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Site Servicing Brief

Morgan's Creek – Stage 2 335 Sandhill Road Ottawa, Ontario



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1.0 Introduction

1.1 Background

Minto Communities Incorporated (Minto), along with their subsidiary companies, is one of the major landowners in the Kanata North Urban Area, located in the western portion of the City of Ottawa. In 2012, J.L. Richards & Associates Limited (JLR) had been retained by Minto to proceed with detailed design of municipal infrastructure for a private development located at 760 March Road referred to as Morgan's Creek.

The Morgan's Creek development consisted of a 2.87 ha parcel bisected by Shirley's Brook, within the jurisdiction of the Mississippi Valley Conservation Authority (MVCA). Given that Shirley's Brook represents a natural barrier bisecting the parcel, the overall servicing for the property was divided into two (2) sites (for design purposes) and investigated independently based on their respective frontage. The western parcel fronting onto March Road was referred to as the March Road Site (Site 1) while the eastern parcel fronting onto Sandhill Road was referred to as the Sandhill Road Site (Site 2). A Site Servicing Brief was submitted to the City of Ottawa (City) in 2012, which described infrastructure requirements for both private sites. Subsequently, the City and other regulatory agencies granted Site Plan Approvals. The infrastructure works were tendered in 2012 and a composite utility plan (CUP) was submitted to the City in 2013. Although the Tender was awarded, construction was never initiated on either of the sites.

Minto now wishes to revise the housing product and layout for both sites (March Road and Sandhill Road) to satisfy current housing demands in the Kanata North Urban Area. It is proposed to develop Morgan's Creek in two (2) stages; Stage 1 consists of the development fronting March Road (762 March Road) while Stage 2 consists of the development fronting Sandhill Road (335 Sandhill Road). The approval for Stage 1 will be under Site Plan Control and subsequent Plan of Condominium, while Stage 2 will require approval under Draft Plan of Subdivision and Plan of Condominium.

This Servicing Brief has been prepared solely for Morgan's Creek Stage 2 (335 Sandhill Road) for the purpose of rezoning as well as to outline the proposed servicing strategy for the Stage 2 lands in accordance with the limitation of existing infrastructure and the City of Ottawa Servicing Study Guidelines for Development Applications (2009). This includes conceptual servicing solutions for water, wastewater and stormwater management.

1.2 Site Description

The overall Morgan's Creek is sited on a ± 2.87 ha parcel bisected by Shirley's Brook. As a result of this constraint, a significant portion of the parcel (± 0.57 ha) will not be developable as this block is floodplain land. The legal description of the subject property is Part of Lot 10, Concession 4, Geographic Township of March, City of Ottawa (refer to Appendix 'A' for Draft Plan of Subdivision). As noted previously, this Servicing Brief was prepared solely for Morgan's Creek Stage 2 (335 Sandhill Road).

Currently, the site is undeveloped with the exception of a small gravel pad abutting Sandhill Road. Topography generally slopes westerly toward Shirley's Brook. Stage 2 of Morgan's Creek, which total 1.59 ha, is bounded along by Shirley's Brook along its western perimeter, by Sandhill Road along its eastern perimeter, by an existing cemetery to the south, and by an existing residential unit to the north. Minto wishes to develop Stage 2 of Morgan's Creek into 60 row townhouse units (executive towns).

1.3 Existing Infrastructure

Existing watermains, sanitary and storm sewers that are located within the Sandhill Road rightof-way (ROW) will service stage 2 of Morgan's Creek (See 'Sandhill Road As-Builts (IBI Group)' in Appendix 'A'). This infrastructure has been identified as being readily accessible, if residual capacity can be proven to be available.

<u>Water</u>

There is one (1) watermain bounding the Stage 2 lands and available for a potential connection, if capacity permits. This watermain is 300 mm diameter and is located along Sandhill Road (along the east side of the roadway).

<u>Sanitary</u>

There is one (1) sanitary sewer bounding the Stage 2 lands and available for a potential connection, if capacity permits. This sewer is a 250 mm diameter sanitary sewer that is located along Sandhill Road.

<u>Storm</u>

There is one (1) storm sewer bounding the Stage 2 lands and available for a potential connection, if capacity permits. This sewer is a 675 mm diameter storm sewer that is located along Sandhill Road.

1.4 Background Documents

Infrastructure associated with Stage 2 of the Morgan's Creek development will be designed in accordance with the following documents:

- Kanata North Environmental/Stormwater Management Plan, CH2M Gore & Storrie, 2001.
- Shirley's Brook Floodplain Analysis and Stormwater Management Report Novatech Engineering Consultants Ltd, November 2006.
- Shirley's Brooks Stormwater Management Facility 1 West, Design Brief, David McManus Engineering Ltd., April 15, 2009
- Site Servicing Brief for Morgan's Creek, 760 March Road, J.L. Richards & Associates Limited, revised July 2012.

1.5 Consultation and Permits

Two (2) pre-consultation meetings were held in 2012 for Morgan's Creek. Due to the six (6) year time lapse since the original pre-consultation meetings, another pre-consultation meeting was held on August 22, 2018 (refer to Appendix 'A' for meeting notes).

2.0 Geotechnical

A geotechnical investigation was carried out by Paterson Group Inc. (Paterson) to assess general soil, groundwater and infiltration capabilities, and to provide recommendations for development, including construction considerations. The findings and recommendations of this investigation were compiled in the Report entitled "Geotechnical Investigation Proposed Residential Development, Sandhill Road at Ottawa, Ontario," Report Number PG2234-2, dated July 13, 2011. In 2012, a complete copy of this Report was provided to the City. A more recent report was prepared titled "Geotechnical Investigation: Proposed Residential Development 762 March Road and 355 Sandhill Road, Ottawa, Ontario" Report PG2234-2 (revision 2), dated December 11, 2018 and submitted to the City for review.

3.0 Water Servicing

3.1 Design Criteria

A Hydraulic Network Analysis (HNA) was conducted for the Morgan's Creek Stage 2 development to confirm that the existing and proposed watermains can provide adequate supply while complying with both the City of Ottawa Design Guidelines for Water Distribution (July 2010) and Technical Bulletins ISDTB-2010-02, ISTB-2014-02 and ISTB-2018-02. These documents have been referred to in this section as the Design Guidelines, TB-2010-02, TB-2014-02 and TB-2018-02, respectively. The Design Guidelines require that a water supply system be designed to satisfy the following demand criteria:

- Maximum day demand plus fire flow; and
- Maximum hourly demand (peak hour demand).

Section 4.2.2 of the Design Guidelines requires that all new development additions to the public water distribution system be designed such that the minimum and maximum water pressures, as well as flow rates, conform to the following:

- Under maximum hourly demand conditions (peak hour), the pressures are not less than 276 kPa (40 psi);
- During periods of maximum day and fire flow demand, the residual pressure at any point in the distribution system shall not be less than 140 kPa (20 psi);
- In accordance with the Ontario Building Code in areas that may be occupied, the static pressure at any fixture shall not exceed 552 kPa (80 psi);
- The maximum pressure at any point in the distribution system in unoccupied areas shall not exceed 689 kPa (100 psi); and
- Feedermains, which have been provided primarily for the purpose of redundancy, shall meet, at a minimum, the basic day plus fire flow demand.

To satisfy the design criteria and water demand, supply to Morgan's Creek Stage 2 will be achieved from the existing connections listed in Section 1.3. Further, to minimize degradation of water quality, the following is proposed:

- Providing the best configuration of the system, particularly at dead ends. On this note, the proposed Draft Plan of Subdivision does not include any dead-end watermains, and
- Optimizing and limiting the sizes of proposed infrastructure to minimize water degradation. Proposed watermains servicing multi-unit residential buildings have been limited to 200 mm diameter as per the recommendations of the TB-2014-02.

The analysis described in the following section was completed to satisfy the above demand criteria.

3.2 Domestic Water Demands

The water demands presented in this section reflect the unit count associated with the Draft Plan of Subdivision (refer to Appendix 'A') which proposes 60 executive row townhouses in 14 blocks.

Domestic water demands were calculated for the proposed development based on the residential unit type and a population density of 2.7 person/unit, as prescribed in Table 4.1 of the Design Guidelines for Water Distribution.

The residential consumption rate for the average day demand was set in accordance with Table 4.2 of the Design Guidelines. Given that the population for Stage 2 is less than 500, peaking factors interpolated from the MOE Design Guidelines (Table 3-3) were used to generate the maximum day and peak hour demands. Table 3-1 below summarizes the water consumption rates used in the model.

Demand Scenario	Residential		
Average Day Demand	350 L/c/d		
Maximum Day Demand Interpolated from Table 3-3	4.8 x Avg Day		
Peak Hour Demand Interpolated from Table 3-3	7.3 x Avg Day		

Table 3-1: Water Consumption Unit Rates

The following table summarizes the overall water demands computed using the aforementioned consumption rates and peaking factors (refer to Appendix 'B' for detailed calculations).

Table 3-2: Calculated Water Demands

Average Day	Maximum Day	Peak Hour Demand	
Demand (L/s)	Demand (L/s)	(L/s)	
0.66	3.15	4.79	

3.3 **Proposed Water Servicing and Roughness Coefficients**

The overall watermain layout for Morgan's Creek Stage 2 is shown on the Site Servicing Plan (Drawing S1). Watermain roughness coefficients were determined using the friction factors presented in Section 4.2.12 of the Design Guidelines and are summarized in Table 3-3 below. The internal pipe diameters were modelled based on Section 4.3.5 of the Design Guidelines, as summarized in Table 3-4 below.

Table 3-3: Watermain Roughness Coefficients

Watermain Diameter	C-Factor
150 mm	100
200 to 250 mm	110
300 to 600 mm	120

Nominal Diameter	Inside Diameter		
150 mm	155 mm		
200 mm	204 mm		
250 mm	250 mm		
300 mm	297 mm		
400 mm	393 mm		

Table 3-4: PVC Watermain Internal Diameters

3.4 Watermain Sizing and Roughness Coefficients

3.4.1 General

Various guidelines are used throughout North America to establish fire flow requirements for different types of buildings. The Guidelines entitled "Water Supply for Public Fire Protection (1999)" developed by the Fire Underwriters Survey (FUS) govern fire flow protection in the City of Ottawa.

Fire flow requirements for this HNA were calculated for the row townhouse units in accordance with the FUS Guidelines, as well as TB-2014-02 and TB-2018-02. Specifically, the protocol for the application of the FUS method was used as outlined in Appendix H: Protocol to Clarify the Application of the Fire Flow calculation method Published by Fire Underwriters Survey (FUS) of TB-2018-02.

3.4.2 Required Fire Flow

The Design Guidelines as well as TB-2014-02 and TB-2018-02 require that fire flow requirements be calculated based on the type of unit, exposure to adjacent units, building material, etc. In addition, the required fire flow (RFF) must also be calculated based on the maximum number of consecutive units if the distance between structures is less than 3.0 m (per the FUS).

Based on review of the layout for Stage 2, most of the units comply with the requirements for the capped fire flow of 10,000 L/min (167 L/s) as they provide the minimum 10 m separation, with the exception of two (2) blocks that do not qualify for the capped fire flow as the rear separation is less than 10 m. Consequently, the actual fire flow requirement was calculated for the non-complying units (refer to Appendix 'B' for location and calculations). The maximum RFF was estimated at 14,000 L/min (233 L/s) for Block 11 as depicted in Appendix 'B' and summarized below in Table 3-5.

Block Number	Fire Flow L/min (L/s)	Capped Flow L/min (L/s)	Targeted Flow L/min (L/s)	
12	14,000 (233)	10,000 (167) ¹	10,000 (167)	
11	14,000 (233)	N/A ²	14,000 (233)	

Table 3-5: FUS Fire Flow Requirements

¹ Based on the product and separation, the proposed units do qualify for the capped flow per ISTB-2014-02. ² Based on the product and separation, the proposed units do not qualify for the capped fire flow per ISTB-2014-02.

3.5 Hydraulic Boundary Conditions

The HNA was carried out using hydraulic boundary conditions supplied by City staff under various water demand conditions (refer to Appendix 'B' for a copy of the City correspondence). As per the proposed servicing (Drawing S1), potable water will be supplied to Stage 2 via a 200 mm diameter watermain loop. Table 3-6 summarizes the hydraulic boundary conditions used in the HNA.

Water Demand Scenarios	Head (m)
Peak Hour	124.2
Maximum Day Plus Fire Flow 14,000 L/min (233 L/s)	117.7
Maximum Pressure Check	131.6

3.6 Simulation Results

The performance of the proposed water distribution system (refer to Appendix 'B' for Schematic), as depicted on the Site Servicing Drawing S1, was evaluated utilizing WaterCAD® under various water domestic demands and fire flow conditions in accordance with the Design Guidelines. The simulation results are summarized below.

3.6.1 Peak Hour

The peak water demands shown in Table 3-2 were distributed over the nodes within the Stage 2 site. Using the boundary conditions presented in Table 3-6 above, the model yielded the following results (refer to Appendix 'B' for the model output):

- The minimum pressures along Sandhill Rd were found to range between 463 kPa (67.2 psi) at Junctions J-2, J-4 and J-5 (Street No. 1) and 468 kPa (67.9 psi) at Junctions J-6 and J-7, as shown in Appendix 'B';
- The simulated hydraulic grade lines (HGL) were found to be constant across the site at an elevation of 124.20 m.

Based on the above simulation results, the minimum pressure criterion of 276 kPa (40 psi) will be exceeded everywhere within Stage 2.

3.6.2 Maximum Day plus Fire Flow

To ensure adequate fire protection, the maximum day demand shown in Table 3-2 was simulated simultaneously with the fire flow along the distribution system within Stage 2. This simulation was carried out using the boundary condition presented in Table 3-6. The conservative RFF of 14,000 L/min (233 L/s) was used for the analysis.

The fire flow simulation was carried out by allowing WaterCAD® to calculate the maximum fire flow availability that can be drawn from each hydrant without allowing any part of the system to experience pressures less than 140 kPa (20 psi), recognizing that hydrants have limited capacity. The simulation results showed that 95 L/s (the maximum fire flow that can be supplied by a hydrant per ISTB-2018-02) can be drawn from each proposed hydrant within Stage 2 while maintaining a minimum system pressure of 140 kPa.

The simulation results (Appendix 'B') show that the proposed water distribution system is capable of delivering fire flows ranging between 17,400 L/min (290 L/s) and 31,380 L/min (523 L/s) within Stage 2 under the 14,000 L/min (233 L/s) supply head (refer to Appendix 'B'). Hence, the RFF can be fulfilled everywhere within Stage 2. At the time of detailed design, hydrant spacing will be carried out in accordance with their limitations as per ISTB-2018-02.

3.6.3 Maximum HGL

An analysis is generally required to ensure that the maximum pressure constraint of 552 kPa (80 psi) is not exceeded. The maximum HGL condition was simulated using average day demands within Stage 2 to determine the need to incorporate pressure reducing valves (PRVs). Based on the boundary condition shown in Table 3-6, the simulation results are as follows:

- The maximum pressures were found to range between 535 kPa (77.6 psi) and 540 kPa (78.3 psi) as shown in Appendix 'B'; and
- The simulated hydraulic grade lines were found to be constant at 131.60 m within Stage 2.

