DCR/PHOENIX GROUP OF COMPANIES

ADEQUACY OF PUBLIC SERVICING REPORT
109575-5.2.2.1

# 1208 OLD MONTREAL ROAD

## CITY OF OTTAWA

Prepared for DCR/PHOENIX HOMES
by IBI Group
February 12, 2021

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# 1 INTRODUCTION

## 1.1 Objective

IBI Professional Services Inc. (hereinafter referred to as IBI, or IBI Group) has been retained by DCR/PHOENIX Group of Companies to prepare this updated Adequacy of Public Services Report in support of the Draft Plan approval for its **5.37ha** properties located at 1154, 1176, 1180 and 1208 Old Montreal Road. The revised draft plan has been prepared to address comments received from the 2018 submission. A copy of the site servicing comments from that submission have been included in **Appendix A** along with responses. At the time of writing this report, DCR/Phoenix remains in negotiation with the property owner of 1172 Old Montreal Road to included those lands however this report will demonstrates the functionality of the subject lands with or with 1172 Old Montreal Road, as illustrated by the AOV legal plans in **Appendix A**. This report will provide stakeholders with functional level design constraints in support of the proposed development sufficient to prepare draft conditions for the Plan of Subdivision.

## 1.2 Location

The subject properties are located in the City of Ottawa, within the former Cumberland Township and within the Cardinal Creek Village (CCV) CDP. It is bound to the north by Old Montreal Road, to the east by vacant agricultural/future development lands, to the south by a tributary branch of the Cardinal Creek, and to the west by existing rural development lands. The site is located opposite of de la Famille-Laporte Avenue, constructed by Tamarack Homes as part of the CCV development. Refer to **Figure 1.1** below for key map.

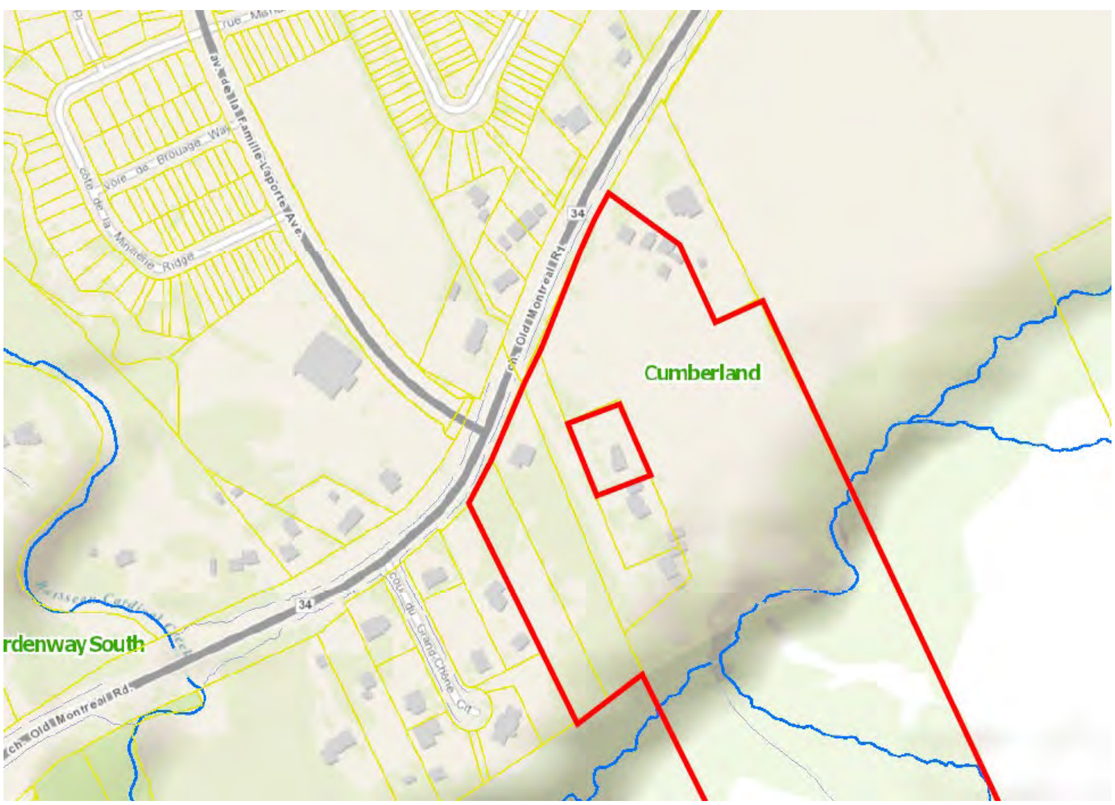



**Figure 1.1** – Key Map of Subject Lands

The subject lands are inclusive in the Cardinal Creek Village Master Servicing Study.

## 1.3 Proposed Development

DCR/Phoenix is proposing to develop the subject lands with a mix of medium and high density development. The proposed site would combine stacked townhouse condominiums, freehold townhouses on private streets, and apartment buildings.

Parking for the freehold townhouses is provided for with standard construction single car garages, driveways and residual on-street parking. Parking for the stacked condominiums is provided by a combination of surface parking lot, on-street parking and the apartments buildings have a combination of street parking, at grade garages, and below ground parking, for additional details see the Architectural Master plan prepared by M. David Blakely Architects located in **Appendix A**.

Due to the uncertainty of the land acquisition deal for 1172 Old Montreal Road, 2 draft plans have been prepared to support development with or without this property. Refer to **Appendix A** for each draft plan. The table below illustrates the unit counts for each plan.

| PLAN | UNIT TYPE | NUMBER OF UNITS |
|---|---|---|
| Draft Plan 1<br>Excluding 1172 Old Montreal | Urban Towns/Freehold Towns/Back to Back towns | 112 |
| | Condominium Unit/Apartment | 380 |
| **TOTAL** | | **492** |
| Draft Plan 2<br>Including 1172 Old Montreal | Urban Towns/Freehold Towns/Back to Back towns | 137 |
| | Condominium Unit/Apartment | 417 |
| **TOTAL** | | **554** |

This report has been prepared to demonstrate adequate servicing for the ultimate build out plan, therefore Draft Plan 2 will be used for all supporting calculations.

## 1.4 Previous Studies

In approving the CCV CDP, the City of Ottawa required the CDP lands undergo a number of studies and reports to support various development activities in the area. With respect to the provision of the three principle infrastructure services of water distribution, wastewater disposal and stormwater management, the following is a short list of the pertinent approved studies:

**Master Servicing Study**

“Master Servicing Study for Tamarack (Queen Street) Corporation, Cardinal Creek Village, City of Ottawa”, prepared by DSEL, dated July 2013.

**Design Brief**

“Design Brief for Cardinal Creek Village Phase 1A & 1B, Tamarack (Cardinal Creek) Corporation, City of Ottawa”, prepared by DSEL, dated May 2014.

**Stormwater Management Report**

“Stormwater Management Report for Phase 1 of Cardinal Creek Village”, prepare by JFSA, updated May 2014).

## 1.5 Constraints to Development

There are 2 major constraints to the development of the site.

The primary major constraint to development is the substantial changes in existing topography across the site which impacts road slopes which further complicates stormwater management.

The secondary major constraint to development of the plan is the land acquisition of 1172 Old Montreal Road. This parcel is virtually centered within the development, while development can occur around the parcel, grade change between the retained and developed lands will need to be addressed.

## 1.6 Pre-Consultation

The pre-consultation meetings focused on road profiles and site grading. Site servicing was discussed, however given the Cardinal Creek Village Master Servicing Study was just recently approved, water distribution, wastewater and stormwater sewers are all sized based on current standards to accommodate this development and are all located within close proximity to the subject site.

From the pre-consultation meeting, the following criteria were established as starting points.

- A reasonable approach slope to Old Montreal Road must be provided.
- Municipal Road, centerline slope may exceed minimum (6.0% slope) where sidewalks are not located parallel to the road, maximum road slope of 12% for straight sections without entrances/sidewalk locations
- Easements for public sidewalks through the development may be required
- At least 1 barrier free sidewalk to the upper plateau of the site, and may include switchback sections
- Public sidewalk in an easement may include stairs, which will be closed during the winter months
- City of Ottawa will require special ice prevention schedule for steep roads, particularly the roads connecting to Old Montreal Road.

## 1.7 Geotechnical Consideration

EXP Services Inc., has been retained by DCR/Phoenix Homes to provide a geotechnical investigation for the subject lands, see Updated Preliminary Geotechnical Investigation dated February 12, 2021. The geotechnical report provides recommendations for site servicing which includes but is not limited to the following:

- Preliminary Grade raise for the site is 2.5m
- Trench backfill and subgrade fill in parking area ans access roads-OPSS101 Select Subgrade Material (SSM) or on site dry and compactible material-Compacted to 95% of the SPMDD
- Landscape area, clean fill free of organic and deleterious material placed in 300mm thick lifts and each lift compacted to 92% of SPMDD.
- Clay dykes are required in granular service trenches to prevent lowering of ground water table on site.
- Bedding for the underground services including material specifications, thickness of cover material and compaction requirements conform to City of Ottawa requirements and/or

Ontario Provincial Standard Specification and Drawings (OPSS and OPSD). A minimum of 300 mm of OPSS 1010 is recommended for use as a granular bedding on this project and should be placed and compacted to 98 percent of the SPMDD.

- Due to the some services will be installed in silty clay below the prevailing groundwater table, it is recommended the pipe bedding in theses areas should consist of 300 mm thick OPSS 1010 Granular B Type II sub-bedding material overlain by 150 mm thick OPSS 1010 Granular A bedding material. The bedding materials should be compacted to at least 98 percent SPMDD.
- In areas of high infiltration and as a trench base stabilization techniques, such as removal of loose/soft material, placement of crushed stone sub-bedding (Granular B Type II), completely wrapped in a non- woven geotextile, may also be used if trench base disturbance becomes a problem in wet or soft areas.
- Pavement structure to follow below recommendation:

| Recommended Pavement Structure Thicknesses | | | | |
|---|---|---|---|---|
| **Pavement Layer** | **Compaction Requirements** | **Driveways** | **Parking Areas** | **Access Roads and Fire Route** |
| Asphaltic Concrete (PG 58-34) | 92 to 97 % MRD | 50 mm HL3 | 65 mm – SP12.5 | 50 mm – SP12.5<br>60 mm – SP19 |
| Granular A Base (crushed limestone) | 100% SPMDD* | 150 mm | 150 mm | 150 mm |
| Granular B Sub-base, Type II | 100% SPMDD* | 300 mm | 450 mm | 600 mm |
| SPMDD* Standard Proctor Maximum Dry Density, ASTM-D698MRD<br>denotes Maximum Relative Density, ASTM D2041<br>Asphaltic Concrete in accordance with OPSS 1150 and 1151 | | | | |

- The granular materials used for pavement construction should conform to OPSS 1010 for Granular A and Granular B, Type II and should be compacted to 100 percent of the SPMDD (ASTM D698). The asphaltic concrete used and its placement should meet OPSS 1151 and 310/313 requirements. It should be compacted to 92 to 97 percent of the maximum relative density in accordance with ASTM D2041.

# 2 WATER DISTRIBUTION

## 2.1 Existing Conditions

The subject site is located within Pressure Zone 2E of the City of Ottawa's water distribution system. An existing 406mm watermain is located within the Old Montreal Road ROW.

## 2.2 Design Criteria

### 2.2.1 Water Demands

As previously noted, the development consists of a mix of apartments, street towns, urban towns, and back to back towns this analysis is based on 512 units with 42 units to be added at a future date. Populations by unit were taken from Table 4.1 of the City Design Guidelines. A watermain demand calculation sheet is included in **Appendix A** and the total water demands are summarized as follows:

| | |
|---|---|
| Average Day | 4.21 l/s |
| Maximum Day | 10.54 l/s |
| Peak Hour | 23.18 l/s |

### 2.2.2 System Pressure

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. |

### 2.2.3 Fire Flow Rate

As per the Ottawa Design Guidelines, the fire flow rate has been calculated using the Fire Underwriters Survey (FUS) method. The FUS method takes into account the type of building construction, the building occupancy, the use of sprinklers and the exposures to adjacent structures. Calculations were performed for Blocks 6, 11 & 14. Block 6 is the largest apartment building, using fire restrictive construction and a sprinkler system the FUS calculation provides a 15,000 l/min fire flow requirement. Block 11 and Block 14 are back to back townhouse and street townhouse block with the largest area and most exposure. In terms of FUS calculation wood frame construction was used without sprinklers. The FUS calculation results in a fire flow demand of 13,000 l/min and 12,000 l/min respectively. A copy of the calculations is included in **Appendix A**.

### 2.2.4 Boundary Conditions

Boundary conditions for two scenarios were obtained from the City – Existing Conditions and Future Conditions. Existing Conditions are used in this analysis because Future Conditions were calculated assuming a 406 mm watermain to the north of Old Montreal Road which has yet to be installed.

The two boundary conditions for the analysis obtained from the City are:

1. Old Montreal Road at Famille-Laporte Avenue
2. Old Montreal Road near Cartographe Street

A copy is also included in **Appendix A**, and they are summarized as follows:

| BOUNDARY CONDITIONS | | |
|---|---|---|
| SCENARIO | HGL (m)<br>Famille-Laporte Avenue | HGL (m)<br>Cartographe Street |
| Maximum HGL | 130.2 | 130.2 |
| Minimum HGL (Peak Hour) | 124.8 | 124.8 |
| Max Day + Fire Flow (10,000 l/min | 122.3 | 121.6 |
| Max Day + Fire Flow (15,000 l/min) | 116.9 | 115.5 |

### 2.2.5 Hydraulic Model

A computer model for the conceptual site has been developed using the Infowater program by Innoyze. The two boundary conditions (which represent the two connections to the existing watermain) have been incorporated into the model. The water model was run with all units evaluated at the 15,000 l/min (250 l/s) fire flow.

