Report
Project: 135925-6.4.3

BARRETT LANDS - BLOCK 178 SERVICING BRIEF

Prepared for BARRETT CO-TENANCY
by IBI GROUP

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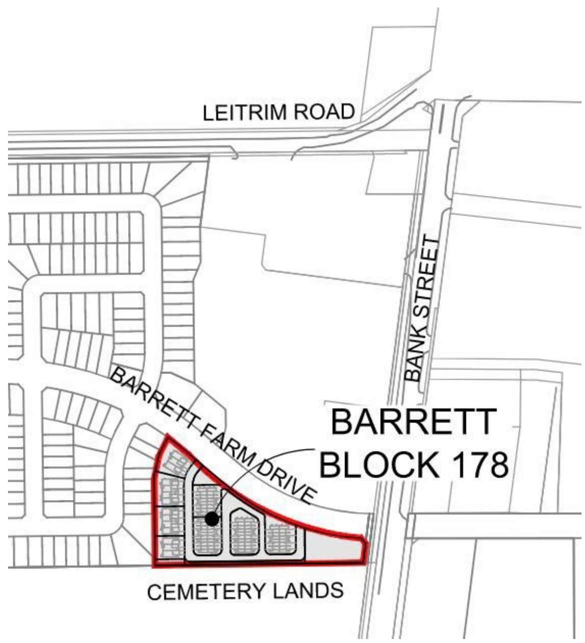
1 INTRODUCTION

Barrett Lands Block 178 is located in the northern portion of the Leitrim Development Area (LDA) and is part of the Barrett Lands subdivision. IBI Group Professional Services Inc. (IBI Group) has been retained by Barrett Co-Tenancy to provide professional engineering services for Block 178. The subject site is approximately 1.28 ha and consists of 50 townhouse units. The site consists of freehold frontage onto an 8.5m and a 6.0m wide private lane. There will be a common elements agreement in place for the shared elements of the site.

Block 178 is bounded by Barrett Farm Drive to the North, Barrett Lands Phase 3 lands to the west, Cemetery lands to the south and a future commercial to the east. Refer to key plan below for block location.



The proposed servicing design conforms to current City of Ottawa and MECP design criteria, and no pre-consultation meetings were requested from the South Nation Conservation (SNC) or the Ontario Ministry of Environment, Conservation and Parks (MECP).

1.1 Guidelines and Standards

This evaluation takes into consideration the City of Ottawa Sewer Design Guidelines (OSDG) (October 2012), and the February 2014 Technical Bulletin ISDTB-2014-01, the September 2016 Technical Bulletin PIEDTB-2016-01, the June 2018 Technical Bulletin ISTB-2018-04, October 2019 Technical Bulletin 2019-01, and the July Technical Bulletin 2019-02.

It also considers the City of Ottawa Water Distribution Design Guidelines (OWDDG), and the 2010 Technical Bulletin 2010-02, the 2014 Technical Bulletin 2014-02, the 2018 Technical Bulletin 2018-02 and the 2020 Technical Bulletin 2020-02.

All specifications are as per current City of Ottawa standards and specifications, and Province of Ontario (OPSS/D) standards, specifications and drawings.

1.2 Pre-Consultation Meeting

The City of Ottawa hosted a virtual pre-consultation meeting on August 18th, 2021. Notes of the meeting are provided in **Appendix A**. There were no major engineering concerns flagged in this meeting. The City of Ottawa Servicing Study Checklist has also been included in **Appendix A**.

1.3 Environmental Issues

There are no environmental issues related to this site, as all environmental concerns were dealt with as part of the applicants Barrett Lands Phase 3 subdivision approval.

All existing watercourses or drainage features associated with this site have been addressed through SNCA permit number 2021-GLO-R234.

1.4 Geotechnical Concerns

Golder was retained by Barrett Co-Tenancy to review the grading plan to ensure that the recommendations with its original report for the subject area. There were no particular design concerns for this development.

2 WATER DISTRIBUTION

2.1 Existing Conditions

There is an existing 250mm watermain in Barrett Farm Drive in Barrett Lands Phase 3 to the north of the site, which is proposed to continue east on Barrett Farm Drive in Barrett Phase 3 to the northeast of the site. The proposed development was considered in the water model for the Barrett Phase 2 and 3 developments.

2.2 Design Criteria

2.2.1 Water Demands

Block 178 consists of 50 townhouse units. Per unit population density and consumption rates are taken from **Tables 4.1** and **4.2** of the Ottawa Design Guidelines – Water Distribution and are summarized as follows:

- Semi Detach/Townhouse 2.7 person per unit
- Average Day Demand 280 l/cap/day
- Peak Daily Demand 700 l/cap/day
- Peak Hour Demand 1,540 l/cap/day

A water demand calculation sheet is included in **Appendix B** and the total water demands are summarized as follows:

- Average Day 0.44 l/s
- Maximum Day 1.10 l/s
- Peak Hour 2.42 l/s

2.2.2 System Pressures

The 2010 City of Ottawa Water Distribution Guidelines states that the preferred practice for design of a new distribution system is to have normal operating pressures range between 345 kPa (50 psi) and 552 kPa (80 psi) under maximum daily flow conditions. Other pressure criteria identified in the guidelines are as follows:

Minimum Pressure	Minimum system pressure under peak hour demand conditions shall not be less than 276 kPa (40 psi).
Fire Flow	During the period of maximum day demand, the system pressure shall not be less than 140 kPa (20 psi) during a fire flow event.
Maximum Pressure	Maximum pressure at any point in the distribution system in unoccupied areas shall not exceed 689 kPa (100 psi). In accordance with the Ontario Building/Plumbing Code the maximum pressure should not exceed 552 kPa (80 psi) in occupied areas. Pressure reduction controls may be required for buildings where it is not possible/feasible to maintain the system pressure below 552 kPa.

2.2.3 Fire Flow Rate

A Fire Underwriters Survey has been carried out on a representative block to determine the fire flow for the site. The calculations result in a fire flow of 12,000 l/min; a copy of the FUS calculation is included in **Appendix B**.

2.2.4 Boundary Conditions

The City of Ottawa has provided hydraulic boundary conditions two locations in Barrett Lands Phase 3. The City has provided existing condition and SUC Zone reconfiguration boundary conditions. The existing condition has the highest maximum HGL value and is used in the analysis to determine maximum pressure while the SUC Zone reconfiguration value has the lower values for peak hour and fire and is used in the analysis. A copy of the Boundary Condition is included in **Appendix B** and summarized as follows:

CRITERIA		HYDRAULIC HEAD	
		CONNECTION 1 Private Lane @ Barrett Farm Drive	CONNECTION 2 Private Lane @ Barrett Farm Drive
Existing Conditions	Max HGL (Basic Day)	154.6 m	154.6 m
	Peak Hour	144.7 m	144.7 m
	Max Day + Fire (12,000 l/m)	121.8 m	125.3 m
SUC Reconfiguration	Max HGL (Basic Day)	147.5 m	147.5 m
	Peak Hour	145.8m	145.8 m
	Max Day + Fire (12,000 l/m)	130.2 m	132.3 m

2.2.5 Hydraulic Model

A computer model for the Block 178 water distribution system has been developed using the InfoWater SA program. The model includes the boundary conditions provided by the City of Ottawa and a portion of Barrett Lands Phase 3 watermains.

2.3 Proposed Water Plan

2.3.1 Hydraulic Analysis

The hydraulic model was run under basic day conditions with the existing boundary condition to determine the maximum pressure for the site. The minimum pressure for the site is determined in the peak hour analysis using the SUC Zone reconfiguration boundary condition. There are two fire hydrants on this site, and they are represented by nodes S11-515 and S11-520 in the model; the model was run under the max day plus fire (12,000 l/min) SUC Zone Reconfiguration Boundary condition to determine the design fire flow at the hydrant locations. Results of the analysis for the Block 178 site are summarized in Section 2.3.2 and the water model schematic and model results are included in **Appendix B**.

2.3.2 Summary of Results

Results of the hydraulic analysis for Block 178 are summarized as follows:

SCENARIO	EXISTING	SUC
Basic Day Pressure (kPa)	507.6 – 513.48	439.98 – 451.74
Peak Hour Pressure (kPa)	409.63 – 424.27	423.32 – 435.08
Minimum Residual Pressure (kPa)	93.62	217.25

A comparison of the results and design criteria is summarized as follows:

Maximum Pressure: All nodes have basic day pressure below 552 kPa for existing conditions; therefore, pressure reducing control is not required for this site.

Minimum Pressure: All nodes exceed the minimum requirement of 276 kPa during peak hour conditions for the SUC Zone configuration.

Fire Flow: The model was run with a fire flow of 12,000 l/min under the SUC Zone Reconfiguration. The residual pressures at fire hydrant locations all exceed the minimum requirement of 140 kPa under the SUC Reconfiguration.

3 WASTEWATER

3.1 Existing Conditions

The Leitrim Pump Station is the wastewater outlet for all developed lands within the LDA, including the subject property. In 2002, the City constructed the station, associated forcemains and outlet sewers in Bank Street and Conroy Road. Sewage from the LDA outlets to the Conroy Road Trunk Sewer eventually discharging to a sewage treatment plant located near the Ottawa River. The Barrett Lands Phase 1 report prepared by IBI Group dated March 2017 confirmed that the existing 375mm sewer in Kelly Farm Drive has sufficient capacity for the Barret Lands at Findlay Creek property inclusive of the proposed development.

3.1.1 Verification of Existing Sanitary Sewer Capacity

There is an existing 200mm sanitary sewer in Barrett Farm Drive, which connects to the 375 mm diameter sub-trunk sewer in Kelly Farm Drive. In the previous Barrett Lands Phase 3 report, the design for Block 178 was for 84 apartment units, with an allocated population of 159.6 people, a site area of 1.28 and a total flow of 2.26 L/s, see **Appendix C** for excerpts from the Phase 3 report.

For the subject development, it is proposed to build a total of 50 units – 14 townhomes and 36 back-to-back townhouse units and a future commercial site. The new total proposed population is 126.0 people, area 1.28 Ha and a total flow of 1.88L/s. This represents a total peaking flow decrease of **0.38L/s** when compared to the Phase 3 allocation. The decrease in flow on the existing system from the subject development is considered to have no negative impacts on downstream infrastructure.

3.2 Proposed Sewers

All on-site sewers have been designed to City of Ottawa and MOE design criteria which include but are not limited to the below listed criteria. A copy of the detailed sanitary tributary area plan 400 and the sanitary sewer design sheets are included in **Appendix C** illustrate the population densities and sewers which provide the necessary outlets.

3.2.1 Design Flow:

Average Residential Flow	-	280 l/cap/day
Peak Residential Factor	-	Harmon Formula
Infiltration Allowance	-	0.33 l/sec/Ha
Minimum Pipe Size	-	200mm diameter

3.2.2 Population Density:

Semi-Detached & Townhouse	-	2.7 person/unit

4 SITE STORMWATER MANAGEMENT

4.1 Objective

The purpose of this evaluation is to prepare the dual drainage design, including the minor and major system, for the Block 178 development. The design includes the assignment of inlet control devices, on-site storage, maximum depth of surface ponding and hydraulic grade line analysis. The evaluation takes into consideration the City of Ottawa Sewer Design Guidelines (OSDG) (October 2012), the February 2014 Technical Bulletin ISDTB-2014-01, the September 2016 Technical Bulletin PIEDTB-2016-01 and the June 2018 Technical Bulletin ISTB-2018-04.

4.2 Existing Conditions

The subject development is tributary to the Barrett Farm Drive storm sewer, which was approved for construction for the Barrett Lands Phase 3 development. Subsequent to the approval of Phase 3, the stormwater management analysis for Barrett Lands Phase 3 included an updated to the subject site's tributary allocation into the Barrett Farm Drive storm sewer. As part of that approval, a 675mm diameter storm sewer was approved for the subject block. The subject block is referenced as "R11304" in the Barrett Lands Phase 3 design. A copy of the design sheet, and approved drainage area plan for Phase 3 have been included in **Appendix D**.

Additionally, the Barrett Lands Phase 3 stormwater management identified a minor system restriction for this site to be the 5-year modelled flow of **234 l/s**. An excerpt from the Phase 3 report has been included in **Appendix D.**

4.3 Design Criteria

The stormwater system was designed following the principles of dual drainage, making accommodations for both major and minor flow.

Some of the key criteria include the following:

- Design Storm — 1:2-year return (Ottawa)

  (It should be noted that the overall Barrett Lands Site utilized 1:5 year return storm for minor system release from the subject site, further details are provided in Section 4.4 and 4.5.2)
- Rational Method Sewer Sizing
- Initial Time of Concentration — 10 minutes
- Runoff Coefficients
  - Front Yards — C = 0.77
  - Rear Yards — C = 0.52
- Pipe Velocities — 0.80 m/s to 3.0 m/s
- Minimum Pipe Size — 250 mm diameter (200 mm CB Leads)

A sample calculation of run-off coefficients has been provided in Appendix D. The runoff coefficients used are based on the actual footprint in the site plan. Zoning setbacks do not apply to the site plan. The values calculated are lower than the values used, thus a conservative approach has been provided in this analysis.

4.4 System Concept

According to the Barrett Lands Phase 3 report prepared by IBI Group dated April 2022, the development of the adjacent downstream properties included the expected stormwater servicing needs of the subject property. The existing storm sewers constructed adjacent to the site were oversized to provide the needed capacity for minor storm runoff from the subject site. Minor storm runoff from the subject site will connect to the existing 675mm Ø sewer stub that connects to the existing 1050mmØ trunk storm sewer in Barrett Farm Drive.

4.4.1 Dual Drainage Design

The dual drainage system proposed for the subject site will accommodate both major and minor stormwater runoff. Minor flow from the subject site will be conveyed through the storm sewer network and discharge into the existing 675mm Ø sewer stub that connects to the existing 1050mm ø trunk storm sewer in Barrett Farm Drive.

The balance of the surface flow not captured by the minor system will be conveyed via the major system. Where possible, storage will be provided in surface sags or low points within the roadway. Storage will also be provided within oversized storm pipes. Once the maximum storage is utilized, the excess flow will cascade to the next downstream street sag. Based on Phase 3 information, the 100-year overflow allocation related to the subject development lands is 350 l/s and the 100 year + 20% stress test allocation is 476 l/s. Major flow from street segments will overflow to the major flow block connecting to adjacent Barrett Lands Phase 3 at Delphinium Crescent to the west and to Barrett Farm Drive to the North, once on-site surface ponds have reach capacity.

4.4.2 Proposed Minor System

Using the criteria identified in Section 4.3, the proposed on-site storm sewers were sized accordingly. A detailed storm sewer design sheet and the associated storm sewer drainage area plan is included in **Appendix D**. The general plan of services, depicting all on-site storm sewers can be found in **Appendix A**.

The owner of the site will be responsible for regular maintenance of the on-site sewers, catch basins and inlet control devices (ICDs). Maintenance includes but is not limited to the cost of regular cleaning of the structures and ICDs as necessary. The site owner will also be responsible for replacement of damaged or missing catch basin structures, grates or ICDs as needed.

4.5 Stormwater Management

4.5.1 Water Quality Control

The subject site is part of the larger development referred to as the Leitrim Development Area. The stormwater management strategy was outlined in the following reports:

- Addendum to Leitrim Development Area Stormwater Management Environmental Study Report and Pre-Design Volumes 1 and II (IBI Group, July 2005);
- Design Brief and Amendment to MOE Certificate of Approval Findlay Creek Village Stormwater Facility (IBI Group, July 2005);
- Final Serviceability Report Leitrim Development Area City of Ottawa (IBI Group, March 2007).
- 2016 Final Updated Serviceability Report (Class EA OPA76 Areas 8a, 9a and 9b) Leitrim Development Area (IBI Group, September 2016)

The subject site is part of the drainage area which ultimately discharges into the existing Findlay Creek Village Stormwater Facility. The Findlay Creek Village Stormwater Facility was constructed in 2006 and provides water quality control to an Enhanced Level of Protection according to MOE Stormwater Management Planning and Design Guidelines (March 2003).

4.5.2 Water Quantity Control

The subject site will be limited to a maximum minor system release rate of **234 L/s** based on the Barrett Lands Phase 3 Servicing Brief, reference information is provided within **Appendix D**. This will be achieved through a combination of inlet control devices (ICD's) at inlet locations, surface storage where possible and underground storage in oversized storm pipes where required.

The restricted flows on the private residential site and future commercial site were calculated based on their respective areas. The following assumptions were used for the future commercial block: assume site storage of 12m3 and runoff coefficient of 0.8.

$\mathbf{Q_{restrictedPrivate}} = 234\ L/s \times (A_{Private} / (A_{Private} + A_{Commercial}))$

$\mathbf{Q_{restrictedPrivate}} = 234\ L/s \times (1.06\ ha / (1.06 + 0.16)\ ha)$

$\mathbf{Q_{restrictedPrivate}} = 203.31\ L/s$

$\mathbf{Q_{restrictedCommercial}} = 30.19\ L/s$

There are 2 small locations where water is left to discharge uncontrolled from the subject property. The uncontrolled release can be calculated as follows:

Uncontrolled Release, where $Q_{uncontrolled} = 2.78(C \times i100_{yr} \times A_{uncontrolled})$

C	=Runoff Coefficient	=0.80
Tc	=Time of Concentration	=10min
$i100_{yr}$	=100yr intensity $(1735.688 / (Tc + 6.014)^{0.820}$	=178.56
A_{unc}	=Area uncontrolled	=0.06Ha
$Q_{uncontrolled}$		**=23.83 L/s**

The Maximum allowable release rate from the site can be determined by subtracting the Uncontrolled release rate from the minor system restricted flow rate.

$Q_{max} = Q_{restricted} – Q_{uncontrolled}$

$Q_{max} = 203.31\ L/s – 23.83 L/s$

$\mathbf{Q_{max} = 179.48\ L/s}$

Surface flows in excess of the site's allowable release rate will be stored on site in strategic surface storage areas or oversized underground pipes and gradually released into the minor system to respect the site's allowable release rate. The maximum surface retention depth located within the developed areas will be limited to 300mm during a 1:100-year event as show on the ponding plan located in **Appendix D** and grading plans located in **Appendix E.** Overland flow routes will be provided in the grading to permit emergency overland flow.

The modified rational method was used to evaluate the on-site stormwater management. There are two uncontrolled areas on this site. The flows are calculated above. Therefore, the total restricted flow rate through the minor system will be the design flow rate of **179.48 l/s**. This will be achieved by the used of Inlet Control Devices (ICD's) placed in all on-site catchbasins. A summary of the ICD's, their corresponding storage requirements, storage availability, and associated drainage areas has been provided below.

DRAINAGE AREA	ICD RESTRICTED FLOW (L/s)	100 YEAR STORAGE REQUIRED (m^3)	SURFACE STORAGE PROVIDED (m^3)	SUB-SURFACE STORAGE PROVIDED (m^3)	100yr OVERFLOW (m^3)
S20A	15.00	18.68	20.59	0.00	0.00
S10	33.00	21.75	0.32	0.00	21.43*
S4	26.00	48.04	1.16	0.00	46.88
S20B	10.00	5.45	1.41	0.00	4.04
FUT COM	30.69	29.79	12.00	0.00	17.79
S5	25.00	78.31	1.32	0.00	76.99
S6	50.00	138.36	9.71	0.00	128.65
R6	20.00	163.78	4.38	6.98	152.42*
TOTAL	**179.00**				**173.85**

*Overflow only during major storm events, directed to Delphinium Crescent and Barrett Farm Drive with no negative impact on downstream storm sewer system

4.5.3 2 Year Ponding

A review of the 2-year ponding has been completed using the modified rational method. A minimum Tc of 10min has been used. Where volumes are calculated as a negative value, 0.0m3 has been shown. A summary of each drainage area has been provided below.

DRAINAGE AREA	Total 2-Year Ponding Volume (m3)	Comment
S4	0.0	-
S5	0.0	-
S6	0.75	Negligible volume of ponding during 2-year event
S10	0.0	-
S20A	0.22	Negligible volume of ponding during 2-year event
S20B	0.0	-
R6	8.98	This area is controlled at RYCB7, and there is 6.98m3 of sub- surface storage provided in this area. The required ponding is provided underground, not on the street. A 50% reduction to the release rate was considered for this area.

Based on the above, there will be no surface ponding in the 2-year event.

4.5.4 100 year + 20% Stress Test

A cursory review of the 100yr event + 20% has been performed using the modified rational method. The Peak flow from each area during a 100-year event has been increased by 20%. The calculations have been included in **Appendix D.**

A summary of the require storage volumes, and overflow balances is provided below.

DRAINAGE AREA	ICD RESTRICTED FLOW (L/s)	100yr20 STORAGE REQUIRED (m^3)	SURFACE STORAGE PROVIDED (m^3)	100yr20 OVERFLOW (m^3)
S20A	15.00	25.11	20.59	4.52
S10	33.00	34.18	0.32	33.86*
S4	26.00	69.58	1.16	68.42

FUT COM	30.69	40.90	12.00	28.90
S20B	10.00	7.26	1.41	5.85
S5	25.00	111.93	1.32	110.61
S6	50.00	195.06	9.71	185.35
R6	20.00	230.61	4.38	219.25*
TOTAL	**179.00**			**253.11**

*Overflow from S10 to Barrett Farm Drive, and from R6 to Delphinium Crescent.

DRAINAGE AREA	100yr20 OVERFLOW (m^3)	Time of Concentration	100yr20 OVERFLOW (l/s)	DEPTH (m)
S20A	4.52	15.00	5.02	0.02
S10	33.86*	9.00	62.70*	0.05
FUT COM	28.90	14.00	34.41	0.00
S4	68.42	14.00	81.45	0.05
S20B	5.85	6.00	16.24	0.03
S5	110.61	16.00	115.22	0.06
S6	185.35	18.00	171.62	0.05
R6	219.25*	26.00	140.55*	0.09
TOTAL	**253.11**		**203.25**	

As noted above, the overland flow from the rear yards (R6) is directed to Barrett Lands Phase 3 lands at Delphinium Crescent to the West. The volume of overflow is 253.11m3. Based on a Tc of 26minutes, this volume can be reverse calculated to 203.25 L/s. Channel cross section was used to determine the depth of flow for each area. Refer to calculation sheet in **Appendix D**.

The stress test overflow from S10 will follow the intended overflow route as identified in the Phase 3 grading design drawings. The volume of overflow is 33.86m3. Based on the Tc of 9minutes, this volume can be reverse calculated to 62.70 L/s. Channel cross section was used to determine the depth of flow for each area. Refer to calculation sheet in **Appendix D**.

4.5.5 Open-Channel Drainage Corridor

A summary of the various channel depths of flow is provided below. The cross-sections used for the calculations are shown on drawing 011 as section A-A and section B-B. A V-shape ditch was assumed for the open-channel drainage corridor, with a 22% side slope. Refer to calculation sheet in Appendix D.

POND ID	100yr OVERFLOW (L/s)	100yr20 OVERFLOW (L/s	100yr Depth (m)	100yr20 Depth (m)
S4	55.81	81.45	0.13	0.14
S10	39.68	62.70	0.11	0.13
S20	0	5.02	0.00	0.04
S20A	11.22	16.24	0.07	0.08
S5	80.20	115.22	0.14	0.16
S6 (Open-Channel)	119.12	171.62	0.02	0.06
R6	97.70	140.55	0.09	0.10

4.6 Storm Hydraulic Grade Line

The Barrett Lands Phase 3 report indicates that the 100-year hydraulic grade line (HGL) in Bulkhead 11307N **93.68**, refer to **Appendix D** for the excerpt from the Barrett Lands Phase 3 HGL analysis. The HGL has been extended through the subject site have been calculated as follows:

LOCATION	MH #	USF ELEV (M)	STORM HGL (M)	FREEBOARD (M)
Unit 1-2	MH10	99.36	98.410	0.950
Unit 3	MH 9	99.53	98.460	1.070
Unit 4-18;23-27	MH 8	99.98	98.460	1.520
Unit 19-22;28-37	MH 5	100.43	99.020	1.410
Unit 38-46	MH 4	100.51	99.150	1.360
Unit 47-50	MH 2	100.65	99.340	1.310

All underside of footing elevations have been designed to provide a minimum of 300mm separation between the greater of governing pipe obvert or governing HGL. A copy of the storm HGL analysis for Block 178 is provided in **Appendix D**.

5 SOURCE CONTROLS

5.1 General

On site level or source control management of runoff will be provided to provide quality control for the subject lands. Such controls or mitigative measures are proposed for the development not only for final development but also during construction and build out. Some of these measures are:

- flat lot grading;
- split lot drainage;
- Roof-leaders to vegetated areas;
- vegetation planting; and
- groundwater recharge.

5.2 Lot Grading

There is an elevation difference of approximately 2m from southwest to northeast in Block 178. In accordance with local municipal standards, the parking lots will be graded northeast between 1.5% and 5.0%. Most landscaped area drainage will be directed into a swale drainage system and connects to the storm sewer system. Typically, swales will have slopes larger than 1.5% with subdrains. Copies of the grading plans have been included in **Appendix E.**

5.3 Roof Leaders

This development will consist of stacked homes and apartments. It is proposed that roof leaders from these units be constructed such that runoff is directed to grass areas adjacent to the units. This will promote water quality treatment through settling, absorption, filtration and infiltration and a slow-release rate to the conveyance network.

5.4 Vegetation

As with most subdivision agreements, the developer will be required to complete a vegetation and planting program. Vegetation throughout the development including planting along roadsides and within public parks provides opportunities to re-create lost natural habitat.

6 CONVEYANCE CONTROLS

6.1 General

Besides source controls, the development also proposes to use several conveyance control measures to improve runoff quality. These will include:

- flat vegetated swales;
- catchbasin and maintenance hole sumps; and
- pervious rear yard drainage.

6.2 Flat Vegetated Swales

The development will make use of relatively flat vegetated swales where possible to encourage infiltration and runoff treatment.

6.3 Catchbasins

All catchbasins within the development, either rear yard or street, will be constructed with minimum 600 mm deep sumps. These sumps trap pollutants, sand, grit and debris which can be mechanically removed prior to being flushed into the minor pipe system. Both rear yard and street catchbasins will be fabricated to OPSD 705.010 or 705.020. All storm sewer maintenance holes servicing local sewers less than 900 mm diameter shall be constructed with a 300 mm sump as per City standards.

6.4 Pervious Landscaped Area Drainage

Some of the landscaped area swales make use of a filter wrapped perforated drainage pipe constructed below the rear yard swale. This perforated system is designed to provide some ground water recharge and generally reduce both volumetric and pollutant loadings that enter the minor pipe system.

7 SEDIMENT AND EROSION CONTROL PLAN

7.1 General

During construction, existing stream and conveyance systems can be exposed to significant sediment loadings. Although construction is only a temporary situation, it is proposed to introduce a number of mitigative construction techniques to reduce unnecessary construction sediment loadings. These will include:

- groundwater in trench will be pumped into a filter mechanism prior to release to the environment;
- bulkhead barriers will be installed at the nearest downstream manhole in each sewer which connects to an existing downstream sewer;
- seepage barriers will be constructed in any temporary drainage ditches; and
- silt sacks will remain on open surface structure such as manholes and catchbasins until these structures are commissioned and put into use.

7.2 Trench Dewatering

During construction of municipal services, any trench dewatering using pumps will be discharged into a filter trap made up of geotextile filters and straw bales similar in design to the OPSD 219.240 Dewatering Trap. These will be constructed in a bowl shape with the fabric forming the bottom and the straw bales forming the sides. Any pumped groundwater will be filtered prior to release to the existing surface runoff. The contractor will inspect and maintain the filters as needed including sediment removal and disposal and material replacement as needed.

7.3 Bulkhead Barriers

At the first manhole constructed immediately upstream of an existing sewer, a ½ diameter bulkhead will be constructed over the lower half of the outletting sewer. This bulkhead will trap any sediment carrying flows, thus preventing any construction –related contamination of existing sewers. The bulkheads will be inspected and maintained including periodic sediment removal as needed.

7.4 Seepage Barriers

These barriers will consist of both the Light Duty Straw Bale Barrier as per OPSD 219.100 or the Light Duty Silt Fence Barrier as per OPSD 219.110 and will be installed in accordance with the sediment and erosion control drawing. The barriers are typically made of layers of straw bales or geotextile fabric staked in place. All seepage barriers will be inspected and maintained as needed.

7.5 Surface Structure Filters

All catchbasins, and to a lesser degree manholes, convey surface water to sewers. However, until the surrounding surface has been completed these structures will be covered to prevent sediment from entering the minor storm sewer system. Until rear yards are sodded or until streets are asphalted and curbed, all catchbasins and manholes will be equipped with geotextile filter socks. These will stay in place and be maintained during construction and build until it is appropriate to remove them.

7.6 Stockpile Management

During construction of any development similar to that being proposed both imported and native soils are stockpiled. Mitigative measures and proper management to prevent these materials entering the sewer systems is needed.

During construction of the deeper municipal services, water, sewers and service connections, imported granular bedding materials are temporarily stockpiled on site. These materials are however quickly used up and generally before any catchbasins are installed. Street catchbasins are installed at the time of roadway construction and rearyard catchbasins are usually installed after base course asphalt is placed.

Contamination of the environment as a result of stockpiling of imported construction materials is generally not a concern since these materials are quickly used and the mitigative measures stated previously, especially the use of filter fabric in catchbasins and manholes help to manage these concerns.

The roadway granular materials are not stockpiled on site. They are immediately placed in the roadway and have little opportunity of contamination. Lot grading sometimes generates stockpiles of native materials. However, this is only a temporary event since the materials are quickly moved off site.

The construction of this development will involve a substantial rock blasting, breaking and crushing operation. Given the existing topography, a substantial cut and fill operation is required in order to construction a development that meets City Standards. As part of this operation, materials will be manipulated onsite, and provided the sediment and erosion control measures are in place, are generally inconsequential to the surrounding environment.

8 ROADS AND NOISE ATTENUATION

Vehicular access to Block 178 is provided by two private entrances from Barrett Farm Drive.

There are no sidewalks or pathways proposed within the development. Pedestrian access to the site will be via the private roadway.