These maximum pressures are below the maximum pressure constraint of 552 kPa (80 psi) and PRVs are not anticipated to be required.

4.0 Wastewater Servicing

4.1 Design Criteria

Local sanitary sewers for Stage 2 of Morgan's Creek will be designed in accordance with the City of Ottawa Sewer Design Guidelines (2012) and Technical Bulletins. Sanitary sewers will be designed in accordance with the design parameters summarized in Table 4-1 below.

Design Criteria	Design Value	Reference	
Residential average flow	280 L/cap/day	ISTB-2018-01	
Residential peaking factor	Harmon Formula x 0.8	ISTB-2018-01	
Commercial average flow	28,000 L/gross ha/day	ISTB-2018-01	
ICI peaking factor ⁽¹⁾	1.0/1.5	ISTB-2018-01	
Total Infiltration	0.33 L/s/ha	ISTB-2018-01	
Minimum velocity	0.6 m/s	OSDG Section 6.1.2.2	
Maximum velocity	3.0 m/s	OSDG Section 6.1.2.2	
Manning Roughness Coefficient (for smooth wall pipes)	0.013	Section 6.1.8.2 OSDG	
Minimum allowable slopes	Varies	Table 6.2, Section 6.1.2.2, OSDG	
Population Density	Towns: 2.7 pers/unit	Table 4.2 Section 4.3, OSDG	

(1) 1.5 if ICI contribution >20%, 1.0 otherwise

4.2 Proposed Sanitary Sewer Servicing and Calculations

It is proposed to collect and convey wastewater generated by the Stage 2 lands (1.59 ha) via a local 200 mm diameter collection system, which will discharge into the existing Sandhill Road 250 mm diameter sanitary sewer system at existing MH300A. The local 200 mm diameter sanitary sewer system being proposed is shown on the Conceptual Site Servicing (Drawing CS1) attached to this Servicing Brief.

Sanitary servicing for the Briar Ridge Subdivision (Phase 2) identified the Sandhill Road 250 mm diameter sanitary sewer as the dedicated sanitary outlet for Morgan's Creek Stage 2 as depicted on IBI's Drawing 501-1 (Appendix 'C'). Based on IBI's sanitary sewer design calculations, part of the design capacity of 14.17 L/s for sanitary sewer reach Stub to 300A was allocated to Morgan's Creek Stage 2. The Sandhill Road 250 mm diameter sanitary sewer was designed based on an

overall service area of 7.49 ha and overall population of 770. Given that Morgan's Creek Stage 2 represents approximately 21% of the area (1.59 ha / 7.49 ha) and population (162 cap / 770 cap), its assigned capacity should be consistent on a pro-rata basis. Consequently, Stage 2's capacity should be 21% of the total capacity of 14.17 L/s. which is 2.98 L/s.

The proposed layout for Stage 2 of Morgan's Creek includes 60 townhouse units. Based on the proposed servicing for the subdivision (see Drawing CS1) and the design parameters for residential developments listed above in Table 4-1, a peak sanitary flow of 2.38 L/s was calculated (refer to Table 4-2 below for a summary of conceptual peak flows).

Land Allocation	Population ⁽¹⁾	Area	Average Flow	Peaking Factor ⁽²⁾	Peak Flow	Infiltration Flow ⁽³⁾	Total Flow
Residential / Park / SWM	162 cap	1.59 ha	280 L/cap/day	3.54	1.86 L/s	0.52 L/s	2.38 L/s
TOTAL CONCEPTUAL PEAK FLOW:						2.38 L/s	
 Based on 2.7 person/unit for townhomes and back-to-backs as per the City of Ottawa Sewer Design Guidelines. Based on Harmon Peaking Factor Equation Based on 0.33 L/s/ha infiltration allowance as per the City Technical Bulletin ISTB-2018-01. 							

 Table 4-2: Peak Wastewater Flows

Given the design basis of the Sandhill Road 250 mm diameter sanitary sewer, the theoretical peak wastewater flow of 2.38 L/s for Stage 2 is well below the prorated peak flow of 2.98 L/s described above. Therefore, there is sufficient capacity in the Sandhill Road sanitary sewer top to accommodate the wastewater flows from Stage 2.

4.3 Summary and Conclusions

Based on the above calculations, it is recommended that conceptual sanitary servicing shown on Drawing CS1 (at the back of the Report) be accepted by the City as this local system can accommodate peak wastewater flows from Stage 2 of Morgan's Creek. Given the prorated capacity of the Sandhill Road 250 mm diameter sanitary sewer, the theoretical peak flows from Stage 2 can be accommodated by this dedicated sanitary sewer outlet.

5.0 Storm Servicing and Stormwater Management

5.1 General

This section of the Report presents the analysis (conceptual) completed to confirm that the existing and proposed storm sewers and stormwater management systems can accommodate Stage 2 of Morgan's Creek in accordance with their design intent.

5.2 Storm Criteria

As part of the Briar Ridge project (Phase 2), a storm sewer was identified and constructed as the dedicated storm sewer outlet for the Sandhill Road site (1.59 ha). Based on the information shown on Drawing 500-1 and on the Storm Sewer Design Sheet (Appendix D), capacity was allocated into the Sandhill Road 675 mm diameter storm sewer for Morgan's Creek Stage 2 (Sandhill Road site). Once captured, runoff will then be conveyed northerly along the Sandhill Road storm sewer and will eventually outlet into a stormwater management facility for water quality and quantity control. This facility, referred to by the City as the Shirley's Brook East SWMF #2 (or SWM Facility "C" by Novatech), is located in the northwestern quadrant of the Klondike Road March Valley Road intersection.

Based on IBI's design (refer to appendix 'D' for design information), storm servicing of the external area (7.18 ha) was developed with the following criteria:

- an allowable minor system unit flow rate of 85 L/s/ha;
- a minimum on-site detention constraint of 50 m³/ha based on a runoff coefficient (C) of 0.45.

Given that a weighted average C coefficient of 0.65 is more representative of terrace townhouse developments, the on-site storage requirement of 50 m³/ha should be increased to ensure that the integrity of the downstream stormwater management system is preserved. At detailed design, it is proposed to revisit the on-site storage volume requirements based on the final layout and calculated C coefficient. However, for the purpose of this Servicing Brief, stormwater management calculations were carried out assuming full retention of the 1:100 year storm based on a C of 0.65 (refer to Section 5.3 for details).

Based on the above, the following summarizes the servicing constraints for the Sandhill Road site:

- Minor system flows from Stage 2 must be limited to 85 L/s/ha prior to discharge into the Sandhill Road 675 mm diameter sewer as per the calculations conducted by IBI as part of the Briar Ridge (Phase 2) Subdivision. Based on this design constraint and an area of 1.59 ha minor system flows generated by Stage 2 must be limited to 135.15 L/s.
- In terms of major overland flow and for the purpose of this Servicing Brief, it was assumed that servicing of Stage 2 must incorporate sufficient on-site storage volume to detain the 1:100 year storm while limiting minor system flows to 135.15 L/s. Beyond the 1:100 year storm, excess flows can be conveyed overland to either Shirley's Brook or Sandhill Road. However, during detailed design, a portion of the flow may be uncontrolled and directed to

Shirley's Brook and Sandhill Road due to grading constraints. The portion of uncontrolled flow will be determined during detailed design.

• As previously noted, Shirley's Brook bisects the March Road site and Sandhill Road site. The review of the Flood Risk Map for Shirley's Brook (1989) shows a floodplain elevation of ±73.8 m.

5.3 **Proposed Storm Servicing and Calculations**

High level stormwater management calculations were carried out for Stage 2 to ensure the minor system can capture and convey runoff during frequent storm events up to the minimum 1:2 year storm and using a conservative approach that assumes that the stormwater management system contain events up to 1:100 year recurrence on-site. Both drainage systems have been conceptually sized in accordance with the City of Ottawa Sewer Design Guidelines (November 2004) and based on the servicing constraints summarized in Section 5.2. The general stormwater servicing design parameters used to complete the preliminary design for Morgan's Creek are listed in Table 5-1.

General Design Criteria
Maximum allowable release rate = 135.15 L/s
Minimum on-site storage volume requirement of 50 m ³ /ha as per IBI's design. For the purpose of this Servicing Brief, full retention of the 1:100 year storm was assumed (to be confirmed at detailed design).
Minimum swale grades at 1.5% (with lower grades sub-drain must be provided).
Minimum roadway profile grades at 0.5%.
Minimum roadway slope of 0.1% from crest to crest for overland flow route.
Minimum freeboard of 0.30 m between the finished floor elevation and the maximum street ponding elevation.
Maximum ponding depth (static + dynamic) of 0.35 m.
Minimum of 0.30 m clearance between the underside of footing and the 1:100 year HGL elevation.
Minimum circular orifice diameter of 75 mm or Commercially Distributed Restrictors.
Ensure ponding water does not directly enter the sanitary sewer system through sanitary maintenance holes.
Storm sewers sized for the 1:2 year storm event (Minimum) using the Rational Method and City of Ottawa Intensity-Duration-Frequency (IDF) curves.
Provide measures to ensure that site preparation and construction is in accordance with the current Best Management Practices for Erosion and Sediment Control.
Temporary ICD to be installed at outlet to ensure flow attenuation is restricted to allowable release rate until all elements of system are operable.

Table 5-1:	Stormwater	Servicina	Desian	Criteria
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5.3.1 Minor System

The proposed storm sewers for Morgan's Creek Stage 2 (335 Sandhill Road) will be sized at detailed design to provide the minimum 1:2 year capture rate using the Rational Method. For the purpose of this Servicing Brief, a runoff Coefficient (C) of 0.65 was used based on the proportion of hard surfaces for the proposed layout and units provided by Minto. The 1:2 year rainfall intensities required by the Modified Rational Method were set based on the rainfall equations reported in Section 5.4.2 of the City of Ottawa Design Guidelines.

5.3.2 Stormwater Management Calculations

High level stormwater management calculations were carried out using the Modified Rational Method to demonstrate that the design criteria were fulfilled (i.e., peak flow and storage volume) such that the integrity of the minor/major systems was preserved. The stormwater management calculations are found in Appendix D while Drawings CS1 & CG1 show the conceptual servicing and grading that would achieve the criteria summarized in Table 5-1. Stormwater management calculations were, therefore, carried out based on the following:

- Minor system flows generated by the Sandhill Road site must be controlled to 135.15 L/s based on a unit rate of 85 L/s/ha and an area of 1.59 ha.
- In terms of on-site retention, it was assumed that the stormwater management system could detain the 1:100 year storm.

On-site storage volume requirement will be achieved by a combination of the following two (2) on-site measures:

- Surface storage by means of road sag storage; and
- Underground storage achieved by oversized storm sewers, which would supplement the road sag storage.

In order to demonstrate the feasibility of these two methods for storing the required volumes, the conceptual storage volume was estimated with the Modified Rational Method using two (2) separate calculation approaches. The first approach (Section 5.3.2.1) assumes full retention using exclusively road sag storage while the second (Section 5.3.2.2) assumes that only underground storage would fulfill the storm criterion of detaining the 1:100 year storm.

5.3.2.1 Retention via Surface Storage

Stormwater management calculations carried out (refer to Appendix D) assuming full retention of 1:100 year storm via surface storage show that grading could be developed to provide an aggregate road sag storage of $\pm 250 \text{ m}^3$. Based on the preliminary Grading Plan (Drawing CG1), three (3) road sags are envisioned. Assuming 0.35 m deep sags, the sum of the three (3) sags could provide the 250 m³, being 85 m³ of storage on average for each sag, which is a conservative assumption when 0.30-0.35 m sags at minimum longitudinal slopes are used.

5.3.2.2 Retention via Underground Storage

The Modified Rational Method is known to underestimate storage volume requirements when underground storage is used. As a result, the stormwater management calculations (Appendix D) for this servicing approach assumed half of the allowable release rate of 135.15 L/s (i.e., 66.73 L/s). Based on this calculation method and an overall release rate of 66.73 L/s, \pm 350 m3 would be required in oversized sewers. Based on the Conceptual Servicing (Drawing CS1), more than 310 m of storm sewers are proposed, which translates into a unit storage volume of 1.13 m3/m. The provision of 310 m – 1200 mm diameter storm sewer would meet on its own (i.e., without any surface storage) the storage volume requirement of 350 m3 of storage.

5.3.3 Stormwater Management Calculations

Stormwater management calculations were presented in Sections 5.3.2.1 and 5.3.2.2 for two (2) separate servicing approaches. Results have been summarized in Table 5-2 (below).

Retention Measure	1:100 year Storage Volume Requirement ⁽¹⁾ (m ³)	Conceptual Servicing		
Road Sag Storage	250	3 sags x 85 m³/sag		
Underground Storage	350	310m of 1200 mm diameter sewers		

⁽¹⁾ Storage volumes are conceptual and based off of preliminary design, subject to change during detailed design.

For either storage methods, ICDs would be sized to ensure that the flows are limited to those prescribed in the Sandhill Road storm sewer system. Under the road sag storage options, the three (3) ICDs would share the overall release rate of 135.15 L/s. In regard to the underground storage option, one (1) ICD would be sized to ensure that the overall release rate of 135.15 L/s is respected.

5.3.4 Stormwater Quality

Stormwater quality and quantity control will be provided by the Shirley's Brook East SWMF #2 (or SWM Facility "C" by Novatech). Water will be directed to the SWM by the 675 mm storm sewer on Sandhill Road.

5.4 Summary and Conclusions

The preliminary stormwater servicing and grading as described and shown on Drawing CS1 and CG1 show the Morgan's Creek Stage 2 can be accommodated by the existing Sandhill Road storm sewer and downstream end-of-pipe facility. Servicing and Grading will be refined at detailed design once the on-site storage method (i.e., road sag or underground storage) has been selected.

6.0 Summary of Servicing and Recommendations

Servicing of Minto's Morgan's Creek Phase 2 development, as depicted on the Conceptual Servicing and Grading Plans, has been accounted for in previous studies completed for the subject area. In General, the lands will be serviced as follows:

- Potable water is to be supplied to Morgan's Creek Stage 2 by an existing 300 mm diameter watermain on Sandhill Road.
- Wastewater servicing for Morgan's Creek Stage 2 is to be provided by the existing 250 mm diameter sanitary sewer along Sandhill Road.
- Stormwater servicing is to be provided by the existing 675 mm diameter storm sewer on Sandhill Road. Once captured, runoff will then be conveyed northerly along the Sandhill Road storm sewer and will eventually outlet into a stormwater management facility for water quality and quantity control. This facility, referred to by the City as the Shirley's Brook East SWMF #2 (or SWM Facility "C" by Novatech)

This report has been prepared for the exclusive use of Minto Communities Inc., for the stated purpose, for servicing design of the Morgan's Creek Stage 2 development. Its discussions and conclusions are summary in nature and cannot be properly used, interpreted or extended to other purposes without a detailed understanding and discussions with the client as to its mandated purpose, scope and limitations. This report was prepared for the sole benefit and use of Minto Communities Inc. and may not be used or relied on by any other party without the express written consent of J.L. Richards & Associates Limited.