### 2.2.5 Modeling Results

The hydraulic model was run under basic day, maximum day with fire flows and under peak hour conditions. Water pipes are sized to provide sufficient pressure under peak hour conditions and provide the required fire flows under maximum day conditions. Results of the hydraulic model are included in **Appendix A** and summarized as follows:

| | |
|---|---|
| Basic Day (Max HGL) Pressure (kPa) | 431.0 – 589.9 |
| Peak Hour Pressure (kPa) | 377.8 – 536.7 |
| Minimum Design Flow for 15,000 l/min Fire Flow and 140 kPa Residual Pressure | 317.4 |

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

| | |
|---|---|
| Maximum Pressure: | The portion of the site having pressures above 552kPawill require pressure reducing control as outlined in technical Bulletin ISDTB-2014-02. The elevation that pressure reducing controls is required is approximately elevation 73.8m and below. The exact units requiring pressure reducing control will be determined during detail design. |
| Minimum Pressure: | All nodes exceed the minimum pressure requirement of 276 kPa. During detail design the minimum pressure will be confirmed for all units at the top floors. |
| Fire Flow: | Under the fire flow analysis all nodes exceed the required 15,000 l/min (250 l/s) flow. |

### 2.2.6 Watermain Layout

The proposed conceptual watermain layout for this development is shown on **Figure 2.1** in **Appendix A.** Two connections to the existing 406mm watermain on Old Montreal Road are proposed. A 250mm watermain provides a loop between the two connections and is required to convey the high fire flows as outlined in section 2.2.3. All other watermains have been modelled at 200 mm dia. During detail design the watermain sizes will be confirmed.

# 3 WASTEWATER DISPOSAL

## 3.1 Existing Conditions and Previous Studies

The subject lands are located within the study limits of the Cardinal Creek Village Master Servicing Study (DSEL 2013). The Cardinal Creek Village Phase 1A and 1B sewers have been designed, approved and constructed with adequate capacity to service the subject lands. The Cardinal Creek Trunk wastewater disposal system is tributary to the Trim Road Collector, Cumberland Collector and ultimately received by the R. O. Pickard Wastewater Treatment Facility.

Construction of Phases 1A and 1B of Cardinal Creek Village included installing sanitary sewers in de la Famille Laporte Avenue. These sewers have been installed to provide service for the subject lands.

The subject lands form part of two tributary areas in the Cardinal Creek Village Trunk sewer network. The subject lands development limits vary slightly from the assumed areas identified within the Cardinal Creek Village Servicing Brief (DSEL 2014) an analysis of ultimate area and population follows.

An excerpt from the Cardinal Creek Village External Sanitary Drainage Plan 63A (DSEL, May 2014) has been provided below in **Figure 3.0** below. The full plan has been included in **Appendix B.**

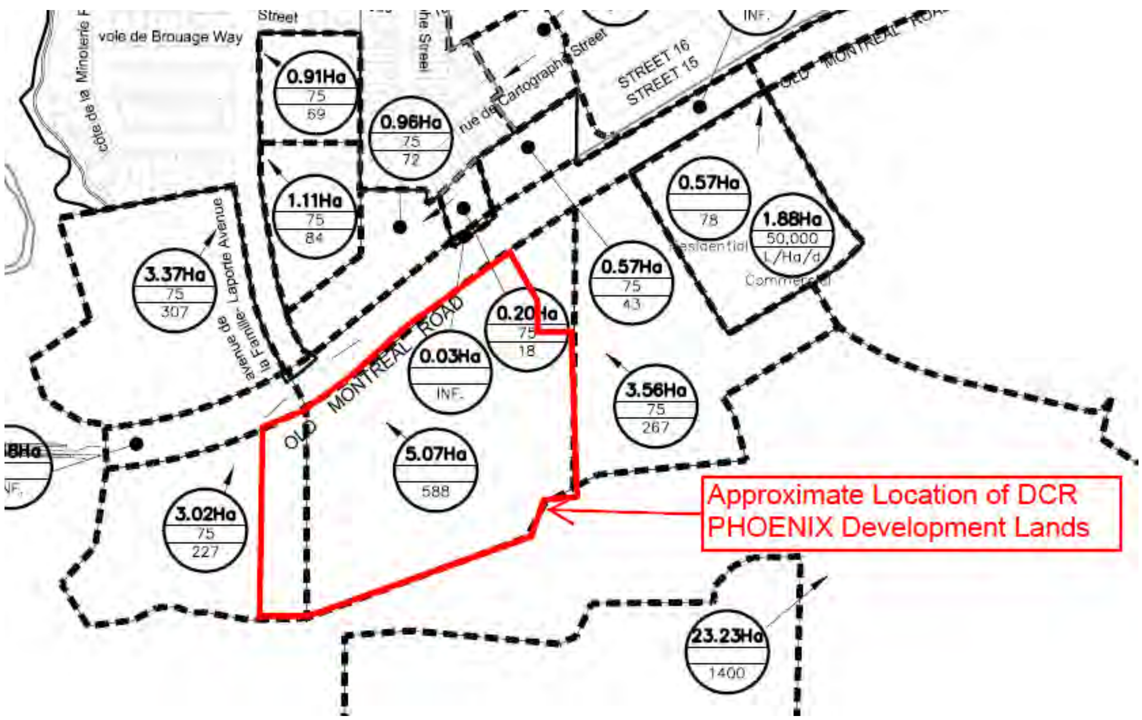



**Figure 3.0** – DCR/Phoenix Lands location on DSEL External Sanitary Drainage Areas

The two areas tributary to the main trunk on de la Famille Laporte Avenue are identified in the **Table 3.1a** below.

| DRAINAGE AREA | AREA (HA) | POPULATION |
|---|---|---|
| 1 | 3.02 | 227 |
| 2 | 5.07 | 588 |

**Table 3.1a** – Summary of relevant areas from Cardinal Creek Phase 1A & 1B (DSEL 2014)

Of drainage area 1, noted in **Table 3.1a** above, the DCR lands represent a total development area of **0.49ha**. This is **16.2%** of the total sanitary drainage area. Therefore, 16.2% of the design population of 227, results in a population allowance of **36.8** for the DCR lands.

Of drainage area 2, noted in **Table 3.1a** above, the DCR lands represent a total development area of **4.88ha**. This is **96.2%** of the total sanitary drainage area. Therefore, 96.2% of the design population of 588, results in a population allowance of **565.7** for the DCR lands.

Therefore, the total allocated population for the DCR/Phoenix development lands are demonstrated in **Table 3.1b** below.

| DRAINAGE AREA | AREA (HA) | POPULATION |
|---|---|---|
| 1 | 0.49 | 36.8 |
| 2 | 4.88 | 565.7 |
| **TOTAL** | **5.37** | **602.5** |

**Table 3.1b** – Summary of total allocated population from Cardinal Creek Phase 1A&1B (DSEL 2014)

## 3.2 Design Criteria

The sanitary flows for the subject lands are determined based on current City of Ottawa design criteria, however when the Cardinal Creek development was approved they were subject to the previous design criteria, the table below provides a comparison

### 3.2.1 Design Flow:

| | | 2014 | 2021 |
|---|---|---|---|
| Average Residential Flow | - | 350 | 280 l/cap/day |
| Average Commercial/Institution Flow | - | 50,000 | 28,000 l/Ha/day |
| Peak Residential Factor | - | Harmon Formula | |
| Peak Commercial/Institution Factor | - | 1.5 | 1 |
| Infiltration Allowance | - | 0.28 | 0.33 l/sec/Ha |

### 3.2.2 Population Density:

| | | |
|---|---|---|
| Single Family | - | 3.4 person/unit |
| Townhouse Units | - | 2.7 person/unit |
| Apartment Units | - | 1.8 person/unit |
| External Low Density Land | - | 120 units/gross Ha |

## 3.3 Proposed Wastewater Disposal System

As previously noted, the proposed wastewater disposal system within the study limits of the Cardinal Creek Master Servicing plan (DSEL, 2013) and the Cardinal Creek Village Phase 1A and 1B Design Brief (DSEL, 2014). All downstream sewers have been sized for sanitary flows generated from the subject lands. As previously noted, a population allowance of **602.5** has been carried through the previous studies.

### 3.3.1 Proposed Population Calculations

As previously noted, the ultimate development plan (Draft Plan 2) proposes 137 townhouse units and 417 condominiums/apartment units, the total design population is indicated below.

| UNIT TYPE | # OF UNITS | POPULATION DENSITY | POPULATION |
|---|---|---|---|
| Townhouse | 137 | 2.7 pp/unit | 369.9 |
| Condo/Apartment | 417 | 1.8 pp/unit | 750.6 |
| **TOTAL** | **554** | **-** | **1120.5** |

The proposed population exceeds the assumed population noted in the MSS for the subject lands. However it will be demonstrated below that a combination of reduced per capita contributing flow and residual capacity in the existing sewers the existing sewer system is able to accommodate the proposed development.

### 3.3.2 Residual Capacity in downstream sewers

Upon investigating the residual capacity in downstream sewers, it was discovered that the allocated 227 people (area 3.02ha south of Old Montreal Road) on the external drainage area plan prepared by DSEL was omitted from their detail design sheets population, this resulted in the 2014 DSEL spreadsheet underestimating the flow by 3.2l/s (22.89-19.69). IBI reviewed the downstream system capacity to verify the downstream system could accommodate the corrected population. IBI has prepared a partial sewer design sheet summary for the external sewer in Cardinal Creek Village Phase 1A & 1B, manhole 115A to 116A. Adding the population missed by DSEL result is an increase in flow of **3.2l/s**, refer to IBI Group **Sanitary Sewer Design Sheet** in **Appendix B**.

Since 2014 the City has modified their design criteria for storm sewers with the most notable change being the reduction in per capita flow from 350 to 280 l/s/cap, and the infiltration allowance from 0.28 to 0.33 l/s/Ha. In the above noted spreadsheet we also provided an update of the design flows using the 2021 criteria and added the increased population per the current development plan, this resulted in a peak flow of 25.67l/s which is an increase of 2.78 l/s over the corrected 2014 flow, and an increase of 5.98l/s (3.2+2.78) from the incorrect DSEL flow. IBI reviewed the capacity of impacted downstream sewers to the Cardinal Creek Phase 1A/1B outlet and verified that when adding the omitted DSEL population and adding the proposed population increase that there was adequate spare capacity to accommodate the proposed development. This was achieved by comparing the design flow to the sewer capacities identified on the DSEL Sanitary Sewer Design Sheets (May 2014) and noted pipe run 204A to 146A had the least spare capacity of 12.95 l/s which exceeds the 5.98 l/s adjustment (population increase and DSEL error adjustment), there for the downstream system is sized to accommodate the flow. The spreadsheet is included in **Appendix B** with all relevant sewer runs highlighted and demonstrates the infrastructure is suitably sized to accommodate the proposed draft plan.

### 3.3.3 Proposed Wastewater Plan

As previously noted, downstream sewers have adequate capacity to service the subject lands. The proposed development will require extension of existing sewers from de la Famille Laporte Avenue onto and crossing Old Montreal Road. The public sanitary sewer system will end at the property line and a private sanitary system will be extended within the site plan as illustrated on Figure 3.1 in **Appendix B**, Conceptual Waste Water Disposal System.

Within the proposed development, the private sanitary sewers will generally follow the alignment of the proposed private roads to provide service to the blocks. There are no external lands contributing to the proposed private sanitary sewers.

Due to existing topography, the southern portion of the site will be serviced via a connection at the western limits where a series of drop MH's will be utilized to limit sewage velocities within the pipe network across this grade transition. Details of the system requirements will be confirmed at detail design.

# 4 STORMWATER MANAGEMENT

## 4.1 Existing Conditions and Previous Studies

The subject lands are tributary to Cardinal Creek, a tributary of the Ottawa River. The Cardinal Creek Village Master Servicing Study (DSEL June 2013) and Cardinal Creek Phase 1A & 1B Design Brief (DSEL May 2014) establish the stormwater management plan for the subject lands. The stormwater solution presented in the MSS consists of using site controls, dual drainage design and end of pipe stormwater management facility. Minor system flows are tributary to the Ottawa River, through the existing SWM facility (DSEL Figure 17, June 2013). Major system flow from the subject lands are tributary to the North Tributary of Cardinal Creek (DSEL Figure 18, June 2013). The subject lands are inclusive in the design of the Phase 1 trunk storm sewer network and are tributary to the Cardinal Creek Village interim pond #1. Additionally, the trunk sewer system for Phase 1 of the Cardinal Creek Village has provided capacity for the 100 year capture for lands south of Old Montreal Road (DSEL Section 5.3.2, May 2014), The DSEL design provides for 1587l/s for the 5.03Ha area (315.5l/s/Ha) at MH 115, the detail design for the subject site will need to limit flow to respect the allocated flow, and provide onsite storage should peak flows wexceed the downstream design. Design Sheets and Drainage area plans from Cardinal Creek Village Phase 1A & 1B Design Brief (DSEL May 2014) have been included in **Appendix C**.

The end of pipe stormwater management facility discharges directly to the Ottawa River, and is designed to provide an enhanced level of service (80% removal of TSS)

Downstream sewers have been modelled using XPSWMM program based on the 100 year 3-hour Chicago and 24-hour SCS design storms, and for the July 1st 1979, August 4th, 1988 and August 8th, 1996 historical events, Refer for DSEL Design Brief May 2014 and JFSA Stormwater Management Report for Phase 1 of Cardinal Creek Village (JFSA, May 2014).

## 4.2 Dual Drainage Design

The subject lands will be designed to be consistent with the findings of the MSS, downstream detail design brief, City of Ottawa sewer design Guidelines (OSDG October 2012), the OSDG guidelines of September 2016 Technical Bulletin PIEDTB-2016-01, and the February 2014 Technical Bulletin ISDTP-2014-1.

The site will be designed with dual drainage features, accommodating minor and major system flows. During frequent storm events, the effective runoff of a catchment area is directly released via catch basin inlets to the network of storm sewers, called the minor system. During less frequent storm events, the balance of the flow (in excess of the minor flow) is accommodated by a system of street segments, and in some cases oversized storm sewers, called the major system.

The street within the subject lands consist of a mix of sawtooth and continuous grade profiles. Where possible, sawtoothing will be employed to facilitate capture and storage. However one section of roadway the road profile will be steeper than typical and additional inlets will be required within the road to capture runoff. Inlet control devices (ICD's) are will be used with the site to maximize the use of available on-site storage and control surcharge to the minor system.

The final design of the subject lands will demonstrate that minor system capture and major flow conveyance is consistent with the findings of the MSS, Design Brief and Stormwater Management report for Phase 1 of Cardinal Creek Village.

