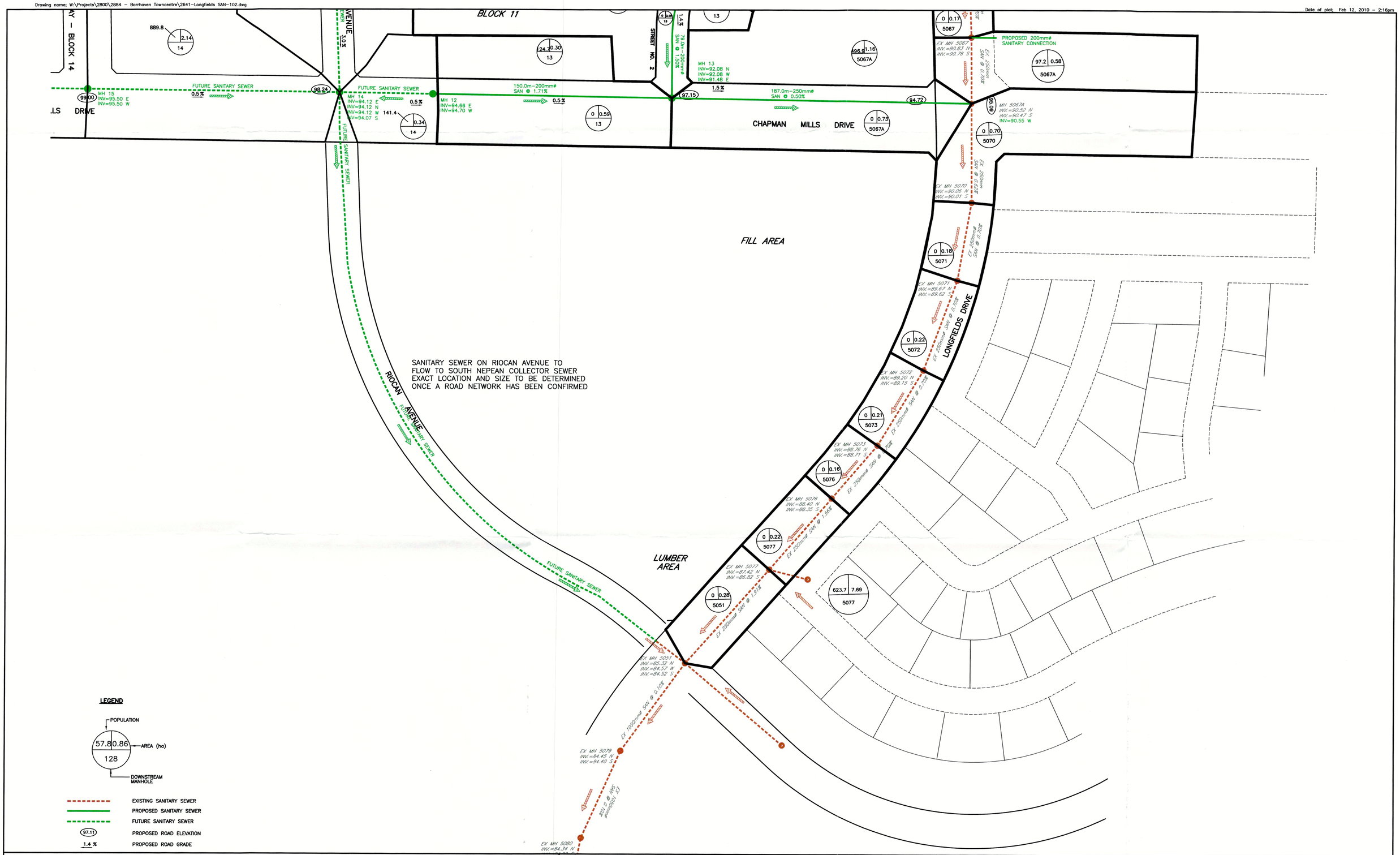
Table 1.1: Development Statistic Projections

Land Use	Total Area (ha)	Projected Residential Units	Residential Population per Unit *	Projected Population *
Block A – Stacked Townhouse Units	0.64	60	2.1	126
Block B – Stacked Townhouse Units	4.19	544	2.1	1142
Glenroy Gilbert Drive Extension	0.39	-	-	-
TOTAL	5.21	604		1268

** NOTE: Population projections may differ from population estimates used in background Transportation Studies, Planning Rationale, and other studies. Population projection and residential population per unit values are based on Ministry of Environment, Conservation and Parks guidelines for servicing demand calculations. Local Roads are included in Total Area estimates above.*

MINTO
BTC BLOCK A
5063-B
0.64 ha. - 126 pers.

MINTO
BTC BLOCK B
13 -5067-A
0.65ha. - 1142 pers.



LEGEND

POPULATION
57.8 / 0.86 — AREA (ha)
128 — DOWNSTREAM MANHOLE

- EXISTING SANITARY SEWER
- PROPOSED SANITARY SEWER
- FUTURE SANITARY SEWER
- (97.11) PROPOSED ROAD ELEVATION
- 1.4 % PROPOSED ROAD GRADE

NOTE
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Ottawa

No.	REVISION	DATE	BY
3.	REVISED PER CITY COMMENTS	FEB 9/10	KLM
2.	REVISED PER CITY COMMENTS	DEC 14/09	KLM
1.	ISSUED FOR SERVICING BRIEF	JUNE 2/09	SMC

LICENSED PROFESSIONAL ENGINEER
K.L. MURPHY
PROVINCE OF ONTARIO

minto
OWNER'S MOST HONOURED BUILDER

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David McManus Engineering Ltd.
400 - 30 Comelot Drive
Nepean Ontario, K2G 5X8
E-mail: mcmanus@dmei.on.ca
Ph. 225-1929 Fax 225-7330

BASEPLAN	DME
DESIGN	JHB
CHECKED	SWB/JHB
CAD	SWB/JHB
PROJ. MGR.	SMC
APPROVED	SMC

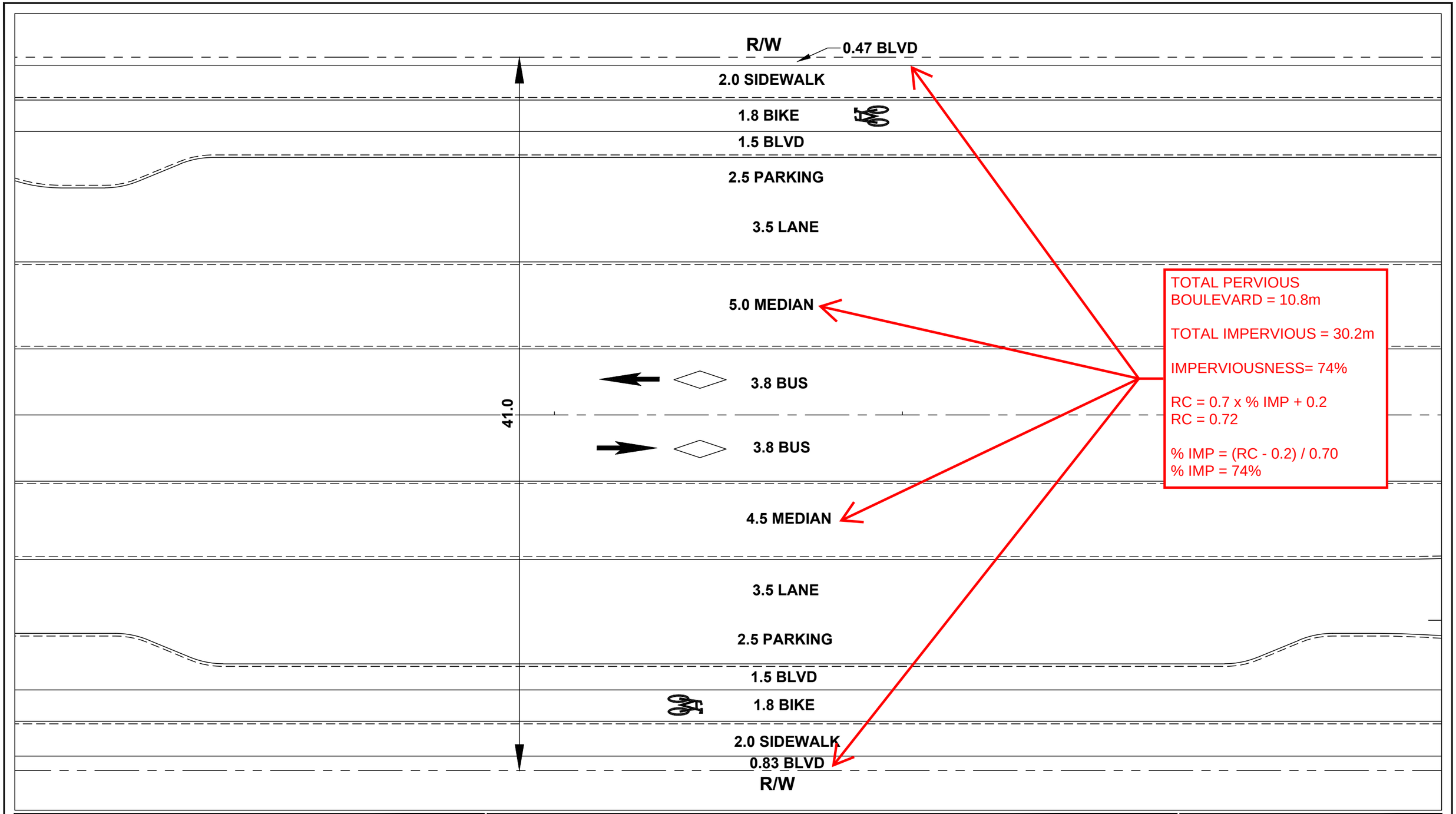
SCALE
1:1000
0 10 20 30 40

MINTO COMMUNITIES INC.
BARRHAVEN TOWN CENTRE
CITY OF OTTAWA
CONCEPTUAL SANITARY DRAINAGE AREA PLAN

PROJECT No.	2884
SURVEY BY	DME
DATE	MAY 2009
DRAWING No.	2884-SAN-102

APPENDIX D

Stormwater Servicing Documents



DSEL
120 Iber Road, Unit 103
Stittsville, ON K2S 1E9
TEL: (613) 836-0856
FAX: (613) 836-7183
www.DSEL.ca

CHAPMAN MILLS DRIVE
41.0m ROW PERVIOUS FIGURE

PROJECT No.:	15-816
SCALE:	1:1500
DATE:	JUNE 2023
FIGURE:	1

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Local Roads Return Frequency = 2 years
Collector Roads Return Frequency = 5 years
Manning 0.013 Arterial Roads Return Frequency = 10 years

	LOCATION		AREA (Ha)														FLOW						SEWER DATA								
			2 YEAR				5 YEAR				10 YEAR				100 YEAR				Time of	Intensity	Intensity	Intensity	Intensity	Peak Flow	DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF	RATIO
			AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	Conc.	2 Year	5 Year	10 Year	100 Year										
Location	From Node	To Node	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(min)	(mm/h)	(mm/h)	(mm/h)	(mm/h)	Q (l/s)	(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)	LOW (min	Q/Q full
SERVICING 6																																
	107	108			0.00	0.00	0.17	0.74	0.35	0.35			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	36	300	300	PVC	3.00	15.5	167.4906	2.3695	0.1090	0.218
	108	109			0.00	0.00			0.00	0.35			0.00	0.00			0.00	0.00	10.11	76.39	103.62	121.47	177.57	36	300	300	PVC	0.35	15.5	57.2089	0.8093	0.3192	0.633
To GLENROY GILBERT DR, Pipe 109 - 110						0.00				0.35				0.00				0.00	10.43														
SERVICING 5																																
	104	105			0.00	0.00	0.25	0.77	0.54	0.54			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	56	300	300	PVC	0.65	16.0	77.9626	1.1029	0.2418	0.715
	105	106			0.00	0.00			0.00	0.54			0.00	0.00			0.00	0.00	10.24	75.89	102.93	120.66	176.38	55	300	300	PVC	0.55	15.5	71.7152	1.0146	0.2546	0.768
To GLENROY GILBERT DR, Pipe 106 - 109						0.00				0.54				0.00				0.00	10.50														
SERVICING 2																																
	100	101			0.00	0.00	0.13	0.74	0.27	0.27			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	28	300	300	PVC	1.80	16.5	129.7377	1.8354	0.1498	0.215
	101	103			0.00	0.00			0.00	0.27			0.00	0.00			0.00	0.00	10.15	76.23	103.41	121.22	177.20	28	300	300	PVC	0.35	15.5	57.2089	0.8093	0.3192	0.483
To GLENROY GILBERT DR, Pipe 103 - 106						0.00				0.27				0.00				0.00	10.47														
GLENROY GILBERT DR																																
					0.00	0.00	0.05	0.64	0.09	0.09			0.00	0.00			0.00	0.00														
					0.00	0.00	0.04	0.58	0.06	0.15			0.00	0.00			0.00	0.00														
	102	103			0.00	0.00	0.03	0.64	0.05	0.21			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	22	300	300	PVC	0.35	30.0	57.2089	0.8093	0.6178	0.377
Contribution From SERVICING 2, Pipe 101 - 103						0.00				0.27				0.00				0.00	10.47														
					0.00	0.00	0.03	0.54	0.05	0.52			0.00	0.00			0.00	0.00														
					0.00	0.00	0.07	0.64	0.12	0.64			0.00	0.00			0.00	0.00														
					0.00	0.00	0.08	0.64	0.14	0.79			0.00	0.00			0.00	0.00														
	103	106			0.00	0.00	0.08	0.77	0.17	0.96			0.00	0.00			0.00	0.00	10.62	74.51	101.04	118.43	173.10	97	450	450	CONC	0.25	85.0	142.5531	0.8963	1.5805	0.679
Contribution From SERVICING 5, Pipe 105 - 106						0.00				0.54				0.00				0.00	10.50														
					0.00	0.00	0.01	0.77	0.02	1.51			0.00	0.00			0.00	0.00														
					0.00	0.00	0.03	0.54	0.05	1.56			0.00	0.00			0.00	0.00														
					0.00	0.00	0.09	0.64	0.16	1.72			0.00	0.00			0.00	0.00														
	106	109			0.00	0.00	0.10	0.64	0.18	1.90			0.00	0.00			0.00	0.00	12.20	69.28	93.86	109.97	160.68	178	525	525	CONC	0.45	68.0	288.4945	1.3327	0.8504	0.617
Contribution From SERVICING 6, Pipe 108 - 109						0.00				0.35				0.00				0.00	10.43														
	109	EX STM 112			0.00	0.00			0.00	2.25			0.00	0.00			0.00	0.00	13.05	66.79	90.44	105.95	154.78	203	525	525	CONC	0.40	10.5	271.9953	1.2565	0.1393	0.747
RIOCAN AVE																																
	154	155			0.00	0.00	0.05	0.72	0.10	0.10			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	10	300	300	PVC	2.00	56.0	136.7555	1.9347	0.4824	0.076
					0.00	0.00	0.16	0.66	0.29	0.39			0.00	0.00			0.00	0.00														
	155	156			0.00	0.00	0.32	0.72	0.64	1.03			0.00	0.00			0.00	0.00	10.48	75.00	101.71	119.22	174.27	105	450	450	CONC	0.25	78.0	142.5531	0.8963	1.4504	0.738
	156	EX STM MH			0.00	0.00			0.00	1.03			0.00	0.00			0.00	0.00	11.93	70.10	94.98	111.30	162.63	98	450	450	CONC	0.20	6.0	127.5033	0.8017	0.1247	0.770
SERVICING 21																																
	Plug	146			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	0	300	300	PVC	1.00	2.5	96.7008	1.3680	0.0305	0.000
	146	150			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	10.03	76.69	104.03	121.95	178.28	0	300	300	PVC	0.35	25.5	57.2089	0.8093	0.5251	0.000
To SERVICING 19, Pipe 150 - 151						0.00				0.00				0.00				0.00	10.56														
	Plug	148			0.00	0.00	0.18	0.78	0.39	0.39			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	41	375	375	PVC	1.00	1.0	175.3301	1.5875	0.0105	0.232
	148	149			0.00	0.00			0.00	0.39			0.00	0.00			0.00	0.00	10.01	76.76	104.14	122.08	178.46	41	450	450	CONC	0.20	22.5	127.5033	0.8017	0.4678	0.319
	149	150			0.00	0.00	0.24	0.74	0.49	0.88			0.00	0.00			0.00	0.00	10.48	75.02	101.73	119.24	174.30	90	600	600	CONC	0.15	2.0	237.8056	0.8411	0.0396	0.378
To SERVICING 19, Pipe 150 - 151						0.00				0.88				0.00				0.00	10.52														
SERVICING 16																																
	Plug	141			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	0	300	300	PVC	1.00	2.5	96.7008	1.3680	0.0305	0.000
To SERVICING 17, Pipe 141 - 143						0.00				0.00				0.00				0.00	10.03														
SERVICING 17																																
Contribution From SERVICING 16, Pipe 140 - 141						0.00				0.00				0.00				0.00	10.03														
	141	143			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	10.03	76.69	104.03	121.95	178.28	0	300	300	PVC	0.35	25.5	57.2089	0.8093	0.5251	0.000
To SERVICING 19, Pipe 143 - 144						0.00				0.00				0.00				0.00	10.56														

