REPORT
PROJECT: 122283-6.2.1

ASSESSMENT OF ADEQUACY OF PUBLIC SERVICES
FINDLAY CREEK VILLAGE - STAGE 5
3100 LEITRIM ROAD
LEITRIM DEVELOPMENT AREA
CITY OF OTTAWA

Prepared for 4840 BANK ST. LTD.
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1 INTRODUCTION

1.1 Purpose

The purpose of this report is to investigate and confirm the adequacy of public services for the proposed site. This report will review the availability of major municipal infrastructure including water supply, wastewater collection and disposal and management of stormwater. This report will also include a Sedimentation and Erosion Control Plan.

This report is being prepared as a technical document in support of a re-zoning application for the subdivision and was prepared in accordance with the November 2009 “Servicing Study Guidelines for Development Applications” in the City of Ottawa. **Appendix A** contains a customized copy of those guidelines which can be used as a quick reference for the location of each of the guideline items within the study report.

1.2 Background

Development in the Leitrim Development Area started in 2002. To assist with a planned and logical development approach for this area, the City of Ottawa, in 2005, completed the Leitrim Community Design Plan (CDP). The CDP identified a preferred development concept and also included technical support documents which, among other items, addressed the requirements of water supply, wastewater disposal and management of stormwater runoff. The 2007 Final Serviceability Report confirmed a strategy to provide the necessary municipal infrastructure to support the Leitrim Development Area (LDA). The original LDA, as defined in the 2005 CDP, is included in **Figure 1.1**. The LDA covered an area of about 520 ha and provides a detailed secondary plan upon which the balance of the development in the LDA will be based.

In 2012, the City of Ottawa expanded its urban envelope under OPA 76. Part of that expansion included an 87 ha expansion in Leitrim including OPA 76 expansion areas 8a, 9a and 9b. **Figure 1.2** shows the original CDP plus the three expansion areas in Leitrim. To support that expansion, the new land owners completed an update to the 2007 Serviceability Report. The 2016 Final Updated Serviceability Report (2016 USR) proposed a revised approach for the provision of major municipal infrastructure including changes needed to support the 2012 expansion areas. The subject site, however, was included in the 2005 Community Design Plan.

1.3 Subject Site

The current draft plan for Stage 5 in Findlay Creek Village is shown on **Figure 1.3**. The property covers an area of about 18 ha and is bounded to the west by the future re-aligned Leitrim Road; to the north by Leitrim Road; to the east by the North South Swale; and to the south by Pond 2. The proposed re-zoning and draft plan approval for the residential development includes 169 single family lots and 221 on-street townhouses. The plan also includes a neighbourhood park.

The Barrett Co-Tenancy also owns the property between the Albion Road Industrial Park and the future re-alignment of Leitrim Road. Although this future employment area is not part of the current development applications, this report will address the servicing options for that property including impacts on the subject and surrounding properties.

At this time, the project is considered one phase for development. This decision can be further reviewed at the time of final design.

1.4 Previous Studies

1. **Leitrim Community Design Plan (2005) including Appendix A (Leitrim Community Plan Serviceability Report Concept J Consolidated Pond City of Ottawa)**

   That report provided the most comprehensive development criteria for land uses, densities and zoning on which all developments in the LDA would follow. The Appendix A from that report reviews the major infrastructure requirements of the LDA and provides recommendations for water supply, sanitary disposal and stormwater management.

2. **Addendum to Leitrim Development Area Stormwater Management Environmental Study Report and Pre-Design (CCL/IBI Group, 2005)** The July 2005 Addendum, which is considered one of the supporting technical documents of the 2005 CDP, identified the criteria and details of the overall SWM strategy for the LDA. The report recommended that two off-line SWM facilities be constructed to treat urban runoff. The Findlay Creek Village Stormwater Facility, was commissioned in 2006. Pond 2, which will provide stormwater management for the subject site, was partially built and commissioned in 2019.

3. **2016 Final Updated Serviceability Report (Class EA OPA 76 Areas 8a, 9a & 9b)** The report is an updated to an earlier Serviceability Report completed in 2007. The updated report was needed to review the impacts on existing major infrastructure by developing an additional 87 ha in the LDA. In 2012, under OPA 76, the City of Ottawa increased its urban envelope by over 900 ha including expansion areas 8a, 9a & 9b in the LDA. The design of the subject site is proposed to be developed as per the recommendations of the final report recommendations.

4. **Design Brief, Barrett Lands Phase 1, 4660 Bank Street, Leitrim Development Area (IBI Group 2018)** This May 2018 report recommended a final detailed servicing plan for the Barrett Phase 1 property which is located immediately east of the subject site. The servicing for the Barrett Lands included sewers and watermains in Kelly Farm Drive which were designed and constructed to provide capacity to most of the FCV Stage 5 property.

5. **Design Brief, Pond 2 Stormwater Facility Leitrim Development Area (IBI Group July 2017)** The report discussed the design and treatment capabilities of the facility which drainage limits includes the subject site. The recommended facility includes two inlets and forebays. The eastern inlet was constructed in 2019 and is designed to accept runoff from a portion of the subject site. The western inlet, and Phase 2 of the pond, will provide the treatment requirements for both portions of the subject site and other areas within its drainage limits.

6. **Pond 2 – Sanitary Sewer – Leitrim Development Area (IBI Group October 2017)** The report includes the recommended design of a sanitary sewer which is designed to accept flows from most of the north west portion of the LDA including a portion of the subject site. The sewer will be constructed concurrently with Phase 2 of Pond 2.

The Stage 5 Lands are proposed to be developed in accordance with the recommendations of these higher level reports. The more specific details of the development will follow in a later report and form part of the final engineering design of the property.

1.5 Existing Infrastructure

Figure 1.4 shows the location of existing major municipal infrastructure in the vicinity of Stage 5. About half the site will be serviced by the infrastructure in Kelly Farm Drive including storm and wastewater outlets and a 300 mm diameter watermain. During development of Phase 1 Barrett Lands, a 300 mm diameter sanitary sewer was constructed under the North South Swale and is

presently terminated on the subject site. Similarly, an 1800 mm diameter storm sewer and a 300 mm diameter watermain have also been constructed in the same location.

The balance of the site will be serviced in the south west direction. Phase 1 of Pond 2 was put into service in 2019 in order to provide an outlet for the adjacent Barrett Lands Phase 1 property. Phase 2 of that facility will be constructed prior to development of the subject site and will include the western inlet which will be oversized for upstream areas including a portion of the Stage 5 development. Concurrent with the Phase 2 pond construction will be the construction of a 375 mm diameter sanitary sewer which is located near the south west portion of the facility. That sewer will have capacity for all lands within the north west portion of the LDA including a portion of the subject site.

Wastewater flows from Findlay Creek Village eventually discharge into the Leitrim Sanitary Pump Station (PS). The subject site was included in the original tributary limits of the PS. In 2014, the City of Ottawa completed a sanitary overflow at the intersection of Findlay Creek Drive and Kelly Farm Drive. That overflow protects all upstream properties, including the subject site, in the event the overflow is called into service.

1.6 Pre-Consultation

There was a formal pre-consultation with the City of Ottawa for Stage 5 on September 20, 2019. Meeting notes from that meeting were produced by the City and a copy of same are included in **Appendix A**. Topics discussed at that meeting included:

- Parkland dedication
- Walkways
- Urban design guidelines
- Draft Plan
- List of required plans
- Stakeholder approvals

1.7 Existing Topography

The Stage 5 site was previously farmed and is generally flat and criss-crossed with several drainage ditches. The site slopes gently from the north-west to the south-east between elevations 95.30 m and 93.50 m. **Figure 1.5** illustrates the existing topography and drainage patterns. All surface runoff is directed to a series of drainage ditches which collectively empty into the North South Swale. Most of the northern portion of the site is cleared, but the southern portion of the site from about 30 m south of Street No. 3 to the pond is treed.

1.8 Geotechnical Considerations

Golder Associates Ltd. was retained to prepare a preliminary geotechnical investigation for the property. 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 report 19129142-2000 was prepared by Golder Associates Ltd. in November 2019. The report recommendations were based on the findings and observations from several boreholes and test pits. Among other items, the report recommendations deal with:

- Site grading
- Foundation design
- Pavement structure
- Sewer and Watermain Construction
- Groundwater Control
- Grade Raises

The geotechnical investigation report confirmed that the site consists mostly of silt, sand, boulders and glacial till on top of limestone bedrock. These conditions are suitable for the subdivision construction.

1.9 Watercourses and Setbacks

There are a number of drainage ditches along the perimeter of and through the site. These will all be filled as a result of urban development. The one water course that will remain is the North South Swale (NSS). The swale construction was completed in 2019 and is designed to eventually receive and convey runoff from tributary lands north of Leitrim Road. The South Nation Conservation (SNC) permitted 6 m setbacks from the NSS which was constructed in a 25 m wide block. Permission was received in 2018 to construct the NSS and for reference a copy of the SNC Permit No.2017-GLO-R166 is included in **Appendix A**.

1.10 Private Services

The developments adjacent to the subject site are connected to the City's central water supply system. These include the Albion Road Industrial Park and Findlay Creek Village. Golder Associates have completed a December 2019 Technical Memorandum "Groundwater Impact Study, Residential Development, Findlay Creek Village, Stage 5, Ottawa, Ontario" which addresses the issue of impacts to nearby wells that could be caused by trench excavations during municipal servicing of Stage 5. The report identifies three active wells within the radius of influence of groundwater level drawndown. The three wells are located in the Albion Road Industrial Park, and service commercial developments. The memorandum concludes that there could be potential reduction in well drawdown due to construction dewatering, but not likely to a degree that could negatively impact water supply. This appears to be a function of the well depths and their ability to tolerate some drawdown.

1.11 Environmental Constraints

There are no significant environmental constraints associated with development of the subject site other than filling existing drainage ditches and re-routing/creating other temporary ditches. To prevent any construction activity impacts on downstream or adjacent properties, appropriate elements will be included in an Erosion and Sedimentation Control Plan.

Also, as stated previously, relevant permits will need to be issued by the South Nation Conservation (SNC) for impacts to existing ditches. The SNC permit will be obtained at the time of construction of the site.

1.12 Leitrim Road Environmental Assessment (EA)

In 2018, the City of Ottawa completed an Environmental Assessment for Leitrim Road (EA) from River Road to Bank Street. The EA was completed because the existing road may have to be relocated southwards to accommodate potential expansion plans at the McDonald Cartier International Airport, which is located about three kilometers west of Stage 5. Part of the recommended Leitrim Road realignment is west of and abuts the subject property. **Figure 1.3** shows the proposed realignment adjacent to the subject site.

The 2016 USR was completed prior to the Leitrim Road EA and preparation of the Stage 5 Concept Plan. In the absence of these two documents, the 2016 USR provided very basic details about the development of the subject site. Accordingly, this report will review not only the detailed design components for the subject site, but will also demonstrate how future developments in the vicinity of the subject property can be accommodated.

2 WATER SUPPLY

2.1 Existing Conditions

As stated in Section 1.5, there is a 300 mm dia watermain presently terminated in Street No 1 immediately west of the North South Swale. There is also a 300 mm dia watermain along Kelly Farm Drive and a 400 mm dia watermain in Fenton Road located west of the subject site and a 400 mm dia watermain in Leitrim Road immediately north of Stage 5. **Figure 1.4** shows the location of these and other adjacent watermains.

2.2 2016 Final Updated Serviceability Report

The preferred water distribution plan for the Leitrim Development Area was included in the 2016 Updated Serviceability Report (2016 USR). A copy of Figure 2.2, Preferred Water Distribution Plan from that report, is included in **Appendix B**. Unlike most other residential areas within the LDA, the Stage 5 lands did not have a detailed road pattern at the time the 2016 USR was prepared. In lieu of the absence of such a plan, the 2016 USR recommended that the subject lands be serviced with a 300 mm diameter watermain that ultimately would stretch between Kelly Farm Drive and Albion Road with a midway connection to an existing 300 mm dia main in the Albion Road Industrial Park. Now that there is a conceptual draft plan for most of the subject site, this report will review the water supply to the area and recommend a new water plan for Stage 5.

2.2.1 Water Demands

Stage 5 is proposed to be a predominantly residential site consisting of single-family lots and on-street townhouses. A park block is also proposed for the development. Per unit population densities and consumption rates are taken from Tables 4.1 and 4.2 of the Ottawa Design Guidelines – Water Distribution and are summarized as follows:

- Single Family 3.4 person per unit
- Townhouse and Semi-Detached 2.7 person per unit
- Stacked Townhouse 2.3 person per unit
- Residential Average Day Demand 350 l/cap/day
- Residential Peak Daily Demand 875 l/cap/day
- Residential Peak Hour Demand 1,925 l/cap/day
- ICI Average Day Demand 50,000 l/gross ha/day
- ICI Peak Daily Demand 75,000 l/gross ha/day
- ICI Peak Hour Demand 135,000 l/gross ha/day

A water demand calculation sheet is included in **Appendix B**.

Because the Leitrim Development Area has a population larger than 3,000 persons, the City of Ottawa has provided system level demands for large growth areas. The system level demands were used in the 2016 USR hydraulic analysis and are used in this analysis for all existing lands in the Leitrim Development Area. The system level demands are summarized in **Table 2.1**.

Table 2.1 LDA Unit Water Demands

	AVERAGE (L/Unit/Day)	OUTDOOR WATER DEMAND (L/Unit/Day)	MAX. DAY (L/Unit/Day)	PEAK DAY (L/Unit/Day)*
Single Family	567	1049	Average + OWD	2.1 x Max Day
Townhouse (Medium Density)	558	0	Average	1.6 x Max Day
Apartment (High Density)	400	0	Average	1.6 x Max Day
Employee* (ICI)	85	0	Average	1.5 x Max Day
Water Loss per Connection	80	N/A	Average	Average

* 100 employees/hectare assumed for ICI land use

The City of Ottawa has also provided external water demand criteria for locations downstream of the LDA, summarized in **Table 2.2**.

Table 2.2 External Water Demand Criteria for Locations Downstream of the LDA

LOCATION	CRITERIA
Carlsbad Trickle Feed	829 Dwelling Units
Existing South of LDA	200 Dwelling Units
Russell	11.8 MLD pumped over 20 hours

The Russell demand will be added to the average and maximum day demand, but will not be included in the peak hour calculations since the pumping is stopped during the peak hour period. Correspondence from the City of Ottawa regarding the LDA water demands is included in **Appendix B**.

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 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). Pressure reduction controls may be required for

	buildings where it is not possible/feasible to maintain the system pressure below 552 kPa.
Water Age	A total travel time of 5 days or less during basic day demand is reasonable. A residence time of 8 days should not be exceeded.

2.2.3 Fire Flow Rate

All the residential units proposed for Stage 5 will be single family homes and traditional on street townhouses. It is expected that all these units will meet the requirements of Item 4.1 and 4.2 of Technical Bulletin ISDTB-2014-02 revision to Ottawa Design Guidelines – Water, in which the fire flow requirement is capped at 10,000 l/min. There are several locations on the Stage 5 plan where the rear of a unit faces the side of an adjacent unit. At these locations, if the distance from the rear of a unit is less than 10 meters from the side of an adjacent unit, then the 10,000 l/min cap from Technical Bulletin ISDTB-2014-2 no longer applies. In order to calculate a fire flow rate using the Fire Underwriters Survey (FUS) method, wood frame buildings need to be separated by a minimum of 3 meters otherwise they are considered a single fire unit. In order to calculate a reasonable fire flow, 3 meter separations will be required between blocks of townhouses and pairs of single family homes. The locations where the 3 meter separations will be required if the 10 meter rear to side separation cannot be achieved is shown on **Figure 2.1**. FUS calculations will be provided during detailed design. For this report the fire flow demand is assumed to be 10,000 l/min for all units.

2.2.4 Hydraulic Model

A computer model for the Leitrim Development Area water distribution system has been developed using the InfoWater SA program. The source of water is the Ottawa South Pumping Station (OSPS) which is located approximately 1 km north of Leitrim Road adjacent to the future rapid rail transit corridor.

The City of Ottawa has been supplying potable water to the Leitrim area for decades. Over the years the City has made modifications and improvements to the delivery network. The Ottawa South Pumping Station (OSPS) was brought into service in 2001 and is currently delivering water to the Leitrim Development Area and other downstream customers at a hydraulic grade line of about 155 m.

In an effort to better integrate the downstream areas including Riverside South, Longfields/Davidson Heights in Barrhaven and Leitrim, the City is planning to lower the hydraulic grade line at the Ottawa South station to about 146 m. For the subject property, the hydraulic analysis of the water distribution system is based on a hydraulic boundary condition provided by the City at Leitrim Road and the rail corridor at the northwest corner of the LDA. A hydraulic grade line elevation of 144 meters is to be used for peak hour and maximum day plus fire analysis which corresponds to the 146 meter level at the OSPS and the demands from the Riverside South community. For average day analysis the current level of 155 meters at the OSPS will be applied at the boundary condition to determine the maximum pressure in the water system. Correspondence from the City of Ottawa concerning boundary conditions is included in **Appendix B**.

2.3 Proposed Water Plan

The hydraulic model was run under basic day, maximum day with fire flows and peak hour conditions for all phases of the development. Water pipes are sized to provide sufficient pressure and deliver fire flows. During the design process the mains are tested at a minimum 150 mm size

and increased in an iterative process until the pressure and fire flow results are sufficient for all phases.

The Stage 5 site will be serviced by connecting to the existing 300 mm diameter watermain on Kelly Farm Drive at two locations in Street No. 1 and 3. The site will be adequately serviced by a combination of 150 and 200 mm diameter mains. A 50 mm watermain is proposed to service the cul-de-sac in Street No. 2 in accordance with City detail W37. Hydrant spacing for the cul-de-sac will be per Technical Bulletin ISTB-2018-02 Appendix I and will be determined during detailed design.

The proposed watermain layout for the Stage 5 site is shown on **Figure 2.1**. The result of the hydraulic analysis is included in **Appendix B** and summarized in below **Table 2.3**.

Table 2.3 Results of Watermain Hydraulic Analysis

SCENARIO	
Basic Day Pressure (kPa)	552.6 - 565.8
Basic Day Maximum Water Age (hrs.)	21.6
Peak Hour Pressure (kPa)	436.0 – 449.3
Minimum Design Fire Flow @140 kPa Residual Pressure (l/s) - Single Family/Townhouse	 170.3 - 302.4

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

Maximum Pressure	All nodes under Basic Day using the HGL of 155 m at the OSPS are above 552 kPa (80 psi) therefore pressure reducing control is required for this development. There is no area where the pressure exceeds the maximum level of 689 kPa (100 psi) in unoccupied areas.
Minimum Pressure	The lowest minimum pressure during peak hour conditions for all analysis is 438.0 kPa which exceeds the minimum 276 kPa (40 psi) requirement.
Fire Flow	The minimum design fire flow is 170.3 l/s which exceeds the requirement of 166.7 l/s (10,000 l/min). During the detailed design phase the building separations will be determined and FUS calculations will be provided as per Section 2.2.3.
Water Age	The water age has been calculated under basic day conditions. The water age is calculated at the boundary conditions. The highest age is 21.6 hours under the post-configuration. Again, the water age will be confirmed at the time of detail subdivision design.

3 SANITARY SEWERS

3.1 Existing Conditions

As noted earlier, there will be two wastewater outlets for the subject site: the existing 300 mm diameter sanitary sewer which is presently terminated in Street 1 immediately west of the NSS and the future 375 mm sanitary sewer which will be extended in 2020 to a location near the western inlet of the stormwater facility Pond 2. That latter sewer presentably terminates south of Pond 2. **Figure 1.4** shows the location of these two sewers. Both outlet sewers eventually join together in Kelly Farm Drive at White Alder Avenue and eventually empty into the Leitrim Sanitary Pump Station (PS).

The 2016 USR recommended that wastewater flows from Stage 5 be directed into one of two sewers: the 375 diameter sub-trunk sewer in Kelly Farm Drive and the future 375 diameter sewer to be constructed immediately west of Pond 2. A copy of Figure 3.12 Preferred Wastewater Plan from the 2016 USR is included in **Appendix C**. Also included in **Appendix C** is a copy of Figure 3.11, Wastewater Drainage Area Plan which shows the approximate limits of the drainage areas in Stage 5 that are proposed to flow to the two recommended outlet sewers. The split location is Node 1290 which corresponds approximately with the intersection of Street 2 and Street 3 near Block 187. Wastewater flows from north and east of that location are recommended to be routed to the existing 300 mm diameter sewer in Street 1 and south of that location to the future 375 mm diameter sewer to be constructed around Pond 2 in 2020.

3.2 Design Criteria

The estimated wastewater flows from the subject site are based on City of Ottawa and MECP design criteria. Among other items, these include:

- Average residential flow = 280 l/c/d
- Peak residential flow factor = Harmon Formula x 0.80
- Average ICI flow = 28,000 l/s/ha
- Peak ICI flow factor = 1.0
- Inflow and Infiltration Rate = 0.33 l/s/ha
- Minimum Full Flow Velocity = 0.60 m/s
- Maximum Full Flow Velocity = 3.0 m/s
- Minimum Pipe Size = 200 mm diameter
- Minimum allowable slopes as listed in below **Table 3.1**.

Table 3.1 City of Ottawa Minimum Allowable Slopes for Sanitary Sewer Pipes

DIAMETER (MM)	SLOPE (%)
200	0.320
250	0.240
300	0.186
375	0.140
450	0.111
525	0.100

Where practical and where there are less than 10 residential connections, the first lengths of sanitary sewers are designed as 200 mm diameter pipes with a minimum slope of 0.65%.

The current Conceptual Draft Plan for Stage 5 includes the following development statistics:

- Single units = 169
- Townhouse units = 199
- Park area = 0.90 ha
- Commercial area = 3.88 ha (not included in the current draft plan)

In accordance with the 2005 CDP and the 2016 USR, the following density rates are estimated for the subject site:

- Single units = 3.2 ppu
- Townhouse units = 2.4 ppu

Based on the above criteria and including a commercial allowance for the vacant lands immediately west of the site, the estimated peak wastewater flow from the subject property will be about 21.86 l/s, which is split into two directions: 16.09 l/s towards the existing 300 mm dia sewer in Street No. 1 and 5.77 l/s towards the 375 mm dia sewer near Pond 2.

3.3 Recommended Wastewater Plan

The 2016 USR recommended a wastewater plan for the subject site but was developed in the absence of a detailed draft plan and road pattern. The recommended plan from the 2016 USR is shown on Figure 3.12 and is included in **Appendix C**. Based on the current conceptual draft plan, **Figure 3.1** shows the proposed wastewater plan for Stage 5 in Findlay Creek Village. The recommended plan consists of a series of 200 mm diameter sewers outletting in two directions. The north portion of the plan, which includes a flow allowance for the future commercial lands west of the realigned Leitrim Road, proposes a sewer network to outlet to the existing 300 mm diameter sewer in Street 1. Sewers south of Street 3 are proposed to outlet to the new 375 mm diameter sewer, which is proposed to be constructed in 2020. The recommended plan also includes a strategy to connect to the 375 mm diameter sub-trunk sewer west of Pond 2. The sub-trunk sewer is recommended to be terminated at node 1271A to be located in the future re-aligned Leitrim Road area. In this location future sanitary connections from the north and west can also easily connect to MH 1271A.

The proposed location of the re-aligned Leitrim Road isolates the future commercial block from the rest of the residential subdivision. In accordance with the wastewater servicing recommended in the 2016 USR, this report includes a wastewater design to drain flows from this area across the Leitrim Road corridor into the subdivision at node 1295 eventually outletting to the existing 300 mm dia pipe in Street No. 1 However, at the time of development of the commercial lands west of Leitrim Road, a review could be made to confirm an alternate southward outlet location similar to that for the storm servicing plan.

The recommended plan is in general accordance with that proposed in the 2016 USR. For further reference, a preliminary sanitary design sheet as well as **Figure 3.2**, External Sanitary Drainage Area Plan are included in **Appendix C**.

3.4 Pipe Clearances

There will be a sewer crossing between the sanitary sewer outletting to the 375 mm dia sewer near Pond 2 and the future storm sewer which will cross the future Leitrim Road ROW. **Figure 3.3** shows how the sewer crossing in that location will work. Based on the analysis, there will be a clearance of about 0.66 m at the critical location. There are no other clearance issues within the Stage 5 plan because the sanitary sewer can be constructed sufficiently lower than the storm sewers.

3.5 2016 Updated Serviceability Report (2016 USR)

As stated earlier, the 2016 USR was completed prior to completion of the Leitrim Road EA and prior to revisions made by the City of Ottawa to its sanitary sewer design criteria. Completion of the 2018 Leitrim Road EA confirmed the proposed roadway corridor through the LDA including the subject site. Based on this latest information, this report includes a further review to the 2016 USR to demonstrate not only how the subject property can be adequately serviced by existing sanitary sewers but also provides additional analysis and details to demonstrate how sanitary sewers can be constructed to service the balance of the northwest portion of the Leitrim Development Area. **Figure 3.2** External Sanitary Drainage Area Plan, and the related Sanitary Sewer Design Sheet in **Appendix C**, provide a plan to service the entire north-west portion of the LDA. The plan is based on the location of the realigned Leitrim Road as well as the 2018 wastewater design criteria provided by the City of Ottawa. This report then confirms that both existing outlet sewers have the capacity to accept wastewater flows from Stage 5.

As stated above in Section 3.3, the expected wastewater flow from the north portion of the subject site to the existing sanitary sewer in Kelly Farm Drive is 16.09 l/s. The predicted flow identified in the Barrett Lands Phase 1 Design Brief was 23.04 l/s. A copy of the sanitary sewer design sheet and Sanitary drainage Area Plan (dwg no. 34731 – 501A) from the latter report are attached for reference in **Appendix C**. The difference between the two flow estimates is mostly attributable to two facts: the fixed alignment of Leitrim Road and the change in wastewater design criteria. Therefore, the existing sanitary sewers in Kelly Farm Drive have more than sufficient capacity to accept the predicted flows from the north portion of the subject site.

Similarly, it can be demonstrated that wastewater flows from not only the subject site, but the remaining tributary areas in the north west portion of the Leitrim Development Area, can be accommodated in the 375 dia sanitary sewer to be constructed in 2020 immediately west of Pond 2. That sewer was designed in 2017, prior to changes in the City's sanitary sewer design criteria and completion of the Leitrim Road EA. Based on the 2017 design, the expected tributary flow was about 103 l/s. A copy of the Wastewater Sewer Design Sheet and Drainage Area Plan (dwg no. 32261-501) from the 2017 sanitary sewer design are included in **Appendix C**.

Because of the recent changes in the tributary area to the 375 mm diameter sewer, a revised Sanitary Drainage Area Plan, **Figure 3.2**, and associated Wastewater Sewer Design Sheet have been updated in this report and are both included in **Appendix C**. Based on these two documents, the estimated peak flow to the 375 mm diameter sewer is now reduced to about 78 l/s. This reduction in flow estimates is mostly attributable to the City's change in wastewater design criteria. Therefore, it can be concluded that the 375 mm diameter sanitary sewer adjacent to Pond 2 will have more than sufficient capacity to accept flows from its tributary area, including Stage 5 in Findlay Creek Village.

4 STORMWATER MANAGEMENT

4.1 Existing Conditions

Most of the Stage 5 lands were farmed in recent years and presently most of the property is cleared. Only that portion south of Street 3 is tree covered. The site includes a series of drainage ditches which eventually outlet to the existing North South Swale. The site is fairly flat and generally drains from the northwest to the southeast. **Figure 1.5** indicates the site topography.

Recent adjacent developments include Phase 1 of the Barrett Lands, the first phase of Pond 2 and the North South Swale and adjacent storm sewer infrastructure which was sized to accommodate storm runoff from most of the subject property. The ultimate build out of Pond 2 and related inlet storm sewers will provide the runoff outlet for the balance of the property. **Figure 1.4** shows the location of the existing storm sewers in Kelly Farm Drive including an 1800 mm diameter pipe which presently terminates within the property in Street No. 1. The figure also shows the location of Pond 2 which will provide stormwater management for the property. Phase 1 of that facility was completed in 2019 and Phase 2 is proposed to be completed prior to development of Stage 5.

4.2 2016 Updated Serviceability Report

The 2016 USR recommended a preferred minor storm plan for the subject site. A copy of Figure 6.2, Preferred Minor Storm Plan from the 2016 USR is included in **Appendix D**. That plan indicates that storm sewers within the subject site will be routed in two directions: one to the east in Street 1 towards the existing 1800 mm diameter pipe and a second to a future storm sewer near the western inlet to Pond 2.

Figure 6.1, Storm Sewer Drainage Area Plan from the 2016 USR, which is included in **Appendix D**, shows the approximate limits tributary to the two outlets. Based on that plan about half of the original Stage 5 lands (± 10 ha, area 1295A and 1295B) is proposed to outlet to the Kelly Farm Drive sewer and eventually to the existing eastern Pond 2 inlet, and the balance (± 3.2 ha, area 1290B) outlets to the future Pond 2 western inlet.

4.3 Storm Sewer Design Criteria

In accordance with the October 2012 City of *Ottawa Sewer Design Guidelines*, the following design criteria was used to size storm sewers using the rational method:

- Design return period: 1:2 year (subdivision)
  1:10 year (arterial road)
- Time of Concentration: 10 minutes
- Minimum velocity: 0.8 m/s
- Maximum velocity: 3.0 m/s
- Manning's roughness coefficient: 0.013
- Minimum allowable slopes: refer to below **Table 4.1**

Table 4.1 City of Ottawa Minimum Allowable Slopes for Storm Sewer Pipes

DIAMETER (MM)	SLOPE (%)
250	0.432
300	0.340
375	0.250
450	0.195
525	0.160
600	0.132
675	0.113
750 and larger	0.100

The average runoff coefficient from Barrett Lands Phase 1 was close to 0.65 for the residential areas. Accordingly, since the proposed land uses for Stage 5 are similar to those in Barrett Lands Phase 1, the same coefficient is used in this report.

4.4 Proposed Minor Storm Plan

The 2016 USR recommended a minor storm plan for the subject site, but was developed in the absence of a detailed draft plan and road pattern and also prior to completion of the 2018 Leitrim Road Environmental Assessment. The recommended plan is shown on Figure 6.2 taken from the 2016 USR and is located in **Appendix D**. Based on the current conceptual draft plan, **Figure 4.2** shows a potential minor storm plan for Stage 5 in Findlay Creek Village. Together with a preliminary storm sewer design sheet for Stage 5, that figure is included in **Appendix D.**

It is proposed to construct a dedicated storm sewer for the employment lands (MH 1250 to the pond) and not integrate that sewer with those in the residential subdivision. This is proposed because of the location of the future Leitrim Road which physically separates the employment lands from the residential lands and will avoid any drainage conflicts between the two distinct land areas. The dedicated 'employment/commercial' storm sewer can connect directly to the Pond 2 western inlet at MH 1270 as shown on **Figure 4.2**. Minor storm drainage pipes from the realigned Leitrim Road could also connect at this location. The design of the future Leitrim Road should include a low point in this area close to the 94.0 m elevation to ensure an outlet and sewer connection to Pond 2 and to also offer the best opportunity to route major storm surface flows to the pond.

To service the subject employment lands and the ARIP, a 1650 mm diameter sewer is needed where shown on **Figure 4.2**. That sewer will need to increase in size to 2100 mm diameter to allow for additional flows from the employment lands west of Pond 2 as well as the re-aligned Leitrim Road before connecting to the pond.

The balance of the plan shows a series of local storm sewers that outlet in two directions. Most of the remaining Stage 5 property will drain, though a series of pipes ranging in size from 375 mm diameter to 1800 mm diameter, to the existing 1800 m diameter sewer in Street No. 1. The southern portion of the site, will drain to the proposed 1050 mm diameter pipe in Street No. 2 which will connect to the western inlet to Pond 2. The proposed drainage split is indicated on **Figure 4.2**. Based on this plan, a total drainage of 10.79 ha will be tributary to the existing 1800 mm dia storm sewer in Street No. 1 with an expected flow of 1053 l/s. This compares with the predicted flow of 2313 l/s in the 2016 USR and 2078 l/s in the Barrett Phase 1 design. The current flow estimate is significantly less than the two previous estimates because flows are now based on a smaller area that will be for residential and not employment uses and the City's criteria has changed since 2017. For reference, a copy of both the Barrett Lands Phase 1 External Storm

Drainage Area Plan (dwg 34731-500 A) and associated storm sewer design sheet are attached in **Appendix D**.

4.5 External Servicing

As stated earlier in Section 4.4, the preferred minor storm plan to service the north-west portion of the LDA, including the southern portion of the subject site, was indicated in the 2016 USR. Since then, the 2018 Leitrim Road EA has been completed; the City has changed its minor storm design criteria and the Stage 5 plan has advanced to a Conceptual Draft Plan state. The cumulative results of these events will have an impact on the higher level storm servicing plan for this area of the Leitrim Development Area.

Accordingly, **Figure 4.3** External Storm Drainage Area Plan and a related Storm Sewer Design Sheet have been prepared and are included in **Appendix D**. These documents essentially update the preferred plan to service Zone 12 from the 2016 USR.