J.L. RICHARDS & ASSOCIATES LIMITED

Prepared by:

Alexandre Tourigny, EIT



	1		
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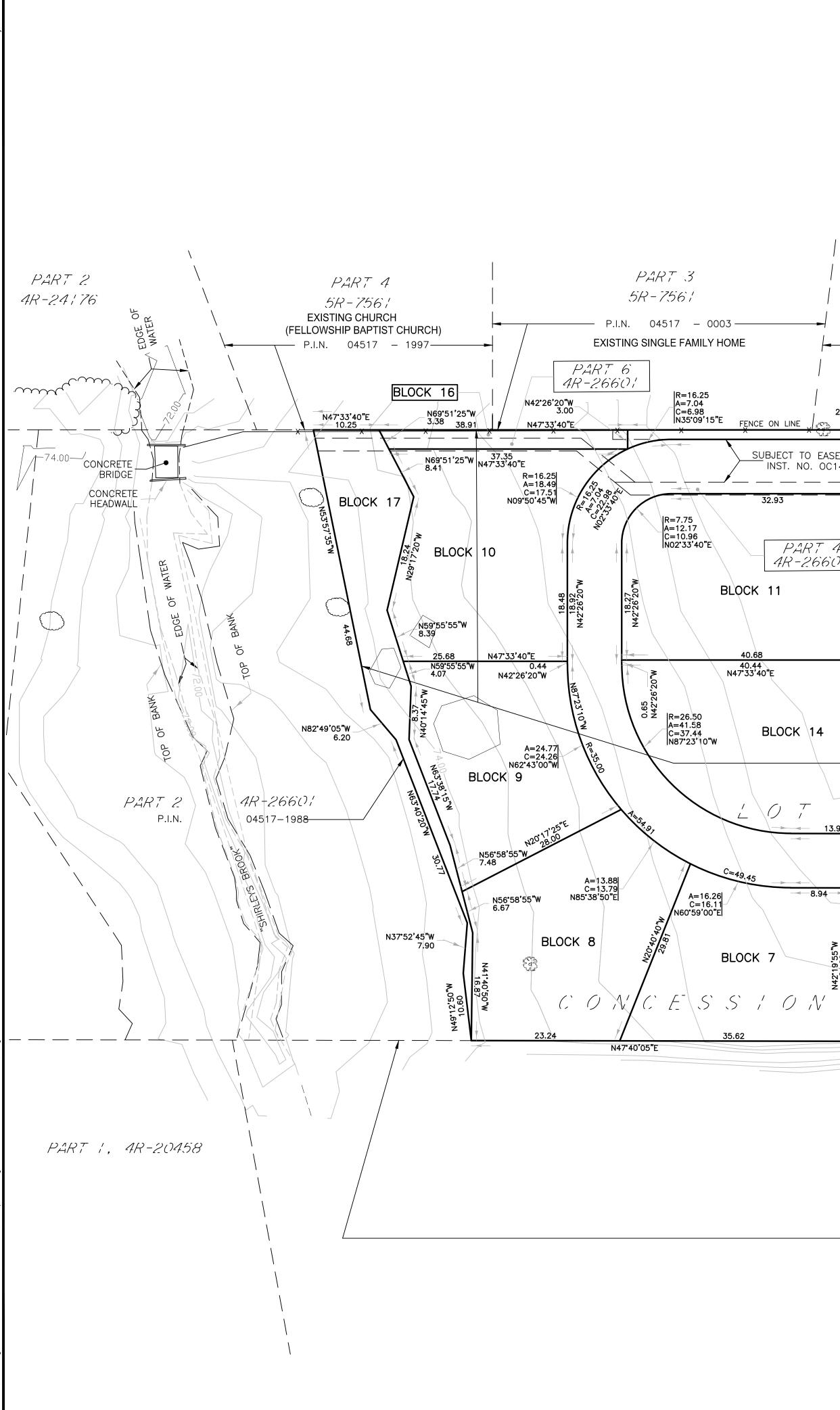
hawkesbury@jlrichards.ca

I.L.Richards

ENGINEERS · ARCHITECTS · PLANNERS

Appendix 'A' – Background Documents

Draft Plan of Subdivision & Location Plan

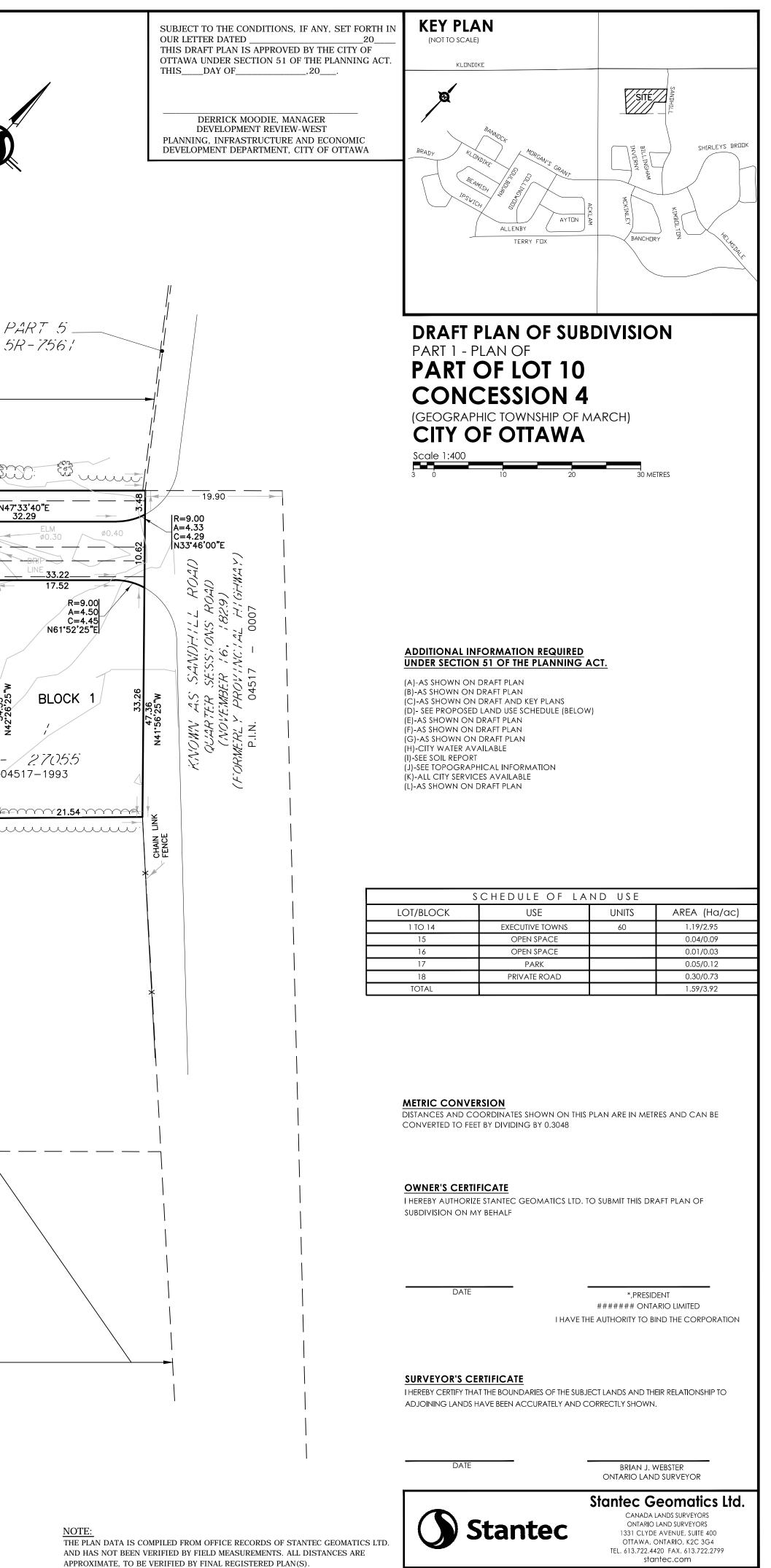


ictive\l6i6i3346_Minto Morgans Creek_360 March Road_CT\subalivision_draft_plan\drawing\l6i6i3346-i30-Minto-RichardsonLan

PART 5 PART 2 5R - 756 / 5R - 756 / EXISTING SINGLE FAMILY HOME 04517 - 0006 P.I.N. R=9.00 A=2.46 R=9.00 A=2.46 C=2.45 N55*22'45"E R=17.50 A=4.78 C=4.76 N55'22'45"E C=2.45 PART 7 N55°22'45"E POST & WIRE FENCE-4R-2660 1000 N47:33'40"E 212.27 105.45 N47*****33'40**"**E BLOCK 15 N47'33'40"E 32.29 PART 5 R=7.75 A=12.17 C=10.96 N02*33'40"E PART SUBJECT TO EASEMENT PER_ N63.11'55"E 4R-26601 BLOCK 18 4R-2660¦ INST. NO. 0C1445177 BLOCK 18 _____N47*****33'40"E____ 65.82 N63.11'55"E 15.62 N47**'**33'35"E 32.93 32.89 N47.33'40"E-R=7.75 A=12.17 C=10.96 N87*26'25"W A=C=1.77 N57'33'55"E R=9.00 A=2.46 C=2.45 N55'22'45"E A=C=0.69 N49*****44'45"E PART 4 4R-2660¦ BLOCK 12 A=C=1.15 N38'11'10"W 34.53 26'25' BLOCK | 2 BLOCK 3 SUBJECT TO EASEMENT PER INST. NO. 0C1445178 A=4.24 C=4.23 N34*57'50"W PAR 40.55 40.79 N47'33'40"E A=3.17 C=3.14 N22°14'00"W 1 AR N67.52'00"E P.I.N. 04517-1993 A=4.81 C=4.79 N19'00'40"W BLOCK 13 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 28.20 2 BLOCK 14 PART 3 50.86 uuu 0.4× 4R-2660¦ `N47*****06'40"E´` - P.I.N. 04517-1994-SUBJECT TO EASEMENT __ ±2.0 WIDE CEDAR HEDGE PER INST. NOs. OC1471755 & ØC1471757 \bigcirc 7 BLOCK 4 13.94 34.27 N47**°**40'05"E R=7.75 A=7.87 C=7.54 N18*34'00"E A=3.48 C=3.47 N04*24'20"W BLOCK 18 CEMETERY N47°40'05"E 34.28 A=10.68 C=10.48 N20'32'30"E /25.33 A=2,36 C=2.35 N43'30'50"E ____±2.0 WIDE CEDAR HEDGE BLOCK 5 BLOCK 6 13.64 102.31 EXISTING CHURCH (ANGLICAN CHURCH OF CANADA)