On-site stormwater management will restrict flow to the minor system to the 100 year capture rate at the designed area and run-off coefficient, as identified in the previous studies for lands south of Old Montreal Road. The intent for 100 year capture is to limit ponding and major flow crossing of an arterial road. This will involve the sizing of onsite sewers to a minimum of the 2 year rational pipe sizes, or of a minimum size modelled to convey the designed flow.

Should the area and run-off coefficient of the final draft plan exceed the allocation in the MSS/SWM Report, or modelled flows exceed the allocated flows, then on-site stormwater management measures will be required. On-site stormwater management measures may include maximizing surface ponding, rooftop ponding or providing underground storage.

## 4.3 Proposed Stormwater Management Plan

As previously noted, downstream infrastructure was designed to provide capacity and treatment of stormwater runoff from the subject lands. The proposed development will require extension of the existing storm sewers from de la Famille Laporte Avenue onto and crossing Old Montreal Road. The public storm sewer system or existing ditch will extend along Old Montreal Road to the East to service the proposed public road, Blocks 8 and 10, and the Public Park Block. Due to existing topography, a section of the storm system will be required to convey storm runoff down a significant grade transition, to address this the storm sewer network will be designed and constructed in such a fashion to limit sewage velocities within the pipe network. This will require the use of flattened pipes relative to the slope combined with drop manholes. It is anticipated that approach capture for roadside catchbasins will be a challenge on the steep segment of road. Flared curbs and additional inlet structures will be implemented as a means to increase capture into the storm sewer system.

A private storm sewer will also be extended into the proposed development through the proposed private road opposite of de la Famille Laporte Avenue. Within the proposed development, the private storm sewer will follow the alignment of the proposed private roads to provide service to the various blocks. Similar to the public section of storm sewer drop manholes will be used as a means of traversing the steep section while limiting sewage velocities in the pipe network.

Figure 4.1 in **Appendix C** illustrates the Conceptual Storm Sewer layout.

There are no external lands contributing to the internal storm sewers. The storm sewers on Montreal Road will be designed for all external areas established in the MSS.

## 4.4 Old Montreal Road

It should be noted that the approved MSS and Phase 1 of the Cardinal Creek Village were intended to capture a large area of Old Montreal Road east of de la Famille Laporte Avenue. Subsequently, the Cardinal Creek Village Phase 2 design included a portion of Old Montreal Road which was originally tributary to Phase 1 / de la Famille Laporte Avenue. Therefore, since the area tributary to Famille Laporte Ave has been reduced, the existing downstream sewers have additional spare capacity beyond the original design, at detail design the appropriate use of this additional spare capacity will be further reviewed and in consultation with the City determine the most appropriate use.

# 5 ROADS AND GRADING

## 5.1 Site Grading

The existing grades within portions of the proposed development lands are 12-17m greater than the existing road centerline of Old Montreal Road. Plus the existing topography suggests that during the construction of Old Montreal Road (former Highway 17), aggressive excavations into the escarpment were made. The existing embankment appears to be cut at approximately 1:1 slope.

The ultimate configuration of Old Montreal Road will consists of a 4 lane arterial road cross section, which has yet to be designed. In absence of this information, it is being assumed that the ultimate road profile will closely follow that of the existing road centerline.

The site is currently occupied by low density rural residences and agricultural land, whose driveways are also cut into the embankment at slopes of approximately 15%.

The site plateaus and is relatively flat towards the southern limits of development until the grade falls off sharply due to the northern banks of a tributary branch of the Cardinal Creek.

The proposed site grading would involve a major earth excavation undertaking. In order to best manage resources, the owner is proposing to construct a series of buildings that will act as retaining wall structures to assist with the grade transition, see cross section on the master plan prepared by M David Blakely Architects in **Appendix A.** In other areas retaining walls such as the Stone Strong system will be used, since most of these walls will be in excess of 1m, these wall will designed and sealed by a professional engineer.

A conceptual macro grading plan has been prepared for the site, see **figure 5.1** in **Appendix D**.

## 5.2 Road Network

The draft plan(s) delineates the proposed road pattern for the development which is a mix of public and private roads. The proposed municipal road within the development will be designed to City of Ottawa Standard 18.0m ROW, however given the requirement for grad transition to the adjacent property additional buffer area has been provided east of the ROW. The private roads within the apartment/condo area will have an 8.5m asphalt road width with designated parallel and perpendicular street parking. The private road servicing the street towns will be 7m wide asphalt road. It should be noted the access opposite of de la Famille Laporte Avenue will be a oneway into the site, see transportation report by IBI for details.

As previously noted, the existing topography will yield unique grading. During preconsultation meetings with the City of Ottawa, the Project Manager and Senior Traffic Engineer agreed to entertain roadway slopes of up to 12.0% in areas where sidewalks can be rerouted away from the public road. The public road has been limited to 12% and a walkway has been provided on the east side of the site providing pedestrian access between the upper and lower portions of the site.

The public sidewalk will be barrier free and provides a reasonable level of service to the residences of the site. The main pedestrian access will be by a public sidewalk through private land within an easement. The sidewalk will maintain a 5.0% continuous slope without handrails, or an 8.3% slope with handrails and intermittent landings as required by the Ontario Building Code.

## 5.3 Municipal Consent

Municipal consent application will be required for works along the ROW of Old Montreal Road. Intersection improvements as per the Traffic Impact Study and extension of deep servicing infrastructure will require comment and review.

# 6 SOURCE CONTROLS

## 6.1 General

Since an end of pipe treatment facility is provided for the development lands, stormwater site management for the subject lands will focus on site level or source control management of runoff. Such controls or mitigative measures are proposed for this development not only for final development but also during construction and build out. Some of these measures are:

- flat site grading where possible;
- vegetation planting; and
- groundwater recharge in landscaped areas.

## 6.2 Lot Grading

Where possible, all of the proposed blocks within the development will make use gentle surface slopes on hard surfaces such as asphalt and concrete. In accordance with local municipal standards, all grading will be between 0.5 and 12.0 percent for hard surfaces and 2.0 and 6.0 percent for all landscaped areas. Significant grade changes will be accomplished through the use of terracing (3:1 max slope) or retaining walls. All street and parking lot catchbasins shall be equipped with 3.0m subdrains on opposite sides of a curbside catchbasin running parallel to the curb, and with 3.0m subdrains extending out from all 4 sides of parking lot catchbasins.

## 6.3 Vegetation

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

## 6.4 Groundwater Recharge

Perforated sub-drain systems will be implemented at capture locations in all vegetated areas. Roof leaders for pitched roofs are to direct runoff to landscaped areas. This will promote increased infiltration during low flow events before water is collected by the storm sewer system.

# 7 CONVEYANCE CONTROLS

## 7.1 General

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

- vegetated swales; and
- catchbasin sumps.

## 7.2 Vegetated Swales

All rearyards within the proposed development make use of relatively vegetated swales. These swales generally employ saw-toothing at regular intervals and encourage infiltration and runoff treatment.

## 7.3 Catchbasins and Maintenance Hole Sumps

All catchbasins within the development, either rear yard or street, will be constructed with minimum 600 mm deep sumps. These sumps trap pollutants, sand, grit and debris which can be mechanically removed prior to being flushed into the minor pipe system. Both rear yard and street catchbasins will be to OPSD 705.02. All storm sewer maintenance holes serving local sewers less than 900 mm diameter shall be constructed with a 300 mm sump as per City standards.

# 8 SEDIMENT AND EROSION CONTROL PLAN

## 8.1 General

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

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

## 8.2 Trench Dewatering

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

## 8.3 Bulkhead Barriers

At the first new manhole constructed within the development that is immediately upstream of an existing sewer a temporary ½ diameter bulkhead will be constructed over the lower half of the outletting sewer. This bulkhead will trap any sediment carrying flows thus preventing any construction-related contamination of existing sewers. The bulkheads will be inspected and maintained including periodic sediment removal as needed and removed prior to top course asphalt being laid.

## 8.4 Seepage Barriers

The presence of road side ditches along Old Montreal Road and the proximity of the Cardinal Creek necessitate the installation of seepage barriers. These barriers will consist of both the Light Duty Straw Bale Barrier as per OPSD 219.100 or the Light Duty Silt Fence Barrier as per OPSD

219.110. The barriers are typically made of layers of straw bales or geotextile fabric staked in place. All seepage barriers will be inspected and maintained as needed.

## 8.5 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 rearyards are sodded or until streets are asphalted and curbed, catchbasins and manholes will be constructed with geotextile filter bags or a geotextile filter fabric located between the structure frame and cover respectively. These will stay in place and be maintained during construction and build until it is appropriate to remove same.

## 8.6 Stockpile Management

During construction of any development similar to that proposed by the Owner, both imported and native soils are stockpiled. Mitigative measures and proper management to prevent these materials entering the sewer systems is needed. Significant excess material will be generated from the subject lands, and will need to be disposed of off-site in a manner consistent with all MOECC regulations.

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

Contamination of the environment as a result of stockpiling of imported construction materials is generally not a concern provided the above noted seepage barriers are installed. These materials are quickly used and the mitigative measures stated previously, especially the ½ diameter sewer bulkheads and filter fabric in catchbasins and manholes help to manage these concerns.

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

To assist in the control of transporting sediment off-site into municipal roads, mud matts will be employed at the construction entrances.

See Conceptual Sediment and Erosion Control Plan figure 5.8 in **Appendix D.**

# 9 CONCLUSIONS

Water, wastewater and stormwater systems required to accommodate the orderly development of the DCR Phoenix 1208 Old Montreal Road lands are available to the subject site. The attached drawings and supporting analysis illustrate the lands can be developed in an orderly and effective manner and in accordance with the City of Ottawa's current level of service requirements.

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

This report outlined conceptual servicing scheme to support the proposed development. The servicing schemes are subject to various governmental approvals prior to construction, including but not limited to the following:

- Certificate of Authorization (C of A) for sewers and SWM: Ministry of Environment;
- Commence Work Order: City of Ottawa;
- Municipal Consent: City of Ottawa.

Report Prepared By:


Demetrius Yannoulopoulos, P. Eng.

J:\109575_OldMontrealRd\5.2 Reports\5.2.2 Civil\5.2.2.1 Sewers\APSR Submission #2\CTR_Report_2021-02-18\KS

# APPENDIX A

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

# MEMO / NOTE DE SERVICE

File No. D07-12-18-0001
Date: July 3, 2018

*IBI response to comments are in red*

To / Destinataire : Michael Boughton

From / Expéditeur : Isaac Wong, P.Eng
Project Manager
Development Review, East Branch

Subject / Objet : Consolidation of Engineering-related Comments
Phoenix Homes – 1154-1208 Old Montreal Road
Ward 1 - Orléans, Councillor Bob Monette
Paul Black

I have reviewed the Site Plan Application circulated May 18, 2018. Please include the following engineering comments in the consolidated response to the proponent:

A. List of Drawing(s):
**Preliminary Development Plan**, Sheet No. SP-1, prepared by M. David Blakely Architect Inc., dated Nov. 2016, revision 7, dated January 2 2018.

**Preliminary Development Plan**, Sheet No. SP-2, prepared by M. David Blakely Architect Inc., dated Nov. 2016, revision 7, dated January 4 2018.

B. List of Report(s):
**Adequacy of Public Servicing Report**, IBI Group, Project # 109575-5.2.2.1, dated January 8 2018.

**Preliminary Geotechnical Investigation**, exp. Services Inc., Project Number OTT-00234493-A0, dated November 7 2016.

**Desktop Hydrogeological Study**, exp. Services Inc., Project Number OTT-00234493-A0, dated January 30 2018.

C. Comments

1. As per Technical Bulletin ISTB-2018-02, the protocol for the FUS method has been revised. Please ensure the FUS calculations are completed to the new standard. This can be completed in the detailed design stage. *FUS calculation has been updated for report, final calculation to be completed as part of detail design*
2. As per Technical Bulletin ISTB-2018-01, the wastewater design flow parameter for the design of sanitary sewers has updated. Please use the new paramaters in the design. This can be completed in the detailed design stage. *Updated design parameters were used for the updated report.*

3. The current MOECC ECA for the Cardinal Creek Village Pond 1 does not include the drainage area for this site. Please confirm that the pond outlet and culvert crossing Hwy. 174 can accomodoate the anitcipated flows from this site. Please also amend the MOECC ECA to include this site, this can be completed in the detailed design stage. *Downstream sewer design drawings and tributary plans all included this area, ECA for site will be required however no amendment to SWM pond ECA should be required.*
4. With the number of proposed households, will the antcipated flows for stormwater meet the allowable release rate allocatted in the Cardinal Creek Village Master Servicing Study for this site? Does the Cardinal Creek Village Pond 1 have sufficient capacity from this site? *The site was assigned a runoff coefficient of C=0.7 plus the site was allocate 100yr flow in the storm sewer to avoid major flow having to traverse Old Montreal Road. If required onsite attenuation will be used to limit flow to meet specific design requires of the downstream sewer.*
5. Will Blocks 1-5 and 7-8 form a condominium? If so, the subdivision draft approval will contain a condition for the owner to attain approval for a Common Elements Condomimum agreement. *Plan has been revised owner has not determined type of ownership, to be confirmed at detail design.*
6. Please provide a plan and profile of the proposed road section between Block 3 and 4. *Plan has changed see conceptual grading plan elevations.*
7. Please have the Geotechnical Engineer review the updated plans and revise the Geotechnical Invesigation report to confirm that the site is suitable for the proposed semi-detached and freehold townhouses. The report only refers to one to two-storey single family residences for this property. *See geotechnical report by EXP*
8. Please provide examples of roads in the City of Ottawa with grades similar to those proposed in this subdivision and describe how vehicles react with the road in winter conditions. *Preconsult with City staff determined maximum grade of 12% could be used, this was with a full understanding additional maintenance during winter months would be required.*

D. <u>Comments from Internal City of Ottawa Departmental Circulation</u>

9. It is very likely that the second 406 mm watermain constructed to service Cardinal Village within Pressure Zone 2E will need to be in operation. Water quality issues has delayed the commissioning of the second feed. *Provided boundary conditions indicate system will meet operational requirements.*
10. The Interim Grading Plan does not provide adequate detail from which a determination can be made as to whether block sizes, for example, are sufficiently sized to determine the number of deviations from City standards will be required based on what the City is being asked to approve in this Draft Plan submission. *Updated conceptual grading provides additional details/elevations, as does the master architectural*

*plan.*

11. From an infrastructure perspective, while the topographic relief on-site ensures “good drainage”, the challenge is restricting flows to maximum allowable velocities; avoiding maintenance hole lids from blowing-out when the system is surcharged; and containing major system flows within the ROWs at the bottom of steep slopes where bends in the streets are proposed.