As can be seen in Figure 6.1, Storm Drainage Area Plan (**Appendix D**) from the 2016 USR, MH 1270 is proposed to capture minor storm runoff from the “north-west” area of the LDA, **Figure 4.2** shows not only a plan to service Stage 5, but also an updated minor Storm Plan for the balance of the area. Future flows from the commercial area west of Pond 2, including a park and the realigned Leitrim Road can be serviced by a 1650 mm diameter sewer which will connect to MH 1270. Future flows from the Albion Road Industrial Park and the future commercial lands west of Stage 5 can also outlet to MH 1270 with a 1800 mm diameter pipe and flows from the north leg of the realigned Leitrim Road can connect to this MH with a 750 mm diameter pipe.

From MH 1270, a 2100 mm diameter pipe can be completed to a junction MH 1270B which will also accept flows from Stage 5 via a new 1050 mm diameter sewer. From there a 2400 mm diameter sewer will outlet to the western flow splitter MH to Pond 2. Based on the newest criteria, the total estimated flow from the “north-west” area, including the subject site is 5778 l/s. This compares to the flow estimate of 8408 l/s from the 2016 USR. For reference, a copy of the Storm Sewer Design Sheet (Zone 12) from the 2016 USR is included in **Appendix D**. The difference is attributable to a recent change in the City’s storm sewer design criteria with respect to rainfall intensity curves. The 2016 design was based on a 1:5 year curve and the current design is based on a 1:2 year event.

4.6 Temporary Drainage

Besides adjacent local storm sewers, there are also a number of ditches that carry runoff both around and through the subject property. **Figure 4.1** shows the location of those ditches. There are two existing culverts in Leitrim Road immediately north of the site. Those culverts carry runoff from north of Leitrim Road and route the flows into existing ditches which are located throughout the site. There are also existing road side ditches on the south side of the road which outlet to these two culverts.

The largest of those ditches is identified as ditch A-B-C-D-E and collects both surface runoff from north of Leitrim Road and piped flows from the Albion Road Industrial Park at point B. This ditch is entombed between points B-B1. These flows empty into the North South Swale at point E. Ditch A-B-C-D-E is wet most of the year. There are two intermittent ditches on the site that also empty into the larger ditch at Points C and D. The remaining adjacent ditches are roadside ditches H-A, H-G and I-E. The three roadside ditches are proposed to remain as well as a portion of the larger A-B-C-D-E ditch.

Figure 4.1 shows the location of the future employments lands and the future Leitrim Road. Surface drainage in these areas generally drains towards the south east, so the Stage 5

development will impede that surface flow pattern. Consequently, a temporary drainage system is needed to deal with the situation.

Figure 4.4 shows a proposal to temporarily deal with those surface flows. This proposal includes constructing three temporary drainage ditches to be designed to collect and carry runoff around the Stage 5 residential development. A new ditch A-B-C is proposed to be constructed in the future Leitrim Road widening immediately north of Stage 5. That ditch will route flow away from the two ditches that run southward from Leitrim Road and discharge that flow eastward to the North South Ditch (NSS). A ditch inlet (DI1) can be constructed behind lot 146 and direct surface flows through a sewer pipe to the NSS.

The other two temporary ditches could be constructed immediately to the west of Stage 5 in the future Leitrim Road re-alignment. Ditch D-B can direct some runoff to the A-B-C ditch at point B. The remaining flow from west of the site can be routed southwards via temporary ditch D-E-F where another ditch inlet (DI2) can be installed and connected to the storm sewer inlet pipe to Pond 2. The latter temporary ditch will also intercept flows from the existing 'western' ditch at point E.

4.7 Dual Drainage

Development of the subject site will include a stormwater strategy using the dual drainage system. The system features a combination of on-site detention (surface ponding) with inlet control devices (ICDs) and direct conveyance with no ponding. It accommodates both minor and major stormwater runoff. During frequent storms the effective runoff collected by catchment areas is directly released via catch basin inlets into the network of storm sewers, called the minor system. During less frequent storms, the balance of the flow (in excess of the minor flow) is accommodated by a system of rear yard swales and street segments called the major system. The main advantage of this arrangement is its ability to adjust the rate of total inflow into the minor system to satisfy the required level of service. The required total inflow is typically maintained by the restriction of the capacity and the density of the inlets directly connected into this system. As noted, during less frequent storms, the balance of the flow is accommodated by the major system. Typically, this accommodation is achieved by the attenuation on catchment surfaces called on-site detention and/or direct conveyance of the flow to a recipient. For the subject site, major flow from the north and central portion of the site will be conveyed to the North South Swale and major flow from the south portion will be conveyed to Pond 2.

Major flow from Stage 5 was accounted for in the 2016 USR. The Pond 2 location was identified as major flow location ID 17 on Figure 6.11, Major Flow Routing Features, from that report (enclosed in **Appendix D**). The following **Table 4.2** summarizes the major system evaluation at this location as presented in the 2016 Report.

Table 4.2 Summary of Major Flow at 2016 USR

MAJOR FLOW LOCATION ID	ROW (M)	MAX. CUMMULATIVE FLOW (CMS)	STATIC DEPTH OF PONDING (EST) (M)	DEPTH OF OVERFLOW (M)	TOTAL DEPTH (M)	VELOCITY (M/S)	DXV (M^2/S)
100 Year 3 Hour Chicago Storm							
17	18	0.51	0.19	0.11	0.3	1.16	0.35
100 Year 3 Hour Chicago Storm + 20%							
17	18	1.66	0.13	0.17	0.30	1.73	0.52

Note: The information presented in the above table was extracted from Table 6.15 from the 2016 USR.

At the location noted in the above table, the maximum ponding depth is at the maximum allowable 0.35 m, and the product of depth and velocity is less than 0.6 m^2/s, as per the 2012 Ottawa Sewer Design Guidelines (OSDG) for the 100 year 3 hour Chicago storm event. In addition, at this preliminary design stage, the static depth of ponding is unknown. Therefore, it was assumed that the depth of static ponding would be less than the balance between total depth (0.35 m) and cascading depth during the 100 year storm event.

For the 100 year 3 hour Chicago storm event increased by 20%, the total estimated static and dynamic ponding exceeds 0.35 m at the major system outlet location. During detail design, the major system will be evaluated in greater detail.

4.8 Hydraulic Evaluation

The storm sewer system for the LDA, including the subject site, was hydraulically evaluated as part of the 2016 USR. Hydraulic evaluation has continued to be updated as the detailed design of various phases is completed. The hydraulic grade line (HGL) for two Pond 2 trunk storm sewers that will service Zone 12 (which includes the subject site), is presented in the below **Table 4.3**. The results are from the detailed design of Barrett Phase 1, an existing development tributary to Pond 2 and located immediately east of Kelly Farm Drive. The results are presented for two sanitary inflow options. This is due to the interconnection between the LDA's storm and sanitary systems via a sanitary emergency overflow. The sanitary inflow options are discussed in detail in Section 6.4.1 in the 2016 USR.

Table 4.3 Hydraulic Gradient Line Analysis – Subject Site

XPSWMM NODE	USF (M) EXISTING / *PROPOSED*	FINISHED GRADE (M) EXISTING / *PROPOSED*	STORM HYDRAULIC GRADE LINE							
			100 YEAR 24 HOUR SCS				100 YEAR 3 HOUR CHICAGO			
			SANI INFLOW OPTION 1		SANI INFLOW OPTION 2		SANI INFLOW OPTION 1		SANI INFLOW OPTION 2	
			HGL (M)	USF–HGL (M)	HGL (M)	USF–HGL (M)	HGL (M)	USF–HGL (M)	HGL (M)	USF–HGL (M)
Pond 2 Western Trunk										
P2	*N/A*	*N/A*	91.86	n/a	91.85	N/A	91.70	N/A	91.71	N/A
W2-FS	*N/A*	*N/A*	92.09	n/a	92.08	N/A	92.17	N/A	92.17	N/A
S1270	*93.30*	*94.80*	92.25	1.05	92.24	1.06	92.40	0.90	92.40	0.90

XPSWMM NODE	USF (M)	FINISHED GRADE (M)	STORM HYDRAULIC GRADE LINE							
			100 YEAR 24 HOUR SCS				100 YEAR 3 HOUR CHICAGO			
	EXISTING	EXISTING	SANI INFLOW OPTION 1		SANI INFLOW OPTION 2		SANI INFLOW OPTION 1		SANI INFLOW OPTION 2	
	PROPOSED	*PROPOSED*	HGL (M)	USF–HGL (M)	HGL (M)	USF–HGL (M)	HGL (M)	USF–HGL (M)	HGL (M)	USF–HGL (M)
S1260	*93.85*	*95.35*	92.28	1.57	92.27	1.58	92.44	1.41	92.43	1.42
Pond 2 Eastern Trunk										
P2	*N/A*	*N/A*	91.86	n/a	91.85	N/A	91.70	N/A	91.71	N/A
E2-FS	*N/A*	*N/A*	91.86	n/a	91.85	N/A	91.82	N/A	91.83	N/A
MH821	*N/A*	*93.41*	91.91	n/a	91.90	N/A	91.91	N/A	91.91	N/A
MH800	*N/A*	*95.12*	92.23	n/a	92.22	N/A	92.33	N/A	92.34	N/A
MH11105	*93.33*	*95.19*	92.33	1.00	92.33	1.00	92.48	0.85	92.50	0.83
MH11104	*N/A*	*95.29*	92.45	n/a	92.44	N/A	92.64	N/A	92.65	N/A
MH11100	*N/A*	*95.55*	92.63	n/a	92.63	N/A	92.90	N/A	92.91	N/A

Note: The information presented in the above table were extracted from HGL tables presented on the CD included in Appendix E of the report entitled Design Barret Lands – Phase 1 4660 Bank Street Leitrim Development Area (IBI Group, May 2018).

The HGL results presented in **Table 4.3 Hydraulic Gradient Line Analysis – Subject Site**indicate that the minimum 0.3 m clearance between the USF and HGL is maintained across subject site. The analysis was based on a preliminary Macro Grading and Drainage Plan, Figure 8.1 from the 2016 USR. A copy of that plan is included in **Appendix D**.

4.9 Macro Grading Plan

Because there was no conceptual plan for the subject site in the 2016 USR, the Macro Grading Plan in that report contained limited grading information for the Stage 5 area. Also, in recent discussions with the City of Ottawa, the subject site should try to match, as practically as possible, the future grades of the realigned Leitrim Road. Consequently, **Figure 4.5**, Macro Grading Plan, has been prepared and is included in **Appendix D**.

This figure shows preliminary street grades which also indicate the major flow drainage limits. Major surface flows from the north east portion of the site will be routed to the North South Swale in either Street No. 1 or Street No. 3. The balance will be routed to Pond 2 via Block 227 or directly to Pond 2 from Street No. 3.

Figure 4.5 also indicates the potential grades along the future Leitrim Road as well as potential grading along the western portion of the Stage 5 lots. As can be seen from this figure, it appears that it will be possible to match the subdivision grading with the future road profile.

5 SEDIMENTATION AND ERIOSION CONTROL PLAN

5.1 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:

- Until the local storm sewers are constructed, groundwater in trenches will be pumped into a filter mechanism prior to release to the environment or alternatively, dewatering will be routed to the nearest storm sewer;
- 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;
- Filter cloths will remain on open surface structures such as maintenance holes and catchbasins until these structures are commissioned and put into use; and
- Silt fence on the site perimeter.

5.2 Trench Dewatering

The two likely options are to discharge into the existing storm sewer in Street No. 1 which outlets to the existing Pond 2 and provides end-of-pipe treatment or to discharge 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.

5.3 Bulkhead Barriers

Although the storm sewers eventually outlet into a sediment forebay, a ½ diameter bulkhead will be constructed over the lower half of the new outletting sewers to reduce sediment loadings during construction. These bulkheads will trap any sediment laden flows, thus preventing any construction-related contamination into existing sewers. The bulkheads will be inspected and maintained including periodic sediment removal as needed.

5.4 Seepage Barriers

In order to further reduce sediment loading to the environment or the Stormwater Management Facility, a seepage barrier will be installed on any surface water courses at appropriate locations that may become evident during construction. These barriers will be similar to either the Light Duty Straw Bale Barrier as per OPSD 219.100 or the Light Duty Silt Fence Barrier as per OPSD219.110 (copies of both are included in **Appendix E**). They are typically made of layers of straw bales or geotextile fabric staked in place. All seepage barriers will be inspected and maintained as needed.

5.5 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 should be covered in some fashion to prevent sediment from entering the minor storm sewer system.

Until streets are asphalted and curbed, all new catchbasins and manholes will be constructed with a geotextile filter fabric located between the structure frame and cover. These will stay in place and be maintained during construction and build until it is appropriate to remove same.

No specific ESC Plan is proposed at this time. A detailed ESC Plan will be developed at the time of final design for agency approvals. In time, the selected contractor for the site construction will confirm final details of the plan.

6 APPROVALS AND PERMIT REQUIREMENTS

6.1 City of Ottawa

The City of Ottawa will review all and approve most development applications as they relate to provision of water supply, wastewater collection and disposal, and stormwater conveyance and treatment. Ultimately, the City will issue final approvals for construction, including:

- MECP Section 53 Application for Sewers
- Form 1 for Watermains
- Commence Work Notification

6.2 Province of Ontario

At the time of final design approvals, the Ministry of Environment, Conservation and Parks (MECP) will approve the local sewers under Section 53 of the Ontario Water Resources Act and issue the appropriate Environmental Compliance Approvals. If required, the MECP will also issue a Permit To Take Water (PTTW).

6.3 Conservation Authority

The South Nation Conservation will issue permits for filling the local drainage ditches.

6.4 Federal Government

There are no permits, authorizations or approvals required from the federal government for the proposed development.

7 CONCLUSIONS AND RECOMMENDATIONS

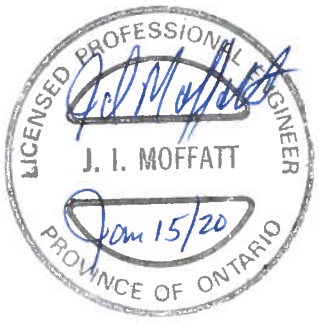
7.1 Conclusion

Development of the Leitrim Community Design Plan has been well thought out and planned. These plans have provided development guidelines and criteria for the subject site. Including updated information contained in this report, it appears that the subject lands can proceed with development when a number of improvements and/or extensions of existing major municipal infrastructure are completed. These include:

1. Completion of construction of Pond 2 including the western inlet sewer and forebay.
2. Extension of the 375 mm diameter sanitary sewer around the western edge of Pond 2.
3. Construction of local sewers and watermains throughout the subject site during its development.

7.2 Recommendation

Once the major municipal infrastructures identified in Section 7.1 are implemented, the subject site can proceed to final development. This report therefore recommends that the City provide relevant draft conditions and that the planning and development review processes for the subject lands move forward.



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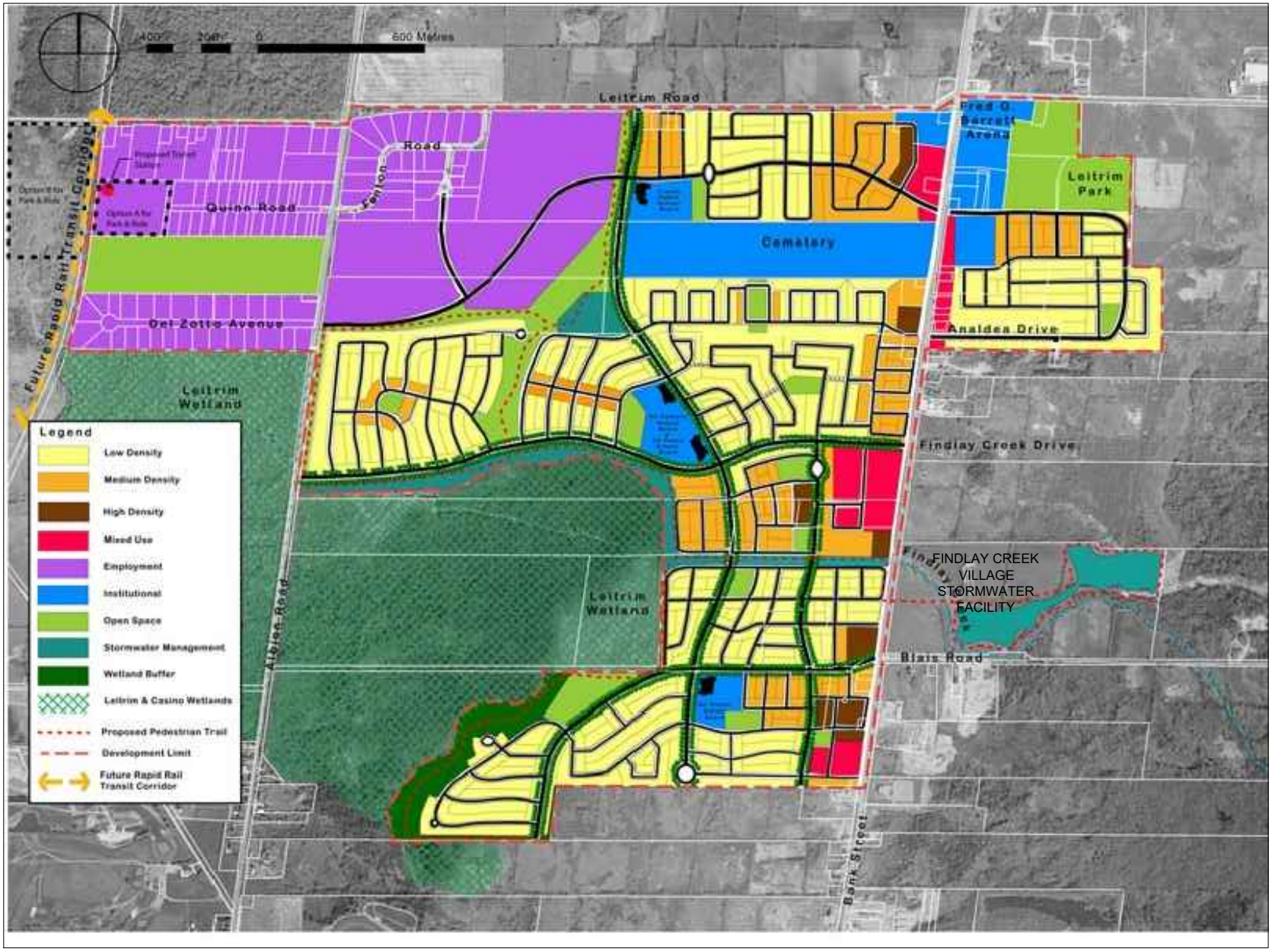

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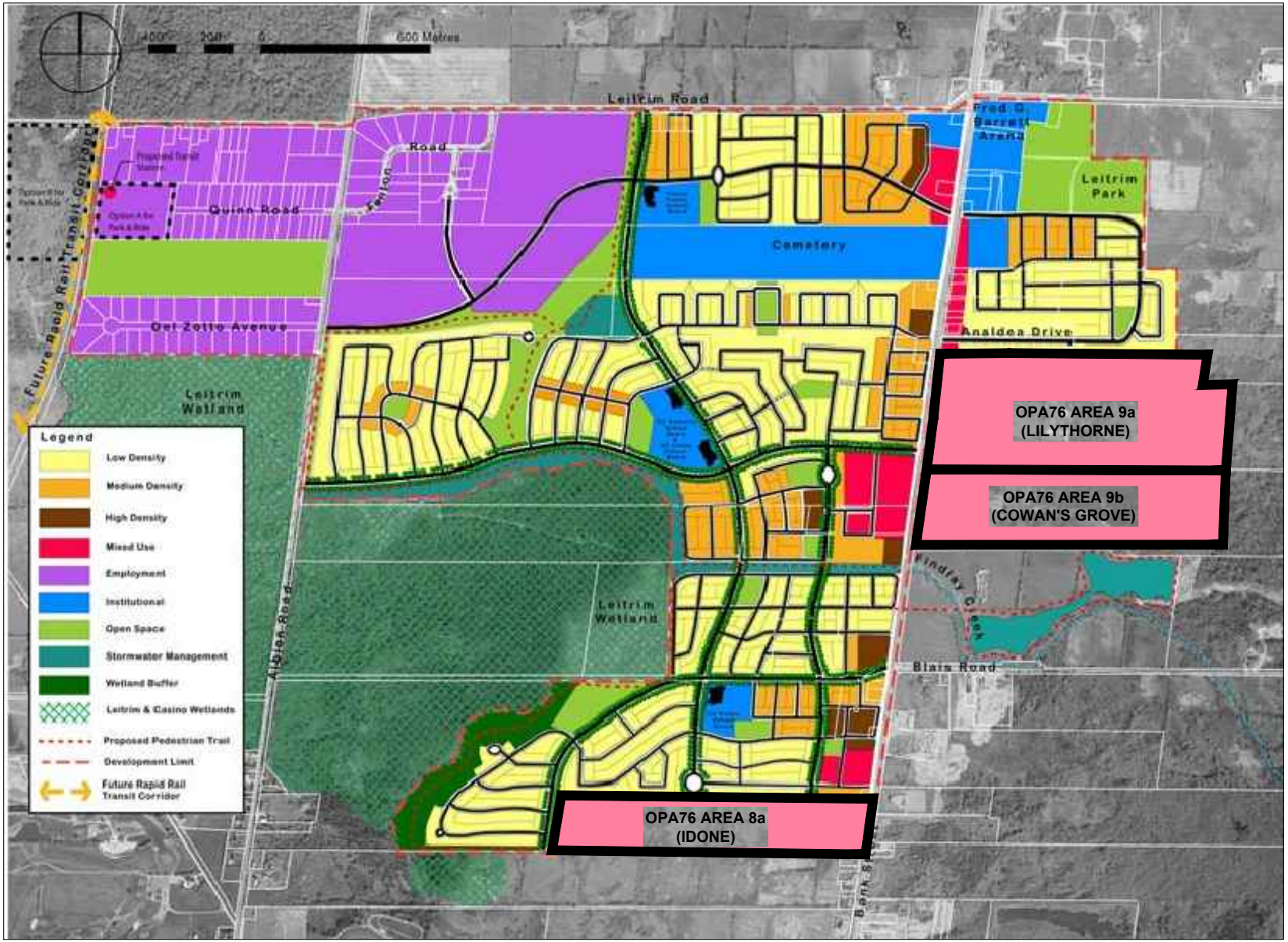
IBI

Scale	Project Title	Drawing Title	Sheet No.
NTS	ASSESSMENT OF ADEQUACY OF PUBLIC SERVICES FINDLAY CREEK VILLAGE - STAGE 5 3100 LEITRIM ROAD LEITRIM DEVELOPMENT AREA	LEITRIM COMMUNITY DESIGN PLAN - 2005	FIGURE 1.1



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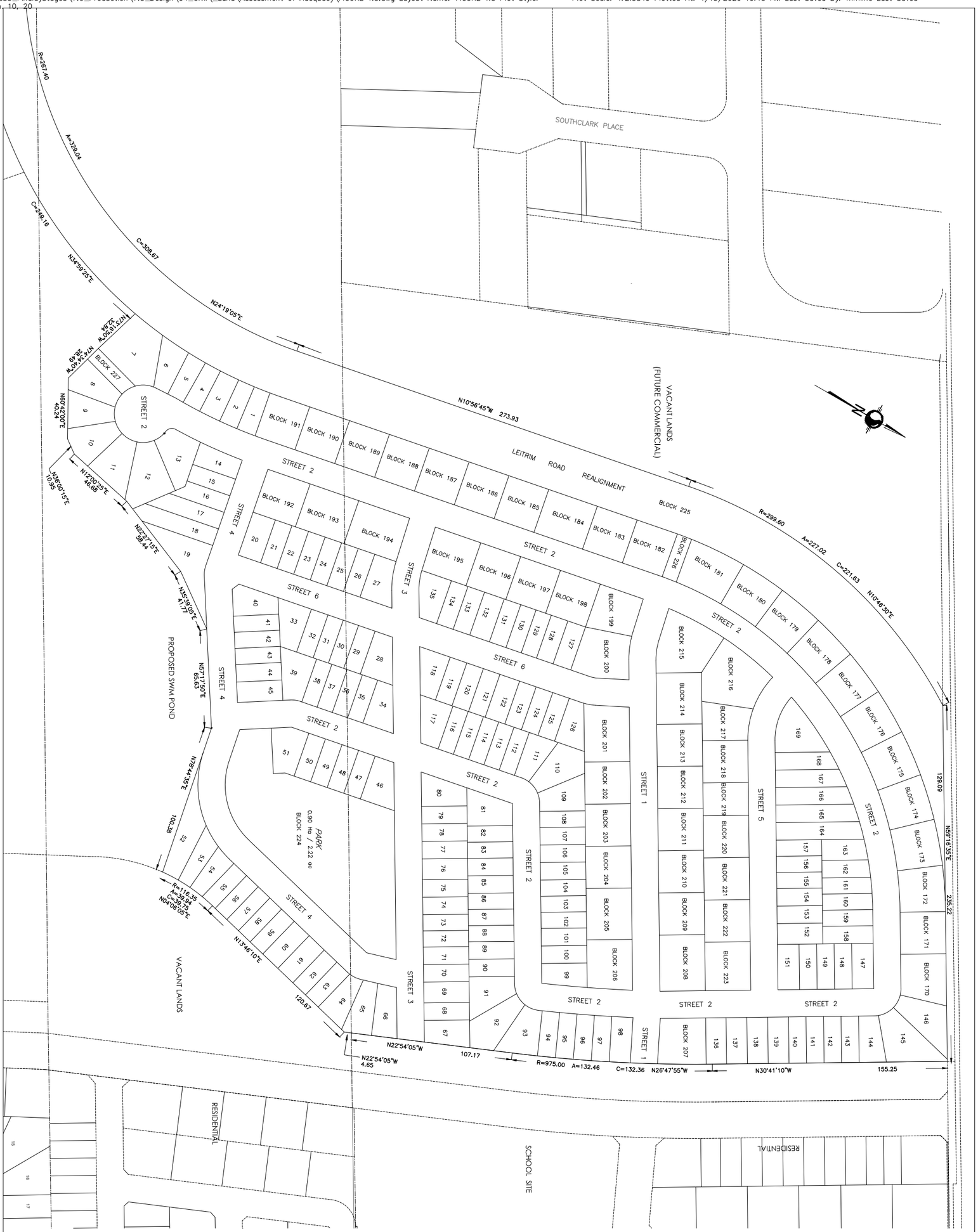
Scale	Project Title	Drawing Title	Sheet No.
NTS	ASSESSMENT OF ADEQUACY OF PUBLIC SERVICES FINDLAY CREEK VILLAGE - STAGE 5 3100 LEITRIM ROAD LEITRIM DEVELOPMENT AREA	LEITRIM COMMUNITY DESIGN PLAN-2005 WITH OPA 76 Expansion Areas 8a, 9a and 9b	FIGURE 1.2



DRAFT PLAN OF SUBDIVISION

PART OF LOTS 16 AND 17
CONCESSION 4 (RIDEAU FRONT)
(GEOGRAPHIC TOWNSHIP OF GLOUCESTER)
CITY OF OTTAWA

Scale 1:1250

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

ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51 OF THE PLANNING ACT.

[A]-AS SHOWN ON DRAFT PLAN
[B]-AS SHOWN ON DRAFT PLAN
[C]-AS SHOWN ON DRAFT AND KEY PLANS
[F]-AS SHOWN ON DRAFT PLAN
[E]-AS SHOWN ON DRAFT PLAN
[G]-AS SHOWN ON DRAFT PLAN
[H]-CITY WATER AVAILABLE
[I]-AS SHOWN ON DRAFT PLAN
[J]-SEE TOPOGRAPHICAL INFORMATION
[K]-ALL CITY SERVICES AVAILABLE
[L]-NO REGISTERED EASEMENTS ON TITLE

LAND USE

AREA OF LOTS (SINGLES 1-149) = 7.14 Hectares (17.7 Acres)
AREA OF BLOCKS (TOWNHOMES 170-223) = 4.88 Hectares (12.1 Acres)
AREA OF BLOCK (PARK 224) = 0.9 Hectares (2.2 Acres)
AREA OF BLOCKS (REMNANTS 225 & 227) = 0.08 Hectares (0.2 Acres)
AREA OF BLOCKS (WALKWAYS 226-227) = 0.06 Hectares (0.15 Acres)
AREA OF ROADS = 4.99 Hectares (12.3 Acres)
TOTAL AREA OF SUBDIVISION = 21.90 Hectares (54.1 Acres)

SURVEYOR'S CERTIFICATE
I CERTIFY THAT THE BOUNDARIES OF THE SUBJECT LANDS AND THEIR RELATIONSHIP TO ADJOINING LANDS HAVE BEEN ACCURATELY AND CORRECTLY SHOWN.

DATE

T. MARTINCIC
ONTARIO LAND SURVEYOR

Stantec

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OTTAWA, ON K2C 3G4
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DRAWN: MIE	CHECKED: *	PM: R.	FILE: -

PROJECT NO.: 161610513

Sheet No.

FIGURE 1.3

Drawing Title

DRAFT PLAN

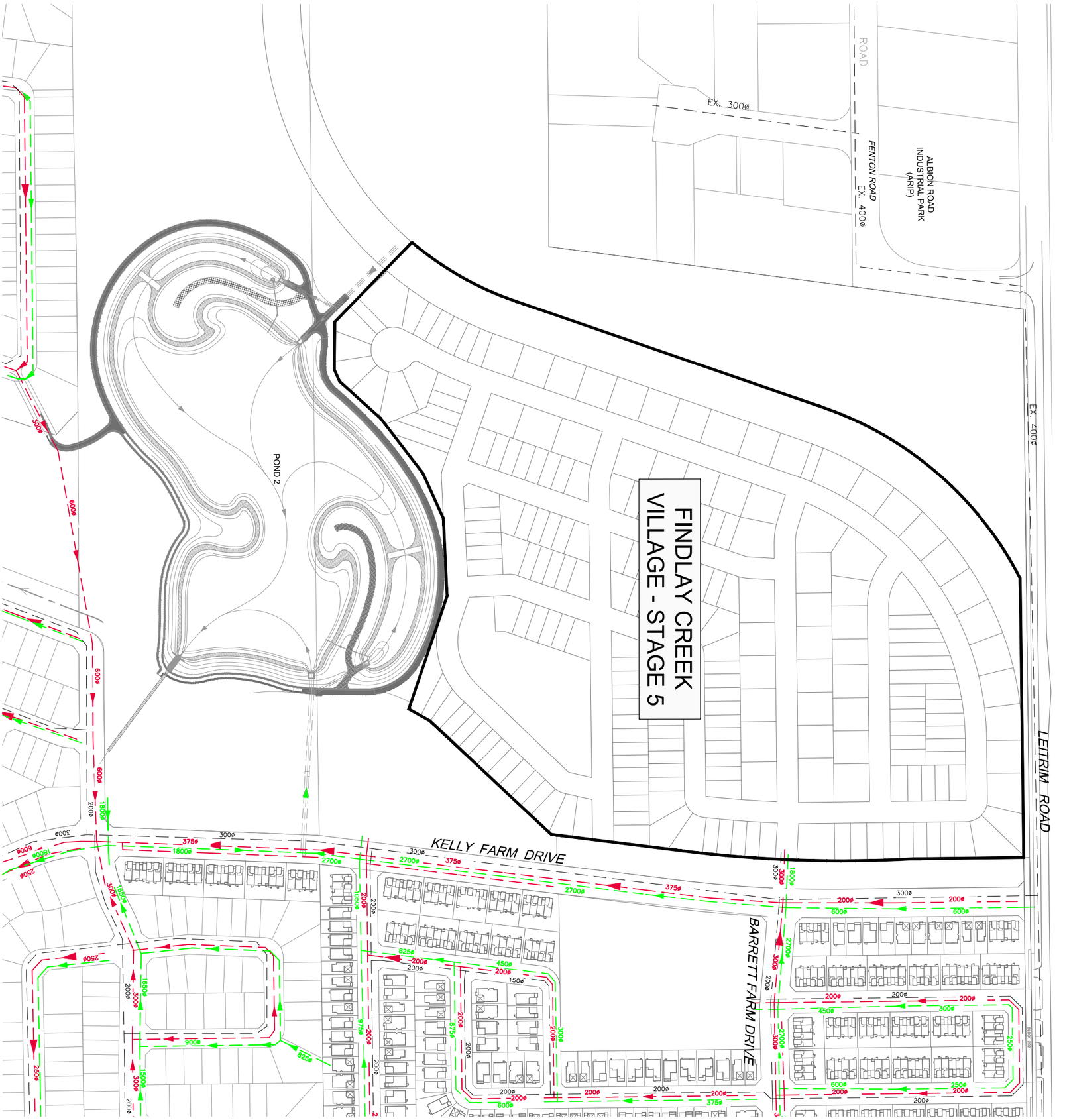
Project Title

ASSESSMENT OF ADEQUACY OF PUBLIC SERVICES
FINDLAY CREEK VILLAGE - STAGE 5
3100 LEITRIM ROAD
LEITRIM DEVELOPMENT AREA

Scale

N.T.S.

IBI



LEGEND:

- EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN

N

Sheet No.	Drawing Title	Project Title	Scale
FIGURE 1.4	EXISTING INFRASTRUCTURE	ASSESSMENT OF ADEQUACY OF PUBLIC SERVICES FINDLAY CREEK VILLAGE - STAGE 5 3100 LEITRIM ROAD LEITRIM DEVELOPMENT AREA	N.T.S.

IBI

J:\122283_FindlayStage5\7.0_Production\7.3_Design\04_Civil_Land\Assessment of Adequacy\FIGURE 1.5.dwg Layout Name: FIGURE 1.5 Plot Style: ---- Plot Scale: 1:2.5849 Plotted At: 1/15/2020 10:13 AM Last Saved By: mmilne Last Saved At: Jan. 13, 20

Sheet No.