Definitions:
Q = 2.78 AIR, where
Q = Peak Flow in Litres per second (L/s)
A = Areas in hectares (ha)
I = Rainfall Intensity (mm/h)
R = Runoff Coefficient

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min. Velocity = 0.80 m/s

Designed: CPB	PROJECT: Minto - Barrhaven Town Centre Stage 1		
Checked: SLM	LOCATION: City of Ottawa		
Dwg. Reference:	File Ref: 15-816	Date: 06 Oct 2023	Sheet No. SHEET 1 OF 3

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Local Roads Return Frequency = 2 years
Collector Roads Return Frequency = 5 years
Manning 0.013 Arterial Roads Return Frequency = 10 years

	LOCATION		AREA (Ha)																FLOW						SEWER DATA								
			2 YEAR				5 YEAR				10 YEAR				100 YEAR				Time of	Intensity	Intensity	Intensity	Intensity	Peak Flow	DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF	RATIO
			AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	Conc.	2 Year	5 Year	10 Year	100 Year										
Location	From Node	To Node	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(min)	(mm/h)	(mm/h)	(mm/h)	(mm/h)	Q (l/s)	(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)	LOW (min	Q/Q full
	Plug	160			0.00	0.00	0.18	0.79	0.40	0.40			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	41	375	375	PVC	1.00	1.0	175.3301	1.5875	0.0105	0.235
	160	159			0.00	0.00			0.00	0.40			0.00	0.00			0.00	0.00	10.01	76.76	104.14	122.08	178.46	41	375	375	PVC	0.30	22.5	96.0323	0.8695	0.4313	0.429
	159	143			0.00	0.00	0.25	0.71	0.49	0.89			0.00	0.00			0.00	0.00	10.44	75.15	101.92	119.46	174.62	91	375	375	PVC	0.45	2.0	117.6150	1.0649	0.0313	0.770
To SERVICING 19, Pipe 143 - 144						0.00				0.89				0.00				0.00	10.47														
SERVICING 19																																	
	142	143			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	0	375	375	PVC	0.30	6.0	96.0323	0.8695	0.1150	0.000
Contribution From SERVICING 17, Pipe 141 - 143						0.00				0.00				0.00				0.00	10.56														
Contribution From SERVICING 17, Pipe 159 - 143						0.00				0.89				0.00				0.00	10.47														
	143	144			0.00	0.00			0.00	0.89			0.00	0.00			0.00	0.00	10.56	74.74	101.35	118.79	173.63	90	450	450	CONC	0.20	12.5	127.5033	0.8017	0.2599	0.706
Contribution From SERVICING 9, Pipe 164 - 144						0.00				0.86				0.00				0.00	10.05														
	144	150			0.00	0.00			0.00	1.75			0.00	0.00			0.00	0.00	10.82	73.81	100.07	117.29	171.43	175	600	600	CONC	0.15	50.0	237.8056	0.8411	0.9908	0.735
Contribution From SERVICING 21, Pipe 146 - 150						0.00				0.00				0.00				0.00	10.56														
Contribution From SERVICING 21, Pipe 149 - 150						0.00				0.88				0.00				0.00	10.52														
	150	151			0.00	0.00			0.00	2.63			0.00	0.00			0.00	0.00	11.81	70.50	95.53	111.94	163.58	251	675	675	CONC	0.15	12.0	325.5584	0.9098	0.2198	0.772
To FUTURE CHAPMAN MILLS DR, Pipe 151 - 152						0.00				2.63				0.00				0.00	12.03														
SERVICING 15																																	
	Plug	129			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	0	300	300	PVC	1.00	2.5	96.7008	1.3680	0.0305	0.000
	129	135			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	10.03	76.69	104.03	121.95	178.28	0	300	300	PVC	2.50	23.0	152.8973	2.1631	0.1772	0.000
To SERVICING 14, Pipe 135 - 138						0.00				0.00				0.00				0.00	10.21														
	Plug	133			0.00	0.00	0.11	0.79	0.24	0.24			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	25	375	375	PVC	1.00	1.0	175.3301	1.5875	0.0105	0.144
	133	134			0.00	0.00			0.00	0.24			0.00	0.00			0.00	0.00	10.01	76.76	104.14	122.08	178.46	25	450	450	CONC	0.20	15.5	127.5033	0.8017	0.3222	0.197
	Plug	131			0.00	0.00	0.18	0.76	0.38	0.38			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	40	375	375	PVC	1.00	1.0	175.3301	1.5875	0.0105	0.226
	131	134			0.00	0.00			0.00	0.38			0.00	0.00			0.00	0.00	10.01	76.76	104.14	122.08	178.46	40	375	375	PVC	2.45	20.0	274.4351	2.4848	0.1342	0.144
	134	135			0.00	0.00	0.22	0.76	0.46	1.09			0.00	0.00			0.00	0.00	10.33	75.55	102.47	120.11	175.57	111	600	600	CONC	0.15	2.0	237.8056	0.8411	0.0396	0.468
To SERVICING 14, Pipe 135 - 138						0.00				1.09				0.00				0.00	10.37														
SERVICING 10																																	
	Plug	115			0.00	0.00	0.08	0.81	0.18	0.18			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	19	375	375	PVC	3.55	15.5	330.3473	2.9910	0.0864	0.057
To SERVICING 9, Pipe 115 - 116						0.00				0.18				0.00				0.00	10.09														
	Plug	115			0.00	0.00	0.11	0.79	0.24	0.24			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	25	375	375	PVC	0.30	6.5	96.0323	0.8695	0.1246	0.262
To SERVICING 9, Pipe 115 - 116						0.00				0.24				0.00				0.00	10.12														
SERVICING 9																																	
	164	144			0.00	0.00	0.46	0.67	0.86	0.86			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	89	450	450	CONC	0.20	2.5	127.5033	0.8017	0.0520	0.700
To SERVICING 19, Pipe 144 - 150						0.00				0.86				0.00				0.00	10.05														
Contribution From SERVICING 10, Pipe 113 - 115						0.00				0.18				0.00				0.00	10.09														
Contribution From SERVICING 10, Pipe 114 - 115						0.00				0.24				0.00				0.00	10.12														
	115	116			0.00	0.00	0.36	0.68	0.68	1.10			0.00	0.00			0.00	0.00	10.12	76.33	103.54	121.37	177.43	114	375	375	CONC	0.70	3.0	146.6917	1.3282	0.0376	0.778
	112	116			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	0	300	300	PVC	0.35	61.0	57.2089	0.8093	1.2562	0.000
	116	117			0.00	0.00			0.00	1.10			0.00	0.00			0.00	0.00	11.26	72.30	98.00	114.84	167.84	108	525	525	CONC	0.20	82.0	192.3297	0.8885	1.5382	0.562
	117	127			0.00	0.00			0.00	1.10			0.00	0.00			0.00	0.00	12.79	67.52	91.43	107.12	156.50	101	525	525	CONC	0.20	19.5	192.3297	0.8885	0.3658	0.524
To SERVICING 14, Pipe 127 - 135						0.00				1.10				0.00				0.00	13.16														
SERVICING 11																																	
	Plug	119			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	0	300	300	PVC	1.00	4.0	96.7008	1.3680	0.0487	0.000
To SERVICING 12, Pipe 119 - 125						0.00				0.00				0.00				0.00	10.05														
	Plug	121			0.00	0.00	0.18	0.78	0.39	0.39			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	41	375	375	PVC	1.00	2.5	175.3301	1.5875	0.0262	0.232
To SERVICING 12, Pipe 121 - 124						0.00				0.39				0.00				0.00	10.03														

Definitions:
Q = 2.78 AIR, where
Q = Peak Flow in Litres per second (L/s)
A = Areas in hectares (ha)
I = Rainfall Intensity (mm/h)
R = Runoff Coefficient

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min. Velocity = 0.80 m/s

p

Designed: CPB	PROJECT: Minto - Barrhaven Town Centre Stage 1	
Checked: SLM	LOCATION: City of Ottawa	
Dwg. Reference:	File Ref: 15-816	Date: 06 Oct 2023
		Sheet No. SHEET 2 OF 3

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Local Roads Return Frequency = 2 years
Collector Roads Return Frequency = 5 years
Manning 0.013 Arterial Roads Return Frequency = 10 years

	LOCATION		AREA (Ha)														FLOW						SEWER DATA								
			2 YEAR				5 YEAR				10 YEAR				100 YEAR				Time of	Intensity	Intensity	Intensity	Intensity	Peak Flow	DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF	RATIO
			AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	Conc.	2 Year	5 Year	10 Year	100 Year										
Location	From Node	To Node	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(min)	(mm/h)	(mm/h)	(mm/h)	(mm/h)	Q (l/s)	(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)	LOW (min	Q/Q full
SERVICING 13																																
	Plug	123			0.00	0.00	0.08	0.81	0.18	0.18			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	19	375	375	PVC	1.00	2.5	175.3301	1.5875	0.0262	0.107
To SERVICING 12, Pipe 123 - 124						0.00				0.18				0.00				0.00	10.03														
SERVICING 12																																
Contribution From SERVICING 11, Pipe 118 - 119						0.00				0.00				0.00				0.00	10.05														
	119	125			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	10.05	76.62	103.94	121.84	178.11	0	300	300	PVC	1.05	23.0	99.0888	1.4018	0.2735	0.000
To SERVICING 14, Pipe 125 - 127						0.00				0.00				0.00				0.00	10.32														
Contribution From SERVICING 13, Pipe 122 - 123						0.00				0.18				0.00				0.00	10.03														
	123	124			0.00	0.00			0.00	0.18			0.00	0.00			0.00	0.00	10.03	76.70	104.05	121.98	178.32	19	375	375	PVC	0.30	15.0	96.0323	0.8695	0.2875	0.195
Contribution From SERVICING 11, Pipe 120 - 121						0.00				0.39				0.00				0.00	10.03														
	121	124			0.00	0.00			0.00	0.39			0.00	0.00			0.00	0.00	10.03	76.70	104.05	121.98	178.32	41	375	375	PVC	1.35	20.0	203.7152	1.8445	0.1807	0.199
Contribution From SERVICING 14, Pipe 162 - 124						0.00				0.54				0.00				0.00	10.47														
	124	125			0.00	0.00			0.00	1.11			0.00	0.00			0.00	0.00	10.47	75.06	101.80	119.32	174.42	113	450	450	CONC	0.20	2.0	127.5033	0.8017	0.0416	0.887
To SERVICING 14, Pipe 125 - 127						0.00				1.11				0.00				0.00	10.51														
SERVICING 14																																
					0.00	0.00	0.01	0.69	0.02	0.02			0.00	0.00			0.00	0.00														
	163	162			0.00	0.00	0.06	0.69	0.12	0.13			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	14	300	300	PVC	1.65	38.5	124.2144	1.7573	0.3651	0.113
	162	124			0.00	0.00	0.20	0.73	0.41	0.54			0.00	0.00			0.00	0.00	10.37	75.43	102.30	119.92	175.29	55	300	300	PVC	0.45	5.5	64.8688	0.9177	0.0999	0.852
To SERVICING 12, Pipe 124 - 125						0.00				0.54				0.00				0.00	10.47														
Contribution From SERVICING 12, Pipe 119 - 125						0.00				0.00				0.00				0.00	10.32														
Contribution From SERVICING 12, Pipe 124 - 125						0.00				1.11				0.00				0.00	10.51														
	125	127			0.00	0.00			0.00	1.11			0.00	0.00			0.00	0.00	10.51	74.91	101.59	119.08	174.06	113	600	600	CONC	0.15	22.0	237.8056	0.8411	0.4360	0.474
	126	127			0.00	0.00	0.34	0.64	0.60	0.60			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	63	450	450	CONC	0.20	3.0	127.5033	0.8017	0.0624	0.494
Contribution From SERVICING 9, Pipe 117 - 127						0.00				1.10				0.00				0.00	13.16														
	127	135			0.00	0.00			0.00	2.82			0.00	0.00			0.00	0.00	13.16	66.48	90.01	105.45	154.04	254	600	600	CONC	0.30	39.0	336.3080	1.1894	0.5465	0.754
Contribution From SERVICING 15, Pipe 129 - 135						0.00				0.00				0.00				0.00	10.21														
Contribution From SERVICING 15, Pipe 134 - 135						0.00				1.09				0.00				0.00	10.37														
	135	138			0.00	0.00			0.00	3.90			0.00	0.00			0.00	0.00	13.71	65.00	87.98	103.06	150.53	344	675	675	CONC	0.30	12.0	460.4091	1.2866	0.1554	0.746
To FUTURE CHAPMAN MILLS DR, Pipe 138 - 139						0.00				3.90				0.00				0.00	13.86														
FUTURE CHAPMAN MILLS DR																																
Contribution From SERVICING 14, Pipe 135 - 138						0.00				3.90				0.00				0.00	13.86														
	138	139			0.00	0.00			0.00	3.90			0.00	0.00			0.00	0.00	13.86	64.59	87.42	102.40	149.57	341	750	750	CONC	0.25	79.5	556.6385	1.2600	1.0516	0.613
					0.00	0.00			0.00	3.90			0.00	0.00			0.00	0.00														
	139	151			0.00	0.00			0.00	3.90	0.75	0.72	1.50	1.50			0.00	0.00	14.91	61.97	83.84	98.18	143.38	475	750	750	CONC	0.40	75.5	704.0982	1.5938	0.7895	0.674
Contribution From SERVICING 19, Pipe 150 - 151						0.00				2.63				0.00				0.00	12.03														
	151	EX STM 129			0.00	0.00			0.00	6.53			0.00	1.50			0.00	0.00	15.70	60.16	81.35	95.26	139.09	675	750	750	CONC	0.70	36.5	931.4344	2.1083	0.2885	0.724