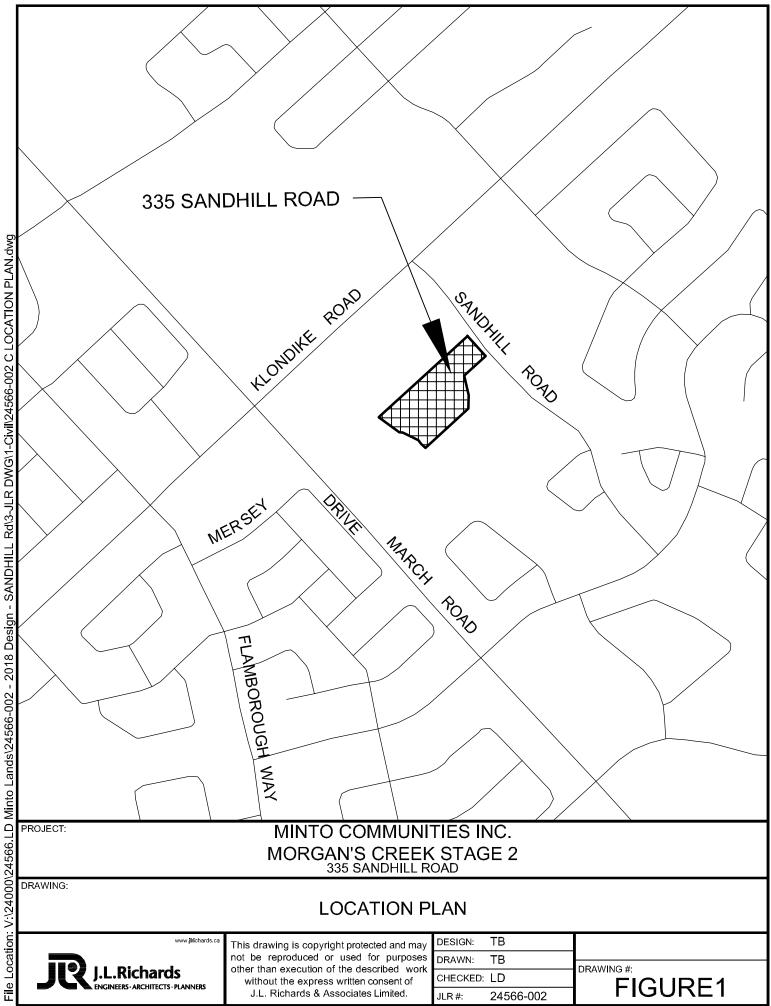
PART 1, 5R-13027

P.I.N. 04517 – 1984

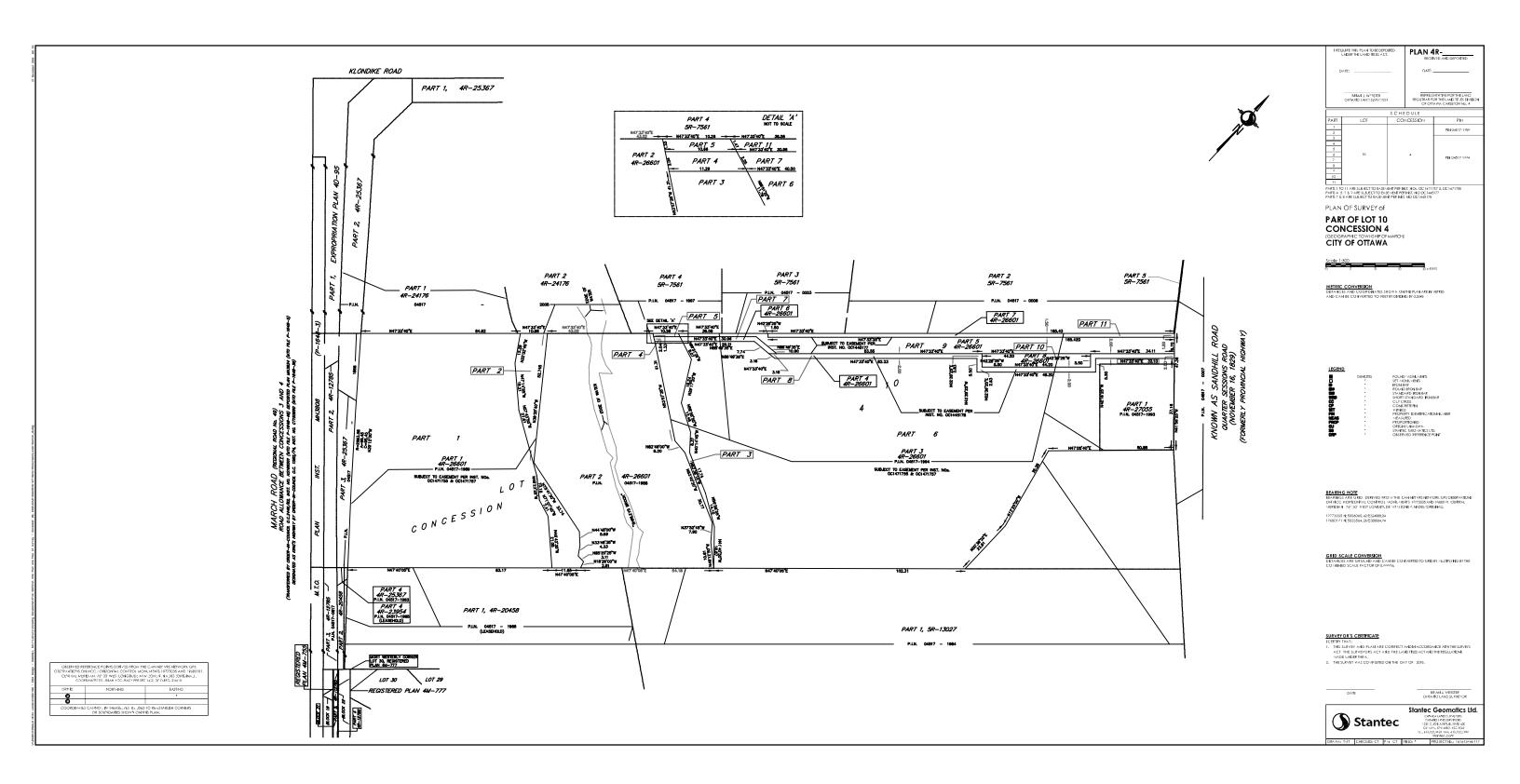


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DRAWN: TMT CHECKED: CT PM: CT FIELD: * PROJECT No.: 161613946-130



Plan of Survey



City of Ottawa Pre-Consultation

Tyler Cassidy

From:	Kevin A. Harper <kharper@minto.com></kharper@minto.com>
Sent:	September 4, 2018 3:07 PM
То:	Lucie Dalrymple; Christopher Gordon (christopher.gordon@cghtransportation.com)
Cc:	Thomas Couper; Susan Murphy
Subject:	FW: Pre-Consultation Follow-Up: 760 March Road
Attachments:	Tech bulletin ISTB-2018-02.pdf; Plan & Study List.pdf; MVCA - Reg Mapping
	Compilation - August 21, 2018.pdf

Good afternoon to you both. Please find the summary notes from our pre-consult with the City back on August 22. We'll be in touch regarding next steps shortly. Thank you.

Kevin



Kevin A. Harper, AICP, MCIP, RPP, LEED AP Development Manager - High Rise **MINTO COMMUNITIES - CANADA** 200-180 Kent St, Ottawa, ON K1P 0B6 **T** 613.751.2857 A division of The Minto Group

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From: McCreight, Laurel [mailto:Laurel.McCreight@ottawa.ca]
Sent: August-29-18 8:35 AM
To: Kevin A. Harper <KHarper@minto.com>
Subject: Pre-Consultation Follow-Up: 760 March Road

Hi Kevin,

Please refer to the below regarding the Pre-Consultation Meeting held on Wednesday August 22nd, 2018 for the property at 760 March Road for a residential development. I have also attached the Plans & Study List.

<u>General</u>

- Site plan application previously approved and the agreement registered in January 2013
 - o Original proposal approved 156 units in 12 buildings

- o Development put on hold in April 2013 due to a product review
- Current proposal introduces a unit increase of 20 (total of 176 units) in 12 buildings
 - o Back-to-back stacked townhouses
 - Site plan for the entire property, but development will be phased with the units on March Road end to be developed first
- Application can be treated as revision application, subject to public consultation

Planning/Urban Design

- Upgraded elevations will be required on March and Sandhill
 - o Landscaping, masonry, balconies
- How will the amenity areas between the units along the creek be treated?
- Perhaps the amenity area for the units along Sandhill could be considered as a stonedust pathway through the heritage buffer

Engineering

- Please use <u>The Servicing Study Guidelines for Development Applications</u>
- Servicing and site works shall be in accordance with the following documents:
 - o Ottawa Sewer Design Guidelines (October 2012)
 - Ottawa Design Guidelines Water Distribution (2010)
 - Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (2007)
 - City of Ottawa Slope Stability Guidelines for Development Applications (revised 2012)
 - o City of Ottawa Environmental Noise Control Guidelines (January, 2016)
 - City of Ottawa Park and Pathway Development Manual (2012)
 - City of Ottawa Accessibility Design Standards (2012)
 - o Ottawa Standard Tender Documents (latest version)
 - Ontario Provincial Standards for Roads & Public Works (2013)
- Record drawings and utility plans are also available for purchase from the City (Contact the City's Information Centre by email at <u>mailto:InformationCentre@ottawa.ca</u> or by phone at (613) 580-2424 x.44455)
- The Stormwater Management Criteria, for the subject site, is to be based on the following:
 - The requirements set by the Shirley's Brook SWM Facility 1-West (report attached);
 - The requirements set by the Shirley's Brook SWM Facility 'C' dated November 2006 completed by Novatech;
 - The requirements set by March Road Reconstruction dated October, 2010 completed by Stantec;
 <u>Please provide this report</u>
 - Flows to the storm sewer in excess of the release rates set by the above report, up to and including the 100-year storm event, must be detained on site; and
 - A calculated time of concentration (Cannot be less than 10 minutes)
- Shirley's Brook Area-Specific Development Charges for Stormwater Management Facilities apply

 Required fees can be found <u>here</u>
- Please use the following link to access The Facility 1-West document <u>https://www.dropbox.com/s/a2elxlxl1mivv8l/2654 - Shirley%27s_Brook - SWM_Facility_1 - West%20Complete.pdf?dl=0</u>
- Water Boundary condition requests must include the location of the service and the expected loads required by the proposed development. Please provide the following information:0
 - Location of service (map/plan view) including location of ROW hydrant to be utilized for RFF purposes, if any (Refer to Technical Bulletin-ISTB-2018-02 (dated March 21, 2018) for hydrant capacity and placement requirements (attached))
 - Type of development and the amount of fire flow required (as per FUS, 1999)
 - Average daily demand: ____ L/s
 - Maximum daily demand: ____L/s
 - Maximum hourly daily demand: ____ L/s

- Water Frontage Fees apply and will by applied within the Site Plan Agreement Financial Requirements
- Please contact the local Ottawa District Ministry of the Environment and Climate Change office to discuss if an MOECC Environmental Compliance Approval (Private Sewage Works) amendment or new application will be required for the proposed development. For residential applications contact <u>Charlie Primeau</u> (613) 521-3450, ext. 251
- History of the site servicing was note at the pre-consultation meeting including:
 - The sanitary service lateral for the site area fronting March Road has already been installed during the March Road Reconstruction project
 - The lateral is capped at both ends and extends to Mersey Drive
 - A section of the existing sanitary sewer along Mersey Drive was re-laid by Minto complete with an MOE ECA application, to ensure the lateral for this site can connect to the sewer, as the lateral was installed lower than the previous Mersey Drive sewer elevation
 - Two (2) water laterals have already been installed along March Road as part of the March Road Reconstruction project
 - An MOE ECA application had been filed and accepted for the foundation drain outlet to Shirley's Brook, however the approval has since lapsed
 - This outlet was preferred due to the high HGL on March Road.
- Please contact <u>Gabrielle Schaeffer</u> for any engineering related questions

Transportation

- Follow Traffic Impact Assessment Guidelines Screening form to start, full Traffic Impact Assessment if any of the triggers on the screening form are satisfied
 - o Start this process immediately
 - Applicant advised that their application will not be deemed complete until the submission of the draft step 1-4, including the functional draft RMA package (if applicable) and/or monitoring report (if applicable)
- ROW protection on March between Terry Fox and Richardson is 44.5m even
- Noise Impact Studies required for the following:
 - o Road
 - Stationary (due to the proximity to neighbouring exposed mechanical equipment)
- Clear throat requirements for apartments style units that is >100 units on an arterial is 15m
- Sidewalks will be required along the full length of the frontage on Sandhill
- On drawings:
 - Show all details of the roads abutting the site up to and including the opposite curb; include such items as pavement markings, accesses and/or sidewalks
 - Turning templates will be required for all accesses showing the largest vehicle to access the site; required for internal movements and at all access (entering and exiting and going in both directions)
 - o Show all curb radii measurements; ensure that all curb radii are reduced as much as possible
 - o Show road/lane/aisle widths
 - Show depressed curb locations along pedestrian paths
- Please contact <u>Rosanna Baggs</u> for an transportation related questions

Environmental

- A Blanding's Turtle has been found in Shirley's Brook since the previous approval
 - o Within a 2 km radius the riparian lands become a significant habitat
 - o Significant habitat is 30 metre with a 55 metre meander belt
 - You can apply for a permit from MNR for a reduced width
- An environmental consultant will be required to address the species at risk
- A tree removal permit is required for any trees to be removed greater than 10 cm in diameter
- The environmental impact statement and tree conservation report can be combined
- Please contact <u>Matthew Hayley</u> for any environmental related questions

<u>MVCA</u>

- Updated regulation mapping was completed in November 2017
- A meander belt hazard of 87 metres was introduced
 - A erosion hazard study/meander belt width study can be completed to determine that actual width of meander belt to be required
 - o Can also work with adjacent landowners
- Please contact Niall Oddie at MVCA for any questions

Please do not hesitate to contact me if you have any questions.

Regards, Laurel

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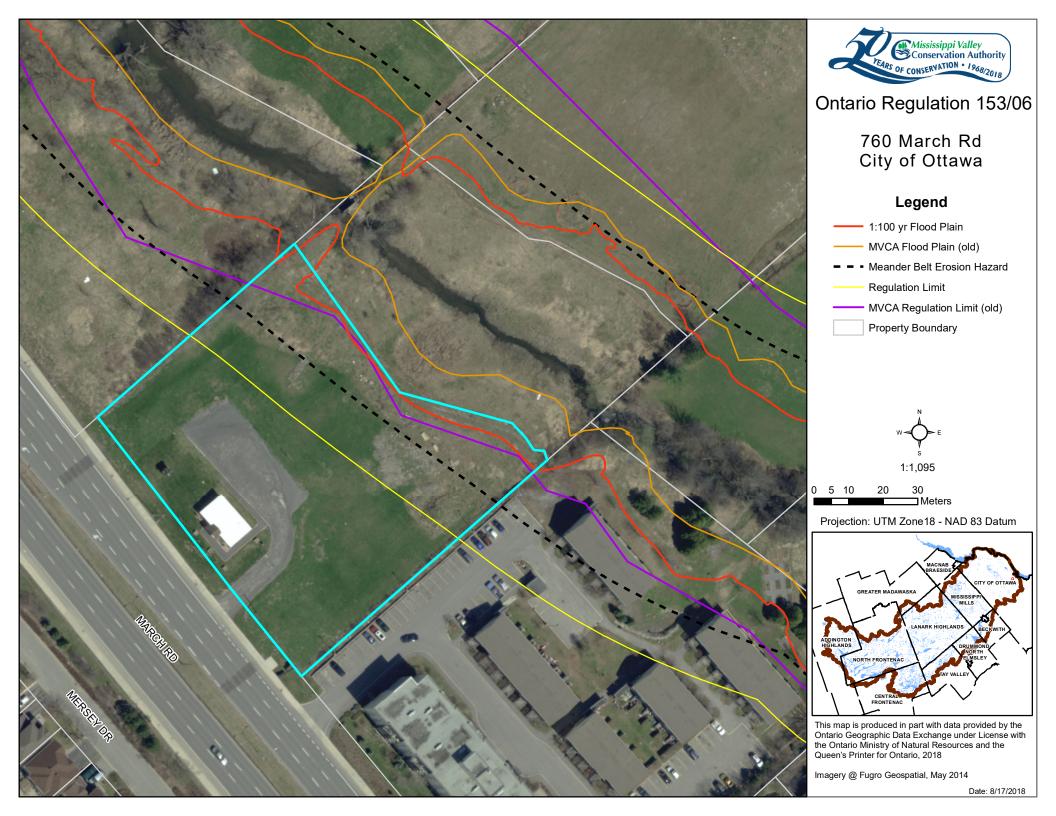
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Laurel McCreight MCIP, RPP Planner Development Review West Urbaniste Examen des demandes d'aménagement ouest

City of Ottawa | Ville d'Ottawa 613.580.2424 ext./poste 16587 ottawa.ca/planning / ottawa.ca/urbanisme

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APPLICANT'S STUDY AND PLAN IDENTIFICATION LIST

Legend: **S** indicates that the study or plan is required with application submission.

A indicates that the study or plan may be required to satisfy a condition of approval/draft approval.

For information and guidance on preparing required studies and plans refer to:

http://ottawa.ca/en/development-application-review-process-0/guide-preparing-studies-and-plans

S/A	Number of copies	ENGINEERING			Number of copies
<mark>S</mark>	<mark>10</mark>	1. Site Servicing Plan	2. Site Servicing Brief		<mark>3</mark>
S 10		3. Grade Control and Drainage Plan	 Geotechnical Study and Meander Belt Width Study 		<mark>3</mark>
		5. Composite Utility Plan	6. Groundwater Impact Study		
		7. Servicing Options Report	8. Wellhead Protection Study		
S	<mark>6</mark>	9. Transportation Impact Brief	10. Erosion and Sediment Control Plan / Brief	S	<mark>3</mark>
S	<mark>3</mark>	11.Storm water Management Brief	12.Hydro geological and Terrain Analysis		
S	<mark>3</mark>	13.Hydraulic Water main Analysis	14.Stationary Noise Study	S	2
	10	15.Roadway Modification Design Plan	16.Confederation Line Proximity Study		
S/A	Number of copies	PLANNING / DESIGN / SURVEY		S/A	Number of copies
	-	17.Draft Plan of Subdivision	18.Plan Showing Layout of Parking Garage		•
		19.Draft Plan of Condominium	20.Planning Rationale	S	<mark>3</mark>
S	<mark>10</mark>	21.Site Plan	22.Minimum Distance Separation (MDS)		
		23.Concept Plan Showing Proposed Land Uses and Landscaping	24.Agrology and Soil Capability Study		
		25.Concept Plan Showing Ultimate Use of Land	26.Cultural Heritage Impact Statement		
S	<mark>10</mark>	27.Landscape Plan	an 28.Archaeological Resource Assessment Requirements: S (site plan) A (subdivision, condo)		
S	1	29.Survey Plan	30.Shadow Analysis		
<mark>S</mark>	3	31.Architectural Building Elevation Drawings (dimensioned)	32.Design Brief (includes the Design Review Panel Submission Requirements)		Available online
		33.Wind Analysis			
S/A	Number of copies	ENVIRONMENTAL		S/A	Number of copies
<mark>8</mark>	<mark>3</mark>	34.Phase 1 Environmental Site Assessment (update if necessary)	35.Impact Assessment of Adjacent Waste Disposal/Former Landfill Site		
		36.Phase 2 Environmental Site Assessment (depends on the outcome of Phase 1)	37.Assessment of Landform Features		
		38.Record of Site Condition	39.Mineral Resource Impact Assessment		
<mark>S</mark>	3	40.Tree Conservation Report	41.Environmental Impact Statement / Impact Assessment of Endangered Species		<mark>3</mark>
		42.Mine Hazard Study / Abandoned Pit or Quarry Study	43.Integrated Environmental Review (Draft, as part of Planning Rationale)		
S/A	Number of copies				Number of copies
<mark>S</mark>	3 3	44. Site Light Lighting Plan/Letter	45.		