FIGURE 1.5

Drawing Title

EXISTING TOPOGRAPHY
AND DRAINAGE PATTERNS

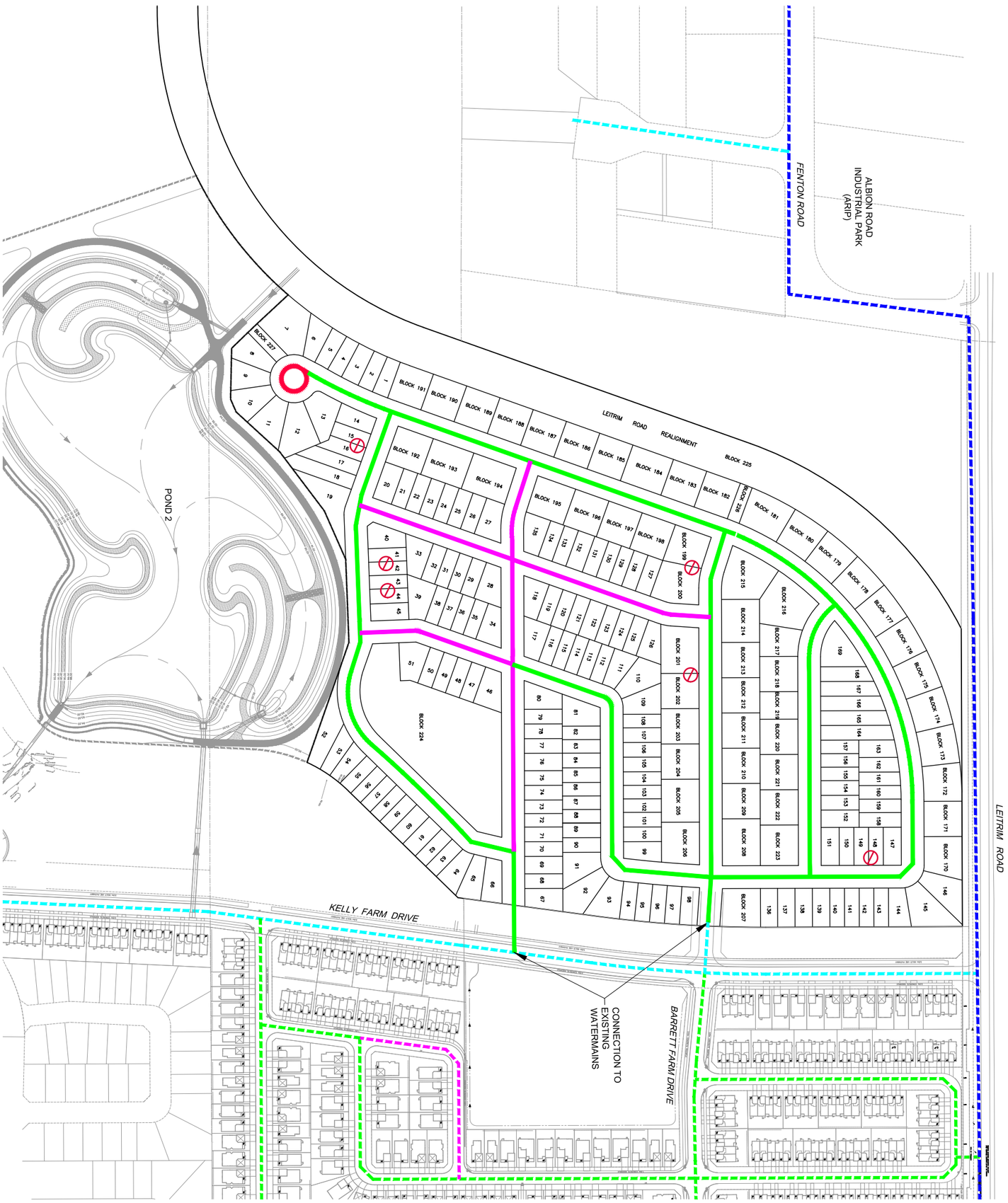
Project Title

ASSESSMENT OF ADEQUACY
OF PUBLIC SERVICES
FINDLAY CREEK VILLAGE - STAGE 5
3100 LEITRIM ROAD
LEITRIM DEVELOPMENT AREA

Scale

N.T.S.

IBI



LEGEND:

- PROPOSED 150mmØ WATERMAIN
- PROPOSED 200mmØ WATERMAIN
- PROPOSED 50mmØ WATERMAIN
- EXISTING 400mmØ WATERMAIN
- EXISTING 300mmØ WATERMAIN
- EXISTING 200mmØ WATERMAIN
- EXISTING 150mmØ WATERMAIN
- LOCATION OF POTENTIAL 3.0m SIDE TO SIDE BUILDING SEPARATION OR 10m REAR TO SIDE SEPARATION

N

Sheet No.

FIGURE 2.1

Drawing Title

PROPOSED
WATER PLAN

Project Title

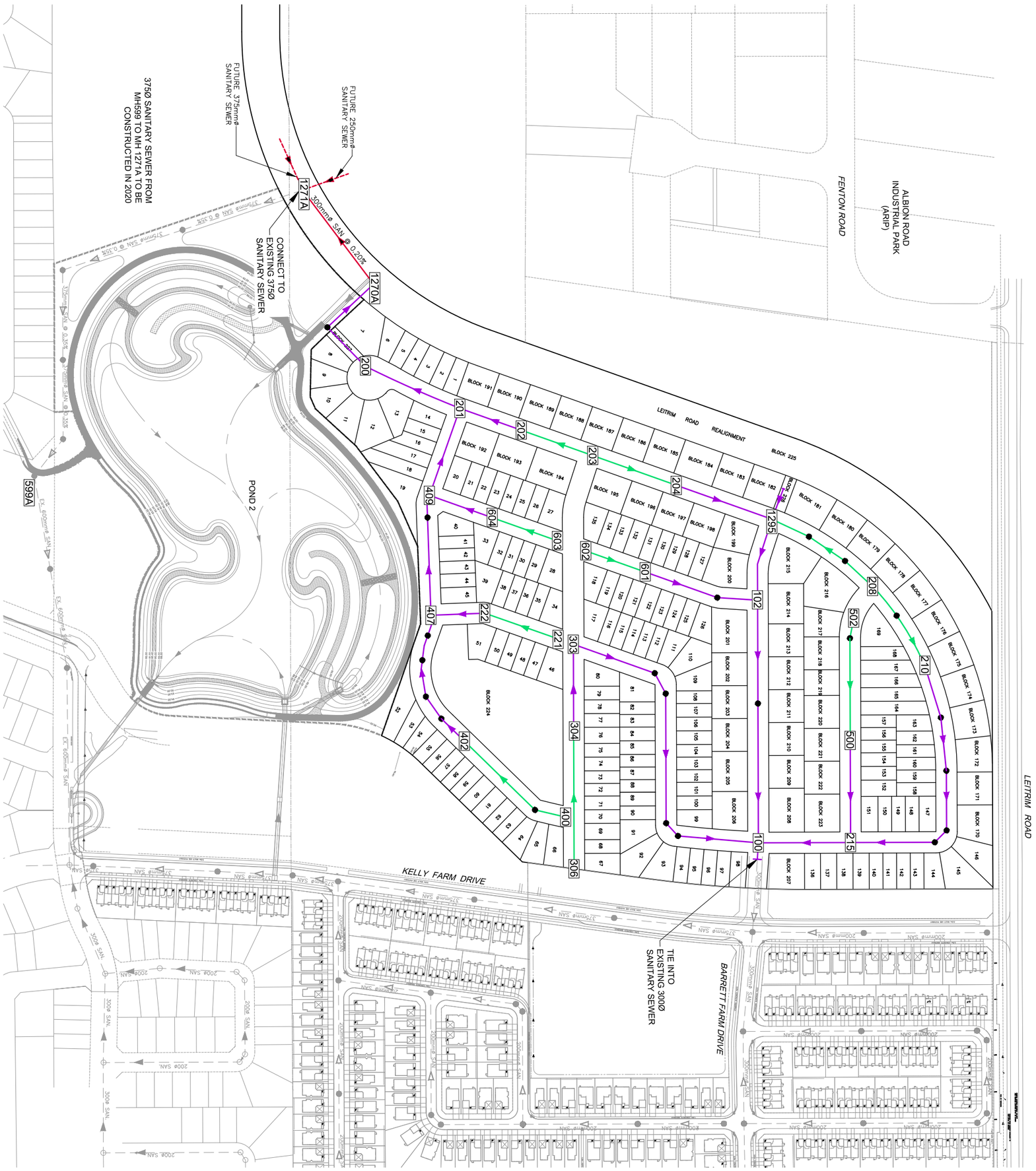
ASSESSMENT OF ADEQUACY
OF PUBLIC SERVICES
FINDLAY CREEK VILLAGE - STAGE 5
3100 LEITRIM ROAD
LEITRIM DEVELOPMENT AREA

Scale

N.T.S.

IBI

J:\122283_FindlayStage5\7.0_Production\7.3_Design\04_Civil_Land\Assessment of Adequacy\FIGURE 3.1.dwg Layout Name: FIGURE 3.1 Plot Style: ---- Plot Scale: 1:2.5849 Plotted At: 1/15/2020 11:54 AM Last Saved By: mmilne Last Saved At: Jan. 15, 20



LEGEND :

- EXISTING SEWER, DIRECTION AND SIZE
- PROPOSED 200Ø SANITARY SEWER @ 0.35%, MANHOLE NODE AND DIRECTION
- PROPOSED 200Ø SANITARY SEWER @ 0.65%, MANHOLE NODE AND DIRECTION

N

Sheet No.	Drawing Title	Project Title	Scale
FIGURE 3.1	PROPOSED WASTEWATER PLAN	ASSESSMENT OF ADEQUACY OF PUBLIC SERVICES FINDLAY CREEK VILLAGE - STAGE 5 3100 LEITRIM ROAD LEITRIM DEVELOPMENT AREA	N.T.S.

IBI

ROAD GRADE	= 94.00
TOP 1800Ø ST.	= 92.13
OBV. 1800Ø ST.	= 90.30
PIPE WALL	= 0.20m
BTM. PIPE	= 90.10
TOP 300Ø SAN.	= 89.61
PIPE WALL	= 0.03m
TOP PIPE	= 89.64
CLEARANCE	= 0.66m

1800mmø
FUTURE 750mmø
1800
1270
300mmø SAN @ 0.20%
FUTURE 1650mmø
2100mmø
1277
2400mmø
1050mmø
1050mmø
BLOCK 227
375mmø SAN
BLOCK 190
BLOCK 191
BLOCK 192
BLOCK 193
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
20
21
94.00
92.00
91.00
90.40
90.00
89.00
88.50
POND 2

LEGEND :

375ø SAN. — EXISTING SEWER, DIRECTION AND SIZE

PROPOSED 200Ø SANITARY SEWER, MANHOLE NODE AND DIRECTION

1800ø
1270
ROPOSED STORM SEWER, SIZE, MANHOLE NODE AND DIRECTION

N

IBI

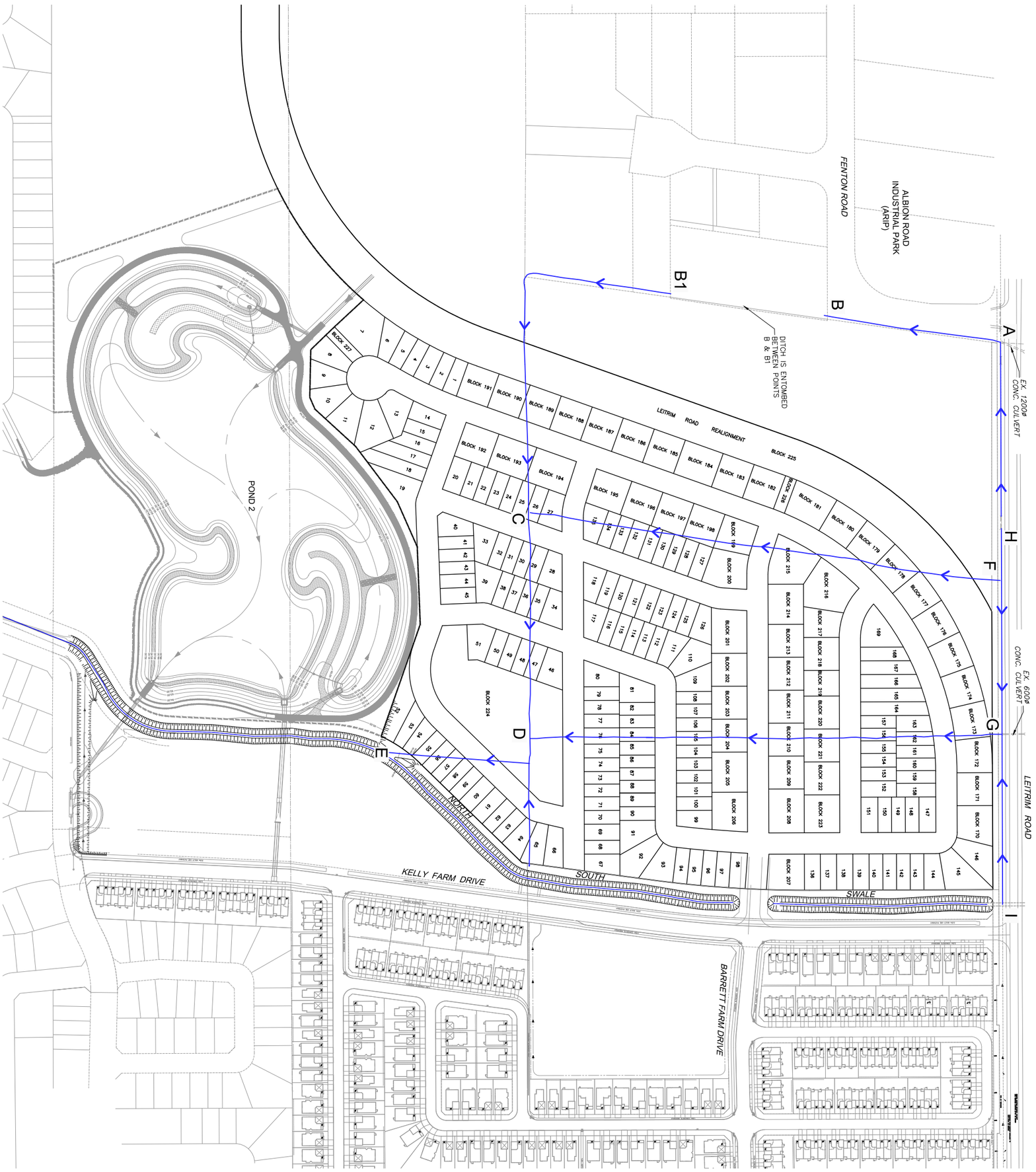
Scale N.T.S.

Project Title
ASSESSMENT OF ADEQUACY OF PUBLIC SERVICES
FINDLAY CREEK VILLAGE - STAGE 5
3100 LEITRIM ROAD
LEITRIM DEVELOPMENT AREA

Drawing Title
MAJOR PIPE CLEARANCE LOCATION

Sheet No.
FIGURE 3.3

J:\122283_FindlayStage5\7.0_Production\7.3_Design\04_Civil_Land\Assessment of Adequacy\FIGURE 3.3 Pipe Clearance.dwg Layout Name: FIGURE 3.3 Plot Style: ---- Plot Scale: 1:2.5849 Plotted At: 1/15/2020 11:40 AM Last Saved By:
mmline Last Saved At: Jan. 15, 20



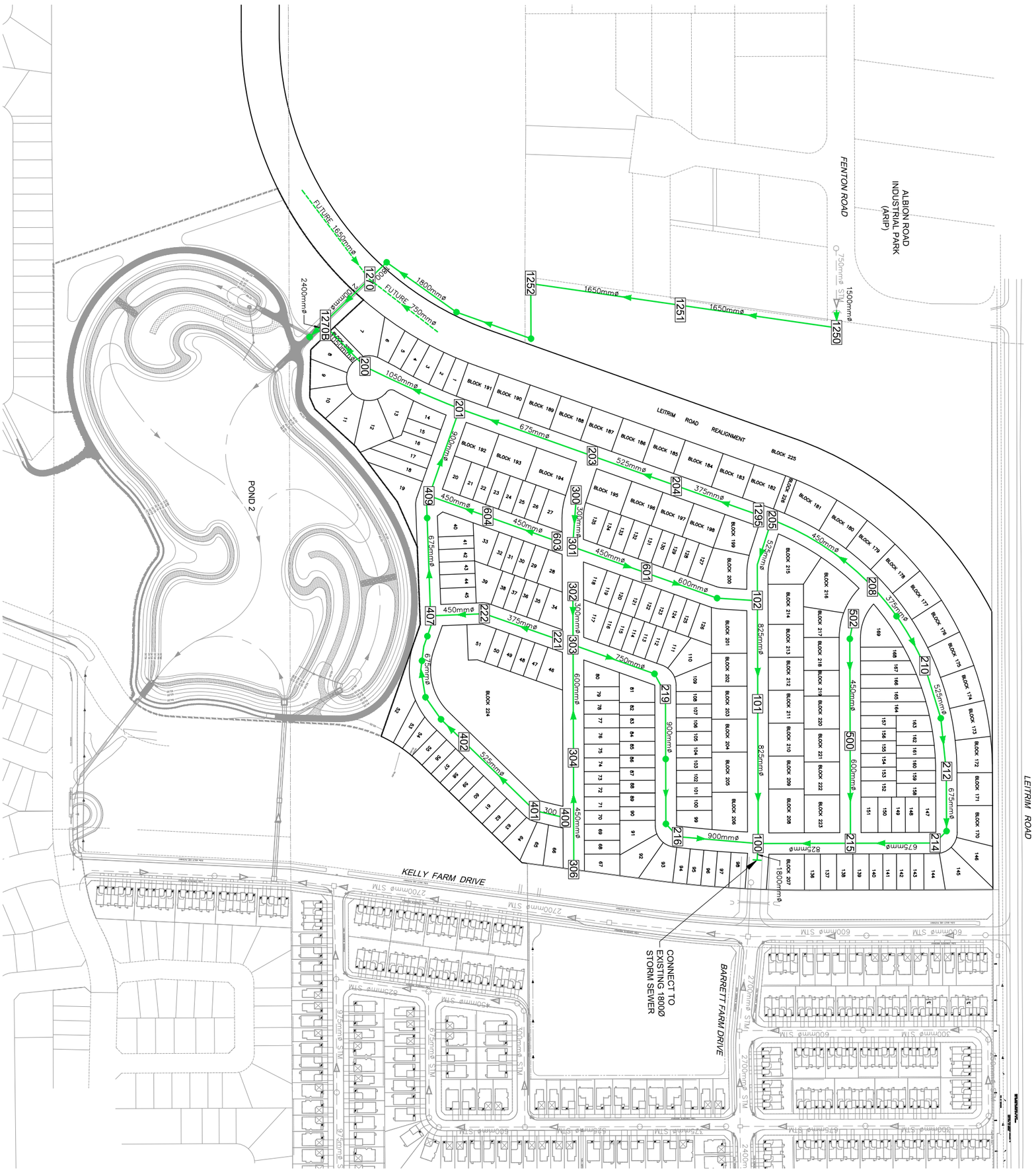
LEGEND :

EXISTING DITCH

N

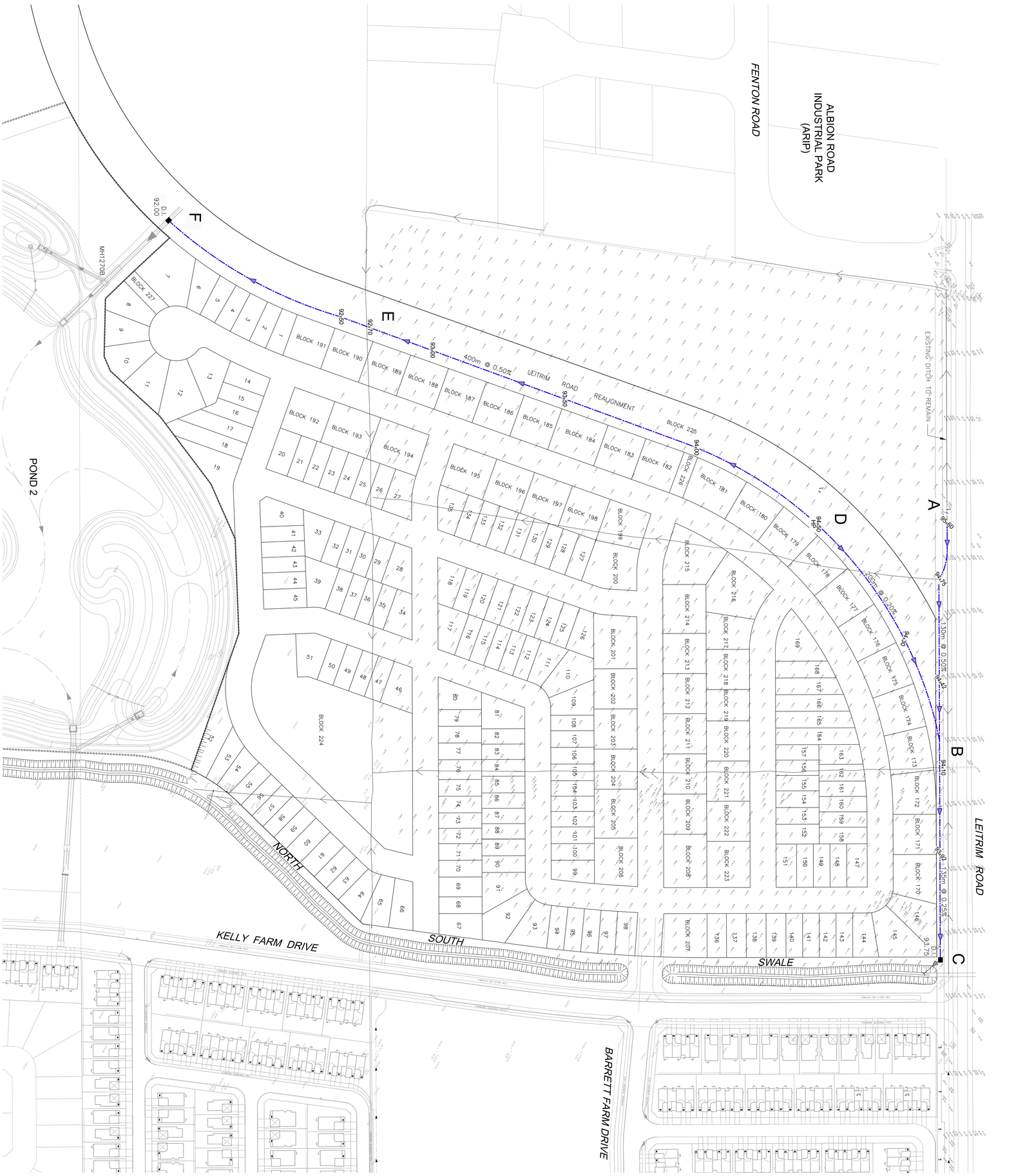
Sheet No.	Drawing Title	Project Title	Scale
FIGURE 4.1	EXISTING DRAINAGE DITCHES	ASSESSMENT OF ADEQUACY OF PUBLIC SERVICES FINDLAY CREEK VILLAGE - STAGE 5 3100 LEITRIM ROAD LEITRIM DEVELOPMENT AREA	N.T.S.

IBI



Sheet No.	Drawing Title	Project Title	Scale
FIGURE 4.2	PROPOSED MINOR STORM PLAN	ASSESSMENT OF ADEQUACY OF PUBLIC SERVICES FINDLAY CREEK VILLAGE - STAGE 5 3100 LEITRIM ROAD LEITRIM DEVELOPMENT AREA	N.T.S.

IBI



LEGEND :

EXISTING DITCH

PROPOSED TEMPORARY DITCH

N

Sheet No.

FIGURE 4.4

Drawing Title

TEMPORARY DRAINAGE DITCH SOLUTION

Project Title

ASSESSMENT OF ADEQUACY OF PUBLIC SERVICES
FINDLAY CREEK VILLAGE - STAGE 5
3100 LEITRIM ROAD
LEITRIM DEVELOPMENT AREA

Scale

N.T.S.

IBI

APPENDIX A

- **City of Ottawa Servicing Study Guidelines Checklist**
- **Meeting Notes from September 26, 2019 Pre-Consultation Meeting with City of Ottawa**
- **South Nation Conservation Permit No. 2017-GLO-R166**

General Content

ITEM DESCRIPTION		LOCATION
	Executive Summary (for larger reports only)	N/A
√	Date and revision number of the report	Front Cover
√	Location Map and plan showing municipal address, boundary, and layout of proposed development.	Figure 1.3
√	Plan showing the site and location of all existing services.	Figure 1.4
√	Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.	Sections 1.3, 2.2.1, 3.3 and 4.4
√	Summary of Pre-consultation Meeting with City and other approval agencies.	Appendix A, B
√	Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria.	Section 1.4, 2.2, 3.2, and 4.3
√	Statement of objectives and servicing criteria	Sections 2.2.1, 3.3 and 4.4
√	Identification of existing and proposed infrastructure available in the immediate area.	Figure 1.4
√	Identification of Environmentally Significant Areas, Watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).	Section 1.9
√	Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighbouring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.	Section 4.2 and 4.6 Figures 4.3 and 4.5
√	Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.	Section 1.10
√	Proposed phasing of the development, if applicable.	Section 1.3
√	Reference to geotechnical studies and recommendations concerning servicing.	Section 1.8

	ITEM DESCRIPTION	LOCATION
√	All preliminary and formal site plan submissions should have the following information: • Metric scale • North arrow (including construction North) • Key plan • Name and contact information of applicant and property owner • Property limits including bearings and dimensions • Existing and proposed structures and parking areas • Easements, road widening and rights-of-way • Adjacent street names	Done

Development Servicing Report: Water

	ITEM DESCRIPTION	LOCATION
√	Confirm consistency with Master Servicing Study, if available	Section 2.2
√	Availability of public infrastructure to service proposed development	Figure 1.4 and Section 2.4
√	Identification of system constraints – external water needed	Section 2.2.1
√	Identify boundary conditions	Section 2.2.4 Appendix B
√	Confirmation of adequate domestic supply and pressure	Section 2.3
√	Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow at locations throughout the development.	Section 2.2.3
√	Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.	Section 2.3
	Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defining phases of the project including the ultimate design.	N/A
	Address reliability requirements such as appropriate location of shut-off valves.	N/A

ITEM DESCRIPTION		LOCATION
	Check on the necessity of a pressure zone boundary modification.	N/A
√	Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range.	Section 2.3
√	Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.	Figure 1.4
√	Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities and timing of implementation.	Section 2.2.4
√	Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Section 2.2.1
√	Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	Section 2.3 Appendix B

Development Servicing Report: Wastewater

ITEM DESCRIPTION		LOCATION
√	Summary of proposed design criteria (Note: Wet-weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure).	Section 3.3
√	Confirm consistency with Master Servicing Study and/or justifications for deviations.	Section 3.2
√	Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age condition of sewers.	Section 3.3
√	Description of existing sanitary sewer available for discharge of wastewater from proposed development.	Section 3.1 Figure 1.4

ITEM DESCRIPTION		LOCATION
√	Verify available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable)	Section 3.2
√	Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix “C”) format.	Section 3.4
√	Description of proposed sewer network including sewers, pumping stations and forcemains.	Sections 3.1 and 3.4 Figure 3.1
√	Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality).	Section 1.11 Section 6
	Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	Section1.5
	Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	N/A
√	Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.	Section 1.5
√	Special considerations such as contamination, corrosive environment, check soils, etc.	Section 1.8

Development Servicing Report: Stormwater Checklist

ITEM DESCRIPTION		LOCATION
√	Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)	Section 4.1
	Analysis of available capacity in existing public infrastructure.	Section 4.3

ITEM DESCRIPTION		LOCATION
√	A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.	Figure 1.5
√	Water quantity control objective (e.g. controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5 year event (dependent on the receiving sewer design) to 100 year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects.	Section 5.3.2
√	Water quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	Section 5.3.1
√	Description of the stormwater management concept with facility locations and descriptions with references and supporting information.	Section 5
	Set-back from private sewage disposal systems.	N/A
	Watercourse and hazard lands setbacks.	N/A
	Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	N/A
√	Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	Section 5.1
√	Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).	Sections 4.5, Appendix D, 5.4 and 5.5
√	Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	Section 1.9
√	Calculate pre and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.	Section 5.5
	Any proposed diversion of drainage catchment areas from one outlet to another.	N/A

ITEM DESCRIPTION		LOCATION
√	Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.	Sections 4.5, 5.6 and 5.7 Figures 8, 9 and 10
√	If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100-year return period storm event.	Section 5.6
	Identification of potential impacts to receiving watercourses	N/A
	Identification of municipal drains and related approval requirements.	N/A
√	Descriptions of how the conveyance and storage capacity will be achieved for the development.	Sections 5.5.1 and 5.6.2
√	100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	Figures 10
√	Inclusion of hydraulic analysis including hydraulic grade line elevations.	Section 5.6
√	Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	Section 6
	Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.	N/A
	Identification of fill constraints related to floodplain and geotechnical investigation.	N/A

Approval and Permit Requirements: Checklist

	ITEM DESCRIPTION	LOCATION
√	Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not the approval authority for the Lakes and Rivers Improvement Act. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams as defined in the Act.	Section 7.3
√	Application for Certification of Approval (CofA) under the Ontario Water resources Act.	Section 7.2
	Changes to Municipal Drains	N/A
√	Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)	Section 7.3 and 7.4

Conclusion Checklist

	ITEM DESCRIPTION	LOCATION
√	Clearly stated conclusions and recommendations	Section 8
	Comments received from review agencies including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.	N/A
√	All draft and final reports shall be signed and stamped by professional Engineer registered in Ontario.	Done

Karen Kelly

From: Jim Moffatt
Sent: Wednesday, January 15, 2020 3:27 PM
To: Karen Kelly
Subject: FW: FC, Phase 5
Attachments: Pre-Consultation Comments - Findlay Creek Phase 5 - 20191003.pdf; Findlay Creek Stage 5 - Parkland Proposal - 20191003.pdf; BHZ from tp1247e.pdf; ttp11500e Table C4 plant species.pdf

Here are the meeting notes for Appendix A. Add the email and the attachments. Another email to follow.

From: Tse, Wendy [mailto:Wendy.Tse@ottawa.ca]
Sent: Friday, October 4, 2019 9:27 AM
To: Melissa Cote <mcote@tartanland.on.ca>; Pierre Dufresne <pdufresne@tartanland.on.ca>; Jim Moffatt <jmoffatt@IBIGroup.com>; Bernie Muncaster <bmuncaster@rogers.com>; David Hook <DHook@IBIGroup.com>
Cc: Sevigny, John <John.Sevigny@ottawa.ca>; Walker, Burl <Burl.Walker@ottawa.ca>; Giampa, Mike <Mike.Giampa@ottawa.ca>; Brad Wright <bwright@nation.on.ca>; Korol-Paradis, Andre <andre.korol-paradis@ottawa.ca>; Hayley, Matthew <Matthew.Hayley@ottawa.ca>; Cvetkovic, Katarina <Katarina.Cvetkovic@ottawa.ca>; Hayley, Matthew <Matthew.Hayley@ottawa.ca>; Brown, Delroy <Delroy.Brown@yow.ca>
Subject: FC, Phase 5

Good morning Melissa and Pierre,

Thank you for meeting with staff on Sept. 20, 2019 to discuss the proposed development of Phase 5 of Findlay Creek. Our understanding of the proposal is that it will contain approximately 184 single detached dwellings and 194 townhomes with one park block and one future employment block. Leitrim Road will be aligned in accordance with the Leitrim Road Re-alignment EA.

At this point, there are no Official Plan concerns. The site is subject to the Leitrim Community Design Plan and it's current zoning is IL2[1528]H(14)-h. A zoning by-law amendment application (fee of $16,960.099+$370.00 CA) will be required along with an application for plan of subdivision approval ($83,988.51+$10,000 engineering design review+$3,685.00 CA). A 10% discount will be applied if both applications are submitted at the same time.

The following are the required plans and studies for the two applications:

- Planning rationale, include justification on reduction of 30m setback from watercourse
- Draft plan of subdivision
- Survey plan (one paper copy)
- Archaeological assessment (one copy)
- Phase 1 and 2 ESAs
- Tree Conservation Report
- Environmental Impact Statement
- Integrated Environmental Review (draft, may be part of planning rationale)
- Assessment of Adequacy of Public Services
- Geotechnical Study
- Hydrogeological Assessment
- Noise Study

- Pedestrian plan (showing potential sidewalks, walkways, MUPs etc.)
- TIA

Assessment on Adequacy of Public Services:

- Prior to submitting the servicing report the consultant should contact John Sevigny at john.sevigny@ottawa.ca and request boundary conditions for the watermain design. The consultant will need to provide the type of development, fire flow required (including the FUS calculations), average day demand, maximum day demand and maximum hour demand as well as a location plan showing the points of connection to the public system.
- The design is to follow the latest Updated Serviceability Report for the Leitrim Development Area dated September 2016

Geotechnical Study:

- Containing detailed information on geotechnical matters and recommendations (i.e. pavement, foundation, bedding construction etc.).
- Sensitive Marine Clay (SMC) is widely found across Ontario – geotechnical reports should include Atterberg Limits, consolidation testing, sensitivity values, and vane shear test results (at a minimum) with a discussion for proposals in areas containing SMC; If SMC exists than the tree planting restrictions are to be discussed and follow the City's most current tree planting guidelines.