The site has been designed in order to provide curbside municipal waste disposal.

There are no bus routes proposed within Block 178.

There are no collector streets or nearby noise sources that would trigger an environmental noise assessment.

8.1 Aircraft Sound Levels

As stated in Section 2.1, the site is within the Airport Vicinity Development Zone (AVDZ), the limit of the AVCZ is shown on Figure 2. The site however is outside of the 25 NEF/NEP contour line so the building components and ventilation requirements of Part 6 Prescribed Measures for Aircraft Noise of the Guidelines do not apply. A warning clause is required for the residential units inside the AVDZ.

Warning clause for aircraft noise is as follows:

“Purchasers/tenants are advised that due to the proximity of the airport, noise from the airport and individual aircraft may at times interfere with outdoor or indoor activities”.

9 SOILS

Golder Associates Ltd. was retained to prepare a geotechnical investigation for the proposed mixed use development for the Barrett Lands Phase 3. The objectives of the investigation were to prepare a report to:

- Determine the subsoil and groundwater conditions at the site by means of test pits and boreholes and;
- To provide geotechnical recommendations pertaining to design of the proposed development including construction considerations.

The geotechnical report 20442530-100 was prepared by Golder Associates Ltd. in February 2022. The report contains recommendations which include but are not limited to the following:

- The maximum permissible grade raise is 3.5m
- In areas where finished grade exceeds grade raise limits, geotechnical reviews are required
- Fill placed below the foundations to meet OPSS Granular 'A' or Granular 'B' Type II placed in 300 mm lifts compacted to 98% SPMDD.
- Fill for roads to be suitable native material in 300mm lifts compared to 95% SPMDD

Pavement Structure:

LOCAL ROAD	THICKNESS
Asphaltic Concrete	90mm
OPSS Granular A Base	150mm
OPSS Granular B Type II Subbase	400mm

- Pipe bedding and cover; bedding to be minimum 150 mm OPSS Granular 'A' up to spring line of pipe. Cover to be 300 mm OPSS A (PUC and concrete pipes) or sand for concrete pipes. Both bedding and cover to be placed in maximum 225 mm lifts compacted to 95% SPMDD.

In general the grading plan for Block 178 adheres to the grade raise constraints noted above. A copy of the grading plans is included in **Appendix E**. The site does not pose any significant grade raise; thus a grading plan review letter is not required for this development.

10 RECOMMENDATIONS

Water, wastewater and stormwater systems required to develop Barrett Lands Block 178 will be designed in accordance with MOE and City of Ottawa's current level of service requirements.

The use of lot level controls, conveyance controls and end of pipe controls outlined in the report will result in effective treatment of surface stormwater runoff from the site. Adherence to the proposed sediment and erosion control plan during construction will minimize harmful impacts on surface water.

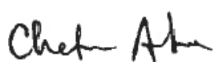
Final detail design will be subject to governmental approval prior to construction, including but not limited to the following:

- Block 178 Commence Work Order: City of Ottawa
- ECA for Sewage Works: MOECP Transfer of Review by City of Ottawa
- Block 178 Watermain Approval: City of Ottawa
- Block 178 Commence Work Order (utilities): City of Ottawa

Report prepared by:

Demetrius Yannoulopoulos, P.Eng.
Director

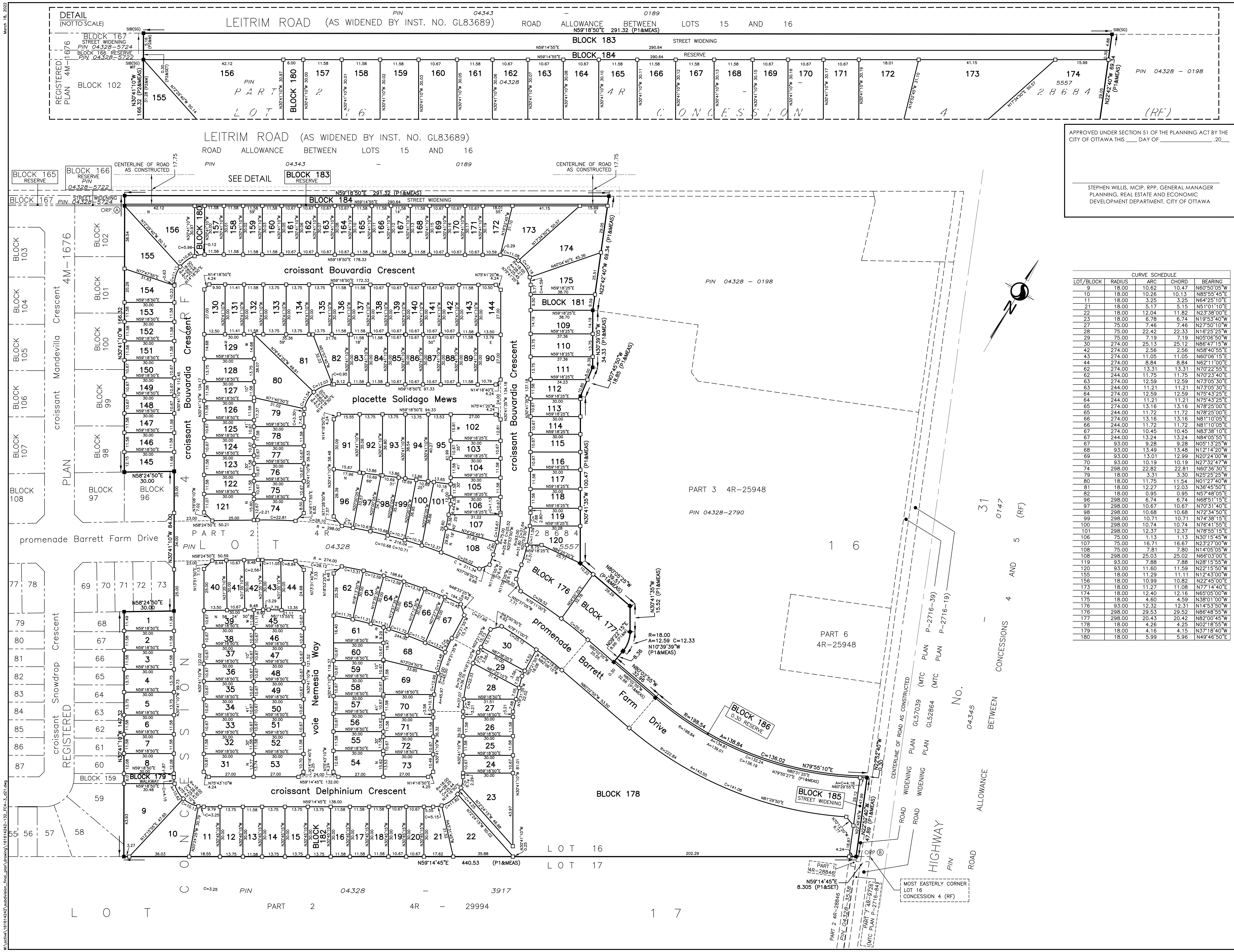
Ryan Magladry, C.E.T.
Project Manager



Anton Chetrar, P.Eng.
Civil Engineer

APPENDIX A

AOV Plan of Subdivision for Barrett Lands Phase 3
Site Plan for Barrett Lands Block 178
135925-001 - General Plan of Services
City of Ottawa Pre-Consultation Meeting Notes



APPROVED UNDER SECTION 51 OF THE PLANNING ACT BY THE CITY OF OTTAWA THIS ____ DAY OF ______________ ,20___

STEPHEN WILLIS, MCIP, RPP, GENERAL MANAGER
PLANNING, REAL ESTATE AND ECONOMIC
DEVELOPMENT DEPARTMENT, CITY OF OTTAWA

PLAN 4M-

I CERTIFY THAT THIS PLAN IS REGISTERED IN THE LAND REGISTRY OFFICE FOR THE LAND TITLES DIVISION OF OTTAWA-CARLETON No.4 AT____ O'CLOCK ON THE_____ DAY OF ____________, 2022 AND ENTERED IN THE PARCEL REGISTER FOR PROPERTY IDENTIFIER__________________, AND THE REQUIRED CONSENTS ARE REGISTERED AS PLAN DOCUMENT NUMBER OC-___________.

REPRESENTATIVE FOR LAND REGISTRAR

THIS PLAN COMPRISED OF ALL OF PIN 04328-5557

PLAN OF SUBDIVISION of

PART OF LOT 16
CONCESSION 4 (RIDEAU FRONT)
(GEOGRAPHIC TOWNSHIP OF GLOUCESTER)
CITY OF OTTAWA

Scale 1:1000

20 0 20 40 60 METRES

METRIC CONVERSION

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

GRID SCALE CONVERSION

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.999946.

BEARING NOTE

BEARINGS ARE GRID, DERIVED FROM CAN-NET VRS NETWORK GPS OBSERVATIONS ON NCC HORIZONTAL CONTROL MONUMENTS 19773035 AND 19680191, CENTRAL MERIDIAN, 76° 30' WEST LONGITUDE MTM ZONE 9, NAD83 (ORIGINAL).

19773035 N:5006060.42 E:324888.04
19680191 N:5033564.26 E:388064.94

OBSERVED REFERENCE POINTS DERIVED FROM THE CAN-NET VRS NETWORK GPS OBSERVATIONS ON NCC HORIZONTAL CONTROL MONUMENTS 19773035 AND 19680191, CENTRAL MERIDIAN, 76° 30' WEST LONGITUDE MTM ZONE 9, NAD83 (ORIGINAL).
COORDINATES TO URBAN ACCURACY PER SEC 14(2) OF O.REG. 216/10

ORP ID	NORTHING	EASTING
Ⓐ	5021294.73	374944.42
Ⓑ	5021182.72	375523.14

COORDINATES CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.

CURVE SCHEDULE

LOT/BLOCK	RADIUS	ARC	CHORD	BEARING
9	18.00	10.62	10.47	N60°50'05"W
10	18.00	10.26	10.13	N85°55'45"E
11	18.00	3.25	3.25	N64°25'10"E
21	18.00	5.17	5.15	N51°01'10"E
22	18.00	12.04	11.82	N23°38'00"E
23	18.00	6.78	6.74	N19°53'40"W
27	75.00	7.46	7.46	N27°50'10"W
28	75.00	22.42	22.33	N16°25'25"W
29	75.00	7.19	7.19	N05°06'50"W
30	274.00	25.13	25.12	N86°47'15"W
42	274.00	2.56	2.56	N58°40'55"E
43	274.00	11.05	11.05	N60°06'15"E
44	274.00	8.84	8.84	N62°11'00"E
62	274.00	13.31	13.31	N70°22'55"E
62	244.00	11.75	11.75	N70°23'40"E
63	274.00	12.59	12.59	N73°05'30"E
63	244.00	11.21	11.21	N73°05'30"E
64	274.00	12.59	12.59	N75°43'25"E
64	244.00	11.21	11.21	N75°43'25"E
65	274.00	13.16	13.16	N78°25'00"E
65	244.00	11.72	11.72	N78°25'00"E
66	274.00	13.16	13.16	N81°10'05"E
66	244.00	11.72	11.72	N81°10'05"E
67	274.00	10.45	10.45	N83°38'10"E
67	244.00	13.24	13.24	N84°05'55"E
67	93.00	9.28	9.28	N05°13'25"W
68	93.00	13.49	13.48	N12°14'20"W
69	93.00	13.01	12.99	N20°24'00"W
70	93.00	10.19	10.19	N27°32'47"W
74	298.00	22.82	22.81	N60°36'30"E
79	18.00	3.31	3.30	N25°25'25"W
80	18.00	11.75	11.54	N01°27'40"W
81	18.00	12.27	12.03	N36°45'50"E
82	18.00	0.95	0.95	N57°48'05"E
96	298.00	6.74	6.74	N68°51'15"E
97	298.00	10.67	10.67	N70°31'40"E
98	298.00	10.68	10.68	N72°34'50"E
99	298.00	10.71	10.71	N74°38'15"E
100	298.00	10.74	10.74	N76°41'55"E
101	298.00	12.37	12.37	N78°55'15"E
106	75.00	1.13	1.13	N30°15'45"W
107	75.00	16.71	16.67	N23°27'00"W
108	75.00	7.81	7.80	N14°05'05"W
108	298.00	25.03	25.02	N66°03'00"E
119	93.00	7.88	7.88	N28°15'55"W
120	93.00	11.60	11.59	N22°15'50"W
155	18.00	11.29	11.11	N12°43'00"W
156	18.00	10.99	10.82	N22°45'00"E
173	18.00	11.27	11.08	N77°14'40"E
174	18.00	12.40	12.16	N65°05'00"W
175	18.00	4.60	4.59	N38°01'00"W
176	93.00	12.32	12.31	N14°53'50"W
176	298.00	29.53	29.52	N86°48'55"W
177	298.00	20.43	20.42	N82°00'45"W
178	18.00	4.26	4.25	N02°18'55"W
179	18.00	4.16	4.15	N37°18'40"W
180	18.00	5.99	5.96	N49°46'50"E

LEGEND

■	DENOTES	FOUND MONUMENTS
□	"	SET MONUMENTS (IB) UNLESS OTHERWISE STATED
IB	"	IRON BAR
IBø	"	ROUND IRON BAR
SIB	"	STANDARD IRON BAR
SSIB	"	SHORT STANDARD IRON BAR
CC	"	CUT CROSS
CP	"	CONCRETE PIN
WIT	"	WITNESS
PIN	"	PROPERTY IDENTIFICATION NUMBER
MEAS	"	MEASURED
PROP	"	PROPORTIONED
OU	"	ORIGIN UNKNOWN
SG	"	STANTEC GEOMATICS LTD.
ORP	"	OBSERVED REFERENCE POINT
P1	"	PLAN 4R-28684
P2	"	REGISTERED PLAN 4M-1676

OWNER'S CERTIFICATE ALL OF PIN 04328-5557

THIS IS TO CERTIFY THAT :

1. LOTS 1 to 175, BOTH INCLUSIVE, BLOCKS 176, 177 and 178, THE STREETS, NAMELY promenade Barrett Farm Drive, croissant Bouvardia Crescent, croissant Delphinium Crescent, voie Nemesia Way and placette Solidago Mews WALKWAYS, NAMELY BLOCKS 179 and 180, ACCESS BLOCKS, NAMELY BLOCKS 181 and 182, RESERVES, NAMELY BLOCKS 183 and 186 and STREET WIDENINGS, NAMELY BLOCKS 184 and 185 HAVE BEEN LAID OUT IN ACCORDANCE WITH OUR INSTRUCTIONS.
2. THE STREETS AND STREET WIDENINGS AND LANES ARE HEREBY DEDICATED TO THE CITY OF OTTAWA AS PUBLIC HIGHWAYS.

DATE

CHRIS TAGGART, PRESIDENT
FINDLAY CREEK PROPERTIES (NORTH) LTD.
TARTAN HOMES (NORTH LEITRIM) INC.
TARTAN LAND (NORTH LEITRIM) INC.
I HAVE THE AUTHORITY TO BIND THE CORPORATION

SURVEYOR'S CERTIFICATE

I CERTIFY THAT :

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.

THE SURVEY WAS COMPLETED ON THE DAY OF , 2022

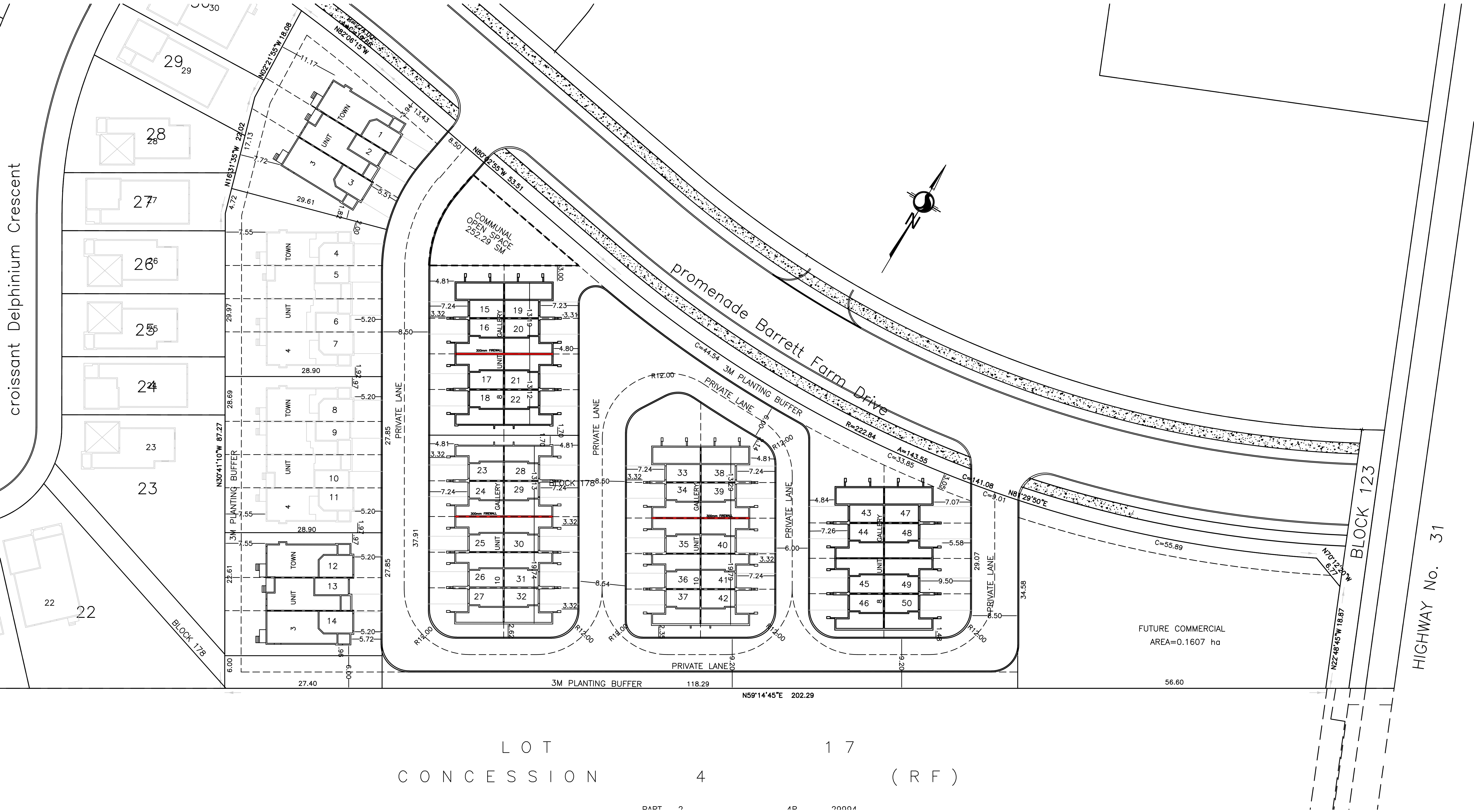
DATE

FRANCIS LAU
ONTARIO LAND SURVEYOR

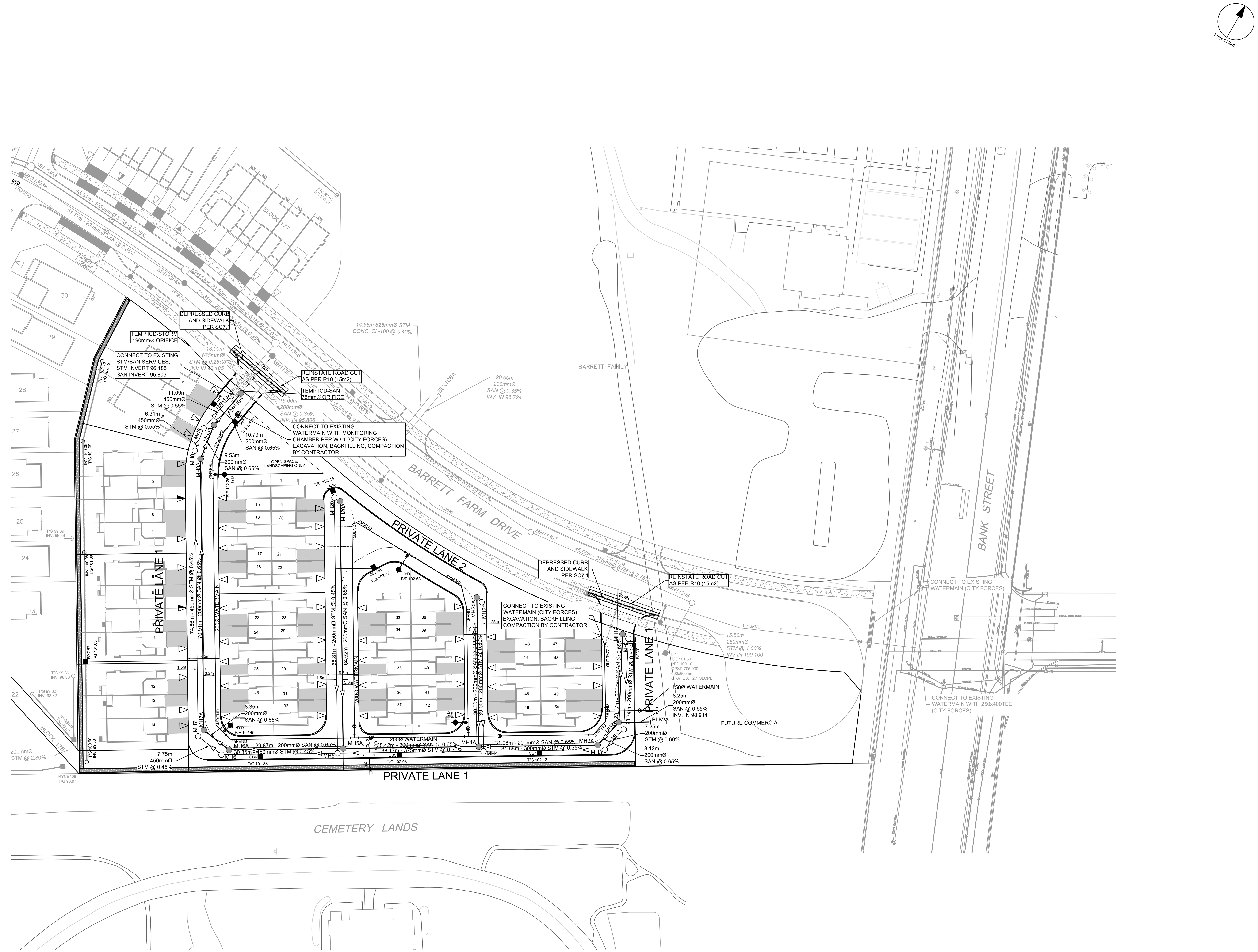
Stantec

Stantec Geomatics Ltd.
CANADA LANDS SURVEYORS
ONTARIO LAND SURVEYORS
1331 CLYDE AVENUE, SUITE 300
OTTAWA, ONTARIO, K2C 3G4
TEL. 613.722.4420 FAX. 613.722.2799
stantec.com

DRAWN: ME	CHECKED: *	PM: FL	FIELD: *	PROJECT No.: 161614242-132



croissant Delphinium Crescent
promenade Barrett Farm Drive
HIGHWAY No. 31
BLOCK 123
BLOCK 178
COMMUNAL OPEN SPACE 252.29 SM
PRIVATE LANE
3M PLANTING BUFFER
FUTURE COMMERCIAL
AREA=0.1607 ha
N59°14'45"E 202.29
N30°41'10"W 87.27
TOWN UNIT
GALLERY UNIT
LOT 17
CONCESSION 4 (RF)



CLIENT

BARRETT CO-TENANCY

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ISSUES

No.	DESCRIPTION	DATE
1	SUBMISSION NO.1 FOR CITY REVIEW	2022-05-10
2	SUBMISSION NO.2 FOR CITY REVIEW	2022-11-25
3		
4		
5		
6		
7		
8		

SEE 010, 011, 012 FOR NOTES, LEGEND, CB TABLE, STREET SECTIONS AND DETAILS

KEY PLAN

KEY PLAN NTS

CONSULTANTS

1:500

SEAL

LICENSED PROFESSIONAL ENGINEER
D. G. Yannoulopoulos
2022/11/25
PROVINCE OF ONTARIO

IBI GROUP
Suite 400 – 333 Preston Street
Ottawa ON K1S 5N4 Canada
tel 613 225 1311 / 613 241 3300 fax 613 225 9868
ibigroup.com

PROJECT

BARRETT BLOCK 178

PROJECT NO: 135925

DRAWN BY:	CHECKED BY:
M.M.	A.C.
PROJECT MGR:	APPROVED BY:
R.M.	J.I.M.

SHEET TITLE

GENERAL PLAN

SHEET NUMBER	ISSUE
001	2

File Location: J:\135925_BarrettLands\7.0_Production\7.03_Design\04_Civil\Sheets\001 GENERAL PLAN.dwg Last Saved: November 23, 2022 by mmilne Plotted: Thursday, November 24, 2022 11:54:04 AM by Marian Milne

CITY FILE No. D07-12-22-0112

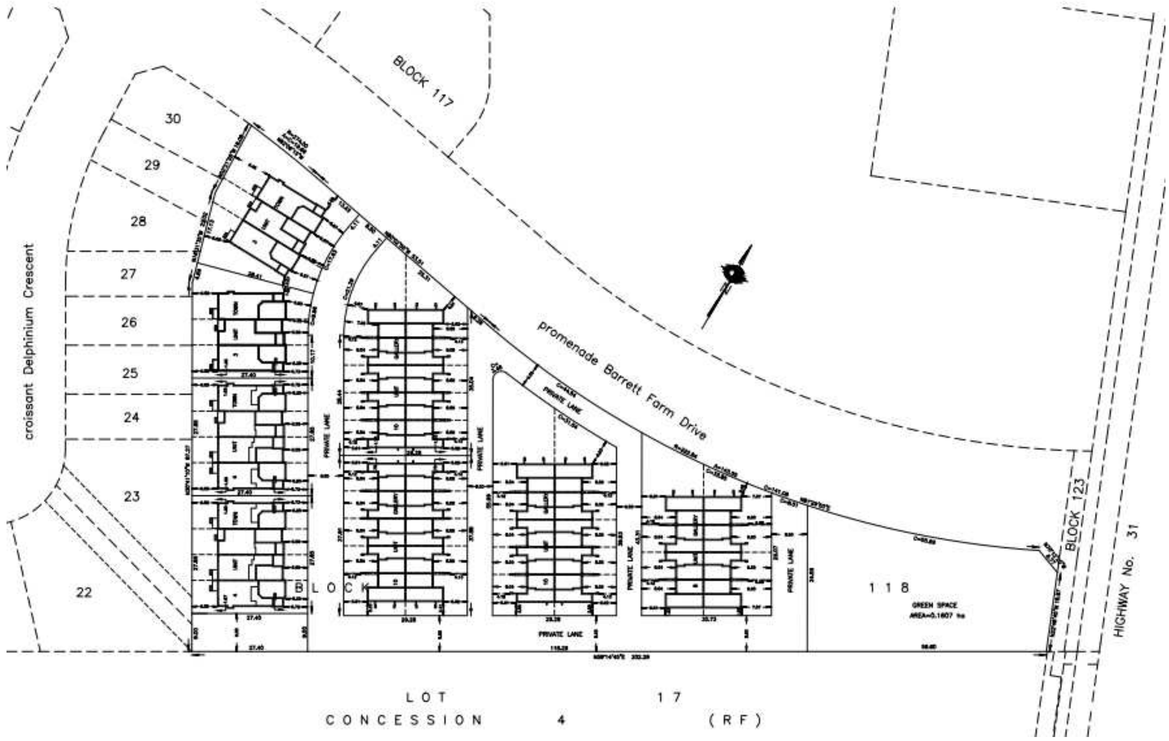
CITY PLAN No. 18826

Blk 118, Bank Street at Barrett Farm
Meeting Summary Notes
July 27, 2021, Online Teams Meeting
Revised Aug 18, 2021

Attendees:
- Melissa Cote, Tartan
- Yvonne Mitchell, Planning Student, City of Ottawa
- Tracey Scaramozzino (File Lead, Planner, City of Ottawa)

Not in Attendance:
- Mark Young, Urban Design
- Burl Walker,
- John Sevigny
- Mark Richardson
- Matthew Hayley
- Mike Giampa
- James Holland, SNation

Issue of Discussion:
- Vacant site, within Plan of subdivision, Block 118
- PUD, 14 townhouse units, 38 back to back towns;
- Density of 40units/net ha (only half of CDP recommendation of 80 units/ha). The Developer doesn't have a product that provides the recommended density – as they are no longer producing the Java product.
- Private laneways of 6m and 8.5m for servicing, utilities, and municipal garbage
- Site plan, Plan of Condo and Private Road Naming Applications are req'd
- The subdivision contemplated 90 units in this area and only 52 are being proposed. Therefore transportation/services should not be an issue



1. **Official Plan, Current:** General Urban Area

2. **Official Plan, Draft:** Suburban Transect, no overlays, no designations, Bank St in this area is a minor corridor
    a. "Recognize this as suburban pattern, but to support the evolution to 15min n'hood"

3. **Leitrim CDP** (from 2005): Mixed Use (intended to be part of core retail along Bank st – smaller parcels to provide n'hood uses; larger retail is focused south at existing commercial plaza
    a. The CDP is not being converted into a secondary plan in the new OP and will remain in effect.

4. **Zoning Information: GM12 -** General Mixed Use permits residential (apt, PUD, townhouse etc) and non-residential (animal hospital, bank, community centre etc) Subzone 12 permits additional non-residential uses such as bar, cinema, gas bar, theatre, sports arena.