Meeting Date: August 22, 2018

Application Type: Site Plan Control

File Lead (Assigned Planner): Laurel McCreight

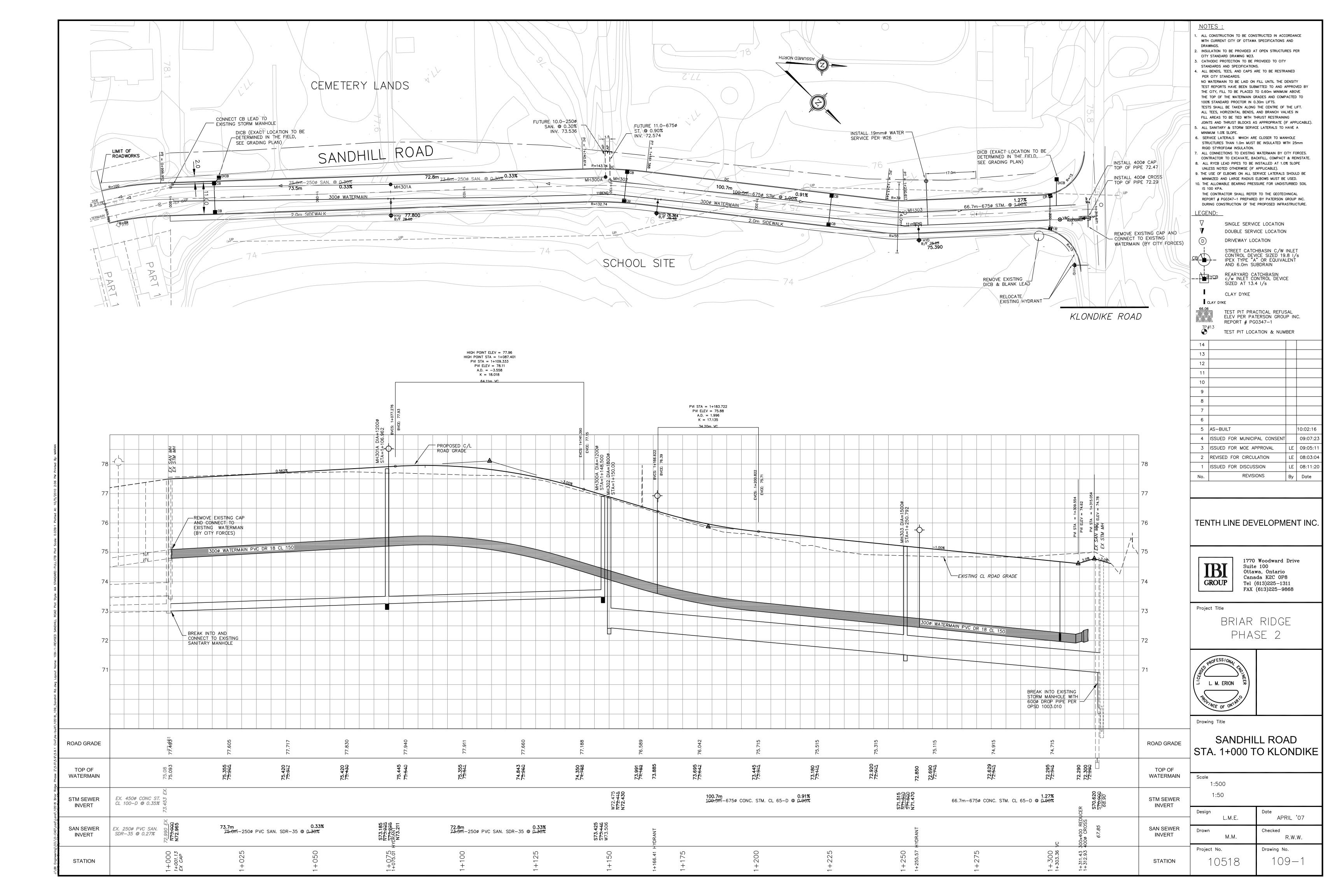
Infrastructure Approvals Project Manager: Gabrielle Schaeffer *Preliminary Assessment: 1 2 3 4 5 5

Site Address (Municipal Address): 760 March Road

*One (1) indicates that considerable major revisions are required before a planning application is submitted, while five (5) suggests that proposal appears to meet the City's key land use policies and guidelines. This assessment is purely advisory and does not consider technical aspects of the proposal or in any way guarantee application approval.

It is important to note that the need for additional studies and plans may result during application review. If following the submission of your application, it is determined that material that is not identified in this checklist is required to achieve complete application status, in accordance with the Planning Act and Official Plan requirements, the Planning, Infrastructure and Economic Development Department will notify you of outstanding material required within the required 30 day period. Mandatory pre-application consultation will not shorten the City's standard processing timelines, or guarantee that an application will be approved. It is intended to help educate and inform the applicant about submission requirements as well as municipal processes, policies, and key issues in advance of submitting a formal development application. This list is valid for one year following the meeting date. If the application is not submitted within this timeframe the applicant must again pre-consult with the Planning, Infrastructure and Economic Development Department.

110 Laurier Avenue West, Ottawa ON K1P 1J1 Mail code: 01-14 110, av. Laurier Ouest, Ottawa (Ontario) K1P 1J1 Courrier interne : 01-14 Visit us: Ottawa.ca/planning Visitez-nous : Ottawa.ca/urbanisme Sandhill Road As-Builts (IBI Group)



Appendix 'B' - Watermain

Water Demand and FUS Calculation

Water Demand Calculations Morgan's Creek (JLR 24566-001)

Site 2 - Sandhill Road		
No. Row Townhouse Units	60	units
Density	2.7	p/p/u
No. Ppl	162	ppl
Average Day Consumption Rate	350	L/c/d
Average Day Demand	0.66	L/s
Maximum Day Peaking Factor	4.8	x Avg Day (Table 3-3, MOE 2008)
Maximum Day Demand	3.15	L/s
Peak Hour Peaking Factor	7.3	x Avg Day (Table 3-3, MOE 2008)
Peak Hour Demand	4.79	L/s

FUS Fire Flow Calculations - SITE 2 (Row Townhouse Block 11)

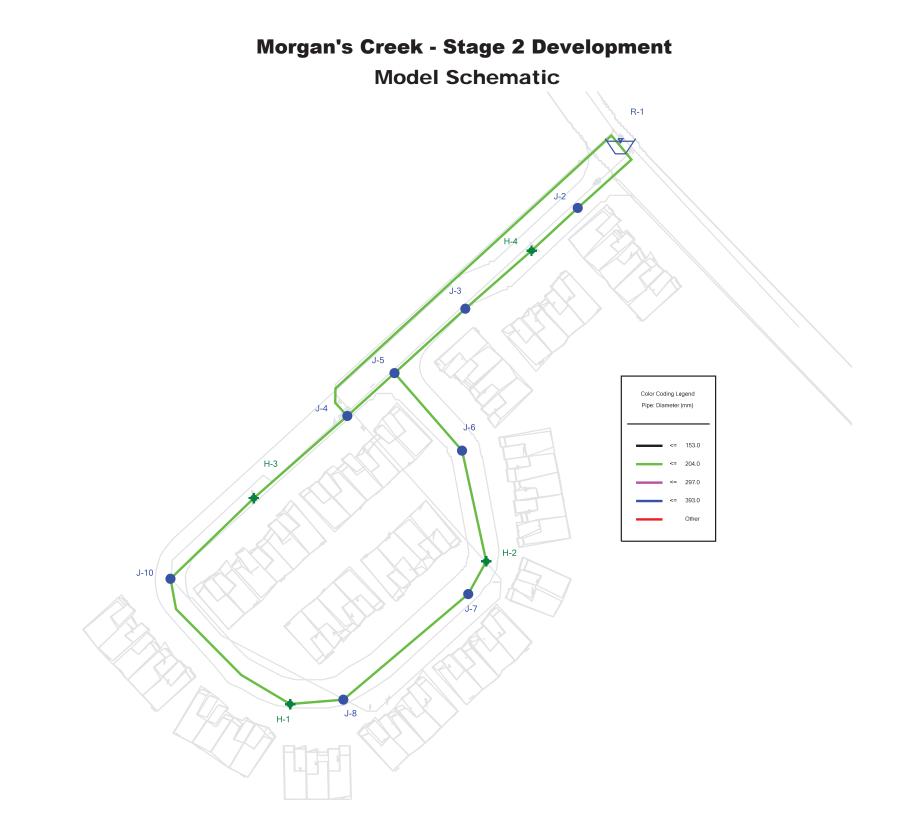
24566-002 Morgan's Creek - Sandhill Road

Step	Parameter	Value		Note
4	Type of Construction	Wood Frame		
	Coefficient (C)	1.5		—
3	Ground Floor Area	517	m²	Includes 6 units within fire flow area, separated by less than 3.0 m.
	Height in storeys	2	storeys	Basements are excluded.
	Total Floor Area	1034	m ²	—
	Fire Flow Formula	F=220C√A		
	Fire Flow	10611	L/min	
	Rounded Fire Flow	11000	L/min	Flow rounded to nearest 1000 L/min.
			,	Residential buildings have a limited combustible
	Occupancy Class	Limited Combustible		occupancy
	Occupancy Charge	-15%		
	Occupancy Increase or	-1650		
	Decrease	0050		
	Fire Flow	9350	L/min	No rounding applied.
	Sprinkler Protection	None		_
	Sprinkler Credit	0%		_
	Decrease for Sprinkler	0	L/min	
	North Side Exposure			
	Exposing Wall:	Wood Frame		
	Exposed Wall:	Wood Frame		
Ler	Length of Exposed Wall:	0.0	m	
	Height of Exposed Wall:	0	storeys	
-	Length-Height Factor	0.0	m-storeys	
	Separation Distance	93	m	
	North Side Exposure	0%		—
	Charge	0%		
	East Side Exposure			
	Exposing Wall:	Wood Frame		
	Exposed Wall:	Wood Frame		
	Length of Exposed Wall:	14.9	m	
	Height of Exposed Wall:	2	storeys	
	Length-Height Factor	29.8	m-storeys	
	Separation Distance	3.12	m	
	East Side Exposure	17%		—
	Charge	2770		_
	South Side Exposure			
	Exposing Wall:	Wood Frame		
	Exposed Wall:	Wood Frame		
	Length of Exposed Wall:	25.1	m	
	Height of Exposed Wall:	2	storeys	
	Length-Height Factor	50.2	m-storeys	
	Separation Distance	9.84	m	
	South Side Exposure	18%		
	Charge	10/0		_
	West Side Exposure			
	Exposing Wall:	Wood Frame		
	Exposed Wall:	Wood Frame		
	Length of Exposed Wall:	14.9	m	
	Height of Exposed Wall:	2	storeys	
	Length-Height Factor	29.8	m-storeys	
	Separation Distance	16.1	m	
	West Side Exposure	12%		
	<u>Charge</u> Total Exposure Charge	47%		The total exposure charge is below the maximum valu
			1/min	of 75%.
	Increase for Exposures Fire Flow	4395 13745	L/min L/min	
		14000	L/min	Flow rounded to nearest 1000 L/min.
	Rounded Fire Llow			now nounded to nearest 1000 L/IIIII.
ity Cap	Rounded Fire Flow Required Fire Flow (RFF)	14000	L/min	The City of Ottawa's cap does not apply since there is less than 10 m separation between the back of the un and the side of the adjacent unit.

Fire Underwriters Survey (FUS) Fire Flow Calculations

In accordance with City of Ottawa Technical Bulletin ISTB-2018-02 dated March 21, 2018

Model Schematic



City Correspondence and Hydraulic Boundary Conditions

Boundary Conditions for 760 March

Information Provided:

Date provided: November 2018

March Road

	Demand			
Scenario	L/min	L/s		
Average Daily Demand	33.6	0.56		
Maximum Daily Demand	181.2	3.02		
Peak Hour	271.8	4.53		
Fire Flow Demand #1	13020	217		
Fire Flow Demand #2	16980	283		

Sandhill Road

	Den	nand
Scenario	L/min	L/s
Average Daily Demand	39.6	0.66
Maximum Daily Demand	189	3.15
Peak Hour	287.4	4.79
Fire Flow Demand #1	13980	233
Fire Flow Demand #2	16980	283

Location:



Results:

Connection 1 - March

Demand Scenario	Head (m)	Pressure ¹ (psi)
Maximum HGL	131.6	74.6
Peak Hour	124.2	64.1
Max Day plus Fire (13,000 l/min)	121.4	60.2
Max Day plus Fire (17,000 L/min)	118.9	56.6

¹ Ground Elevation = 79.1m

Connection 2 - Sandhill

Demand Scenario	Head (m)	Pressure ¹ (psi)
Maximum HGL	131.6	76.9
Peak Hour	124.2	66.4
Max Day plus Fire (14,000 l/min)	117.7	57.2
Max Day plus Fire (17,000 L/min)	114.4	52.5

¹ Ground Elevation = 77.5m

Notes:

- 1) Avoid oversizing local watermains to accommodate large required fire flows (refer to Tech Bulletin ISTDB-2014-02). Servicing studies often use a design fire flow rate of 13,000 L/min to evaluate existing and proposed water distribution systems.
- 2) Connecting site's 1 and 2 with a watermain under Shirley's Brook (refer to site plan) is an attractive option. The watermain will provide sufficient looping and eliminate the "P-Loop" design off Sandhill Road and the need to insert an isolation valve on the existing backbone watermain on March Road (to ensure an uninterrupted supply of water during a planned closure or emergency condition).

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.