Hydrogeological Assessment:

- Addressing the impacts to existing well in the vicinity of the development.
- This report shall include at a minimum the following items:
    - Basic hydrogeology for the area
    - Risk to existing wells during construction and from the long term development of the site (e.g. quantity/quality, recharge, water budget)
    - Monitoring program for existing wells.

Airport Authority

- The site is within 100m of the 35 NEP and below approach/take-off surface 25L 25C . At this site, the user will experience significant sound levels resulting from the use of any southern runway particularly with the operation of the future parallel runway.
- Within the BHZ "no owner or lessee of land within the limits of the bird hazard zone shall permit any part of that land to be used for activities or uses attracting birds that create a hazard to aviation safety" this includes ponds and the planning of trees which attracts birds (please see attachments). When submitted, the Airport Authority will review the proposed park site and landscaping.

Parks

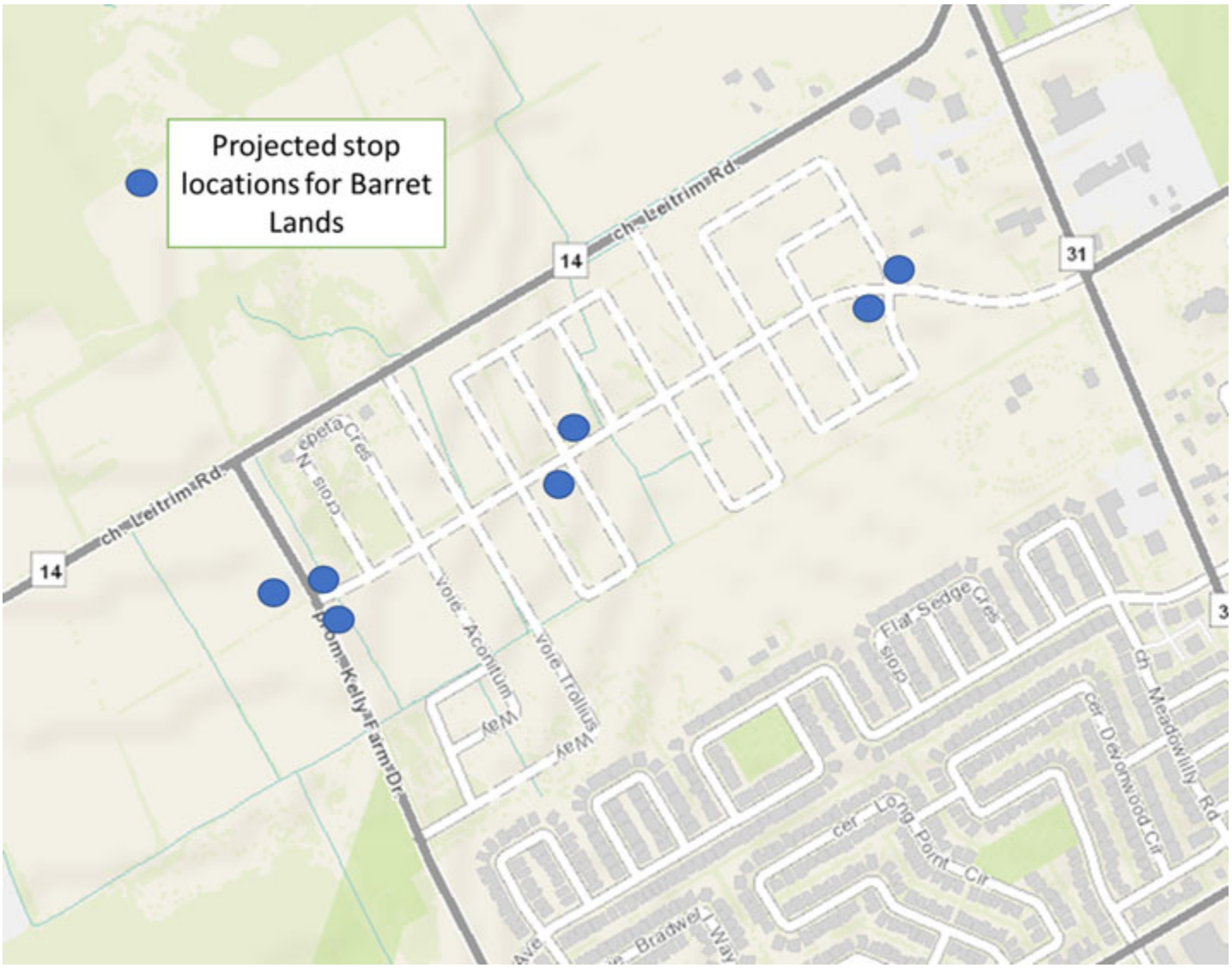
Please see attachments

OC Transpo

- Route 294/93 is expected to be extended through the Barrett Lands subdivision east of this subdivision via Barrett Farm Drive.
- This service adjustment is expected to have stops on the intersection of Kelly Farm Drive and Barrett Farm Drive.
    - These locations can be revisited to offer better service for Findlay Creek Phase 5.
- The enclosed area for Findlay Creek Phase 5 make efficient bus service difficult.

    - Service cannot be offered within this subdivision, and it is unlikely that all of the subdivision will fall within our service standards.
- A service review will likely be done for the Findlay Creek area
    - Service on realigned Leitrim Road is a possible option
    - It would therefore be pertinent to consider pedestrian connections to realigned Leitrim Road.

Please see projected Barrett Lands stops below:



General Preliminary Comments

- Pedestrian connections should be provided within this phase as well as to Leitrim Road, these should be considered in the context of the pedestrian plan and key neighbourhood features
- Investigate some possibilities for window streets- alternatives should be investigated to break up the noise wall that will be required when Leitrim Road is constructed. This will also make users of the future MUP more visible, increasing their safety. As well, a window street along the pond will make this a community amenity, rather than an amenity for the homeowners who will abut
- An Environmental Compliance Approval from the Ministry of Environment, Climate and Parks is required for the storm and sanitary sewers.

- All reports should follow the City's Guides for Preparing Studies and plans – these guides can be found at standard for https://ottawa.ca/en/city-hall/planning-and-development/information-developers/development-application-review-process/development-application-submission/guide-preparing-studies-and-plans#standards-policies-and-guidelines

With the submission, please provide three hard copies (unless otherwise noted) of each report/plan as well as the electronic versions in pdf format.

Please let me know if there are any questions.

Regards,
Wendy

Wendy Tse, MCIP, RPP, LEED GA
Planner / Urbaniste
Development Review /Examen des demandes d'aménagement

Planning, Infrastructure and Economic Development Department/
Services de la planification, de l'infrastructure et du développement économique

City of Ottawa/ Ville d'Ottawa
110, avenue Laurier Avenue West / Ouest, 4th Floor / 4ième étage
Ottawa, ON K1P 1J1

Tel. : 613-580-2424 ext. 12585
E-mail / Courriel : wendy.tse@ottawa.ca
Mail Code: 01-14

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MEMO / NOTE DE SERVICE

To / Destinataire	Wendy Tse, Planner Development Review South Branch	File/N° de fichier : n/a
From / Expéditeur	Burl Walker, Planner Parks and Facilities Planning Branch	
Subject / Objet	Subdivision and Zoning By-law Amendment Pre-consultation Findlay Creek Phase 5 3100 Leitrim Road	Date: 03 October 2019

Below please find my comments on the pre-consultation submission for the proposed Findlay Creek Phase 5 development.

1. The parkland dedication requirement for the subdivision is approximately 1.348 ha as calculated below based on the draft plan of subdivision and the information in the pre-consultation application form. In the event that the number of dwelling units changes or the area of the industrial block changes, the parkland dedication requirement will also change.

Proposed Use	**Number of Dwelling Units**	**Gross Land Area (ha)**	**Parkland Dedication Rate**	**Parkland Dedication (ha)**
Single detached dwellings and Townhomes	374		1 ha per 300 dwelling units	1.246
Industrial[1]		4.3 ha for Block 234 + 0.8 ha for half of Leitrim Road Realignment adjacent to Block 234 = 5.1 ha	2% of Gross Land Area	0.102
Total				1.348

Note 1: The gross land area of the industrial block shown in the table is approximate. The gross land area is to be updated during the subdivision application process.

2. There is an over dedication of 0.414 ha of parkland for Findlay Creek Village. As per the draft subdivision agreement for Phase 1 of the Barrett and Hope Cemetery subdivisions,

the parkland over dedication is to be credited to the Findlay Creek Phase 5 subdivision. Therefore, the net parkland dedication requirement for Findlay Creek Phase 5 is 0.934 ha.

3. In the event that the alternative residential parkland dedication rate in the Planning Act is repealed through Bill 108 prior to draft plan approval, the parkland dedication requirements for the subdivision will need to be updated.

4. The size of the park block should be adjusted to equalize the net parkland dedication requirement for the subdivision.

5. Attached is a sketch showing a proposed relocation of the park block. The park is proposed on the south side of Street No. 4 with street frontage on two streets - Street Nos. 3 and 4. The park location is shown at the periphery of the Primary Bird Hazard Zone for the Ottawa McDonald-Cartier International Airport. The intent is to reduce the risk of generating hazardous bird activity in the core of the Primary Bird Hazard Zone in proximity to the future southern runway. The park block is also located within a 400m distance of all of the residential lots in the subdivision. Lastly, the park is situated in a more prominent location in the subdivision with frontage on Street No. 4, which is one of the two entrances to the subdivision from Kelly Farm Drive. Please note that other locations for the park can be considered.

6. A preliminary list of amenities for the park are presented below:

    - Centrally located playground with junior playground equipment, senior playground equipment, swings and a sand play area
    - Half-court or full-court basketball
    - Potential gazebo or shade structure with concrete pad and picnic table
    - Park benches and waste receptacle(s)
    - Park identification sign
    - Park pathways
    - Landscape planting with a possible tree grove with the intent of not providing an extensive lawn area in the park that could be attractive for larger/heavier bird species that have a higher level of risk of causing an aircraft accident

7. Ornamental trees and shrubs attractive to birds will need to be avoided when selecting the tree species for the park.

8. The Ottawa Airport Authority will need to be consulted during the subdivision process and the park planning and design process to ensure that the proposed park location and development will satisfactorily mitigate the bird hazard risks.

9. It would be helpful if the EIS could include recommendations for the park development to mitigate the risk of attracting birds that are hazardous for aircraft. Please refer to Government of Canada Publications TP#8240 Safety Above All – A coordinated approach to airport-vicinity wildlife management and TP#13549 Sharing the Skies:

    https://www.tc.gc.ca/eng/civilaviation/publications/tp8240-awmb38-appendix-a-5031.htm
    https://www.tc.gc.ca/eng/civilaviation/publications/tp13549-menu-2163.htm

10. One walkway block should be provided to the south of the park between Street No. 3 and the multi-use pathway around Leitrim Pond 2. Another walkway block between Street Nos. 2 or 3 and the multi-use pathway should also be considered to allow residents with another point of entry and to allow for a variety of walking routes between the subdivision and the pond.

11. Please review the potential to implement Urban Design Guidelines 54 and 56 for Greenfield Neighbourhoods by providing single loaded frontage along the north side of Leitrim Pond 2 for part of Street No. 2 and/or Street No. 3 as follows:

When designing greenspaces…

Guideline 54:
Design stormwater management areas, and other greenspaces with majority of their frontage onto public roads to make a visible contribution to the neighbourhood.

Figure 54a: Open street frontages along stormwater management areas provide universal views for the entire neighbourhood.

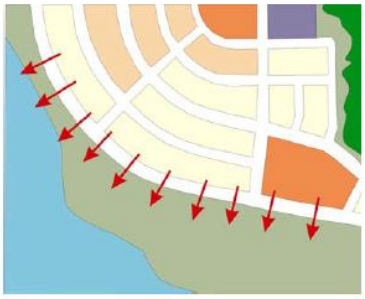


Figure 54b: Single-loaded roads along stormwater management areas provide excellent views for facing units without monopolizing visual access.

Guideline 56:
Design streetscapes with open accessible frontages along greenspaces, such as woodlots and stormwater management ponds. Provide fencing along greenspaces only to prevent direct access to sensitive environmental areas or unsafe conditions.

Figure 56a: Single-loaded roads around woodlots provide excellent views and vistas for facing units.

Figure 56b: This woodlot is incorporated into the street and block pattern of the neighbourhood.

12. An O1 zone is suitable for the park block.

Attach.

Findlay Creek Phase 5
Park Concept Sketch
Parks and Facilities Planning Services
October 3, 2019

400m radius
from park centre

Primary Bird Hazard Zone

Secondary Bird Hazard Zone

Proposed Park
0.93 ha

KEY PLAN
NOT TO SCALE

SITE

DRAFT PLAN OF SUBDIVISION

PART OF LOTS 16 AND 17
CONCESSION 4 (RIDEAU FRONT)
(GEOGRAPHIC TOWNSHIP OF GLOUCESTER)
CITY OF OTTAWA

Scale 1:2500

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

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

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

SCHEDULE OF LAND USE

LOT/BLOCK	USE	UNITS	AREA (Ha/ac)
1 to 184	Singles	184	8.30/20.50
185 to 232	Towns	314	4.50/10.48
233	Park		0.80/1.99
234	Open Space		4.27/10.55
Streets	Streets		5.18/21.21
Total		370	26.17/64.48

INFORMATION: REQUIRED UNDER SECTION 51 (17) OF THE PLANNING ACT R.S.O. 1990

a. SEE PLAN
b. SEE PLAN
c. SEE PLAN
d. SEE PROPOSED LAND USE SCHEDULE (ABOVE)
e. SEE PLAN
f. SEE PLAN
g. SEE PLAN
h. CITY WATER AVAILABLE \ WELL
i. SEE SOIL REPORT
j. SEE TOPOGRAPHICAL INFORMATION
k. ALL CITY SERVICES AVAILABLE
l. NO EASEMENTS REGISTERED ON TITLE \ SUBJECT TO

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

DATE

*PRESIDENT
******* ONTARIO LIMITED
I HAVE THE AUTHORITY TO BIND THE CORPORATION

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

DATE
BRIAN J. WEBSTER
ONTARIO LAND SURVEYOR

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

Stantec Geomatics Ltd.
CANADA LAND SURVEYORS
ONTARIO LAND SURVEYORS
100 CLYDE AVENUE, SUITE 400
OTTAWA, ONTARIO, K2C 3G4
TEL: 613.722.4420 FAX: 613.722.2799
stantec.com

DRAWN: CEC | CHECKED: * | Pln: RP | FIELD: * | PROJECT No.: 161414100-131

Part III -- Bird Hazards and Wildlife

3.1 General

In its many civil aviation responsibilities, Transport Canada remains focused sharply on the safety of air travelers. This focus has led the department to examine numerous potential hazards, including those found on and in areas around Canadian aerodromes.

Working with industry experts, and based on extensive international scientific research, Transport Canada has confirmed that these hazards include many forms of wildlife, from birds and deer which are often struck by aircraft, to smaller prey animals that attract more hazardous species. Wildlife of all types can be hazardous to aircraft because they can cause structural or engine damage. The hazard is greatest at and in the vicinity of aerodromes due to the concentration of aircraft activity close to the ground, where the majority of wildlife lives. In addition, aircraft involved in takeoffs or landings are at low altitudes and in a critical phase of flight where any disruptions to the operation could be catastrophic.

The presence of birds at or near aerodromes presents particular hazards. Aerodromes are naturally attractive areas to many species of birds because the wide open, short grass areas provide the basic elements of security from predators and humans, a place to nest and loaf (just generally sit about) and access to food and water sources. Wildlife Management programs at aerodromes effectively reduce this natural attraction of birds to aerodrome lands, primarily through major habitat management and manipulation projects, as well as through day to day vigilance and the use of bird scaring techniques. While these on aerodrome activities are effective, they can be neutralized by the presence of attractive land use or activities outside the aerodrome boundary. Hazardous bird species will be persistent in their attempts to use the aerodrome as a convenient stop over and resting place before or after feeding at a nearby location. It is therefore important that land in the surrounding area be used in a manner that is compatible with the wildlife control measures in use on the aerodrome, to minimize the attraction to birds and other potentially hazardous species.

Wildlife respects no boundaries, physical or regulatory, and often congregates in and passes through air-traffic corridors, such as take-off, departure, approach and landing areas. The result is risk to aircraft and air travelers that can be minimized when aerodrome area stakeholders work together and systematically integrate their efforts to:

- identify wildlife hazards and risks;
- plan, coordinate and implement management and mitigation measures; and
- measure results.

These activities can prevent lands in the vicinity from being used or developed in a manner that is incompatible with the safe operation of aircraft due to hazardous wildlife activity.

The following information provides guidance on the acceptability of different land use practices in the vicinity of aerodromes. General land use practices have been evaluated on their relative attractiveness to traditionally hazardous bird species.

Note: *Where land in the vicinity of aerodromes is targeted for development, local land use authorities should consult a wildlife/bird hazard specialist to identify and address any issues relative to attractant and habitat concerns prior to approval of the development.*

3.2 Hazardous Land-use Acceptability

Not all potentially hazardous activities possess the same level of potential risk and cannot be treated equally when planning land uses in the vicinity of an aerodrome. The acceptability of land use activities can be classified using specific zones created around the aerodrome property, as defined in *Safety Above All* - http://www.tc.gc.ca/eng/civilaviation/publications/tp8240-awmb38-appendix-a-5031.htm.

Primary Hazard Zones generally enclose airspace in which aircraft are at or below altitudes of 1500 feet AGL (above ground level). These are the altitudes most populated by hazardous birds, and at which collisions with birds have the potential to result in the greatest damage.

Secondary Hazard Zones (4km beyond the Primary Hazard Zone) are buffers that account for:

- variables in pilot behaviour and technique;
- variations in departure and arrival paths that are influenced by environmental conditions, ATC (air traffic control) requirements, IFR versus VFR flight, etc.; and
- unpredictability of bird behaviour, and variations in bird movements around specific land uses.

Special Hazard Zones, though often distant from aerodromes, may regularly attract potentially hazardous species across primary or secondary zones.

Table 1. Hazardous land-use acceptability by hazard zone

LEVEL OF RISK	LAND USE	LAND-USE ACCEPTABILITY BY ZONE		
		Primary	**Secondary**	**Special**
Potentially High	Putrescible waste landfills	No	No	No
	Food waste hog farms	No	No	No
	Fish processing/packing plants	No	No	No
	Horse racetracks	No	No	No
	Wildlife refuges	No	No	No
	Waterfowl feeding stations	No	No	No
Potentially Moderate	Open or partially enclosed waste transfer stations	No	No	Yes
	Cattle paddocks	No	No	Yes
	Poultry factory farms	No	No	Yes
	Sewage lagoons	No	No	Yes
	Marinas/fishing boats/fish cleaning facilities	No	No	Yes
	Golf courses	No	No	Yes
	Municipal parks	No	No	Yes
	Picnic areas	No	No	Yes
Potentially Low	Dry waste landfills	No	Yes	Yes
	Enclosed waste transfer facility	No	Yes	Yes
	Wet/dry recycling facility	No	Yes	Yes
	Marshes, swamps & mudflats	No	Yes	Yes
	Stormwater management ponds	No	Yes	Yes
	Plowing/cultivating/haying	No	Yes	Yes
	Commercial shopping mall/plazas	No	Yes	Yes
	Fast food restaurants	No	Yes	Yes
	Outdoor restaurants	No	Yes	Yes
	School yards	No	Yes	Yes
	Community & recreation centers	No	Yes	Yes
Potentially Limited	Vegetative compost facilities	Yes	Yes	Yes
	Natural habitats	Yes	Yes	Yes
	Inactive agricultural fields	Yes	Yes	Yes
	Inactive hay fields	Yes	Yes	Yes
	Rural ornamental & farm ponds	Yes	Yes	Yes
	Residential areas	Yes	Yes	Yes

Land-use acceptability is site sensitive, and can be determined only through detailed assessments of each aerodrome and its surroundings. The table indicates general land-use suitability in primary, secondary and special hazard zones.

Although the table lists discreet categories, land-use suitability is dynamic and subject to change based on a variety of factors, including seasonal considerations and the range of activities that may be associated with a specific site. For example, agricultural fields can be classified as posing limited risk as long as they remain inactive. The moment cultivation begins; the degree of risk escalates, since the turning of soil, seeding, etc., increase the attraction to wildlife.

Risk may also escalate incrementally due to concentrations of land uses. For example, a golf course's attractiveness to birds may increase if the facility is bordered by a storm water management pond, marsh or agricultural operation.

Finally, it's important to note that risks associated with many land uses can be reduced through appropriate mitigation and monitoring. The acceptability of a commercial shopping plaza in a primary hazard zone, for example, would depend on the effectiveness of facility design-or the property owner's active, calculated interventions-to minimize the operation's attractiveness to potentially hazardous bird species.

For remedial actions please consult the Wildlife Control Procedures Manual (TP 11500) available at the following website:

http://www.tc.gc.ca/eng/civilaviation/publications/tp11500-menu-1630.htm

The information contained here provides a brief explanation and appreciation of the compatibility issues between aerodromes and wildlife. Land use planners are invited to obtain more details by accessing the following website:

http://www.tc.gc.ca/eng/civilaviation/publications/tp8240-awmb38-appendix-a-5031.htm

Part IV -- Aircraft Noise

4.1 General

An assessment of the annoyance resulting from exposure to aircraft noise is often essential to both aviation planners and those responsible for directing the nature of development of lands adjacent to aerodromes. This section will discuss noise measurement, annoyance prediction, the Noise Exposure Forecast and the Noise Exposure Projection. It also contains an assessment of various land uses in terms of their compatibility with aircraft noise.

4.1.1 Noise Measurement

The sound pressure level created by an aircraft (or any other noise source) can be measured by means of a sound level meter. The microphone of the sound level meter senses the pressure fluctuations over a short period of time. The sound pressure is the root mean square value of the difference between atmospheric pressure and the instantaneous pressure of the sound, the mean being read over several periodic cycles. For mathematical convenience, the logarithmic parameter called sound pressure level (SPL) is used. The unit of sound (noise) measurement is the decibel (dB).

A particular sound signal may comprise several different frequencies to which the human ear may respond in various ways. In order that noise measurements may relate more closely to loudness as judged by the average person, sound level meters are equipped with weighting networks which make use of information related to the frequency response characteristics of the human ear. Some sound level meters have the capability of reading on A, B, C, and D weighting scales, and decibel values are correspondingly indicated as dB(A), dB(B), dB(C) or dB(D), according to the weighting network used. However, the dB(A) is the most common.

C.4 Ornamental Trees and Shrubs Attractive to Birds

Common Name	Botanical Name
Serviceberry	*Amelanchier canadensis*
Alleghany serviceberry	*Amelanchier laevis*
Yellow birch	*Betula lutea*
Gray birch	*Betula populifolia*
River birch	*Betula nigra*
Paper birch	*Betula papyrifera*
Western white birch	*Betula commutata*
Flowering dogwood	*Cornus florida*
Japanese dogwood	*Cornus kousa*
Cornelian cherry	*Cornus mas*
Pacific dogwood	*Cornus nuttali*
Cockspur thorn	*Crataegus crus-galli*
Toba hawthorn	*Crataegus x mordenensis* "*Toba*"
Englich hawthorn	*Crataegus oxyacantha*
Paul's scarlet hawthorn	*Crataegus sp.*
Cutleaf peashrub	*Caragana arborescens*
Weeping caragana	*Caragana arborescens*
Tidy caragana	*Caragana microphylla*
Silverleaf dogwood	*Cornus alba*
Siberian dogwood	*Cornus alba*
Yellowdoe dogwood	*Cornus alba*
Red osier dogwood	*Cornus stolonifera*
Yellow twig dogwood	*Cornus stolonifera*
Peking cotoneaster	*Cotoneaster acutifolia*
Early cotoneaster	*Cotoneaster adpressa praecox*
Rockspray cotoneaster	*Cotoneaster horizontalis*
Hedge cotoneaster	*Cotoneaster lucida*
Russian Olive	*Eleagnus angustifolia*
American beech	*Fagus grandifolia*
Purple beech	*Fagus sylvatica*
Weeping birch	*Fagus sylvatica*
Betchel crabapple	*Malus ioensis*
Pissard plum	*Prunus cerasifers*
Amur choke cherry	*Prunus maackii*
May Day tree	*Prunus padus commutata*
Autumn Flowering Higan cherry	*Prunus subhirtella*
Shubert choke cherry	*Prunus virginiana*
White cedar	*Thuja occidentalis*
Witchhazel	*Hamamelis virginiana*
Oregon grape	*Mahonia aquifolium*
Virginia creeper	*Partenocissus quinquenfolia*
Western sand cherry	*Partenocissus tomentosa*
Flowering almond	*Partenocissus triloba*
Alpine currant	*Ribes alpinum*
Austrian brier rose	*Rosa foetida*
Shining rose	*Rosa nitida*
Redleaf rose	*Rosa rubrifolia*
Burnett rose	*Rosa spinosissima*
Korean spice viburnum	*Viburnum carlesii*
Wayfaring tree	*Viburnum lantana*
European highbush cranberry	*Viburnum*

SOUTH NATION CONSERVATION
DE LA NATION SUD
1947-2017

February 23, 2018 **Permit No. 2017-GLO-R166**

Barrett Co-tenancy
237 Somerset Street West
Ottawa, On , ON K2P 0J3
Attention: Pierre Dufresne

Re: Fill Ditches, Temporary Ditching, Construct Swale,
Install Culvert and Pedestrian Bridge.
Lot 17 Concession 4 , Ottawa
Formerly. Gloucester
Roll # 061460007000705

Dear Mr. Dufresne,

The South Nation River Conservation Authority, herein referred to as South Nation Conservation (SNC), is a corporation created under the Conservation Authorities Act of Ontario and funded and directed by the municipalities that make up the South Nation River Watershed. It is the obligation of SNC to implement Ontario Regulation 170/06 (Development, Interference with Wetlands and Alterations to Shorelines and Watercourses). As a result, a permit is required from this office to undertake the above noted project.

Upon completion of its review of this proposal, SNC staff has determined that this project is allowable under Ontario Regulation 170/06, and SNC hereby grants you permission to undertake the above noted project.

SNC's understanding of the work to be done is as follows:

- The existing ditches to be filled total 2130 m in length and require 6400 cubic metres of fill.
- The NS swale will be increased in length by 860 m and will include a pedestrian bridge and twin 1200 m x 1800 m concrete box culverts along with a restorative planting plan. Please note the species list should be reviewed with the City of Ottawa as there are certain species that cannot be used in the Airport zone area.
- Temporary ditches will be constructed to convey flows during the work phases and will total approximately 800 m. These will be filled as the work progresses easterly.
- Sediment and erosion controls will be implemented as per documents noted in the next section.

The details of your project are outlined in the following documents forwarded to our office and will proceed accordingly:

- South Nation Conservation Application Form – Development, Interference with Wetlands and Alteration to Shorelines and Watercourses Regulation 170/06 dated, 12/5/2017 received December 5, 2017 provided by IBI Group; Karlinda Hinds.
- Location Plan, Barrett Lands Phase 1.
- Written project description prepared by IBI group, Proposed Ditch Filling and Temporary Drainage Ditches Barrett Lands Subdivision Phase 1 Leitrim Development Area, dated January 22, 2018 signed by Karlinda Hinds, E.I.T.
- Drawings: 112,113,114,117, 200, 201, 202, 203, and 900, Project No. 34731, Barrett Lands Phase 1, Prepared by IBI Group, signed and stamped by J.I. Moffatt, P.Eng.
- Implementation and Methodology Plan Figures 2 and 3
- Implementation and Methodology Details Figure 4
- Existing and proposed ditches, Figure 2
- Barrett Farm Drive Culvert Analysis
- Barrett Lands Landscape Plans and Planting Details (Lashley & Associates, October 30, 2017.

SNC requests that the following concerns will be addressed:
Sediment and Erosion Control

- Sediment and erosion control measures should be implemented prior to work, and maintained during the work phase, to prevent entry of sediment into the water or the movement of re-suspended sediment.
- All disturbed areas should be stabilized and re-vegetated as required upon completion of work and restored to a pre-disturbed state or better.
- Sediment and erosion control measures should be left in place until all disturbed areas have been stabilized.
- **SNC may visit the site at any time after the application submittal through to the expiry date of the permit. During this time SNC will indicate any deficiencies observed in the sediment and erosion control methods on site. The applicant, by signing this permit, agrees that any directives in regard to these matters will be followed without delay.**
- The applicant by signing the permit has agreed to be responsible for ensuring the sediment and erosion control measures are effective and will be inspected and maintained throughout the work phase and finally until the work site has re-vegetated to a pre-disturbed state.

In the event of unexpected rainfall, any fill that is removed from the site and placed on the shore (above the high water mark) should be properly stabilized through the implementing of appropriate sediment and erosion control measures. This will prevent entry of sediment into the watercourse.

This permit does not relieve you of your responsibility for obtaining other documents or permits that may be required from the Government of Canada, the Government of Ontario or the municipality in which the land is located, including landowner permission. A copy of this document should be kept at the worksite.

If you have any questions concerning this permit or should there be any changes to the proposed work please contact our office.

This permit is valid for 24 months from the date of issuance and is not transferable to other land owners.
South Nation Conservation reserves the right to enter the site during or post construction through to 6 months past the expiry date of the permit.

South Nation Conservation assumes no responsibility or liability for flood, erosion or slope failure damage that may occur to this property, or any activity undertaken by you affecting the property interests of adjacent landowners.

Any deviation from the approved criteria without written approval from South Nation Conservation will constitute a violation of the approved permit. This could result in the permit being revoked.

Geoff Owens

Date: February 23, 2018

Geoff Owens,
Regulations Officer

Note: This letter of permission does not come into full force until the attached copy of this letter is returned to the SNC office in Finch, signed and dated, which return shall be taken as indicating the acceptance of the conditions of SNC approval.

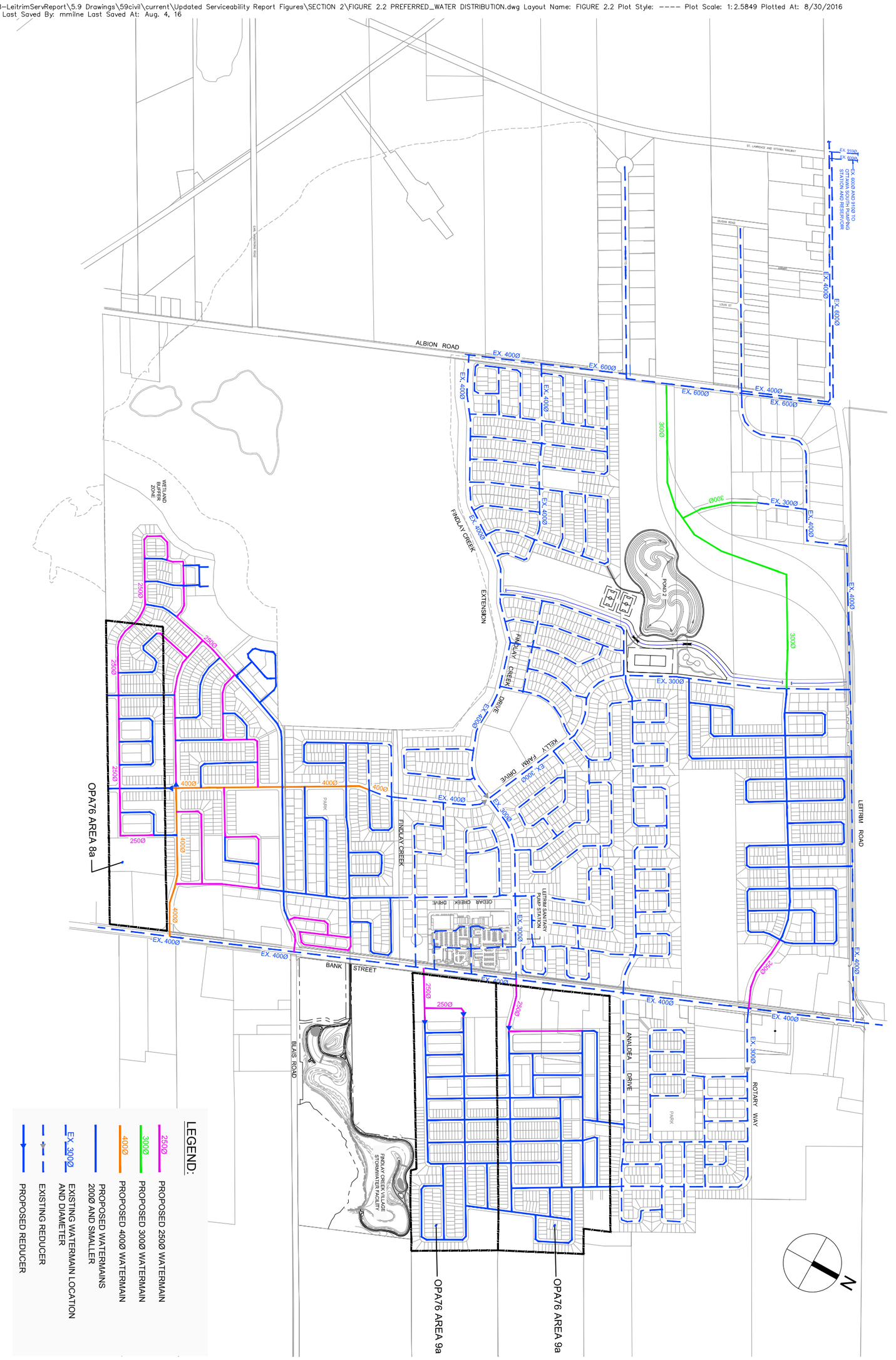
Name: Pierre Dufresne (please print)

Signed: _____ Date: 2/26/18

APPENDIX B

- **Figure 2.2 Preferred Water Distribution Plan from the 2016 Final Updated Serviceability Report**
- **Watermain Demand Calculation Sheets**
- **Correspondence from the City of Ottawa**
- **Hydraulic Model Output**

J:\34738-LeitrimServReport\5.9 Drawings\59civil\current\Updated Serviceability Report Figures\SECTION 2\FIGURE 2.2 PREFERRED_WATER DISTRIBUTION.dwg Layout Name: FIGURE 2.2 Plot Style: ---- Plot Scale: 1:2.5849 Plotted At: 8/30/2016 9:49 AM Last Saved By: mmilne Last Saved At: Aug. 4, 16



Sheet No.	Drawing Title	Project Title	Scale
FIGURE 2.2	PREFERRED WATER DISTRIBUTION PLAN	UPDATED SERVICEABILITY PLAN (CLASS EA OPA76 AREAS 8a, 9a and 9b) LEITRIM DEVELOPMENT AREA	N.T.S.