Definitions:
Q = 2.78 AIR, where
Q = Peak Flow in Litres per second (L/s)
A = Areas in hectares (ha)
I = Rainfall Intensity (mm/h)
R = Runoff Coefficient

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min. Velocity = 0.80 m/s

LICENSED PROFESSIONAL ENGINEER
S. L. MERRICK
100196523
2023-10-06
PROVINCE OF ONTARIO
JOB # 15-816

Designed: CPB	PROJECT: Minto - Barrhaven Town Centre Stage 1	
Checked: SLM	LOCATION: City of Ottawa	
Dwg. Reference:	File Ref: 15-816	Date: 06 Oct 2023 / Sheet No. SHEET 3 OF 3

Area ID	Total Area (m^2)	Pervious Area (m^2)	Impervious Area (m^2)	RC
South Block				
155-156	1634	560	1074	0.66
115-116	3649	1147	2502	0.68
PLUG-115	818	105	713	0.81
PLUG-115	1094	172	922	0.79
136-137	115	54	61	0.57
137-138	1575	158	1418	0.83
PLUG-131	1836	367	1469	0.76
126-127	3378	1255	2123	0.64
PLUG-121	1756	301	1455	0.78
103-106	767	142	625	0.77
106-109	104	19	85	0.77
163-162	742	223	519	0.69
162-124	1965	477	1488	0.73
134-135	2165	433	1732	0.76
122-123	818	105	713	0.81
161-160	1756	276	1480	0.79
164-144	4609	1514	3095	0.67
PLUG-133	1094	172	922	0.79
147-148	1796	308	1488	0.78
139-151	1730	384	1346	0.74
159-143	2464	657	1807	0.71
149-150	2442	551	1891	0.74
to Ex.Glenroy Gilbert	1657	417	1240	0.72
to Ex. Longfields	1736	660	1076	0.63
North Block				
102-103	376	170	206	0.58
100-101	1342	304	1038	0.74
103-106	266	137	129	0.54
104-105	2459	460	1999	0.77
107-108	1658	372	1286	0.74
106-109	276	142	134	0.54

Report

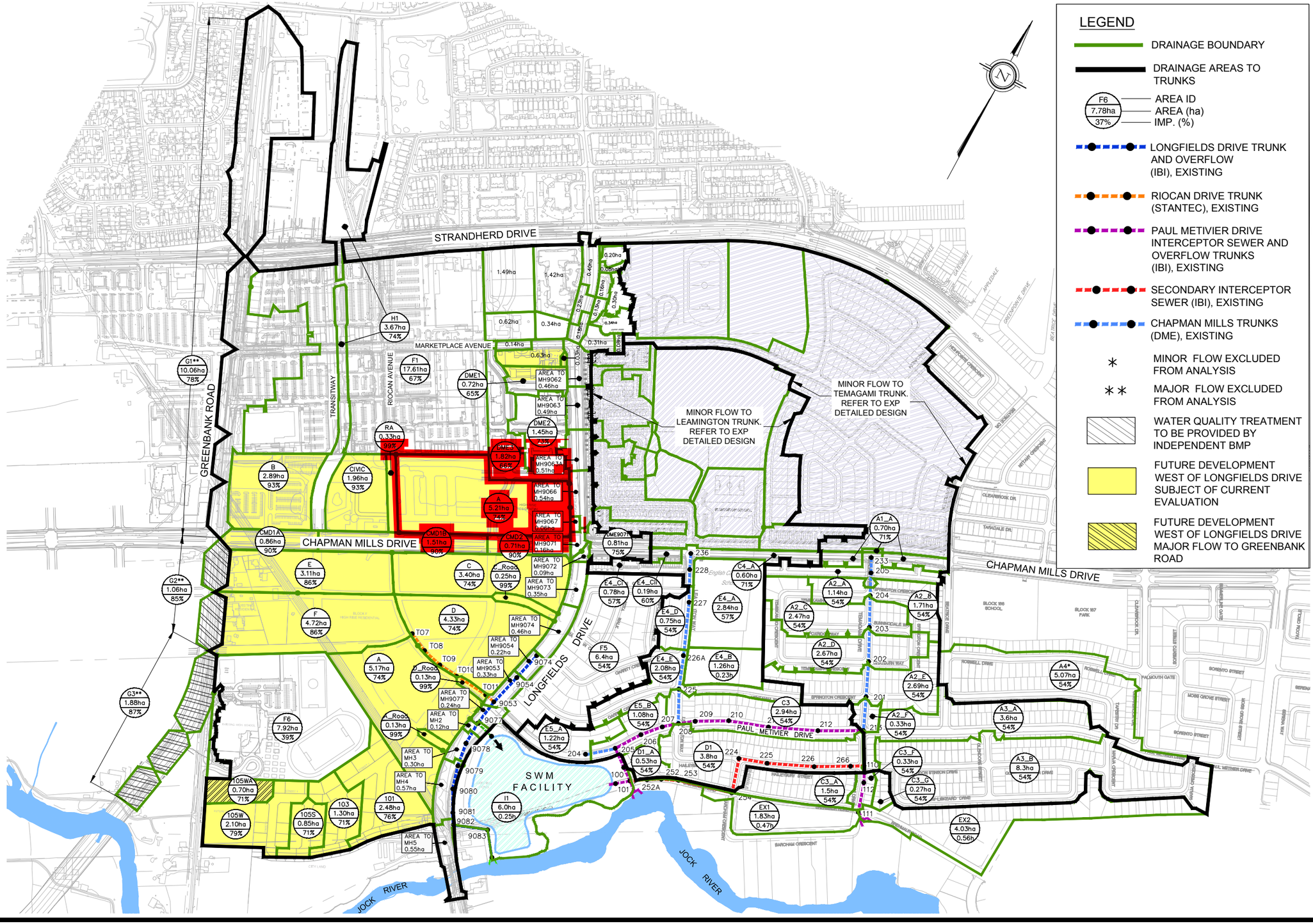
Nepean South Chapman Mills Stormwater Management Servicing Fourth Addendum

Prepared for Minto Communities – Canada
by IBI Group
February 16, 2018

Table 2.9 Revised drainage areas

2006					UPDATED				
DRAINAGE AREA ID	AREA (HA)	TIMP (%)	SURFACE STORAGE (CU-M)	MINOR SYSTEM CAPTURE (L/S)	DRAINAGE AREA ID	AREA (HA)	TIMP (%)	SURFACE STORAGE (CU-M)	MINOR SYSTEM CAPTURE (L/S)
F2	14.4	85	3012(1)	1575	DME-9063A (DME3)	1.82	66	252	435(2)
					Block A	5.21	74(3)	750	784(4)(5)(6)
					R-9066	0.54	71	0	211
					Riocan Avenue	0.33	99	0	28(7)
F3	9.4	85	2057(1)	956	CMD1B	1.50	90(3)	0	752(4)(7)
					CMD2	0.71	90(3)	0	457(4)(5)
					Block B	2.89	93(3)	0	1331(4)
					Block H Civic	1.96	93(3)	0	900(4)
					CMD1A	0.86	90(3)	0	383(4)
F4	31.6	85	5814(1)	3750	E	3.11(9)	86	0	280(10)
					F	4.72(9)	86	0	425(10)
					C	3.40	74(13)	0	306(10)
					C_ROAD	0.25	99	0	122(4)
					D	4.33	74(13)	0	389(10)
					D_ROAD	0.13	99	0	66(4)
					Parcel A	5.17	74(13)	0	465(10)
					A_ROAD	0.13	99	0	65(4)
					105W	2.10	79(3)	0	189(10)
					105WA(16)	0.70	71(15)	0	63(10)
					105S	0.85	71(3)	0	77(10)
					103	1.30	71(3)	0	117(10)
					101	2.48	76(3)	0	223(10)
F6	7.37	37	863(1)	627	F6(14)	7.84	39	680	831(4)
H1	3.2	80	392	530	H1	3.67	74	1056	556
G1	10.40	78	0	1544	G1	10.06	78	0	1869(8)
G2	1.08	85	0	268	G2(11)	1.06	85	0	268(12)
G3	1.88	87	0	478	G3(11)	1.88	87	0	478(12)

(1) 100 year on-site storage
(2) Based on rational method for Ampersand Stage I
(3) Weighted c value (from which imperviousness was calculated) established by engineering consultant completing conceptual design
(4) 100 year flow capture (based on 100 year 3 hour Chicago storm)
(5) 100 year flow from a 0.358 ha portion of Block A flow cascades to Chapman Mills Drive (CMD2)
(6) Minor flow from a 0.915 ha portion of Block A drains via the storm sewer on Glenroy Gilbert Drive (via Ampersand Stage I); minor flow from a 3.936 ha portion and 100 year flow from a 0.358 ha portion drains via the storm sewer on Chapman Mills Drive
(7) Major flow from Riocan Avenue cascades to Chapman Mills Drive (CMD1B)
(8) Minor system capture per Stantec/AECOM July 2009
(9) Drainage area extended west to Greenbank Road
(10) Minor system capture increased to 90 l/s/ha from 85 l/s/ha
(11) Water quality treatment for areas G2, G3 to be provided by an independent BMP
(12) Minor system capture per TSH May 2006
(13) Imperviousness consistent with that of Block A
(14) Per detailed design of site
(15) Per email from DSEL November 6, 2017
(16) Major flow conveyed toward Greenbank Road



Scale	Project Title	Drawing Title	Sheet No.
N.T.S.	NEPEAN SOUTH-CHAPMAN MILLS SWM SERVICING ADDENDUM	DRAINAGE AREA PLAN	FIGURE 1A

Stormwater - Proposed Development
City of Ottawa Sewer Design Guidelines, 2012

Target Flow Rate

Q 147.00 L/s

Estimated Post Development Peak Flow from Unattenuated Areas

Area 0.04 0.08
C 0.58 0.64

Total Area 0.12 ha <-- Sum of Drainage to CB 9, CB 10
C 0.62 Rational Method runoff coefficient

	5-year					100-year				
t_c (min)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)	i (mm/hr)	Q_{actual}* (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)
13.1	90.4	18.5	18.5	0.0	0.0	154.8	31.7	31.7	0.0	0.0

Note:
Tc = 13.05 min per Design Sheet
--> 5-year flow conveyed within Glenroy Gilbert Drive Extension storm sewer sytem.
--> Flows exceeding the 5-year storm directed overland towards Riocan Avenue Extension.

Area 0.03 0.07
C 0.54 0.64

Total Area 0.10 ha <-- Drainage to CB 13
C 0.61 Rational Method runoff coefficient

	5-year					100-year				
t_c (min)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)	i (mm/hr)	Q_{actual}* (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)
13.1	90.4	15.4	15.4	0.0	0.0	154.8	26.3	26.3	0.0	0.0

Note:
Tc = 13.05 min per Design Sheet
--> 5-year flow conveyed within Glenroy Gilbert Drive Extension storm sewer sytem.
--> Flows exceeding the 5-year storm directed to DCB 15.

Area 0.08 0.08
C 0.77 0.64

Total Area 0.16 ha <-- Drainage to CB 12, CB 14
C 0.70 Rational Method runoff coefficient

	5-year					100-year				
t_c (min)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)	i (mm/hr)	Q_{actual}* (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)
13.1	90.4	28.0	28.0	0.0	0.0	154.8	48.0	48.0	0.0	0.0

Note:
Tc = 13.05 min per Design Sheet
--> 5-year flow conveyed within Glenroy Gilbert Drive Extension storm sewer sytem.
--> Flows exceeding the 5-year storm directed to DCB 16.