    To limit the velocity of flows in the sanitary and storm sewer systems, drop manholes will be required. The City should require functional designs of the storm and sanitary sewers to be prepared prior to Draft Plan approval to ensure the ROW widths are adequate to allow for future replacement of the sewers and drop maintenance holes using conventional construction methods. *As noted drop MH’s will be used to limit velocities, and the sewer depth and MH will be spaced to avoid any overly deep sections. It should also be noted that the downstream sewers have been sized to accommodate the 100yr flow from this site, this was to restrict major flow from crossing Old Montreal road. Given the provided capacity in the piped system we no not expect any surcharge issues.*

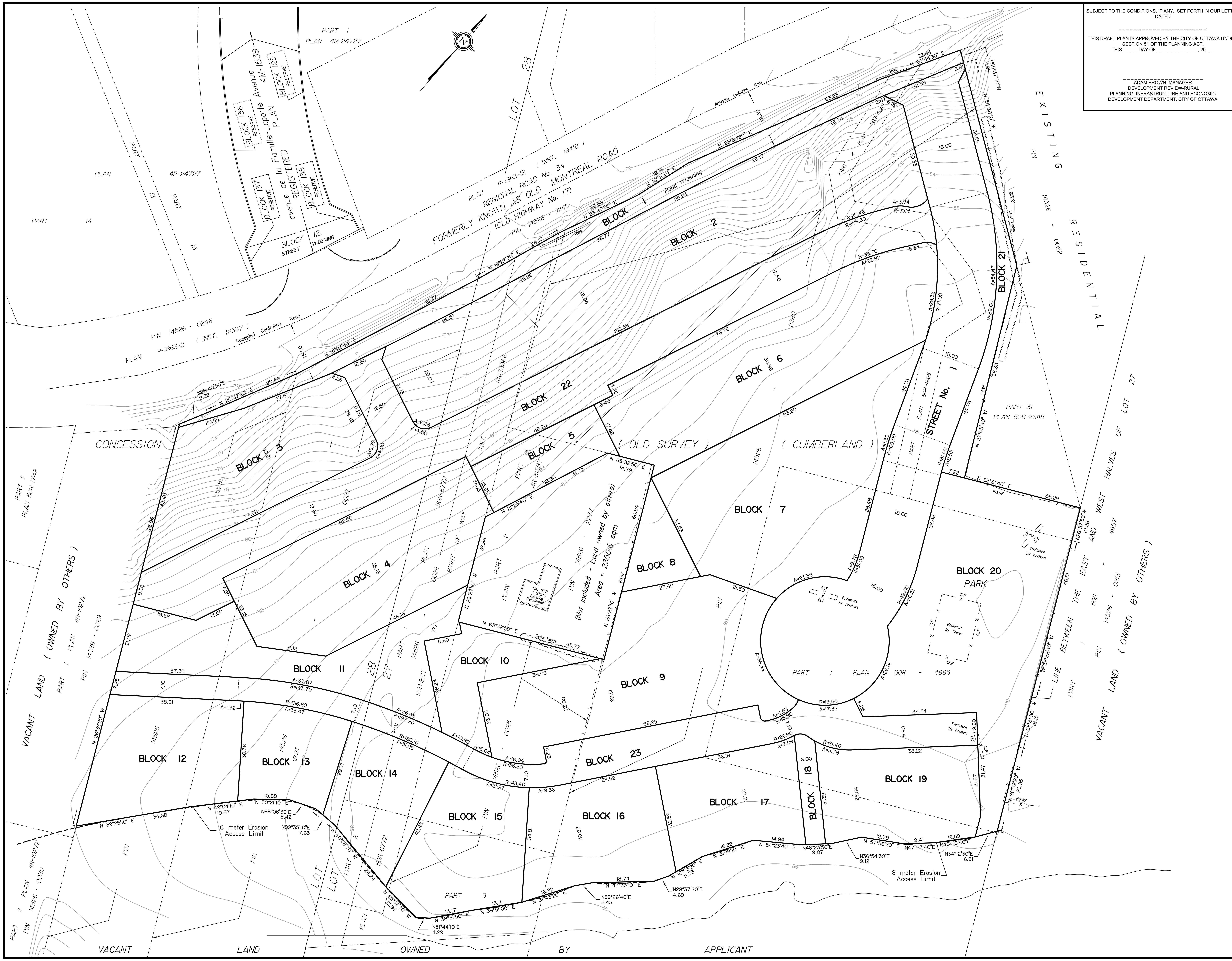
12. Review comments are being requested from the City of Ottawa’s Road Services and will be provided at a later date.

Please consider these comments in combination with comments you receive from other technical groups, agencies and the public. Contact me if it is necessary to resolve any conflicting comments and/or include the above comments with your summary to the applicant. Also, please add the following statement in the letter to the applicant.

Please feel free to contact me at 613-580-2424, extension 24169 or via email Isaac.Wong@ottawa.ca if you have any questions.

Sincerely,

Isaac Wong, P.Eng
Project Manager
Development Review, East Branch



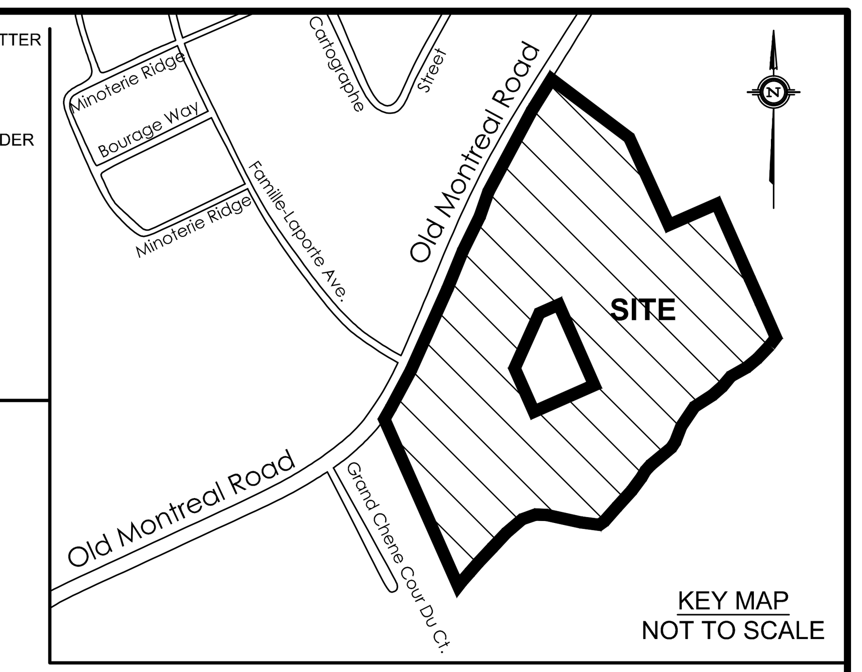


SUBJECT TO THE CONDITIONS, IF ANY, SET FORTH IN OUR LETTER DATED

_______________________.

THIS DRAFT PLAN IS APPROVED BY THE CITY OF OTTAWA UNDER SECTION 51 OF THE PLANNING ACT.
THIS ____ DAY OF _____________, 20__ .

_______________________
ADAM BROWN, MANAGER
DEVELOPMENT REVIEW-RURAL
PLANNING, INFRASTRUCTURE AND ECONOMIC
DEVELOPMENT DEPARTMENT, CITY OF OTTAWA


*DRAFT PLAN OF SUBDIVISION OF*

# PART OF LOTS 27 and 28
# CONCESSION 1 (OLD SURVEY)

Geographic Township of Cumberland

## CITY OF OTTAWA

Surveyed by Annis , O'Sullivan , Vollebekk Ltd.

Scale 1 : 500

20 15 10 5 0 10 20 Metres

Metric

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

## SURVEYOR'S CERTIFICATE

I CERTIFY THAT :
The boundaries of the lands to be subdivided and their relationship to adjoining lands have been accurately and correctly shown.

___________ Date ___________ Andre Roy
ONTARIO LAND SURVEYOR

## OWNER'S CERTIFICATE

This is to certify that I am the owner / agent of the lands to be subdivided and that this plan was prepared in accordance with my instructions.

___________ Date ___________
PHOENIX HARBOUR
OLD MONTREAL ROAD INC.
I have authority to bind the corporation

## ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51-17 OF THE PLANNING ACT

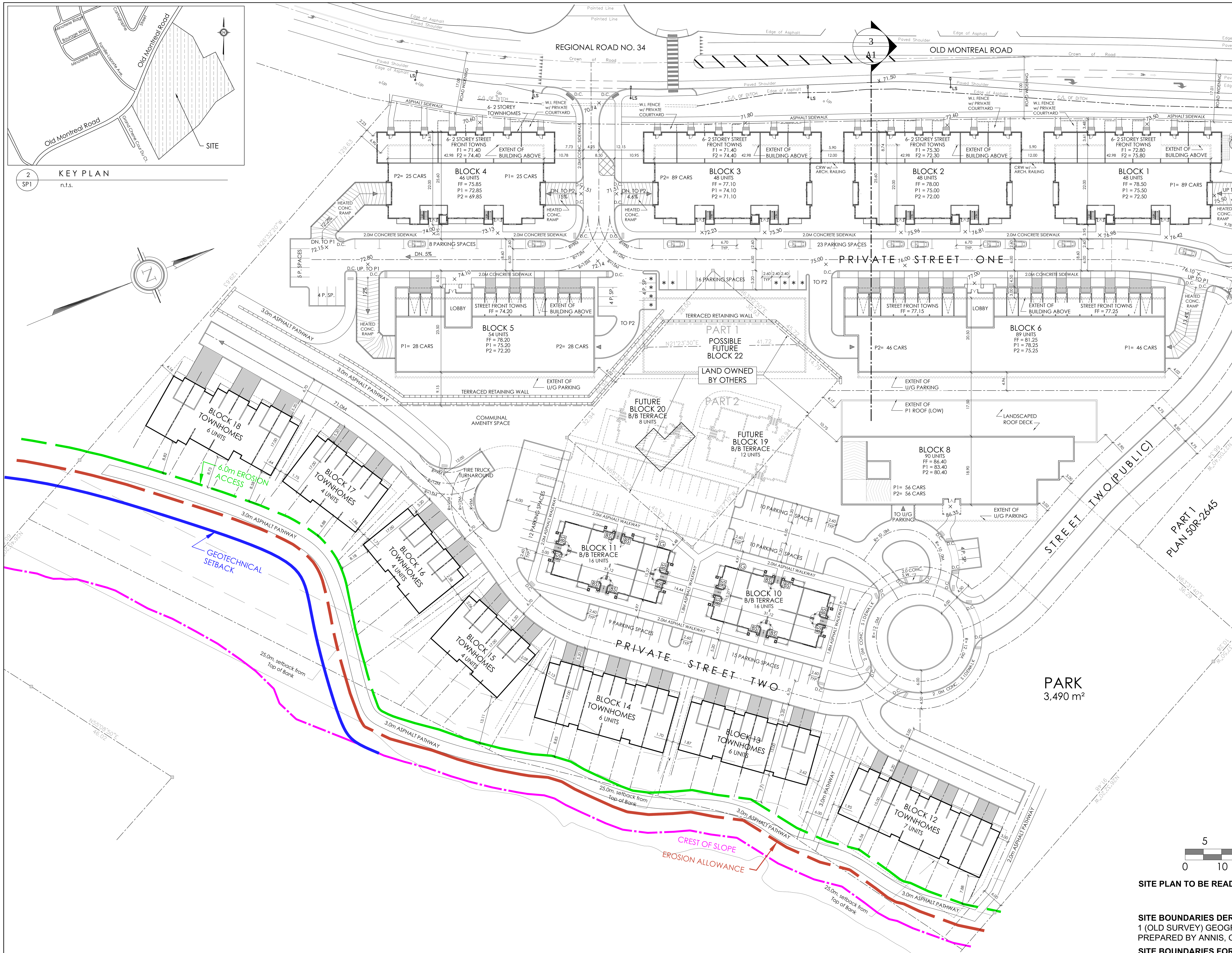
(a) see plan
(b) see plan
(c) see plan
(d) multi-family residential housing, park land
(e) see plan
(f) see plan
(g) see plan
(h) City of Ottawa
(i) see soils report
(j) see plan
(k) sanitary, storm sewers, municipal water, bell, hydro, cable and gas to be available
(l) see plan

**AREA SCHEDULE**

| LOT\BLOCK | Square Metres |
|---|---|
| 1 | 1334.7 |
| 2 | 5111.3 |
| 3 | 2088.3 |
| 4 | 2635.6 |
| 5 | 641.5 |
| 6 | 3257.8 |
| 7 | 3246.3 |
| 8 | 394.8 |
| 9 | 2936.1 |
| 10 | 802.1 |
| 11 | 1834.2 |
| 12 | 1546.0 |
| 13 | 864.8 |
| 14 | 1046.2 |
| 15 | 1411.5 |
| 16 | 1399.1 |
| 17 | 1242.1 |
| 18 | 198.2 |
| 19 | 1363.7 |
| 20 | 3568.4 |
| 21 | 517.6 |
| 22 | 4021.4 |
| 23 | 2460.8 |
| STREET | 4178.1 |


Ontario Land Surveyors
ANNIS, O'SULLIVAN, VOLLEBEKK LTD.
14 Concourse Gate, Suite 500
Nepean, Ont. K2E 7S6
Phone: (613) 727-0850 / Fax: (613) 727-1079
Email: Nepean@aovltd.com


Job No. 16878-17 Phoenix Pt Lts 27 28 CI OS CU DPS D2 | N




## SITE INFORMATION:

SITE AREA = 52,724.47m² (527.25 ACRES)