IBI

Lance Erion

Subject: FW: Leitrim Serviceability Update, September 2014

From: Rogers, Christopher [mailto:Christopher.Rogers@ottawa.ca]
Sent: Friday, October 24, 2014 11:10 AM
To: Bob Wingate
Cc: Zagorski, Joseph; Diduch, Roman
Subject: Leitrim Serviceability Update, September 2014

Bob,

Comments on the draft report are as follows:

- An introduction is needed to explain the purpose of the report, as this strongly influences the level of detail expected.
- Construction of the new 610mm main on Leitrim was completed in 2014. The project limits included Leitrim Road, from the CPR corridor to Albion, and on Albion from Leitrim to Fenton. This project provides a redundant supply to the majority of the existing Zone 3C, including LDA, via Albion and Findlay Creek.
- The information used for the analysis is dated. Please note the following:

- System-level demands for large growth areas are now estimated as given in the table below. The numbers used in your analysis are conservative, except for the unit demands for apartments. These numbers should only be used for establishing the backbone of the proposed distribution system. Design guideline demands should be used for local system designs.
- The post zone reconfiguration OSPS HGL is currently expected to be 146m. Note that the current Zone 3C remains at 155m. The plan should consider post-reconfiguration boundary conditions for pressure minima, and pre-reconfiguration conditions for pressure maxima.
- Zone 3C will be supplied by two pumping facilities, the OSPS and the Barrhaven PS. Rather that updating the Riverside South development numbers, we propose using our estimated future boundary conditions at Leitrim/CPR = 144m for peak hour and max day + fire (i.e. no need to consider RS development in your model). The development downstream of FCV can be represented as given in Table 2.2, but consider 829 units for Carlsbad.

- Provide figure clearly illustrating existing and proposed service areas, sub-areas identified in OPA 76, existing watermains (including new 610), proposed future watermains. Watermains should be colour-coded to emphasize mains larger than 200mm (nominal).
- Figure 2.2 as referenced in Section 2.4 was not provided in my copy of the report. Review of proposed network cannot be completed without figure as requested above. Focus should be on backbone of network and connection points to existing system.
- Review of alternatives would be better focussed on viable options, such as sizing and configuration of backbone distribution system. For example, if the second E-W main from the north (pipe 1557) were to be sized at 305mm, could this potentially allow for downsizing of downstream mains, to increase number of 6" mains? The City's interest here is to ensure design demands will be met with minimum network pipe sizing, so as to avoid high water age in the system.
- Provide figure illustrating distribution of residual pressure at model nodes under various design conditions, employing a suitable colour-coding scheme.
- Notwithstanding the above point, local sizing and fire demands will need to be reviewed for each plan of subdivision and site plan, and local system sizing will need to be finalized based on the City's design guideline demands, rather than the system-level demands considered in this report.

	Average (L/unit/day)	Outdoor Water Demand (L/unit/day)	Max Day (L/unit/day)	Peak Hour
SFH (OGB)	567	1049	Average + OWD	2.1 x Max Day
MLT (OGB)	558	0	Average	1.6 x Max Day
APT (OGB)	400	0	Average	1.6 x Max Day
EMP (OGB)	85	0	Average	1.5 x Max Day
Water Loss per connection	80	N/A	Average	Average
	Sum above for total Average Day		Sum above for total Max Day	Sum above for to Peak Hour

Regards,

Chris Rogers, M.A.Sc., P.Eng.
Senior Project Manager
Policy Development and Urban Design Branch
Gestionnaire principal de projet
Direction de l'élaboration des politiques et de l'esthétique urbaine

City of Ottawa | Ville d'Ottawa
[redacted] 613.580.2424 ext./poste 27785
ottawa.ca/planning / ottawa.ca/urbanisme

IBI GROUP

IBI GROUP
333 PRESTON STREET
OTTAWA, ONTARIO
K1S 5N4

WATERMAIN DEMAND CALCULATION SHEET

PROJECT : FINDLAY CREEK VILLAGE - STAGE 5
LEITRIM DEVELOPMENT AREA
LOCATION : CITY OF OTTAWA

FILE: 122283-5.7
DATE PRINTED: 07-Jan-20
DESIGN: L.E.
PAGE: 1 OF 1

NODE	RESIDENTIAL				NON-RESIDENTIAL (ICI)			AVERAGE DAILY DEMAND (l/s)			MAXIMUM DAILY DEMAND (l/s)			MAXIMUM HOURLY DEMAND (l/s)			FIRE DEMAND (l/min)
	SINGLE FAMILY UNITS	TOWN HOUSE UNITS	HIGH DENSITY (ha)	POPULATION	INDUST. (ha)	COMM. (ha)	INSTIT. (ha)	RESIDENTIAL	ICI	TOTAL	RESIDENTIAL	ICI	TOTAL	RESIDENTIAL	ICI	TOTAL	
T-02	2	12		39				0.16		0.16	0.40		0.40	0.87		0.87	10,000
T-04		24		65				0.26		0.26	0.66		0.66	1.44		1.44	10,000
T-06		24		65				0.26		0.26	0.66		0.66	1.44		1.44	10,000
T-10		24		65				0.26		0.26	0.66		0.66	1.44		1.44	10,000
T-12	1	24		68				0.28		0.28	0.69		0.69	1.52		1.52	10,000
T-14	11	16		81				0.33		0.33	0.82		0.82	1.80		1.80	10,000
T-16	8	4		38				0.15		0.15	0.38		0.38	0.85		0.85	10,000
T-18	8	4		38				0.15		0.15	0.38		0.38	0.85		0.85	10,000
T-20	6	20		74				0.30		0.30	0.75		0.75	1.66		1.66	10,000
T-22	14			48				0.19		0.19	0.48		0.48	1.06		1.06	10,000
T-24	10			34				0.14		0.14	0.34		0.34	0.76		0.76	10,000
T-26	18			61				0.25		0.25	0.62		0.62	1.36		1.36	10,000
T-28	8			27				0.11		0.11	0.28		0.28	0.61		0.61	10,000
T-30	7			24				0.10		0.10	0.24		0.24	0.53		0.53	10,000
T-32	10			34				0.14		0.14	0.34		0.34	0.76		0.76	10,000
T-34	11			37				0.15		0.15	0.38		0.38	0.83		0.83	10,000
T-36		24		65				0.26		0.26	0.66		0.66	1.44		1.44	10,000
T-38		24		65				0.26		0.26	0.66		0.66	1.44		1.44	10,000
T-40	9			31				0.12		0.12	0.31		0.31	0.68		0.68	10,000
T-41	8			27				0.11		0.11	0.28		0.28	0.61		0.61	10,000
T-42	3			10				0.04		0.04	0.10		0.10	0.23		0.23	10,000
T-43	8			27				0.11		0.11	0.28		0.28	0.61		0.61	10,000
T-44	9			31				0.12		0.12	0.31		0.31	0.68		0.68	10,000
T-46		10		27				0.11		0.11	0.27		0.27	0.60		0.60	10,000
T-48	3	4		21				0.09		0.09	0.21		0.21	0.47		0.47	10,000
T-50	6			20				0.08		0.08	0.21		0.21	0.45		0.45	10,000
T-52	6			20				0.08		0.08	0.21		0.21	0.45		0.45	
TOTALS	**166**	**214**		**1,142**						**4.63**			**11.57**			**25.45**	

POPULATION DENSITY

Single Family	3.4 persons/unit
Semi Detached & Townhouse	2.7 persons/unit
High Density	1.8 persons/unit

WATER DEMAND RATES

Residential	350 l/cap/day
ICI	50,000 l/ha/day

PEAKING FACTORS

Maximum Daily	
Residential	2.5 x avg. day
ICI	1.5 x avg. day
Maximum Hourly	
Residential	2.2 x max. day
ICI	1.8 x max. day

FIRE DEMANDS

Single Family & Townhouses	10,000 l/min (166.7 l/s)
High Density	15,000 l/min (250 l/s)
ICI	15,000 l/min (250 l/s)

FCV OVERALL WATER MODEL

Bank Street

Leitrim Road

Stage 5 Site

Boundary Condition

7000

482

B-100 B-110 B-120 B-130 B-140 B-150 B-160 B-170 B-175 B-190 B-200 B-210

L-110 L-120 L-130 L-135 L-140 L-150 L-155 L-160 L-165 L-170

S9-100 S9-110

S10-200 S10-180 S10-210 S10-150 S10-100 S10-300 S10-101 S10-130 S10-120 S10-310 S10-105 S10-190 S10-330 S10-280 S10-230 S10-080 S10-250 S10-270 S10-090 S10-260 S10-020 S10-060 S10-050 S10-340 S10-040

S11-280 S11-290 S11-275 S11-295 S11-270 S11-220 S11-250 S11-265 S11-240 S11-210 S11-205 S11-260 S11-144 S11-140 S11-235 S11-120 S11-230 S11-102 S11-110 S11-416 S11-180 S11-104 S11-112 S11-410 S11-405 S11-400

T-18 T-20 T-16 T-14 T-02 T-12 T-04 T-22 T-06 T-10 T-26 T-24 T-30 T-32 T-36 T-34 T-38 T-40 T-41 T-45 T-42 T-46 T-48

S8-310 S8-330 S8-260 S8-280 S8-340 S8-270 S8-240 S8-200 S8-150 S8-180 S8-110 S8-270 S8-130 S8-100

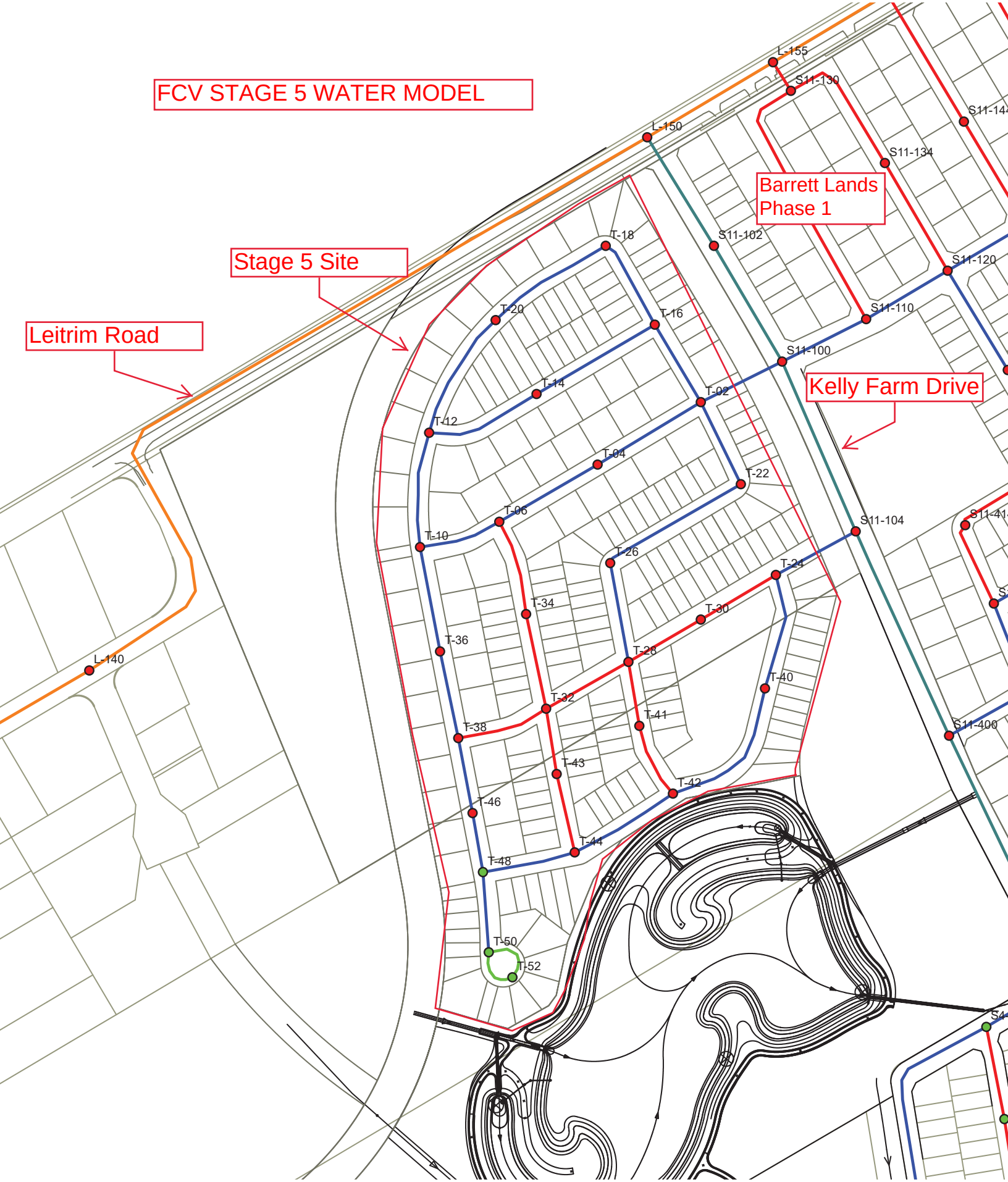
S1-260 S1-240 S1-150 S1-220 S1-140 S1-210 S1-180 S3B-190 S1-170 S1-100 S1-290 S3B-170 S1-120 S3B-180 S1-110 S1-300 S3-480 S3B-150 S3-500 S3B-145 S3-450 S3-510 S3B-140 S3B-100 S3B-120 S3B-105

S2-100 S2-110 S2-120 S3-140 S3-210 S3-190 S3-180 S3-120 S3-170 S3-160 S4-170 S4-240 S4-090 S4-250 S4-120 S4-200 S4-140 S4-130 S3-420 S3-400 S3-430 S3-410

S7-365 S7-350 S7-345 S7-300 S7-355 S7-320 S7-260 S7-280 S7-290 S7-340 S7-050 S7-100 S7-155 S7-330 S7-150 S7-110 S7-190 S7-120 S7-310 S7-332 S7-130 S7-170 S7-205

S6A-240 S6A-185 S6A-175 S6A-110 S6A-170 S6A-230 S6B-110 S6A-160 S6A-260 S6A-120 S6B-170 S6A-150 S6B-180 S6A-145 S6B-150 S6A-140 S6B-140

S5-170 S5-160 S5-150 S5-180 S5-140 S5-320 S5-290 S5-220 S5-100 S5-110 S5-540 S5-500 S5-250 S5-240 S5-260 S5-450 S5-470 S5-430 S5-380 S5-390 S5-370 S5-400 S5-420


FCV STAGE 5 WATER MODEL
Barrett Lands
Phase 1
Stage 5 Site
Leitrim Road
Kelly Farm Drive
L-155
S11-130
L-150
S11-134
S11-102
S11-120
S11-110
S11-100
S11-104
S11-400
T-18
T-20
T-16
T-14
T-02
T-12
T-04
T-22
T-06
T-10
T-26
T-24
T-34
T-30
T-36
T-28
T-40
T-32
T-41
T-38
T-43
T-42
T-46
T-44
T-48
T-50
T-52
L-140

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)	Water Age (hrs)
251	☐	S9-100	1.46	101.00	154.63	525.57	4.00
252	☐	S9-110	0.83	101.50	154.27	517.08	21.53
253	☐	T-02	0.16	95.85	152.64	556.53	7.77
254	☐	T-04	0.26	95.95	152.64	555.52	8.77
255	☐	T-06	0.26	96.05	152.64	554.52	9.77
256	☐	T-10	0.26	96.15	152.64	553.54	12.39
257	☐	T-12	0.28	96.25	152.64	552.57	12.38
258	☐	T-14	0.33	96.10	152.64	554.04	9.91
259	☐	T-16	0.15	95.95	152.64	555.52	8.77
260	☐	T-18	0.15	96.05	152.64	554.54	9.77
261	☐	T-20	0.30	96.15	152.64	553.55	11.24
262	☐	T-22	0.19	95.70	152.64	557.98	8.77
263	☐	T-24	0.14	95.60	152.63	558.90	16.92
264	☐	T-26	0.25	95.85	152.64	556.48	9.77
265	☐	T-28	0.11	95.75	152.64	557.44	10.77
266	☐	T-30	0.10	95.70	152.64	557.92	11.77
267	☐	T-32	0.14	95.85	152.64	556.46	12.33
268	☐	T-34	0.15	96.00	152.64	555.00	10.77
269	☐	T-36	0.26	95.80	152.64	556.96	13.39
270	☐	T-38	0.26	95.60	152.64	558.91	14.68
271	☐	T-40	0.12	95.75	152.64	557.43	18.57
272	☐	T-41	0.11	95.60	152.64	558.91	11.77
273	☐	T-42	0.04	95.50	152.64	559.89	16.68
274	☐	T-43	0.11	95.60	152.64	558.91	13.33
275	☐	T-44	0.12	95.30	152.64	561.85	17.40
276	☐	T-46	0.11	95.40	152.64	560.87	15.68
277	☐	T-48	0.09	95.00	152.64	564.79	16.68
278	☐	T-50	0.08	94.90	152.64	565.77	20.59
279	☐	T-52	0.08	94.95	152.63	565.26	21.59

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)	Water Age (hrs)
251	☐	S9-100	3.03	101.00	143.48	416.28	0.00
252	☐	S9-110	1.24	101.50	143.05	407.15	0.00
253	☐	T-02	0.87	95.85	140.78	440.31	0.00
254	☐	T-04	1.44	95.95	140.76	439.11	0.00
255	☐	T-06	1.44	96.05	140.75	438.01	0.00
256	☐	T-10	1.44	96.15	140.75	437.00	0.00
257	☐	T-12	1.52	96.25	140.75	436.02	0.00
258	☐	T-14	1.80	96.10	140.75	437.50	0.00
259	☐	T-16	0.85	95.95	140.76	439.06	0.00
260	☐	T-18	0.85	96.05	140.75	438.02	0.00
261	☐	T-20	1.66	96.15	140.75	437.00	0.00
262	☐	T-22	1.06	95.70	140.78	441.73	0.00
263	☐	T-24	0.76	95.60	140.84	443.34	0.00
264	☐	T-26	1.36	95.85	140.77	440.22	0.00
265	☐	T-28	0.61	95.75	140.77	441.20	0.00
266	☐	T-30	0.53	95.70	140.80	441.97	0.00
267	☐	T-32	0.76	95.85	140.75	440.00	0.00
268	☐	T-34	0.83	96.00	140.75	438.50	0.00
269	☐	T-36	1.44	95.80	140.74	440.42	0.00
270	☐	T-38	1.44	95.60	140.75	442.39	0.00
271	☐	T-40	0.68	95.75	140.81	441.55	0.00
272	☐	T-41	0.61	95.60	140.77	442.67	0.00
273	☐	T-42	0.23	95.50	140.78	443.66	0.00
274	☐	T-43	0.61	95.60	140.75	442.45	0.00
275	☐	T-44	0.68	95.30	140.76	445.43	0.00
276	☐	T-46	0.60	95.40	140.75	444.36	0.00
277	☐	T-48	0.47	95.00	140.75	448.29	0.00
278	☐	T-50	0.45	94.90	140.75	449.27	0.00
279	☐	T-52	0.45	94.95	140.71	448.44	0.00

		ID	Total Demand (L/s)	Available Flow at Hydrant (L/s)	Critical Node ID	Critical Node Pressure (kPa)	Critical Node Head (m)	Design Flow (L/s)	Design Pressure (kPa)	Design Fire Node Pressure (kPa)
216	☐	S7-280	167.15	262.00	S7-280	139.96	108.88	262.00	139.96	139.96
217	☐	S7-290	167.76	258.30	S7-290	139.96	108.73	258.30	139.96	139.96
218	☐	S7-300	167.72	216.70	S7-300	139.96	108.58	216.70	139.96	139.96
219	☐	S7-310	167.18	194.54	S7-310	139.96	108.98	194.54	139.96	140.00
220	☐	S7-330	167.20	328.76	S7-330	139.96	110.13	328.76	139.96	139.98
221	☐	S7-332	251.25	257.94	S7-332	139.96	109.78	257.94	139.96	139.96
222	☐	S7-335	166.78	213.25	S7-335	139.96	109.38	213.25	139.96	139.96
223	☐	S7-340	167.04	334.41	S7-340	139.96	109.98	334.41	139.96	139.98
224	☐	S7-345	166.94	266.28	S7-345	139.96	109.08	266.28	139.96	139.96
225	☐	S7-355	167.15	260.37	S7-355	139.96	109.48	260.37	139.96	139.96
226	☐	S7-360	166.92	285.57	S7-360	139.96	108.93	285.57	139.96	139.97
227	☐	S7-365	167.03	222.50	S7-365	139.96	108.88	222.50	139.96	139.96
228	☐	S8-100	167.15	301.16	S8-110	139.76	109.76	301.05	139.96	140.17
229	☐	S8-110	167.39	145.57	S8-110	139.96	109.78	145.57	139.96	139.97
230	☐	S8-130	167.19	255.95	S8-130	139.96	109.58	255.95	139.96	139.96
231	☐	S8-140	167.10	225.13	S8-140	139.96	109.66	225.13	139.96	139.96
232	☐	S8-150	167.12	190.53	S8-150	139.96	109.98	190.53	139.96	139.99
233	☐	S8-170	167.01	215.40	S8-170	139.96	109.78	215.40	139.96	139.96
234	☐	S8-180	167.18	204.53	S8-180	139.96	109.78	204.53	139.96	139.96
235	☐	S8-200	167.32	199.39	S8-200	139.96	109.97	199.39	139.96	140.01
236	☐	S8-240	167.42	213.64	S8-240	139.96	110.56	213.64	139.96	139.96
237	☐	S8-260	167.39	207.41	S8-260	139.96	110.98	207.41	139.96	139.96
238	☐	S8-270	166.92	217.22	S8-270	139.96	110.47	217.22	139.96	139.96
239	☐	S8-280	166.92	228.87	S8-280	139.96	110.86	228.87	139.96	139.96
240	☐	S8-300	166.92	261.17	S8-300	139.96	112.68	261.17	139.96	139.96
241	☐	S8-310	167.14	217.07	S8-310	139.96	114.08	217.07	139.96	139.96
242	☐	S8-330	166.87	286.38	S8-330	139.96	115.11	286.38	139.96	139.97
243	☐	S8-340	166.94	313.35	S8-340	139.96	113.33	313.35	139.96	139.97
244	☐	S8-350	167.12	283.40	S8-350	139.96	113.98	283.40	139.96	139.97
245	☐	S8-360	166.67	304.95	S8-360	139.96	115.58	304.95	139.96	139.97
246	☐	S9-100	253.03	213.03	S9-100	139.96	115.28	213.03	139.96	139.96
247	☐	S9-110	251.24	216.97	S9-110	139.96	115.78	216.97	139.96	139.97
248	☐	T-02	167.07	299.81	T-02	139.96	110.13	299.81	139.96	139.97
249	☐	T-04	167.33	238.60	T-04	139.96	110.23	238.60	139.96	139.96
250	☐	T-06	167.33	241.52	T-06	139.96	110.33	241.52	139.96	139.96
251	☐	T-10	167.33	245.69	T-10	139.96	110.43	245.69	139.96	139.96
252	☐	T-12	167.36	229.84	T-12	139.96	110.53	229.84	139.96	139.96
253	☐	T-14	167.49	212.38	T-14	139.96	110.38	212.38	139.96	139.96
254	☐	T-16	167.05	241.14	T-16	139.96	110.23	241.14	139.96	139.96
255	☐	T-18	167.05	208.25	T-18	139.96	110.33	208.25	139.96	139.96
256	☐	T-20	167.42	202.88	T-20	139.96	110.43	202.88	139.96	139.96
257	☐	T-22	167.15	243.55	T-22	139.96	109.98	243.55	139.96	139.96
258	☐	T-24	167.01	302.35	T-24	139.96	109.88	302.35	139.96	139.97

		ID	Total Demand (L/s)	Available Flow at Hydrant (L/s)	Critical Node ID	Critical Node Pressure (kPa)	Critical Node Head (m)	Design Flow (L/s)	Design Pressure (kPa)	Design Fire Node Pressure (kPa)
259	☐	T-26	167.29	230.37	T-26	139.96	110.13	230.37	139.96	139.96
260	☐	T-28	166.95	249.52	T-28	139.96	110.03	249.52	139.96	139.96
261	☐	T-30	166.91	190.63	T-30	139.96	109.98	190.64	139.96	139.99
262	☐	T-32	167.01	226.38	T-32	139.96	110.13	226.38	139.96	139.96
263	☐	T-34	167.05	170.26	T-34	139.96	110.28	170.26	139.96	139.96
264	☐	T-36	167.33	225.43	T-36	139.96	110.08	225.43	139.96	139.96
265	☐	T-38	167.33	230.35	T-38	139.96	109.88	230.35	139.96	139.96
266	☐	T-40	166.98	244.02	T-40	139.96	110.03	244.02	139.96	139.96
267	☐	T-41	166.95	192.58	T-41	139.96	109.88	192.58	139.96	139.99
268	☐	T-42	166.77	244.86	T-42	139.96	109.78	244.86	139.96	139.96
269	☐	T-43	166.95	182.32	T-43	139.96	109.88	182.32	139.96	139.97
270	☐	T-44	166.98	235.66	T-44	139.96	109.58	235.66	139.96	139.96
271	☐	T-46	166.94	220.47	T-46	139.96	109.68	220.47	139.96	139.96
272	☐	T-48	166.88	222.04	T-48	139.96	109.28	222.04	139.96	139.96
273	☐	T-50	166.88	174.16	T-50	139.96	109.18	174.16	139.96	139.96

FCV Stage 5 - Peak Hour HGL 144m - 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)
351	☐	847	S8-300	S8-280	76.13	204.00	110.00	-2.18	0.07	0.00	0.05	Open	0	0.00
352	☐	845	S8-330	S8-300	74.32	204.00	110.00	-1.19	0.04	0.00	0.02	Open	0	0.00
353	☐	905	S8-330	S8-310	153.09	204.00	110.00	-0.28	0.01	0.00	0.00	Open	0	0.00
354	☐	909	S8-330	S8-340	80.61	204.00	110.00	0.48	0.01	0.00	0.00	Open	0	0.00
355	☐	1069	S8-340	S8-350	47.07	204.00	110.00	0.56	0.02	0.00	0.00	Open	0	0.00
356	☐	911	S8-340	S1-260	92.76	204.00	110.00	-0.35	0.01	0.00	0.00	Open	0	0.00
357	☐	1075	S8-360	S8-350	61.66	204.00	110.00	-0.11	0.00	0.00	0.00	Open	0	0.00
358	☐	1073	S8-360	S8-330	58.07	204.00	110.00	-0.79	0.02	0.00	0.01	Open	0	0.00
359	☐	1167	S9-100	L-110	318.80	204.00	110.00	-10.21	0.31	0.27	0.84	Open	0	0.00
360	☐	P117	T-02	S11-100	78.13	204.00	110.00	-15.05	0.46	0.13	1.72	Open	0	0.00
361	☐	P121	T-02	T-16	77.38	204.00	110.00	6.49	0.20	0.03	0.36	Open	0	0.00
362	☐	P115	T-04	T-02	103.75	204.00	110.00	-5.02	0.15	0.02	0.22	Open	0	0.00
363	☐	P111	T-06	T-10	72.31	204.00	110.00	2.16	0.07	0.00	0.05	Open	0	0.00
364	☐	P113	T-06	T-04	97.70	204.00	110.00	-3.58	0.11	0.01	0.12	Open	0	0.00
365	☐	P109	T-10	T-12	99.60	204.00	110.00	0.19	0.01	0.00	0.00	Open	0	0.00
366	☐	P127	T-12	T-14	101.49	204.00	110.00	-1.06	0.03	0.00	0.01	Open	0	0.00
367	☐	P129	T-12	T-20	113.90	204.00	110.00	-0.27	0.01	0.00	0.00	Open	0	0.00
368	☐	P123	T-16	T-18	80.80	204.00	110.00	2.78	0.09	0.01	0.08	Open	0	0.00
369	☐	P125	T-16	T-14	117.85	204.00	110.00	2.86	0.09	0.01	0.08	Open	0	0.00
370	☐	P131	T-20	T-18	114.73	204.00	110.00	-1.93	0.06	0.00	0.04	Open	0	0.00
371	☐	P75	T-22	T-26	131.99	204.00	110.00	1.61	0.05	0.00	0.03	Open	0	0.00
372	☐	P119	T-22	T-02	78.40	204.00	110.00	-2.67	0.08	0.01	0.07	Open	0	0.00
373	☐	P69	T-24	T-30	75.10	155.00	100.00	3.52	0.19	0.04	0.53	Open	0	0.00
374	☐	P79	T-24	T-40	101.08	204.00	110.00	6.11	0.19	0.03	0.32	Open	0	0.00
375	☐	P77	T-26	T-28	86.34	204.00	110.00	0.25	0.01	0.00	0.00	Open	0	0.00
376	☐	P87	T-28	T-32	81.44	155.00	100.00	2.49	0.13	0.02	0.28	Open	0	0.00
377	☐	P71	T-30	T-28	72.08	155.00	100.00	2.99	0.16	0.03	0.39	Open	0	0.00
378	☐	P89	T-32	T-38	80.74	155.00	100.00	1.24	0.07	0.01	0.08	Open	0	0.00
379	☐	P103	T-32	T-34	83.06	155.00	100.00	0.85	0.04	0.00	0.04	Open	0	0.00
380	☐	P105	T-34	T-06	83.32	155.00	100.00	0.02	0.00	0.00	0.00	Open	0	0.00
381	☐	P107	T-36	T-10	91.25	204.00	110.00	-0.53	0.02	0.00	0.00	Open	0	0.00
382	☐	P95	T-38	T-36	76.08	204.00	110.00	0.91	0.03	0.00	0.01	Open	0	0.00
383	☐	P81	T-40	T-42	131.76	204.00	110.00	5.43	0.17	0.03	0.26	Open	0	0.00
384	☐	P135	T-41	T-28	55.70	155.00	100.00	-0.13	0.01	0.00	0.00	Open	0	0.00
385	☐	P83	T-42	T-44	98.49	204.00	110.00	4.73	0.14	0.02	0.20	Open	0	0.00

		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)
386	☐	P133	T-42	T-41	65.81	155.00	100.00	0.48	0.03	0.00	0.01	Open	0	0.00
387	☐	P139	T-43	T-32	56.84	155.00	100.00	0.35	0.02	0.00	0.01	Open	0	0.00
388	☐	P137	T-44	T-43	68.99	155.00	100.00	0.96	0.05	0.00	0.05	Open	0	0.00
389	☐	P85	T-44	T-48	80.80	204.00	110.00	3.09	0.09	0.01	0.09	Open	0	0.00
390	☐	P93	T-46	T-38	65.41	204.00	110.00	1.12	0.03	0.00	0.01	Open	0	0.00
391	☐	P91	T-48	T-46	51.53	204.00	110.00	1.72	0.05	0.00	0.03	Open	0	0.00
392	☐	P97	T-48	T-50	68.99	204.00	110.00	0.90	0.03	0.00	0.01	Open	0	0.00
393	☐	P99	T-50	T-52	39.35	50.00	100.00	0.24	0.12	0.03	0.88	Open	0	0.00
394	☐	P101	T-52	T-50	46.78	50.00	100.00	-0.21	0.11	0.03	0.74	Open	0	0.00

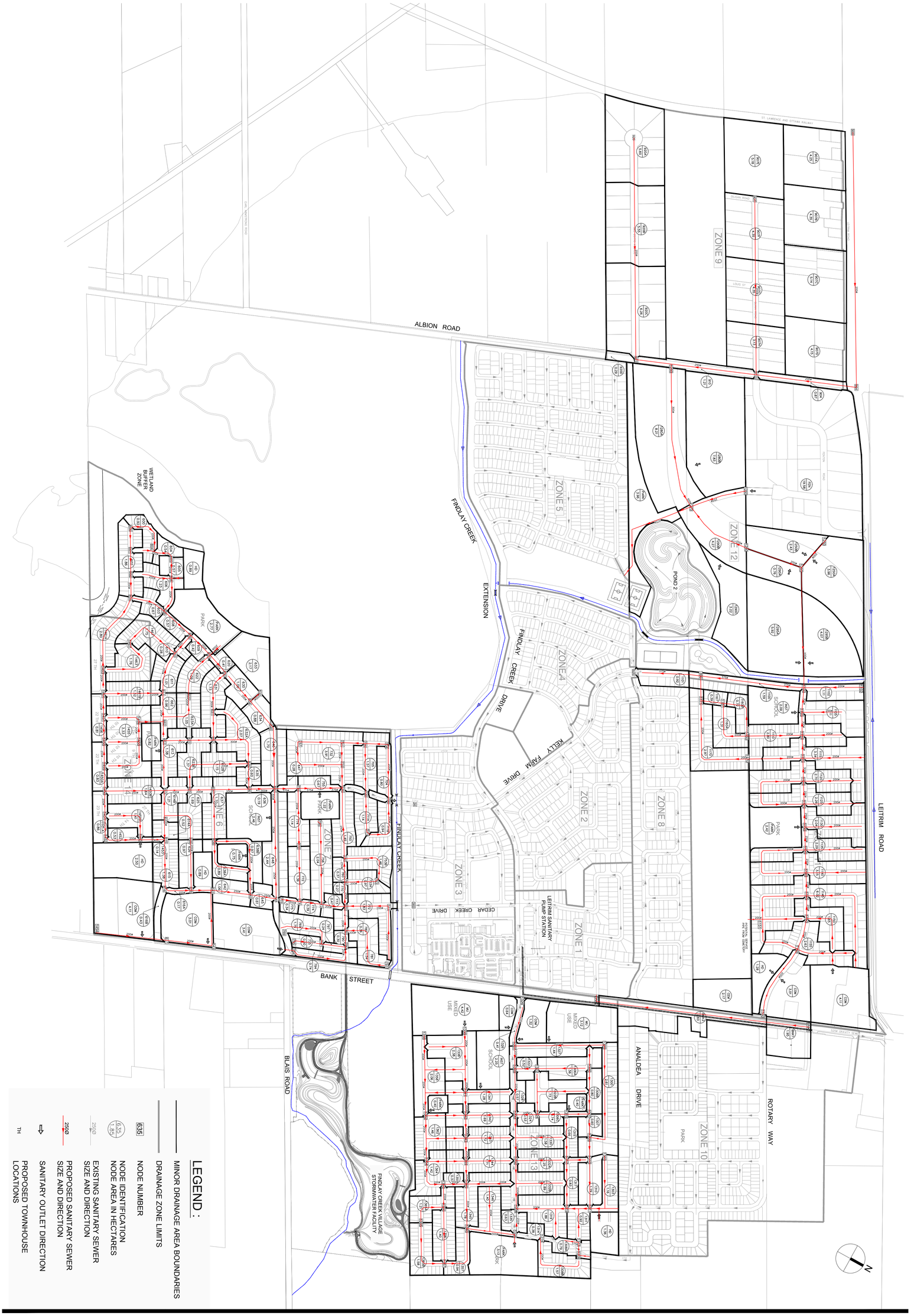
APPENDIX C

- **Figure 3.12, Preferred Wastewater Plan from the 2016 Final Updated Serviceability Report**
- **Figure 3.11, Wastewater Drainage Area Plan from the 2016 Final Updated Serviceability Report**
- **Preliminary Sanitary Sewer Design Sheet for Stage 5**
- **Figure 3.2, Sanitary Drainage Area Plan for Stage 5**
- **Barrett Lands Phase 1 Sanitary Sewer Design Sheet**
- **Barrett Lands Phase 1 Sanitary Drainage Area Plan Drawing No. 34731-501A**
- **2017 Wastewater Sewer Design Sheet for the 375 mmØ Sanitary Sewer near Pond 2**
- **Drawing No. 32261-501, Drainage Area Plan for the 375 mmØ Sanitary Sewer near Pond 2**

J:\34738-LeitrimServReport\5.9 Drawings\59civil\current\Updated Serviceability Report Figures\SECTION 3\FIGURE 3.12 PREFERRED WASTEWATER.dwg Layout Name: FIGURE 3.12 Plot Style: ---- Plot Scale: 1:2.5849 Plotted At: 8/30/2016 10:16
AM Last Saved By: mmilne Last Saved At: Aug. 30, 16

Sheet No.	Drawing Title	Project Title	Scale
FIGURE 3.12	PREFERRED WASTEWATER PLAN	UPDATED SERVICEABILITY PLAN (CLASS EA OPA76 AREAS 8a, 9a and 9b) LEITRIM DEVELOPMENT AREA	N.T.S.