Estimated Post Development Peak Flow from Attenuated Areas

Area ID DCB 15
Available Sub-surface Storage

Total Subsurface Storage (m^3)

Stage Attenuated Areas Storage Summary

	Surface Storage				Surface and Subsurface Storage			
	Stage	Ponding	h_o	delta d	V*	V_{acc}**	$Q_{release}$†	$V_{drawdown}$
	(m)	(m^2)	(m)	(m)	(m^3)	(m^3)	(L/s)	(hr)
Orifice INV	97.96		0.00			0.0	0.0	0.00
T/G	99.34	0.7	1.38	1.38	0.0	0.0	22.0	0.00
	99.49	56.0	1.53	0.15	3.2	3.2	23.2	0.04
Max Ponding	99.64	261.6	1.68	0.15	21.9	25.1	24.3	0.29

* V=Incremental storage volume
**V_{acc}=Total surface and sub-surface
† $Q_{release}$ = Release rate calculated from orifice equation

Orifice Location **DCB 15** **Dia** 94

Area 0.03 0.09
C 0.54 0.64

Total Area 0.13 ha
C 0.62 Rational Method runoff coefficient *Note: Rational Method Coefficient "C" increased by 25% for 100-year calculations*

	5-year					100-year				
t_c	i	Q_{actual}‡	$Q_{release}$	Q_{stored}	V_{stored}	i	Q_{actual}‡	$Q_{release}$	Q_{stored}	V_{stored}
(min)	(mm/hr)	(L/s)	(L/s)	(L/s)	(m^3)	(mm/hr)	(L/s)	(L/s)	(L/s)	(m^3)
13	90.4	20.1	20.1	0.0	0.0	154.8	54.0	24.2	29.8	23.3
15	83.6	18.6	18.6	0.0	0.0	142.9	50.7	24.2	26.4	23.8
20	70.3	15.6	15.6	0.0	0.0	120.0	44.3	24.2	20.1	24.1
25	60.9	13.6	13.6	0.0	0.0	103.8	39.8	24.2	15.6	23.4
30	53.9	12.0	12.0	0.0	0.0	91.9	36.5	24.2	12.3	22.1
35	48.5	10.8	10.8	0.0	0.0	82.6	33.9	24.2	9.7	20.3
40	44.2	9.8	9.8	0.0	0.0	75.1	31.8	24.2	7.6	18.2
45	40.6	9.0	9.0	0.0	0.0	69.1	30.2	24.2	5.9	15.9
50	37.7	8.4	8.4	0.0	0.0	64.0	28.7	24.2	4.5	13.4
55	35.1	7.8	7.8	0.0	0.0	59.6	27.5	24.2	3.3	10.8
60	32.9	7.3	7.3	0.0	0.0	55.9	26.5	24.2	2.2	8.1
65	31.0	6.9	6.9	0.0	0.0	52.6	25.6	24.2	1.3	5.2
70	29.4	6.5	6.5	0.0	0.0	49.8	24.8	24.2	0.5	2.3
75	27.9	6.2	6.2	0.0	0.0	47.3	24.1	24.1	0.0	0.0
80	26.6	5.9	5.9	0.0	0.0	45.0	23.5	23.5	0.0	0.0
85	25.4	5.6	5.6	0.0	0.0	43.0	22.9	22.9	0.0	0.0
90	24.3	5.4	5.4	0.0	0.0	41.1	22.4	22.4	0.0	0.0
95	23.3	5.2	5.2	0.0	0.0	39.4	21.9	21.9	0.0	0.0
100	22.4	5.0	5.0	0.0	0.0	37.9	21.5	21.5	0.0	0.0
105	21.6	4.8	4.8	0.0	0.0	36.5	21.1	21.1	0.0	0.0
110	20.8	4.6	4.6	0.0	0.0	35.2	20.7	20.7	0.0	0.0

5-year Qattenuated **20.1 L/s** **100-year $Q_{attenuated}$** **24.3 L/s**
5-year Max. Storage Required **0.0 m^3** **100-year Max. Storage Required** **24.1 m^3**
Est. 5-year Storage Elevation **97.96 m** **Est. 100-year Storage Elevation** **99.63 m**

Area ID DCB 16
Available Sub-surface Storage

Total Subsurface Storage (m^3)

Stage Attenuated Areas Storage Summary

		Surface Storage			Surface and Subsurface Storage			
	Stage	Ponding	h_o	delta d	V*	V_{acc}**	$Q_{release}$†	$V_{drawdown}$
	(m)	(m^2)	(m)	(m)	(m^3)	(m^3)	(L/s)	(hr)
Orifice INV	97.96		0.00			0.0	0.0	0.00
T/G	99.34	0.7	1.38	1.38	0.0	0.0	29.1	0.00
	99.49	47.9	1.53	0.15	2.7	2.7	30.6	0.02
Max Ponding	99.64	219.2	1.68	0.15	18.5	21.2	32.1	0.18

* V=Incremental storage volume
**V_{acc}=Total surface and sub-surface
† $Q_{release}$ = Release rate calculated from orifice equation

Orifice Location **DCB 16** **Dia** 108

Area 0.01 0.09
C 0.77 0.64

Total Area 0.10 ha
C 0.65 Rational Method runoff coefficient *Note: Rational Method Coefficient "C" increased by 25% for 100-year calculations*

	5-year					100-year				
t_c (min)	i (mm/hr)	Q_{actual}‡ (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)	i (mm/hr)	Q_{actual}‡ (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)
13	89.9	16.0	16.0	0.0	0.0	153.9	54.2	31.8	22.4	17.7
15	83.6	14.9	14.9	0.0	0.0	142.9	51.8	31.8	19.9	18.0
20	70.3	12.5	12.5	0.0	0.0	120.0	46.7	31.8	14.8	17.8
25	60.9	10.8	10.8	0.0	0.0	103.8	43.1	31.8	11.3	16.9
30	53.9	9.6	9.6	0.0	0.0	91.9	40.4	31.8	8.6	15.5
35	48.5	8.6	8.6	0.0	0.0	82.6	38.3	38.3	0.0	0.0
40	44.2	7.9	7.9	0.0	0.0	75.1	36.7	36.7	0.0	0.0
45	40.6	7.2	7.2	0.0	0.0	69.1	35.3	35.3	0.0	0.0
50	37.7	6.7	6.7	0.0	0.0	64.0	34.2	34.2	0.0	0.0
55	35.1	6.3	6.3	0.0	0.0	59.6	33.2	33.2	0.0	0.0
60	32.9	5.9	5.9	0.0	0.0	55.9	32.4	32.4	0.0	0.0
65	31.0	5.5	5.5	0.0	0.0	52.6	31.7	31.7	0.0	0.0
70	29.4	5.2	5.2	0.0	0.0	49.8	31.0	31.0	0.0	0.0
75	27.9	5.0	5.0	0.0	0.0	47.3	30.5	30.5	0.0	0.0
80	26.6	4.7	4.7	0.0	0.0	45.0	30.0	30.0	0.0	0.0
85	25.4	4.5	4.5	0.0	0.0	43.0	29.5	29.5	0.0	0.0
90	24.3	4.3	4.3	0.0	0.0	41.1	29.1	29.1	0.0	0.0
95	23.3	4.2	4.2	0.0	0.0	39.4	28.7	28.7	0.0	0.0
100	22.4	4.0	4.0	0.0	0.0	37.9	28.4	28.4	0.0	0.0
105	21.6	3.8	3.8	0.0	0.0	36.5	28.1	28.1	0.0	0.0
110	20.8	3.7	3.7	0.0	0.0	35.2	27.8	27.8	0.0	0.0

5-year Qattenuated **16.0 L/s** **100-year $Q_{attenuated}$** **31.8 L/s**
5-year Max. Storage Required **0.0 m^3** **100-year Max. Storage Required** **18.0 m^3**
Est. 5-year Storage Elevation **97.96 m** **Est. 100-year Storage Elevation** **99.61 m**

Area ID STM108
Available Sub-surface Storage

Total Subsurface Storage (m^3) 40.3 <-- Provided storage excludes storage volume below system invert

Stage Attenuated Areas Storage Summary

		Surface Storage			Surface and Subsurface Storage			
	Stage	Ponding	h_o	delta d	V*	V_{acc}**	$Q_{release}$†	$V_{drawdown}$
	(m)	(m^2)	(m)	(m)	(m^3)	(m^3)	(L/s)	(hr)
Orifice INV	96.49		0.00			0.0	0.0	0.00
Storage Chamber INV	97.54		1.05	1.05	0.0	0.0	5.8	0.00
Storage Chamber OBV	98.30		1.81	0.76	40.3	40.3	7.6	1.47
T/G	99.39	0.4	2.90	1.09	0.0	40.3	9.7	1.15
Max Ponding	99.69	189.7	3.20	0.30	19.8	60.1	10.0	1.67

* V=Incremental storage volume
**V_{acc}=Total surface and sub-surface
† $Q_{release}$ = Release rate per Tempest LMF Flow Curve

Orifice Location **STM108** **ICD** Tempest LMF 80
Total Area 0.17 ha
C 0.74 Rational Method runoff coefficient *Note: Rational Method Coefficient "C" increased by 25% for 100-year calculations*

	5-year					100-year				
t_c	i	Q_{actual}‡	$Q_{release}$	Q_{stored}	V_{stored}	i	Q_{actual}‡	$Q_{release}$	Q_{stored}	V_{stored}
(min)	(mm/hr)	(L/s)	(L/s)	(L/s)	(m^3)	(mm/hr)	(L/s)	(L/s)	(L/s)	(m^3)
13	90.4	31.6	6.8	24.8	19.4	154.8	67.6	7.9	59.7	46.7
15	83.6	29.2	6.8	22.4	20.2	142.9	62.4	7.9	54.5	49.1
20	70.3	24.5	6.8	17.8	21.3	120.0	52.4	7.9	44.5	53.4
25	60.9	21.3	6.8	14.5	21.8	103.8	45.4	7.9	37.5	56.2
30	53.9	18.8	6.8	12.1	21.7	91.9	40.1	7.9	32.2	58.0
35	48.5	17.0	6.8	10.2	21.4	82.6	36.1	7.9	28.2	59.2
40	44.2	15.4	6.8	8.7	20.8	75.1	32.8	7.9	24.9	59.8
45	40.6	14.2	6.8	7.4	20.0	69.1	30.2	7.9	22.3	60.1
50	37.7	13.2	6.8	6.4	19.2	64.0	27.9	7.9	20.0	60.1
55	35.1	12.3	6.8	5.5	18.2	59.6	26.0	7.9	18.1	59.9
60	32.9	11.5	6.8	4.7	17.1	55.9	24.4	7.9	16.5	59.5
65	31.0	10.8	6.8	4.1	15.9	52.6	23.0	7.9	15.1	58.9
70	29.4	10.3	6.8	3.5	14.7	49.8	21.7	7.9	13.8	58.2
75	27.9	9.7	6.8	3.0	13.4	47.3	20.6	7.9	12.7	57.3
80	26.6	9.3	6.8	2.5	12.0	45.0	19.7	7.9	11.8	56.4
85	25.4	8.9	6.8	2.1	10.7	43.0	18.8	7.9	10.9	55.4
90	24.3	8.5	6.8	1.7	9.3	41.1	18.0	7.9	10.1	54.3
95	23.3	8.1	6.8	1.4	7.8	39.4	17.2	7.9	9.3	53.2
100	22.4	7.8	6.8	1.1	6.3	37.9	16.6	7.9	8.7	51.9
105	21.6	7.5	6.8	0.8	4.9	36.5	15.9	7.9	8.0	50.7
110	20.8	7.3	6.8	0.5	3.3	35.2	15.4	7.9	7.5	49.3

5-year Qattenuated	**6.8 L/s**	**100-year $Q_{attenuated}$**	**10.0 L/s**
5-year Max. Storage Required	**21.8 m^3**	**100-year Max. Storage Required**	**60.1 m^3**
Est. 5-year Storage Elevation	**97.95 m**	**Est. 100-year Storage Elevation**	**99.69 m**

Notes:
- Required storage volumes calculated using the average Q release rate between storage tank invert and max ponding elevation
- Flow from the storage tank assumes maximum Q Release at max ponding elevation

Area ID STM105
Available Sub-surface Storage

Total Subsurface Storage (m^3) 67.4 <-- Provided storage excludes storage volume below system invert

Stage Attenuated Areas Storage Summary

		Surface Storage			Surface and Subsurface Storage			
	Stage	Ponding	h_o	delta d	V*	V_{acc}**	$Q_{release}$†	$V_{drawdown}$
	(m)	(m^2)	(m)	(m)	(m^3)	(m^3)	(L/s)	(hr)
Orifice INV	97.00		0.00			0.0	0.0	0.00
Storage Chamber INV	97.83		0.83	0.83		0.0	4.0	0.00
Storage Chamber OBV	98.59		1.59	0.76	67.4	67.4	5.5	3.40
T/G	99.69	0.4	2.69	1.10	0.0	67.4	7.2	2.60
Max Ponding	99.99	491.1	2.99	0.30	50.5	117.9	7.6	4.31

* V=Incremental storage volume
**V_{acc}=Total surface and sub-surface
† $Q_{release}$ = Release rate per Tempest LMF Flow Curve

Orifice Location **STM105** **ICD** Tempest LMF 70
Total Area 0.25 ha
C 0.77 Rational Method runoff coefficient *Note: Rational Method Coefficient "C" increased by 25% for 100-year calculations*

	5-year					100-year				
t_c	i	Q_{actual}‡	$Q_{release}$	Q_{stored}	V_{stored}	i	Q_{actual}‡	$Q_{release}$	Q_{stored}	V_{stored}
(min)	(mm/hr)	(L/s)	(L/s)	(L/s)	(m^3)	(mm/hr)	(L/s)	(L/s)	(L/s)	(m^3)
13	90.4	48.4	5.0	43.3	33.9	154.8	103.5	5.8	97.7	76.5
15	83.6	44.7	5.0	39.7	35.7	142.9	95.5	5.8	89.7	80.7
20	70.3	37.6	5.0	32.6	39.1	120.0	80.2	5.8	74.4	89.3
25	60.9	32.6	5.0	27.6	41.3	103.8	69.4	5.8	63.6	95.4
30	53.9	28.8	5.0	23.8	42.9	91.9	61.4	5.8	55.6	100.1
35	48.5	25.9	5.0	20.9	44.0	82.6	55.2	5.8	49.4	103.7
40	44.2	23.6	5.0	18.6	44.7	75.1	50.2	5.8	44.4	106.6
45	40.6	21.7	5.0	16.7	45.1	69.1	46.2	5.8	40.4	109.0
50	37.7	20.1	5.0	15.1	45.4	64.0	42.7	5.8	36.9	110.8
55	35.1	18.8	5.0	13.8	45.4	59.6	39.9	5.8	34.1	112.4
60	32.9	17.6	5.0	12.6	45.4	55.9	37.4	5.8	31.6	113.6
65	31.0	16.6	5.0	11.6	45.2	52.6	35.2	5.8	29.4	114.6
70	29.4	15.7	5.0	10.7	44.9	49.8	33.3	5.8	27.5	115.4
75	27.9	14.9	5.0	9.9	44.6	47.3	31.6	5.8	25.8	116.0
80	26.6	14.2	5.0	9.2	44.1	45.0	30.1	5.8	24.3	116.5
85	25.4	13.6	5.0	8.6	43.6	43.0	28.7	5.8	22.9	116.8
90	24.3	13.0	5.0	8.0	43.1	41.1	27.5	5.8	21.7	117.1
95	23.3	12.5	5.0	7.5	42.5	39.4	26.4	5.8	20.6	117.2
100	22.4	12.0	5.0	7.0	41.8	37.9	25.3	5.8	19.5	117.2
105	21.6	11.5	5.0	6.5	41.1	36.5	24.4	5.8	18.6	117.1
110	20.8	11.1	5.0	6.1	40.4	35.2	23.5	5.8	17.7	117.0

5-year Qattenuated **5.0 L/s** **100-year $Q_{attenuated}$** **7.6 L/s**
5-year Max. Storage Required **45.4 m^3** **100-year Max. Storage Required** **117.2 m^3**
Est. 5-year Storage Elevation **98.34 m** **Est. 100-year Storage Elevation** **99.99 m**

Notes:
- Required storage volumes calculated using the average Q release rate between storage tank invert and max ponding elevation
- Flow from the storage tank assumes maximum Q Release at max ponding elevation

Area ID STM101
Available Sub-surface Storage

Total Subsurface Storage (m^3) 35.0 <-- Provided storage excludes storage volume below system invert