## UNIT COUNTS:

| | | APARTMENTS | URBAN TOWNS | TOWNS | B/B TERRACE HOMES |
|---|---|---|---|---|---|
| BLOCK 1 = | 4 LEVEL APARTMENT BLDG. + 2 STOREY TOWNS | 42 UNITS | 6 UNITS | | |
| BLOCK 2 = | 4 LEVEL APARTMENT BLDG. + 2 STOREY TOWNS | 42 UNITS | 6 UNITS | | |
| BLOCK 3 = | 4 LEVEL APARTMENT BLDG. + 2 STOREY TOWNS | 42 UNITS | 6 UNITS | | |
| BLOCK 4 = | 4 LEVEL APARTMENT BLDG. + 2 STOREY TOWNS | 40 UNITS | 6 UNITS (w/ P2 PARKING) | | |
| BLOCK 5 = | 5 LEVEL APARTMENT BLDG. + 3 STOREY TOWNS | 47 UNITS | 7 UNITS | | |
| BLOCK 6 = | 5 LEVEL APARTMENT BLDG. + 3 STOREY TOWNS | 77 UNITS | 12 UNITS (w/ GARAGES) | | |
| BLOCK 8 = | 5 LEVEL APARTMENT BLDG. | 90 UNITS | | | |
| BLOCK 10 = | BACK / BACK TERRACE HOMES | | | | 16 UNITS |
| BLOCK 11 = | BACK / BACK TERRACE HOMES | | | | 16 UNITS |
| BLOCK 12 = | TOWNHOMES | | | 7 UNITS | |
| BLOCK 13 = | TOWNHOMES | | | 6 UNITS | |
| BLOCK 14 = | TOWNHOMES | | | 6 UNITS | |
| BLOCK 15 = | TOWNHOMES | | | 4 UNITS | |
| BLOCK 16 = | TOWNHOMES | | | 4 UNITS | |
| BLOCK 17 = | TOWNHOMES | | | 4 UNITS | |
| BLOCK 18 = | TOWNHOMES | | | 6 UNITS | |
| TOTAL = | | 380 UNITS | 43 UNITS | 37 UNITS | 32 UNITS |

TOTAL ALL UNITS = 492 UNITS
(NOT INCLUDING FUTURE UNITS)

## PARKING REQUIREMENTS:

BLOCKS 1-4 : APARTMENTS BDLG. + TOWNS [190 UNITS]
PARKING REQUIRED 1.2/d.u. + 0.2/d.u. VISITORS = 190 x 1.2 + .2 = 266 SPACES
PARKING PROVIDED = 266 SPACES (228 U/G, 38 SURFACE)

BLOCKS 5-6 : APARTMENTS BDLG. + TOWNS [124 UNITS (APT. ONLY)]
PARKING REQUIRED 1.2/d.u. + 0.2/d.u. VISITORS = 124 x 1.2 + .2 = 174 SPACES
PARKING PROVIDED = 174 SPACES (148 U/G, 26 SURFACE)

BLOCK 8 : APARTMENTS BDLG. [90 UNITS]
PARKING REQUIRED 1.2/d.u. + 0.2/d.u. VISITORS = 90 x 1.2 + .2 = 126 SPACES
PARKING PROVIDED = 126 SPACES (112 U/G, 14 SURFACE)

BLOCKS 10-11 : BACK TO BACK TERRACE HOMES (32 UNITS)
PARKING REQUIRED 1.2/d.u. + 0.2/d.u. VISITORS = 32 x 1.2 + .2 = 45 SPACES
PARKING PROVIDED = 45 SPACES (SURFACE)

## LEGEND/ ABREVIATIONS:

D.C. DEPRESSED CURB
CRW CONCRETE RETAINING WALL
W.I. WROUGHT IRON
TWSI TACTILE WALKING SURFACE INDICATOR
CONC. CONCRETE
ASPH. ASPHALT

GAS METERS LOCATION
BS BUILDING SERVICES LOCATION (IN LOWER LEVEL)
WALL MOUNTED LIGHT FIXTURE
FIRE HYDRANT

L.S. LIGHT STANDARD
TWSI
SIAMESE CONNECTIONS
TRANSFORMER

5 20 50 100m
0 10 30 75

**SITE PLAN TO BE READ IN CONJUNSTION WITH:** SITE SERVICING PLAN PREPARED BY IBI GROUP
GRADING PLAN PREPARED BY IBI GROUP
LANDSCAPE PLAN PREPARED BY ______________

**SITE BOUNDARIES DERIVED FROM:** TOPOGRAPHICAL PLAN OF PART OF LOTS 27 AND 28 CONCESSION 1 (OLD SURVEY) GEOGRAPHIC TOWNSHIP OF CUMBERLAND CITY OF OTTAWA
PREPARED BY ANNIS, O'SULLIVAN, VOLLEBEKK LTD. FIELD WORK COMPLETED ON FEBRUARY 8, 2017.

**SITE BOUNDARIES FOR PART 1 & 2 DERIVED FROM:** PLAN 4R-31597, DECEMBER 12, 2018.

M. David Blakely
Architect Inc.
2200 Prince of Wales Dr. Suite 101 Ottawa, Ontario
Phone (613) 226-8811 Fax (613) 226-7942 k2E 6Z9

GENERAL NOTES:

1. THE CONTRACTOR IS RESPONSIBLE FOR CHECKING AND VERIFYING ALL DIMENSIONS, ANY DISCREPANCY MUST BE REPORTED TO M. DAVID BLAKELY ARCHITECT INC.
2. ALL WORK AND MATERIALS TO BE IN COMPLAINCE WITH ALL CODES, REGULATIONS, & BY-LAWS
3. ADDITIONAL DRAWINGS MAY BE ISSUED FOR CLARIFICATION TO ASSIST THE PROPER EXECUTION OF WORK. SUCH DRAWINGS WILL HAVE THE SAME MEANING AND INTENT AS IF THEY WERE INCLUDED WITH THE PLANS IN CONTRACT DOCUMENTS
4. DO NOT SCALE DRAWINGS.
5. THIS DRAWING SHALL NOT BE USED OR COPIED WITHOUT THE AUTHORIZATION OF THE ARCHITECT
6. THIS DRAWING SHALL NOT BE USED FOR PERMIT OR CONSTRUCTION UNLESS THE DRAWING BEARS THE ARCHITECT'S SEAL AND SIGNATURE

CONSTRUCTION NORTH

SEAL

REVISIONS

| No. | DATE | DESCRIPTION | INIT. |
|---|---|---|---|
| 12. | 11/09/19 | REVISED MODEL TYPES / LAYOUT | SM |
| 11. | 28/01/19 | REVISED MODEL TYPES / LAYOUT | SM |
| 10. | 08/01/19 | CONTOUR LINES ADDED | SM |
| 9. | 13/06/18 | REVISED BLOCKS 1-4 | SM |
| 8. | 05/04/18 | ADDED SCALE TO SECTION | SM |
| 7. | 04/01/18 | REVISED BLOCK LOCATIONS | SM |
| 6. | 28/09/17 | REVISED SITE BOUNDARIES | SM |
| 5. | 20/09/17 | REVISED SITE LAYOUT | SM |
| 4. | 05/07/17 | REVISED UNIT TYPES | SM |
| 3. | 13/04/17 | REVISED SITE LAYOUT | SM |
| 2. | 21/12/16 | REVISED 36 UNIT BLOCK LAYOUT | SM |
| 1. | 30/11/16 | FOR REVIEW | SM |

REVISIONS

| No. | DATE | DESCRIPTION | INIT. |
|---|---|---|---|
| 24. | | | |
| 23. | | | |
| 22. | | | |
| 21. | | | |
| 20. | | | |
| 19. | | | |
| 18. | 10/02/21 | SIDEWALK @ PVT. STREET 2 DELETED | MB |
| 17. | 05/02/21 | OLD. MTL. RD. GEOMETRY UPDATED | MB |
| 16. | 29/01/21 | BOUNDARIES UPDATED/ PARTS 1&2 | MB |
| 15. | 03/11/20 | GEOTECHNICAL ADDED | MB |
| 14. | 13/07/20 | BLKS. 5,6,& 8 REVISED/ GRADES REVISED | MB |
| 13. | 04/12/19 | REVISED BLDG. FOOTPRINTS / LAYOUT | MB |

A
B C
A - DETAIL NUMBER
B - SHEET NUMBER (DETAIL REQUIRED)
C - SHEET NUMBER (DETAIL LOCATION)

PROJECT: PROPOSED SUBDIVISION
OLD MONTREAL ROAD
OTTAWA, ONTARIO.

CLIENT: PHOENIX HOMES
18A Bentley Ave Ottawa, ON K2E 6T8

DRAWING TITLE: SITE PLAN

| DATE: | SCALE: | SHEET No. REV No.: |
|---|---|---|
| NOV., 2016 | 1:500 | SP-1 |
| DRAWN BY: SBM | CHECKED: MDB | |

**WATERMAIN DEMAND CALCULATION SHEET**

**IBI GROUP**
**333 PRESTON STREET**
**OTTAWA, ONTARIO**
**K1S 5N4**

**PROJECT : 1208 OLD MONTREAL ROAD**
**CLIENT : DCR PHOENIX**

FILE: 109575-5.7
DATE PRINTED: 16-Feb-21
DESIGN: MB


| LOCATION | 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 | TOWNHOUSE URBAN B/B TERRACE | APARTMENT | POPULATION | INDUST. (ha) | COMM. (ha) | INSTIT. (ha) | RESIDENTIA | ICI | TOTAL | RESIDENTIA | ICI | TOTAL | RESIDENTIA | ICI | TOTAL | |
| Block 6 | | | 77 | 139 | | | | 0.56 | | 0.56 | 1.40 | | 1.40 | 3.09 | | 3.09 | 15,000 |
| Block 1, 6 | | 6 | 42 | 92 | | | | 0.37 | | 0.37 | 0.93 | | 0.93 | 2.05 | | 2.05 | 15,000 |
| Block 2. 6 | | 6 | 42 | 92 | | | | 0.37 | | 0.37 | 0.93 | | 0.93 | 2.05 | | 2.05 | 15,000 |
| Block 3 | | | 42 | 76 | | | | 0.31 | | 0.31 | 0.77 | | 0.77 | 1.68 | | 1.68 | 15,000 |
| Block 4, 5 | | 7 | 40 | 91 | | | | 0.37 | | 0.37 | 0.92 | | 0.92 | 2.03 | | 2.03 | 15,000 |
| Block 15, 16 | | 8 | | 22 | | | | 0.09 | | 0.09 | 0.22 | | 0.22 | 0.48 | | 0.48 | 15,000 |
| Block 11, 14 | | 22 | | 59 | | | | 0.24 | | 0.24 | 0.60 | | 0.60 | 1.32 | | 1.32 | 15,000 |
| Block 10, 13 | | 22 | | 59 | | | | 0.24 | | 0.24 | 0.60 | | 0.60 | 1.32 | | 1.32 | 15,000 |
| Block 8 | | | 90 | 162 | | | | 0.66 | | 0.66 | 1.64 | | 1.64 | 3.61 | | 3.61 | 10,000 |
| Block 5 | | | 47 | 85 | | | | 0.34 | | 0.34 | 0.86 | | 0.86 | 1.88 | | 1.88 | 10,000 |
| Block 1 | | 6 | | 16 | | | | 0.07 | | 0.07 | 0.16 | | 0.16 | 0.36 | | 0.36 | |
| Block 12 | | 7 | | 19 | | | | 0.08 | | 0.08 | 0.19 | | 0.19 | 0.42 | | 0.42 | |
| Block 17, 18 | | 10 | | 27 | | | | 0.11 | | 0.11 | 0.27 | | 0.27 | 0.60 | | 0.60 | 15,000 |
| Future Block 19, 20 | | 20 | | 54 | | | | 0.22 | | 0.22 | 0.55 | | 0.55 | 1.20 | | 1.20 | 15,000 |
| Block 4 | | 6 | | 16 | | | | 0.07 | | 0.07 | 0.16 | | 0.16 | 0.36 | | 0.36 | |
| Block 3 | | 6 | | 16 | | | | 0.07 | | 0.07 | 0.16 | | 0.16 | 0.36 | | 0.36 | 15,000 |
| Block 2 | | 6 | | 16 | | | | 0.07 | | 0.07 | 0.16 | | 0.16 | 0.36 | | 0.36 | 15,000 |
| **Total** | | **132** | **380** | **1040** | | | | | | **4.21** | | | **10.54** | | | **23.18** | |

POPULATION DENSITY

| | |
|---|---|
| Single Family | 3.4 persons/unit |
| Townhouse Urban, B/B | 2.7 persons/unit |
| Apartment | 1.8 persons/unit |

WATER DEMAND RATES

| | |
|---|---|
| Residential | 350 l/cap/day |

PEAKING FACTORS

| | |
|---|---|
| Maximum Daily Residential | 2.5 x avg. day |
| Maximum Hourly Residential | 2.2 x max. day |

FIRE DEMANDS

| | |
|---|---|
| Single Family | 10,000 l/min (166.7 l/s) |
| Townhouse | 12,000 l/min (200 l/s) |
| Back to Back | 13,000 l/min (217 l/s) |
| Apartment | 15,000 l/min (250 l/s) |

## Block 6 Fire Flow Requirement from Fire Underwriters Survey

Building Floor Area Block 6 Apartment Building with Urban Towns

| | Apartment | | Urban Towns | | Total | |
|---|---|---|---|---|---|---|
| width | 84.0 | m | 88.0 | m | | |
| depth | 15.0 | m | 8.0 | m | | |
| stories | 5 | | 2 | | | |
| Area | 6,300 | $m^2$ | 1,408.0 | $m^2$ | 7,708.0 | $m^2$ |

F = 220C√A

| | | | | |
|---|---|---|---|---|
| C | 0.8 | | C = | 1.5 wood frame |
| A | 7,708 | $m^2$ | | 1.0 ordinary |
| | | | | 0.8 non-combustile |
| F | 15,452 | l/min | | 0.6 fire-resistive |
| use | 15,000 | l/min | | |

Occupancy Adjustment

| | | | |
|---|---|---|---|
| | | | -25% non-combustile |
| | | | -15% limited combustile |
| Use | -15% | | 0% combustile |
| | | | +15% free burning |
| Adjustment | -2250 | l/min | +25% rapid burning |
| Fire flow | 12,750 | l/min | |