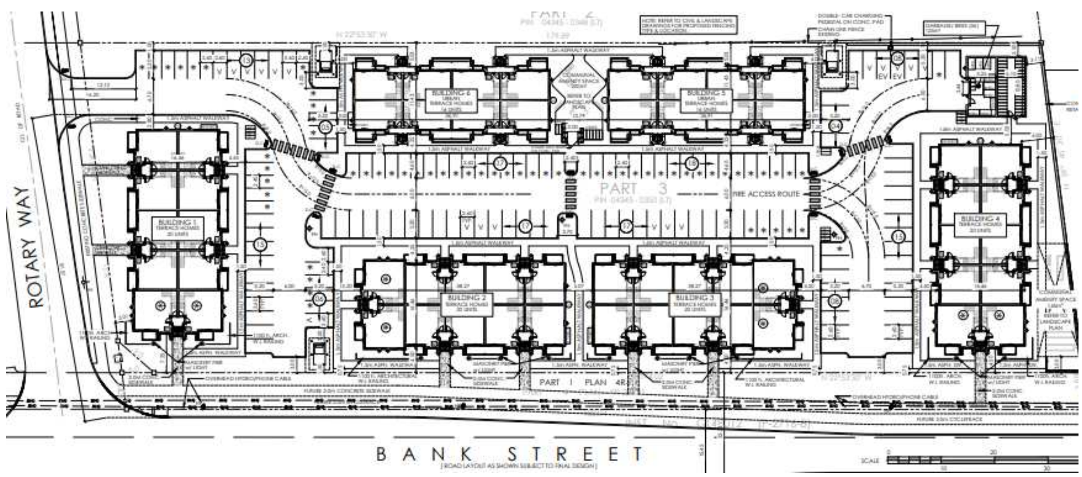
5. **Infrastructure/Servicing (John Sevigny):**
   a. Servicing will be reviewed during Phase 3 of the subdivision, which as of July 26, hasn't been submitted.

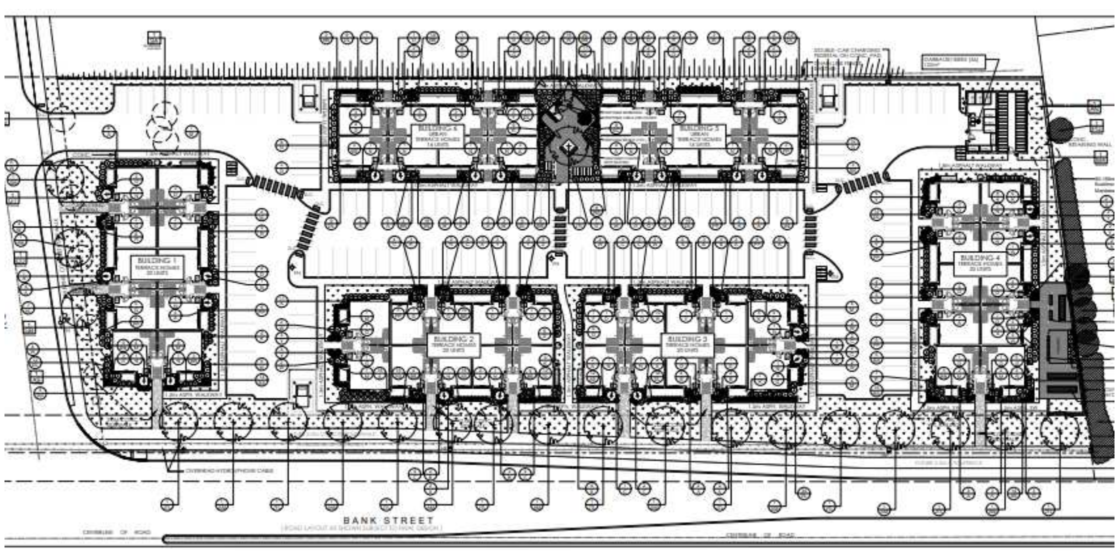
6. **Initial Planning Comments (Tracey Scaramozzino):**
   a. Can density be increased as per the CDP (40u/ha is being provided; 80 u/ha was contemplated in the CDP).
   b. Possibly design open space along Bank St to have sitting area/plantings/soft surfaces, similar to POPS.
   c. Units in general should have higher floor-ceiling hts on ground floor to allow the conversion to commercial units over time.
   d. The 'empty' parcels along Barrett Farm should be nicely designed with trees and perennials and soft surfaces.
   e. The plan of subdivision does not provide guidance for development of this site.
   f. Within Airport Bird Hazard zone
   g. Follow up discussions between Tracey and Melissa:

   May 28, 2021, from Melissa: I think there will be a lot of opportunity for trees and other soft landscaping along with a nice sitting area. I will wait to hear what Mark suggests and I'm following up with Tamarack regarding other product type suitable for possible conversion later on.
   May 27, 2021 from Tracey: I was also thinking some more about the green spaces on your proposal and am wondering if the green areas fronting Barrett Farm Drive might be nice with a few trees and some perennials - soft surfaces to help with climate change and heat-island effect. The green location on the corner might be nice with a mixture of plantings, sitting areas and soft area - that may or may not be open to the general public like a POPS.....

   h. The almost-approved Glenview project on the east side of Bank St. at Rotary Way has back to back, stacked towns with the ability for future ground floor conversions to commercial (due to higher floor-ceiling hts) and were able to meet the req'd density for 'apts'.
   i. ~~Tracey sent Melissa an example of a design brief, and details from Glenview PUD across the street at Rotary Way that is near approval, – as per images below.~~

Document 7, Elevations showing potential business signage





7. **Urban Design Comments (Mark Young):**

   1. A design brief is required. Please see attached terms of reference.
   2. Early consideration needs to be given to the allowance of street trees, both public and private. The proposed private roadway width of 6.0 m combined with a 4.0 m front yard setback, may present a challenge in the provision of trees. This should be addressed.
   3. Please provide direction regarding the proposed “Green Space”. Is this intended to be public or private?
   4. Is any visitor parking proposed? Lay-by parking should be considered for visitors within the private development.
   5. What is the purpose of the 9.0 m block abutting the southern property line? Is this for servicing and a walkway? Please advise.

8. **Parks (Burl Walker):**
   a. Parks issues are being reviewed through the associated subdivision file.

9. **Trees (Mark Richardson):**
   a. Preserve and protect the healthy trees to create a visual buffer along southern property line.
   b. Tree permit is required prior to any tree removal on site
   c. Submit a TCR with application.

10. **Environment (Matthew Hayley): (added August 18, 2021)**

   a) They will need to have their TCR address butternut trees (or provide an EIS). Mark R will comment on tree conservation but I would point out that there is an excellent opportunity for tree retention along the southern property line.

   b) Landscaping - OP Section 4.9 has some policies addressing energy conservation through design - in partic as ular for this area, I would recommend considering shading along the southern property line adjacent to that lane. This will combat urban heat island and to provide some screening from the adjacent use. Street trees are also important and should be provided.

   c) Integrated Environmental Review (IER) – if they are providing a planning rational the IER can be contained within that document as per the TOR for the Planning Rational, otherwise they should have an IER provided.

11. **Conservation Authority (James Holland, South Nation):**
   a. All issues are being reviewed through the associated subdivision file.

12. **Transportation (Mike Giampa):**

a. Comments are outstanding at this time, likely dealt with during the plan of subdivision.

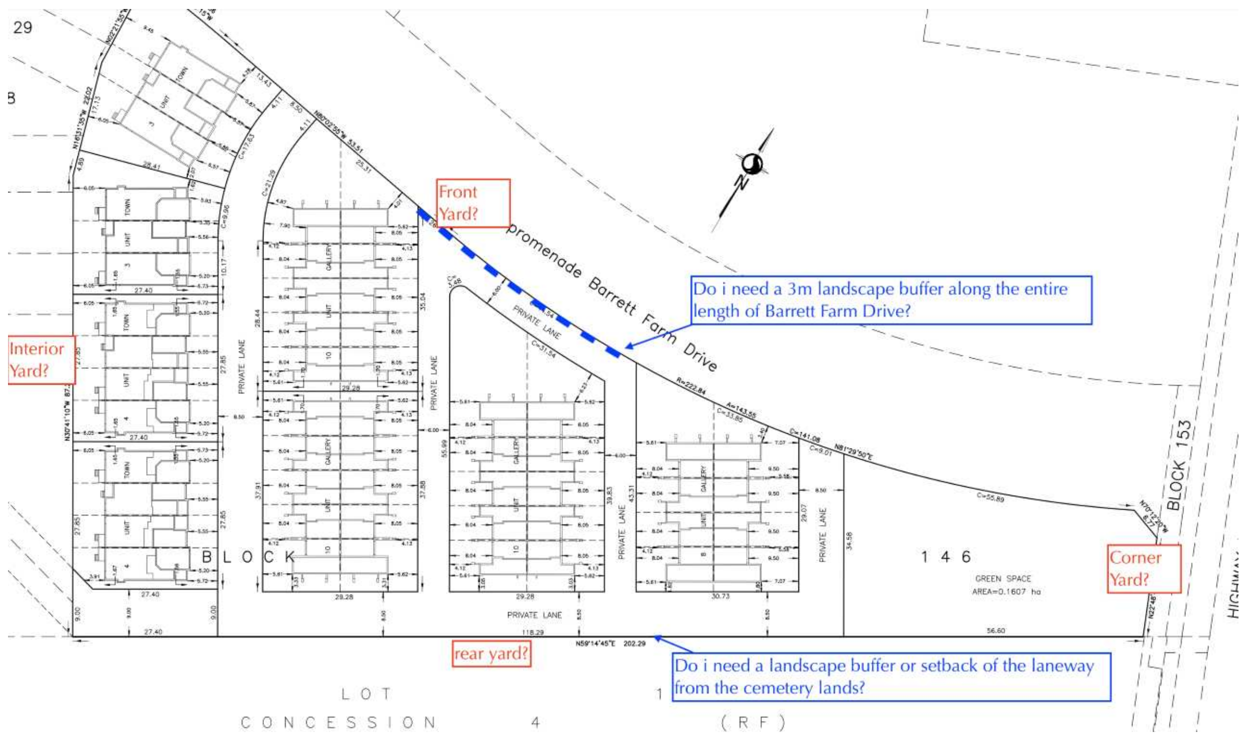
13. Waste Collection

a. Residential properties will receive City collection on the private streets.
b. 6m ROW is acceptable for waste collection.

14. General Information

a. Ensure that all plans and studies are prepared as per City guidelines – as available online…
https://ottawa.ca/en/city-hall/planning-and-development/information-developers/development-application-review-process/development-application-submission/guide-preparing-studies-and-plans

Response to August 1, 2021 Questions from Melissa:



1. Front yard? Corner yard? Rear yard? Side yard?

Response: Based on my interpretation of the definitions of each in the zoning bylaw:

- Front yard = Bank Street
- Corner yard = Barrett Farm Drive
- Rear yard = empty residential lot
- Side yard = cemetery lands

2. Do I need a landscape buffer along the entire length of Barret Farm Drive?

   Response: Yes, but this buffer can be passed by driveways or roads. The full landscape buffer requirements under the zoning (GM12) are as follows:

(h) Minimum width of landscaped area	(i) abutting a street	3 m
	(ii) abutting a residential or institutional zone	3 m
	(iii)other cases	No minimum

   Based on the above requirement for the GM zone, a 3m landscape buffer would be required around the entire site, as it borders on streets, residential and institutional zones.

3. Do I need a landscape buffer or setback of the laneway from the cemetery lands?
   Response: As per previous question and Table 187 of the applicable zoning (GM12), a landscape buffer of 3m is required abutting an institutional zone. Regarding setbacks, the interior lot line setback would not apply from the lot line to the laneway but from the proposed townhomes as follows:
   (d) Minimum interior side yard setbacks
   (iii) For a residential use building
   1. For a building equal or lower than 11m in height = 1.2m
   2. For a building higher than 11m in height = 3m

APPENDIX B

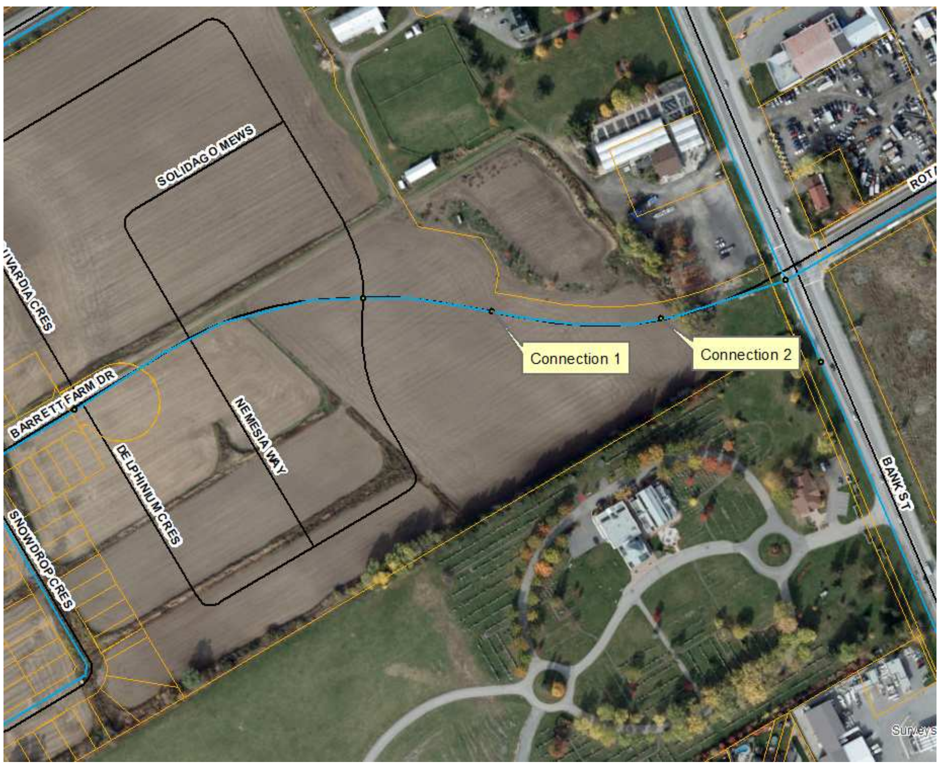
Water Distribution Model

Boundary Conditions
3100 Leitrim Road

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	26	0.44
Maximum Daily Demand	66	1.10
Peak Hour	145	2.42
Fire Flow Demand #1	10,000	166.67
Fire Flow Demand #2	12,000	200.00
Fire Flow Demand #3	15,000	250.00

Location



Results – Existing Conditions

Connection 1 – Barrett Farm Drive

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	154.6	76.7
Peak Hour	144.7	62.5
Max Day plus Fire #1	122.0	28.3
Max Day plus Fire #2	118.1	22.8
Max Day plus Fire #3	110.6	12.1

Ground Elevation = 102.1 m

Connection 2 – Barrett Farm Drive

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	154.6	76.7
Peak Hour	144.7	62.5
Max Day plus Fire #1	123.3	27.7
Max Day plus Fire #2	119.8	22.8
Max Day plus Fire #3	113.1	13.3

Ground Elevation = 103.8 m

Results – SUC Zone Reconfiguration

Connection 1 – Barrett Farm Drive

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	147.5	66.6
Peak Hour	145.8	64.2
Max Day plus Fire #1	135.8	49.9
Max Day plus Fire #2*	130.2	41.9
Max Day plus Fire #3	124.5	33.8

Ground Elevation = 102.1 m
*Interpolated

Connection 2 – Barrett Farm Drive

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	147.5	65.5
Peak Hour	145.8	63.0
Max Day plus Fire #1	137.2	50.8
Max Day plus Fire #2*	132.3	43.8
Max Day plus Fire #3	127.4	36.8

Ground Elevation = 103.8 m
*Interpolated

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.

IBI GROUP

IBI GROUP
333 PRESTON STREET
OTTAWA, ON
K1S 5N4

WATERMAIN DEMAND CALCULATION SHEET

PROJECT : **BLOCK 178**
LOCATION : CITY OF OTTAWA
DEVELOPER : **TAGGART**

FILE: 135925
DATE PRINTED: 22-Nov-22
DESIGN: AC

NODE	RESIDENTIAL UNITS SF	RESIDENTIAL UNITS SD & TH	RESIDENTIAL UNITS OTHER	RESIDENTIAL POP'N	NON-RESIDENTIAL INDTRL (ha.)	NON-RESIDENTIAL COMM. (ha.)	NON-RESIDENTIAL INST. (ha.)	AVERAGE DAILY DEMAND (l/s) Res.	AVERAGE DAILY DEMAND (l/s) Non-res.	AVERAGE DAILY DEMAND (l/s) Total	MAXIMUM DAILY DEMAND (l/s) Res.	MAXIMUM DAILY DEMAND (l/s) Non-res.	MAXIMUM DAILY DEMAND (l/s) Total	MAXIMUM HOURLY DEMAND (l/s) Res.	MAXIMUM HOURLY DEMAND (l/s) Non-res.	MAXIMUM HOURLY DEMAND (l/s) Total	FIRE DEMAND (l/min)
Findlay Creek																	
J20		13		35				0.11	0.00	0.11	0.28	0.00	0.28	0.63	0.00	0.63	
J26		10		27				0.09	0.00	0.09	0.22	0.00	0.22	0.48	0.00	0.48	
J16		8		22				0.07	0.00	0.07	0.18	0.00	0.18	0.39	0.00	0.39	
J18		8		22				0.07	0.00	0.07	0.18	0.00	0.18	0.39	0.00	0.39	
J22		7		19				0.06	0.00	0.06	0.15	0.00	0.15	0.34	0.00	0.34	
J24		4		11				0.04	0.00	0.04	0.09	0.00	0.09	0.19	0.00	0.19	
TOTALS		50		135						0.44			1.10			2.42	

ASSUMPTIONS

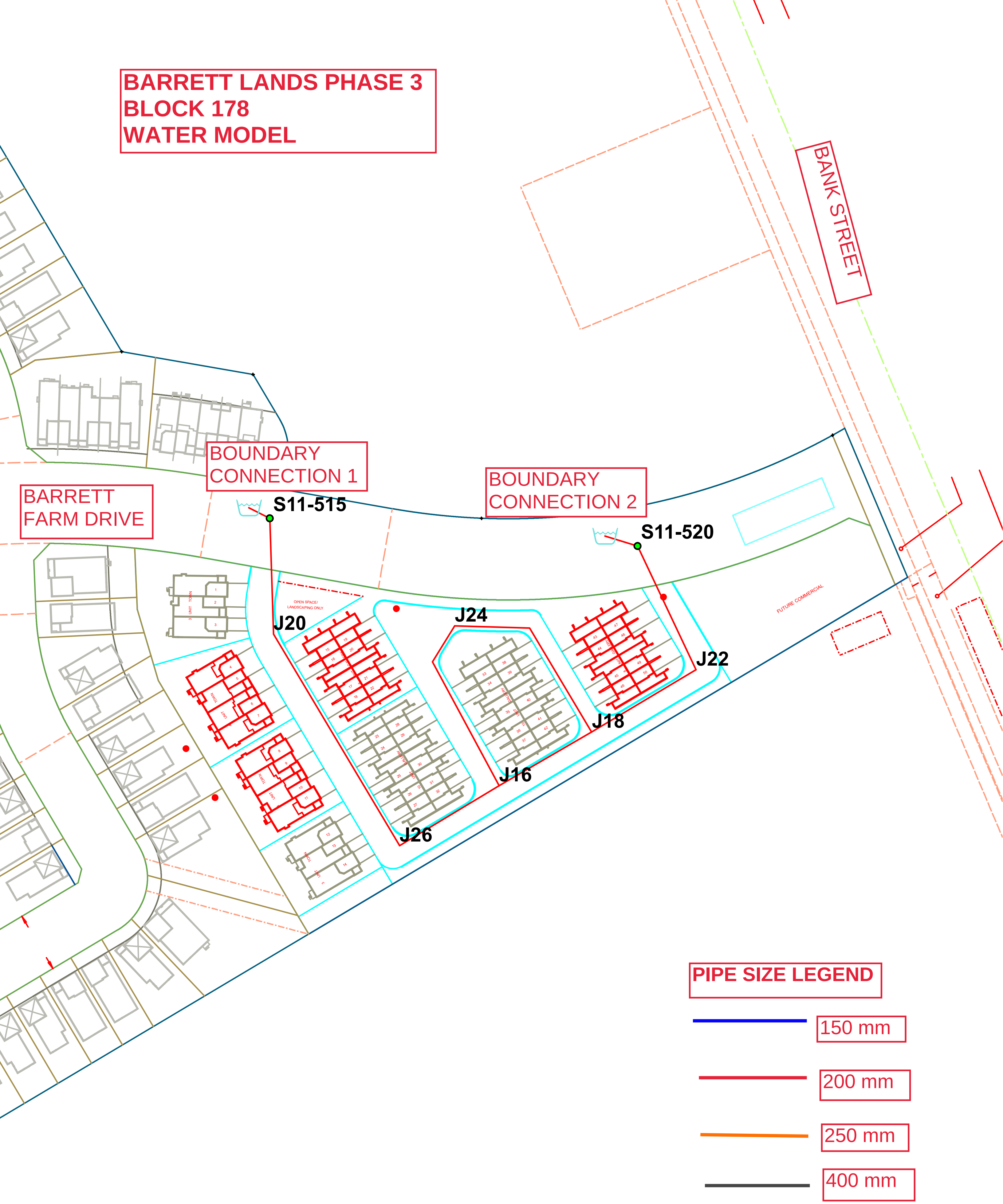
RESIDENTIAL DENSITIES
- Single Family (SF) 3.4 p / p / u
- Semi Detached (SD) & Townhouse (TH) 2.7 p / p / u
- Apartment (APT) 1.8 p / p / u
-Other 66 u / p / ha

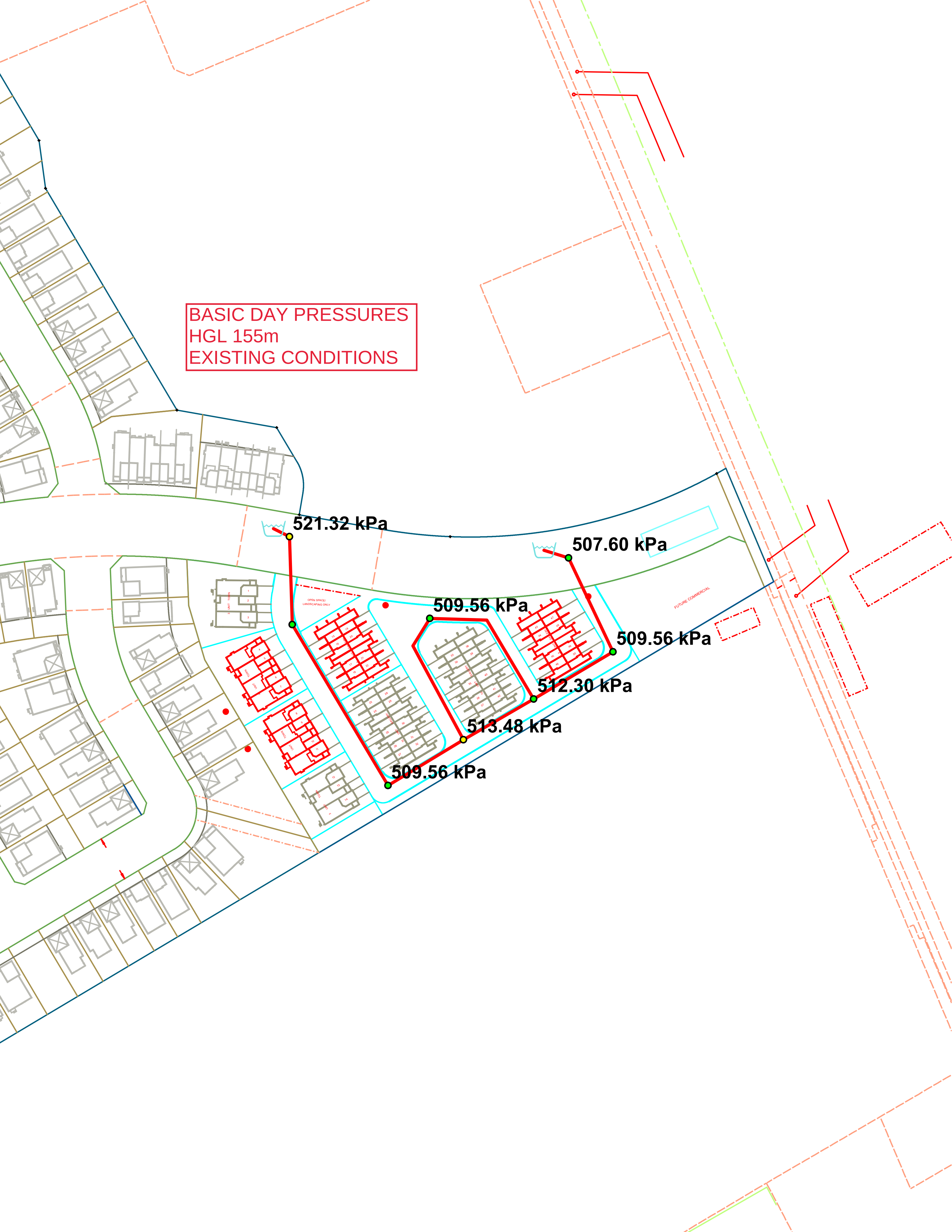
AVG. DAILY DEMAND
- Residential 280 l / cap / day
- ICI 50,000 l / ha / day

MAX. DAILY DEMAND
- Residential 700 l / cap / day
- ICI 75,000 l / ha / day

MAX. HOURLY DEMAND
- Residential 1,540 l / cap / day
- ICI 135,000 l / ha / day

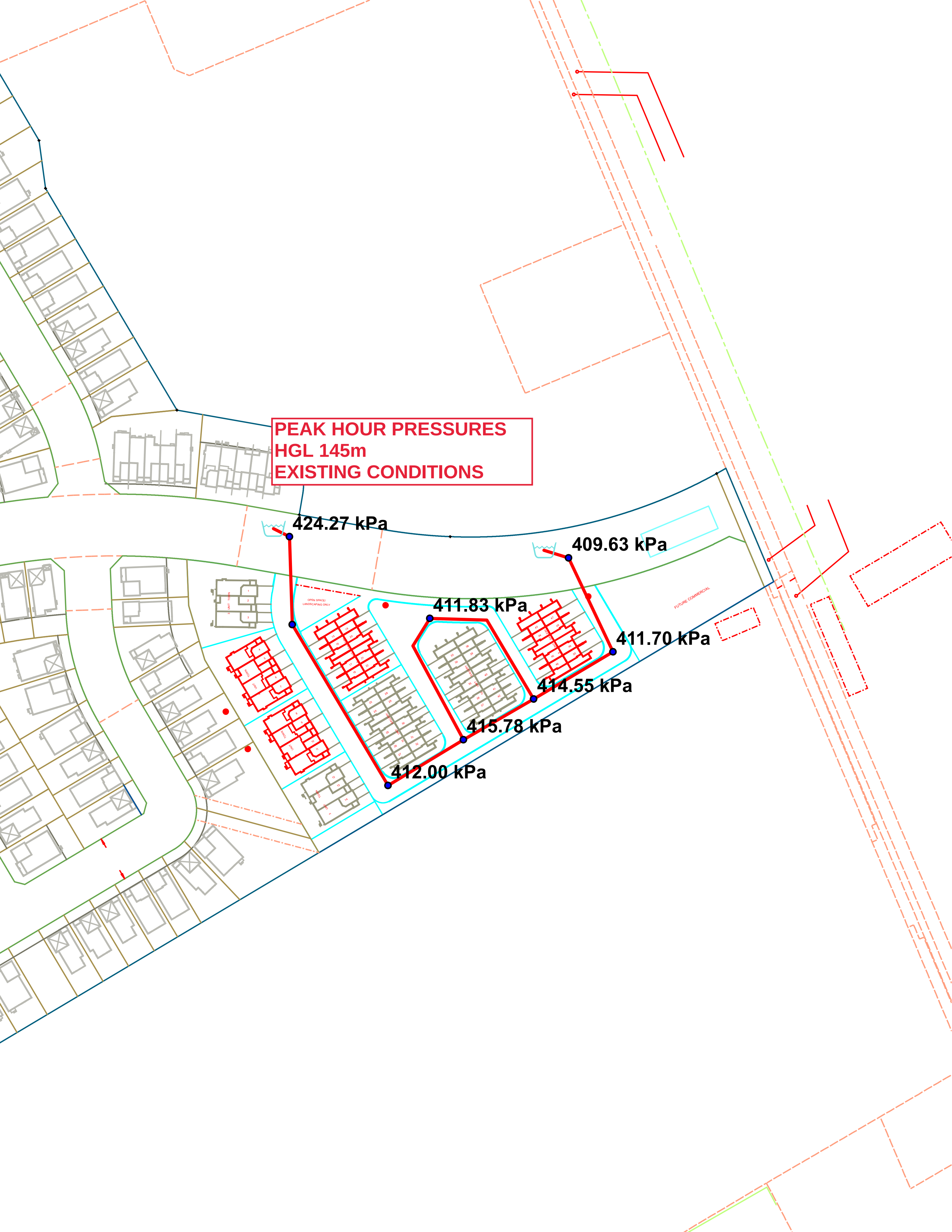
FIRE FLOW
- SF, SD, TH & ST 10,000 l / min
l / min
- ICI 13,000 l / min


BARRETT LANDS PHASE 3
BLOCK 178
WATER MODEL
BANK STREET
BOUNDARY CONNECTION 1
BOUNDARY CONNECTION 2
BARRETT FARM DRIVE
S11-515
S11-520
J20
J24
J22
J18
J16
J26
OPEN SPACE/ LANDSCAPING ONLY
FUTURE COMMERCIAL
PIPE SIZE LEGEND
150 mm
200 mm
250 mm
400 mm


BASIC DAY PRESSURES
HGL 155m
EXISTING CONDITIONS
521.32 kPa
507.60 kPa
509.56 kPa
509.56 kPa
512.30 kPa
513.48 kPa
509.56 kPa
FUTURE COMMERCIAL

Basic Day HGL - Junction Report

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)	Water Age (hrs)
1	☐	J16	0.07	102.20	154.60	513.48	0.00
2	☐	J18	0.07	102.32	154.60	512.30	0.00
3	☐	J20	0.11	102.60	154.60	509.56	0.00
4	☐	J22	0.06	102.60	154.60	509.56	0.00
5	☐	J24	0.04	102.60	154.60	509.56	0.00
6	☐	J26	0.09	102.60	154.60	509.56	0.00
7	☐	S11-515	0.00	101.40	154.60	521.32	0.00
8	☐	S11-520	0.00	102.80	154.60	507.60	0.00