Stage Attenuated Areas Storage Summary

		Surface Storage			Surface and Subsurface Storage			
	Stage	Ponding	h_o	delta d	V*	V_{acc}**	$Q_{release}$†	$V_{drawdown}$
	(m)	(m^2)	(m)	(m)	(m^3)	(m^3)	(L/s)	(hr)
Orifice INV	97.59		0.00			0.0	0.0	0.00
Storage Chamber INV	98.39		0.80	0.80		0.0	5.8	0.00
Storage Chamber OBV	99.15		1.56	0.76	35.0	35.0	7.9	1.23
T/G	100.25	0.4	2.66	1.10	0.0	35.0	10.3	0.94
Max Ponding	100.41	98.8	2.82	0.16	5.6	40.6	10.7	1.05

* V=Incremental storage volume
**V_{acc}=Total surface and sub-surface
† $Q_{release}$ = Release rate per Tempest LMF Flow Curve

Orifice Location **STM101** **Dia** Tempest LMF 95
Total Area 0.13 ha
C 0.74 Rational Method runoff coefficient *Note: Rational Method Coefficient "C" increased by 25% for 100-year calculations*

	5-year					100-year				
t_c (min)	i (mm/hr)	Q_{actual}‡ (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)	i (mm/hr)	Q_{actual}‡ (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)
13	90.4	24.2	6.7	17.5	13.7	154.8	51.7	8.3	43.4	34.0
15	83.6	22.3	6.7	15.7	14.1	142.9	47.7	8.3	39.5	35.5
20	70.3	18.8	6.7	12.1	14.5	120.0	40.1	8.3	31.8	38.2
25	60.9	16.3	6.7	9.6	14.4	103.8	34.7	8.3	26.4	39.7
30	53.9	14.4	6.7	7.7	13.9	91.9	30.7	8.3	22.4	40.4
35	48.5	13.0	6.7	6.3	13.2	82.6	27.6	8.3	19.3	40.6
40	44.2	11.8	6.7	5.1	12.3	75.1	25.1	8.3	16.9	40.4
45	40.6	10.9	6.7	4.2	11.3	69.1	23.1	8.3	14.8	40.0
50	37.7	10.1	6.7	3.4	10.2	64.0	21.4	8.3	13.1	39.3
55	35.1	9.4	6.7	2.7	9.0	59.6	19.9	8.3	11.7	38.5
60	32.9	8.8	6.7	2.1	7.7	55.9	18.7	8.3	10.4	37.5
65	31.0	8.3	6.7	1.6	6.3	52.6	17.6	8.3	9.3	36.4
70	29.4	7.8	6.7	1.2	4.9	49.8	16.6	8.3	8.4	35.2
75	27.9	7.5	6.7	0.8	3.5	47.3	15.8	8.3	7.5	33.9
80	26.6	7.1	6.7	0.4	2.0	45.0	15.0	8.3	6.8	32.5
85	25.4	6.8	6.7	0.1	0.5	43.0	14.3	8.3	6.1	31.1
90	24.3	6.5	6.5	0.0	0.0	41.1	13.7	8.3	5.5	29.6
95	23.3	6.2	6.2	0.0	0.0	39.4	13.2	8.3	4.9	28.1
100	22.4	6.0	6.0	0.0	0.0	37.9	12.7	8.3	4.4	26.5
105	21.6	5.8	5.8	0.0	0.0	36.5	12.2	8.3	3.9	24.8
110	20.8	5.6	5.6	0.0	0.0	35.2	11.8	8.3	3.5	23.2

5-year Qattenuated **6.7 L/s** **100-year $Q_{attenuated}$** **10.7 L/s**
5-year Max. Storage Required **14.5 m^3** **100-year Max. Storage Required** **40.6 m^3**
Est. 5-year Storage Elevation **98.71 m** **Est. 100-year Storage Elevation** **100.41 m**

Notes:
- Required storage volumes calculated using the average Q release rate between storage tank invert and max ponding elevation
- Flow from the storage tank assumes maximum Q Release at max ponding elevation

Summary of Release Rates and Storage Volumes

Control Area	5-year Release Rate (L/s)	5-year Required Storage (m^3)	100-Year Release Rate (L/s)	100-Year Required Storage (m^3)	100-Year Available Storage (m^3)
Unattenuated Areas (CB9 - CB14)	61.9	0.0	61.9	0.0	0.0
DCB 15	20.1	0.0	24.3	24.1	25.1
DCB 16	16.0	0.0	31.8	18.0	21.2
STM108	6.8	21.8	10.0	60.1	60.1
STM105	5.0	45.4	7.6	117.2	117.9
STM101	6.7	14.5	10.7	40.6	40.6
Total	**116.5**	**81.7**	**146.3**	**259.9**	**264.9**

Stormwater - Proposed Development
City of Ottawa Sewer Design Guidelines, 2012

Target Flow Rate

Q 637.00 L/s

Estimated Post Development Peak Flow from Unattenuated Areas

Area 0.17 ha <-- Sum of Unattenuated Drainage to Glenroy Gilbert Drive
C 0.72 Rational Method runoff coefficient

	5-year					100-year				
t_c (min)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)
13.9	87.4	29.7	29.7	0.0	0.0	149.5	50.8	50.8	0.0	0.0

Note:
Tc = 13.88 min per Design Sheet

Area 0.16 ha <-- Sum of Unattenuated Drainage to Riocan Avenue
C 0.66 Rational Method runoff coefficient

	5-year					100-year				
t_c (min)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)
13.9	87.4	25.6	25.6	0.0	0.0	149.5	43.8	43.8	0.0	0.0

Note:
Tc = 13.88 min per Design Sheet

Area	0.01	0.16	0.17	0.01
C	0.57	0.83	0.74	0.53

Total Area 0.35 ha <-- Sum of Unattenuated Drainage to Chapman Mills Drive
C 0.77 Rational Method runoff coefficient

	5-year					100-year				
t_c (min)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)
13.9	87.4	65.4	65.4	0.0	0.0	149.5	111.9	111.9	0.0	0.0

Note:
Tc = 13.88 min per Design Sheet

Area 0.17 ha <-- Sum of Unattenuated Drainage to Longfields Drive
C 0.63 Rational Method runoff coefficient

	5-year					100-year				
t_c (min)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)
13.9	87.4	26.0	26.0	0.0	0.0	149.5	44.5	44.5	0.0	0.0

Note:
Tc = 13.88 min per Design Sheet

Estimated Post Development Peak Flow from Attenuated Areas

Area ID STM115
Available Sub-surface Storage

Sewers

ID	450mm	525mm	1500mm	U/G Tank
Storage Pipe Dia (mm)	450	525	1500	
L (m)	60	43.5	47	
V_{sewer} (m^3)	9.5	9.4	83.1	27.9

*Top of lid or max ponding elevation = 98.87

Total Subsurface Storage (m^3) 129.9 <-- Provided storage excludes storage volume below system invert

Stage Attenuated Areas Storage Summary

		Surface Storage			Surface and Subsurface Storage			
	Stage	**Ponding**	**h_o**	**delta d**	**V***	**V_{acc}****	**$Q_{release}$†**	**$V_{drawdown}$**
	(m)	**(m^2)**	**(m)**	**(m)**	**(m^3)**	**(m^3)**	**(L/s)**	**(hr)**
Orifice INV	95.11		0.00			0.0	0.0	0.00
Storage Pipe INV	96.17		1.06	1.06	0.0	0.0	36.9	0.00
Storage Pipe OBV	98.62		3.51	2.45	129.9	129.9	67.2	0.54
T/G	98.67	0.4	3.56	0.05	0.0	129.9	67.7	0.53
Max Ponding	98.87	72.3	3.76	0.20	5.2	135.1	69.5	0.54

* V=Incremental storage volume
**V_{acc}=Total surface and sub-surface
† $Q_{release}$ = Release rate calculated from orifice equation

Orifice Location **STM115** **Dia** 130

Area 0.08 0.36 0.11
C 0.81 0.68 0.79

Total Area 0.55 ha
C 0.72 Rational Method runoff coefficient *Note: Rational Method Coefficient "C" increased by 25% for 100-year calculations*

	5-year					**100-year**				
t_c	**i**	**Q_{actual}‡**	**$Q_{release}$**	**Q_{stored}**	**V_{stored}**	**i**	**Q_{actual}‡**	**$Q_{release}$**	**Q_{stored}**	**V_{stored}**
(min)	**(mm/hr)**	**(L/s)**	**(L/s)**	**(L/s)**	**(m^3)**	**(mm/hr)**	**(L/s)**	**(L/s)**	**(L/s)**	**(m^3)**
14	87.4	96.2	46.6	49.7	41.4	149.5	205.8	53.2	152.5	127.0
20	70.3	77.4	46.6	30.8	37.0	120.0	165.1	53.2	111.9	134.3
25	60.9	67.1	46.6	20.5	30.8	103.8	143.0	53.2	89.7	134.6
30	53.9	59.4	46.6	12.8	23.1	91.9	126.5	53.2	73.2	131.8
35	48.5	53.4	46.6	6.9	14.5	82.6	113.7	53.2	60.5	127.0
40	44.2	48.7	46.6	2.1	5.1	75.1	103.5	53.2	50.2	120.5
45	40.6	44.7	44.7	0.0	0.0	69.1	95.1	53.2	41.8	112.9
50	37.7	41.5	41.5	0.0	0.0	64.0	88.0	53.2	34.8	104.4
55	35.1	38.7	38.7	0.0	0.0	59.6	82.1	53.2	28.9	95.2
60	32.9	36.3	36.3	0.0	0.0	55.9	77.0	53.2	23.7	85.4
65	31.0	34.2	34.2	0.0	0.0	52.6	72.5	53.2	19.2	75.1
70	29.4	32.3	32.3	0.0	0.0	49.8	68.5	53.2	15.3	64.3
75	27.9	30.7	30.7	0.0	0.0	47.3	65.1	53.2	11.8	53.2
80	26.6	29.3	29.3	0.0	0.0	45.0	61.9	53.2	8.7	41.8
85	25.4	27.9	27.9	0.0	0.0	43.0	59.1	53.2	5.9	30.1
90	24.3	26.8	26.8	0.0	0.0	41.1	56.6	53.2	3.4	18.2
95	23.3	25.7	25.7	0.0	0.0	39.4	54.3	53.2	1.1	6.0
100	22.4	24.7	24.7	0.0	0.0	37.9	52.2	53.2	0.0	0.0
105	21.6	23.8	23.8	0.0	0.0	36.5	50.2	53.2	0.0	0.0
110	20.8	22.9	22.9	0.0	0.0	35.2	48.5	53.2	0.0	0.0
115	20.1	22.2	22.2	0.0	0.0	34.0	46.8	53.2	0.0	0.0

5-year Qattenuated **46.6 L/s** **100-year $Q_{attenuated}$** **69.5 L/s**
5-year Max. Storage Required **41.4 m^3** **100-year Max. Storage Required** **134.6 m^3**
Est. 5-year Storage Elevation **96.95 m** **Est. 100-year Storage Elevation** **98.85 m**

Notes:
- Required storage volumes calculated using the average Q release rate between storage pipe invert to max ponding elevation.
- Flow from the control area assumes Q Release at maximum ponding elevation.

Estimated Post Development Peak Flow from Attenuated Areas

Area ID STM126
Available Sub-surface Storage

Total Subsurface Storage (m^3) 105.5 <-- Provided storage excludes storage volume below system invert

Stage Attenuated Areas Storage Summary

		Surface Storage			Surface and Subsurface Storage			
	Stage	Ponding	h_o	delta d	V*	V_{acc}**	$Q_{release}$†	$V_{drawdown}$
	(m)	(m^2)	(m)	(m)	(m^3)	(m^3)	(L/s)	(hr)
Orifice INV	94.76		0.00			0.0	0.0	0.00
Storage Chamber INV	94.84		0.07	0.07	0.0	0.0	4.7	0.00
Storage Chamber OBV	96.36		1.60	1.53	105.5	105.5	21.7	1.35

* V=Incremental storage volume
**V_{acc}=Total surface and sub-surface
† $Q_{release}$ = Release rate calculated from orifice equation

Orifice Location **STM126** **dia** 90
Total Area 0.34 ha
C 0.64 Rational Method runoff coefficient *Note: Rational Method Coefficient "C" increased by 25% for 100-year calculations*

	5-year					100-year				
t_c	i	Q_{actual}‡	$Q_{release}$	Q_{stored}	V_{stored}	i	Q_{actual}‡	$Q_{release}$	Q_{stored}	V_{stored}
(min)	(mm/hr)	(L/s)	(L/s)	(L/s)	(m^3)	(mm/hr)	(L/s)	(L/s)	(L/s)	(m^3)
14	87.4	52.0	10.9	41.1	34.3	149.5	111.3	13.2	98.0	81.6
20	70.3	41.8	10.9	31.0	37.2	120.0	89.3	13.2	76.1	91.3
25	60.9	36.3	10.9	25.4	38.1	103.8	77.3	13.2	64.1	96.1
30	53.9	32.1	10.9	21.2	38.2	91.9	68.4	13.2	55.2	99.3
35	48.5	28.9	10.9	18.0	37.8	82.6	61.5	13.2	48.3	101.3
40	44.2	26.3	10.9	15.4	37.0	75.1	55.9	13.2	42.7	102.5
45	40.6	24.2	10.9	13.3	36.0	69.1	51.4	13.2	38.2	103.1
50	37.7	22.4	10.9	11.5	34.6	64.0	47.6	13.2	34.4	103.2
55	35.1	20.9	10.9	10.0	33.1	59.6	44.4	13.2	31.2	102.8
60	32.9	19.6	10.9	8.7	31.5	55.9	41.6	13.2	28.4	102.2
65	31.0	18.5	10.9	7.6	29.7	52.6	39.2	13.2	26.0	101.3
70	29.4	17.5	10.9	6.6	27.8	49.8	37.1	13.2	23.8	100.1
75	27.9	16.6	10.9	5.7	25.8	47.3	35.2	13.2	22.0	98.8
80	26.6	15.8	10.9	4.9	23.7	45.0	33.5	13.2	20.3	97.3
85	25.4	15.1	10.9	4.2	21.6	43.0	32.0	13.2	18.8	95.6
90	24.3	14.5	10.9	3.6	19.4	41.1	30.6	13.2	17.4	93.9
95	23.3	13.9	10.9	3.0	17.1	39.4	29.4	13.2	16.1	92.0
100	22.4	13.3	10.9	2.5	14.8	37.9	28.2	13.2	15.0	89.9
105	21.6	12.9	10.9	2.0	12.4	36.5	27.2	13.2	13.9	87.9
110	20.8	12.4	10.9	1.5	10.0	35.2	26.2	13.2	13.0	85.7
115	20.1	12.0	10.9	1.1	7.6	34.0	25.3	13.2	12.1	83.4