Sprinkler Adjustment

| | | |
|---|---|---|
| Use | -30% | |
| Adjustment | -3825 | l/min |

Exposure Adjustment

| Building Face | Separation (m) | Adjacent Exposed Wall Length | Stories | L*H Factor | Exposure Charge * |
|---|---|---|---|---|---|
| north | 6 | 24 | 3 | 72 | 18% |
| east | 19 | 88 | 2 | 176 | 18% |
| south | >45 | | | | 0% |
| west | 6 | 24 | 3 | 72 | 8% |
| Total | | | | | 44% |

| | | |
|---|---|---|
| Adjustment | 5,610 | l/min |
| Total adjustments | 1,785 | l/min |
| Fire flow | 14,535 | l/min |
| **Use** | **15,000** | **l/min** |
| | **250.0** | **l/s** |

* Exposure charges from Techinical Bulletin ISTB 2018-02 Appendix H (ISO Method)

**Block 11 Fire Flow Requirement from Fire Underwriters Survey**

Building Floor Area Block 11 Back to Back Terrace Towns

| | | |
|---|---|---|
| width | 29.5 | m |
| depth | 15.0 | m |
| stories | 3 | |
| Area | 1,327.5 | $m^2$ |

$F = 220C\sqrt{A}$

| | | | | | |
|---|---|---|---|---|---|
| C | 1.5 | | C = | 1.5 | wood frame |
| A | 1,328 | $m^2$ | | 1.0 | ordinary |
| | | | | 0.8 | non-combustile |
| F | 12,024 | l/min | | 0.6 | fire-resistive |
| use | 12,000 | l/min | | | |

Occupancy Adjustment

| | | | | |
|---|---|---|---|---|
| | | | -25% | non-combustile |
| | | | -15% | limited combustile |
| Use | -15% | | 0% | combustile |
| | | | +15% | free burning |
| Adjustment | -1800 | l/min | +25% | rapid burning |
| Fire flow | 10,200 | l/min | | |

Sprinkler Adjustment

| | | |
|---|---|---|
| Use | 0% | |
| Adjustment | 0 | l/min |

Exposure Adjustment

| Building Face | Separation (m) | Adjacent Exposed Wall Length | Stories | L*H Factor | Exposure Charge * |
|---|---|---|---|---|---|
| north | 15 | 15 | 3 | 45 | 12% |
| east | 22 | 37 | 2 | 74 | 9% |
| south | >45 | | | | 0% |
| west | 28 | 12 | 2 | 24 | 8% |
| Total | | | | | 29% |

| | | |
|---|---|---|
| Adjustment | 2,958 | l/min |
| Total adjustments | 2,958 | l/min |
| Fire flow | 13,158 | l/min |
| **Use** | **13,000** | **l/min** |
| | **216.7** | **l/s** |

* Exposure charges from Techinical Bulletin ISTB 2018-02 Appendix H (ISO Method)

## Block 14 Fire Flow Requirement from Fire Underwriters Survey

Building Floor Area Block 14 Street townhouses

| | | |
|---|---|---|
| width | 36.0 | m |
| depth | 15.0 | m |
| stories | 2 | |
| Area | 1,080.0 | $m^2$ |

F = 220C√A

| | | | | | |
|---|---|---|---|---|---|
| C | 1.5 | | C = | 1.5 | wood frame |
| A | 1,080 | $m^2$ | | 1.0 | ordinary |
| | | | | 0.8 | non-combustile |
| F | 10,845 | l/min | | 0.6 | fire-resistive |
| use | 11,000 | l/min | | | |

Occupancy Adjustment

| | | | | |
|---|---|---|---|---|
| | | | -25% | non-combustile |
| | | | -15% | limited combustile |
| Use | -15% | | 0% | combustile |
| | | | +15% | free burning |
| Adjustment | -1650 | l/min | +25% | rapid burning |
| Fire flow | 9,350 | l/min | | |

Sprinkler Adjustment

| | | |
|---|---|---|
| Use | 0% | |
| Adjustment | 0 | l/min |

Exposure Adjustment

| Building Face | Separation (m) | Adjacent Exposed Wall | | | Exposure Charge * |
|---|---|---|---|---|---|
| | | Length | Stories | L*H Factor | |
| north | 4 | 15 | 2 | 30 | 12% |
| east | >45 | | | | 0% |
| south | 4 | 15 | 2 | 30 | 12% |
| west | 22 | 30 | 3 | 90 | 9% |
| Total | | | | | 33% |

| | | |
|---|---|---|
| Adjustment | 3,086 | l/min |
| Total adjustments | 3,086 | l/min |
| Fire flow | 12,436 | l/min |
| **Use** | **12,000** | **l/min** |
| | **200.0** | **l/s** |

* Exposure charges from Techinical Bulletin ISTB 2018-02 Appendix H (ISO Method)

## Michael Black

**From:** White, Joshua (Planning) <Joshua.White@ottawa.ca>
**Sent:** Friday, October 27, 2017 10:02 AM
**To:** Ryan Magladry
**Subject:** FW: 1208 Old Montreal Road - Boundary Condition Request
**Attachments:** 1208MontrealRoad_Boundary Conditions_05Oct2017.docx

Here are the boundary conditions for this site

I have provided two scenarios:

- Existing conditions – one 406 mm feed on Old Montreal
- Future conditions – the additional of the 2nd 406 mm feed at Dairy.

---

**From:** Ryan Magladry [mailto: ]
**Sent:** Wednesday, October 04, 2017 1:15 PM
**To:** White, Joshua (Planning) <Joshua.White@ottawa.ca>
**Subject:** RE: 1208 Old Montreal Road - Boundary Condition Request

See attached. Locations are approximate, but should be sufficient for this exercise.
Thx

Ryan Magladry

**IBI GROUP**
400-333 Preston Street
Ottawa ON K1S 5N4 Canada
tel +1 613 225 1311 fax +1 613 225 9868



---

**From:** White, Joshua (Planning) [mailto:Joshua.White@ottawa.ca]
**Sent:** Wednesday, October 04, 2017 12:07 PM
**To:** Ryan Magladry <rmagladry@IBIGroup.com>
**Subject:** RE: 1208 Old Montreal Road - Boundary Condition Request

If you could show where the connections are going on this screen shot.

Josh

---

**From:** Ryan Magladry [mailto:rmagladry@IBIGroup.com]
**Sent:** Friday, September 22, 2017 9:26 AM
**To:** White, Joshua (Planning) <Joshua.White@ottawa.ca>
**Cc:** Demetrius Yannoulopoulos <dyannoulopoulos@IBIGroup.com>
**Subject:** 1208 Old Montreal Road - Boundary Condition Request

Good morning Josh,
Subsequent to your preliminary design meeting with Demetrius a few weeks back, we are proceeding with draft plan for the DCR development at 1208 Old Montreal Road. Could we please receive watermain boundary conditions for the proposed development? Attached preliminary demand calculations.

Thanks,

Ryan Magladry

**IBI GROUP**
400-333 Preston Street
Ottawa ON K1S 5N4 Canada
tel +1 613 225 1311 fax +1 613 225 9868



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'

# Boundary Conditions 1208 Montreal Road

## Information Provided

Date provided: September 2017

| Scenario | Demand | |
|---|---|---|
| | L/min | L/s |
| Average Daily Demand | 241.8 | 4.03 |
| Maximum Daily Demand | 603.6 | 10.06 |
| Peak Hour | 1328.4 | 22.1 |
| Fire Flow Demand # 1 | 10000 | 166.7 |
| Fire Flow Demand # 2 | 15000 | 250.0 |

## Scenario 1: Existing Conditions

## Results

### Connection 1 - Old Montreal near Famille-Laporte

| Demand Scenario | Head (m) | Pressure[1] (psi) |
|---|---|---|
| Maximum HGL | 130.2 | 84.4 |
| Peak Hour | 124.8 | 76.8 |
| Max Day plus Fire (10,000 l/min) | 122.3 | 73.2 |
| Max Day plus Fire (15,000 l/min) | 116.9 | 65.6 |

[1] Ground Elevation = 70.8 m

### Connection 2 - Old Montreal near Cartographe

| Demand Scenario | Head (m) | Pressure[1] (psi) |
|---|---|---|
| Maximum HGL | 130.2 | 80.6 |
| Peak Hour | 124.8 | 72.9 |
| Max Day plus Fire (10,000 l/min) | 121.6 | 68.4 |
| Max Day plus Fire (15,000 l/min) | 115.5 | 59.8 |

[1] Ground Elevation = 73.5 m

## Scenario 2: Future Conditions (2nd 406 mm watermain)

# Results

**Connection 1 - Old Montreal near Famille-Laporte**

| Demand Scenario | Head (m) | Pressure[1] (psi) |
|---|---|---|
| Maximum HGL | 130.2 | 84.4 |
| Peak Hour | 124.8 | 76.8 |
| Max Day plus Fire (10,000 l/min) | 123.6 | 75.0 |
| Max Day plus Fire (15,000 l/min) | 119.6 | 69.4 |

[1] Ground Elevation = 70.8 m

**Connection 2 - Old Montreal near Cartographe**

| Demand Scenario | Head (m) | Pressure[1] (psi) |
|---|---|---|
| Maximum HGL | 130.2 | 80.6 |
| Peak Hour | 124.8 | 73.0 |
| Max Day plus Fire (10,000 l/min) | 123.2 | 70.7 |
| Max Day plus Fire (15,000 l/min) | 118.9 | 64.5 |