PEAK HOUR PRESSURES
HGL 145m
EXISTING CONDITIONS
424.27 kPa
409.63 kPa
411.83 kPa
411.70 kPa
414.55 kPa
415.78 kPa
412.00 kPa
FUTURE COMMERCIAL

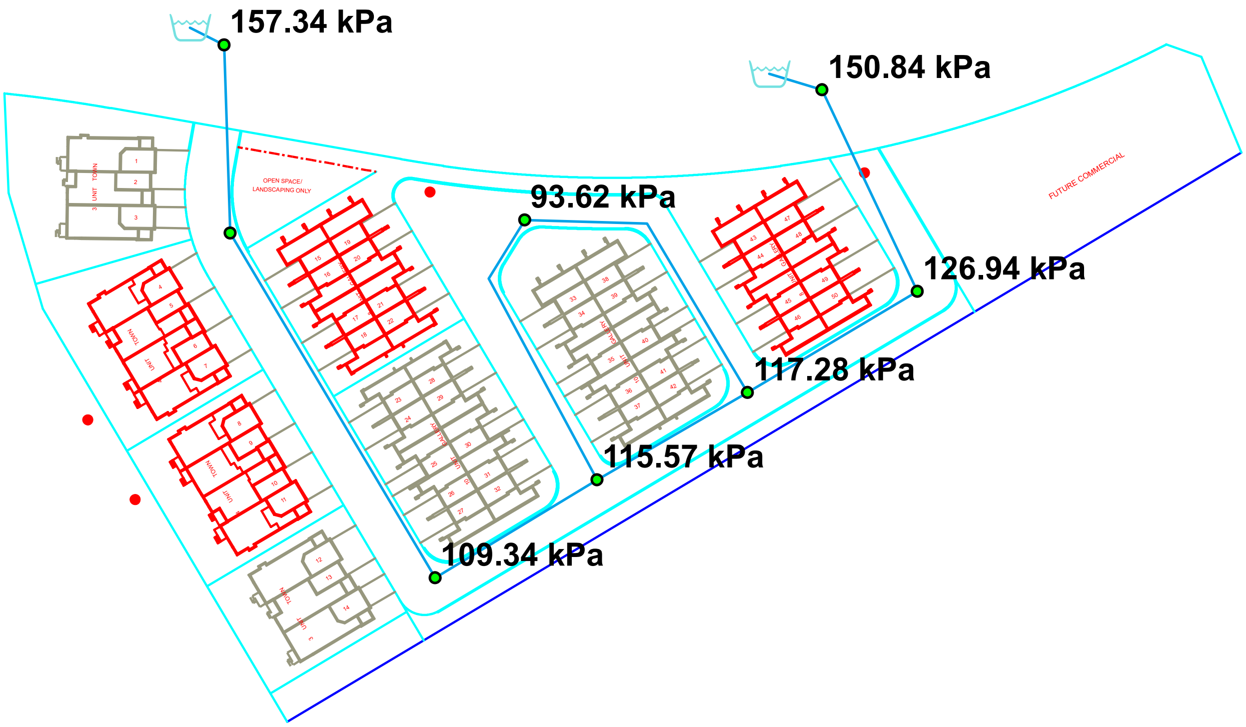
Peak Hour HGL - Junction Report

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)	Water Age (hrs)
1	☐	J16	0.39	102.20	144.63	415.78	0.00
2	☐	J18	0.39	102.32	144.62	414.55	0.00
3	☐	J20	0.63	102.60	144.68	412.33	0.00
4	☐	J22	0.40	102.60	144.61	411.70	0.00
5	☐	J24	0.19	102.60	144.63	411.83	0.00
6	☐	J26	0.48	102.60	144.64	412.00	0.00
7	☐	S11-515	0.00	101.40	144.70	424.27	0.00
8	☐	S11-520	0.00	102.80	144.60	409.63	0.00

Peak Hour HGL - Pipe Report

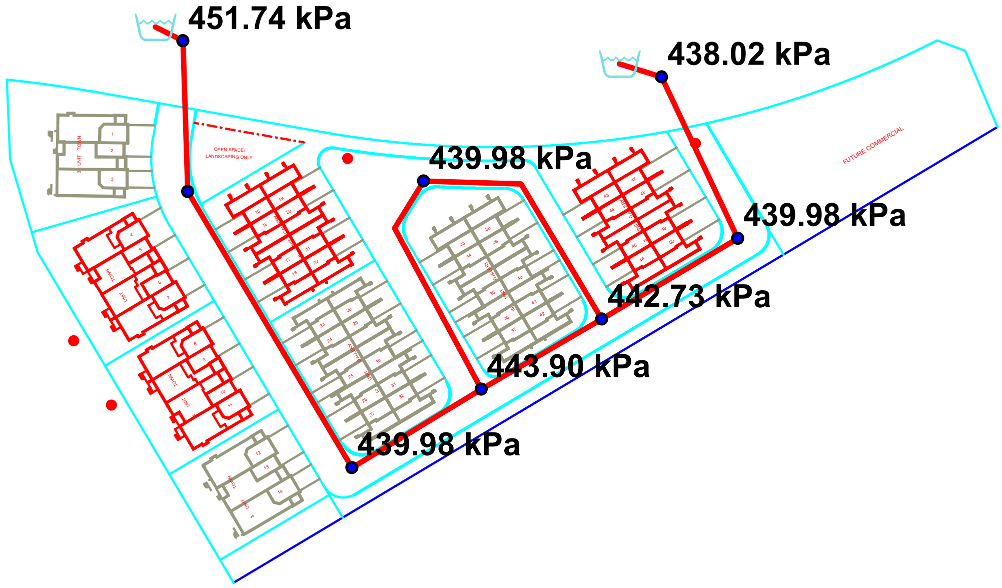
		ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)	Headloss (m)	HL/1000 (m/k-m)	Status	Flow Reversal Count	Water Age (hrs)
1	☐	P117	RES9000	S11-515	7.01	204.00	110.00	8.03	0.25	0.00	0.54	Open	0	0.00
2	☐	P119	S11-515	J20	34.25	204.00	110.00	8.03	0.25	0.02	0.54	Open	0	0.00
3	☐	P121	J16	J18	31.72	204.00	110.00	4.28	0.13	0.01	0.17	Open	0	0.00
4	☐	P123	J18	J22	35.97	204.00	110.00	5.95	0.18	0.01	0.31	Open	0	0.00
5	☐	P125	J16	J24	54.11	204.00	110.00	2.26	0.07	0.00	0.05	Open	0	0.00
6	☐	P127	J20	J26	72.93	204.00	110.00	7.40	0.23	0.03	0.46	Open	0	0.00
7	☐	P129	J22	S11-520	40.51	204.00	110.00	5.55	0.17	0.01	0.27	Open	0	0.00
8	☐	P131	J24	J18	58.07	204.00	110.00	2.07	0.06	0.00	0.04	Open	0	0.00
9	☐	P133	J26	J16	34.42	204.00	110.00	6.92	0.21	0.01	0.41	Open	0	0.00
10	☐	P135	S11-520	RES9002	10.06	204.00	110.00	5.55	0.17	0.00	0.27	Open	0	0.00

MAX DAY + FIRE HGL 118m
RESIDUAL PRESSURES
EXISTING CONDITIONS



		ID	Total Demand (L/s)	Hydrant Available Flow (L/s)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (kPa)	Critical Node Pressure at Fire Demand (kPa)	Critical Pressure for Design Run (kPa)	Hydrant Design Flow (L/s)	Hydrant Pressure at Design Flow (kPa)
1	☐	J16	166.85	114.10	J24	138.32	115.64	139.96	109.37	141.73
2	☐	J18	166.85	115.49	J24	137.89	116.26	139.96	109.40	142.14
3	☐	J20	166.95	116.16	J20	139.96	124.87	139.96	116.16	139.96
4	☐	J22	166.82	129.66	J22	139.96	126.94	139.96	129.66	139.96
5	☐	J24	166.76	86.88	J24	139.96	93.62	139.96	86.88	139.96
6	☐	J26	166.89	98.72	J26	139.96	109.34	139.96	98.72	139.96
7	☐	S11-515	166.67	314.80	J20	133.77	148.73	139.96	262.80	147.16
8	☐	S11-520	166.67	254.90	S11-520	139.96	150.84	139.96	254.90	139.96

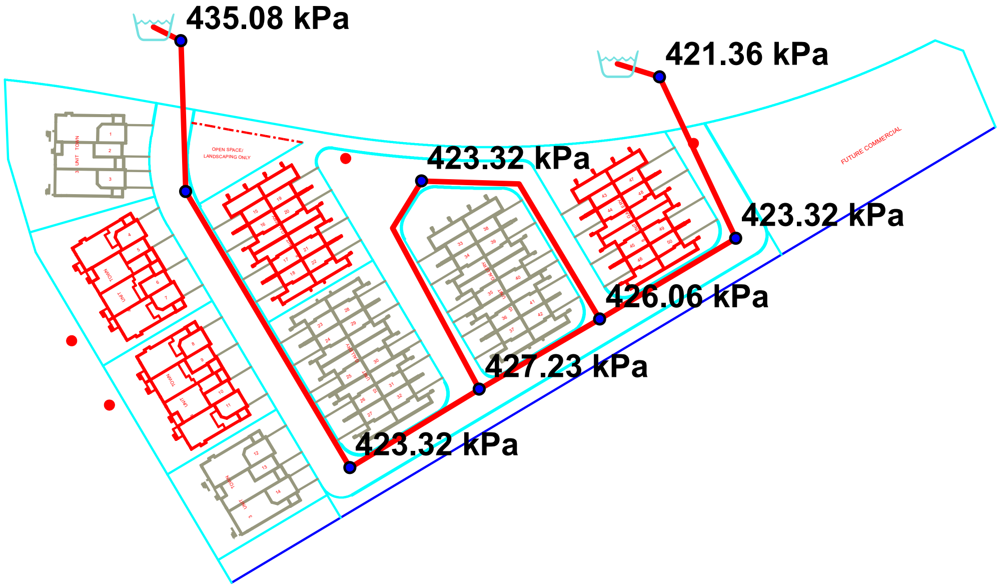
SUC ZONE RECONFIGURATION - BASIC DAY (MAX HGL) PRESSURES



SUC Zone Reconfiguration - Basic Day (MAX HGL) Pressure

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)	Water Age (hrs)
1	☐	J16	0.07	102.20	147.50	443.90	0.00
2	☐	J18	0.07	102.32	147.50	442.73	0.00
3	☐	J20	0.11	102.60	147.50	439.98	0.00
4	☐	J22	0.06	102.60	147.50	439.98	0.00
5	☐	J24	0.04	102.60	147.50	439.98	0.00
6	☐	J26	0.09	102.60	147.50	439.98	0.00
7	☐	S11-515	0.00	101.40	147.50	451.74	0.00
8	☐	S11-520	0.00	102.80	147.50	438.02	0.00

PEAK HOUR PRESSURES
HGL 146m



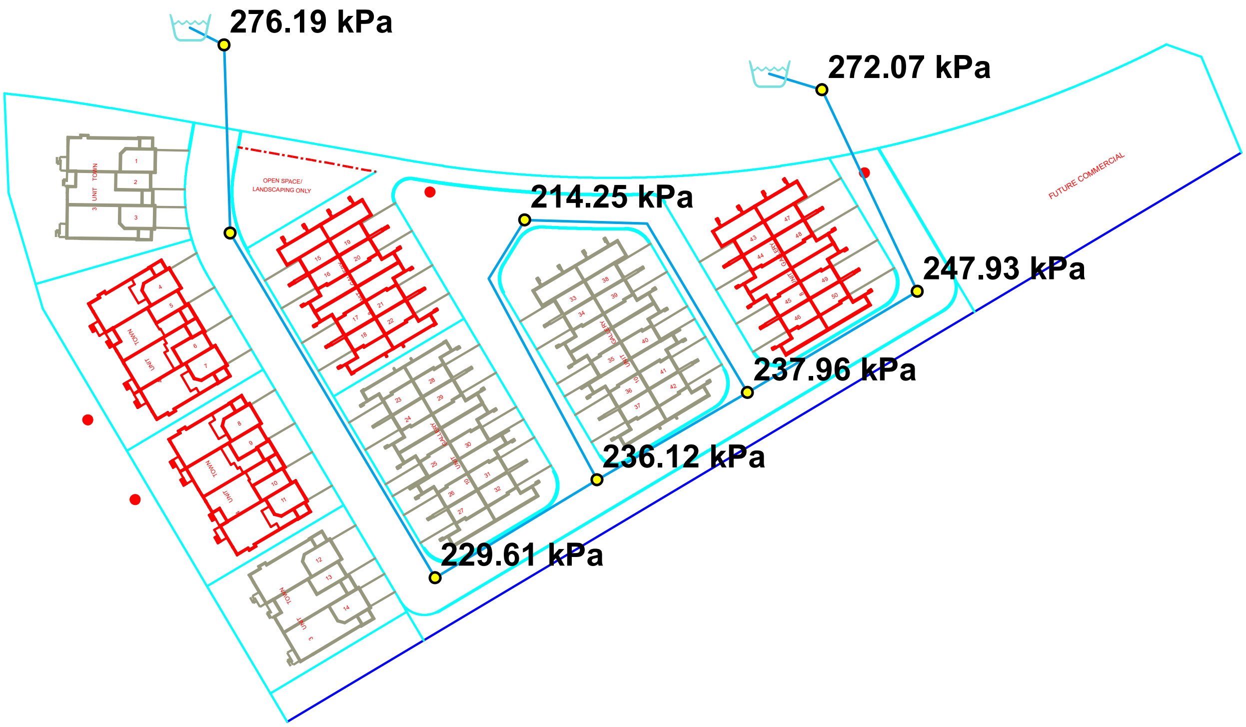
Peak Hour HGL - Junction Report

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)	Water Age (hrs)
1	☐	J16	0.39	102.20	145.80	427.23	0.00
2	☐	J18	0.39	102.32	145.80	426.06	0.00
3	☐	J20	0.63	102.60	145.80	423.32	0.00
4	☐	J22	0.40	102.60	145.80	423.32	0.00
5	☐	J24	0.19	102.60	145.80	423.32	0.00
6	☐	J26	0.48	102.60	145.80	423.32	0.00
7	☐	S11-515	0.00	101.40	145.80	435.08	0.00
8	☐	S11-520	0.00	102.80	145.80	421.36	0.00

Peak Hour HGL - Pipe Report

		ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)	Headloss (m)	HL/1000 (m/k-m)	Status	Flow Reversal Count	Water Age (hrs)
1	☐	P117	RES9000	S11-515	7.01	204.00	110.00	1.27	0.04	0.00	0.02	Open	0	0.00
2	☐	P119	S11-515	J20	34.25	204.00	110.00	1.27	0.04	0.00	0.02	Open	0	0.00
3	☐	P121	J16	J18	31.72	204.00	110.00	-0.24	0.01	0.00	0.00	Open	0	0.00
4	☐	P123	J18	J22	35.97	204.00	110.00	-0.81	0.02	0.00	0.01	Open	0	0.00
5	☐	P125	J16	J24	54.11	204.00	110.00	0.01	0.00	0.00	0.00	Open	0	0.00
6	☐	P127	J20	J26	72.93	204.00	110.00	0.64	0.02	0.00	0.00	Open	0	0.00
7	☐	P129	J22	S11-520	40.51	204.00	110.00	-1.21	0.04	0.00	0.02	Open	0	0.00
8	☐	P131	J24	J18	58.07	204.00	110.00	-0.18	0.01	0.00	0.00	Open	0	0.00
9	☐	P133	J26	J16	34.42	204.00	110.00	0.16	0.01	0.00	0.00	Open	0	0.00
10	☐	P135	S11-520	RES9002	10.06	204.00	110.00	-1.21	0.04	0.00	0.02	Open	0	0.00

SUC ZONE RECONFIGURATION - Max Day + Fire 130m Residual Pressures



		ID	Total Demand (L/s)	Hydrant Available Flow (L/s)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (kPa)	Critical Node Pressure at Fire Demand (kPa)	Critical Pressure for Design Run (kPa)	Hydrant Design Flow (L/s)	Hydrant Pressure at Design Flow (kPa)
1	☐	J16	166.85	300.52	J16	139.96	236.12	139.96	300.52	139.96
2	☐	J18	166.85	308.02	J18	139.96	237.96	139.96	308.02	139.96
3	☐	J20	166.95	368.62	J20	139.96	244.41	139.96	368.62	139.98
4	☐	J22	166.82	354.66	J22	139.96	247.93	139.96	354.66	139.96
5	☐	J24	166.76	249.51	J24	139.96	214.25	139.96	249.51	139.96
6	☐	J26	166.89	290.94	J26	139.96	229.61	139.96	290.94	139.96
7	☐	S11-515	166.67	803.38	J20	150.93	268.09	139.96	803.38	139.96
8	☐	S11-520	166.67	682.46	J22	163.39	273.38	139.96	682.46	139.96

APPENDIX C

Sanitary Sewer Design Sheet
135925-400 - Sanitary Drainage Plan
Barrett Lands Phase 3 Sanitary Design Sheet
Barrett Lands Phase 3 Sanitary Drainage Area Plan

IBI GROUP
400-333 Preston Street
Ottawa, Ontario K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

SANITARY SEWER DESIGN SHEET

Barrett Lands Block 178
CITY OF OTTAWA
Barrett Co-Tenancy

LOCATION				RESIDENTIAL									
STREET	AREA ID	FROM MH	TO MH	AREA w/ Units (Ha)	UNIT TYPES SF	SD	TH	APT	AREA w/o Units (Ha)	POPULATION IND	CUM	RES PEAK FACTOR	PEAK FLOW (L/s)
Private Lane No.1	S2A	MH1A	MH2A	0.07			4			9.6	9.6	3.73	0.12
Private Lane No.1	FUTCOM	Blkhd	MH2A	0.00						0.0	0.0	3.80	0.00
Private Lane No.1		MH2A	MH3A							0.0	9.6	3.73	0.12
Private Lane No.1		MH3A	MH4A						0.04	2.4	12.0	3.73	0.14
Private Lane No. 2	S4A-2	MH21A	MH4A	0.15			9			21.6	21.6	3.70	0.26
Private Lane No. 2	S5A-2	MH20A	MH5A	0.24			14			33.6	33.6	3.68	0.40
Private Lane No.1	S5A-1	MH4A	MH5A						0.03	1.8	35.4	3.67	0.42
Private Lane No.1	S6A	MH5A	MH6A						0.03	1.8	70.8	3.63	0.83
Private Lane No.1	S7A	MH6A	MH7A	0.03						0.0	70.8	3.63	0.83
Private Lane No.1	S8A	MH7A	MH8A	0.39			20			48.0	118.8	3.58	1.38
Private Lane No.1	S9A	MH8A	MH9A	0.09			2			4.8	123.6	3.57	1.43
Private Lane No.1	S10A	MH9A	MH10A	0.05			1			2.4	126.0	3.57	1.46
Block 178	11418A	MH10A	MH11305A							0.0	126.0	3.57	1.46

STREET	FROM MH	TO MH	ICI AREAS – AREA (Ha) INSTITUTIONAL IND	INSTITUTIONAL CUM	COMMERCIAL IND	COMMERCIAL CUM	INDUSTRIAL IND	INDUSTRIAL CUM	ICI PEAK FACTOR	PEAK FLOW (L/s)	INFILTRATION ALLOWANCE AREA (Ha) IND	CUM	FLOW (L/s)	FIXED FLOW (L/s) IND	CUM	TOTAL FLOW (L/s)	PROPOSED SEWER DESIGN CAPACITY (L/s)	LENGTH (m)	DIA (mm)	SLOPE (%)	VELOCITY (full) (m/s)	AVAILABLE CAPACITY L/s	(%)
Private Lane No.1	MH1A	MH2A		0.00		0.00		0.00	1.00	0.00	0.07	0.07	0.02		0.00	0.14	27.59	23.07	200	0.65	0.851	27.45	99.50%
Private Lane No.1	Blkhd	MH2A		0.00	0.16	0.16		0.00	1.50	0.08	0.16	0.16	0.05		0.00	0.13	27.59	8.12	200	0.65	0.851	27.46	99.53%
Private Lane No.1	MH2A	MH3A		0.00		0.16		0.00	1.50	0.08	0.00	0.07	0.02		0.00	0.22	27.59	8.12	200	0.65	0.851	27.37	99.21%
Private Lane No.1	MH3A	MH4A		0.00		0.16		0.00	1.50	0.08	0.04	0.11	0.04		0.00	0.26	27.59	31.08	200	0.65	0.851	27.33	99.06%
Private Lane No. 2	MH21A	MH4A		0.00		0.00		0.00	1.00	0.00	0.15	0.15	0.05		0.00	0.31	27.59	39.00	200	0.65	0.851	27.28	98.88%
Private Lane No. 2	MH20A	MH5A		0.00		0.00		0.00	1.00	0.00	0.24	0.24	0.08		0.00	0.48	27.59	64.92	200	0.65	0.851	27.11	98.26%
Private Lane No.1	MH4A	MH5A		0.00		0.16		0.00	1.50	0.08	0.03	0.29	0.10		0.00	0.59	27.59	35.42	200	0.65	0.851	26.99	97.84%
Private Lane No.1	MH5A	MH6A		0.00		0.16		0.00	1.50	0.08	0.03	0.56	0.18		0.00	1.09	27.59	29.87	200	0.65	0.851	26.49	96.03%
Private Lane No.1	MH6A	MH7A		0.00		0.16		0.00	1.50	0.08	0.03	0.59	0.19		0.00	1.10	27.59	8.35	200	0.65	0.851	26.48	96.00%
Private Lane No.1	MH7A	MH8A		0.00		0.16		0.00	1.00	0.05	0.39	0.98	0.32		0.00	1.75	27.59	70.91	200	0.65	0.851	25.83	93.65%
Private Lane No.1	MH8A	MH9A		0.00		0.16		0.00	1.00	0.05	0.09	1.07	0.35		0.00	1.84	27.59	9.53	200	0.65	0.851	25.75	93.34%
Private Lane No.1	MH9A	MH10A		0.00		0.16		0.00	1.00	0.05	0.05	1.12	0.37		0.00	1.88	27.59	10.79	200	0.65	0.851	25.71	93.19%
Block 178	MH10A	MH11305A		0.00		0.16		0.00	1.00	0.05	0.00	1.12	0.37		0.00	1.88	20.24	16.00	200	0.35	0.624	18.36	90.71%

Design Parameters:

Residential			ICI Areas			
SF	3.2	p/p/u				
TH/SD	2.4	p/p/u	INST	28,000	L/Ha/day	
APT	1.9	p/p/u	COM	28,000	L/Ha/day	
Other	60	p/p/Ha	IND	35,000	L/Ha/day	MOE Chart
				17000	L/Ha/day	

Notes:
1. Mannings coefficient (n) = 0.013
2. Demand (per capita): 280 L/day 200 L/day
3. Infiltration allowance: 0.33 L/s/Ha
4. Residential Peaking Factor:
   Harmon Formula = 1+(14/(4+(P/1000)^0.5))0.8
   where K = 0.8 Correction Factor
5. Commercial and Institutional Peak Factors based on total area,
   1.5 if greater than 20%, otherwise 1.0

Designed: AC

Checked: RM

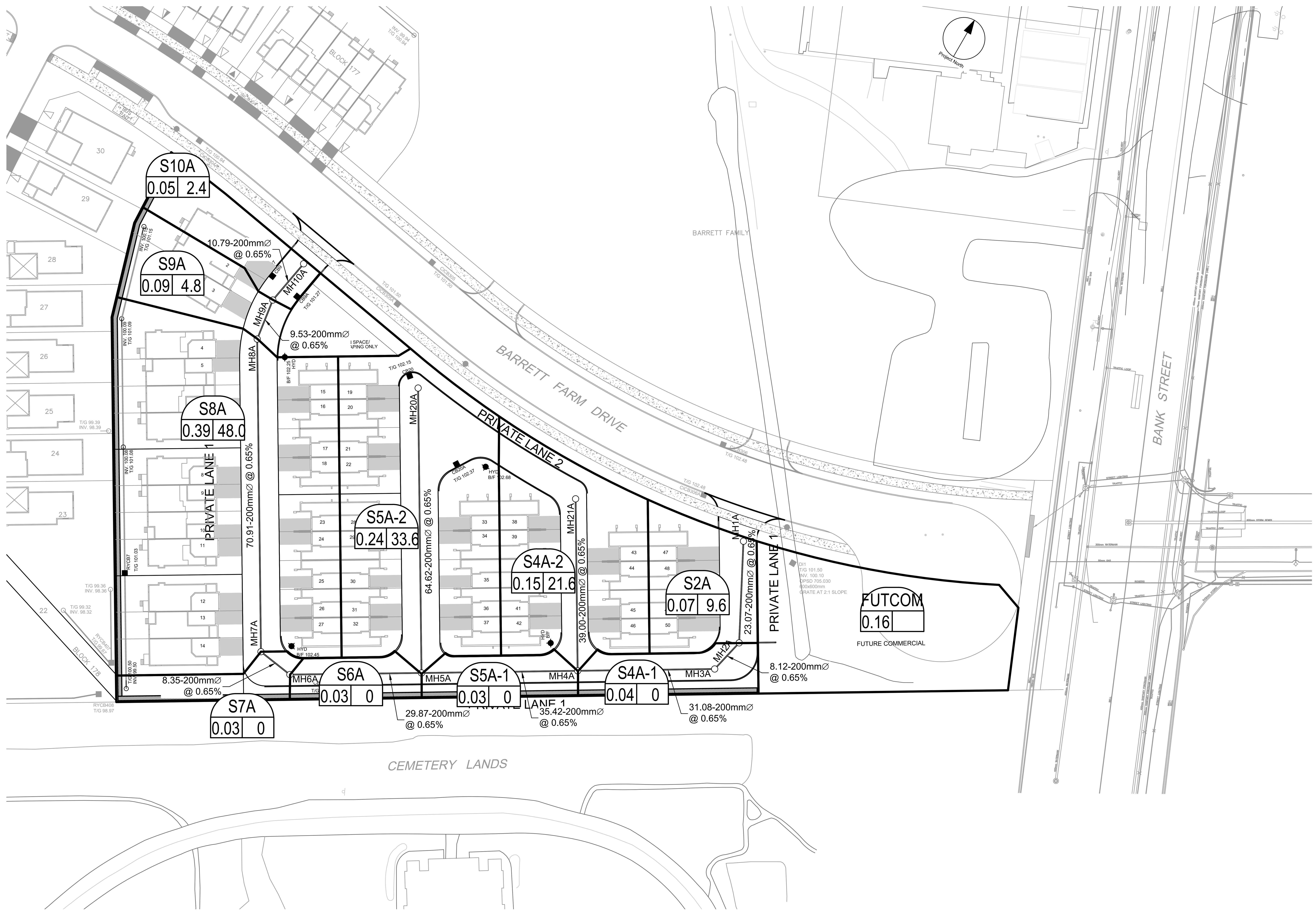
Dwg. Reference: 135925 - 400

No.	Revision	Date
1.	Submission No. 1 for City Review	2022-05-09
2.	Submission No. 2 for City Review	2022-11-11

File Reference:	Date:	Sheet No:
135925.00	2022-05-09	1 of 1

LEGEND :

- S9A — AREA NUMBER
- 0.09 — AREA IN HECTARES
- 4.8 — POPULATION



CLIENT

BARRETT CO-TENANCY

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ISSUES

No.	DESCRIPTION	DATE
1	SUBMISSION NO.1 FOR CITY REVIEW	2022-05-10
2	SUBMISSION NO.2 FOR CITY REVIEW	2022-11-25
3		
4		
5		
6		
7		
8		

SEE 010, 011, 012 FOR NOTES, LEGEND, CB TABLE, STREET SECTIONS AND DETAILS

KEY PLAN
NTS

CONSULTANTS

SEAL

LICENSED PROFESSIONAL ENGINEER
D. G. Yannoulopoulos
2022/11/25
PROVINCE OF ONTARIO

IBI GROUP
Suite 400 – 333 Preston Street
Ottawa ON K1S 5N4 Canada
tel 613 225 1311 / 613 241 3300 fax 613 225 9868
ibigroup.com

PROJECT

BARRETT BLOCK 178

PROJECT NO:
135925

DRAWN BY:	CHECKED BY:
M.M.	A.C.
PROJECT MGR:	APPROVED BY:
R.M.	J.I.M.