5-year Qattenuated **10.9 L/s** | **100-year $Q_{attenuated}$** **21.7 L/s**
5-year Max. Storage Required **38.2 m^3** | **100-year Max. Storage Required** **103.2 m^3**
Est. 5-year Storage Elevation **95.39 m** | **Est. 100-year Storage Elevation** **96.33 m**

Notes:
- Required storage volumes calculated using the average Q release rate within the tank
- Flow from the storage tank assumes maximum Q Release at the tank obvert

Area ID STM124

Available Sub-surface Storage 79.92
195.22

Total Subsurface Storage (m^3) 275.1 <-- Provided storage excludes storage volume below system invert

Stage Attenuated Areas Storage Summary

		Surface Storage			Surface and Subsurface Storage			
	Stage	Ponding	h_o	delta d	V*	V_{acc}**	$Q_{release}$†	$V_{drawdown}$
	(m)	(m^2)	(m)	(m)	(m^3)	(m^3)	(L/s)	(hr)
Orifice INV	94.90		0.00			0.0	0.0	0.00
Storage Chamber INV	96.19		1.28	1.28	0.0	0.0	6.5	0.00
Storage Chamber OBV	97.71		2.81	1.53	275.1	275.1	9.5	8.05

* V=Incremental storage volume

**V_{acc}=Total surface and sub-surface

† $Q_{release}$ = Release rate per Tempest LMF Flow Curve

Orifice Location **STM124** **ICD** Tempest LMF 80

Area	0.18	0.20	0.08	0.07
C	0.78	0.73	0.81	0.69

Total Area 0.53 ha

C 0.75 Rational Method runoff coefficient *Note: Rational Method Coefficient "C" increased by 25% for 100-year calculations*

	5-year					100-year				
t_c (min)	i (mm/hr)	Q_{actual}‡ (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)	i (mm/hr)	Q_{actual}‡ (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)
14	87.4	96.9	7.6	89.3	74.4	149.5	207.3	8.0	199.3	166.0
20	70.3	78.0	7.6	70.3	84.4	120.0	166.4	8.0	158.4	190.1
30	53.9	59.8	7.6	52.2	94.0	91.9	127.4	8.0	119.4	215.0
40	44.2	49.0	7.6	41.4	99.3	75.1	104.2	8.0	96.2	231.0
50	37.7	41.8	7.6	34.1	102.4	64.0	88.7	8.0	80.7	242.1
60	32.9	36.6	7.6	28.9	104.1	55.9	77.5	8.0	69.5	250.3
70	29.4	32.6	7.6	25.0	104.8	49.8	69.1	8.0	61.1	256.5
80	26.6	29.5	7.6	21.8	104.8	45.0	62.4	8.0	54.4	261.2
90	24.3	27.0	7.6	19.3	104.3	41.1	57.0	8.0	49.0	264.7
100	22.4	24.9	7.6	17.2	103.3	37.9	52.6	8.0	44.6	267.5
110	20.8	23.1	7.6	15.5	102.1	35.2	48.8	8.0	40.8	269.5
120	19.5	21.6	7.6	14.0	100.5	32.9	45.6	8.0	37.6	270.9
130	18.3	20.3	7.6	12.7	98.7	30.9	42.9	8.0	34.9	271.9
140	17.3	19.2	7.6	11.5	96.8	29.2	40.4	8.0	32.4	272.5
150	16.4	18.2	7.6	10.5	94.6	27.6	38.3	8.0	30.3	272.7
160	15.6	17.3	7.6	9.6	92.3	26.2	36.4	8.0	28.4	272.6
170	14.8	16.5	7.6	8.8	89.9	25.0	34.7	8.0	26.7	272.3
180	14.2	15.7	7.6	8.1	87.4	23.9	33.2	8.0	25.2	271.7
190	13.6	15.1	7.6	7.4	84.8	22.9	31.8	8.0	23.8	270.9
200	13.0	14.5	7.6	6.8	82.1	22.0	30.5	8.0	22.5	269.9
210	12.6	13.9	7.6	6.3	79.2	21.1	29.3	8.0	21.3	268.8

5-year Qattenuated	**7.6 L/s**	**100-year $Q_{attenuated}$**	**9.5 L/s**
5-year Max. Storage Required	**104.8 m^3**	**100-year Max. Storage Required**	**272.7 m^3**
Est. 5-year Storage Elevation	**96.77 m**	**Est. 100-year Storage Elevation**	**97.70 m**

Notes:
- Required storage volumes calculated using the average Q release rate within the tank
- Flow from the storage tank assumes maximum Q Release at the tank obvert

Area ID STM134
Available Sub-surface Storage

Total Subsurface Storage (m^3) 79.7 <-- Provided storage excludes storage volume below system invert

Stage Attenuated Areas Storage Summary

		Surface Storage			Surface and Subsurface Storage			
	Stage	Ponding	h_o	delta d	V*	V_{acc}**	$Q_{release}$†	$V_{drawdown}$
	(m)	(m^2)	(m)	(m)	(m^3)	(m^3)	(L/s)	(hr)
Orifice INV	93.41		0.00			0.0	0.0	0.00
Storage Chamber INV	94.17		0.75	0.75		0.0	81.3	0.00
Storage Chamber OBV	95.69		2.28	1.53	79.7	79.7	141.3	0.16

* V=Incremental storage volume
**V_{acc}=Total surface and sub-surface
† $Q_{release}$ = Release rate calculated from orifice equation

Orifice Location **STM134** **dia** 210

Area 0.18 0.22 0.11
C 0.76 0.76 0.79

Total Area 0.51 ha
C 0.77 Rational Method runoff coefficient *Note: Rational Method Coefficient "C" increased by 25% for 100-year calculations*

	5-year					100-year				
t_c (min)	i (mm/hr)	Q_{actual}‡ (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)	i (mm/hr)	Q_{actual}‡ (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)
14	87.4	94.9	86.5	8.3	6.9	149.5	202.9	111.3	91.5	76.2
20	70.3	76.3	76.3	0.0	0.0	120.0	162.8	111.3	51.5	61.8
25	60.9	66.1	66.1	0.0	0.0	103.8	141.0	111.3	29.6	44.5
30	53.9	58.6	58.6	0.0	0.0	91.9	124.7	111.3	13.4	24.1
35	48.5	52.7	52.7	0.0	0.0	82.6	112.1	111.3	0.8	1.6
40	44.2	48.0	48.0	0.0	0.0	75.1	102.0	102.0	0.0	0.0
45	40.6	44.1	44.1	0.0	0.0	69.1	93.7	93.7	0.0	0.0
50	37.7	40.9	40.9	0.0	0.0	64.0	86.8	86.8	0.0	0.0
55	35.1	38.1	38.1	0.0	0.0	59.6	80.9	80.9	0.0	0.0
60	32.9	35.8	35.8	0.0	0.0	55.9	75.9	75.9	0.0	0.0
65	31.0	33.7	33.7	0.0	0.0	52.6	71.5	71.5	0.0	0.0
70	29.4	31.9	31.9	0.0	0.0	49.8	67.6	67.6	0.0	0.0
75	27.9	30.3	30.3	0.0	0.0	47.3	64.1	64.1	0.0	0.0
80	26.6	28.8	28.8	0.0	0.0	45.0	61.1	61.1	0.0	0.0
85	25.4	27.5	27.5	0.0	0.0	43.0	58.3	58.3	0.0	0.0
90	24.3	26.4	26.4	0.0	0.0	41.1	55.8	55.8	0.0	0.0
95	23.3	25.3	25.3	0.0	0.0	39.4	53.5	53.5	0.0	0.0
100	22.4	24.3	24.3	0.0	0.0	37.9	51.4	51.4	0.0	0.0
105	21.6	23.4	23.4	0.0	0.0	36.5	49.5	49.5	0.0	0.0
110	20.8	22.6	22.6	0.0	0.0	35.2	47.8	47.8	0.0	0.0
115	20.1	21.8	21.8	0.0	0.0	34.0	46.2	46.2	0.0	0.0

5-year Qattenuated **86.5 L/s** **100-year $Q_{attenuated}$** **141.3 L/s**
5-year Max. Storage Required **6.9 m^3** **100-year Max. Storage Required** **76.2 m^3**
Est. 5-year Storage Elevation **94.30 m** **Est. 100-year Storage Elevation** **95.62 m**

Notes:
- Required storage volumes calculated using the average Q release rate within the tank
- Flow from the storage tank assumes maximum Q Release at the tank obvert

Area ID STM164
Available Sub-surface Storage

Total Subsurface Storage (m^3) 203.5 <-- Provided storage excludes storage volume below system invert

Stage Attenuated Areas Storage Summary

		Surface Storage			Surface and Subsurface Storage			
	Stage	Ponding	h_o	delta d	V*	V_{acc}**	$Q_{release}$†	$V_{drawdown}$
	(m)	(m^2)	(m)	(m)	(m^3)	(m^3)	(L/s)	(hr)
Orifice INV	92.98		0.00			0.0	0.0	0.00
Storage Chamber INV	93.14		0.16	0.16		0.0	3.5	0.00
Storage Chamber OBV	94.28		1.30	1.14	203.5	203.5	11.3	5.00

* V=Incremental storage volume
**V_{acc}=Total surface and sub-surface
† $Q_{release}$ = Release rate per Tempest LMF Flow Curve

Orifice Location **STM164** **ICD** Tempest LMF 105
Total Area 0.46 ha
C 0.67 Rational Method runoff coefficient *Note: Rational Method Coefficient "C" increased by 25% for 100-year calculations*

	5-year					100-year				
t_c	i	Q_{actual}‡	$Q_{release}$	Q_{stored}	V_{stored}	i	Q_{actual}‡	$Q_{release}$	Q_{stored}	V_{stored}
(min)	(mm/hr)	(L/s)	(L/s)	(L/s)	(m^3)	(mm/hr)	(L/s)	(L/s)	(L/s)	(m^3)
14	87.4	74.8	6.5	68.3	56.9	149.5	159.9	7.4	152.5	127.0
20	70.3	60.1	6.5	53.6	64.4	120.0	128.4	7.4	121.0	145.2
25	60.9	52.1	6.5	45.6	68.4	103.8	111.1	7.4	103.7	155.6
30	53.9	46.2	6.5	39.7	71.4	91.9	98.3	7.4	90.9	163.6
35	48.5	41.5	6.5	35.0	73.6	82.6	88.4	7.4	81.0	170.0
40	44.2	37.8	6.5	31.3	75.2	75.1	80.4	7.4	73.0	175.2
45	40.6	34.8	6.5	28.3	76.4	69.1	73.9	7.4	66.5	179.5
50	37.7	32.2	6.5	25.7	77.2	64.0	68.4	7.4	61.0	183.1
55	35.1	30.1	6.5	23.6	77.8	59.6	63.8	7.4	56.4	186.1
60	32.9	28.2	6.5	21.7	78.1	55.9	59.8	7.4	52.4	188.7
65	31.0	26.6	6.5	20.1	78.3	52.6	56.3	7.4	48.9	190.9
70	29.4	25.1	6.5	18.6	78.3	49.8	53.3	7.4	45.9	192.7
75	27.9	23.9	6.5	17.4	78.2	47.3	50.6	7.4	43.2	194.3
80	26.6	22.7	6.5	16.2	77.9	45.0	48.1	7.4	40.7	195.6
85	25.4	21.7	6.5	15.2	77.6	43.0	46.0	7.4	38.6	196.7
90	24.3	20.8	6.5	14.3	77.2	41.1	44.0	7.4	36.6	197.6
95	23.3	20.0	6.5	13.5	76.7	39.4	42.2	7.4	34.8	198.4
100	22.4	19.2	6.5	12.7	76.1	37.9	40.6	7.4	33.2	199.0
105	21.6	18.5	6.5	12.0	75.4	36.5	39.1	7.4	31.7	199.4
110	20.8	17.8	6.5	11.3	74.7	35.2	37.7	7.4	30.3	199.8
115	20.1	17.2	6.5	10.7	74.0	34.0	36.4	7.4	29.0	200.0
120	19.5	16.7	6.5	10.2	73.2	32.9	35.2	7.4	27.8	200.2
125	18.9	16.1	6.5	9.6	72.3	31.9	34.1	7.4	26.7	200.2
130	18.3	15.7	6.5	9.2	71.5	30.9	33.1	7.4	25.7	200.2

5-year Qattenuated **6.5 L/s** **100-year $Q_{attenuated}$** **11.3 L/s**
5-year Max. Storage Required **78.3 m^3** **100-year Max. Storage Required** **200.0 m^3**
Est. 5-year Storage Elevation **93.58 m** **Est. 100-year Storage Elevation** **94.26 m**

Notes:
- Required storage volumes calculated using the average Q release rate within the tank
- Flow from the storage tank assumes maximum Q Release at the tank obvert

Area ID STM159

Available Sub-surface Storage 48.75
161.53

Total Subsurface Storage (m^3) 210.3 <-- Provided storage excludes storage volume below system invert

Stage Attenuated Areas Storage Summary

		Surface Storage			Surface and Subsurface Storage			
	Stage	Ponding	h_o	delta d	V*	V_{acc}**	$Q_{release}$†	$V_{drawdown}$
	(m)	(m^2)	(m)	(m)	(m^3)	(m^3)	(L/s)	(hr)
Orifice INV	93.17		0.00			0.0	0.0	0.00
Storage Chamber INV	93.22		0.05	0.05		0.0	2.7	0.00
Storage Chamber OBV	94.36		1.19	1.14	210.3	210.3	13.0	4.49

* V=Incremental storage volume

**V_{acc}=Total surface and sub-surface

† $Q_{release}$ = Release rate calculated from orifice equation

Orifice Location **STM159** **Dia** 75

Area 0.18 0.25
C 0.79 0.71

Total Area 0.43 ha
C 0.74 Rational Method runoff coefficient *Note: Rational Method Coefficient "C" increased by 25% for 100-year calculations*