IBI



Sheet No.	Drawing Title	Project Title	Scale
FIGURE 3.11	WASTEWATER DRAINAGE AREA PLAN	UPDATED SERVICEABILITY PLAN (CLASS EA OPA76 AREAS 8a, 9a and 9b) LEITRIM DEVELOPMENT AREA	N.T.S.

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ibigroup.com

SANITARY SEWER DESIGN SHEET

Project: Findlay Creek Village Stage 5
Location: City of Ottawa
Client: Barrett Co-Tenancy

11.84 169.00 199.00

LOCATION				RESIDENTIAL									ICI AREAS							INFILTRATION ALLOWANCE			TOTAL FLOW	PROPOSED SEWER DESIGN						
				AREA	UNIT TYPES				AREA	POPULATION		PEAK	PEAK	AREA (Ha)						PEAK	AREA (Ha)		FLOW		CAPACITY	LENGTH	DIA	SLOPE	VELOCITY	AVAILABLE CAPACITY	
STREET	AREA ID	FROM MH	TO MH	w/ Units (Ha)	SF	SD	TH	APT	w/o Units (Ha)	IND	CUM	FACTOR	FLOW (L/s)	INSTITUTIONAL IND	INSTITUTIONAL CUM	COMMERCIAL IND	COMMERCIAL CUM	INDUSTRIAL IND	INDUSTRIAL CUM	FLOW (L/s)	IND	CUM	(L/s)	(L/s)	(L/s)	(m)	(mm)	(%)	(full) (m/s)	L/s	(%)
Street No. 2		MH 208	MH 210	0.55	3		12			38.4	38.4	4.00	0.50								0.55	0.55	0.18	0.68	27.59	85.00	200	0.65	0.851	26.91	97.54%
Street No. 2		MH 210	MH 215	1.73	22		20			118.4	156.8	4.00	2.03								1.73	1.73	0.57	2.60	20.24	222.00	200	0.35	0.624	17.64	87.14%
Street No. 5		MH 502	MH 500	0.51	1		14			36.8	36.8	4.00	0.48								0.51	0.51	0.17	0.65	27.59	92.00	200	0.65	0.851	26.94	97.66%
Street No. 5		MH 500	MH 215	0.70	5		12			44.8	81.6	4.00	1.06								0.70	1.21	0.40	1.46	20.24	100.00	200	0.35	0.624	18.79	92.80%
Street No. 2		MH 215	MH 100	0.40	3		4			19.2	257.6	4.00	3.34								0.40	3.34	1.10	4.44	20.24	78.00	200	0.35	0.624	15.80	78.06%
Street No. 2		MH 204	MH 1295	0.67			21			50.4	50.4	4.00	0.65								0.67	0.67	0.22	0.87	20.24	80.00	200	0.35	0.624	19.37	95.68%
Block 226 (Comm)		Blkhd	MH 1295	0.00						0.0	0.0	4.00	0.00			3.88	3.88			1.89	3.88	3.88	1.28	3.17	20.24	20.00	200	0.35	0.624	17.08	84.36%
Street No. 2		MH 208	MH 1295	0.93			24			57.6	57.6	4.00	0.75								0.93	0.93	0.31	1.05	27.59	105.00	200	0.65	0.851	26.53	96.18%
Street No. 1		MH 1295	MH 102	0.18			2			4.8	112.8	4.00	1.46				3.88			1.89	0.18	5.66	1.87	5.22	20.24	70.00	200	0.35	0.624	15.03	74.23%
Street No. 6		MH 602	MH 601	0.74	11					35.2	35.2	4.00	0.46								0.74	0.74	0.24	0.70	27.59	67.00	200	0.65	0.851	26.89	97.46%
Street No. 6		MH 601	MH 102	0.58	7		5			34.4	69.6	4.00	0.90								0.58	1.32	0.44	1.34	20.24	85.00	200	0.35	0.624	18.90	93.39%
Street No. 1		MH 102	MH 100	1.64			53			127.2	309.6	4.00	4.01				3.88			1.89	1.64	8.62	2.84	8.74	20.24	206.00	200	0.35	0.624	11.50	56.80%
Street No. 3		MH 306	MH 304	0.56	10					32.0	32.0	4.00	0.41								0.56	0.56	0.18	0.60	27.59	121.00	200	0.65	0.851	26.99	97.83%
Street No. 3		MH 304	MH 303	0.36	4					12.8	44.8	4.00	0.58								0.36	0.92	0.30	0.88	20.24	77.00	200	0.35	0.624	19.36	95.63%
Street No 2		MH 303	MH 100	2.29	37					118.4	163.2	4.00	2.12								2.29	3.21	1.06	3.17	20.24	289.00	200	0.35	0.624	17.07	84.32%
Street No. 1		MH 100	Ex Blkhd	0.00	0		0			0.0	730.4	3.88	9.19				3.88			1.89	0.00	15.17	5.01	16.09	51.44	8.00	300	0.26	0.705	35.35	68.73%
Street No. 4		MH 400	MH 402	0.63	10				0.90	32.0	32.0	4.00	0.41								1.53	1.53	0.50	0.92	27.59	107.00	200	0.65	0.851	26.67	96.67%
Street No. 4		MH 402	MH 407	0.45	5					16.0	48.0	4.00	0.62								0.45	1.98	0.65	1.28	20.24	121.00	200	0.35	0.624	18.97	93.70%
Street No. 2		MH 221	MH 222	0.54	11					35.2	35.2	4.00	0.46								0.54	0.54	0.18	0.63	27.59	69.00	200	0.65	0.851	26.95	97.70%
		MH 222	MH 407	0.08	1					3.2	38.4	4.00	0.50								0.08	0.62	0.20	0.70	20.24	46.00	200	0.35	0.624	19.54	96.53%
Street No. 4		MH 407	MH 409	0.39	6					19.2	105.6	4.00	1.37								0.39	2.99	0.99	2.36	20.24	102.00	200	0.35	0.624	17.89	88.36%
Street No. 6		MH 603	MH 604	0.47	10					32.0	32.0	4.00	0.41								0.47	0.47	0.16	0.57	27.59	60.00	200	0.65	0.851	27.02	97.93%
		MH 604	MH 409	0.29	4					12.8	44.8	4.00	0.58								0.29	0.76	0.25	0.83	20.24	58.00	200	0.35	0.624	19.41	95.89%
Street No. 4		MH 409	MH 201	0.46	6					19.2	169.6	4.00	2.20								0.46	4.21	1.39	3.59	20.24	78.00	200	0.35	0.624	16.65	82.28%
Street No. 2		MH 203	MH 201	0.96			31			74.4	74.4	4.00	0.96								0.96	0.96	0.32	1.28	27.59	115.00	200	0.65	0.851	26.31	95.36%
Street No. 2		MH 201	MH 200	0.99	13		1			44.0	288.0	4.00	3.73								0.99	6.16	2.03	5.77	20.24	90.00	200	0.35	0.624	14.48	71.52%
Block 227/Leitrim Road		MH 200	MH 1270A	0.00						0.0	288.0	4.00	3.73								0.00	6.16	2.03	5.77	20.24	106.00	200	0.35	0.624	14.48	71.52%
Leitrim Road		MH 1270A	MH 1271A	0.00						0.0	288.0	4.00	3.73								0.00	6.16	2.03	5.77	45.12	100.00	300	0.20	0.618	39.35	87.22%
Leitrim Rd West	1271C		1271A																	17.93	17.93	17.93	5.92	14.63						
	1271B		1271A	11.84						96.0	96.0	4.00	1.24							8.72	11.84	11.84	3.91	5.15						
	1271A		1271A																	24.18	24.18	24.18	7.98	19.73						
	1271E		1271A																	16.54	16.54	16.54	5.46	13.50						
			1271A								96.0	4.00	1.24							11.75	8.04	16.54	16.54	5.46	13.50						
			1271A																	28.51	0.00	70.49	23.26	53.02	91.46		375	0.25	0.802	38.44	42.03%
ARIP	1271D		1271A																	19.58		19.58								
Leitrim Road	1271L		1271A																	3.51	23.09	19.58	7.62	18.84	31.02		250	0.25	0.612	12.18	39.25%
Total		1271A	599A						2.2	0.0	384.0	4.00	4.98								81.74	101.94	33.64	78.35	*108.21*	*403.73*	*375*	*0.35*	*0.949*	*29.86*	*27.59%*

Design Parameters:

Residential		
SF	3.2	p/p/u
TH/SD	2.4	p/p/u
APT	1.8	p/p/u
Other	60	p/p/Ha

ICI Areas			
			Peak Factor
INST	28,000	L/Ha/day	1.5
COM	28,000	L/Ha/day	1.5
IND	35,000	L/Ha/day	MOE Chart

Notes:
1. Mannings coefficient (n) = 0.013
2. Demand (per capita): 280 L/day 300 L/day
3. Infiltration allowance: 0.33 L/s/Ha
4. Residential Peaking Factor:
   Harmon Formula = 1+(14/(4+P^0.5))*0.8
   where P = population in thousands

Designed: J.I.M.
Checked: K.H.
Dwg. Reference: 122283

No.	Revision	Date
1.	City Submission No. 1	2020-01-14

File Reference: 122283-6.2.4
Date: 2020-01-14
Sheet No: 1 of 1

Sheet No.

FIGURE 3.2

Drawing Title

EXTERNAL SANITARY
DRAINAGE AREA PLAN

Project Title

ASSESSMENT OF ADEQUACY
OF PUBLIC SERVICES
FINDLAY CREEK VILLAGE - STAGE 5
3100 LEITRIM ROAD
LEITRIM DEVELOPMENT AREA

Scale

N.T.S.

IBI

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SANITARY SEWER DESIGN SHEET

Barrett Lands
CITY OF OTTAWA
Tartan Land Corporation

LOCATION				RESIDENTIAL										ICI AREAS							INFILTRATION ALLOWANCE			TOTAL FLOW	PROPOSED SEWER DESIGN						
				AREA w/ Units (Ha)	UNIT TYPES				AREA w/o Units (Ha)	POPULATION		PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)						PEAK FLOW (L/s)	AREA (Ha)		FLOW		CAPACITY	LENGTH	DIA	SLOPE	VELOCITY (full) (m/s)	AVAILABLE CAPACITY	
STREET	AREA ID	FROM MH	TO MH		SF	SD	TH	APT		IND	CUM			INSTITUTIONAL		COMMERCIAL		INDUSTRIAL			IND	CUM	(L/s)	(L/s)	(L/s)	(m)	(mm)	(%)		L/s	(%)
														IND	CUM	IND	CUM	IND	CUM											
MUSCARI STREET	11138A	MH11138A	MH11137A	0.74			27			64.8	64.8	4.00	1.05		0.00		0.00		0.00	0.00	0.74	0.74	0.21	1.26	34.22	90.85	200	1.00	1.055	32.96	96.33%
MUSCARI STREET	11137A	MH11137A	MH11142A	0.66			22			52.8	117.6	4.00	1.91		0.00		0.00		0.00	0.00	0.66	1.40	0.39	2.30	26.50	106.56	200	0.60	0.817	24.21	91.33%
MUSCARI STREET		MH11142A	MH11140A							0.0	117.6	4.00	1.91		0.00		0.00		0.00	0.00	0.00	1.40	0.39	2.30	55.26	7.00	300	0.30	0.757	52.96	95.84%
BARRETT FARM DRIVE	COM1, RES1, HD, CEM, PARK	BLK11141A	MH11140A	27.44	238		264	84		1546.4	1546.4	3.67	22.99		0.00	8.86	8.86		0.00	7.69	36.30	36.30	10.16	40.84	50.44	45.00	300	0.25	0.691	9.60	19.02%
BARRETT FARM DRIVE	11140A	MH11140A	MH11120A	0.30	4					12.8	1676.8	3.64	24.75		0.00		8.86		0.00	7.69	0.30	38.00	10.64	43.08	48.38	78.04	300	0.23	0.663	5.30	10.95%
NEPETA CRESCENT	11114Aa	MH11114A	MH11115A	0.07			2			4.8	4.8	4.00	0.08		0.00		0.00		0.00	0.00	0.07	0.07	0.02	0.10	45.26	11.39	200	1.75	1.396	45.17	99.78%
NEPETA CRESCENT	11115A	MH11115A	MH11116A	0.67			24			57.6	62.4	4.00	1.01		0.00		0.00		0.00	0.00	0.67	0.74	0.21	1.22	46.54	96.49	200	1.85	1.435	45.32	97.38%
NEPETA CRESCENT	11116A	MH11116A	MH11119A	0.51			16			38.4	100.8	4.00	1.63		0.00		0.00		0.00	0.00	0.51	1.25	0.35	1.98	20.24	93.95	200	0.35	0.624	18.26	90.20%
BARRETT FARM DRIVE	11117A	MH11117A	MH11119A	0.19			7			16.8	16.8	4.00	0.27		0.00		0.00		0.00	0.00	0.19	0.19	0.05	0.33	41.91	93.95	200	1.50	1.292	41.58	99.22%
BARRETT FARM DRIVE	11118A	MH11118A	MH11119A	0.19			7			16.8	16.8	4.00	0.27		0.00		0.00		0.00	0.00	0.19	0.19	0.05	0.33	27.59	93.95	200	0.65	0.851	27.26	98.82%
NEPETA CRESCENT		MH11119A	MH11120A							0.0	134.4	4.00	2.18		0.00		0.00		0.00	0.00	0.00	1.63	0.46	2.63	50.44	7.00	300	0.25	0.691	47.81	94.78%
BARRETT FARM DRIVE	11120A	MH11120A	MH11110A	0.13						0.0	1811.2	3.62	26.55		0.00		8.86		0.00	7.69	0.13	39.76	11.13	45.38	50.44	78.01	300	0.25	0.691	5.07	10.04%
NEPETA CRESCENT	11114Ab	MH11114A	MH11113A	0.27			8			19.2	19.2	4.00	0.31		0.00		0.00		0.00	0.00	0.27	0.27	0.08	0.39	24.19	61.85	200	0.50	0.746	23.81	98.40%
NEPETA CRESCENT	11113A	MH11113A	MH11112A	0.08			2			4.8	24.0	4.00	0.39		0.00		0.00		0.00	0.00	0.08	0.35	0.10	0.49	40.49	11.45	200	1.40	1.248	40.00	98.80%
NEPETA CRESCENT	11112A	MH11112A	MH11111A	0.67			24			57.6	81.6	4.00	1.32		0.00		0.00		0.00	0.00	0.67	1.02	0.29	1.61	40.49	97.92	200	1.40	1.248	38.88	96.03%
NEPETA CRESCENT	11111A	MH11111A	MH11118A	0.62			21			50.4	132.0	4.00	2.14		0.00		0.00		0.00	0.00	0.62	1.64	0.46	2.60	24.19	93.00	200	0.50	0.746	21.60	89.26%
NEPETA CRESCENT		MH11118A	MH11110A							0.0	132.0	4.00	2.14		0.00		0.00		0.00	0.00	0.00	1.64	0.46	2.60	55.26	7.00	300	0.30	0.757	52.66	95.30%
SCHOOL BLOCK	INST	BLK11110AS	MH11110A							0.0	0.0	4.00	0.00	2.07	2.07		0.00		0.00	1.80	2.07	2.07	0.58	2.38	24.19	19.00	200	0.50	0.746	21.82	90.18%
BARRETT FARM DRIVE	11110A	MH11110A	MH11100A	0.18						0.0	1943.2	3.60	28.30		2.07		8.86		0.00	9.49	0.18	43.65	12.22	50.01	55.26	84.55	300	0.30	0.757	5.24	9.49%
KELLY FARM DRIVE	11102A	MH11102A	MH11101A	0.61	6		4			28.8	28.8	4.00	0.47		0.00		0.00		0.00	0.00	0.61	0.61	0.17	0.64	27.59	104.28	200	0.65	0.851	26.95	97.69%
KELLY FARM DRIVE	11101A	MH11101A	MH11107A	0.49	4		4			22.4	51.2	4.00	0.83		0.00		0.00		0.00	0.00	0.49	1.10	0.31	1.14	27.59	87.12	200	0.65	0.851	26.45	95.88%
KELLY FARM DRIVE		MH11107A	MH11100A							0.0	51.2	4.00	0.83		0.00		0.00		0.00	0.00	0.00	1.10	0.31	1.14	55.26	7.00	300	0.30	0.757	54.12	97.94%
KELLY FARM DRIVE	COM2, RES2	BLK11100A	MH11100A						9.96	597.6	597.6	3.93	9.52		0.00	9.35	9.35		0.00	8.12	19.31	19.31	5.41	23.04	50.44	45.00	300	0.25	0.691	27.40	54.31%
KELLY FARM DRIVE	11100A	MH11100A	MH11103A	0.14						0.0	2592.0	3.50	36.70		2.07		18.21		0.00	17.60	0.14	64.20	17.98	72.28	77.60	61.00	375	0.18	0.681	5.32	6.85%
KELLY FARM DRIVE	11103A	MH11103A	MH11104A	0.14						0.0	2592.0	3.50	36.70		2.07		18.21		0.00	17.60	0.14	64.34	18.02	72.32	77.60	56.74	375	0.18	0.681	5.28	6.80%
KELLY FARM DRIVE	11104A	MH11104A	MH11105A	0.26						0.0	2592.0	3.50	36.70		2.07		18.21		0.00	17.60	0.26	64.60	18.09	72.40	77.60	119.35	375	0.18	0.681	5.21	6.71%
KELLY FARM DRIVE	11105A	MH11105A	MH800A	0.21						0.0	2592.0	3.50	36.70		2.07		18.21		0.00	17.60	0.21	64.81	18.15	72.45	77.60	116.30	375	0.18	0.681	5.15	6.63%
TROLLIUS WAY	11139A	MH11139A	MH11136A	0.75	14					44.8	44.8	4.00	0.73		0.00		0.00		0.00	0.00	0.75	0.75	0.21	0.94	20.24	87.77	200	0.35	0.624	19.31	95.38%
TROLLIUS WAY	11136A	MH11136A	MH11134A	0.84	17					54.4	99.2	4.00	1.61		0.00		0.00		0.00	0.00	0.84	1.59	0.45	2.05	20.24	103.59	200	0.35	0.624	18.19	89.86%
TROLLIUS WAY	11134A	MH11134A	MH11133A	0.67	13					41.6	140.8	4.00	2.28		0.00		0.00		0.00	0.00	0.67	2.26	0.63	2.91	20.24	102.36	200	0.35	0.624	17.33	85.60%
TROLLIUS WAY	11133A	MH11133A	MH11132A	0.26	3					9.6	150.4	4.00	2.44		0.00		0.00		0.00	0.00	0.26	2.52	0.71	3.14	20.24	11.51	200	0.35	0.624	17.10	84.48%
TROLLIUS WAY	11132A	MH11132A	MH11131A	0.68	13					41.6	192.0	4.00	3.11		0.00		0.00		0.00	0.00	0.68	3.20	0.90	4.01	20.24	96.21	200	0.35	0.624	16.24	80.20%
TROLLIUS WAY	11131A	MH11131A	MH11130A	0.76	16					51.2	243.2	4.00	3.94		0.00		0.00		0.00	0.00	0.76	3.96	1.11	5.05	20.24	96.00	200	0.35	0.624	15.19	75.06%
ACONITUM WAY	11128A	MH11128A	MH11121A	0.57	10					32.0	32.0	4.00	0.52		0.00		0.00		0.00	0.00	0.57	0.57	0.16	0.68	20.24	72.95	200	0.35	0.624	19.56	96.65%
ACONITUM WAY	11121A	MH11121A	MH11122A	0.69	13					41.6	73.6	4.00	1.19		0.00		0.00		0.00	0.00	0.69	1.26	0.35	1.55	20.24	97.14	200	0.35	0.624	18.70	92.37%
ACONITUM WAY	11122Aa	MH11122A	MH11127A	0.53	10					32.0	105.6	4.00	1.71		0.00		0.00		0.00	0.00	0.53	1.79	0.50	2.21	20.24	69.40	200	0.35	0.624	18.03	89.07%
ACONITUM WAY	11127A	MH11127A	MH11126A	0.19	2					6.4	112.0	4.00	1.81		0.00		0.00		0.00	0.00	0.19	1.98	0.55	2.37	20.24	11.52	200	0.35	0.624	17.87	88.30%
ACONITUM WAY	11126A	MH11126A	MH11125A	0.67	12					38.4	150.4	4.00	2.44		0.00		0.00		0.00	0.00	0.67	2.65	0.74	3.18	20.24	103.51	200	0.35	0.624	17.06	84.30%
LAVATERA STREET	11122Ab	MH11122A	MH11123A	0.30	4					12.8	86.4	4.00	1.40		0.00		0.00		0.00	0.00	0.30	0.30	0.08	1.48	20.24	95.52	200	0.35	0.624	18.76	92.67%
LAVATERA STREET	11123A	MH11123A	MH11124A	0.06			1			2.4	88.8	4.00	1.44		0.00		0.00		0.00	0.00	0.06	0.36	0.10	1.54	20.24	7.97	200	0.35	0.624	18.70	92.39%
LAVATERA STREET	11124A	MH11124A	MH11125A	0.33			10			24.0	112.8	4.00	1.83		0.00		0.00		0.00	0.00	0.33	0.69	0.19	2.02	20.24	73.24	200	0.35	0.624	18.22	90.02%
LAVATERA STREET	11125A	MH11125A	MH11130A	0.36			10			24.0	287.2	4.00	4.65		0.00		0.00		0.00	0.00	0.36	3.70	1.04	5.69	20.24	78.74	200	0.35	0.624	14.55	71.89%
TROLLIUS WAY	11130A	MH11130A	MH801A	0.33	3		4			19.2	549.6	3.95	8.80		0.00		0.00		0.00	0.00	0.33	7.99	2.24	11.04	20.24	77.22	200	0.35	0.624	9.21	45.47%
KELLY FARM DRIVE	11190A	MH11190A	MH11192A	0.34			12			28.8	28.8	4.00	0.47		0.00		0.00		0.00	0.00	0.34	0.34	0.10	0.56	27.59	81.96	200	0.65	0.851	27.02	97.96%
KELLY FARM DRIVE	11192A	MH11192A	MH801A	0.26			9			21.6	95.2	4.00	1.54		0.00		0.00		0.00	0.00	0.26	0.60	0.17	1.71	24.19	77.50	200	0.50	0.746	22.48	92.93%
KELLY FARM DRIVE		MH801A	MH800A							0.0	644.8	3.91	10.23		0.00		0.00		0.00	0.00	0.00	8.59	2.41	12.63	55.26	6.56	300	0.30	0.757	42.62	77.14%
KELLY FARM DRIVE	800A	MH800A	MH820A	0.09						0.0	3236.8	3.41	44.77	2.07	2.07		18.21		0.00	17.60	0.09	73.49	20.58	82.95	89.61	38.82	375	0.24	0.786	6.66	7.43%
KELLY FARM DRIVE	820A	MH820A	MH826A	0.11						0.0	3236.8	3.41	44.77	2.07	2.07		18.21		0.00	17.60	0.11	73.60	20.61	82.98	89.61	97.38	375	0.24	0.786	6.63	7.40%
KELLY FARM DRIVE	826A	MH826A	MH827A	0.19						0.0	3236.8	3.41	44.77	2.07	2.07		18.21		0.00	17.60	0.19	73.79	20.66	83.03	89.61	70.00	375	0.24	0.786	6.58	7.34%
KELLY FARM DRIVE	812A	MH812A	MH814A	0.37			14			33.6	33.6	4.00	0.54		0.00		0.00		0.00	0.00	0.37	0.37	0.10	0.65	27.59	96.38	200	0.65	0.851	26.94	97.65%
KELLY FARM DRIVE	814A	MH814A	MH816A	0.27			10			24.0	57.6	4.00	0.93		0.00		0.00		0.00	0.00	0.27	0.64	0.18	1.11	27.59	69.26	200	0.65	0.851	26.47	95.97%
KELLY FARM DRIVE		MH816A	MH827A							0.0	57.6	4.00	0.93		0.00		0.00		0.00	0.00	0.00	0.64	0.18	1.11	20.24	6.01	200	0.35	0.624	19.13	94.50%
KELLY FARM DRIVE		MH827A	EXBLK825A							0.0	3294.4	3.41	45.47		2.07		18.21		0.00	17.60	0.00	74.43	20.84	83.92	89.61	3.48	375	0.24	0.786	5.69	6.35%

Design Parameters:

Residential		
SF	3.2	p/p/u
TH/SD	2.4	p/p/u
APT	1.8	p/p/u
Other	60	p/p/Ha

ICI Areas			
			Peak Factor
INST	50,000	L/Ha/day	1.5
COM	50,000	L/Ha/day	1.5
IND	35,000	L/Ha/day	MOE Chart

Notes:
1. Mannings coefficient (n) = 0.013
2. Demand (per capita): 350 L/day 300 L/day
3. Infiltration allowance: 0.28 L/s/Ha
4. Residential Peaking Factor:
Harmon Formula = 1+(14/(4+P^0.5))
where P = population in thousands

Designed: K.H., W.Y.

Checked: J.I.M.

Dwg. Reference: 34731-501

No.	Revision	Date
1	City Submission No. 1	2017-04-28
2	City Submission No. 2	2017-09-22
3	City Submission No. 3	2018-01-17
4	Revised Per New Legal 2018-04-09	2018-04-16

File Reference:	Date:	Sheet No:
34731.5.7.1	2018-04-16	1 of 1

REVIEWED BY
DEVELOPMENT REVIEW SERVICES BRANCH

Signed ____________________

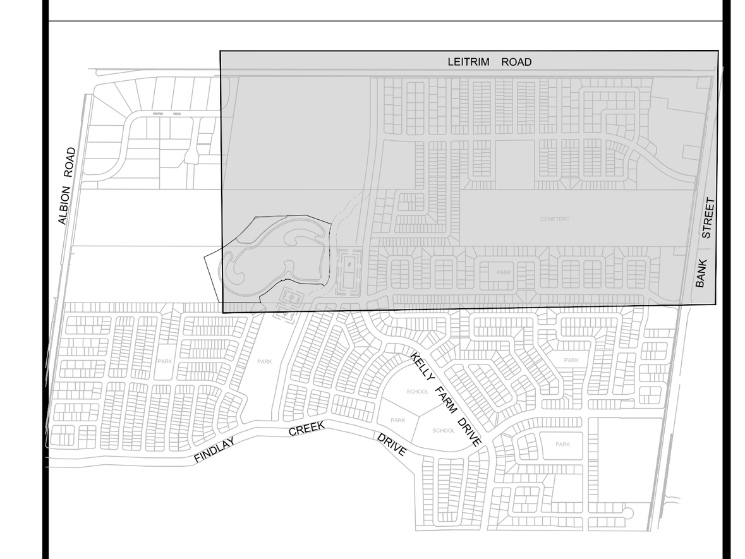
Date ____________________ 2017

Plan Number ____________________

LEGEND :

11135A — AREA NUMBER
0.43 | 30.6 — POPULATION
AREA IN HECTARES

FUTURE MINOR FLOW DIRECTION



No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5	ISSUED FOR MOE APPROVAL	J.I.M.	2018:05:23
4	REVISED PER NEW LEGAL 2018-04-09	J.I.M.	2018:04:16
3	SUBMISSION NO. 3 FOR CITY REVIEW	J.I.M.	2018:01:17
2	SUBMISSION NO. 2 FOR CITY REVIEW	J.I.M.	2017:09:22
1	SUBMISSION NO. 1 FOR CITY REVIEW	J.I.M.	2017:04:28

BARRETT
CO-TENANCY

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Project Title
BARRETT LANDS
PHASE 1

LICENSED PROFESSIONAL ENGINEER
J. I. MOFFATT
2018/05/23
PROVINCE OF ONTARIO

N

Drawing Title
EXTERNAL SANITARY
DRAINAGE AREA PLAN

Scale
1:2500

Design	Date
K.H.	MARCH 2017
Drawn	Checked
M.M.	J.I.M.
Project No.	Drawing No.
34731	501A

CITY PLAN No.