SHEET TITLE

SANITARY DRAINAGE AREA PLAN

SHEET NUMBER: 400

ISSUE: 2

CITY FILE No. D07-12-22-0112

CITY PLAN No. 18826

Plotted: Thursday, November 24, 2022 11:56:07 AM by Marian Milne

IBI GROUP
400-333 Preston Street
Ottawa, Ontario K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

SANITARY SEWER DESIGN SHEET

Barrett Lands Phase 3
CITY OF OTTAWA
Barrett Co-Tenancy

LOCATION				RESIDENTIAL										ICI AREAS								INFILTRATION ALLOWANCE			FIXED FLOW (L/s)		TOTAL FLOW	PROPOSED SEWER DESIGN						
				AREA w/ Units (Ha)	UNIT TYPES				AREA w/o Units (Ha)	POPULATION		RES PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)						ICI PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)		FLOW (L/s)			(L/s)	CAPACITY (L/s)	LENGTH (m)	DIA (mm)	SLOPE (%)	VELOCITY (full) (m/s)	AVAILABLE CAPACITY	
														INSTITUTIONAL		COMMERCIAL		INDUSTRIAL																
STREET	AREA ID	FROM MH	TO MH		SF	SD	TH	APT		IND	CUM			IND	CUM	IND	CUM	IND	CUM			IND	CUM		IND	CUM							L/s	(%)
Barrett Farm Drive	11305B	MH11306A	MH11305A	0.32						0.0	0.0	3.80	0.00		0.00	4.01	4.01		0.00	1.50	1.95	4.33	4.33	1.43		0.00	3.38	26.50	56.11	200	0.60	0.817	23.13	87.25%
Block 178	11418A	BLK11305AS	MH11305A	1.28				84		159.6	159.6	3.55	1.83		0.00		0.00		0.00	1.00	0.00	1.28	1.28	0.42		0.00	2.26	20.24	16.00	200	0.35	0.624	17.99	88.85%
Barrett Farm Drive	11304A	MH11305A	MH11304A	0.31			4			9.6	169.2	3.54	1.94		0.00		4.01		0.00	1.50	1.95	0.31	5.92	1.95		0.00	5.84	20.24	29.81	200	0.35	0.624	14.40	71.13%
Barrett Farm Drive	11330A	MH11304A	MH11303A	0.26			6			14.4	183.6	3.53	2.10		0.00		4.01		0.00	1.50	1.95	0.26	6.18	2.04		0.00	6.09	20.24	51.17	200	0.35	0.624	14.15	69.92%
Bouvardia Crescent	11334A	MH11316A	MH11334A	0.09	1					3.2	3.2	3.76	0.04		0.00		0.00		0.00	1.00	0.00	0.09	0.09	0.03		0.00	0.07	37.64	12.36	200	1.21	1.161	37.57	99.82%
Block 120 (City Yard)	COM2	BLK11120A	MH11334A	0.00						0.0	0.0	3.80	0.00		0.00	2.02	2.02		0.00	1.50	0.98	2.02	2.02	0.67		0.00	1.65	32.10	50.00	200	0.88	0.990	30.45	94.86%
Bouvardia Crescent	11333A	MH11334A	MH11333A	0.29	4					12.8	16.0	3.71	0.19		0.00		0.00		0.00	1.00	0.00	0.29	0.38	0.13		0.00	0.32	30.60	59.23	200	0.80	0.944	30.29	98.96%
Bouvardia Crescent	11332A	MH11333A	MH11332A	0.54	12					38.4	54.4	3.65	0.64		0.00		2.02		0.00	1.00	0.65	0.54	2.65	0.87		0.00	2.17	39.76	76.44	200	1.35	1.226	37.58	94.54%
Bouvardia Crescent	11331A	MH11332A	MH11331A	0.12	2					6.4	60.8	3.64	0.72		0.00		2.02		0.00	1.00	0.65	0.12	2.77	0.91		0.00	2.29	39.76	17.13	200	1.35	1.226	37.47	94.25%
Bouvardia Crescent	11303A	MH11331A	MH11303A	0.09	1					3.2	64.0	3.63	0.75		0.00		2.02		0.00	1.50	0.98	0.09	2.86	0.94		0.00	2.68	54.96	27.28	200	2.58	1.695	52.28	95.12%
Delphinium Crescent	11408A	MH11408A	MH11407A	0.15	2					6.4	6.4	3.75	0.08		0.00		0.00		0.00	1.00	0.00	0.15	0.15	0.05		0.00	0.13	43.28	29.00	200	1.60	1.335	43.15	99.71%
Delphinium Crescent	11407A	MH11407A	MH11406A	0.29	5					16.0	22.4	3.70	0.27		0.00		0.00		0.00	1.00	0.00	0.29	0.44	0.15		0.00	0.41	43.28	29.33	200	1.60	1.335	42.87	99.04%
Delphinium Crescent	11406A	MH11406A	MH11405A	0.33	7					22.4	44.8	3.66	0.53		0.00		0.00		0.00	1.00	0.00	0.33	0.77	0.25		0.00	0.79	43.28	44.63	200	1.60	1.335	42.50	98.19%
Delphinium Crescent	11405A	MH11405A	MH11404A	0.11	1					3.2	48.0	3.65	0.57		0.00		0.00		0.00	1.00	0.00	0.11	0.88	0.29		0.00	0.86	43.28	9.12	200	1.60	1.335	42.42	98.02%
Delphinium Crescent	11404A	MH11404A	MH11403A	0.38	6					19.2	67.2	3.63	0.79		0.00		0.00		0.00	1.00	0.00	0.38	1.26	0.42		0.00	1.21	32.46	71.55	200	0.90	1.001	31.25	96.28%
Nemesia Way	11350A	MH11351A	MH11350A	0.38	7					22.4	22.4	3.70	0.27		0.00		0.00		0.00	1.00	0.00	0.38	0.38	0.13		0.00	0.39	27.59	48.50	200	0.65	0.851	27.19	98.57%
Nemesia Way	11403A	MH11350A	MH11403A	0.46	10					32.0	54.4	3.65	0.64		0.00		0.00		0.00	1.00	0.00	0.46	0.84	0.28		0.00	0.92	27.59	62.94	200	0.65	0.851	26.67	96.67%
Block 124 (Cemetery)	CEM, 11352A	BLK11352A	MH11403A	0.00						0.0	0.0	3.80	0.00		0.00	0.00	0.00		0.00	1.00	0.00	0.00	0.00	0.00		0.00	0.00	27.59	42.00	200	0.65	0.851	27.59	100.00%
Delphinium Crescent	11402A	MH11403A	MH11402A	0.41	6					19.2	140.8	3.56	1.62		0.00		0.00		0.00	1.00	0.00	0.41	2.51	0.83		0.00	2.45	20.24	71.56	200	0.35	0.624	17.79	87.88%
Delphinium Crescent	11401A	MH11402A	MH11401A	0.13	1					3.2	144.0	3.56	1.66		0.00		0.00		0.00	1.00	0.00	0.13	2.64	0.87		0.00	2.53	20.24	9.12	200	0.35	0.624	17.71	87.50%
Delphinium Crescent	11400A	MH11401A	MH11400A	0.60	13					41.6	185.6	3.53	2.12		0.00		0.00		0.00	1.00	0.00	0.60	3.24	1.07		0.00	3.19	20.24	79.50	200	0.35	0.624	17.05	84.24%
Delphinium Crescent	11300A	MH11400A	MH11300A	0.24	4					12.8	198.4	3.52	2.26		0.00		0.00		0.00	1.00	0.00	0.24	3.48	1.15		0.00	3.41	20.24	64.94	200	0.35	0.624	16.83	83.15%
Barrett Farm Drive	11302A	MH11303A	MH11302A	0.53	9					28.8	276.4	3.47	3.11		0.00		6.03		0.00	1.50	2.93	0.53	10.34	3.41		0.00	9.46	26.50	81.49	200	0.60	0.817	17.05	64.32%
Barrett Farm Drive	11301A	MH11302A	MH11301A	0.19	3					9.6	286.0	3.47	3.22		0.00		6.03		0.00	1.50	2.93	0.19	10.53	3.47		0.00	9.62	32.46	27.85	200	0.90	1.001	22.84	70.36%
Solidago Mews	11322A	MH11323A	MH11322A	0.86	15					48.0	48.0	3.65	0.57		0.00		0.00		0.00	1.00	0.00	0.86	0.86	0.28		0.00	0.85	49.58	101.40	200	2.10	1.529	48.73	98.28%
Solidago Mews	11321A	MH11322A	MH11321A	0.10	1					3.2	51.2	3.65	0.61		0.00		0.00		0.00	1.00	0.00	0.10	0.96	0.32		0.00	0.92	41.91	8.88	200	1.50	1.292	40.98	97.80%
Solidago Mews	11320A	MH11321A	MH11301A	0.34	6					19.2	70.4	3.63	0.83		0.00		0.00		0.00	1.00	0.00	0.34	1.30	0.43		0.00	1.26	42.60	80.27	200	1.55	1.314	41.34	97.05%
Barrett Farm Drive	11201A	MH11301A	MH11300A	0.34	5					16.0	372.4	3.43	4.14		0.00		6.03		0.00	1.50	2.93	0.34	12.17	4.02		0.00	11.09	26.50	78.01	200	0.60	0.817	15.42	58.17%
Bouvardia Crescent	11315A	MH11316A	MH11315A	0.14	1					3.2	3.2	3.76	0.04		0.00		0.00		0.00	1.00	0.00	0.14	0.14	0.05		0.00	0.09	38.26	9.28	200	1.25	1.180	38.17	99.78%
Bouvardia Crescent	11314A	MH11315A	MH11314A	0.80	17					54.4	57.6	3.64	0.68		0.00		0.00		0.00	1.00	0.00	0.80	0.94	0.31		0.00	0.99	53.01	91.45	200	2.40	1.635	52.02	98.13%
Bouvardia Crescent	11313A	MH11314A	MH11313A	0.69	15					48.0	105.6	3.59	1.23		0.00		0.00		0.00	1.00	0.00	0.69	1.63	0.54		0.00	1.77	37.48	91.71	200	1.20	1.156	35.72	95.29%
Bouvardia Crescent	11312A	MH11313A	MH11312A	0.13	1					3.2	108.8	3.59	1.26		0.00		0.00		0.00	1.00	0.00	0.13	1.76	0.58		0.00	1.85	37.48	8.91	200	1.20	1.156	35.64	95.08%
Bouvardia Crescent	11311A	MH11312A	MH11311A	0.64	12					38.4	147.2	3.55	1.70		0.00		0.00		0.00	1.00	0.00	0.64	2.40	0.79		0.00	2.49	34.22	85.85	200	1.00	1.055	31.73	92.73%
Bouvardia Crescent	11310A	MH11311A	MH11300A	0.41	8					25.6	172.8	3.54	1.98		0.00		0.00		0.00	1.00	0.00	0.41	2.81	0.93		0.00	2.91	42.32	71.31	200	1.53	1.305	39.42	93.13%
Barrett Farm Drive	11205A	MH11300A	MH11204A	0.51	5		8			35.2	778.8	3.29	8.31		0.00		6.03		0.00	1.50	2.93	0.51	18.97	6.26		0.00	17.50	30.39	2.77	250	0.24	0.600	12.89	42.41%

Design Parameters:

Residential			ICI Areas			
SF	3.2	p/p/u				
TH/SD	2.4	p/p/u	INST	28,000	L/Ha/day	
APT	1.9	p/p/u	COM	28,000	L/Ha/day	
Other	60	p/p/Ha	IND	35,000	L/Ha/day	MOE Chart
				17000	L/Ha/day	

Notes:

1. Mannings coefficient (n) = 0.013
2. Demand (per capita): 280 L/day 200 L/day
3. Infiltration allowance: 0.33 L/s/Ha
4. Residential Peaking Factor:
   Harmon Formula = 1+(14/(4+(P/1000)^0.5))0.8
   where K = 0.8 Correction Factor
5. Commercial and Institutional Peak Factors based on total area,
   1.5 if greater than 20%, otherwise 1.0

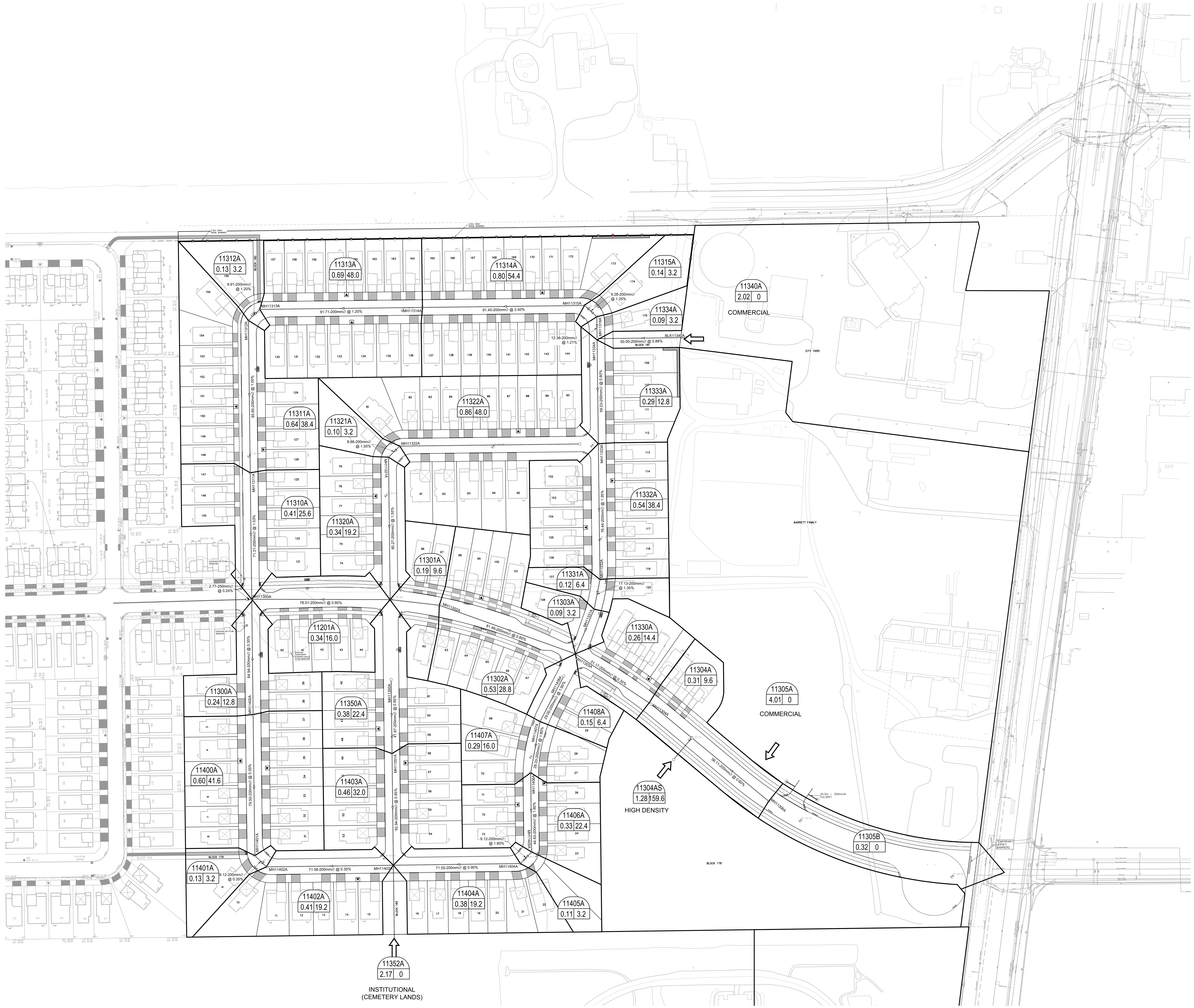
Designed: AC

Checked: JIM

Dwg. Reference: 34731 - TBD

No.	Revision	Date
1.	Submission No. 1 for City Review	2021-11-10
2.	Submission No. 2 for City Review	2022-02-24
3.	Submission No. 3 for City Review	2022-04-06

File Reference:	Date:	Sheet No:
34731-5.7	2021-11-10	1 of 1



LEGEND :

11408A — AREA NUMBER
0.15 — RUNOFF COEFFICIENT
6.4 — AREA IN HECTARES

SEE 020, 021, 022 FOR NOTES, LEGEND, CB TABLE, STREET SECTIONS AND DETAILS

KEY PLAN
NTS

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4			
3			
2	SUBMISSION NO. 2 FOR CITY REVIEW	J.I.M.	2022:02:28
1	SUBMISSION NO. 1 FOR CITY REVIEW	J.I.M.	2021:11:10

BARRETT
CO-TENANCY

IBI GROUP
400 – 333 Preston Street
Ottawa ON K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

Project Title
BARRETT LANDS
PHASE 3

LICENSED PROFESSIONAL ENGINEER
J. I. MOFFATT
2022/02/28
PROVINCE OF ONTARIO

Drawing Title
SANITARY DRAINAGE
AREA PLAN

Scale
1:1000

Design	Date
FHJF	NOVEMBER 2021
Drawn	Checked
M.M.	J.I.M.
Project No.	Drawing No.
34731	420

D07-16-17-0002PH3

18627

APPENDIX D

Storm Sewer Design Sheet
135925-500 - Storm Drainage Plan
135925-600 - Ponding Plan
Barrett Lands Phase 3 Storm Design Sheet
Barrett Lands Phase 3 Storm Drainage Area Plan
Modified Rational Method on-site SWM calculations
On-site Underground Storage System
Storm HGL Calculations
Barrett Lands Phase 3 HGL Reference
Overflow Depth/Capacity Calculation
Temporary Orifice Sizing
Sample Runoff Coefficient Calculations
Minor system release rate (Barrett Lands Phase 3)

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LEGEND

Black text	2 year event curve design
Blue text	5 year event curve design
Green Text	100 year design curve

STORM SEWER DESIGN SHEET

Barrett Lands Block 178
City of Ottawa
Barrett Co-Tenancy

LOCATION				AREA (Ha)										RATIONAL DESIGN FLOW														
STREET	AREA ID	FROM	TO	C= 0.20	C= 0.30	C= 0.42	C= 0.50	C= 0.52	C= 0.72	C= 0.73	C= 0.77	C= 0.85	C= 1.00	IND 2.78AC	CUM 2.78AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (2) (mm/hr)	i (5) (mm/hr)	i (10) (mm/hr)	i (100) (mm/hr)	2yr PEAK FLOW (L/s)	5yr PEAK FLOW (L/s)	10yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)
Private Lane No.1		MH1	MH2											0.00	0.00	10.00	0.48	10.48	76.81				0.00				0.00	0.00
Private Lane No.1		MH2	MH3											0.00	0.00	10.48	0.15	10.63	74.99				0.00				0.00	0.00
Private Lane No.1	S4	MH3	MH4								0.15			0.32	0.32	10.63	0.65	11.28	74.46				23.91				26.00	26.00
Private Lane No. 2		MH21	MH4											0.00	0.00	10.00	0.80	10.80	76.81				0.00				0.00	0.00
Private Lane No. 2	S20A, S20B	MH20	MH5								0.13			0.28	0.28	10.00	1.36	11.36	76.81				21.37				25.00	25.00
Private Lane No.1	S5	MH4	MH5								0.14			0.30	0.62	11.28	0.72	12.00	72.22				44.84				51.00	51.00
Private Lane No.1	S6	MH5	MH6								0.30			0.64	1.54	12.00	0.42	12.42	69.89				107.72				126.00	126.00
Private Lane No.1	R6	MH6	MH7					0.19						0.27	1.82	12.42	0.11	12.52	68.62				124.61				146.00	146.00
Private Lane No.1		MH7	MH8											0.00	1.82	12.52	1.02	13.55	68.30				124.03				146.00	146.00
Private Lane No.1		MH8	MH9											0.00	1.82	13.55	0.08	13.63	65.42				118.80				146.00	146.00
Private Lane No.1	S10	MH9	MH10								0.14			0.30	2.12	13.63	0.14	13.76	65.21				137.96				179.00	179.00
Private Lane No.1		MH10	MH11305A											0.00	2.12	13.76	0.19	13.95	64.85				137.19				179.00	179.00

LOCATION			SEWER DATA								
					PIPE SIZE (mm)					AVAIL CAP	
STREET	FROM	TO	CAPACITY (L/s)	LENGTH (m)	DIA	W	H	SLOPE (%)	VELOCITY (m/s)	(L/s)	(%)
Private Lane No.1	MH1	MH2	26.50	23.74	200			0.60	0.817	26.50	100.00%
Private Lane No.1	MH2	MH3	26.50	7.25	200			0.60	0.817	26.50	100.00%
Private Lane No.1	MH3	MH4	59.68	31.68	300			0.35	0.818	33.68	56.44%
Private Lane No. 2	MH21	MH4	26.50	39.00	200			0.60	0.817	26.50	100.00%
Private Lane No. 2	MH20	MH5	41.62	66.81	250			0.45	0.821	16.62	39.93%
Private Lane No.1	MH4	MH5	100.18	38.17	375			0.30	0.879	49.18	49.09%
Private Lane No.1	MH5	MH6	199.52	30.35	450			0.45	1.215	73.52	36.85%
Private Lane No.1	MH6	MH7	199.52	7.75	450			0.45	1.215	53.52	26.83%
Private Lane No.1	MH7	MH8	199.52	74.66	450			0.45	1.215	53.52	26.83%
Private Lane No.1	MH8	MH9	220.58	6.31	450			0.55	1.344	74.58	33.81%
Private Lane No.1	MH9	MH10	220.58	11.09	450			0.55	1.344	41.58	18.85%
Private Lane No.1	MH10	MH11305A	518.80	16.00	675			0.35	1.404	339.80	65.50%

Definitions:
Q = 2.78CiA, where:
Q = Peak Flow in Litres per Second (L/s)
A = Area in Hectares (Ha)
i = Rainfall intensity in millimeters per hour (mm/hr)

[i = 732.951 / (TC+6.199)^0.810]	2 YEAR
[i = 998.071 / (TC+6.053)^0.814]	5 YEAR
[i = 1174.184 / (TC+6.014)^0.816]	10 YEAR
[i = 1735.688 / (TC+6.014)^0.820]	100 YEAR

Notes:
1. Mannings coefficient (n) = 0.013
0.024

Designed: AC

Checked: RM

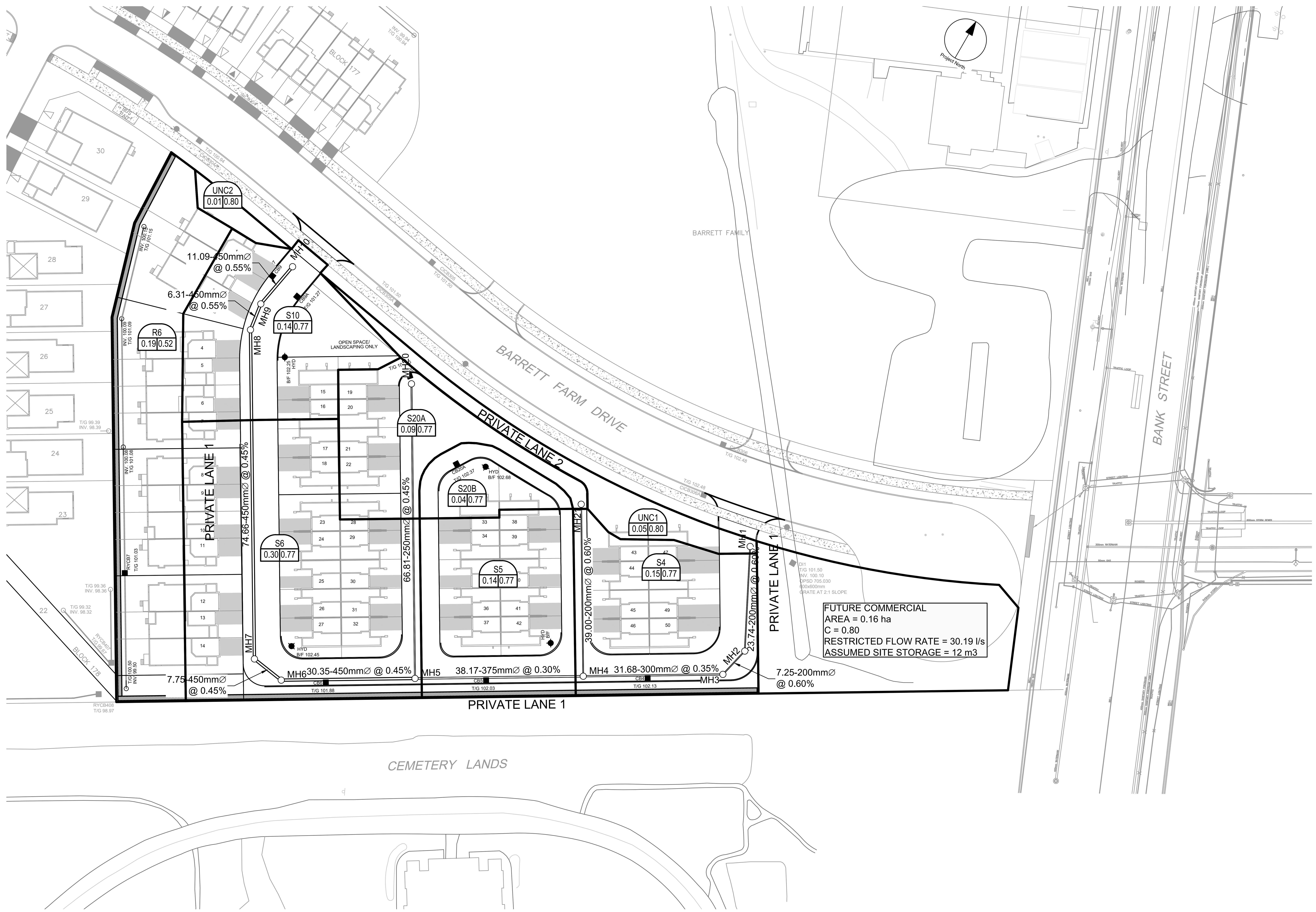
Dwg. Reference: 135925-500

No.	Revision	Date
1.	Submission No.1 for City Review	2022-05-09
2.	Submission No.2 for City Review	2022-11-11

File Reference:	Date:	Sheet No:
135925.00	2022-05-09	1 of 1

LEGEND :

S10 — AREA NUMBER
0.50 — RUNOFF COEFFICIENT
0.14 — AREA IN HECTARES



CLIENT

BARRETT CO-TENANCY

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ISSUES

No.	DESCRIPTION	DATE
1	SUBMISSION NO.1 FOR CITY REVIEW	2022-05-10
2	SUBMISSION NO.2 FOR CITY REVIEW	2022-11-25
3		
4		
5		
6		
7		
8		

SEE 010, 011, 012 FOR NOTES, LEGEND, CB TABLE, STREET SECTIONS AND DETAILS

KEY PLAN
NTS

1:500

CONSULTANTS

SEAL

LICENSED PROFESSIONAL ENGINEER
D. G. Yannoulopoulos
2022/11/25
PROVINCE OF ONTARIO

IBI GROUP
Suite 400 – 333 Preston Street
Ottawa ON K1S 5N4 Canada
tel 613 225 1311 / 613 241 3300 fax 613 225 9868
ibigroup.com

PROJECT

BARRETT BLOCK 178

PROJECT NO:
135925

DRAWN BY:	CHECKED BY:
M.M.	A.C.
PROJECT MGR:	APPROVED BY:
R.M.	J.I.M.