	5-year					100-year				
t_c (min)	i (mm/hr)	Q_{actual}‡ (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)	i (mm/hr)	Q_{actual}‡ (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)
14	87.4	77.6	6.7	70.9	59.0	149.5	165.9	7.8	158.1	131.6
20	70.3	62.4	6.7	55.7	66.8	120.0	133.2	7.8	125.3	150.4
30	53.9	47.9	6.7	41.2	74.2	91.9	102.0	7.8	94.1	169.4
40	44.2	39.2	6.7	32.6	78.1	75.1	83.4	7.8	75.6	181.4
50	37.7	33.4	6.7	26.8	80.3	64.0	71.0	7.8	63.1	189.4
60	32.9	29.3	6.7	22.6	81.3	55.9	62.0	7.8	54.2	195.1
70	29.4	26.1	6.7	19.4	81.5	49.8	55.3	7.8	47.4	199.2
80	26.6	23.6	6.7	16.9	81.2	45.0	49.9	7.8	42.1	202.1
90	24.3	21.6	6.7	14.9	80.4	41.1	45.6	7.8	37.8	204.1
100	22.4	19.9	6.7	13.2	79.3	37.9	42.1	7.8	34.2	205.4
110	20.8	18.5	6.7	11.8	77.9	35.2	39.1	7.8	31.2	206.1
120	19.5	17.3	6.7	10.6	76.4	32.9	36.5	7.8	28.7	206.4
130	18.3	16.2	6.7	9.6	74.6	30.9	34.3	7.8	26.5	206.3
140	17.3	15.3	6.7	8.7	72.7	29.2	32.4	7.8	24.5	205.9
150	16.4	14.5	6.7	7.8	70.6	27.6	30.6	7.8	22.8	205.2
160	15.6	13.8	6.7	7.1	68.5	26.2	29.1	7.8	21.3	204.3
170	14.8	13.2	6.7	6.5	66.2	25.0	27.8	7.8	19.9	203.2
180	14.2	12.6	6.7	5.9	63.8	23.9	26.5	7.8	18.7	201.8
190	13.6	12.1	6.7	5.4	61.4	22.9	25.4	7.8	17.6	200.3
200	13.0	11.6	6.7	4.9	58.9	22.0	24.4	7.8	16.6	198.7
210	12.6	11.1	6.7	4.5	56.3	21.1	23.5	7.8	15.6	196.9

5-year Qattenuated **6.7 L/s**
5-year Max. Storage Required **81.5 m^3**
Est. 5-year Storage Elevation **93.66 m**

100-year $Q_{attenuated}$ **13.0 L/s**
100-year Max. Storage Required **206.4 m^3**
Est. 100-year Storage Elevation **94.34 m**

Notes:
- Required storage volumes calculated using the average Q release rate within the tank
- Flow from the storage tank assumes maximum Q Release at the tank obvert

Area ID STM149
Available Sub-surface Storage

Total Subsurface Storage (m^3) 74.8 <-- Provided storage excludes storage volume below system invert

Stage Attenuated Areas Storage Summary

		Surface Storage			Surface and Subsurface Storage			
	Stage	Ponding	h_o	delta d	V*	V_{acc}**	$Q_{release}$†	$V_{drawdown}$
	(m)	(m^2)	(m)	(m)	(m^3)	(m^3)	(L/s)	(hr)
Orifice INV	92.84		0.00			0.0	0.0	0.00
Storage Chamber INV	92.93		0.09	0.09		0.0	32.2	0.00
Storage Chamber OBV	94.07		1.23	1.14	74.8	74.8	119.1	0.17

* V=Incremental storage volume
**V_{acc}=Total surface and sub-surface
† $Q_{release}$ = Release rate calculated from orifice equation

Orifice Location **STM149** **Dia** 225

Area 0.18 0.24
C 0.78 0.74

Total Area 0.42 ha
C 0.76 Rational Method runoff coefficient *Note: Rational Method Coefficient "C" increased by 25% for 100-year calculations*

	5-year					100-year				
t_c (min)	i (mm/hr)	Q_{actual}‡ (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)	i (mm/hr)	Q_{actual}‡ (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)
14	87.4	77.2	54.3	22.8	19.0	149.5	165.0	75.7	89.3	74.4
20	70.3	62.1	54.3	7.7	9.3	120.0	132.4	75.7	56.8	68.1
25	60.9	53.8	53.8	0.0	0.0	103.8	114.7	75.7	39.0	58.5
30	53.9	47.6	47.6	0.0	0.0	91.9	101.4	75.7	25.7	46.3
35	48.5	42.9	42.9	0.0	0.0	82.6	91.2	75.7	15.5	32.5
40	44.2	39.0	39.0	0.0	0.0	75.1	83.0	75.7	7.3	17.5
45	40.6	35.9	35.9	0.0	0.0	69.1	76.2	75.7	0.6	1.5
50	37.7	33.3	33.3	0.0	0.0	64.0	70.6	70.6	0.0	0.0
55	35.1	31.0	31.0	0.0	0.0	59.6	65.8	65.8	0.0	0.0
60	32.9	29.1	29.1	0.0	0.0	55.9	61.7	61.7	0.0	0.0
65	31.0	27.4	27.4	0.0	0.0	52.6	58.1	58.1	0.0	0.0
70	29.4	25.9	25.9	0.0	0.0	49.8	55.0	55.0	0.0	0.0
75	27.9	24.6	24.6	0.0	0.0	47.3	52.2	52.2	0.0	0.0
80	26.6	23.5	23.5	0.0	0.0	45.0	49.7	49.7	0.0	0.0
85	25.4	22.4	22.4	0.0	0.0	43.0	47.4	47.4	0.0	0.0
90	24.3	21.5	21.5	0.0	0.0	41.1	45.4	45.4	0.0	0.0
95	23.3	20.6	20.6	0.0	0.0	39.4	43.5	43.5	0.0	0.0
100	22.4	19.8	19.8	0.0	0.0	37.9	41.9	41.9	0.0	0.0
105	21.6	19.1	19.1	0.0	0.0	36.5	40.3	40.3	0.0	0.0
110	20.8	18.4	18.4	0.0	0.0	35.2	38.9	38.9	0.0	0.0
115	20.1	17.8	17.8	0.0	0.0	34.0	37.5	37.5	0.0	0.0

5-year Qattenuated **54.3 L/s** **100-year $Q_{attenuated}$** **119.1 L/s**
5-year Max. Storage Required **19.0 m^3** **100-year Max. Storage Required** **74.4 m^3**
Est. 5-year Storage Elevation **93.22 m** **Est. 100-year Storage Elevation** **94.06 m**

Notes:
- Required storage volumes calculated using the average Q release rate within the tank
- Flow from the storage tank assumes maximum Q Release at the tank obvert

Summary of Release Rates and Storage Volumes

Control Area	5-year Release Rate (L/s)	5-year Required Storage (m^3)	100-Year Release Rate (L/s)	100-Year Required Storage (m^3)	100-Year Available Storage (m^3)
Unattenuated Areas					
Glenroy Gilbert	29.7	0.0	50.8	0.0	0.0
Riocan	25.6	0.0	43.8	0.0	0.0
Chapman Mills	65.4	0.0	111.9	0.0	0.0
Longfields	26.0	0.0	44.5	0.0	0.0
Attenuated Areas					
STM115	46.6	41.4	69.5	134.6	135.1
STM126	10.9	38.2	21.7	103.2	105.5
STM124	7.6	104.8	9.5	272.7	275.1
STM134	86.5	6.9	141.3	76.2	79.7
STM164	6.5	78.3	11.3	200.0	203.5
STM159	6.7	81.5	13.0	206.4	210.3
STM149	54.3	19.0	119.1	74.4	74.8
Total	**365.9**	**370.1**	**636.6**	**1067.6**	**1084.1**

Date: June, 2023
DSEL File: 816

ICD Sizing (CBs within City ROW)

Orifice Dia (mm)	Head (m)	Flow (L/s)
83	1.38	17.5
94	1.38	22.4
102	1.38	26.4
108	1.38	29.6
127	1.38	40.9
152	1.38	58.5
178	1.38	80.3

CB ID	Area (Ha)	RC	Design Flow (5yr	ICD Size (mm)
CICB 3	0.08	0.72	16.7	83
CB 4	0.08	0.72	16.7	83
CB 5	0.08	0.72	16.7	83
CB 6	0.08	0.72	16.7	83
CB 7	0.03	0.72	6.3	83
CB 8	0.03	0.72	6.3	83
CB 9	0.09	0.61	15.9	83
CB 10	0.03	0.64	5.6	83
CB 12	0.08	0.70	16.2	83
CB 13	0.10	0.61	17.7	83
CB 14	0.08	0.70	16.2	83

	5-yr	
i	104.2	mm/hr
T_c	10.0	min

Stormwater - Proposed Development
City of Ottawa Sewer Design Guidelines, 2012

Estimated Post Development Peak Flow to DICB 1

Area 0.72 ha <-- Sum of Unattenuated Drainage from Future Chapman Mills Drive
C 0.70 Rational Method runoff coefficient

	10-year				
t_c (min)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)
13.9	102.3	143.3	143.3	0.0	0.0

Note:
Tc = 13.88 min per Design Sheet

Area	0.01	0.16	0.17	0.01
C	0.57	0.83	0.74	0.53

Total Area 0.35 ha <-- Sum of Unattenuated Drainage to Chapman Mills Drive (from Block B)
C 0.77 Rational Method runoff coefficient

	5-year				
t_c (min)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)
13.9	87.4	65.4	65.4	0.0	0.0

Note:
Tc = 13.88 min per Design Sheet

Design Parameters

Max Head: 1.380 m Controlled Flow Rate: 0.2087 m^3/s

Calculations

A blockage factor has also been applied.

Orifice Flow

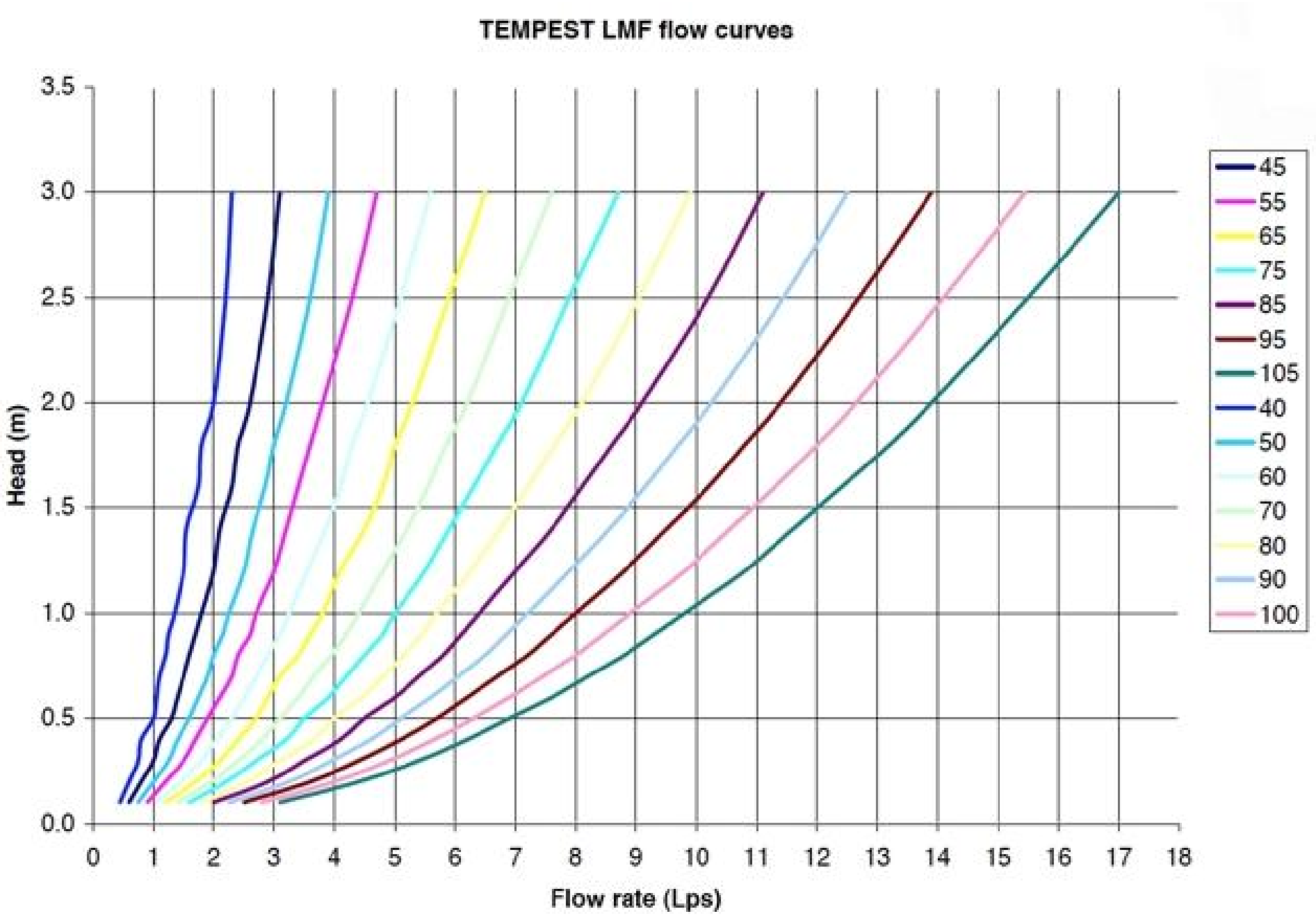
$Q = CA(2gH)^{0.5}$

where: C = 0.62
A = area of ICD oulet
H = maximum depth

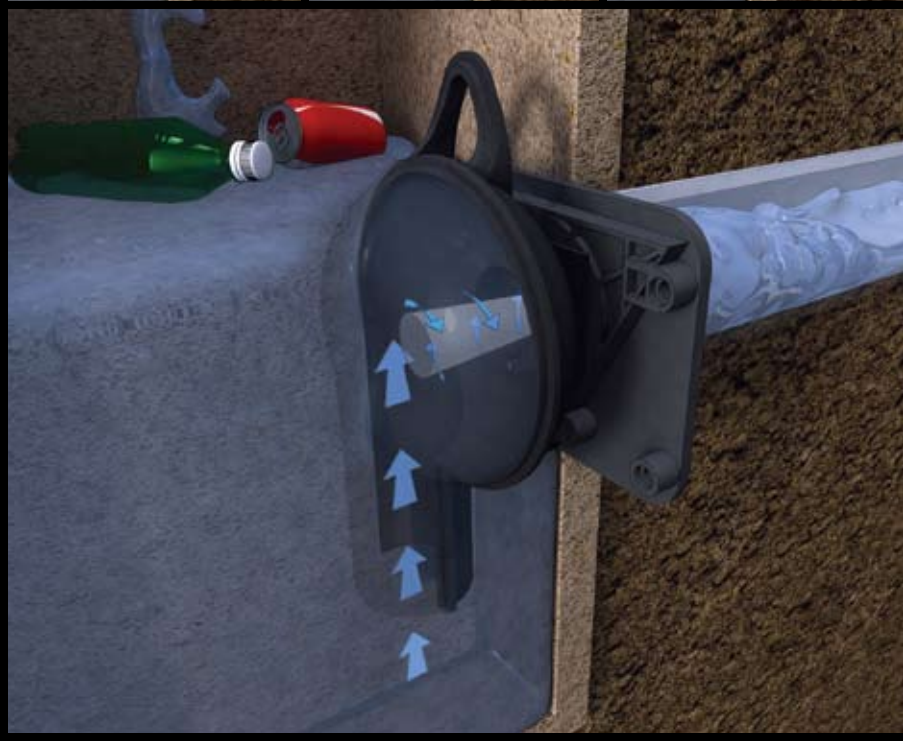
$A = \pi r^2$

Area of ICD required = 0.06 m^2
Diameter of Circular ICD= 0.2870 m
287.0 mm

Diameter ICD Provided = 285 mm


TEMPEST LMF flow curves
Head (m)
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
Flow rate (Lps)
45
55
65
75
85
95
105
40
50
60
70
80
90
100

The Next Generation in Storm Sewer Inlet Controls



TEMPEST™
INLET CONTROL DEVICES

STORM WATER FLOW CONTROL

THE COST-EFFECTIVE SOLUTION TO YOUR STORM WATER SURCHARGE PROBLEMS

- Conserves sewer system capacity
- System accommodates low to high flows
- Integrated odour and floatable control
- Fast and easy to install and maintain

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INLET CONTROL DEVICES

THE NEXT GENERATION IN STORM SEWER INLET CONTROLS

Reduces Sewer Overflows and Basement Backups

Tempest is a family of cost-effective inlet control devices that work together across a series of catch basins to limit the amount of storm water runoff that can enter a combined sewer system during a storm event. Basement backups and sewer overflows are avoided because storm water surcharges are controlled at the sewer inlet and are allowed to remain in catch basins or temporarily above ground.