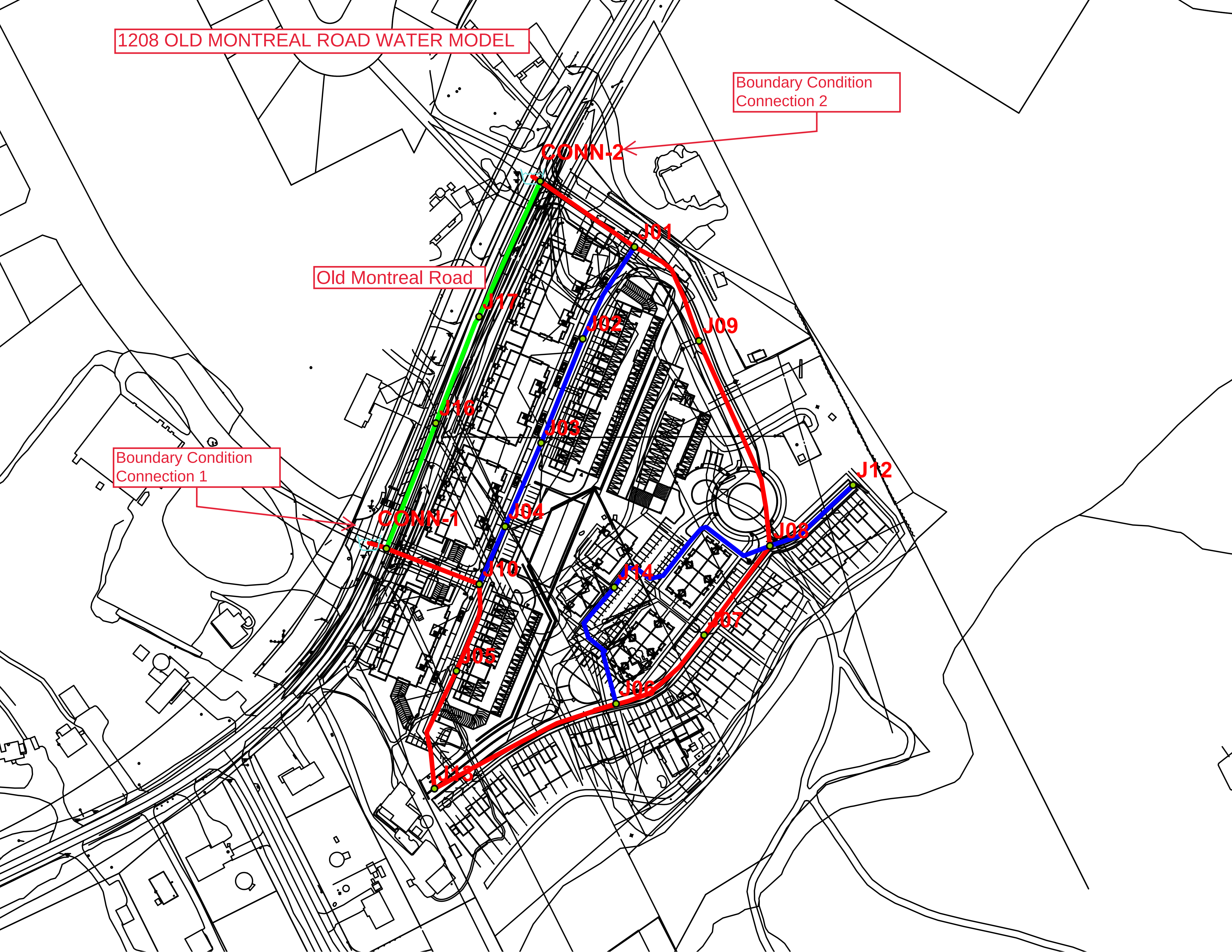
[1] Ground Elevation = 73.5 m

# Notes:

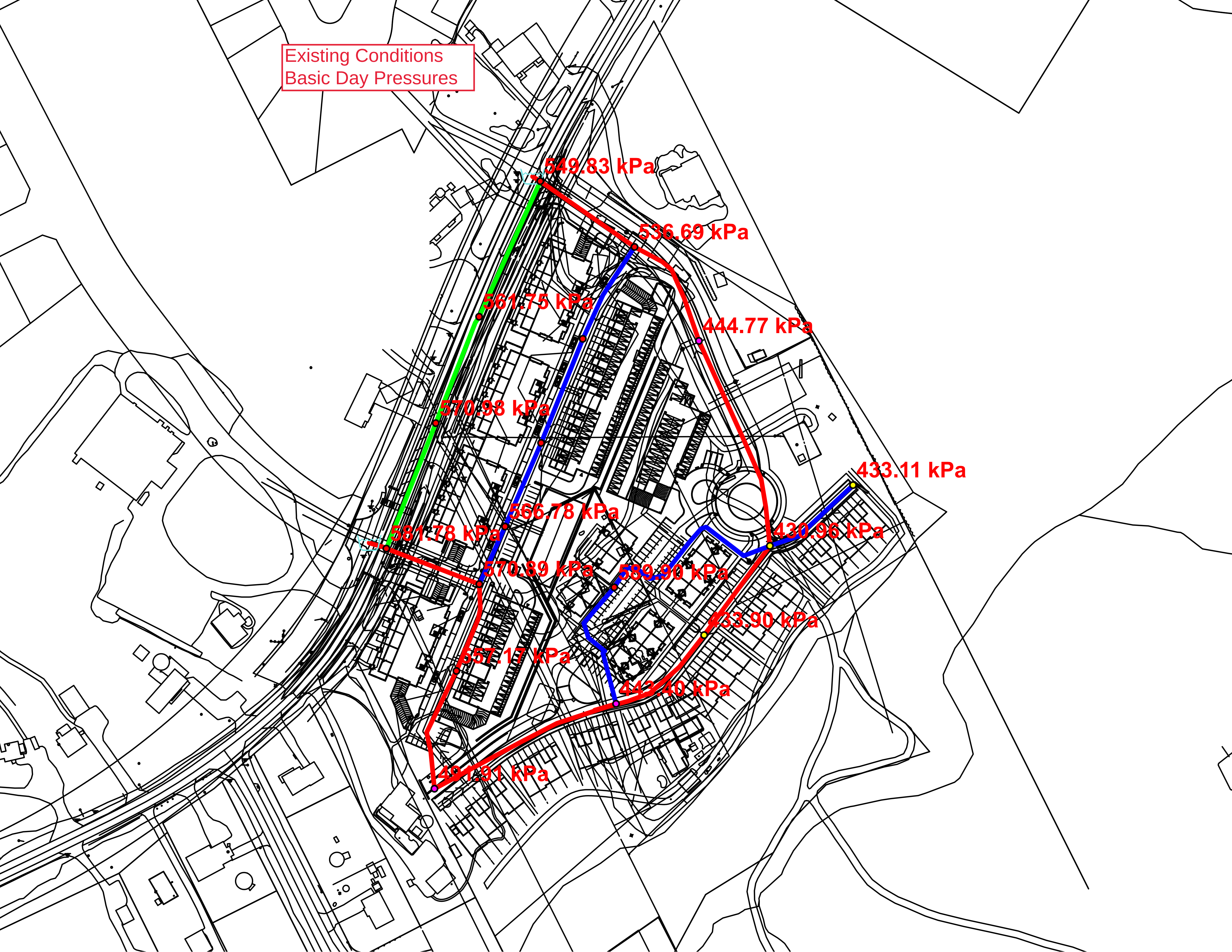
1) As per the Ontario Building Code in areas that may be occupied, the static pressure at any fixture shall not exceed 552 kPa (80 psi.) Pressure control measures to be considered are as follows, in order of preference:
   a) If possible, systems to be designed to residual pressures of 345 to 552 kPa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

# Disclaimer

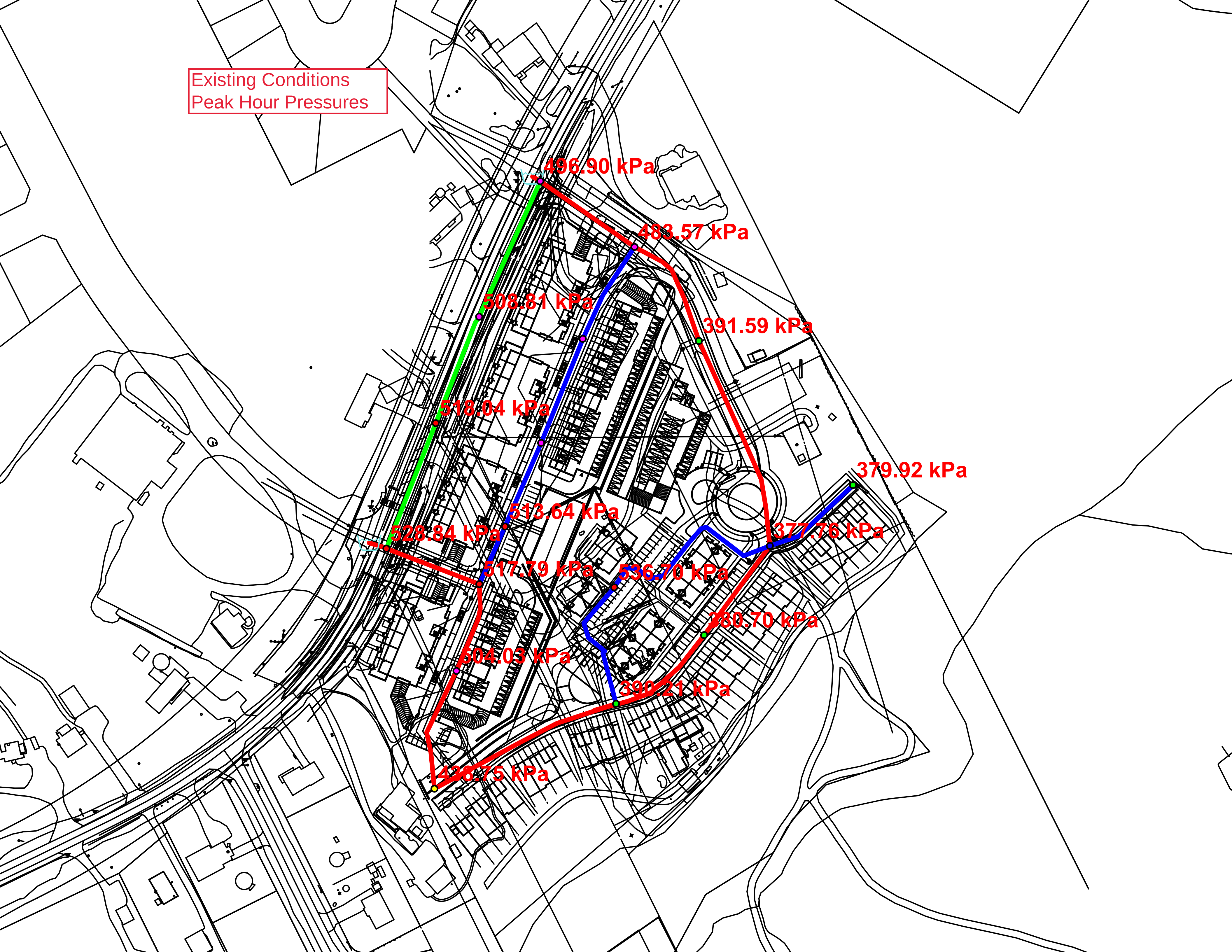
*The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary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

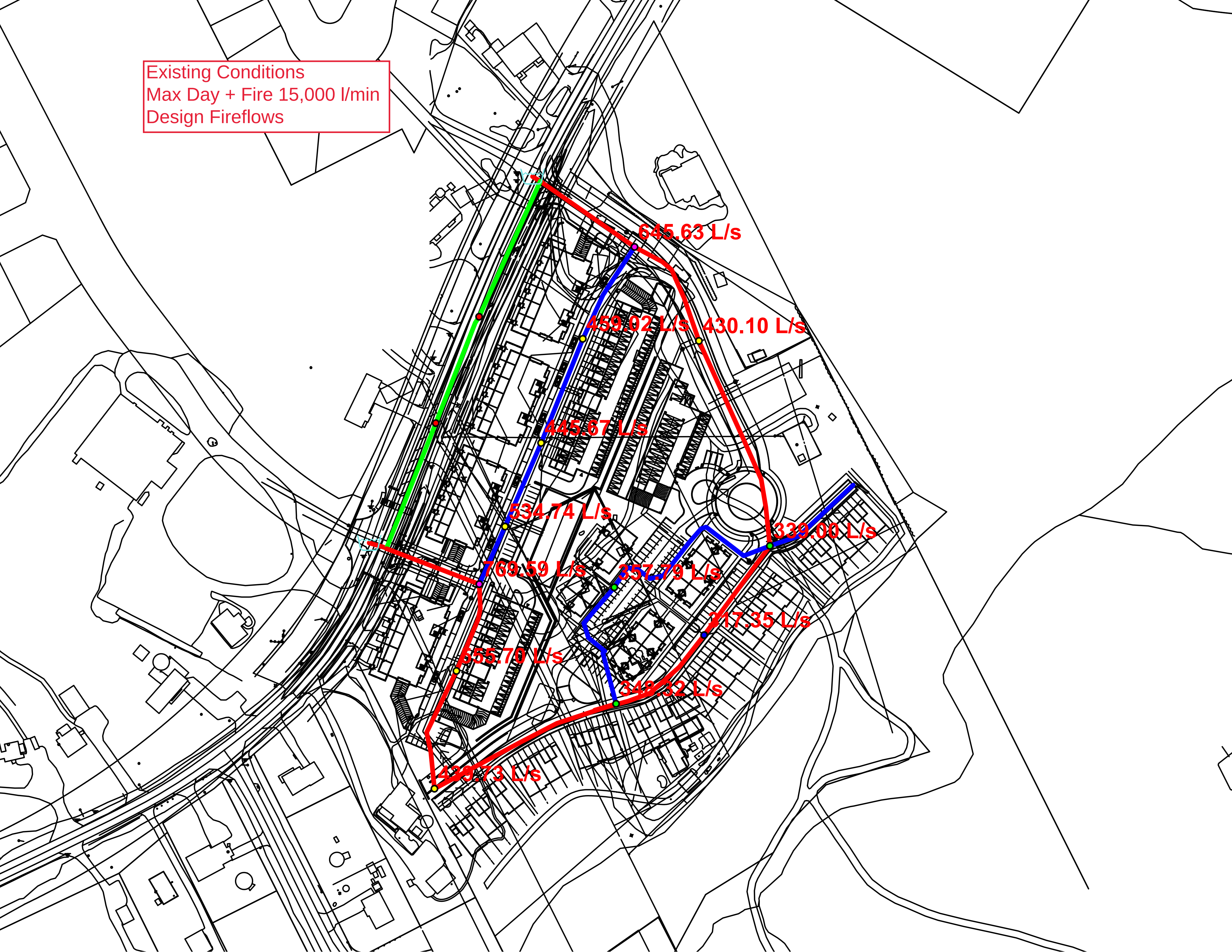


1208 OLD MONTREAL ROAD WATER MODEL
Boundary Condition Connection 2
CONN-2
J01
Old Montreal Road
J17
J02
J09
J16
J03
Boundary Condition Connection 1
J12
CONN-1
J04
J08
J10
J14
J07
J05
J06
J13



Existing Conditions
Basic Day Pressures
549.83 kPa
536.69 kPa
561.75 kPa
444.77 kPa
570.98 kPa
433.11 kPa
566.78 kPa
581.78 kPa
430.96 kPa
570.89 kPa
589.90 kPa
433.90 kPa
557.17 kPa
443.40 kPa
491.91 kPa


Existing Conditions
Peak Hour Pressures
496.90 kPa
483.57 kPa
508.81 kPa
391.59 kPa
518.04 kPa
379.92 kPa
513.64 kPa
528.84 kPa
377.76 kPa
517.79 kPa
536.70 kPa
380.70 kPa
504.03 kPa
390.21 kPa
426.75 kPa



Existing Conditions
Max Day + Fire 15,000 l/min
Design Fireflows
645.63 L/s
459.02 L/s
430.10 L/s
445.67 L/s
534.74 L/s
339.00 L/s
769.59 L/s
357.79 L/s
317.35 L/s
555.70 L/s
348.32 L/s
439.73 L/s

Basic Day (Max HGL) - Junction Report

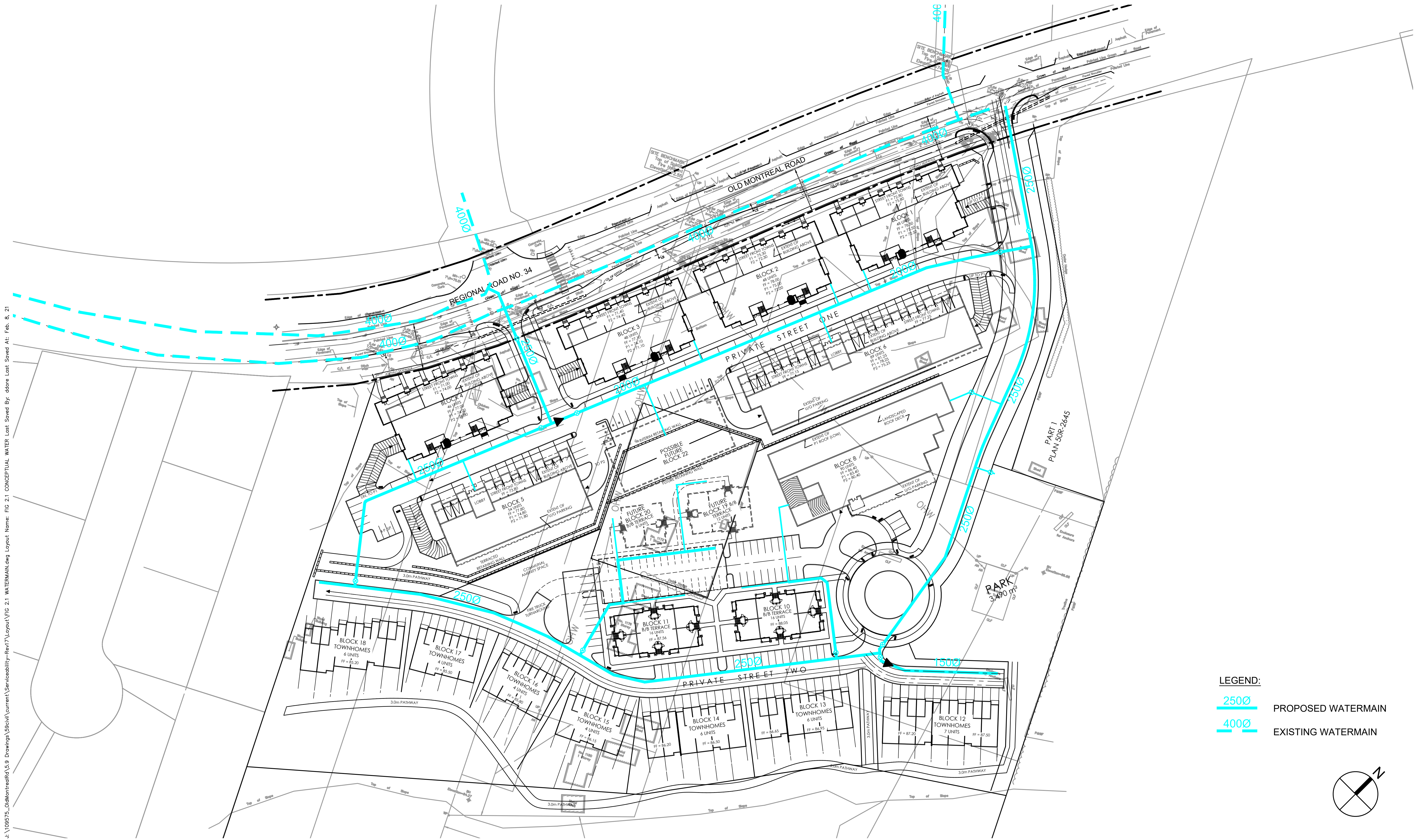
| | | ID | Demand (L/s) | Elevation (m) | Head (m) | Pressure (kPa) |
|---|---|---|---|---|---|---|
| 1 | ☐ | J01 | 0.56 | 75.43 | 130.20 | 536.69 |
| 2 | ☐ | J02 | 0.37 | 74.50 | 130.20 | 545.81 |
| 3 | ☐ | J03 | 0.37 | 73.28 | 130.20 | 557.76 |
| 4 | ☐ | J04 | 0.31 | 72.36 | 130.20 | 566.78 |
| 5 | ☐ | J05 | 0.37 | 73.34 | 130.20 | 557.17 |
| 6 | ☐ | J06 | 0.09 | 84.95 | 130.20 | 443.40 |
| 7 | ☐ | J07 | 0.24 | 85.92 | 130.20 | 433.90 |
| 8 | ☐ | J08 | 0.24 | 86.22 | 130.20 | 430.96 |
| 9 | ☐ | J09 | 0.66 | 84.81 | 130.20 | 444.77 |
| 10 | ☐ | J10 | 0.34 | 71.94 | 130.20 | 570.89 |
| 11 | ☐ | J11 | 0.07 | 74.09 | 130.20 | 549.83 |
| 12 | ☐ | J12 | 0.08 | 86.00 | 130.20 | 433.11 |
| 13 | ☐ | J13 | 0.11 | 80.00 | 130.20 | 491.91 |
| 14 | ☐ | J14 | 0.22 | 70.00 | 130.20 | 589.90 |
| 15 | ☐ | J15 | 0.07 | 70.83 | 130.20 | 581.78 |
| 16 | ☐ | J16 | 0.07 | 71.93 | 130.20 | 570.98 |
| 17 | ☐ | J17 | 0.07 | 72.87 | 130.20 | 561.75 |