SHEET TITLE

STORM DRAINAGE AREA PLAN

SHEET NUMBER 500

ISSUE 2

CITY FILE No. D07-12-22-0112

CITY PLAN No. 18826

IBI GROUP

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

Run-off Coefficients

PROJECT: Barrett Block 146
DATE: 2022-04-22
CLIENT: Barrett Co-Tennancy
FILE: 135925.6.4

				S2&R3								
				BACK TO BACK			TOWNS - REAR			TOWNS - FRONT		
				GRASS	ROOF	ASPHALT	GRASS	ROOF	ASPHALT	GRASS	ROOF	ASPHALT
				255.00	1121.00		492.00	400.00		380.00	1601.00	
TOTAL (m^2)				255.00	1121.00		492.00	400.00		380.00	1601.00	
				1376.00			892.00			1981.00		
Runoff Coefficient (C) :				0.2	0.9	0.9	0.2	0.9	0.9	0.2	0.9	0.9
Ave. Runoff Coefficient (C):				0.77			0.51			0.77		
Runoff Coefficient Used(C):				**0.77**			**0.52**			**0.77**		

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LEGEND

Black text	2 year event curve design
Blue text	5 year event curve design (Barrett Farm Drive)
Green Text	100 year design curve

STORM SEWER DESIGN SHEET

Barrett Lands Phase 3
City of Ottawa
Barrett Co-Tenancy

LOCATION				AREA (Ha)										RATIONAL DESIGN FLOW															SEWER DATA								
STREET	AREA ID	FROM	TO	C= 0.20	C= 0.30	C= 0.42	C= 0.57	C= 0.68	C= 0.72	C= 0.73	C= 0.78	C= 0.80	C= 1.00	IND 2.78AC	CUM 2.78AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (2) (mm/hr)	i (5) (mm/hr)	i (10) (mm/hr)	i (100) (mm/hr)	2yr PEAK FLOW (L/s)	5yr PEAK FLOW (L/s)	10yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE SIZE (mm) DIA	W	H	SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (2yr) (L/s)	(%)
Temporary	Area 9	DI1	MH11307			0.24								0.28	0.28	12.00	0.21	12.21	69.89	94.70	110.96	162.13				45.43		45.43	62.04	15.50	250			1.00	1.224	16.61	26.77%
Barrett Farm Drive	S11306	MH11307	MH11306						0.19					0.38	0.66	10.00	0.89	10.89	76.81	104.19	122.14	178.56		68.82				114.26	158.41	74.50	375			0.75	1.389	44.15	27.87%
Barrett Family	R11305	DI2	MH11306									4.01		8.92	8.92	12.00	0.14	12.14	69.89	94.70	110.96	162.13	623.33					623.33	821.24	14.66	750			0.50	1.801	197.92	24.10%
Temporary		DI2	MH11306											See Barrett Family ditch design in Appendix D														348.22	530.86	14.66	525			1.40	2.376	182.64	34.40%
Temporary	Culvert	Ditch	Ditch											See culvert design in Appendix D														34.08	109.29	20.00	300			4.00	1.498	75.21	68.82%
Barrett Farm Drive		MH11306	MH11305											0.00	8.92	12.14	0.43	12.57	69.47	94.12	110.28	161.14	619.59					698.95	1,159.96	54.50	825			0.60	2.102	461.01	39.74%
Barrett Farm Drive	S11305	MH11306	MH11305							0.09				0.18	0.84	12.14	0.43	12.57	69.47	94.12	110.28	161.14		79.36				698.95	1,159.96	54.50	825			0.60	2.102	461.01	39.74%
Barrett Farm Drive	R11304	BLK11305	MH11305									1.28		2.85	2.85	12.00	0.25	12.25	69.89	94.70	110.96	162.13	198.97					198.97	438.47	18.00	675			0.25	1.187	239.50	54.62%
Barrett Farm Drive		MH11305	MH11304											0.00	11.76	12.57	0.36	12.92	68.18	92.34	108.18	158.06	802.08					820.82	1,274.02	30.40	1050			0.20	1.425	453.20	35.57%
Barrett Farm Drive	S11305	MH11305	MH11304							0.10				0.20	0.20	12.57	0.36	12.92	68.18	92.34	108.18	158.06		18.74				820.82	1,274.02	30.40	1050			0.20	1.425	453.20	35.57%
Barrett Farm Drive		MH11304	MH11303											0.00	11.76	12.92	0.51	13.43	67.15	90.93	106.52	155.62	789.98					917.90	1,424.40	48.54	1050			0.25	1.594	506.50	35.56%
Barrett Farm Drive	S11304A	MH11304	MH11303								0.25			0.54	1.39	12.57	0.51	13.08	68.18	92.34	108.18	158.06		127.91				917.90	1,424.40	48.54	1050			0.25	1.594	506.50	35.56%
Bouvardia Crescent	R11334	MH11316	MH11334				0.03							0.05	0.05	10.00	0.17	10.17	76.81	104.19	122.14	178.56	3.65					3.65	62.04	12.72	250			1.00	1.224	58.39	94.11%
Block 120	R11340	BLK11340	MH11334									1.98		4.40	4.40	12.00	0.45	12.45	69.89	94.70	110.96	162.13	307.78					307.78	524.32	48.00	600			0.67	1.796	216.54	41.30%
Bouvardia Crescent	S11334, R11333	MH11334	MH11333				0.08		0.27					0.67	5.12	12.45	0.54	12.98	68.54	92.84	108.77	158.92	350.80					350.80	535.93	59.22	600			0.70	1.836	185.14	34.54%
Bouvardia Crescent	R11332, S11333	MH11333	MH11332				0.12		0.20					0.59	5.71	12.98	0.51	13.49	66.98	90.70	106.25	155.22	382.36					382.36	744.26	78.11	600			1.35	2.550	361.90	48.63%
Bouvardia Crescent	R11331, S11331	MH11332	MH11331					0.24	0.25					0.95	6.66	13.49	0.11	13.60	65.57	88.76	103.98	151.88	436.87					436.87	744.26	16.85	600			1.35	2.550	307.39	41.30%
Bouvardia Crescent		MH11331	MH11303											0.00	6.66	13.60	0.16	13.77	65.27	88.36	103.50	151.18	434.90					434.90	744.26	25.07	600			1.35	2.550	309.36	41.57%
Barrett Farm Drive		MH11303	MH11302											0.00	18.43	13.77	0.57	14.33	64.84	87.76	102.80	150.16	1,194.83					1,360.93	2,206.67	83.97	1050			0.60	2.469	845.73	38.33%
Barrett Farm Drive	S11303A, S11303B	MH11303	MH11302							0.25				0.51	1.89	13.77	0.57	14.33	64.84	87.76	102.80	150.16		166.10				1,360.93	2,206.67	83.97	1050			0.60	2.469	845.73	38.33%
Barrett Farm Drive		MH11302	MH11301											0.00	18.43	14.33	0.20	14.54	63.38	85.77	100.46	146.72	1,168.04					1,330.37	2,206.67	30.00	1050			0.60	2.469	876.29	39.71%
Barrett Farm Drive		MH11302	MH11301											0.00	1.89	14.33	0.20	14.54	63.38	85.77	100.46	146.72		162.33				1,330.37	2,206.67	30.00	1050			0.60	2.469	876.29	39.71%
Solidago Mews	R11323, S11323	MH11323	MH11322				0.26		0.25					0.91	0.91	10.00	0.87	10.87	76.81	104.19	122.14	178.56	70.08					70.08	146.19	104.38	300			2.10	2.004	76.12	52.07%
Solidago Mews		MH11322	MH11321											0.00	0.91	10.87	0.09	10.96	73.62	99.82	116.99	170.99	67.17					67.17	123.55	8.91	300			1.50	1.693	56.38	45.63%
Solidago Mews	R11321, S11321, S11301	MH11321	MH11301				0.53		0.22	0.15				1.58	2.50	10.96	0.83	11.79	73.32	99.40	116.50	170.27	183.08					183.08	347.53	77.89	525			0.60	1.555	164.45	47.32%
Barrett Farm Drive		MH11301	MH11300											0.00	20.92	14.54	0.53	15.07	62.88	85.08	99.65	145.53	1,315.81					1,569.35	2,206.67	79.16	1050			0.60	2.469	637.32	28.88%
Barrett Farm Drive	R11301, S11301A, S11301B	MH11301	MH11300				0.43			0.20				1.09	2.98	14.54	0.53	15.07	62.88	85.08	99.65	145.53		253.54				1,569.35	2,206.67	79.16	1050			0.60	2.469	637.32	28.88%
Bouvardia Crescent	R11315	MH11316	MH11315				0.14							0.22	0.22	10.00	0.11	10.11	76.81	104.19	122.14	178.56	17.04					17.04	69.36	9.12	250			1.25	1.369	52.32	75.43%
Bouvardia Crescent	S11314	MH11315	MH11314						0.30					0.60	0.82	10.11	0.79	10.90	76.38	103.61	121.46	177.55	62.81					62.81	96.11	89.59	250			2.40	1.897	33.30	34.65%
Bouvardia Crescent	R11313A, R11313B, S11313	MH11314	MH11313				0.44		0.26					1.22	2.04	10.90	0.81	11.71	73.52	99.68	116.82	170.74	149.98					149.98	325.82	96.25	450			1.20	1.985	175.84	53.97%
Bouvardia Crescent	R11313C	MH11313	MH11312				0.10							0.16	2.20	11.71	0.08	11.78	70.82	95.97	112.45	164.33	155.69					155.69	325.82	9.33	450			1.20	1.985	170.13	52.22%
Bouvardia Crescent	R11311, S11312, S11311B	MH11312	MH11311				0.48			0.37				1.51	3.71	11.78	0.74	12.53	70.57	95.62	112.05	163.74	261.81					261.81	448.66	89.18	525			1.00	2.008	186.85	41.65%
Bouvardia Crescent	S11311, S11311A	MH11311	MH11300							0.25				0.51	4.22	12.53	0.55	13.07	68.30	92.51	108.39	158.36	288.04					288.04	590.57	66.44	600			0.85	2.023	302.52	51.23%
Delphinium Crescent		MH11408	MH11407											0.00	0.00	10.00	0.27	10.27	76.81	104.19	122.14	178.56	0.00					0.00	78.47	25.01	250			1.60	1.549	78.47	100.00%
Delphinium Crescent	S11407	MH11407	MH11406						0.18					0.36	0.36	10.27	0.31	10.58	75.79	102.79	120.49	176.14	27.31					27.31	78.47	28.74	250			1.60	1.549	51.17	65.20%
Delphinium Crescent	R11406	MH11406	MH11405				0.17							0.27	0.63	10.58	0.51	11.09	74.65	101.23	118.66	173.44	47.01					47.01	78.47	47.61	250			1.60	1.549	31.47	40.10%
Delphinium Crescent		MH11405	MH11404											0.00	0.63	11.09	0.10	11.19	72.86	98.76	115.75	169.17	45.88					45.88	78.47	9.35	250			1.60	1.549	32.60	41.54%
Delphinium Crescent	S11404	MH11404	MH11403				0.48		0.49					1.74	2.37	11.19	0.72	11.91	72.51	98.29	115.19	168.35	171.94					171.94	282.17	74.37	450			0.90	1.719	110.23	39.07%
Nemesia Way	S11350, R11350A, R11350B	MH11350	MH11351				0.28		0.24					0.92	0.92	10.00	0.61	10.61	76.81	104.19	122.14	178.56	70.97					70.97	141.68	45.20	375			0.60	1.243	70.71	49.91%
Nemesia Way	S11351	MH11351	MH11403						0.25					0.50	1.42	10.61	0.79	11.39	74.55	101.10	118.49	173.20	106.20					106.20	230.39	66.41	450			0.60	1.403	124.19	53.90%
Delphinium Crescent	S11401A, R11402	MH11403	MH11402				0.27		0.24					0.91	4.70	11.91	0.93	12.85	70.17	95.07	111.40	162.78	330.05					330.05	580.71	71.43	750			0.25	1.273	250.66	43.16%
Delphinium Crescent		MH11402	MH11401											0.00	4.70	12.85	0.12	12.97	67.36	91.22	106.87	156.13	316.86					316.86	580.71	9.06	750			0.25	1.273	263.84	45.44%
Delphinium Crescent	S11401B, R11401	MH11401	MH11400				0.31		0.18					0.85	5.56	12.97	1.05	14.02	67.03	90.76	106.33	155.33	372.35					372.35	580.71	80.19	750			0.25	1.273	208.36	35.88%
Delphinium Crescent	S11400, R11400A, R11400B	MH11400	MH11300				0.22		0.26					0.87	6.42	14.02	0.95	14.96	64.19	86.88	101.76	148.63	412.39					412.39	669.70	68.90	825			0.20	1.214	257.31	38.42%
Barrett Farm Drive		MH11300	EX Blkhd											0.00	31.57	15.07	0.02	15.09	61.60	83.33	97.58	142.50	1,944.49					2,192.79	4,658.21	2.51	1650			0.24	2.110	2465.42	52.93%
Barrett Farm Drive		MH11300	EX Blkhd											0.00	2.98	15.07	0.02	15.09	61.60	83.33	97.58	142.50		248.31				2,192.79	4,658.21	2.51	1650			0.24	2.110	2465.42	52.93%

Definitions:
Q = 2.78CiA, where:
Q = Peak Flow in Litres per Second (L/s)
A = Area in Hectares (Ha)
i = Rainfall intensity in millimeters per hour (mm/hr)

[i = 732.951 / (TC+6.199)^0.810]	2 YEAR
[i = 998.071 / (TC+6.053)^0.814]	5 YEAR
[i = 1174.184 / (TC+6.014)^0.816]	10 YEAR
[i = 1735.688 / (TC+6.014)^0.820]	100 YEAR

Notes:
1. Mannings coefficient (n) = 0.013
0.024

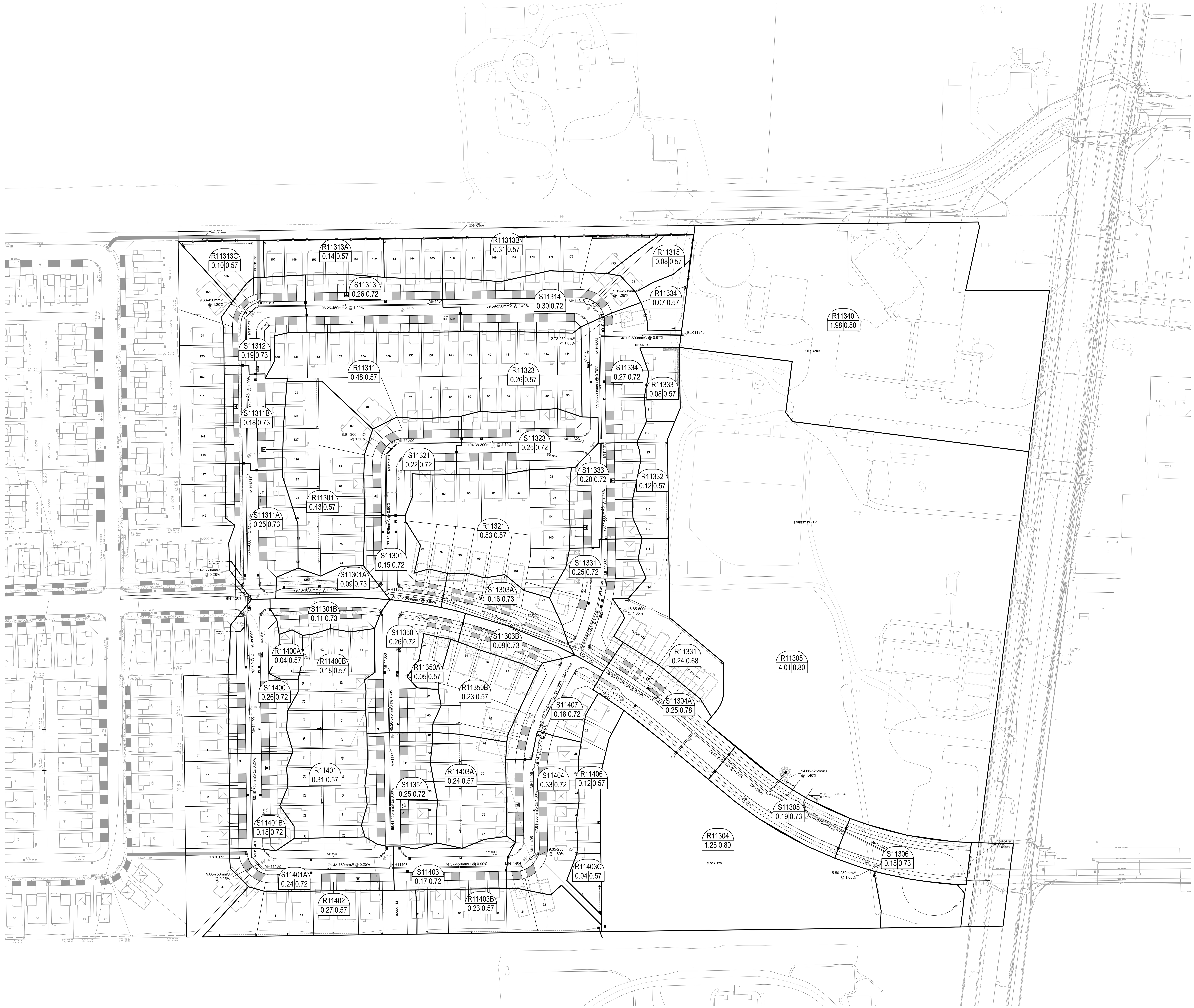
Designed: AC

Checked: JIM

Dwg. Reference: 34731-520

No.	Revision	Date
1.	Submission No.1 for City Review	2021-11-10
2.	Submission No.2 for City Review	2022-02-24
3.	Submission No.3 for City Review	2022-04-06

File Reference:	Date:	Sheet No:
34731-5.7	2021-11-10	1 of 1



LEGEND :

S11407 — AREA NUMBER
0.18 | 0.69 — RUNOFF COEFFICIENT
AREA IN HECTARES

SEE 020, 021, 022 FOR NOTES, LEGEND, CB TABLE, STREET SECTIONS AND DETAILS

LEITRIM ROAD / KELLY FARM DRIVE / BANK STREET

KEY PLAN
NTS

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4			
3			
2	SUBMISSION NO. 2 FOR CITY REVIEW	J.I.M.	2022:02:28
1	SUBMISSION NO. 1 FOR CITY REVIEW	J.I.M.	2021:11:10

BARRETT CO-TENANCY

IBI GROUP
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Ottawa ON K1S 5N4 Canada
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ibigroup.com

Project Title
BARRETT LANDS
PHASE 3

LICENSED PROFESSIONAL ENGINEER
J. I. MOFFATT
2022/02/28
PROVINCE OF ONTARIO

N

Drawing Title
STORM DRAINAGE
AREA PLAN

Scale
1:1000

Design	Date
FHJF	NOVEMBER 2021
Drawn	Checked
M.M.	J.I.M.
Project No.	Drawing No.
34731	520

D07-16-17-0002PH3

18627

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PROJECT:	Barrett Block 178
DATE:	2022-11-11
FILE:	135925-6.4.4
REV #:	2
DESIGNED BY:	AC
CHECKED BY:	RM

STORMWATER MANAGEMENT

Formulas and Descriptions

i_{2yr} = 1:2 year Intensity = 732.951 / $(T_c+6.199)^{0.810}$
i_{5yr} = 1:5 year Intensity = 998.071 / $(T_c+6.053)^{0.814}$
i_{100yr} = 1:100 year Intensity = 1735.688 / $(T_c+6.014)^{0.820}$
T_c = Time of Concentration (min)
C = Average Runoff Coefficient
A = Area (Ha)
Q = Flow = 2.78CiA (L/s)

Maximum Allowable Release Rate

Restricted Flowrate (based on modelled flow from Phase 3)

EXT	234.000 l/s		From Barrett Phase 3
Private Residential	203.31	1.060 ha	
Future Commercial	30.69	0.160 ha	

$Q_{restricted}$ = 203.31 L/s

*Uncontrolled Release ($Q_{uncontrolled}$ = 2.78*C*i_{100yr}*$A_{uncontrolled}$)*

C =	0.8
T_c =	10 min
i_{100yr} =	178.56 mm/hr
$A_{uncontrolled}$ =	0.06 Ha

$Q_{uncontrolled}$ = 23.83 L/s

Maximum Allowable Release Rate ($Q_{max\ allowable}$ = $Q_{restricted}$ - $Q_{uncontrolled}$)

$Q_{max\ allowable}$ = 179.48 L/s

OVERFLOW SUMMARY TABLE

Area ID	Overflow to		100year	100year+20%
S10	Barrett Farm Drive		39.68	62.70
R6	Delphinium Cres.		97.70	140.55
Total			137.38	203.25
Barrett Phase 3 allowance			350	476

MODIFIED RATIONAL METHOD (100-Year, 100-Year +20% & 2-Year Ponding)

Drainage Area	*S20A*
Area (Ha)	0.090
C =	1.00
Restricted Flow Q_r (L/s)=	15.00

100-Year Ponding						100Yr +20%		
T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow Q_p=2.78xCi_{100yr}A (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)	100YRQp 20% (L/s)	Qp - Qr (L/s)	Volume 100+20 (m3)
5	242.70	60.72	15.00	45.72	13.72			
10	178.56	44.68	15.00	29.68	17.81			
15	142.89	35.75	15.00	20.75	**18.68**	42.90	27.90	**25.11**
20	119.95	30.01	15.00	15.01	18.01			
25	103.85	25.98	15.00	10.98	16.47			

Storage (m^3) / 100+20

Overflow	Required	Surface	Sub-surface	Balance	Overflow	Required	Balance
0.00	18.68	20.59	0	0.00	0.00	25.11	4.52
			L/s =	0.00		L/s =	5.02

overflows to: S10

Drainage Area	*S20A*
Area (Ha)	0.090
C =	0.80
Restricted Flow Q_r (L/s)=	15.00

2-Year Ponding					
T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow Q_p=2.78xCi_{2yr}A (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
8	85.46	17.11	15.00	2.11	1.01
9	80.87	16.19	15.00	1.19	0.64
10	76.81	15.37	15.00	0.37	**0.22**
11	73.17	14.65	15.00	-0.35	-0.23
12	69.89	13.99	15.00	-1.01	-0.73

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.22	20.59	0	0.00

overflows to: S10

Drainage Area S10 – 100-Year

Drainage Area	S10
Area (Ha)	0.140
C =	1.00
Restricted Flow Q_r (L/s)=	33.00

100-Year Ponding						100Yr +20%		
T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)	100YRQp 20% (L/s)	Qp - Qr (L/s)	Volume 100+20 (m3)
-1	462.72	180.09	33.00	147.09	-8.83			
4	262.41	102.13	33.00	69.13	16.59			
9	188.25	73.27	33.00	40.27	**21.75**	87.92	54.92	**29.66**
14	148.72	57.88	33.00	24.88	20.90			
19	123.87	48.21	33.00	15.21	17.34			

Storage (m^3)					100+20		
Overflow	Required	Surface	Sub-surface	Balance	Overflow	Required	Balance
0.00	21.75	0.32	0	21.43	4.52	34.18	33.86
			L/s =	39.68		L/s =	62.70

overflows to: Barrett Farm Drive

Drainage Area S10 – 2-Year

Drainage Area	S10
Area (Ha)	0.140
C =	0.80
Restricted Flow Q_r (L/s)=	33.00

2-Year Ponding					
T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
8	85.46	26.61	33.00	-6.39	-3.07
9	80.87	25.18	33.00	-7.82	-4.22
10	76.81	23.91	33.00	-9.09	**-5.45**
11	73.17	22.78	33.00	-10.22	-6.74
12	69.89	21.76	33.00	-11.24	-8.09

Storage (m^3)				
Overflow	Required	Surface	Sub-surface	Balance
0.00	-5.45	0.32	0	0.00

overflows to: Barrett Farm Drive

Drainage Area FUTCOM – 100-Year

Drainage Area	FUTCOM
Area (Ha)	0.160
C =	1.00
Restricted Flow Q_r (L/s)=	30.69

100-Year Ponding						100Yr +20%		
T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)	100YRQp 20% (L/s)	Qp - Qr (L/s)	Volume 100+20 (m3)
4	262.41	116.72	30.69	86.03	20.65			
9	188.25	83.74	30.69	53.05	28.65			
14	148.72	66.15	30.69	35.46	**29.79**	79.38	48.69	**40.90**
19	123.87	55.10	30.69	24.41	27.83			
24	106.68	47.45	30.69	16.76	24.14			

Storage (m^3)					100+20		
Overflow	Required	Surface	Sub-surface	Balance	Overflow	Required	Balance
0.00	29.79	12.00	0	17.79	0.00	40.90	28.90
			L/s =	21.18		L/s =	34.41

overflows to: S4

Drainage Area FUTCOM – 2-Year

Drainage Area	FUTCOM
Area (Ha)	0.160
C =	0.80
Restricted Flow Q_r (L/s)=	30.69

2-Year Ponding					
T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
8	85.46	30.41	30.69	-0.28	-0.13
9	80.87	28.78	30.69	-1.91	-1.03
10	76.81	27.33	30.69	-3.36	**-2.01**
11	73.17	26.04	30.69	-4.65	-3.07
12	69.89	24.87	30.69	-5.82	-4.19

Storage (m^3)				
Overflow	Required	Surface	Sub-surface	Balance
0.00	-2.01	12.00	0	0.00

overflows to: S4

Drainage Area S4 – 100-Year

Drainage Area	S4
Area (Ha)	0.150
C =	1.00
Restricted Flow Q_r (L/s)=	26.00

100-Year Ponding						100Yr +20%		
T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)	100YRQp 20% (L/s)	Qp - Qr (L/s)	Volume 100+20 (m3)
4	262.41	109.42	26.00	83.42	20.02			
9	188.25	78.50	26.00	52.50	28.35			
14	148.72	62.02	26.00	36.02	**30.25**	74.42	48.42	**40.67**
19	123.87	51.65	26.00	25.65	29.24			
24	106.68	44.48	26.00	18.48	26.62			

Storage (m^3)					100+20		
Overflow	Required	Surface	Sub-surface	Balance	Overflow	Required	Balance
17.79	48.04	1.16	0	46.88	28.90	69.58	68.42
			L/s =	55.81		L/s =	81.45

overflows to: S5

Drainage Area S4 – 2-Year

Drainage Area	S4
Area (Ha)	0.150
C =	0.80
Restricted Flow Q_r (L/s)=	26.00

2-Year Ponding					
T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
8	85.46	28.51	26.00	2.51	1.20
9	80.87	26.98	26.00	0.98	0.53
10	76.81	25.62	26.00	-0.38	**-0.23**
11	73.17	24.41	26.00	-1.59	-1.05
12	69.89	23.32	26.00	-2.68	-1.93

Storage (m^3)				
Overflow	Required	Surface	Sub-surface	Balance
0.00	-0.23	1.16	0	0.00

overflows to: S5

Drainage Area S20B – 100-Year

Drainage Area	S20B
Area (Ha)	0.040
C =	1.00
Restricted Flow Q_r (L/s)=	10.00

100-Year Ponding						100Yr +20%		
T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)	100YRQp 20% (L/s)	Qp - Qr (L/s)	Volume 100+20 (m3)
-4	977.56	108.70	10.00	98.70	-23.69			
1	351.38	39.07	10.00	29.07	1.74			
6	226.01	25.13	10.00	15.13	**5.45**	30.16	20.16	**7.26**
11	169.91	18.89	10.00	8.89	5.87			
16	137.55	15.30	10.00	5.30	5.08			

Storage (m^3)					100+20		
Overflow	Required	Surface	Sub-surface	Balance	Overflow	Required	Balance
0.00	5.45	1.41	0	4.04	0.00	7.26	5.85
			L/s =	11.22		L/s =	16.24

overflows to: S5

Drainage Area S20B – 2-Year

Drainage Area	S20B
Area (Ha)	0.040
C =	0.80
Restricted Flow Q_r (L/s)=	10.00

2-Year Ponding					
T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
8	85.46	7.60	10.00	-2.40	-1.15
9	80.87	7.19	10.00	-2.81	-1.51
10	76.81	6.83	10.00	-3.17	**-1.90**
11	73.17	6.51	10.00	-3.49	-2.30
12	69.89	6.22	10.00	-3.78	-2.72

Storage (m^3)				
Overflow	Required	Surface	Sub-surface	Balance
0.00	-1.90	1.41	0	0.00

overflows to: S5

Drainage Area	S5		
Area (Ha)	0.140		
C =	1.00	Restricted Flow Q_r (L/s)=	25.00

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow Q_p=2.78xCi_{100yr}A (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)	100YRQp 20% (L/s)	Qp - Qr (L/s)	Volume 100+20 (m3)
100-Year Ponding						**100Yr +20%**		
6	226.01	87.96	25.00	62.96	22.67			
11	169.91	66.13	25.00	41.13	27.14			
16	137.55	53.53	25.00	28.53	**27.39**	64.24	39.24	**37.67**
21	116.30	45.26	25.00	20.26	25.53			
26	101.18	39.38	25.00	14.38	22.43			

Storage (m^3) — 100+20

Overflow	Required	Surface	Sub-surface	Balance	Overflow	Required	Balance
50.92	78.31	1.32	0	76.99	74.26	111.93	110.61
			L/s =	80.20		L/s =	115.22

overflows to: S6

Drainage Area	S5		
Area (Ha)	0.140		
C =	0.80	Restricted Flow Q_r (L/s)=	25.00

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow Q_p=2.78xCi_{2yr}A (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
2-Year Ponding					
8	85.46	26.61	25.00	1.61	0.77
9	80.87	25.18	25.00	0.18	0.10
10	76.81	23.91	25.00	-1.09	**-0.65**
11	73.17	22.78	25.00	-2.22	-1.46
12	69.89	21.76	25.00	-3.24	-2.33

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	-0.65	1.32	0	0.00

overflows to: S6

Drainage Area	S6		
Area (Ha)	0.300		
C =	1.00	Restricted Flow Q_r (L/s)=	50.00

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow Q_p=2.78xCi_{100yr}A (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)	100YRQp 20% (L/s)	Qp - Qr (L/s)	Volume 100+20 (m3)
100-Year Ponding						**100Yr +20%**		
8	199.20	166.13	50.00	116.13	55.74			
13	155.11	129.36	50.00	79.36	61.90			
18	128.08	106.82	50.00	56.82	**61.37**	128.19	78.19	**84.44**
23	109.68	91.47	50.00	41.47	57.23			
28	96.27	80.29	50.00	30.29	50.89			

Storage (m^3) — 100+20

Overflow	Required	Surface	Sub-surface	Balance	Overflow	Required	Balance
76.99	138.36	9.71	0	128.65	110.61	195.06	185.35
			L/s =	119.12		L/s =	171.62

overflows to: R6

Drainage Area	S6		
Area (Ha)	0.300		
C =	0.80	Restricted Flow Q_r (L/s)=	50.00

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow Q_p=2.78xCi_{2yr}A (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
2-Year Ponding					
8	85.46	57.02	50.00	7.02	3.37
9	80.87	53.96	50.00	3.96	2.14
10	76.81	51.24	50.00	1.24	**0.75**
11	73.17	48.82	50.00	-1.18	-0.78
12	69.89	46.63	50.00	-3.37	-2.42

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.75	9.71	0	0.00

overflows to: R6

Drainage Area	R6		
Area (Ha)	0.170	Restricted Flow Q_r (L/s)=	20.00
C =	0.68	50% Restricted Flow Q_r (L/s)=	10.00

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow Q_p=2.78xCi_{100yr}A (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)	100YRQp 20% (L/s)	Qp - Qr (L/s)	Volume 100+20 (m3)
100-Year Ponding						**100Yr +20%**		
16	137.55	44.20	10.00	34.20	32.84			
21	116.30	37.37	10.00	27.37	34.49			
26	101.18	32.52	10.00	22.52	**35.12**	39.02	29.02	**45.27**
31	89.83	28.87	10.00	18.87	35.09			
36	80.96	26.02	10.00	16.02	34.60			

Storage (m^3) — 100+20

Overflow	Required	Surface	Sub-surface	Balance	Overflow	Required	Balance
128.65	163.78	4.38	6.98	152.42	185.35	230.61	219.25
			L/s =	97.70		L/s =	140.55

overflows to: Delphinium Cres.

Drainage Area	R6		
Area (Ha)	0.170		
C =	0.68	Restricted Flow Q_r (L/s)=	10.00

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow Q_p=2.78xCi_{2yr}A (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
2-Year Ponding					
11	73.17	23.51	10.00	13.51	8.92
12	69.89	22.46	10.00	12.46	8.97
13	66.93	21.51	10.00	11.51	**8.98**
14	64.23	20.64	10.00	10.64	8.94
15	61.77	19.85	10.00	9.85	8.87

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	8.98	4.38	6.98	0.00

overflows to: Delphinium Cres.