CITY FILE No. D07-16-13-0023

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

WASTEWATER SEWER DESIGN SHEET

BARRETT CO-TENANCY
LEITRIM POND 2
LEITRIM DEVELOPMENT AREA

LOCATION				RESIDENTIAL									ICI AREAS							INFILTRATION ALLOWANCE				TOTAL FLOW	PROPOSED SEWER DESIGN						
				UNIT TYPE				HARMON PEAKING FACTOR					AREA (Ha)							AREA (Ha)			FLOW		CAPACITY	LENGTH	DIA	SLOPE	VELOCITY (full)	AVAILABLE CAPACITY	
								AREA	POPULATION		PEAK FACTOR	PEAK FLOW	INSTITUTIONAL		COMMERCIAL *		INDUSTRIAL		PEAK FLOW											
STREET	AREA ID	FROM MH	TO MH	Single	Semi	TH	APT	(Ha)	IND	CUM		(L/s)	IND	CUM	IND	CUM	IND	CUM	(L/s)	PARK	IND	CUM	(L/s)	(L/s)	(L/s)	(m)	(mm)	(%)	(m/s)	L/s	(%)
	1271B, 1271F		1271A					15.06	289	289	*4.00*	4.69			0.00	0.00			0.00		15.06	15.06	4.22	8.90							
	1271A, 1271C, 1271D, 1271E		1271A					0.00	0	0	*4.00*	0.00			108.05	108.05			62.53		108.05	108.05	30.25	92.78							
		1271A	1272A					0.00	0	289	*4.00*	4.69			0.00	108.05			62.53		0.00	123.11	34.47	101.69	108.21	80.00	375	0.35	0.949	6.53	6.03
	1272	1272A	1273A					0.00	0	289	*4.00*	4.69			0.00	108.05			62.53	3.96	3.96	127.07	35.58	102.79	108.21	85.00	375	0.35	0.949	5.42	5.01
		1273A	1274A					0.00	0	289	*4.00*	4.69			0.00	108.05			62.53		0.00	127.07	35.58	102.79	108.21	76.00	375	0.35	0.949	5.42	5.01
		1274A	1275A					0.00	0	289	*4.00*	4.69			0.00	108.05			62.53		0.00	127.07	35.58	102.79	108.21	67.00	375	0.35	0.949	5.42	5.01
		1275A	*Ex. 599A*					0.00	0	289	*4.00*	4.69			0.00	108.05			62.53		0.00	127.07	35.58	102.79	108.21	38.30	375	0.35	0.949	5.42	5.01

Design Parameters:

Residential			ICI Areas		
			Ave. Flows (L/ha/day)		Peak Factor
SF/SD	3.2	p/p/u			
TH	2.4	p/p/u	INST	50,000	1.0
APT	1.9	p/p/u	COM	50,000	1.0
Other	60	p/p/Ha	IND	35,000	1.0

Notes:

1. Mannings coefficient (n) = 0.01

	MOE Criteria
2. Average Demand (per capita):	350 (L/c/d)
3. Infiltration allowance:	0.28 (L/s/ha)
4. Residential Peaking Factor: *Harmon Formula = 1+(14/(4+P^0.5)) where P = population in thousands*	Harmon

Designed: K.H.

Checked: J.I.M.

Dwg. Reference: 501

No.	Revision	Date
1.	SUBMISSION NO. 1 FOR CITY REVIEW	2017-02-24
2.	MOE SUBMISSION	2017-10-06

File Reference:	Date:	Sheet No:
32261.5.7.1	2017-02-24	1 of 1

*** Sanitary Flows are computed using Commercial land use as per the Master Servicing Study (MSS) and the resultant design flows are greater than they would be for Industrial land use**

LEGEND :

1271D
19.58 -
1 COMM

- AREA ID
- POPULATION
- LAND USE
- AREA IN HECTARES

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4			
3			
2	ISSUED FOR MOE	JIM	17:10:06
1	SUBMISSION #1 FOR CITY REVIEW	JIM	17:02:24

BARRETT CO-TENANCY

IBI GROUP
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tel 613 225 1311 fax 613 225 9868
ibigroup.com

Project Title

LEITRIM POND 2

PROFESSIONAL ENGINEER
J. I. MOFFATT
17/10/06
PROVINCE OF ONTARIO

N

Drawing Title

SANITARY DRAINAGE AREA PLAN

Scale
1:3000

Design	Date
K.H.	FEBRUARY 2017
Drawn	Checked
M.M.	J.I.M.
Project No.	Drawing No.
32261	501

APPENDIX D

- **Figure 6.2, Preferred Minor Storm Plan from the 2016 Final Updated Serviceability Report**
- **Figure 6.1, Storm Drainage Area Plan from the 2016 Final Updated Serviceability Report**
- **Preliminary Storm Sewer Design Sheet for Stage 5**
- **Figure 4.3, Storm Drainage Area Plan for Stage 5**
- **Barrett Lands Phase 1 External Storm Drainage Area Plan, Drawing No. 34731-500A**
- **Barrett Lands Phase 1 Storm Sewer Design Sheet**
- **Figure 6.11, Major Flow Routing Features from the 2016 Final Updated Serviceability Report**
- **Figure 8.1, Macro Grading and Drainage Plan from the 2016 Final Updated Serviceability Report**
- **Figure 4.5, Macro Grading Plan – Stage 5**

Sheet No.

FIGURE 6.2

Drawing Title

PREFERRED MINOR STORM PLAN

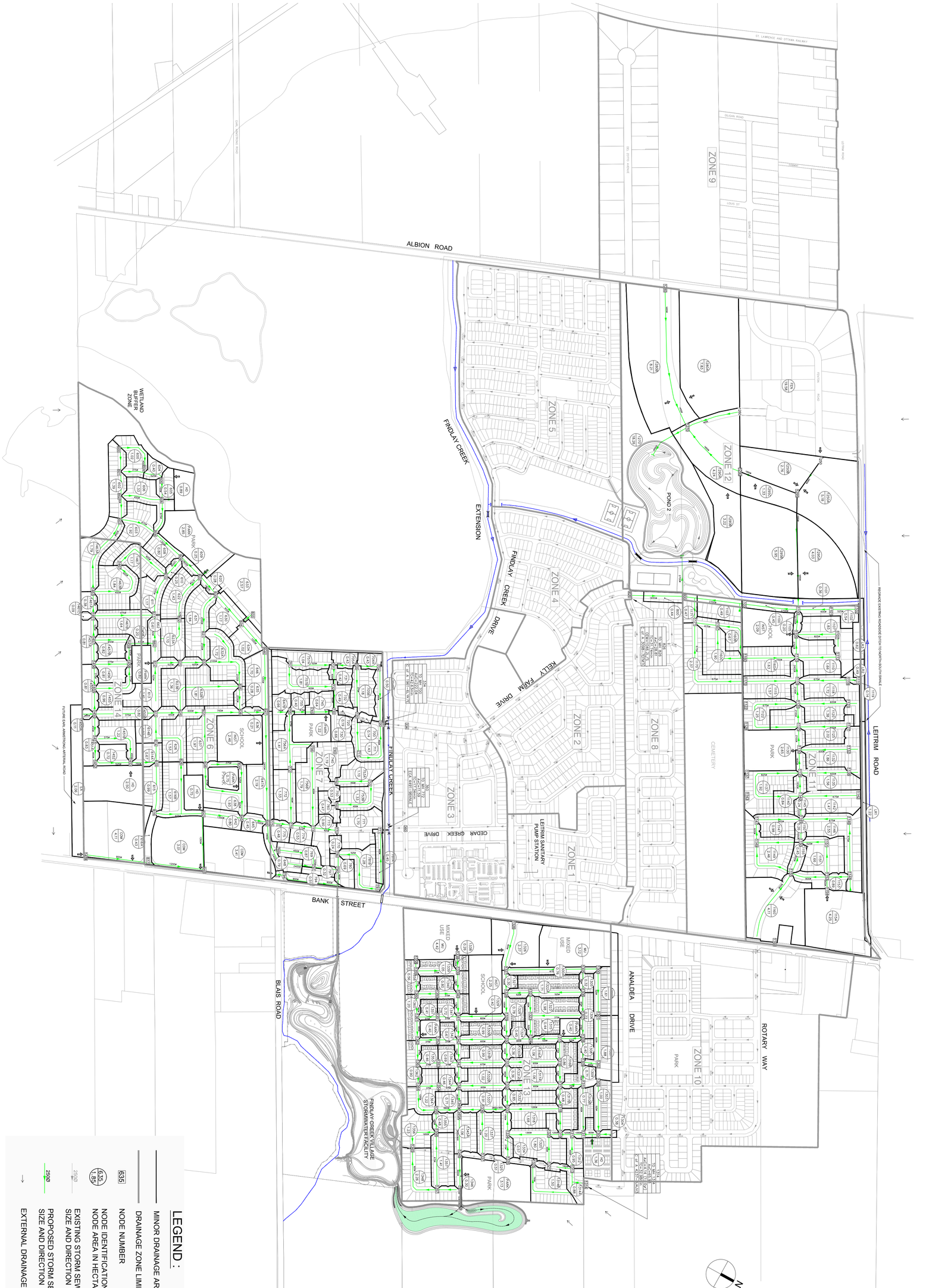
Project Title

UPDATED SERVICEABILITY PLAN
(CLASS EA OPA76 AREAS 8a, 9a and 9b)
LEITRIM DEVELOPMENT AREA

Scale

N.T.S.

IBI



Sheet No.

FIGURE 6.1

Drawing Title

STORM DRAINAGE AREA PLAN

Project Title

UPDATED SERVICEABILITY PLAN
(CLASS EA OPA76 AREAS 8a, 9a and 9b)
LEITRIM DEVELOPMENT AREA

Scale

N.T.S.

IBI

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

STORM SEWER DESIGN SHEET

PROJECT: FINDLAY CREEK VILLAGE STAGE 5
LOCATION: CITY OF OTTAWA
CLIENT: Barrett Co-Tenancy

LOCATION				AREA (Ha)										RATIONAL DESIGN FLOW																SEWER DATA							
STREET	AREA ID	FROM MH	TO MH	C= 0.15	C= 0.20	C= 0.30	C= 0.52	C= 0.63	C= 0.68	C= 0.69	C= 0.65	C= 0.75	C= 0.80	IND 2.78AC	CUM 2.78AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (2) (mm/hr)	i (10) (mm/hr)	i(25) (mm/hr)	i(50) (mm/hr)	i (100) (mm/hr)	i (115%+100) (mm/hr)	2yr PEAK FLOW (L/s)	10yr PEAK FLOW (L/s)	25yr PEAK FLOW (L/s)	50yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	115%+100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE SIZE (mm) DIA	PIPE SIZE (mm) W	PIPE SIZE (mm) H	SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (5yr) (L/s)	AVAIL CAP (5yr) (%)
Street No. 2		MH 208	MH 210								0.49			0.89	0.89	10.00	1.55	11.55	76.81						68.42							68.42	104.28	85.00	375			0.33	0.915	35.85	34.38%
Street No. 2		MH 210	MH 212								0.49			0.89	1.78	11.55	1.24	12.79	71.33						127.09							127.09	212.82	71.00	525			0.23	0.952	85.73	40.28%
Street No. 2		MH 212	MH 214								0.51			0.92	2.70	12.79	1.16	13.95	67.52						182.54							182.54	339.63	64.00	675			0.15	0.919	157.10	46.25%
Street No. 2		MH 214	MH 215								0.39			0.70	3.40	13.95	1.36	15.31	64.36						218.75							218.75	339.63	75.00	675			0.15	0.919	120.88	35.59%
Street No. 5		MH 502	MH 500								0.56			1.01	1.01	10.00	1.55	11.55	76.81						77.72							77.72	162.91	92.00	450			0.30	0.992	85.19	52.29%
Street No 5		MH 500	MH 215								0.71			1.28	2.29	11.55	1.96	13.51	71.34						163.72							163.72	248.09	100.00	600			0.15	0.850	84.37	34.01%
Street No. 2		MH 215	Mh 100								0.41			0.75	6.44	15.31	1.24	16.55	61.04						393.07							393.07	579.98	78.00	825			0.15	1.051	186.91	32.23%
Street No. 2		MH 208	MH 205								0.59			1.07	1.07	10.00	1.76	11.76	76.81						81.88							81.88	162.91	105.00	450			0.30	0.992	81.03	49.74%
Street No. 1		MH 205	MH 102								0.36			0.65	1.72	11.76	1.28	13.04	70.64						121.26							121.26	200.65	69.00	525			0.20	0.898	79.39	39.56%
Street No. 3		MH 300	MH 301								0.20			0.36	0.36	10.00	0.82	10.82	76.81						27.76							27.76	59.68	40.00	300			0.35	0.818	31.93	53.49%
Street No. 6		MH 301	MH 601								0.27			0.49	0.85	10.82	1.58	12.40	73.81						62.69							62.69	133.02	77.00	450			0.20	0.810	70.33	52.87%
Street No. 6		MH 601	MH 102								0.61			1.10	1.95	12.40	1.67	14.07	68.68						134.03							134.03	248.09	85.00	600			0.15	0.850	114.06	45.98%
Street No 1		MH 102	MH 101								0.76			1.37	5.04	14.07	1.83	15.89	64.06						322.98							322.98	518.75	103.00	825			0.12	0.940	195.77	37.74%
Street No. 1		MH 101	MH 100								0.74			0.89	5.93	15.89	1.83	17.72	59.74						354.40							354.40	518.75	103.00	825			0.12	0.940	164.35	31.68%
Street No. 3		MH 302	MH 303								0.20			0.36	0.36	10.00	0.92	10.92	76.81						27.76							27.76	59.68	45.00	300			0.35	0.818	31.93	53.49%
Street No. 3		MH 306	MH 304								0.75			1.36	1.36	10.00	2.04	12.04	76.81						104.09							104.09	148.72	111.00	450			0.25	0.906	44.63	30.01%
Street No. 6		MH 304	MH 303								0.41			0.92	2.28	12.04	1.51	13.55	69.76						158.84							158.84	248.09	77.00	600			0.15	0.850	89.25	35.98%
Street No. 2		MH 303	MH 219								0.99			1.79	4.43	13.55	1.45	15.01	65.41						289.58							289.58	449.81	86.00	750			0.15	0.986	160.23	35.62%
Street No. 2		MH 219	MH 216								0.93			1.68	6.11	15.01	2.19	17.20	61.76						377.18							377.18	654.22	131.00	900			0.12	0.996	277.05	42.35%
Street No. 2		MH 216	MH 100								0.42			0.76	6.87	17.20	1.20	18.40	57.03						391.58							391.58	654.22	72.00	900			0.12	0.996	262.65	40.15%
Street No. 1		MH 100	EX Blkhd								0.00			0.00	19.24	18.40	0.06	18.46	54.75						1,053.36							1,053.36	6,114.62	8.00	1800			0.26	2.328	5061.26	82.77%
Street No. 2		MH 1295	MH 204								0.45			0.81	0.81	10.00	1.31	11.31	76.81						62.45							62.45	115.68	80.00	375			0.40	1.015	53.23	46.01%
Street No. 2		MH 204	MH 203								0.74			1.34	2.15	11.31	1.10	12.42	72.10						155.04							155.04	283.76	84.00	525			0.40	1.270	128.71	45.36%
Street No. 2		MH 203	MH 201								1.11			2.01	4.16	12.42	1.47	13.89	68.62						285.21							285.21	480.32	115.00	675			0.30	1.300	195.11	40.62%
Street No. 4		MH 400	MH 401								0.17			0.31	0.31	10.00	0.45	10.45	76.81						23.59							23.59	59.68	22.00	300			0.35	0.818	36.09	60.47%
Street No. 4		MH 401	MH 402			0.90					0.42			1.51	1.82	10.45	1.58	12.03	75.13						136.48							136.48	200.65	85.00	525			0.20	0.898	64.16	31.98%
Street No. 4		MH 402	MH 407								0.44			0.80	2.61	12.03	2.19	14.22	69.81						182.34							182.34	339.63	121.00	675			0.15	0.919	157.30	46.31%
Street No. 2		MH 221	MH 222								0.39			0.70	0.70	10.00	1.31	11.31	76.81						54.13							54.13	100.18	69.00	375			0.30	0.879	46.06	45.97%
Street No. 2		MH 222	MH 407								0.16			0.29	0.99	11.31	0.85	12.16	72.12						71.68							71.68	148.72	46.00	450			0.25	0.906	77.04	51.80%
Street No. 4		MH 407	MH 409								0.38			0.69	4.29	14.22	1.60	15.82	63.67						273.31							273.31	392.18	102.00	675			0.20	1.062	118.87	30.31%
Street No. 6		MH 603	MH 604								0.46			0.83	0.83	10.00	1.23	11.23	76.81						63.84							63.84	133.02	60.00	450			0.20	0.810	69.17	52.00%
Street No. 6		MH 604	MH 409								0.20			0.36	1.19	11.23	1.19	12.43	72.37						86.31							86.31	133.02	58.00	450			0.20	0.810	46.71	35.11%
Street No. 4		MH 409	MH 201								0.42			0.76	6.24	15.82	1.30	17.13	59.90						373.99							373.99	654.22	78.00	900			0.12	0.996	280.24	42.84%
Street No. 2		MH 201	MH 200								0.97			1.75	12.15	17.13	1.36	18.48	57.17						694.74							694.74	986.85	90.00	1050			0.12	1.104	292.11	29.60%
Block 227		MH 200	MH 1270B								0.00			0.00	12.15	18.48	0.75	19.24	54.60						663.60							663.60	986.85	50.00	1050			0.12	1.104	323.25	32.76%
	Albion Rd Ind Park	Stub	MH 1250										19.58	40.82	40.82	15.00	0.08	15.08	61.77						2,521.61							2,521.61	3,687.25	10.00	1500			0.25	2.021	1165.64	31.61%
	Future Commercial	MH 1250	MH 1251										2.97	6.19	47.02	15.08	0.97	16.05	61.57						2,894.99							2,894.99	4,754.27	125.00	1650			0.25	2.154	1859.28	39.11%
	Future Commercial	MH 1251	MH 1252										0.91	1.90	48.91	16.41	0.97	17.38	58.62						2,867.26							2,867.26	4,754.27	125.00	1650			0.25	2.154	1887.01	39.69%
	Future Employment Lands	MH 1252	MH 1270										2.04	4.25	53.17	17.38	1.74	19.12	56.66						3,012.64							3,012.64	5,362.88	213.00	1800			0.20	2.042	2350.25	43.82%
	Future Leitrim Road North*		MH 1270										1.69	3.52	3.52	12.00	6.54	18.54		110.96						390.98						390.98	580.71	500.00	750			0.25	1.273	189.73	32.67%
	Future Leitrim Road West*		MH 1270										1.82	3.79	3.79	14.00	5.03	19.03		101.82						386.39						2,447.51	4,754.27	650.00	1650			0.25	2.154	2306.76	48.52%
	Future Employment Lands, Park Lands		MH 1270			2.20							14.51	32.09	32.09	14.00	5.03	19.03	64.23						2,061.12							2,447.51	4,754.27	650.00	1650			0.25	2.154	2306.76	48.52%
		MH 1270	MH 1270B											0.00	7.32	19.03	0.37	19.40		84.80						620.60						5,194.29	8,089.52	50.00	2100			0.20	2.263	2895.23	35.79%
		MH 1270	MH 1270B											0.00	85.26	19.03	0.37	19.40	53.65						4,573.68							5,194.29	8,089.52	50.00	2100			0.20	2.263	2895.23	35.79%
		MH 1270B	Pond											0.00	7.32	19.40	0.11	19.51		83.80						613.25						5,777.91	10,871.26	18.00	2250			0.25	2.649	5093.35	46.85%
		MH 1270B	Pond											0.00	97.41	19.40	0.11	19.51	53.02						5,164.65							5,777.91	10,871.26	18.00	2250			0.25	2.649	5093.35	46.85%

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 = 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
[i = 1569.580 / (TC+6.014)^0.820] 50 YEAR

Notes:
1. Mannings coefficient (n) = 0.013

Designed: J.I.M.
Checked: K.H.
Dwg. Reference: 122283

No.	Revision	Date
1.	SUBMISSION #1 FOR CITY REVIEW	2019-01-14
2.		
3.		
4.		
5.		

File Reference: 122283-6.2.4
Date: 2019-01-14
Sheet No: 1 of 1

Sheet No.

FIGURE 4.3

Drawing Title

EXTERNALSTORM
DRAINAGE AREA PLAN

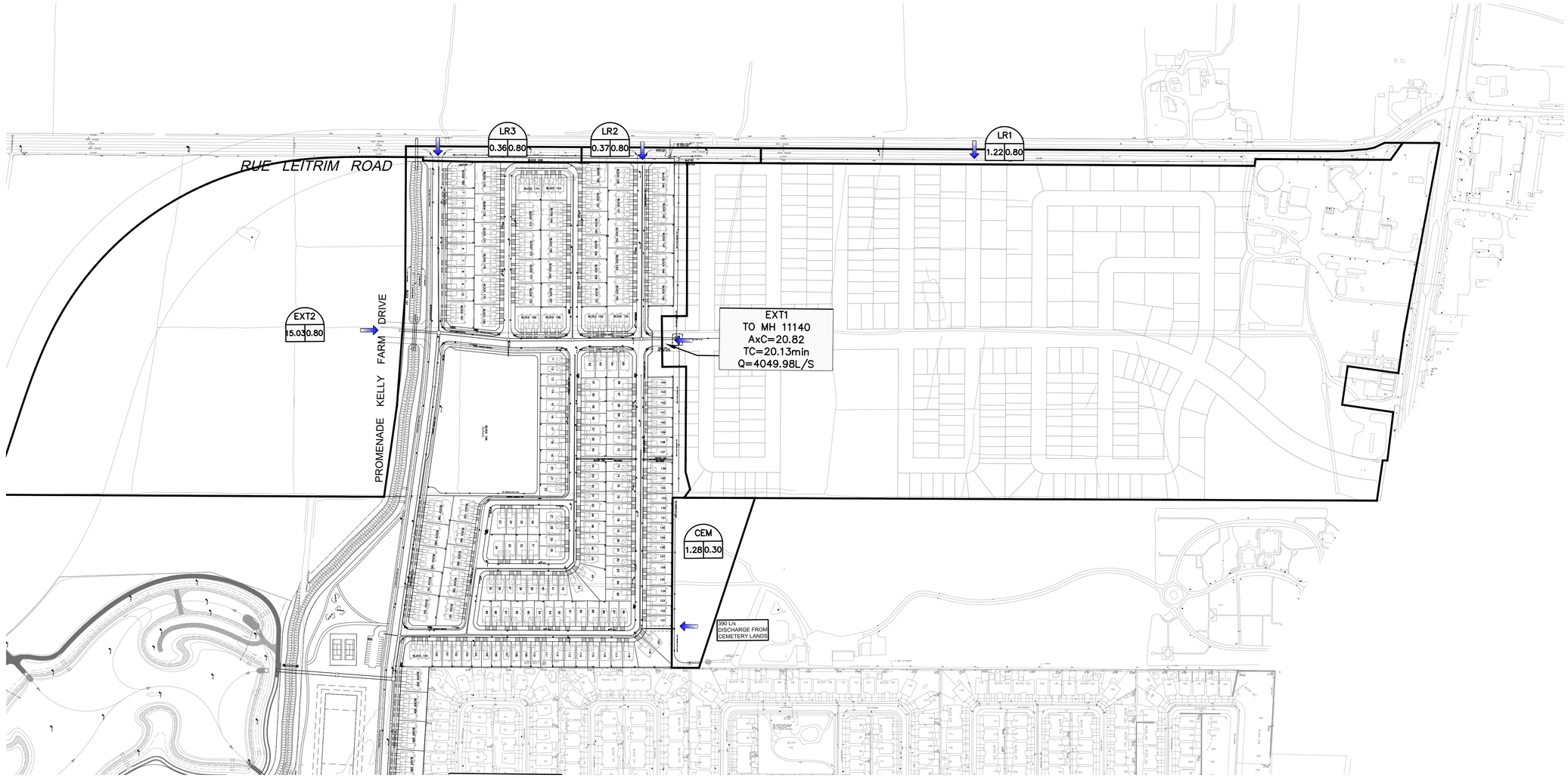
Project Title

ASSESSMENT OF ADEQUACY
OF PUBLIC SERVICES
FINDLAY CREEK VILLAGE - STAGE 5
3100 LEITRIM ROAD
LEITRIM DEVELOPMENT AREA

Scale

N.T.S.

IBI



REVIEWED BY
DEVELOPMENT REVIEW SERVICES BRANCH

Signed _____

Date _____ 2017

Plan Number _____

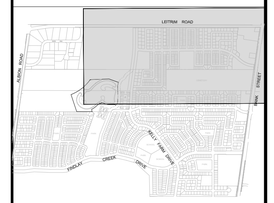
LEGEND :

LR3 — AREA NUMBER

0.36 | 0.80 — RUN OFF COEFFICIENT

AREA IN HECTARES

FUTURE MINOR FLOW DIRECTION



No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5	ISSUED FOR MOE APPROVAL	J.I.M.	2018:05:23
4	REVISED PER NEW LEGAL 2018-04-09	J.I.M.	2018:04:16
3	SUBMISSION NO. 3 FOR CITY REVIEW	J.I.M.	2018:01:17
2	SUBMISSION NO. 2 FOR CITY REVIEW	J.I.M.	2017:09:22
1	SUBMISSION NO. 1 FOR CITY REVIEW	J.I.M.	2017:04:28

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 1

LICENSED PROFESSIONAL ENGINEER
J. I. MOFFATT
2018/05/23
PROVINCE OF ONTARIO

N

Drawing Title

EXTERNAL STORM
DRAINAGE AREA PLAN

Scale
1:2500

Design	Date
K.H.	MARCH 2017
Drawn	Checked
M.M.	J.I.M.
Project No.	Drawing No.
34731	500A

CITY FILE No. D07-16-13-0023 CITY PLAN No.

IBI GROUP
400-333 Preston Street
Ottawa, Ontario K1S 5N4 Canada
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LEGEND
Black text 2 year event curve design
Blue text 5 year event curve design (Kelly Farm Drive, Barrett Farm Drive)
Red text 10 year event curve design (Leitrim Road)
Green Text 100 year design curve

STORM SEWER DESIGN SHEET

Barrett Lands
City of Ottawa
Tartan Land Corporation

LOCATION				AREA (Ha)										RATIONAL DESIGN FLOW													SEWER DATA								
STREET	AREA ID	FROM	TO	C= 0.20	C= 0.30	C= 0.45	C= 0.50	C= 0.55	C= 0.65	C= 0.70	C= 0.75	C= 0.73	C= 0.80	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)	CUM 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)	(%)
2016 UPDATED SERVICEABILITY REPORT														Time of Concentration = 10.0min + 140m/1.2m/s = 11.94																						
MUSCARI STREET		BLK11138	MH11138											0.00	0.00	11.94	0.34	12.28	70.08	94.95	111.26	162.58	0.00						91.55	115.68	21.00	375			0.40	1.015	24.13	20.86%
MUSCARI STREET	LR2	BLK11138	MH11138										0.37	0.82	0.82	11.94	0.34	12.28	70.08	94.95	111.26	162.58			91.55				91.55	115.68	21.00	375			0.40	1.015	24.13	20.86%
MUSCARI STREET	S11138, R1115	MH11138	MH11137				0.30					0.34		1.11	1.11	12.28	0.84	13.12	69.02	93.50	109.55	160.06	76.40						167.96	297.43	90.78	450			1.00	1.812	129.48	43.53%
MUSCARI STREET		MH11138	MH11137											0.00	0.82	11.94	0.84	12.78	70.08	94.95	111.26	162.58			91.55				167.96	297.43	90.78	450			1.00	1.812	129.48	43.53%
MUSCARI STREET	S11137, R11137A-B	MH11137	MH11140				0.61					0.34		1.54	2.64	13.12	1.20	14.32	66.59	90.17	105.63	154.31	176.13						264.35	347.53	112.42	525			0.60	1.555	83.18	23.93%
MUSCARI STREET		MH11137	MH11140											0.00	0.82	12.78	1.20	13.98	67.57	91.51	107.21	156.63			88.22				264.35	347.53	112.42	525			0.60	1.555	83.18	23.93%
2016 UPDATED SERVICEABILITY REPORT														Time of Concentration = 20.13min													Future Design Flow = 4049.98 L/s										
BARRETT FARM DRIVE	S11141, EXT1	BLK11141	MH11140							0.18				0.35	0.35	20.13	0.34	20.47	51.82	69.97	81.88	119.46		24.51			4,049.98	4,049.98	4,296.64	7,005.73	40.00	2100			0.15	1.959	2709.09	38.67%
BARRETT FARM DRIVE	LR1	BLK11141	MH11140										1.22	2.71	2.71	20.13	0.34	20.47	51.82	69.97	81.88	119.46			222.15				4,296.64	7,005.73	40.00	2100			0.15	1.959	2709.09	38.67%
BARRETT FARM DRIVE		MH11140	MH11120											0.00	2.64	20.47	0.74	21.21	51.29	69.24	81.02	118.20	135.65						4,551.61	8,565.43	80.96	2400			0.11	1.834	4013.82	46.86%
BARRETT FARM DRIVE	S11140A, S11140B	MH11140	MH11120							0.41				0.80	1.15	20.47	0.74	21.21	51.29	69.24	81.02	118.20		79.49				4,049.98	4,551.61	8,565.43	80.96	2400			0.11	1.834	4013.82	46.86%
BARRETT FARM DRIVE		MH11140	MH11120											0.00	3.54	20.47	0.74	21.21	51.29	69.24	81.02	118.20			286.49				4,551.61	8,565.43	80.96	2400			0.11	1.834	4013.82	46.86%
NEPETA CRESCENT		MH11114	MH11115											0.00	0.00	10.00	0.11	10.11	76.81	104.19	122.14	178.56	0.00					0.00	0.00	82.07	11.15	250			1.75	1.620	82.07	100.00%
NEPETA CRESCENT	S11115	MH11115	MH11116							0.23				0.45	0.45	10.11	0.96	11.08	76.37	103.59	121.43	177.52	34.18					0.00	34.18	82.07	93.33	250			1.75	1.620	47.89	58.35%
NEPETA CRESCENT	S11116A, R11116A-C	MH11116	MH11120				0.66			0.49				1.87	2.32	11.08	1.96	13.03	72.91	98.84	115.83	169.29	169.04					0.00	169.04	248.09	99.76	600			0.15	0.850	79.05	31.86%
BARRETT FARM DRIVE		MH11120	MH11110											0.00	4.96	21.21	0.63	21.84	50.17	67.71	79.23	115.58	249.01						4,692.46	11,726.17	74.98	2700			0.11	1.984	7033.70	59.98%
BARRETT FARM DRIVE	S11120A, S11120B	MH11120	MH11110							0.27				0.53	1.67	21.21	0.63	21.84	50.17	67.71	79.23	115.58		113.32				4,049.98	4,692.46	11,726.17	74.98	2700			0.11	1.984	7033.70	59.98%
BARRETT FARM DRIVE		MH11120	MH11110											0.00	3.54	21.21	0.63	21.84	50.17	67.71	79.23	115.58			280.16				4,692.46	11,726.17	74.98	2700			0.11	1.984	7033.70	59.98%
NEPETA CRESCENT		MH11114	MH11113											0.00	0.00	10.00	1.14	11.14	76.81	104.19	122.14	178.56	0.00					0.00	0.00	43.87	59.19	250			0.50	0.866	43.87	100.00%
NEPETA CRESCENT		MH11113	MH11112											0.00	0.00	11.14	0.13	11.27	72.69	98.54	115.48	168.77	0.00					0.00	0.00	73.41	11.21	250			1.40	1.449	73.41	100.00%
NEPETA CRESCENT	S11112A, S11112B	MH11112	MH11111							0.41				0.80	0.80	11.27	0.97	12.24	72.26	97.94	114.78	167.74	57.65					0.00	57.65	119.37	95.05	300			1.40	1.636	61.72	51.70%
NEPETA CRESCENT	S11111A, S11111B, R11111	MH11111	MH11110				0.35			0.56				1.58	2.37	12.24	1.28	13.52	69.17	93.70	109.78	160.41	164.21					0.00	164.21	210.32	98.54	450			0.50	1.281	46.11	21.92%
SCHOOL BLOCK	INST	BLK11110S	MH11110								2.07			4.32	4.32	10.00	0.19	10.19	76.81	104.19	122.14	178.56	331.49						331.49	620.09	19.00	675			0.50	1.679	288.60	46.54%
BARRETT FARM DRIVE		MH11110	MH11100											0.00	11.65	21.84	0.69	22.53	49.25	66.46	77.76	113.43	573.98						5,072.07	11,726.17	82.26	2700			0.11	1.984	6654.10	56.75%
BARRETT FARM DRIVE	S11110, R11110, INST	MH11110	MH11100				0.28		0.30					0.93	2.60	21.84	0.69	22.53	49.25	66.46	77.76	113.43		173.13				4,049.98	5,072.07	11,726.17	82.26	2700			0.11	1.984	6654.10	56.75%
BARRETT FARM DRIVE		MH11110	MH11100											0.00	3.54	21.84	0.69	22.53	49.25	66.46	77.76	113.43			274.98				5,072.07	11,726.17	82.26	2700			0.11	1.984	6654.10	56.75%
2016 UPDATED SERVICEABILITY REPORT														Time of Concentration = 10.0min + 170m/1.2m/s = 12.36min																						
KELLY FARM DRIVE		BLK11102	MH11102											0.00	0.00	12.36	0.35	12.71	68.79	93.19	109.18	159.52		0.00				0.00	87.41	162.91	21.00	450			0.30	0.992	75.50	46.34%
KELLY FARM DRIVE	LR3	BLK11102	MH11102										0.36	0.80	0.80	12.36	0.35	12.71	68.79	93.19	109.18	159.52			87.41				87.41	162.91	21.00	450			0.30	0.992	75.50	46.34%
LEITRIM RD DRAINAGE		DICB 2	STM PIPE						0.40					0.72	0.72	55.93	0.07	56.00	25.85	34.69	40.50	58.89			29.27			29.27	29.27	124.08	10.00	250			4.00	2.449	94.80	76.41%
KELLY FARM DRIVE	S11102A-B, R11102A-B	MH11102	MH11101				0.44			0.46				1.51	2.23	12.71	1.40	14.11	67.75	91.76	107.50	157.06		204.58				0.00	290.65	350.85	100.71	600			0.30	1.202	60.20	17.16%
KELLY FARM DRIVE	LR3	MH11102	MH11101											0.00	0.80	12.71	1.40	14.11	67.75	91.76	107.50	157.06			86.07				290.65	350.85	100.71	600			0.30	1.202	60.20	17.16%
KELLY FARM DRIVE	S11101	MH11101	MH11100							0.22				0.43	2.66	14.11	1.30	15.41	63.95	86.55	101.37	148.06		230.02				0.00	311.19	350.85	93.82	600			0.30	1.202	39.66	11.30%
KELLY FARM DRIVE		MH11101	MH11100											0.00	0.80	14.11	1.30	15.41	63.95	86.55	101.37	148.06			81.16				311.19	350.85	93.82	600			0.30	1.202	39.66	11.30%
2016 UPDATED SERVICEABILITY REPORT														Time of Concentration = 14.83min																						
	EXT 2	BLK11100	MH11100										15.03	33.42	33.42	14.83	0.47	15.30	62.17	84.11	98.50	143.85	2,077.74					0.00	2,077.74	4,154.07	45.00	1800			0.12	1.581	2076.33	49.98%
KELLY FARM DRIVE		MH11100	MH11104											0.00	45.07	22.53	0.96	23.49	48.29	65.15	76.22	111.17	2,176.66						6,900.07	12,247.58	119.92	2700			0.12	2.072	5347.51	43.66%
KELLY FARM DRIVE	S11100A, S11100B	MH11100	MH11104						0.28					0.51	5.26	22.53	0.96	23.49	48.29	65.15	76.22	111.17		342.87				4,049.98	6,900.07	12,247.58	119.92	2700			0.12	2.072	5347.51	43.66%
KELLY FARM DRIVE		MH11100	MH11104											0.00	4.34	22.53	0.96	23.49	48.29	65.15	76.22	111.17			330.56				6,900.07	12,247.58	119.92	2700			0.12	2.072	5347.51	43.66%
KELLY FARM DRIVE		MH11104	MH11105											0.00	45.07	23.49	0.96	24.45	47.02	63.42	74.18	108.18	2,119.21						6,860.51	12,247.58	119.60	2700			0.12	2.072	5387.07	43.98%
KELLY FARM DRIVE	S11103A, S11103B	MH11104	MH11105						0.13	0.17				0.57	5.83	23.49	0.96	24.45	47.02	63.42	74.18	108.18		369.60				4,049.98	6,860.51	12,247.58	119.60	2700			0.12	2.072	5387.07	43.98%
KELLY FARM DRIVE		MH11104	MH11105											0.00	4.34	23.49	0.96	24.45	47.02	63.42	74.18	108.18			321.71				6,860.51	12,247.58	119.60	2700			0.12	2.072	5387.07	43.98%
SCHOOL BLOCK		DI 3	STM PIPE	1.28										0.71	0.71	59.19	0.06	59.25	24.80	33.28	38.84	56.46				40.18			40.18	124.08	9.36	250			4.00	2.449	83.89	67.61%
KELLY FARM DRIVE		MH11105	MH800											0.00	45.78	24.45	0.96	25.41	45.82	61.78	72.27	105.37	2,097.79						6,900.61	12,247.58	119.60	2700			0.12	2.072	5346.98	43.66%
KELLY FARM DRIVE	S11105A-B, R11105	MH11105	MH800				0.28			0.46				1.28	7.11	24.45	0.96	25.41	45.82	61.78	72.27	105.37		439.44				4,049.98	6,900.61	12,247.58	119.60	2700			0.12	2.072	5346.98	43.66%
KELLY FARM DRIVE		MH11105	MH800											0.00	4.34	24.45	0.96	25.41	45.82	61.78	72.27	105.37			313.40				6,900.61	12,247.58	119.60	2700			0.12	2.072	5346.98	43.66%
TROLLIUS WAY	S11139, R11139A-B	MH11139	MH11136			0.36			0.35					1.08	1.08	10.00	1.62	11.62	76.81	104.19	122.14	178.56	83.17					0.00	83.17	148.72	87.93	450			0.25	0.906	65.55	44.08%
TROLLIUS WAY	S11136, R11136	MH11136	MH11134			0.22			0.39					0.98	2.06	11.62	2.04	13.66	71.11	96.36	112.92	165.01	146.67					0.00	146.67	248.09	104.08	600			0.15	0.850	101.41	40.88%
TROLLIUS WAY	S11134A-B, R11134A-B	MH11134	MH11133			0.24			0.75					1.66	3.72	13.66	1.91	15.57	65.13	88.16	103.26	150.84	242.16					0.00	242.16	339.63	105.19	675			0.15	0.919	97.48	28.70%
CEMETERY LANDS		DI 1	MH11133											0.00	0.00	50.76	0.37	51.13	27.74	37.24	43.49	63.25					390.00*	390.00	390.00	535.93	40.39	600			0.70	1.836	145.93	27.23%
TROLLIUS WAY		MH11133	MH11132											0.00	3.72	15.57	0.18	15.74	60.46	81.77	95.76	139.82	224.82					390.00	614.82	731.45	11.75	900			0.15	1.114	116.62	15.94%
TROLLIUS WAY	S11132, R11132A-B	MH11132	MH11131			0.29			0.35					1.00	4.71	15.74	1.41	17.15	60.07	81.24	95.12	138.89	283.15					390.00	673.15	905.48	99.51	975			0.15	1.175	232.34	25.66%
TROLLIUS WAY	S11131, R11131A-B	MH11131	MH11130			0.52			0.35					1.28	6.00	17.15	1.36	18.51	57.11	77.19	90.37	131.91	342.48					390.00	732.48	905.48	95.85	975			0.15	1.175	173.01	19.11%
ACONITUM WAY	S11128, R11128	MH11128	MH11121			0.22			0.36					0.93	0.93	10.00	1.52	11.52	76.81	104.19	122.14	178.56	71.10					0.00	71.10	91.46	72.95	375			0.25	0.802	20.35	22.26%
ACONITUM WAY	S11121, R11121A-B	MH11121	MH11122			0.33			0.33					1.01	1.93	11.52	1.80	13.32	71.44	96.82	113.45	165.80	138.22					0.00	138.22	200.65	97.13	525			0.20	0.898	62.42	31.11%
ACONITUM WAY	S11122A, R11122B-C	MH11122	MH11127			0.51			0.25					1.09	3.02	13.32	1.43	14.75	66.04	89.41	104.74	153.01	199.76					0.00	199.76	248.09	72.81	600			0.15	0.850	48.33	19.48%
ACONITUM WAY		MH11127	MH11126											0.00	3.02	14.75	0.23	14.97	62.37	84.39	98.83	144.32	188.66					0.00	188.66	248.09	11.52	600			0.15	0.850	59.43	23.96%
ACONITUM WAY	S11126A, S11126B	MH11126	MH11125						0.48					0.87	3.89	14.97	1.93	16.91	61.83	83.65	97.96	143.05	240.66					0.00	240.66	339.63	106.65	675			0.15	0.919	98.98	29.14%