Ivan Dzeparoski

From: Sent: To: Subject: Attachments: Annie Williams Wednesday, December 12, 2018 12:39 PM Ivan Dzeparoski FW: Request for Hydraulic Boundary Conditions - Morgan's Creek - 760 March Road 760March_BC_05Dec2018.docx

Annie Williams, EIT Civil Engineering Intern

J.L. Richards & Associates Limited 700 - 1565 Carling Avenue, Ottawa, ON K1Z 8R1 Tel: 613-728-3571 Fax: 613-728-6012

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From: Schaeffer, Gabrielle <gabrielle.schaeffer@Ottawa.ca>
Sent: December 5, 2018 1:55 PM
To: Annie Williams <awilliams@jlrichards.ca>
Cc: Guy Forget <gforget@jlrichards.ca>; Kevin A. Harper <KHarper@minto.com>; Lucie Dalrymple
<ldalrymple@jlrichards.ca>
Subject: RE: Request for Hydraulic Boundary Conditions - Morgan's Creek - 760 March Road

Hi Annie,

Attached are the boundary conditions for the 2 connection off March Rd and 2 connections off Sandhill Rd. As stated in the notes, a watermain from March Rd to Sandhill under Shirley's Brook is the preferred design instead of what is currently proposed.

If you wish to discuss, please feel free to contact me.

Regards, Gabrielle

From: Annie Williams <a williams@jlrichards.ca</pre>
Sent: Friday, November 30, 2018 9:45 AM
To: Schaeffer, Gabrielle <gabrielle.schaeffer@Ottawa.ca</pre>
Cc: Guy Forget <gforget@jlrichards.ca</pre>; Kevin A. Harper <KHarper@minto.com</pre>; Lucie Dalrymple
<ld><ldalrymple@jlrichards.ca</pre>
Subject: RE: Request for Hydraulic Boundary Conditions - Morgan's Creek - 760 March Road

Hi Gabrielle,

Since the boundary condition modelling begins on Tuesday, I wanted to provide the minor updates below and attached which correspond with the latest subdivision plan received from Minto. The only change is 60 units in Site 2 (instead of

57). I also re-checked the FUS calculation for Site 2, no change overall. We still wish to request two (2) fire flow boundary conditions for each site, as noted below:

<u>Site 1 (March Road)</u> Average Day = 0.56 L/s Maximum Day = 3.02 L/s Peak Hour = 4.53 L/s Required Fire Flow (RFF) = 217 L/s AND 283 L/s

<u>Site 2 (Sandhill Road)</u> Average Day = 0.66 L/s Maximum Day = 3.15 L/s Peak Hour = 4.79 L/s Required Fire Flow (RFF) = 233 L/s AND 283 L/s

This email summarizes the latest information and should be used to run the model on Tuesday.

Should you have any questions, please do not hesitate to contact me.

Thank you,

Annie Williams, EIT Civil Engineering Intern

J.L. Richards & Associates Limited 700 - 1565 Carling Avenue, Ottawa, ON K1Z 8R1 Tel: 613-728-3571 Fax: 613-728-6012





From: Schaeffer, Gabrielle <gabrielle.schaeffer@Ottawa.ca>
Sent: November 29, 2018 2:53 PM
To: Lucie Dalrymple <ldalrymple@jlrichards.ca>
Cc: Guy Forget <gforget@jlrichards.ca>; Annie Williams <awilliams@jlrichards.ca>; Kevin A. Harper
<KHarper@minto.com>
Subject: RE: Request for Hydraulic Boundary Conditions - Morgan's Creek - 760 March Road

Certainly.

Gabrielle

From: Lucie Dalrymple <<u>Idalrymple@jlrichards.ca</u>>
Sent: Thursday, November 29, 2018 2:52 PM
To: Schaeffer, Gabrielle <<u>gabrielle.schaeffer@Ottawa.ca</u>>
Cc: Guy Forget <<u>gforget@jlrichards.ca</u>>; Annie Williams <<u>awilliams@jlrichards.ca</u>>; Kevin A. Harper
<<u>KHarper@minto.com</u>>
Subject: RE: Request for Hydraulic Boundary Conditions - Morgan's Creek - 760 March Road

Thank you Gabrielle for the update. We will work around that, but would it be possible for you to ask the modeller to start with our request first think Tuesday upon his return.

Would be greatly appreciated.

Thank you

Lucie

Lucie Dalrymple, P.Eng. Associate Senior Civil Engineer

J.L. Richards & Associates Limited 700 - 1565 Carling Avenue, Ottawa, ON K1Z 8R1 Tel: 613-728-3571 Fax: 613-728-6012

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From: Schaeffer, Gabrielle <gabrielle.schaeffer@Ottawa.ca>
Sent: November 29, 2018 1:54 PM
To: Lucie Dalrymple <ldalrymple@jlrichards.ca>
Cc: Guy Forget <gforget@jlrichards.ca>; Annie Williams <awilliams@jlrichards.ca>
Subject: RE: Request for Hydraulic Boundary Conditions - Morgan's Creek - 760 March Road

Lucie,

Unfortunately, Tuesday is the earliest our modelling group can get BCs back to me. One modeler is away until then and the other is in meetings all three days (today, tomorrow and Monday). If you wish to proceed, I will accept the first submission with either: using the old BCs, or no boundary conditions/watermain sizing analysis. Additionally, I will accept a revised Water Servicing section and Water Appendix via email after the formal submittal has been made, but before review, comments are issued.

I hope these options help at this time.

Regards, Gabrielle

From: Lucie Dalrymple <<u>Idalrymple@jlrichards.ca</u>>
Sent: Thursday, November 29, 2018 12:22 PM
To: Schaeffer, Gabrielle <<u>gabrielle.schaeffer@Ottawa.ca</u>>
Cc: Guy Forget <<u>gforget@jlrichards.ca</u>>; Annie Williams <<u>awilliams@jlrichards.ca</u>>
Subject: RE: Request for Hydraulic Boundary Conditions - Morgan's Creek - 760 March Road

Hi Gabrielle,

Unfortunately, the timing in which the boundary conditions will be available (next Tuesday per you email) presents a significant delivery probable from the team of consultants. We have been coordinating this request with the City since October 26, 2018. There was approximately one month lost due to the uncertainty of the existence of the two watermain stubs off of March Road, which was discussed at the August 22, 2018 pre-consultation meeting and which was confirmed in the meeting minutes issued on August 29th, 2018 (copy attached).

We understand that it is not you personally calculating the boundary condition, so would you please assist us in coordinating with the responsible City staff to see if these boundary conditions provided to JLR no later than end of day tomorrow? It would be greatly appreciated.

There is a lot of coordination efforts on all consultants to prepared a complete submission and when one study cannot be completed at the same time as all others, it presents issues. As Annie mentioned, the submission was to be issued tomorrow (based on a 3 week turn around for the boundary condition requested on October 26, 2018). We managed to push the submission date forward to next Friday, which means that the boundary conditions must be received this week.

Please advise if the BC can be provided sooner than next Tuesday.

We appreciate your assistance.

Thank you,

Lucie

Lucie Dalrymple, P.Eng. Associate Senior Civil Engineer

J.L. Richards & Associates Limited 700 - 1565 Carling Avenue, Ottawa, ON K1Z 8R1 Tel: 613-728-3571 Fax: 613-728-6012

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From: Schaeffer, Gabrielle <gabrielle.schaeffer@Ottawa.ca>
Sent: November 29, 2018 11:57 AM
To: Annie Williams <awilliams@jlrichards.ca>
Cc: Lucie Dalrymple <ldalrymple@jlrichards.ca>; Guy Forget <gforget@jlrichards.ca>
Subject: RE: Request for Hydraulic Boundary Conditions - Morgan's Creek - 760 March Road

Hi Annie,

I touched base with our modelling group. I am expecting to receive the BCs Tuesday.

Gabrielle

From: Annie Williams <a williams@jlrichards.ca Sent: Thursday, November 29, 2018 11:43 AM To: Schaeffer, Gabrielle <gabrielle.schaeffer@Ottawa.ca Cc: Lucie Dalrymple <ldalrymple@jlrichards.ca Subject: RE: Request for Hydraulic Boundary Conditions - Morgan's Creek - 760 March Road

Hi Gabrielle,

Per my voicemail from this morning, please let us know when we can expect to receive these boundary conditions.

As mentioned, our original deadline for the March Road design was tomorrow and we have shifted it to next week. We need to prepare our detailed water servicing design within the next few days.

Feel free to give me a call if there is something holding this up.

Thank you,

Annie Williams, EIT Civil Engineering Intern

J.L. Richards & Associates Limited 700 - 1565 Carling Avenue, Ottawa, ON K1Z 8R1 Tel: 613-728-3571 Fax: 613-728-6012



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From: Annie Williams
Sent: November 26, 2018 2:05 PM
To: Schaeffer, Gabrielle <gabrielle.schaeffer@Ottawa.ca>
Cc: Lucie Dalrymple <<u>Idalrymple@jlrichards.ca</u>>; Guy Forget <<u>gforget@jlrichards.ca</u>>
Subject: RE: Request for Hydraulic Boundary Conditions - Morgan's Creek - 760 March Road

Hi Gabrielle,

Following our phone conversation, I have attached the revised water demand calculations. As noted, the Site 2 plan has changed slightly to accommodate 57 units.

Thank you,

From: Schaeffer, Gabrielle <<u>gabrielle.schaeffer@Ottawa.ca</u>>
Sent: November 26, 2018 11:40 AM
To: Annie Williams <<u>awilliams@jlrichards.ca</u>>
Subject: RE: Request for Hydraulic Boundary Conditions - Morgan's Creek - 760 March Road

Hi Annie,

I just completed my review. FUS calcs look good. Domestic calcs need revision:

- Since each population is less than 500 person, please use Table 3-3 of the MOE Design Guidelines for Drinking Water Systems to establish peaking factors for both sites. Please either interpolate the peaking factors or utilize the higher peaking factor which is associated with the lower population in the table (i.e. for 138 person you can use the peaking factors for 100 persons since they are higher than the peaking factors for 150 persons)
- The number of units for Site 2 appear to be high. I see 51 units on the plan provided, not 57.

Once I have the revised calcs, I can provide the boundary conditions.

Regards, Gabrielle

From: Annie Williams <<u>awilliams@jlrichards.ca</u>>
Sent: Friday, November 23, 2018 4:32 PM
To: Schaeffer, Gabrielle <<u>gabrielle.schaeffer@Ottawa.ca</u>>
Cc: Lucie Dalrymple <<u>Idalrymple@jlrichards.ca</u>>; Guy Forget <<u>gforget@jlrichards.ca</u>>
Subject: PE: Request for Hydraulic Roundary Conditions Morgan's Creek - 760 March Re

Subject: RE: Request for Hydraulic Boundary Conditions - Morgan's Creek - 760 March Road

Hi Gabrielle,

Please let us know if the provided information is sufficient and when we can expect the boundary conditions.

Thank you,

Annie Williams, EIT Civil Engineering Intern

J.L. Richards & Associates Limited 700 - 1565 Carling Avenue, Ottawa, ON K1Z 8R1 Tel: 613-728-3571 Fax: 613-728-6012





From: Annie Williams
Sent: November 22, 2018 10:41 AM
To: 'Schaeffer, Gabrielle' <gabrielle.schaeffer@Ottawa.ca>
Cc: Lucie Dalrymple <ldalrymple@jlrichards.ca>; Guy Forget <gforget@jlrichards.ca>
Subject: RE: Request for Hydraulic Boundary Conditions - Morgan's Creek - 760 March Road

Hi Gabrielle,

Minto has slightly revised their layout on the Sandhill site so I have revised the domestic demand calculations (attached).

We would also like to request a second boundary condition for fire flow on each of the sites for 17,000 L/min (283 L/s). The City has indicated previously that the boundary conditions can be interpolated should further revisions to the draft plan occur.

Let me know if you have any questions and when we can expect to receive the boundary conditions.

Thank you,

From: Schaeffer, Gabrielle <<u>gabrielle.schaeffer@Ottawa.ca</u>>
Sent: November 20, 2018 10:08 AM
To: Annie Williams <<u>awilliams@jlrichards.ca</u>>
Subject: RE: Request for Hydraulic Boundary Conditions - Morgan's Creek - 760 March Road

Hi Annie,

Thanks for your voicemail yesterday. I was unaware that water services were already installed for this site (at least fronting March). As of right now, I will proceed with the proposed double connection to March as previous proposed, however I am waiting on approval from operations so we're not in the clear yet.

Please provide me with supporting calcs for your domestic demand calculations. We're trying to minimize the number of boundary condition requestes we run so we're doing the water review up front and just doing a check that the circumstances are the same in application review.

Regards, Gabrielle

From: Annie Williams <a williams@jlrichards.ca
Sent: Friday, October 26, 2018 4:13 PM
To: Schaeffer, Gabrielle <<u>gabrielle.schaeffer@Ottawa.ca</u>
Cc: McCreight, Laurel <<u>Laurel.McCreight@ottawa.ca</u>
; Guy Forget <<u>gforget@jlrichards.ca</u>
; Lucie Dalrymple

<<u>Idalrymple@jlrichards.ca</u>>; Thomas Couper <<u>TCouper@minto.com</u>>; Kevin A. Harper <<u>KHarper@minto.com</u>> **Subject:** Request for Hydraulic Boundary Conditions - Morgan's Creek - 760 March Road

Hi Gabrielle,

We would like to obtain updated hydraulic boundary conditions in support of a Site Plan Application for Minto's development of a residential site (Morgan's Creek) located at 760 March Road in the City of Ottawa (refer to attached Site Plan).

The City previously provided hydraulic boundary conditions for this site back in 2011 (attached). Approvals for the site were granted under Site Plan control; however, the site was never developed. Since that time, the Site Plan has been slightly revised though the general concept remains as follows:

The site is bisected by Shirley's Brook with the western portion (Site 1) fronting onto March Road and the eastern portion (Site 2) fronting onto Sandhill Road. Site 1 includes 60 terrace (duplex) units and is proposed to be serviced from two (2) connections to the existing March Road 400 mm diameter watermain. Site 2 includes 51 row townhouse units and is proposed to be serviced from two (2) connections to the existing 300 mm diameter watermain on Sandhill Road.

We request hydraulic boundary conditions for both Site 1 and Site 2 along the existing watermains at the proposed site entrances (as depicted on the Site Plan).

Based on the City Design Guidelines, the following demands are anticipated:

<u>Site 1</u> Average Day = 0.56 L/s Maximum Day = 1.40 L/s Peak Hour = 3.07 L/s Required Fire Flow (RFF) = 217 L/s

<u>Site 2</u> Average Day = 0.56 L/s Maximum Day = 1.40 L/s Peak Hour = 3.07 L/s Required Fire Flow (RFF) = 233 L/s

Furthermore, if static conditions are expected to fluctuate between existing and future build-out conditions, we would like to obtain both.

The RFF was calculated in accordance with the City Design Guidelines for Water Distribution and associated Technical Bulletins, including the latest ISTB-2018-02. Detailed calculations are attached.

Should you have any questions or require any further information, please do not hesitate to contact me.