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PROJECT:	Barrett Block 178
DATE:	2022-10-27
FILE:	135925-6.4.4
REV #:	2
DESIGNED BY:	AC
CHECKED BY:	RM

UNDERGROUND STORAGE CALCULATIONS - BARRETT BLOCK 178

Pipe Storage	*Area R6*				
From	**To**	**Length**	**Diameter**	**X-sec Area**	**Volume**
ECB1	RYCB7	26.07	250	0.049	1.28
RYCB7	ECB2	28.46	250	0.049	1.40
ECB2	ECB3	29.13	250	0.049	1.43
ECB3	ECB4	20.50	250	0.049	1.01
				Total	5.11

Structure Storage		*Area*				
	Base	**Top**	**Height**	**diameter**	**X-sec Area**	**Volume**
ECB1	98.480	99.48	1.00	300	0.071	0.07
ECB2	100.080	101.08	1.00	300	0.071	0.07
ECB3	100.090	101.09	1.00	300	0.071	0.07
ECB4	100.150	101.15	1.00	300	0.071	0.07
RYCB7	99.630	101.03	1.40	1200	1.131	1.58
					Total	1.87

TOTAL AREA	**6.98**

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STORM HYDRAULIC GRADE LINE DESIGN SHEET
PROJECT TITLE
CITY OF OTTAWA
DEVELOPPER

JOB #: 135925 - 6.04
DATE: 2022-11-11
DESIGN: AC
CHECKED: RM
REV #: 2

FRICTION LOSS	FROM MH	TO MH	PIPE ID
Block 178	**10**	**9**	
INVERT ELEVATION (m)	98.030	98.091	
OBVERT ELEVATION (m)	98.480	98.541	
DIAMETER (mm)			450
LENGTH (m)			11.1
FLOW (l/s)			179.00
HGL (m) ***	**96.430**	**96.474**	**0.044**
MANHOLE COEF K= 0.75	LOSS (m)	0.048	
TOTAL HGL (m)		**98.406**	
MAX. SURCHARGE (mm)		**-135**	

MANNING FORMULA - FLOWING FULL

DIA (m)	Area (m2)	Perim. (m)	Slope (%)	Hyd.R. (m)	Vel. (m/s)	Q (l/s)
0.45	0.16	1.41	0.550	0.11	1.33	211.34

HYDRAULIC SLOPE = 17.82 %
DESIGN FLOW TO FULL FLOW RATIO (Q/ 0.847
DESIGN FLOW DEPTH = 0.315

Head loss in manhole simplified method p. 71 (MWDM)
fig1.7.1, Kratio = 0.75 for 45 bends $K_L=0.75$
Velocity = Flow / Area = 1.13 m/s
$HL = K_L * V^2 / 2g$

FRICTION LOSS	FROM MH	TO MH	PIPE ID
Block 178	**9**	**8**	
INVERT ELEVATION (m)	98.121	98.156	
OBVERT ELEVATION (m)	98.571	98.606	
DIAMETER (mm)			450
LENGTH (m)			6.3
FLOW (l/s)			159.00
HGL (m) ***	**98.406**	**98.426**	**0.020**
MANHOLE COEF K= 0.75	LOSS (m)	0.038	
TOTAL HGL (m)		**98.464**	
MAX. SURCHARGE (mm)		**-142**	

MANNING FORMULA - FLOWING FULL

DIA (m)	Area (m2)	Perim. (m)	Slope (%)	Hyd.R. (m)	Vel. (m/s)	Q (l/s)
0.45	0.16	1.41	0.550	0.11	1.34	212.23

HYDRAULIC SLOPE = 0.92 %
DESIGN FLOW TO FULL FLOW RATIO (Q/ 0.749
DESIGN FLOW DEPTH = 0.288

Head loss in manhole simplified method p. 71 (MWDM)
fig1.7.1, Kratio = 0.75 for 45 bends $K_L=0.75$
Velocity = Flow / Area = 1.00 m/s
$HL = K_L * V^2 / 2g$

FRICTION LOSS	FROM MH	TO MH	PIPE ID
Block 178	**8**	**7**	
INVERT ELEVATION (m)	98.186	98.522	
OBVERT ELEVATION (m)	98.636	98.972	
DIAMETER (mm)			450
LENGTH (m)			74.7
FLOW (l/s)			159.00
HGL (m) ***	**98.464**	**98.696**	**0.232**
MANHOLE COEF K= 0.05	LOSS (m)	0.003	
TOTAL HGL (m)		**98.833**	
MAX. SURCHARGE (mm)		**-139**	

MANNING FORMULA - FLOWING FULL

DIA (m)	Area (m2)	Perim. (m)	Slope (%)	Hyd.R. (m)	Vel. (m/s)	Q (l/s)
0.45	0.16	1.41	0.450	0.11	1.20	191.17

HYDRAULIC SLOPE = 0.49 %
DESIGN FLOW TO FULL FLOW RATIO (Q/ 0.832
DESIGN FLOW DEPTH = 0.311

Head loss in manhole simplified method p. 71 (MWDM)
straight through $K_L=0.05$
Velocity = Flow / Area = 1.00 m/s
$HL = K_L * V^2 / 2g$

FRICTION LOSS	FROM MH	TO MH	PIPE ID
Block 178	**7**	**6**	
INVERT ELEVATION (m)	98.552	98.587	
OBVERT ELEVATION (m)	99.002	99.037	
DIAMETER (mm)			450
LENGTH (m)			7.8
FLOW (l/s)			126.00
HGL (m) ***	**98.833**	**98.848**	**0.015**
MANHOLE COEF K= 0.05	LOSS (m)	0.002	
TOTAL HGL (m)		**98.853**	
MAX. SURCHARGE (mm)		**-185**	

MANNING FORMULA - FLOWING FULL

DIA (m)	Area (m2)	Perim. (m)	Slope (%)	Hyd.R. (m)	Vel. (m/s)	Q (l/s)
0.45	0.16	1.41	0.450	0.11	1.20	191.50

HYDRAULIC SLOPE = 0.26 %
DESIGN FLOW TO FULL FLOW RATIO (Q/ 0.658
DESIGN FLOW DEPTH = 0.266

Head loss in manhole simplified method p. 71 (MWDM)
straight through $K_L=0.05$
Velocity = Flow / Area = 0.79 m/s
$HL = K_L * V^2 / 2g$

IBI GROUP

STORM HYDRAULIC GRADE LINE DESIGN SHEET
PROJECT TITLE
CITY OF OTTAWA
DEVELOPPER

JOB #: 135925 - 6.04
DATE: 2022-11-11
DESIGN: AC
CHECKED: RM
REV #: 2

FRICTION LOSS	FROM MH	TO MH	PIPE ID
Block 178	**6**	**5**	
INVERT ELEVATION (m)	98.617	98.753	
OBVERT ELEVATION (m)	99.067	99.203	
DIAMETER (mm)			450
LENGTH (m)			30.4
FLOW (l/s)			126.00
HGL (m) ***	**98.853**	**98.912**	**0.059**
MANHOLE COEF K= 0.05	LOSS (m)	0.002	
TOTAL HGL (m)		**99.019**	
MAX. SURCHARGE (mm)		**-185**	

MANNING FORMULA - FLOWING FULL

DIA (m)	Area (m2)	Perim. (m)	Slope (%)	Hyd.R. (m)	Vel. (m/s)	Q (l/s)
0.45	0.16	1.41	0.450	0.11	1.20	190.76

HYDRAULIC SLOPE = 0.55 %
DESIGN FLOW TO FULL FLOW RATIO (Q/ 0.661
DESIGN FLOW DEPTH = 0.266

Head loss in manhole simplified method p. 71 (MWDM)
straight through K_L=0.05
Velocity = Flow / Area = 0.79 m/s
HL = K_L * V^2/ 2g

FRICTION LOSS	FROM MH	TO MH	PIPE ID
Block 178	**5**	**4**	
INVERT ELEVATION (m)	98.848	98.963	
OBVERT ELEVATION (m)	99.223	99.338	
DIAMETER (mm)			375
LENGTH (m)			38.2
FLOW (l/s)			51.00
HGL (m) ***	**99.019**	**99.051**	**0.032**
MANHOLE COEF K= 0.05	LOSS (m)	0.001	
TOTAL HGL (m)		**99.154**	
MAX. SURCHARGE (mm)		**-184**	

MANNING FORMULA - FLOWING FULL

DIA (m)	Area (m2)	Perim. (m)	Slope (%)	Hyd.R. (m)	Vel. (m/s)	Q (l/s)
0.375	0.11	1.18	0.300	0.09	0.87	96.19

HYDRAULIC SLOPE = 0.36 %
DESIGN FLOW TO FULL FLOW RATIO (Q/ 0.530
DESIGN FLOW DEPTH = 0.191

Head loss in manhole simplified method p. 71 (MWDM)
straight through K_L=0.05
Velocity = Flow / Area = 0.46 m/s
HL = K_L * V^2/ 2g

FRICTION LOSS	FROM MH	TO MH	PIPE ID
Block 178	**5**	**20**	
INVERT ELEVATION (m)	99.013	99.314	
OBVERT ELEVATION (m)	99.263	99.564	
DIAMETER (mm)			250
LENGTH (m)			66.8
FLOW (l/s)			25.00
HGL (m) ***	**99.019**	**99.137**	**0.118**
MANHOLE COEF K= 0.05	LOSS (m)	0.001	
TOTAL HGL (m)		**99.457**	
MAX. SURCHARGE (mm)		**-108**	

MANNING FORMULA - FLOWING FULL

DIA (m)	Area (m2)	Perim. (m)	Slope (%)	Hyd.R. (m)	Vel. (m/s)	Q (l/s)
0.25	0.05	0.79	0.450	0.06	0.81	39.90

HYDRAULIC SLOPE = 0.66 %
DESIGN FLOW TO FULL FLOW RATIO (Q/ 0.627
DESIGN FLOW DEPTH = 0.143

Head loss in manhole simplified method p. 71 (MWDM)
straight through K_L=0.05
Velocity = Flow / Area = 0.51 m/s
HL = K_L * V^2/ 2g

FRICTION LOSS	FROM MH	TO MH	PIPE ID
Block 178	**4**	**21**	
INVERT ELEVATION (m)	99.198	99.432	
OBVERT ELEVATION (m)	99.398	99.632	
DIAMETER (mm)			200
LENGTH (m)			39.0
FLOW (l/s)			0.00
HGL (m) ***	**99.457**	**99.457**	**0.000**
MANHOLE COEF K= 0.05	LOSS (m)	0.000	
TOTAL HGL (m)		**99.457**	
MAX. SURCHARGE (mm)		**-176**	

MANNING FORMULA - FLOWING FULL

DIA (m)	Area (m2)	Perim. (m)	Slope (%)	Hyd.R. (m)	Vel. (m/s)	Q (l/s)
0.2	0.03	0.63	0.600	0.05	0.81	25.39

HYDRAULIC SLOPE = 0.00 %
DESIGN FLOW TO FULL FLOW RATIO (Q/ 0.000
DESIGN FLOW DEPTH = 0.002

Head loss in manhole simplified method p. 71 (MWDM)
straight through K_L=0.05
Velocity = Flow / Area = 0.00 m/s
HL = K_L * V^2/ 2g

STORM HYDRAULIC GRADE LINE DESIGN SHEET
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CITY OF OTTAWA
DEVELOPPER

JOB #: 135925 - 6.04
DATE: 2022-11-11
DESIGN: AC
CHECKED: RM
REV #: 2

FRICTION LOSS	FROM MH	TO MH	PIPE ID
Block 178	**4**	**3**	
INVERT ELEVATION (m)	99.058	99.168	
OBVERT ELEVATION (m)	99.358	99.468	
DIAMETER (mm)			300
LENGTH (m)			31.7
FLOW (l/s)			26.00
HGL (m) ***	**99.154**	**99.177**	**0.023**
MANHOLE COEF K= 0.05	LOSS (m)	0.000	
TOTAL HGL (m)		**99.309**	
MAX. SURCHARGE (mm)		**-159**	

MANNING FORMULA - FLOWING FULL

DIA (m)	Area (m2)	Perim. (m)	Slope (%)	Hyd.R. (m)	Vel. (m/s)	Q (l/s)
0.3	0.07	0.94	0.350	0.08	0.81	56.95

HYDRAULIC SLOPE = 0.49 %
DESIGN FLOW TO FULL FLOW RATIO (Q 0.457
DESIGN FLOW DEPTH = 0.141

Head loss in manhole simplified method p. 71 (MWDM)
straight through K_L=0.05
Velocity = Flow / Area = 0.37 m/s
$HL = K_L * V^2 / 2g$

FRICTION LOSS	FROM MH	TO MH	PIPE ID
Block 178	**3**	**2**	
INVERT ELEVATION (m)	99.298	99.342	
OBVERT ELEVATION (m)	99.498	99.542	
DIAMETER (mm)			200
LENGTH (m)			7.3
FLOW (l/s)			0.00
HGL (m) ***	**99.309**	**99.309**	**0.000**
MANHOLE COEF K= 0.05	LOSS (m)	0.000	
TOTAL HGL (m)		**99.344**	
MAX. SURCHARGE (mm)		**-198**	

MANNING FORMULA - FLOWING FULL

DIA (m)	Area (m2)	Perim. (m)	Slope (%)	Hyd.R. (m)	Vel. (m/s)	Q (l/s)
0.2	0.03	0.63	0.600	0.05	0.81	25.54

HYDRAULIC SLOPE = 0.48 %
DESIGN FLOW TO FULL FLOW RATIO (Q 0.000
DESIGN FLOW DEPTH = 0.002

Head loss in manhole simplified method p. 71 (MWDM)
straight through K_L=0.05
Velocity = Flow / Area = 0.00 m/s
$HL = K_L * V^2 / 2g$

FRICTION LOSS	FROM MH	TO MH	PIPE ID
Block 178	**2**	**1**	
INVERT ELEVATION (m)	99.372	99.514	
OBVERT ELEVATION (m)	99.572	99.714	
DIAMETER (mm)			200
LENGTH (m)			23.7
FLOW (l/s)			0.00
HGL (m) ***	**99.344**	**99.344**	**0.000**
MANHOLE COEF K= 0.05	LOSS (m)	0.000	
TOTAL HGL (m)		**99.516**	
MAX. SURCHARGE (mm)		**-198**	

MANNING FORMULA - FLOWING FULL

DIA (m)	Area (m2)	Perim. (m)	Slope (%)	Hyd.R. (m)	Vel. (m/s)	Q (l/s)
0.2	0.03	0.63	0.600	0.05	0.81	25.35

HYDRAULIC SLOPE = 0.72 %
DESIGN FLOW TO FULL FLOW RATIO (Q 0.000
DESIGN FLOW DEPTH = 0.002

Head loss in manhole simplified method p. 71 (MWDM)
straight through K_L=0.05
Velocity = Flow / Area = 0.00 m/s
$HL = K_L * V^2 / 2g$

Table 5.10 Storm Hydraulic Grade Line - Local Sewers within Barrett Lands Phase 3 for the 100 Year 3 Hour Chicago and 100 Year 3 Hour Chicago increased by 20% Storm Events

XPSWMM NODE	USF (M)	STORM HYDRAULIC GRADE LINE (1)							
		100 YEAR 3 HOUR CHICAGO				100 YEAR 3 HOUR CHICAGO + 20%			
		RARE EVENT SANITARY FLOW		ANNUAL EVENT SANITARY FLOW		RARE EVENT SANITARY FLOW		ANNUAL EVENT SANITARY FLOW	
		HGL (M)*	USF–HGL (M)	HGL (M)*	USF–HGL (M)	HGL (M)*	USF–HGL (M)	HGL (M)*	USF–HGL (M)
MH11300	95.63	93.91	1.72	93.91	1.72	93.96	1.67	93.96	1.67
MH11301	96.58	94.96	1.62	94.96	1.62	94.96	1.62	94.96	1.62
MH11302	97.98	95.70	2.28	95.70	2.28	95.71	2.27	95.71	2.27
MH11303	98.67	96.23	2.44	96.23	2.44	96.23	2.44	96.23	2.44
MH11304	99.23	96.36	2.87	96.36	2.87	96.36	2.87	96.36	2.87
MH11305	99.28	96.43	2.85	96.43	2.85	96.43	2.85	96.43	2.85
MH11311	96.38	94.90	1.48	94.90	1.48	94.90	1.48	94.90	1.48
MH11312	97.28	95.85	1.43	95.85	1.43	95.85	1.43	95.85	1.43
MH11313	97.48	96.13	1.35	96.13	1.35	96.13	1.35	96.13	1.35
MH11314	98.63	97.27	1.36	97.27	1.36	97.27	1.36	97.27	1.36
MH11315	100.93	99.51	1.42	99.51	1.42	99.51	1.42	99.51	1.42
MH11316	100.93	99.60	1.33	99.60	1.33	99.60	1.33	99.60	1.33
MH11321	97.63	96.11	1.52	96.11	1.52	96.11	1.52	96.11	1.52
MH11322	97.88	96.61	1.27	96.61	1.27	96.61	1.27	96.61	1.27
MH11323	100.08	98.80	1.28	98.80	1.28	98.80	1.28	98.80	1.28
MH11331	98.93	97.60	1.33	97.60	1.33	97.60	1.33	97.60	1.33
MH11332	98.93	97.73	1.21	97.73	1.21	97.73	1.21	97.73	1.21
MH11333	100.38	98.71	1.67	98.71	1.67	98.71	1.67	98.71	1.67
MH11334	100.88	99.24	1.64	99.24	1.64	99.24	1.64	99.24	1.64
MH11350	96.48	95.77	0.71	95.77	0.71	95.77	0.71	95.77	0.71
MH11351	96.63	95.42	1.21	95.42	1.21	95.42	1.21	95.42	1.21
MH11400	95.43	94.56	0.87	94.56	0.87	94.59	0.84	94.59	0.84
MH11401	96.03	94.85	1.18	94.85	1.18	94.89	1.14	94.89	1.14
MH11402	95.78	94.89	0.89	94.89	0.89	94.94	0.84	94.94	0.84
MH11403	96.01	95.06	0.95	95.06	0.95	95.11	0.90	95.11	0.90
MH11404	96.73	95.62	1.11	95.62	1.11	95.63	1.10	95.63	1.10
MH11405	97.13	96.03	1.10	96.03	1.10	96.03	1.10	96.03	1.10
MH11406	97.68	96.77	0.91	96.77	0.91	96.77	0.91	96.77	0.91
MH11407	98.08	97.23	0.85	97.23	0.85	97.23	0.85	97.23	0.85
MH11408	98.73	97.49	1.24	97.49	1.24	97.49	1.24	97.49	1.24

(1) HGL results were obtained from the XPSWMM models entitled 34738-202002-RARE-3CHI100.out, 34738-202002-ANN-3CHI100.out, 34738-202002-RARE-3CHI120.out or 34738-202002-ANN-3CHI120.out and enclosed as part of the digital submission.

Barrett Block 178
Barrett Co-Tenancy

2022-10-27

Ditch S6 Length = 17.26 m

New Ditch Section Required 1:100 yr. flow = 119.12 l/s		0.119 Cu m/sec			
From Seelye use n =	0.013 (Channels)			area=	0.01
choose: slope S =	12.17 %	Up Stream Ditch btm=	102.10	wp=	0.92
Ditch Bottom	0.00 metres	Dn Stream Ditch Btm =	100.00		
Ditch slopes	22.00 :1	Difference =	2.10		
Water depth	**0.021** metres (depth needed to carry 0.13 Cu. M/sec)			Top Bank =	100.15
Check Ditch Capacity (Q)				Free Board =	0.13
Q =	0.012 Cu M/sec	and Velocity =	1.29 M/s		

Ditch S6 Length = 17.26 m

New Ditch Section Required 1:100 yr. +20% flow = 171.62 l/s		0.172 Cu m/sec			
From Seelye use n =	0.013 (Channels)			area=	0.07
choose: slope S =	12.17 %	Up Stream Ditch btm=	102.10	wp=	2.48
Ditch Bottom	0.00 metres	Dn Stream Ditch Btm =	100.00		
Ditch slopes	22.00 :1	Difference =	2.10		
Water depth	**0.056** metres (depth needed to carry 0.13 Cu. M/sec)			Top Bank =	100.15
Check Ditch Capacity (Q)				Free Board =	0.09
Q =	0.172 Cu M/sec	and Velocity =	2.48 M/s		

Ditch S10 Length = 38.00 m

New Ditch Section Required 1:100 yr. flow = 39.68 l/s		0.040 Cu m/sec			
From Seelye use n =	0.013 (Channels)			area=	0.04
choose: slope S =	0.89 %	Up Stream Ditch btm=	101.44	wp=	0.71
Ditch Bottom	0.00 metres	Dn Stream Ditch Btm =	101.10		
Ditch slopes	3.00 :1	Difference =	0.34		
Water depth	**0.113** metres (depth needed to carry 0.13 Cu. M/sec)			Top Bank =	101.25
Check Ditch Capacity (Q)				Free Board =	0.04
Q =	0.040 Cu M/sec	and Velocity =	1.03 M/s		

Ditch S10 Length = 38.00 m

New Ditch Section Required 1:100 yr. +20% flow = 62.7 l/s		0.063 Cu m/sec			
From Seelye use n =	0.013 (Channels)			area=	0.05
choose: slope S =	0.89 %	Up Stream Ditch btm=	101.44	wp=	0.85
Ditch Bottom	0.00 metres	Dn Stream Ditch Btm =	101.10		
Ditch slopes	3.00 :1	Difference =	0.34		
Water depth	**0.135** metres (depth needed to carry 0.13 Cu. M/sec)			Top Bank =	101.25
Check Ditch Capacity (Q)				Free Board =	0.02
Q =	0.064 Cu M/sec	and Velocity =	1.16 M/s		

Ditch S20 Length = 26.64 m

New Ditch Section Required 1:100 yr. flow = 0 l/s		0.000 Cu m/sec			
From Seelye use n =	0.013 (Channels)			area=	0.00
choose: slope S =	3.72 %	Up Stream Ditch btm=	102.39	wp=	0.00
Ditch Bottom	0.00 metres	Dn Stream Ditch Btm =	101.40		
Ditch slopes	3.00 :1	Difference =	0.99		
Water depth	**0.000** metres (depth needed to carry 0.13 Cu. M/sec)			Top Bank =	101.55
Check Ditch Capacity (Q)				Free Board =	0.15
Q =	0.000 Cu M/sec	and Velocity =	0.02 M/s		

Ditch S20 Length = 26.64 m

New Ditch Section Required 1:100 yr. +20% flow = 5.02 l/s		0.005 Cu m/sec			
From Seelye use n =	0.013 (Channels)			area=	0.00
choose: slope S =	3.72 %	Up Stream Ditch btm=	102.39	wp=	0.25
Ditch Bottom	0.00 metres	Dn Stream Ditch Btm =	101.40		
Ditch slopes	3.00 :1	Difference =	0.99		
Water depth	**0.039** metres (depth needed to carry 0.13 Cu. M/sec)			Top Bank =	101.55
Check Ditch Capacity (Q)				Free Board =	0.11
Q =	0.005 Cu M/sec	and Velocity =	1.04 M/s		

Ditch S20B Length = 37.00 m

New Ditch Section Required 1:100 yr. flow = 11.22 l/s		0.011 Cu m/sec			
From Seelye use n =	0.013 (Channels)			area=	0.01
choose: slope S =	0.86 %	Up Stream Ditch btm=	102.47	wp=	0.44
Ditch Bottom	0.00 metres	Dn Stream Ditch Btm =	102.15		
Ditch slopes	3.00 :1	Difference =	0.32		
Water depth	**0.070** metres (depth needed to carry 0.13 Cu. M/sec)			Top Bank =	102.3
Check Ditch Capacity (Q)				Free Board =	0.08
Q =	0.011 Cu M/sec	and Velocity =	0.74 M/s		

Ditch S20B Length = 37.00 m

New Ditch Section Required 1:100 yr. +20% flow = 16.24 l/s		0.016 Cu m/sec			
From Seelye use n =	0.013 (Channels)			area=	0.02
choose: slope S =	0.86 %	Up Stream Ditch btm=	102.47	wp=	0.51
Ditch Bottom	0.00 metres	Dn Stream Ditch Btm =	102.15		
Ditch slopes	3.00 :1	Difference =	0.32		
Water depth	**0.081** metres (depth needed to carry 0.13 Cu. M/sec)			Top Bank =	102.3
Check Ditch Capacity (Q)				Free Board =	0.07
Q =	0.016 Cu M/sec	and Velocity =	0.81 M/s		

Ditch S5 Length = 21.30 m

New Ditch Section Required 1:100 yr. flow = 80.20 l/s		0.080 Cu m/sec			
From Seelye use n =	0.013 (Channels)			area=	0.06
choose: slope S =	1.20 %	Up Stream Ditch btm=	102.23	wp=	0.88
Ditch Bottom	0.00 metres	Dn Stream Ditch Btm =	102.15		
Ditch slopes	3.00 :1	Difference =	0.08		
Water depth	**0.139** metres (depth needed to carry 0.13 Cu. M/sec)			Top Bank =	102.3
Check Ditch Capacity (Q)				Free Board =	0.01
Q =	0.080 Cu M/sec	and Velocity =	1.38 M/s		

Ditch S5 Length = 21.30 m

New Ditch Section Required 1:100 yr. +20% flow = 115.22 l/s		0.115 Cu m/sec			
From Seelye use n =	0.013 (Channels)			area=	0.08
choose: slope S =	1.20 %	Up Stream Ditch btm=	102.23	wp=	1.01
Ditch Bottom	0.00 metres	Dn Stream Ditch Btm =	102.15		
Ditch slopes	3.00 :1	Difference =	0.08		
Water depth	**0.160** metres (depth needed to carry 0.13 Cu. M/sec)			Top Bank =	102.3
Check Ditch Capacity (Q)				Free Board =	-0.01
Q =	0.116 Cu M/sec	and Velocity =	1.51 M/s		

Ditch S4 Length = 20.10 m

New Ditch Section Required 1:100 yr. flow = 55.81 l/s		0.056 Cu m/sec			
From Seelye use n =	0.013 (Channels)			area=	0.05
choose: slope S =	1.00 %	Up Stream Ditch btm=	102.47	wp=	0.80
Ditch Bottom	0.00 metres	Dn Stream Ditch Btm =	102.23		
Ditch slopes	3.00 :1	Difference =	0.24		
Water depth	**0.126** metres (depth needed to carry 0.13 Cu. M/sec)			Top Bank =	102.3
Check Ditch Capacity (Q)				Free Board =	-0.06
Q =	0.056 Cu M/sec	and Velocity =	1.18 M/s		

Ditch S4 Length = 20.10 m

New Ditch Section Required 1:100 yr. +20% flow = 81.45 l/s		0.081 Cu m/sec			
From Seelye use n =	0.013 (Channels)			area=	0.06
choose: slope S =	1.00 %	Up Stream Ditch btm=	102.47	wp=	0.92
Ditch Bottom	0.00 metres	Dn Stream Ditch Btm =	102.23		
Ditch slopes	3.00 :1	Difference =	0.24		
Water depth	**0.145** metres (depth needed to carry 0.13 Cu. M/sec)			Top Bank =	102.3
Check Ditch Capacity (Q)				Free Board =	-0.08
Q =	0.081 Cu M/sec	and Velocity =	1.29 M/s		

Ditch R6 Length = 116.00 m

New Ditch Section Required 1:100 yr. flow = 97.7 l/s		0.098 Cu m/sec			
From Seelye use n =	0.013 (Channels)			area=	0.12
choose: slope S =	0.70 %	Up Stream Ditch btm=	101.34	wp=	2.70
Ditch Bottom	0.00 metres	Dn Stream Ditch Btm =	100.81		
Ditch slopes	15.00 :1	Difference =	0.53		
Water depth	**0.090** metres (depth needed to carry 0.13 Cu. M/sec)			Top Bank =	102.3
Check Ditch Capacity (Q)				Free Board =	1.40
Q =	0.098 Cu M/sec	and Velocity =	0.81 M/s		

Ditch R6 Length = 116.00 m

New Ditch Section Required 1:100 yr. +20% flow = 140.55 l/s		0.141 Cu m/sec			
From Seelye use n =	0.013 (Channels)			area=	0.16
choose: slope S =	0.70 %	Up Stream Ditch btm=	101.34	wp=	3.10
Ditch Bottom	0.00 metres	Dn Stream Ditch Btm =	100.81		
Ditch slopes	15.00 :1	Difference =	0.53		
Water depth	**0.103** metres (depth needed to carry 0.13 Cu. M/sec)			Top Bank =	102.3
Check Ditch Capacity (Q)				Free Board =	1.39
Q =	0.142 Cu M/sec	and Velocity =	0.89 M/s		

Q = A*(1.0/n)*R^2/3*S^1/2 where: A = cross sectional area in Sq. m

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Ottawa, Ontario K1S 5N4 Canada
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PROJECT: BARRETT BLOCK 178
DATE: 2022-10-27
FILE: 135925.6.04
REV #: 2
DESIGNED BY: Anton Chetrar
CHECKED BY: Ryan Magladry

TEMPORARY ICD ORIFICE SIZING

Orifice coefficients	
Cv =	0.60
Cv =	0.65

	Invert	Diameter	Centre ICD	Max. Pond Elevation	Hydraulic Slope	Target Flow	Theoretical Orifice	Theoretical Actual Flow	Recommended Orifice	Recommended Actual Flow
	(m)	(mm)	(m)	(m)	(m)	(l/s)	(m)	(l/s)	(m)	(l/s)
SANITARY MH	95.810	200	95.910	101.40	2.000	1.99	0.0230	1.99	0.075	21.14
STORM MH	96.180	675	96.518	101.40	2.000	136.00	0.1905	136.40	0.190	135.68

* minimum orifice size to be 0.075m

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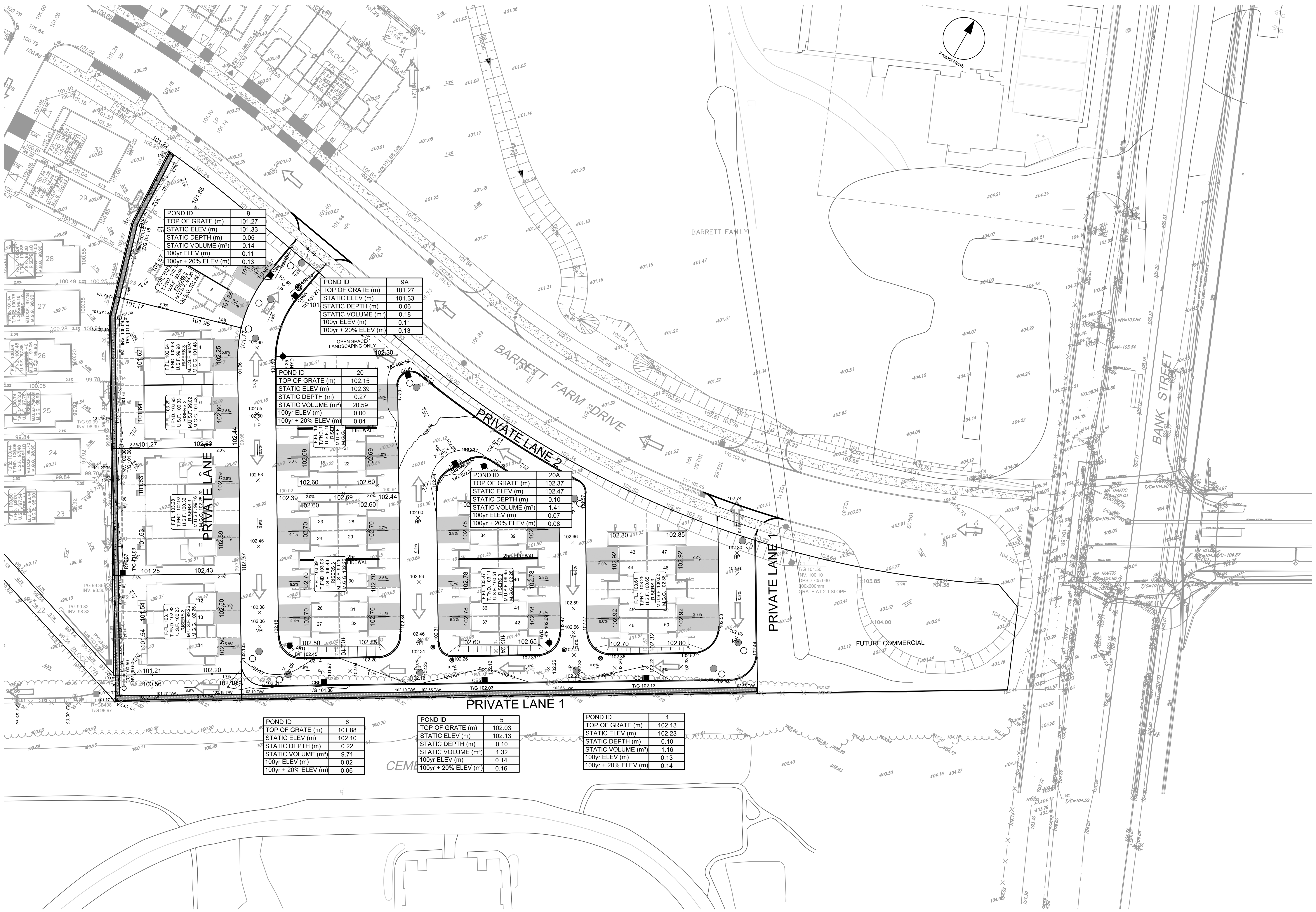
PROJECT: BARRETT BLOCK 178
DATE: 2022-10-27
FILE: 135925.6.04
REV #: 1
DESIGNED BY: Anton Chetrar
CHECKED BY: Ryan Magladry