Integrated Odour and Floatable Control

In addition to flow control, Tempest systems can also alleviate sewer system odour emissions as well as prevent floating debris from entering the sewer system.

Wide Range of Models & Pre-set Flow Rates

Available in a wide range of patent pending models and pre-set flow rates, Tempest systems can accommodate most storm water flow control requirements from 32 GPM to 270 GPM and beyond. Application specific solutions can also be engineered to meet your unique needs in both wet and dry catch basin environments.

Easy to Install and Maintain

Constructed from durable PVC, Tempest units are corrosion free and built to last. The Tempest's light weight design accommodates both square and round catch basins and features a universal back plate and interchangeable components with no moving parts that makes the units quick and easy to install over a catch basin outlet pipe.

These devices also include a quick release mechanism to allow easy access for service without the need to drain the installation.

"IPEX has been a great partner for us in terms of providing a quality system that meets all requirements and a knowledgeable staff that delivers reliable field support"

Kevin Secord
Multi-Drain Inc. (Ottawa, Ontario)

FEATURES & BENEFITS

1. Restricts flow to a narrow range regardless of head
2. Unit design prevents the passage of floatables and odours
3. Neoprene gasket for air-tight seal*
4. Virtually maintenance free and corrosion free durable PVC construction
5. Features a quick release mechanism that's accessed with reach bar. Unit can then be simply lifted out for easy maintenance*
6. Universal back plates available for both square and round catch basins*

For Square Catch Basins

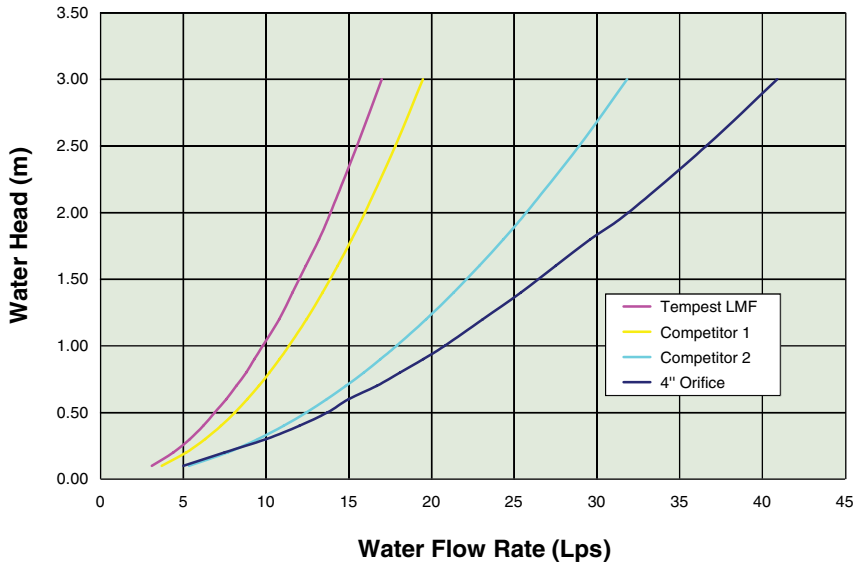
For Round Catch Basins

Tempest LMF

The system depicted is the Tempest LMF available in 14 pre-set rates and designed specifically for low to moderate flow rates with an engineered inlet design that eliminates the passage of odour and floatables

*Excluding Tempest HF Sump

Tempest Inlet Control Devices restrict flow to a narrower range than traditional methods regardless of head



THE TEMPEST FAMILY OF SYSTEMS

TEMPEST LMF

Restricts:
- ✓ Flow
- ✓ Odours
- ✓ Floatables

LOW to MODERATE FLOW RATES

32 GPM (2 L/s) – 270 GPM (17 L/s) **14 pre-set flow rates**

The Tempest LMF system features a vortex inlet design that allows a low flow rate to be set and eliminates the passage of odours and floatables and allows for debris and sediment to collect in the structure.

TEMPEST HF & HF SUMP

Restricts:
- ✓ Flow
- ✓ Odours
- ✓ Floatables

HIGH FLOW RATES

240 GPM (15 L/s) or greater **5 pre-set flow rates**

The standard Tempest HF system allows a near constant discharge rate to be set and eliminates the passage of odours and floatables and allows for debris and sediment to collect in the structure.

The Tempest HF SUMP system is designed for catch basins & manholes in which there is no sump or the outlet pipe is too low to install standard Tempest device.

TEMPEST MHF

Restricts:
- ✓ Flow

Plate Plug

MEDIUM TO HIGH FLOW RATES

143 GPM (9L/s) or greater **Specified pre-set flow rates**

The Tempest MHF is a standard orifice plate or plug device designed to allow a specified flow volume through the outlet pipe at a specified head.

PROBLEM: SURCHARGED SEWER SYSTEMS

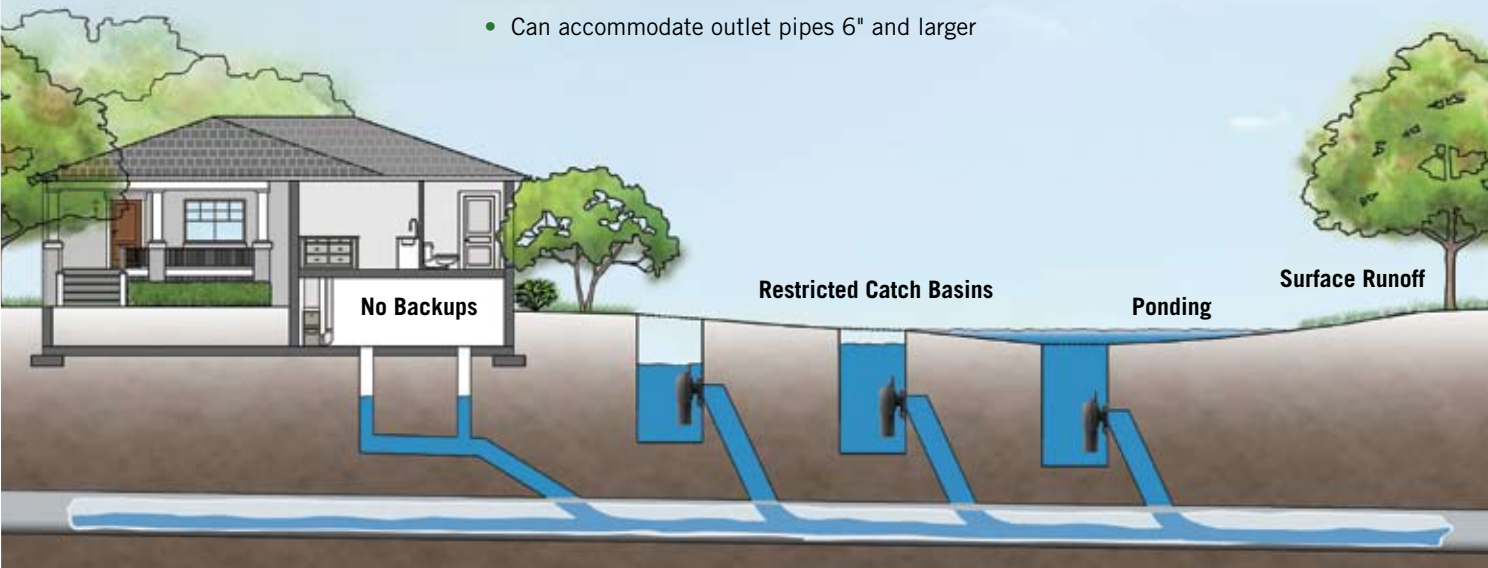
During heavy rain events, storm sewers can become overloaded causing sewer backups into residential basements and onto urban environments and streets. These events cause significant environmental and property damage and are all too common in older sections of municipalities where combined, undersized sewer systems often end up discharging a mixture of storm water runoff and sanitary wastewater into homes, streets and lakes when sewer capacities exceed historical norms.

Traditional approaches to overcoming these challenges have been expensive, disruptive and time consuming for municipalities and the private sector.

SOLUTION: TEMPEST INLET CONTROL SYSTEMS

TEMPEST™
INLET CONTROL DEVICES

- Provides control by restricting flow into the sewer system
- Provides temporary ponding in catch basins, parking lots & roadways
- Helps preserve sewer capacity, slows down the inlet flow
- Reduces residential flooding and flash flooding
- Water surcharge is controlled & directed as per engineer design
- Can accommodate outlet pipes 6" and larger



Previously overloaded sewer now controlled without size increase

CUSTOMER SERVICE CENTER

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About the IPEX Group of Companies

As leading suppliers of thermoplastic piping systems, the IPEX Group of Companies provides our customers with some of the largest and most comprehensive product lines. All IPEX products are backed by more than 50 years of experience. With state-of-the-art manufacturing facilities and distribution centers across North America, we have established a reputation for product innovation, quality, end-user focus and performance.

Markets served by IPEX group products are:

- Electrical systems
- Telecommunications and utility piping systems
- PVC, CPVC, PP, ABS, PEX, FR-PVDF and PE pipe and fittings (1/4" to 48")
- Industrial process piping systems
- Municipal pressure and gravity piping systems
- Plumbing and mechanical piping systems
- PE Electrofusion systems for gas and water
- Industrial, plumbing and electrical cements
- Irrigation systems

Products manufactured by IPEX Inc. and distributed in the United States by IPEX USA LLC.

IPEX

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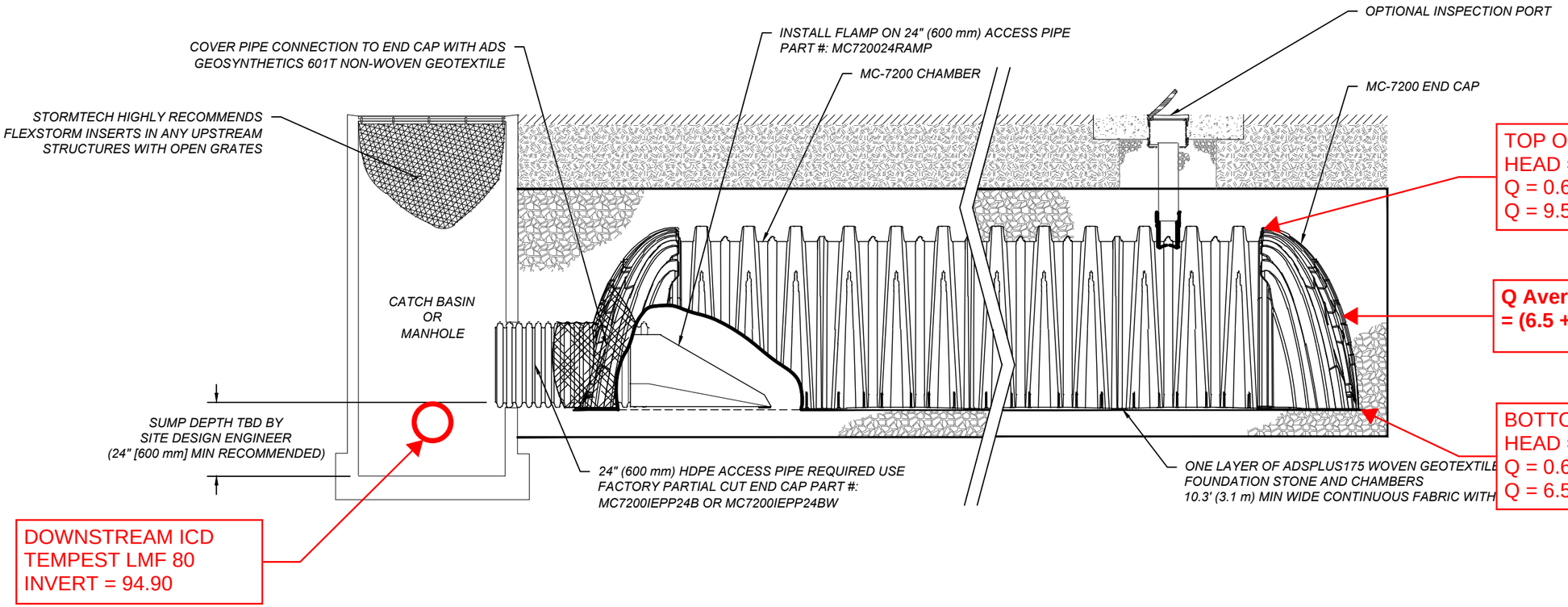
COVER PIPE CONNECTION TO END CAP WITH ADS GEOSYNTHETICS 601T NON-WOVEN GEOTEXTILE
INSTALL FLAMP ON 24" (600 mm) ACCESS PIPE PART #: MC720024RAMP
MC-7200 CHAMBER
OPTIONAL INSPECTION PORT
MC-7200 END CAP
STORMTECH HIGHLY RECOMMENDS FLEXSTORM INSERTS IN ANY UPSTREAM STRUCTURES WITH OPEN GRATES
TOP OF TANK
HEAD = 2.81m
Q = 0.61 x A x (2gh)^0.5
Q = 9.5 L/S
CATCH BASIN OR MANHOLE
Q Average
= (6.5 + 9.5)/2 = 8.0 L/s
SUMP DEPTH TBD BY SITE DESIGN ENGINEER (24" [600 mm] MIN RECOMMENDED)
BOTTOM OF TANK
HEAD = 1.28m
Q = 0.61 x A x (2gh)^0.5
Q = 6.5 L/S
24" (600 mm) HDPE ACCESS PIPE REQUIRED USE FACTORY PARTIAL CUT END CAP PART #: MC7200IEPP24B OR MC7200IEPP24BW
ONE LAYER OF ADSPLUS175 WOVEN GEOTEXTILE
FOUNDATION STONE AND CHAMBERS
10.3' (3.1 m) MIN WIDE CONTINUOUS FABRIC WITH
DOWNSTREAM ICD
TEMPEST LMF 80
INVERT = 94.90