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
*Cemetery flow of 390 L/s taken from Stormwater model

Notes:
1. Mannings coefficient (n) = 0.013

Designed: K.H., W.Y.
Checked: J.I.M.
Dwg. Reference: 34731-500, 500A

No.	Revision	Date
1	City Submission No. 1	2017-04-28
2	City Submission No. 2	2017-09-22
3	City Submission No. 3	2018-10-17
4	Revised Per New Legal 2018-04-09	2018-04-16

File Reference: 34731.5.7.1
Date: 2018-04-16
Sheet No: 1 of 2

IBI GROUP
400-333 Preston Street
Ottawa, Ontario K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
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LEGEND
Black text 2 year event curve design
Blue text 5 year event curve design (Kelly Farm Drive, Barrett Farm Drive)
Red text 10 year event curve design (Leitrim Road)
Green Text 100 year design curve

STORM SEWER DESIGN SHEET

Barrett Lands
City of Ottawa
Tartan Land Corporation

LAVATERA STREET	S11122B, R11122A	MH11122	MH11123			0.11			0.19					0.48	0.48	10.00	2.37	12.37	76.81	104.19	122.14	178.56	36.94				0.00	36.94	50.44	98.34	300			0.25	0.691	13.50	26.77%
LAVATERA STREET		MH11123	MH11124											0.00	0.48	12.37	0.19	12.56	68.76	93.14	109.13	159.45	33.07				0.00	33.07	50.44	7.91	300			0.25	0.691	17.37	34.44%
LAVATERA STREET	S11124, R11124	MH11124	MH11125			0.26				0.31				0.93	1.41	12.56	1.57	14.13	68.19	92.36	108.21	158.10	96.12				0.00	96.12	133.02	76.38	450			0.20	0.810	36.90	27.74%
LAVATERA STREET	S11125, R11125	MH11125	MH11130			0.19				0.23				0.69	5.99	16.91	1.25	18.15	57.61	77.87	91.16	133.08	344.88				0.00	344.88	579.98	78.72	825			0.15	1.051	235.10	40.54%
TROLLIUS WAY	S11130, R11130	MH11130	MH800				0.28		0.26					0.86	12.84	18.51	0.75	19.27	54.55	73.69	86.26	125.88	700.60				390.00	1,090.60	1,560.35	78.85	1050			0.30	1.746	469.75	30.11%
KELLY FARM DRIVE		MH800	MH820											0.00	58.63	25.41	0.41	25.83	44.69	60.24	70.46	102.72	2,619.80					7,836.85	12,247.58	50.98	2700			0.12	2.072	4410.73	36.01%
KELLY FARM DRIVE	S800, R800	MH800	MH820				0.15			0.26				0.71	7.83	25.41	0.41	25.83	44.69	60.24	70.46	102.72		471.52			4,439.98	7,836.85	12,247.58	50.98	2700			0.12	2.072	4410.73	36.01%
KELLY FARM DRIVE		MH800	MH820											0.00	4.34	25.41	0.41	25.83	44.69	60.24	70.46	102.72			305.55			7,836.85	12,247.58	50.98	2700			0.12	2.072	4410.73	36.01%
																31.59											2,690.00											
KELLY FARM DRIVE		EX MH827	MH826											0.00	0.00	31.59	1.35	32.94	38.67	52.07	60.86	88.67	0.00					2,743.70	3,792.13	116.86	1800			0.10	1.444	1048.43	27.65%
KELLY FARM DRIVE	S827A-C, EXT5	EX MH827	MH826							0.53				1.03	1.03	31.59	1.35	32.94	38.67	52.07	60.86	88.67		53.70			2,690.00	2,690.00	2,743.70	3,792.13	116.86	1800			0.10	1.444	1048.43	27.65%
KELLY FARM DRIVE		MH826	MH820											0.00	0.00	32.94	0.58	33.52	37.59	50.59	59.14	86.14	0.00					2,742.18	3,792.13	50.44	1800			0.10	1.444	1049.95	27.69%
KELLY FARM DRIVE		MH826	MH820											0.00	1.03	32.94	0.58	33.52	37.59	50.59	59.14	86.14		52.18				2,690.00	2,742.18	3,792.13	50.44	1800			0.10	1.444	1049.95	27.69%
POND 2		MH820	MH821											0.00	58.63	33.52	0.52	34.04	37.14	49.99	58.42	85.10	2,177.55					10,003.73	15,530.17	66.51	3000			0.11	2.128	5526.44	35.59%
POND 2		MH820	MH821											0.00	8.86	33.52	0.52	34.04	37.14	49.99	58.42	85.10		442.82			7,129.98	10,003.73	15,530.17	66.51	3000			0.11	2.128	5526.44	35.59%
POND 2		MH820	MH821											0.00	4.34	33.52	0.52	34.04	37.14	49.99	58.42	85.10			253.38			10,003.73	15,530.17	66.51	3000			0.11	2.128	5526.44	35.59%
POND 2		MH821	MH822											0.00	58.63	34.04	0.54	34.58	36.75	49.46	57.80	84.19	2,154.70					9,973.49	15,530.17	69.18	3000			0.11	2.128	5556.68	35.78%
POND 2		MH821	MH822											0.00	8.86	34.04	0.54	34.58	36.75	49.46	57.80	84.19		438.13			7,129.98	9,973.49	15,530.17	69.18	3000			0.11	2.128	5556.68	35.78%
POND 2		MH821	MH822											0.00	4.34	34.04	0.54	34.58	36.75	49.46	57.80	84.19			250.68			9,973.49	15,530.17	69.18	3000			0.11	2.128	5556.68	35.78%

Definitions:
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A = Area in Hectares (Ha)
i = Rainfall intensity in millimeters per hour (mm/hr)
[i = 732.951 / (TC+6.199)^0.810] 2 YEAR
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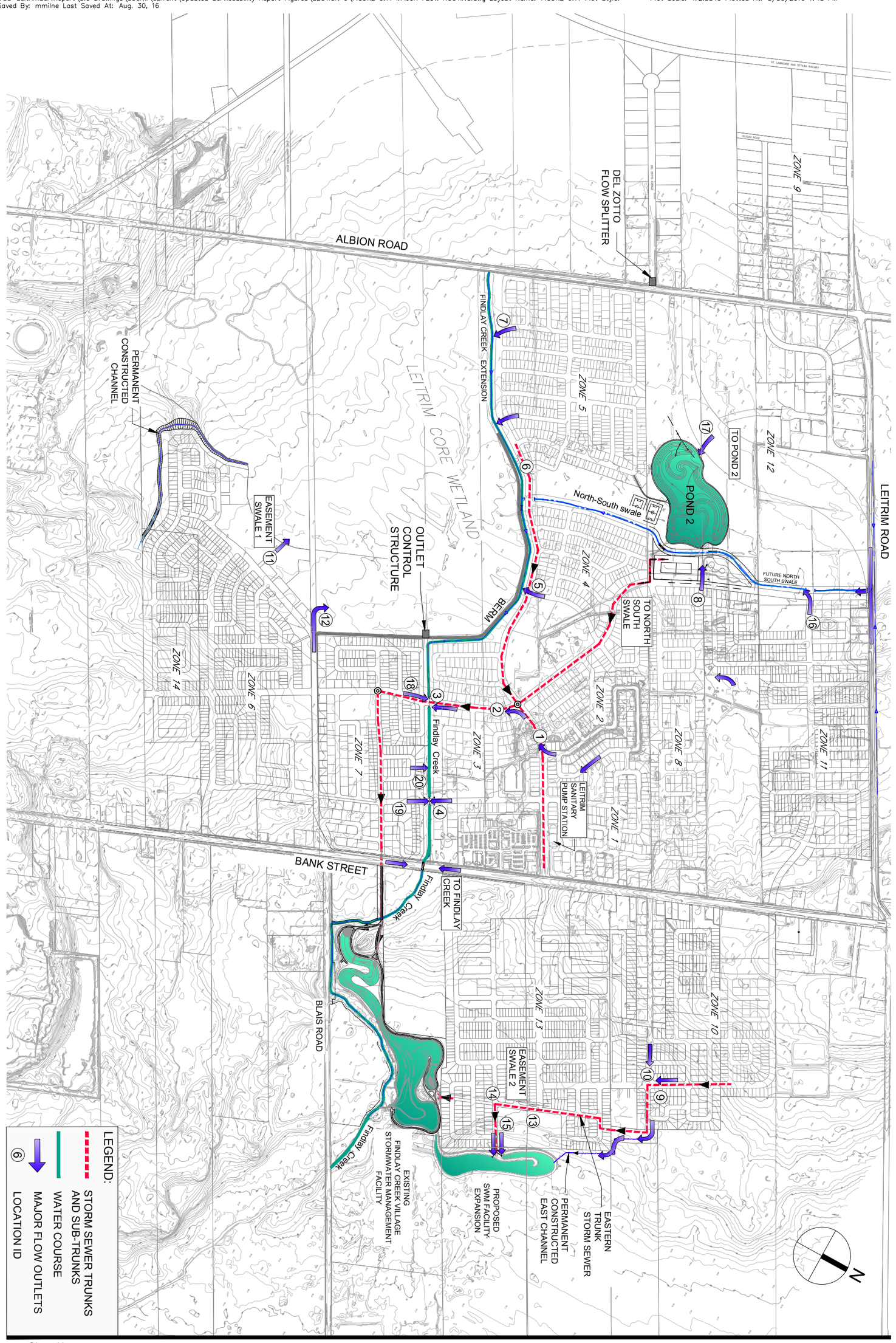
[i = 1174.184 / (TC+6.014)^0.816] 10 YEAR
[i = 1735.688 / (TC+6.014)^0.820] 100 YEAR

Notes:
1. Mannings coefficient (n) = 0.013

Designed: K.H., W.Y.
Checked: J.I.M.
Dwg. Reference: 34731-500, 500A

No.	Revision	Date
1	City Submission No. 1	2017-04-28
2	City Submission No. 2	2017-09-22
3	City Submission No. 3	2018-01-17
4	Revised Per New Legal 2018-04-09	2018-04-16

File Reference: 34731.5.7.1
Date: 2018-04-16
Sheet No: 2 of 2

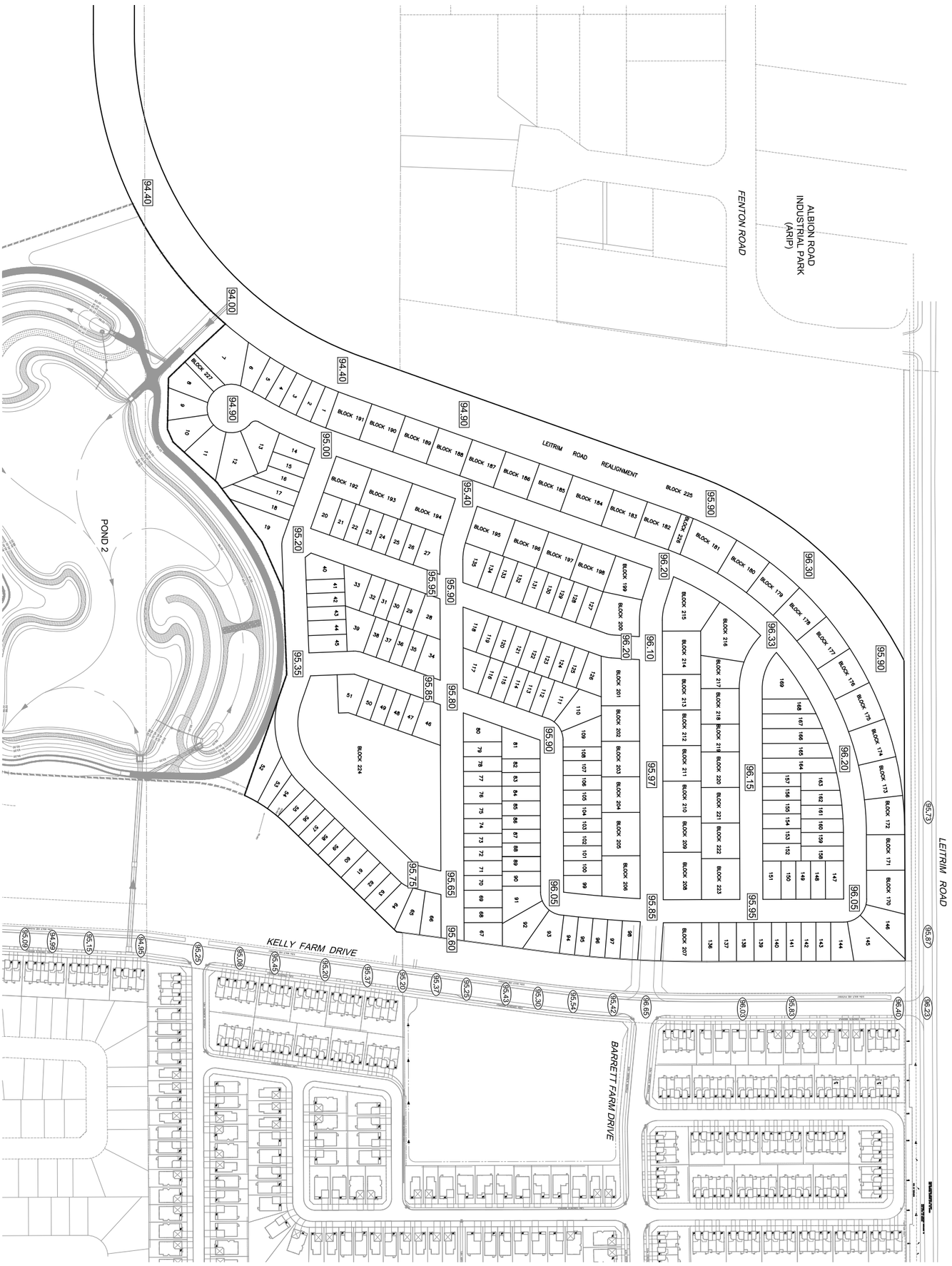


Sheet No.	Drawing Title	Project Title	Scale
FIGURE 6.11	MAJOR FLOW ROUTING FEATURES	UPDATED SERVICEABILITY PLAN (CLASS EA OPA76 AREAS 8a, 9a and 9b) LEITRIM DEVELOPMENT AREA	N.T.S.

IBI

Sheet No.	Drawing Title	Project Title	Scale
FIGURE 8.1	MACRO GRADING AND DRAINAGE PLAN	UPDATED SERVICEABILITY PLAN (CLASS EA OPA76 AREAS 8a, 9a and 9b) LEITRIM DEVELOPMENT AREA	N.T.S.

IBI



LEGEND:

95.95 PROPOSED STREET GRADE

(96.03) EXISTING STREET GRADE

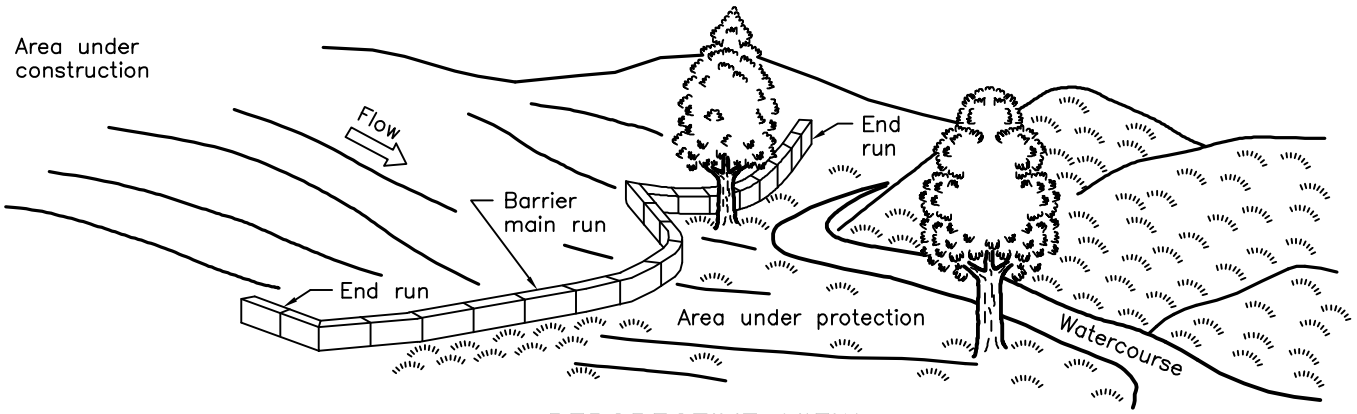
N

Sheet No.	Drawing Title	Project Title	Scale
FIGURE 4.5	MACRO GRADING PLAN	ASSESSMENT OF ADEQUACY OF PUBLIC SERVICES FINDLAY CREEK VILLAGE - STAGE 5 3100 LEITRIM ROAD LEITRIM DEVELOPMENT AREA	N.T.S.

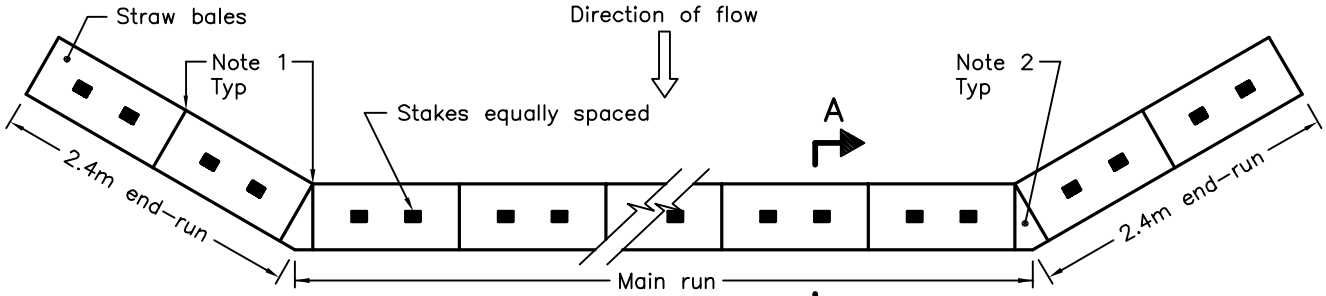
IBI

APPENDIX E

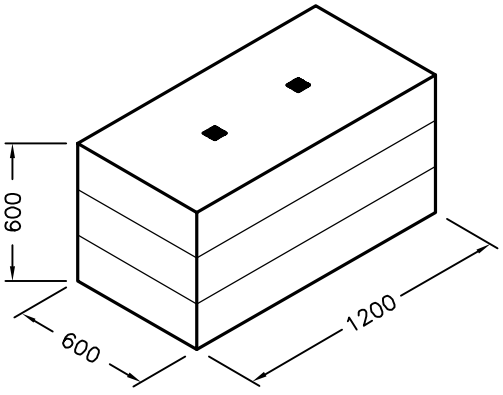
- **OPSD 219.100 Light Duty Straw Bale Barrier**
- **OPSD 219.110 Light Duty Silt Fence Barrier**



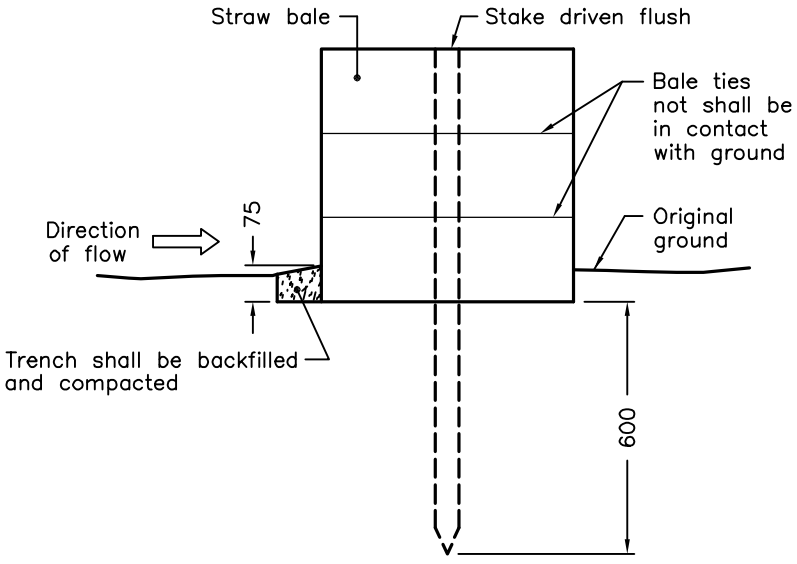
PERSPECTIVE VIEW



PLAN



ISOMETRIC VIEW



SECTION A–A

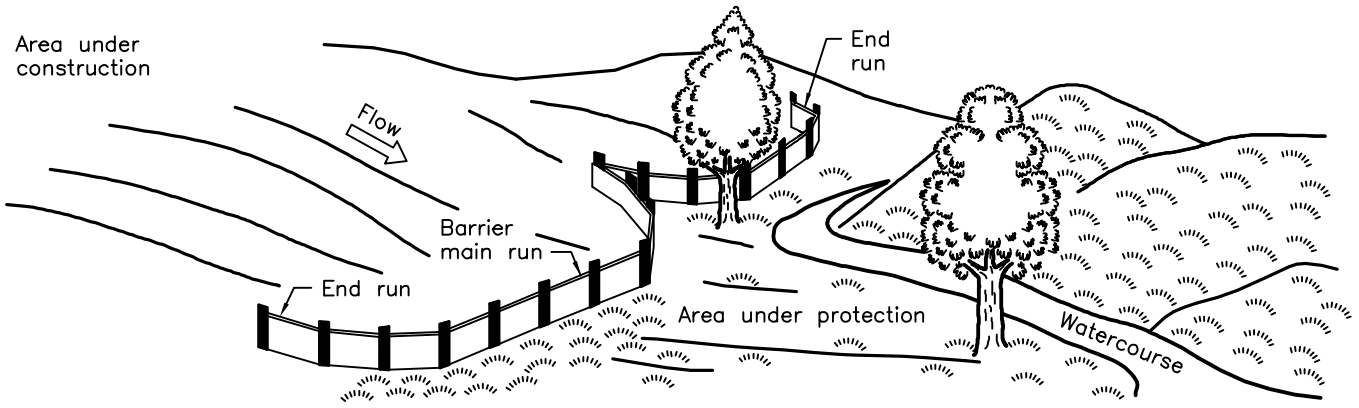
NOTES:

1 Straw bales shall be butted tightly against adjoining bales to prevent sediment flow through barrier.

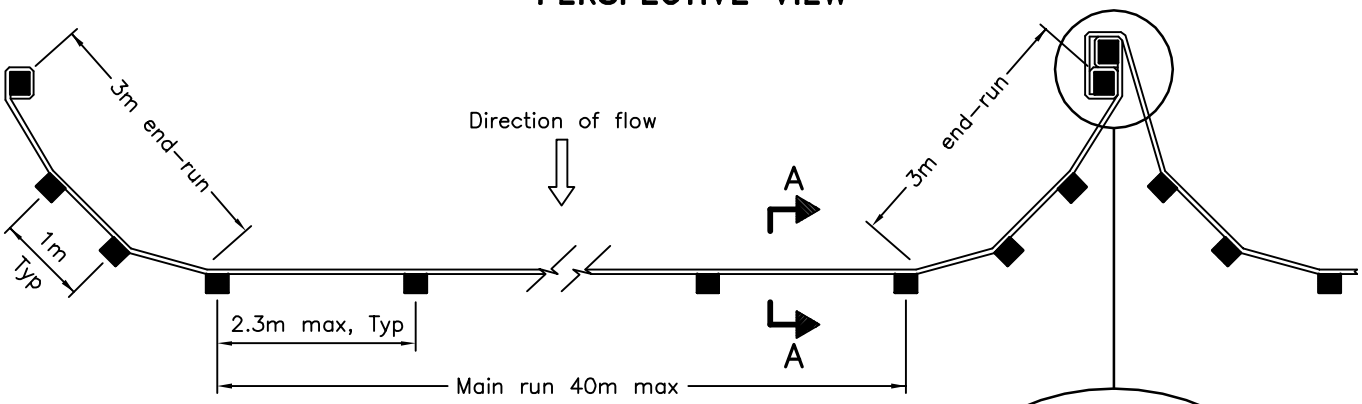
2 Caulk and compact gaps with loose straw.

A All dimensions are in millimetres unless otherwise shown.

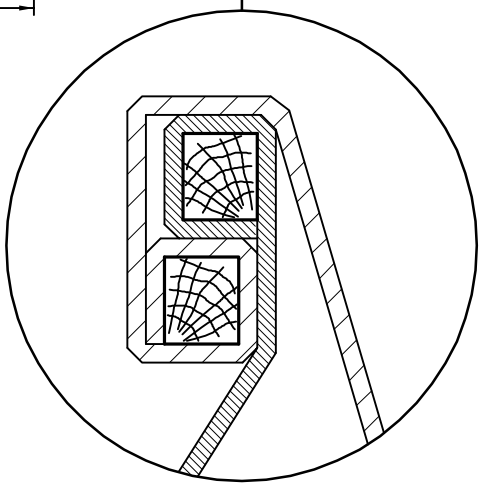
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev	2
LIGHT–DUTY STRAW BALE BARRIER			
	OPSD 219.100		



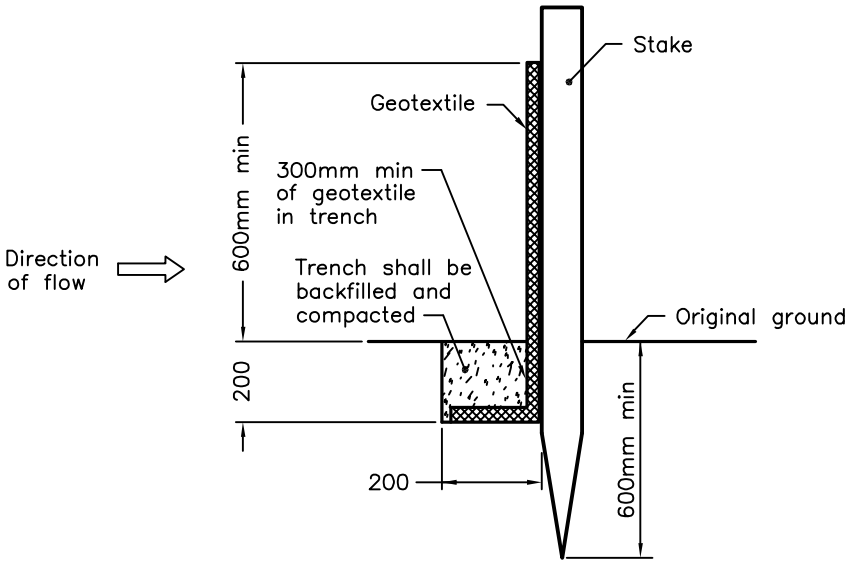
PERSPECTIVE VIEW



PLAN



JOINT DETAIL



SECTION A–A

NOTE:

A All dimensions are in millimetres unless otherwise shown.

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