ICD ORIFICE SIZING

Orifice coefficients	
Cv =	0.60
Cv =	0.65

	Invert	Diameter	Centre ICD	Max. Pond Elevation	Hydraulic Slope	Target Flow	Theoretical		Recommended	
							Orifice	Actual Flow	Orifice	Actual Flow
	(m)	(mm)	(m)	(m)	(m)	(l/s)	(m)	(l/s)	(m)	(l/s)
CB4	100.730	200	100.830	102.23	1.400	26.00	0.0910	26.04	0.090	25.47
CB5	100.630	200	100.730	102.13	1.400	25.00	0.0892	25.02	0.089	24.91
CB6	100.480	200	100.580	102.10	1.520	50.00	0.1236	50.06	0.123	49.57
CB9	99.870	200	99.970	101.33	1.360	16.50	0.0730	16.50	0.075	17.43
CB9A	99.870	200	99.970	101.33	1.360	16.50	0.0730	16.50	0.075	17.43
CB20	100.750	200	100.850	102.39	1.540	15.00	0.0675	15.00	0.075	18.55
CB20A	100.970	200	101.070	102.47	1.400	10.00	0.0564	10.00	0.075	17.69
RYCB7	99.850	250	99.975	101.40	1.425	20.00	0.0794	20.00	0.079	19.80

* minimum orifice size to be 0.075m



POND ID	9
TOP OF GRATE (m)	101.27
STATIC ELEV (m)	101.33
STATIC DEPTH (m)	0.05
STATIC VOLUME (m³)	0.14
100yr ELEV (m)	0.11
100yr + 20% ELEV (m)	0.13

POND ID	9A
TOP OF GRATE (m)	101.27
STATIC ELEV (m)	101.33
STATIC DEPTH (m)	0.06
STATIC VOLUME (m³)	0.18
100yr ELEV (m)	0.11
100yr + 20% ELEV (m)	0.13

POND ID	20
TOP OF GRATE (m)	102.15
STATIC ELEV (m)	102.39
STATIC DEPTH (m)	0.27
STATIC VOLUME (m³)	20.59
100yr ELEV (m)	0.00
100yr + 20% ELEV (m)	0.04

POND ID	20A
TOP OF GRATE (m)	102.37
STATIC ELEV (m)	102.47
STATIC DEPTH (m)	0.10
STATIC VOLUME (m³)	1.41
100yr ELEV (m)	0.07
100yr + 20% ELEV (m)	0.08

POND ID	6
TOP OF GRATE (m)	101.88
STATIC ELEV (m)	102.10
STATIC DEPTH (m)	0.22
STATIC VOLUME (m³)	9.71
100yr ELEV (m)	0.02
100yr + 20% ELEV (m)	0.06

POND ID	5
TOP OF GRATE (m)	102.03
STATIC ELEV (m)	102.13
STATIC DEPTH (m)	0.10
STATIC VOLUME (m³)	1.32
100yr ELEV (m)	0.14
100yr + 20% ELEV (m)	0.16

POND ID	4
TOP OF GRATE (m)	102.13
STATIC ELEV (m)	102.23
STATIC DEPTH (m)	0.10
STATIC VOLUME (m³)	1.16
100yr ELEV (m)	0.13
100yr + 20% ELEV (m)	0.14

CLIENT

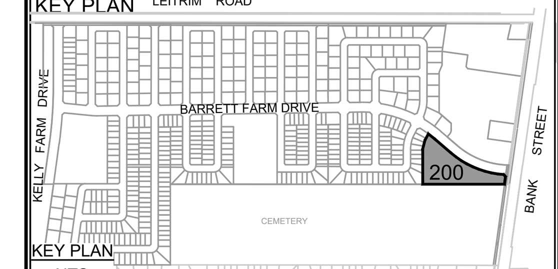
BARRETT CO-TENANCY

ISSUES

No.	DESCRIPTION	DATE
1	SUBMISSION NO.1 FOR CITY REVIEW	2022-05-10
2	SUBMISSION NO.2 FOR CITY REVIEW	2022-11-25
3		
4		
5		
6		
7		
8		

SEE 010, 011, 012 FOR NOTES, LEGEND, CB TABLE, STREET SECTIONS AND DETAILS

KEY PLAN



KEY PLAN
NTS

CONSULTANTS

1:500

SEAL

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tel 613 225 1311 / 613 241 3300 fax 613 225 9868
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PROJECT
BARRETT BLOCK 178

PROJECT NO:
135925

DRAWN BY:	CHECKED BY:
M.M.	A.C.
PROJECT MGR:	APPROVED BY:
R.M.	J.I.M.

SHEET TITLE
PONDING PLAN

SHEET NUMBER 600
ISSUE 2

CITY FILE No. D07-12-22-0112

CITY PLAN No. 18826

DRAINAGE AREA ID	CONTINUOUS /SAG (1)(2)	ROAD TYPE	MINOR SYSTEM DESIGN TARGET (BASED ON ROAD TYPE)		MINOR SYSTEM RE-STRICTION (L/S)	NOTES(3)
			MINOR SYSTEM DESIGN STORM	GENERATED FLOW ON INDIVIDUAL SEGMENT SIMULATED (L/S)		
R11315	Rear Yard	Rear Yard	5	12	17	
R11321	Rear Yard	Rear Yard	5	73	80	
R11323	Rear Yard	Rear Yard	5	36	40	
R11331	Rear Yard	Rear Yard	5	36	40	
R11332	Rear Yard	Rear Yard	5	17	17	
R11334	Rear Yard	Rear Yard	5	10	17	
R11333	Rear Yard	Rear Yard	5	11	16	
R11350A	Rear Yard	Rear Yard	5	7	17	
R11350B	Rear Yard	Rear Yard	5	31	40	
R11400A	Rear Yard	Rear Yard	5	6	6	
R11400B	Rear Yard	Rear Yard	5	25	80	
R11401	Rear Yard	Rear Yard	5	44		
R11402	Rear Yard	Rear Yard	5	38	45	
R11403A	Rear Yard	Rear Yard	5	34	40	
R11403B	Rear Yard	Rear Yard	5	33	40	
R11403C	Rear Yard	Rear Yard	5	6		
R11406	Rear Yard	Rear Yard	5	19	22	
Total restricted flow (ICD flow) – Rear Yard Segments (L/s)					**756**	
External Areas						
R11304	Rear Yard	Rear Yard	2	234	234	
R11305	Rear Yard	Rear Yard	2	581	581	
R11340	Rear Yard	Rear Yard	2	287	287	

(1) Capture on continuous grade is limited to capacity of grate.
(2) The minor flow restriction has been increased in sags to allow full capture of overflow from upstream segments on continuous grade during the design storm event without ponding.
(3) Where CB lead restricts flow, lead diameter is specified in the CB Data Table.

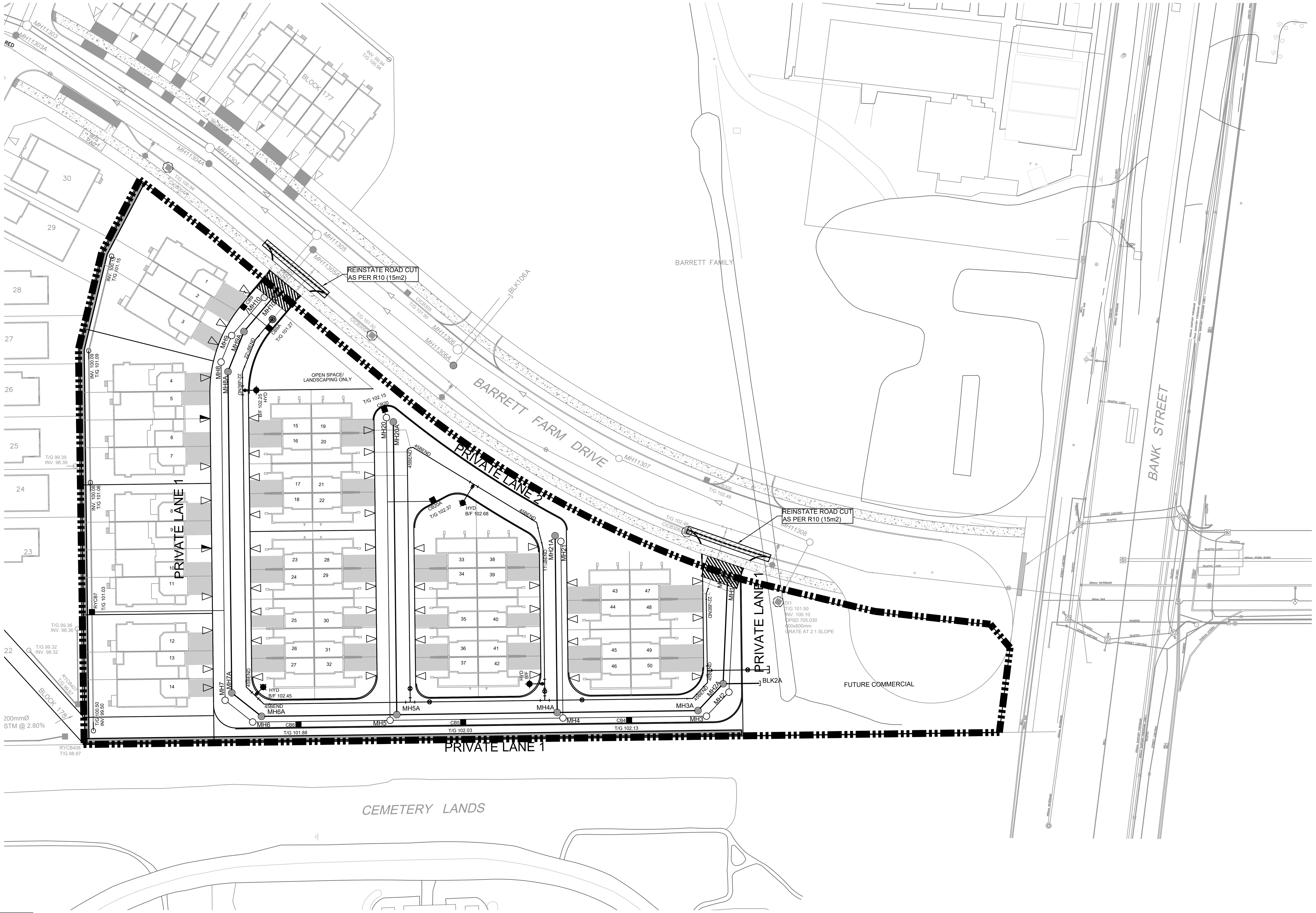
The storage available on-site and its maximum depth and the results of the DDSWMM evaluation for the subject site are presented in **Table 5.4**. The ponding plan for the subject site is presented on **Drawing 34731-620**. The DDSWMM output files are presented in **Appendix E**.

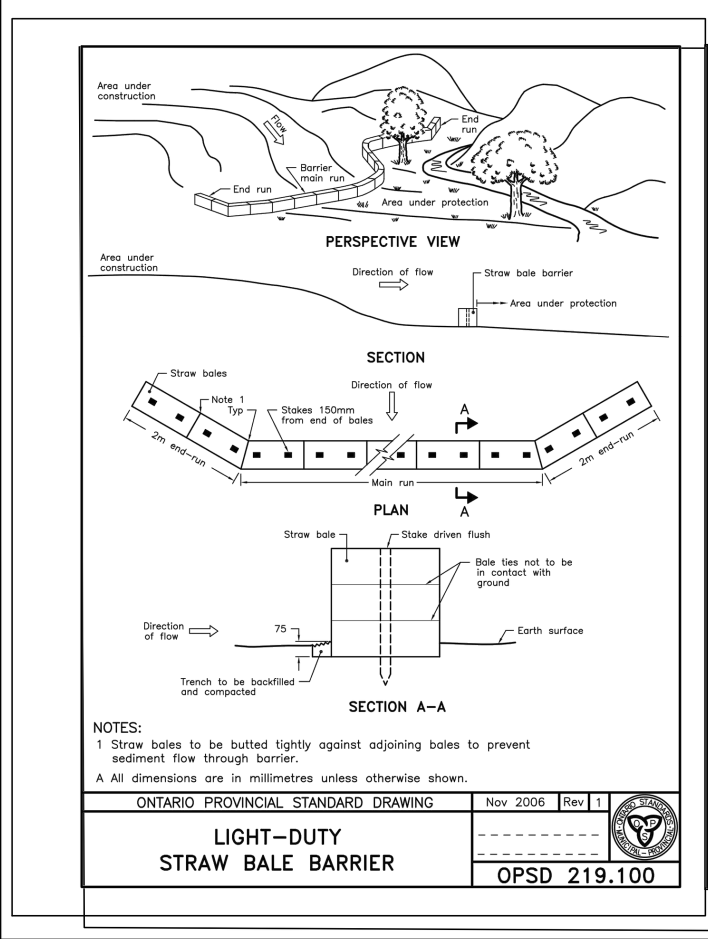
Table 5.4 Summary of On-Site Storage during the Target Minor System Design Storm

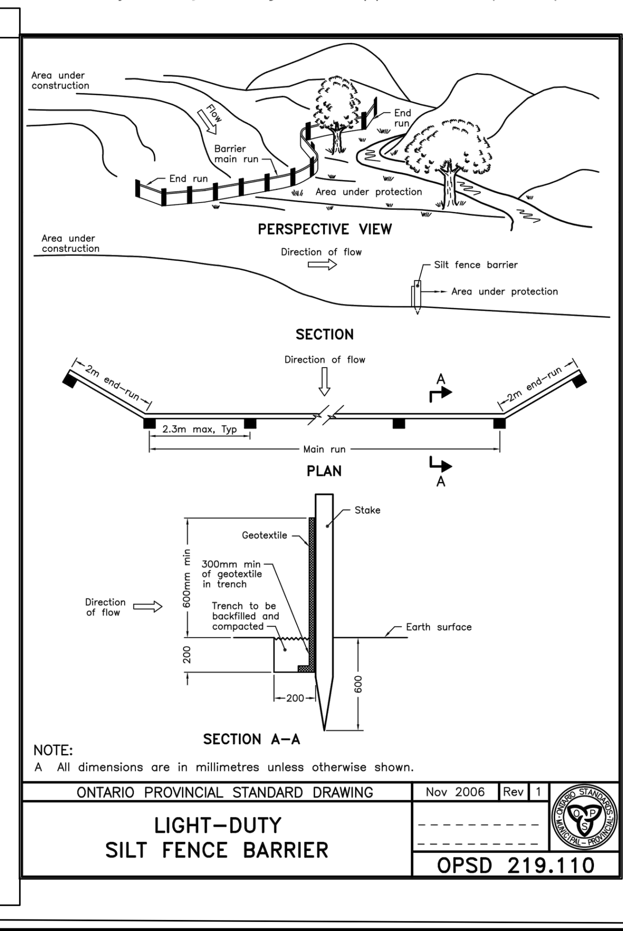
DRAINAGE AREA ID	MINOR SYSTEM DESIGN STORM	AVAILABLE STATIC STORAGE (CU-M)	TOTAL STORAGE USED (CU-M)	OVERFLOW (L/S)
S11304A	5	5.67	0	0
S11304B	5	6.17	0	0
S11401A	2	38.98	0	0
S11401B	2	7.14	0	0
S11400	2	20.04	0	0
S11311A	2	6.22	0	0

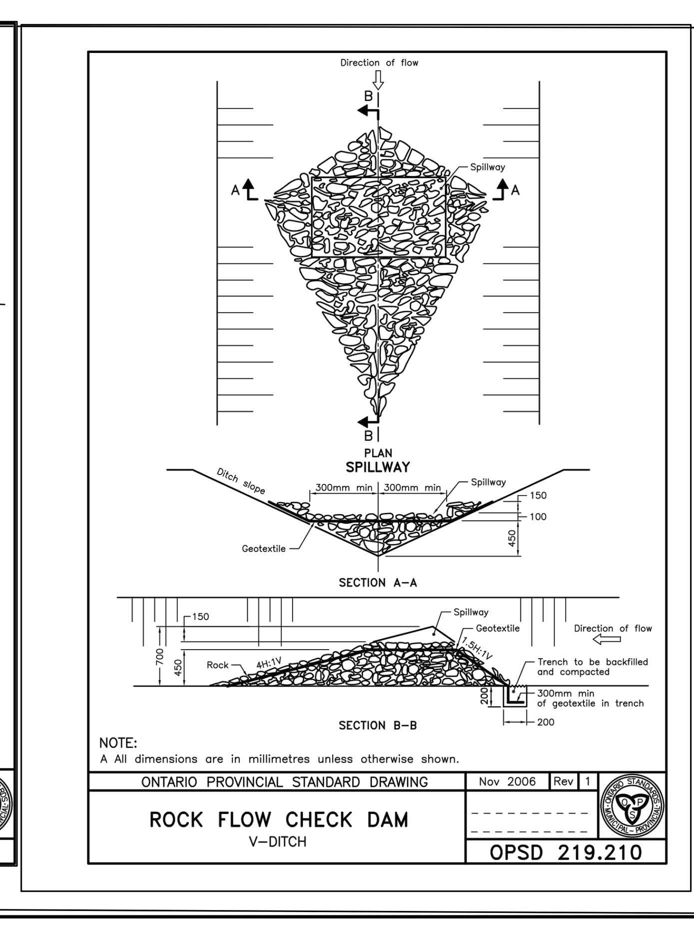
APPENDIX E

135925-900 - Erosion and Sediment Control Plan
135925-200 - Grading Plan









SEDIMENT EROSION LEGEND

- HEAVY DUTY SILT FENCE
- SNOW FENCE
- STRAW BALE CHECK DAM
- STRAW BALE CHECK DAM WITH FILTER CLOTH
- ROCK CHECK DAM
- SEDIMENT SACK PLACED UNDER EXISTING CB COVER
- TEMPORARY MUD MAT 0.15m THICK 50mm CLEAR STONE ON NON WOVEN FILTER CLOTH

NOTES:

1. SILT FENCE TO BE ERECTED PRIOR TO EARTH WORKS BEING COMMENCED. SILT FENCE TO BE MAINTAINED UNTIL VEGETATION IS ESTABLISHED OR UNTIL START OF SUBSEQUENT PHASE.
2. STRAW BALE SEDIMENT TRAPS TO BE CONSTRUCTED IN EXISTING ROAD SIDE DITCHES. TRAPS TO REMAIN AND BE MAINTAINED UNTIL VEGETATION IS ESTABLISHED.
3. SILT SACK TO BE PLACED AND MAINTAINED UNDER COVER OF ALL CATCHBASINS. GEOTEXTILE SILT SACK IN STREET CBs TO REMAIN UNTIL ALL CURBS ARE CONSTRUCTED. GEOTEXTILE FABRIC IN RYCBs TO REMAIN UNTIL VEGETATION IS ESTABLISHED. ALL CATCHBASINS TO BE REGULARLY INSPECTED AND CLEANED, AS NECESSARY, UNTIL SOD AND CURBS ARE CONSTRUCTED.
4. CONTRACTOR TO PROVIDE DETAILS ON LOCATION(S) AND DESIGN OF DEWATERING TRAP(S) PRIOR TO COMMENCING WORK. CONTRACTOR ALSO RESPONSIBLE FOR MAINTAINING TRAP(S) AND ADJUSTING SIZE(S) IF DEEMED REQUIRED BY THE ENGINEER DURING CONSTRUCTION.
5. CONTRACTOR TO PROTECT EXISTING CATCHBASINS WITH FILTER CLOTH UNDER THE COVERS TO TRAP SEDIMENTATION. REFER TO IDENTIFIED STRUCTURES.
6. IF DEEMED NECESSARY BY CITY INSPECTOR, LOCATION OF MUD MATS TO BE DETERMINED IN THE FIELD.
7. CONTRACTOR IS RESPONSIBLE FOR THE INSTALATION, INSPECTION, MAINTENANCE AND REMOVAL OF ALL CONTROL MEASURES.
8. THIS PLAN IS A "LIVING DOCUMENT" WHICH MAY BE REVISED IN THE EVENT THE CONTROL MEASURES ARE INSUFFICIENT.

CLIENT

BARRETT CO-TENANCY

ISSUES

No.	DESCRIPTION	DATE
1	SUBMISSION NO.1 FOR CITY REVIEW	2022-05-10
2	SUBMISSION NO.2 FOR CITY REVIEW	2022-11-25
3		
4		
5		
6		
7		
8		

SEE 010, 011, 012 FOR NOTES, LEGEND, CB TABLE, STREET SECTIONS AND DETAILS

KEY PLAN
NTS

CONSULTANTS

1:500

SEAL

LICENSED PROFESSIONAL ENGINEER
D. G. Yannoulopoulos
2022/11/25
PROVINCE OF ONTARIO

IBI GROUP
Suite 400 – 333 Preston Street
Ottawa ON K1S 5N4 Canada
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ibigroup.com

PROJECT

BARRETT BLOCK 178

PROJECT NO: 135925	
DRAWN BY: M.M.	CHECKED BY: A.C.
PROJECT MGR: R.M.	APPROVED BY: J.I.M.

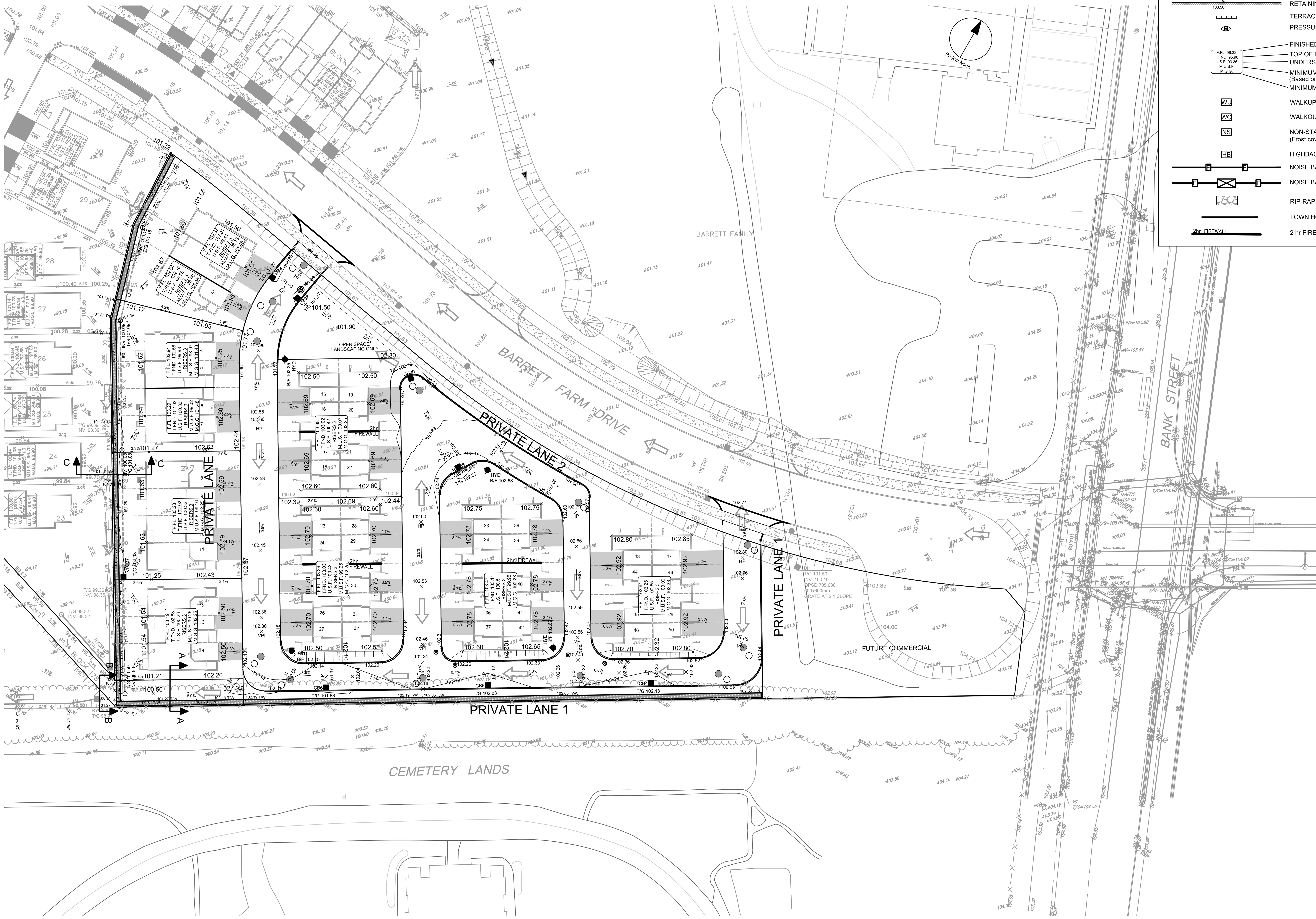
SHEET TITLE

SEDIMENT AND EROSION CONTROL PLAN

SHEET NUMBER	ISSUE
900	2

CITY FILE No. D07-12-22-0112

CITY PLAN No. 18826



GRADING LEGEND

- PROPOSED DITCH C/W FLOW DIRECTION AND SLOPE
- SLOPE C/W FLOW DIRECTION
- MAJOR OVERLAND FLOW ROUTE
- PROPOSED SPOT GRADE
- PROPOSED SWALE GRADE
- PROPOSED SWALE HIGH POINT GRADE
- LOT CORNER GRADE C/W EXISTING GRADE
- FULL STATIC PONDING GRADE
- RETAINING WALL C/W TOP OF WALL AND GRASS GRADE
- TERRACING 3:1 MAXIMUM UNLESS NOTED OTHERWISE
- PRESSURE REDUCING VALVE
- FINISHED FLOOR ELEVATION
- TOP OF FOUNDATION ELEVATION
- UNDERSIDE OF FOOTING ELEVATION
- MINIMUM UNDERSIDE OF FOOTING (Based on the higher of the sewer obverts, or hydraulic grade line)
- MINIMUM GARAGE GRADE
- WU — WALKUP UNIT
- WO — WALKOUT UNIT
- NS — NON-STANDARD FOUNDATION (Frost cover not provided for standard unit)
- HB — HIGHBACK UNIT (1.5m frost cover on footings)
- NOISE BARRIER LOCATION
- NOISE BARRIER GATE
- RIP-RAP
- TOWN HOUSE SPLITS
- 2 hr FIREWALL

CLIENT

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CO-TENANCY

ISSUES

No.	DESCRIPTION	DATE
1	SUBMISSION NO.1 FOR CITY REVIEW	2022-05-10
2	SUBMISSION NO.2 FOR CITY REVIEW	2022-11-25
3		
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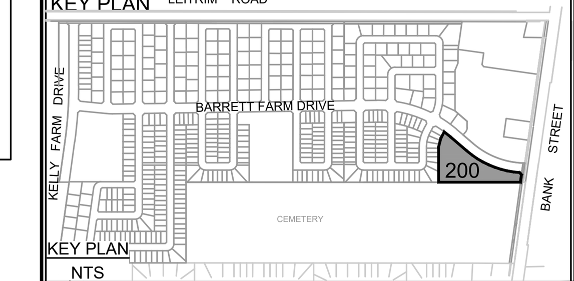
7		
8		

SEE 010, 011, 012 FOR NOTES, LEGEND, CB TABLE, STREET SECTIONS AND DETAILS

KEY PLAN

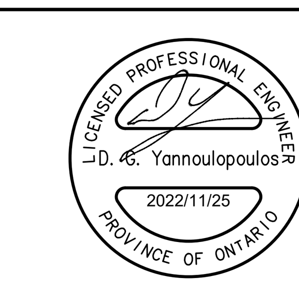


KEY PLAN
NTS

CONSULTANTS

1:500 0 5 15 25m

SEAL



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PROJECT
BARRETT BLOCK 178

PROJECT NO:
135925

DRAWN BY:	CHECKED BY:
M.M.	A.C.
PROJECT MGR:	APPROVED BY:
R.M.	J.I.M.

SHEET TITLE
GRADING PLAN

SHEET NUMBER	ISSUE
200	2

CITY PLAN No. 18826

CITY FILE No. D07-12-22-0112

File Location: J:\135925_BarrettLands\7.0_Production\7.03_Design\04_Civil\Sheets\200 GRADING PLAN.dwg Last Saved: November 2, 2022, by mmilne Plotted: Thursday, November 24, 2022 11:55:49 AM by Marian Milne