Thank you,

Annie Williams, EIT Civil Engineering Intern

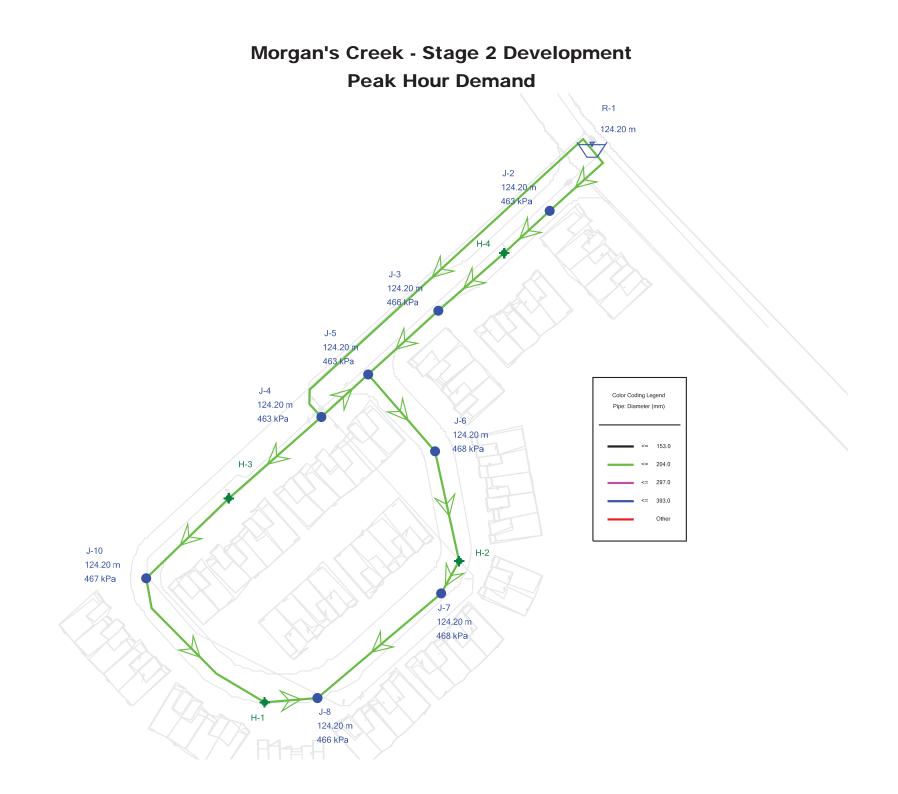
J.L. Richards & Associates Limited 700 - 1565 Carling Avenue, Ottawa, ON K1Z 8R1 Tel: 613-728-3571 Fax: 613-728-6012





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Simulation Results – Peak Hour Demand



Morgan's Creek - Stage 2 Development Peak Hour Demand

Junction Table

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (kPa)
J-4	76.90	0.50	124.20	463
J-5	76.85	0.00	124.20	463
J-2	76.85	0.56	124.20	463
J-8	76.60	1.21	124.20	466
J-3	76.60	0.33	124.20	466
J-10	76.50	0.00	124.20	467
J-7	76.40	0.80	124.20	468
J-6	76.40	0.56	124.20	468

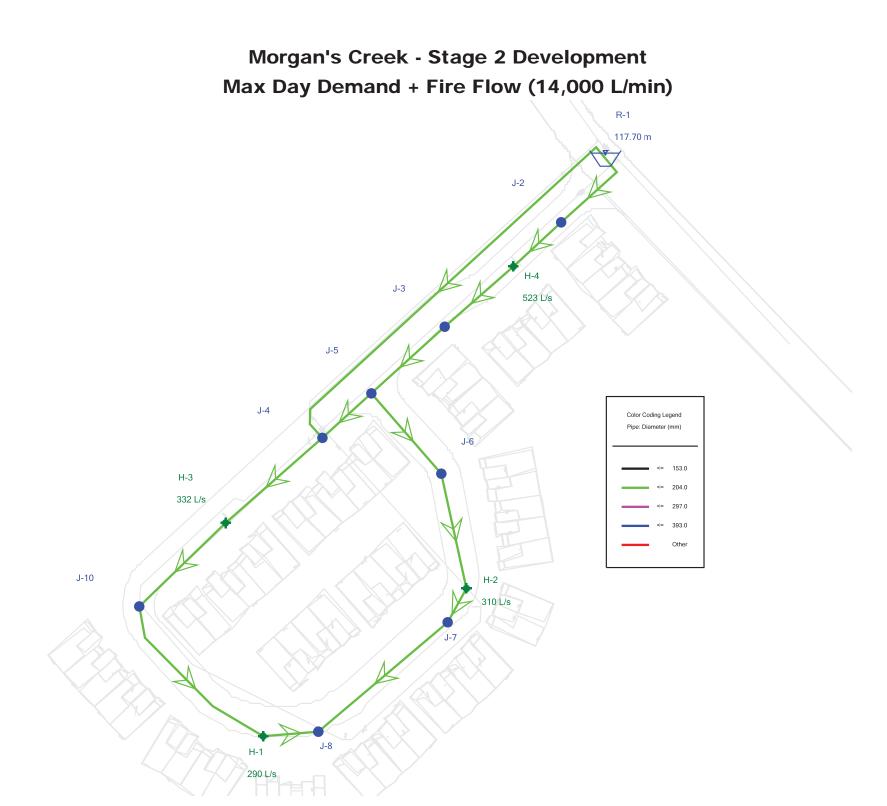
Sandhill Road.wtg 12/18/2018 Bentley Systems, Inc. Haestad Methods Solution Center 27 Siemon Company Drive Suite 200 W Watertown, CT 06795 USA +1-203-755-1666 WaterCAD CONNECT Edition Update 1 [10.01.01.04] Page 1 of 1

Morgan's Creek - Stage 2 Development Peak Hour Demand

Pipe Table

Label	Length (Scaled)	Diameter (mm)	Material	Hazen-Williams C	Hydraulic Grade	Hydraulic Grade (Stop)	Flow (L/s)	Velocity (m/s)
	(m)				(Start) (m)	(m)		
P-7	46	204.0	PVC	110.0	124.20	124.20	0.26	0.01
P-6	11	204.0	PVC	110.0	124.20	124.20	1.06	0.03
P-8	15	204.0	PVC	110.0	124.20	124.20	-0.95	0.03
P-5	32	204.0	PVC	110.0	124.20	124.20	1.06	0.03
P-4	29	204.0	PVC	110.0	124.20	124.20	1.62	0.05
P-9	51	204.0	PVC	110.0	124.20	124.20	-0.95	0.03
P-13	33	204.0	PVC	110.0	124.20	124.20	-0.95	0.03
P-3	27	204.0	PVC	110.0	124.20	124.20	1.44	0.04
P-12	18	204.0	PVC	110.0	124.20	124.20	0.18	0.01
P-11	35	204.0	PVC	110.0	124.20	124.20	-0.95	0.03
P-14	119	204.0	PVC	110.0	124.20	124.20	1.63	0.05
P-2(2)	25	204.0	PVC	110.0	124.20	124.20	1.77	0.05
P-2(1)	18	204.0	PVC	110.0	124.20	124.20	1.77	0.05
P-1	25	204.0	PVC	110.0	124.20	124.20	2.33	0.07

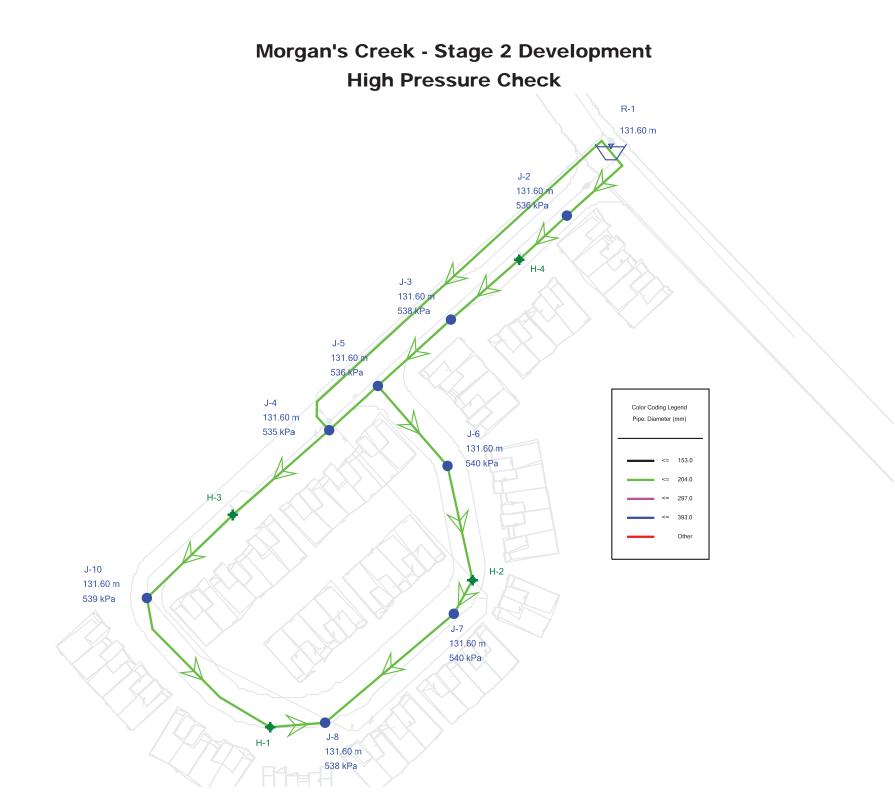
Sandhill Road.wtg 12/18/2018 Bentley Systems, Inc. Haestad Methods Solution Center 27 Siemon Company Drive Suite 200 W Watertown, CT 06795 USA +1-203-755-1666 WaterCAD CONNECT Edition Update 1 [10.01.01.04] Page 1 of 1 Simulation Results – Maximum Day plus Fire Flow



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Label	Fire Flow (Needed) (L/s)	Fire Flow (Available) (L/s)	Flow (Total Available) (L/s)	Satisfies Fire Flow Constraints?	Pressure (Residual Lower Limit) (kPa)	Pressure (Calculated Residual) (kPa)	Junction w/ Minimum Pressure (System)
H-1	233	290	290	True	140	140	J-8
H-2	233	310	310	True	140	140	J-7
H-3	233	332	332	True	140	140	J-10
H-4	233	523	523	True	140	140	J-3

Morgan's Creek - Stage 2 Development Max Day Demand + Fire Flow (14.000 L/min)

Sandhill Road.wtg 12/18/2018 Bentley Systems, Inc. Haestad Methods Solution Center 27 Siemon Company Drive Suite 200 W Watertown, CT 06795 USA +1-203-755-1666 WaterCAD CONNECT Edition Update 1 [10.01.01.04] Page 1 of 1 Simulation Results – High Pressure Check



Morgan's Creek - Stage 2 Development High Pressure Check

Junction Table

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (kPa)
J-4	76.90	0.07	131.60	535
J-5	76.85	0.00	131.60	536
J-2	76.85	0.08	131.60	536
J-8	76.60	0.17	131.60	538
J-3	76.60	0.04	131.60	538
J-10	76.50	0.12	131.60	539
J-7	76.40	0.11	131.60	540
J-6	76.40	0.08	131.60	540

Sandhill Road.wtg 12/18/2018 Bentley Systems, Inc. Haestad Methods Solution Center 27 Siemon Company Drive Suite 200 W Watertown, CT 06795 USA +1-203-755-1666 WaterCAD CONNECT Edition Update 1 [10.01.01.04] Page 1 of 1

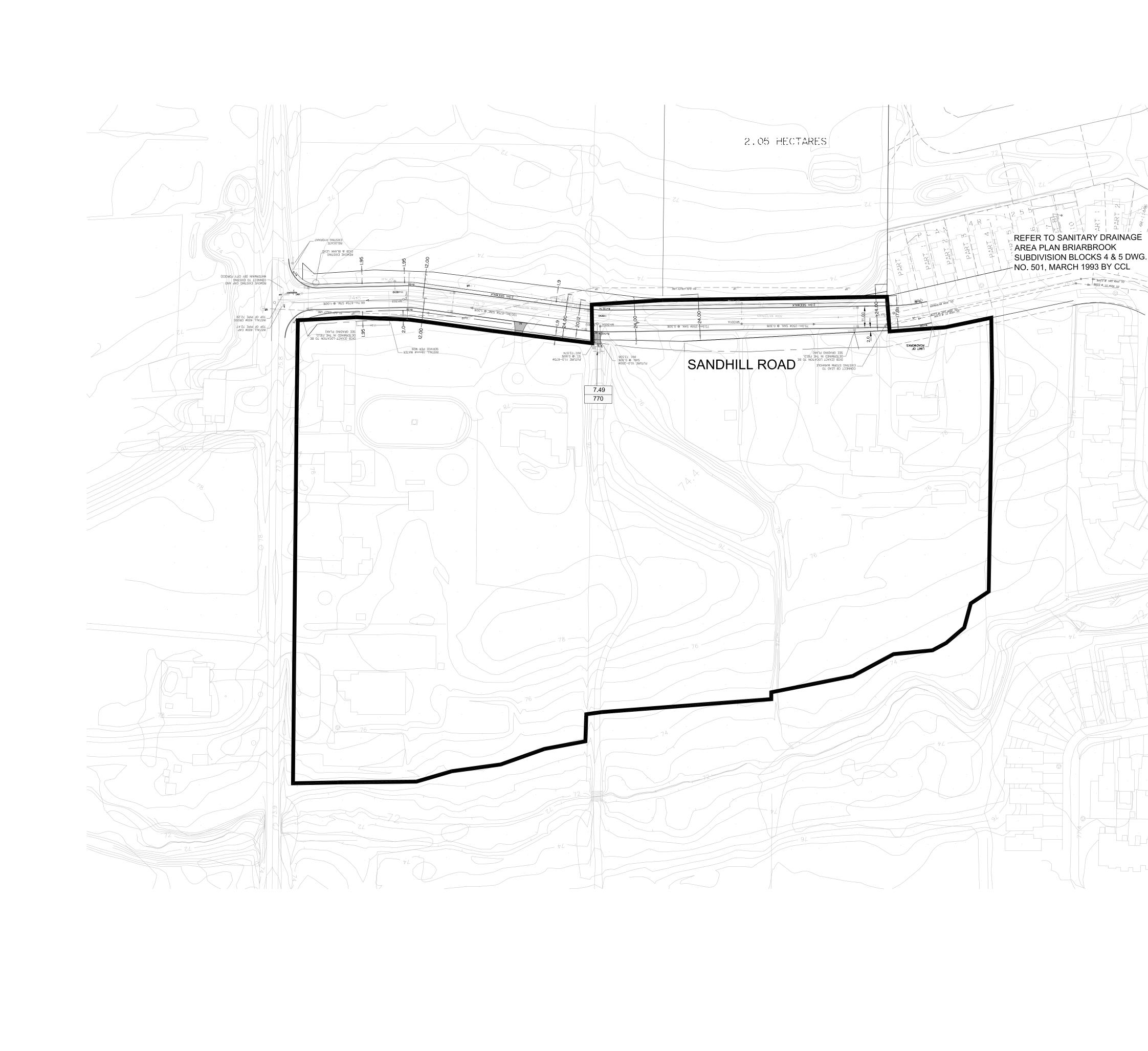
Morgan's Creek - Stage 2 Development High Pressure Check

Pipe Table

Label	Length (Scaled) (m)	Diameter (mm)	Material	Hazen-Williams C	Hydraulic Grade (Start) (m)	Hydraulic Grade (Stop) (m)	Flow (L/s)	Velocity (m/s)
P-7	46	204.0	PVC	110.0	131.60	131.60	0.08	0.00
P-8	15	201.0	PVC	110.0	131.60	131.60	-0.09	0.00
P-5	32	204.0	PVC	110.0	131.60	131.60	0.19	0.01
P-6	11	204.0	PVC	110.0	131.60	131.60	0.19	0.01
P-9	51	204.0	PVC	110.0	131.60	131.60	-0.09	0.00
P-4	29	204.0	PVC	110.0	131.60	131.60	0.27	0.01
P-13	33	204.0	PVC	110.0	131.60	131.60	-0.21	0.01
P-3	27	204.0	PVC	110.0	131.60	131.60	0.27	0.01
P-11	35	204.0	PVC	110.0	131.60	131.60	-0.21	0.01
P-12	18	204.0	PVC	110.0	131.60	131.60	0.00	0.00
P-14	119	204.0	PVC	110.0	131.60	131.60	0.28	0.01
P-2(2)	25	204.0	PVC	110.0	131.60	131.60	0.31	0.01
P-2(1)	18	204.0	PVC	110.0	131.60	131.60	0.31	0.01
P-1	25	204.0	PVC	110.0	131.60	131.60	0.39	0.01

Sandhill Road.wtg 12/18/2018 Bentley Systems, Inc. Haestad Methods Solution Center 27 Siemon Company Drive Suite 200 W Watertown, CT 06795 USA +1-203-755-1666 WaterCAD CONNECT Edition Update 1 [10.01.01.04] Page 1 of 1 Appendix 'C' - Sanitary

IBI Sanitary Drainage Area Plan Sandhill Road



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IBI Sanitary Design Sheet



IBI Group

333 Preston Street - Suite 400 Ottawa, Ontario K1S 5N4

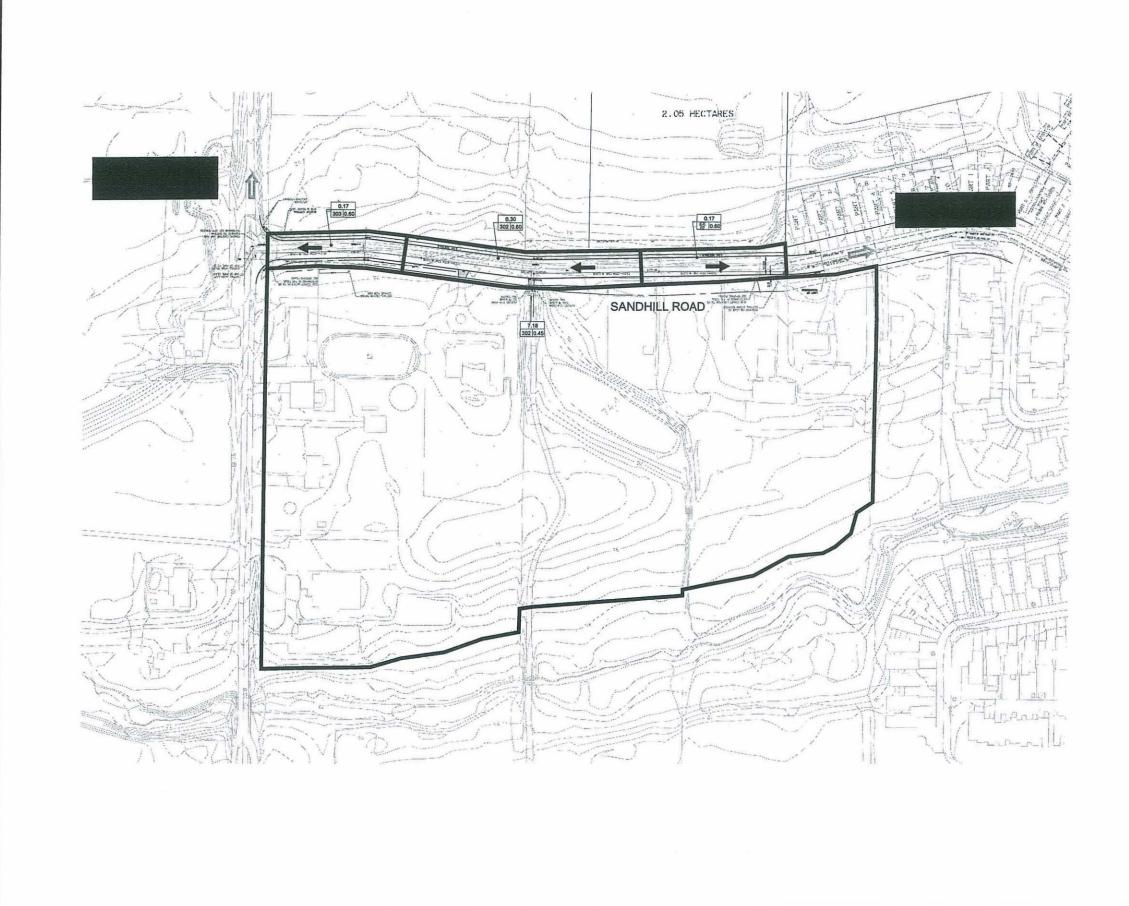
SANITARY SEWER DESIGN SHEET

PROJECT: Briar Ridge Phase 2 - Sandhill Road LOCATION: City of Ottawa CLIENT: Tenth Line Development Inc.

LOC	ATION		1				RESIDE					1	INSTITU		COMMERC	IAL IND	DUSTRIA	AL	INFILTRA	TION ALLO	WANCE				PROPOS	DSED SEWER DESIGN								
			1	UNIT	TYPES	1		POPU	LATION	CUMULAT	IVE FLOW	1		AREA				()				FLOW												
Street	From MH	To MH	Singles	Semis	Towns	Stacked	Area (Ha.)	INDIV.	CUM.	Peaking Factor	Peak Flow (I/s)	INSTIT	UTIONAL Cumm.	COMME Indiv	RCIAL Cumm.	INDUST Indiv C	CRIAL Cumm.	Pk. Flow (I/s)	Incr. Area (Ha.)	Cum. Area (Ha.)	Flow (I/s)	(I/s)	Capacity (I/s)	Pipe Size (mm)	Length (m)	Slope (%)	Velocity m/sec	Avail. L/s	. Cap. (%					
xtemal Area	Stub	1 300A	1				7.49	770.0	770.0	3.87	1 12.07	†					1	0.00	7.49	7.49	2.10		33.98	250	10.0	0.30	0.67	19.81	58.3					
andhill Road	300A	1		ł.				0.0	770.0	3.87	12.07	1	1					0.00	0.00	7.49	2.10		33.98	250	73.5	0.30	0.67	19.81	1					
andhill Road	301A	Ex. 10A		1	-			0.0	770.0	3.87	12.07	1 T	1				1	0.00	0.00	7.49	2.10	14.17	33.98	250	75.0	0.30	0.67	19.81	58.31					
andhill Road	Ex 10A	Ex. 9A					0.43	32.0	802.0	3.86	12.54							0.00	0.43	7.92	2.22	14.76	33.98	250	99.0	0.30	0.67	19.22	56.5					
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usigned: LME						Population Pe	er Unit:	3.4 2.8	For Singles	mis		1		CI Rates		Pe	eak Factor	-	Infiltratio	on Allowance:	0.13	Vsec/Ha	-	î	Accur	ned pipe loss d	coefficient =	0.013						
ecked:					_	Avg. Per Cap	bita Flow Rate:	350	Vday					nstitution Commercial	30000 Vh 50000 Vh	a/day	1.5 1.5				0.10				10001	iee pipe load (0.010						
		REV	SION		DATE		eaking Factor:	Harmon Formula	= 1+(14/(4+P^0.5	i)) where P = p	op'n in thousar	ds		ndustrial	35000 Vh	a/day Mo	oe Guideli	ines																
vg Reference: 518-501-1	File Ref: 10518.5.7	Da 2009-03-09	ito:	Sheet 1 of 1	t No.]																												

Appendix 'D' - Storm

IBI Storm Drainage Area Plan Sandhill Road



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IBI Storm Design Sheet



IBI Group 333 Preston Street - Suite 400 Ottawa, Ontario K1S 5N4

STORM SEWER DESIGN SHEET

PROJECT: Briar Ridge Phase 2 - Sandhill Road LOCATION: City of Ottawa CLIENT: Tenth Line Development Inc.

LOCATION	1				1.0	AF	REA (H	a)		1		RATI	ONAL DE	SIGN FLO	W		LEVEL O	F SERVICE	ICD RESTRICTED FLOW V(L/s) INLET (L/s) INDIV. ACCUM ACCUM. 6.0 8.0 10.0 14.0 21.0 FLOW (L/s) FLOW (L/s)							SEWER DATA							
STREET	FROM	TO	C= 0.20	C=	C=	C=	C=	C=	INDIV	ACCUM.	INLET	TIME	TOTAL	1	PEAK	AR	EA (ha)	FLOV	V (L/s)	00	IN	LET (L/s		INDIV.	ACCUM.	CAP.	LENGTH	PIPE	SLOPE	VEL.	AVA	IL. CAP.	
	MIT	MIT	0.20	0.30	0.45	0.50	0.60	0 0.65	2.78A0	2.78AC	(min.)	IN PIPE	(min.)	(mm/Hr)	FLOW (L/S)	INDIV.	ACCOM.	INDIV.	ACCUM.	6.0	8.0	10.0	4.0 2	.0 FLOW (L/s) FLOW (L/S) (L/s)	(M)	(mm)	(%)	(M/s)	(L/s)	(%)	
DUTLET TO KLONDIKE ROAD				-	-	-	-	-	-											1	-					-							
External Area	STUB	302		-	7.1	8			8.98	8.98	15.00	0.08	15.08	83.56	750.34	7.18	7.18	610.30	610.30				2	5 525.0	0 525.00	831.87	7 11.0	675	0.90	2.252	81.52	9.80	
Sandhill Road	302	301					0.3	80	0.50	9.48	15.08	0.74	15.83	83.30	789.65	0.30	7.48	25.50	635.80					84.0	609.00	831.87	100.5	675	0.90	2.252	42.22	5.01	
Sandhill Road	301	Ex. 159					0.1	7	0.28	9.76	15.83	0.49	16.32	81.27	793.18	0.17	7.65	14.45	650.25	5			1	42.0	651.00	831.87	66.7	675	0.90	2.252	38.68	4.65	
Klondike Road *	Ex. 159	Ex. 158				5.09	9	0.48	3 7.94	17.70	20.67	0.72	21.39	66.53	1,177.66	5							-			1,197.97	94.0	825	0.64	2.171	20.31	1.70	
OUTLET TO SANDHILL ROAD																							_										
Sandhill Road **	Ex. 10	Ex. 9			0.91	1	0.1	7	1.42	2 1.42	22.84	1.45	24.29	61.54	87.38											175.99	93.0	450	0.35	1.072	88.61	50.35	
		Refer to	Storm S	Sewer D	Design S	Sheet, S	SWM Fa	acility 'C'	- Klondil	ke Road, M	1ay 18, 20	007 by Nov	atech Eng	ineering C	onsultants Ltd.								_										
	**	Refer to	Storm S	Sewer D	Design S	Sheet, E	Briarbro	ok Subdi	vision Bl	ocks 4 and	d 5, March	1993 by 1	CCL	I									_	_									
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Designed: LME	-							\vdash			Q = 2.78A	IC, where				Level of S	ervice=	85.00	L/s/Ha	Assum	ned CB	Head= _	1.5 m [1	:5 yr]			Manning	as Coeffici	ent (n) =	0.013			
Checked:											Q = Peak		res per Se	econd (l/s)				ALCONT OF															
				1.1.				1			I = Rainfa	all Intensity	in Millime		our (mm/hr)																		
wg. Reference: 10518-500-1		File Ref: 0518- 5.7	Re	evision		ate: -03-09		1	Date Sheet No 1 of 1		[i=aa8;	071/((TC+	0.053)*0.8	514]																			

Stormwater Management Calculations Spreadsheet



Sandhill Road 335 Sandhill Road

JLR No. 24566-002.1

STORMWATER MANAGEMENT CALCULATIONS

Allowable release rate (1.59 ha * 85.0 L/s/ha) = 135.15 L/s As per IBI Group's Briar Hill Phase 2 Design, Dated March 2009

			DETA	ILS OF STORA	GE VOLUME CALCU	LATIONS			
Morgan's Creek Phase 2	(Total Area =	1.590 ha)						
		400							
	2 year	100 year							
A asph =	0.970	0.970							
C-Factor =	0.900	0.900							
A landscape =	0.620	0.620							
C-Factor =	0.200	0.250							
(AxC)asph + (AxC)grass =	0.997	1.028							
C-Factor (Overall) =	0.627	0.647							
C-Factor (Rounded) =	0.650	0.650							
Time	Intensity	Qp	Qp	Qp	Max Stoage Volume	Qp	Qp	Max Storage Volume	
	1:100 Yr	1:100 Yr	ICD	stored	Requirement ⁽¹⁾	ICD ⁽³⁾	stored	Requirement (2)	
(min)	(mm/hr)	(L/s)	(L/s)	(L/s)	(m ³)	(L/s)	(L/s)	(m ³)	
10	178.56	510.29	135.15	375.1	225.1	67.58	442.7	265.6	
15	142.89	408.37	135.15	273.2	245.9	67.58	340.8	306.7	
20	119.95	342.80	135.15	207.6	249.2	67.58	275.2	330.3	
25	103.85	296.78	135.15	161.6	242.4	67.58	229.2	343.8	
30	91.87	262.54	135.15	127.4	229.3	67.58	195.0	350.9	
35	82.58	236.00	135.15	100.8	211.8	67.58	168.4	353.7	
40	75.15	214.75	135.15	79.6	191.0	67.58	147.2	353.2	
45	69.05	197.34	135.15	62.2	167.9	67.58	129.8	350.4	

⁽¹⁾ Assumes all storage is underground
 ⁽²⁾ Assumes all storage is at the surface
 ⁽³⁾ The flow release rate for underground storage is estimated to (135.15 L/s / 2 = 67.58 L/s) due to variable head in reality vs the underlying assumptions of constant peak flow using the Modified Rational Method. Actual release rate for underground storage to be reevaluated during detailed desit Maximum Conceptual Storage Requirement if all storage is below ground = 249.2 m
 Maximum Conceptual Storage Requirement if all storage is below ground = 253.7 m³
 Conceptual Storage Requirement for Morgan's Creek Phase 2 will be between 249.2 m³ and 353.7 n

Appendix 'E' – Preliminary Engineering Drawings