| | | ID | Demand (L/s) | Elevation (m) | Head (m) | Pressure (kPa) |
|---|---|---|---|---|---|---|
| 1 | ☐ | J01 | 3.09 | 75.43 | 124.78 | 483.57 |
| 2 | ☐ | J02 | 2.05 | 74.50 | 124.78 | 492.66 |
| 3 | ☐ | J03 | 2.05 | 73.28 | 124.78 | 504.61 |
| 4 | ☐ | J04 | 1.68 | 72.36 | 124.78 | 513.64 |
| 5 | ☐ | J05 | 2.03 | 73.34 | 124.78 | 504.03 |
| 6 | ☐ | J06 | 0.48 | 84.95 | 124.77 | 390.21 |
| 7 | ☐ | J07 | 1.32 | 85.92 | 124.77 | 380.70 |
| 8 | ☐ | J08 | 1.32 | 86.22 | 124.77 | 377.76 |
| 9 | ☐ | J09 | 3.61 | 84.81 | 124.77 | 391.59 |
| 10 | ☐ | J10 | 1.88 | 71.94 | 124.78 | 517.79 |
| 11 | ☐ | J11 | 0.36 | 74.09 | 124.80 | 496.90 |
| 12 | ☐ | J12 | 0.42 | 86.00 | 124.77 | 379.92 |
| 13 | ☐ | J13 | 0.60 | 80.00 | 124.77 | 438.75 |
| 14 | ☐ | J14 | 1.20 | 70.00 | 124.77 | 536.70 |
| 15 | ☐ | J15 | 0.36 | 70.83 | 124.80 | 528.84 |
| 16 | ☐ | J16 | 0.36 | 71.93 | 124.80 | 518.04 |
| 17 | ☐ | J17 | 0.36 | 72.87 | 124.80 | 508.81 |

| | | 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) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ☐ | J01 | 251.40 | 780.79 | J09 | 70.94 | 92.05 | 645.63 | 139.96 | 215.81 |
| 2 | ☐ | J02 | 250.93 | 459.02 | J02 | 139.96 | 88.78 | 459.02 | 139.96 | 139.96 |
| 3 | ☐ | J03 | 250.93 | 445.67 | J03 | 139.96 | 87.56 | 445.67 | 139.96 | 139.96 |
| 4 | ☐ | J04 | 250.77 | 534.74 | J04 | 139.96 | 86.64 | 534.74 | 139.96 | 139.98 |
| 5 | ☐ | J05 | 250.92 | 609.38 | J06 | 109.97 | 96.17 | 555.70 | 139.96 | 183.26 |
| 6 | ☐ | J06 | 167.22 | 348.32 | J06 | 139.96 | 99.23 | 348.32 | 139.96 | 139.98 |
| 7 | ☐ | J07 | 167.60 | 317.35 | J07 | 139.96 | 100.20 | 317.35 | 139.96 | 139.97 |
| 8 | ☐ | J08 | 250.60 | 339.00 | J08 | 139.96 | 100.50 | 339.00 | 139.96 | 139.96 |
| 9 | ☐ | J09 | 251.64 | 430.10 | J09 | 139.96 | 99.09 | 430.10 | 139.96 | 139.96 |
| 10 | ☐ | J10 | 250.86 | 867.24 | J06 | 99.94 | 95.15 | 769.59 | 139.96 | 197.67 |
| 11 | ☐ | J13 | 250.27 | 439.73 | J13 | 139.96 | 94.28 | 439.73 | 139.96 | 139.97 |
| 12 | ☐ | J14 | 250.55 | 372.74 | J08 | 128.22 | 99.30 | 357.79 | 139.96 | 162.46 |
| 13 | ☐ | J16 | 250.16 | 2,268.60 | J16 | 139.98 | 86.22 | 2,268.68 | 139.96 | 139.96 |
| 14 | ☐ | J17 | 250.16 | 2,275.60 | J17 | 139.98 | 87.16 | 2,275.68 | 139.96 | 139.96 |

Peak Hour - Pipe Report

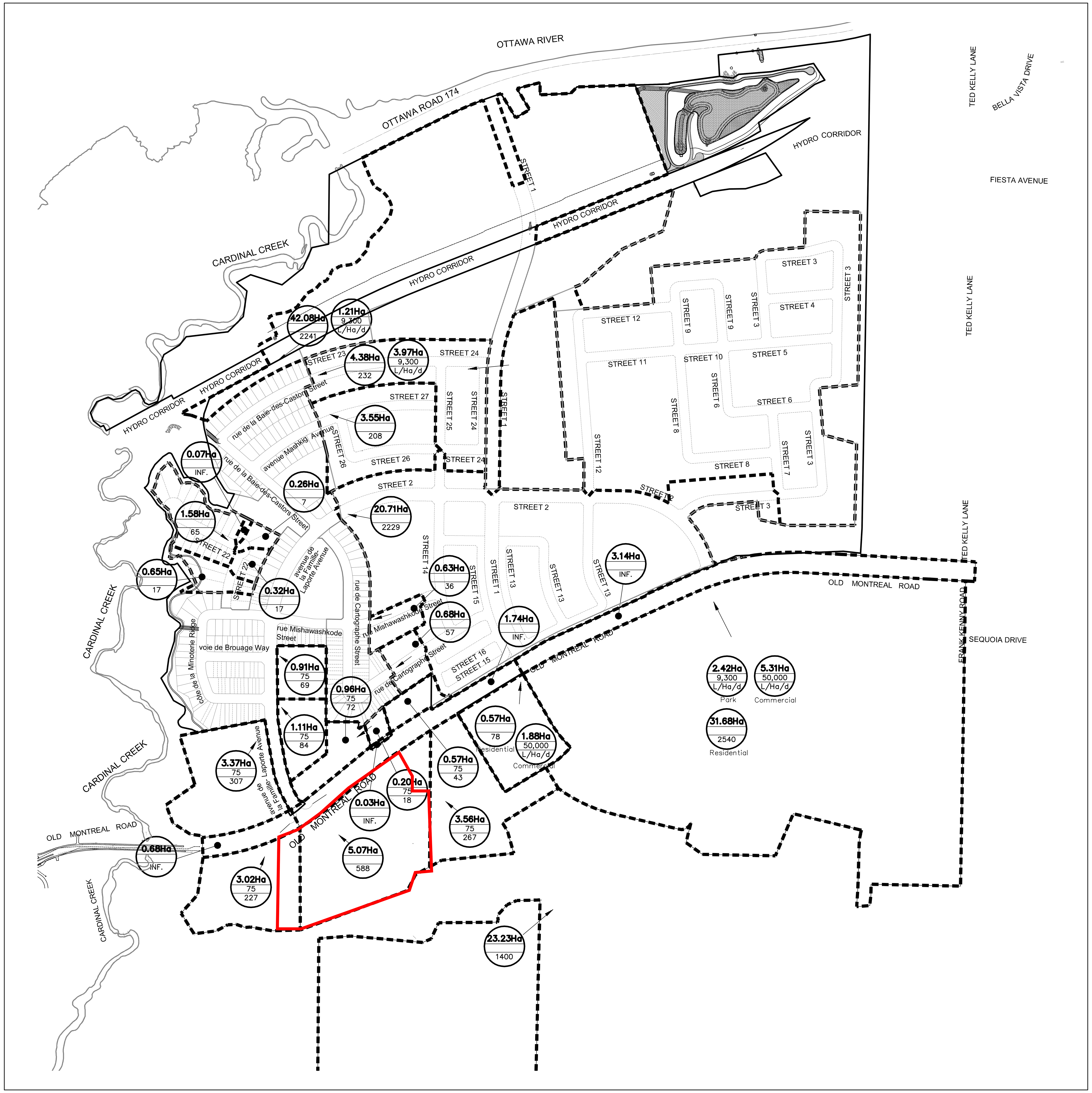
| | | ID | From Node | To Node | Length (m) | Diameter (mm) | Roughness | Flow (L/s) | Velocity (m/s) | Headloss (m) | HL/1000 (m/k-m) | Status | Flow Reversal Count |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ☐ | 1 | J11 | J01 | 56.51 | 250.00 | 110.00 | 10.90 | 0.22 | 0.02 | 0.35 | Open | 0 |
| 2 | ☐ | 10 | J07 | J08 | 54.49 | 250.00 | 110.00 | 0.04 | 0.00 | 0.00 | 0.00 | Open | 0 |
| 3 | ☐ | 11B | J09 | J08 | 107.73 | 250.00 | 110.00 | 1.96 | 0.04 | 0.00 | 0.01 | Open | 0 |
| 4 | ☐ | 12A | J09 | J01 | 58.98 | 250.00 | 110.00 | -5.57 | 0.11 | 0.01 | 0.10 | Open | 0 |
| 5 | ☐ | 2 | J01 | J02 | 51.99 | 204.00 | 110.00 | 2.24 | 0.07 | 0.00 | 0.05 | Open | 0 |
| 6 | ☐ | 3 | J02 | J03 | 55.19 | 204.00 | 110.00 | 0.19 | 0.01 | 0.00 | 0.00 | Open | 0 |
| 7 | ☐ | 4 | J03 | J04 | 44.81 | 204.00 | 110.00 | -1.86 | 0.06 | 0.00 | 0.04 | Open | 0 |
| 8 | ☐ | 5 | J04 | J10 | 31.00 | 204.00 | 110.00 | -3.54 | 0.11 | 0.00 | 0.12 | Open | 0 |
| 9 | ☐ | 6 | J15 | J10 | 48.89 | 250.00 | 110.00 | 10.83 | 0.22 | 0.02 | 0.35 | Open | 0 |
| 10 | ☐ | 7 | J10 | J05 | 44.97 | 250.00 | 110.00 | 5.41 | 0.11 | 0.00 | 0.10 | Open | 0 |
| 11 | ☐ | 8 | J06 | J13 | 98.80 | 250.00 | 110.00 | -2.78 | 0.06 | 0.00 | 0.03 | Open | 0 |
| 12 | ☐ | 9 | J07 | J06 | 78.79 | 250.00 | 110.00 | -1.36 | 0.03 | 0.00 | 0.01 | Open | 0 |
| 13 | ☐ | CONNECTION-C | CONN-2 | J11 | 4.44 | 250.00 | 110.00 | 13.56 | 0.28 | 0.00 | 0.53 | Open | 0 |
| 14 | ☐ | CONNECTION-FL | CONN-1 | J15 | 9.39 | 250.00 | 110.00 | 9.61 | 0.20 | 0.00 | 0.28 | Open | 0 |
| 15 | ☐ | EXISTING-406MM | J15 | J16 | 66.24 | 393.00 | 120.00 | -1.58 | 0.01 | 0.00 | 0.00 | Open | 0 |
| 16 | ☐ | P11 | J08 | J12 | 51.51 | 204.00 | 110.00 | 0.42 | 0.01 | 0.00 | 0.00 | Open | 0 |
| 17 | ☐ | P13 | J05 | J13 | 61.66 | 250.00 | 110.00 | 3.38 | 0.07 | 0.00 | 0.04 | Open | 0 |
| 18 | ☐ | P15 | J08 | J14 | 100.45 | 204.00 | 110.00 | 0.26 | 0.01 | 0.00 | 0.00 | Open | 0 |
| 19 | ☐ | P17 | J06 | J14 | 68.33 | 204.00 | 110.00 | 0.94 | 0.03 | 0.00 | 0.01 | Open | 0 |
| 20 | ☐ | P19 | J16 | J17 | 56.63 | 393.00 | 120.00 | -1.94 | 0.02 | 0.00 | 0.00 | Open | 0 |
| 21 | ☐ | P21 | J17 | J11 | 73.14 | 393.00 | 120.00 | -2.30 | 0.02 | 0.00 | 0.00 | Open | 0 |



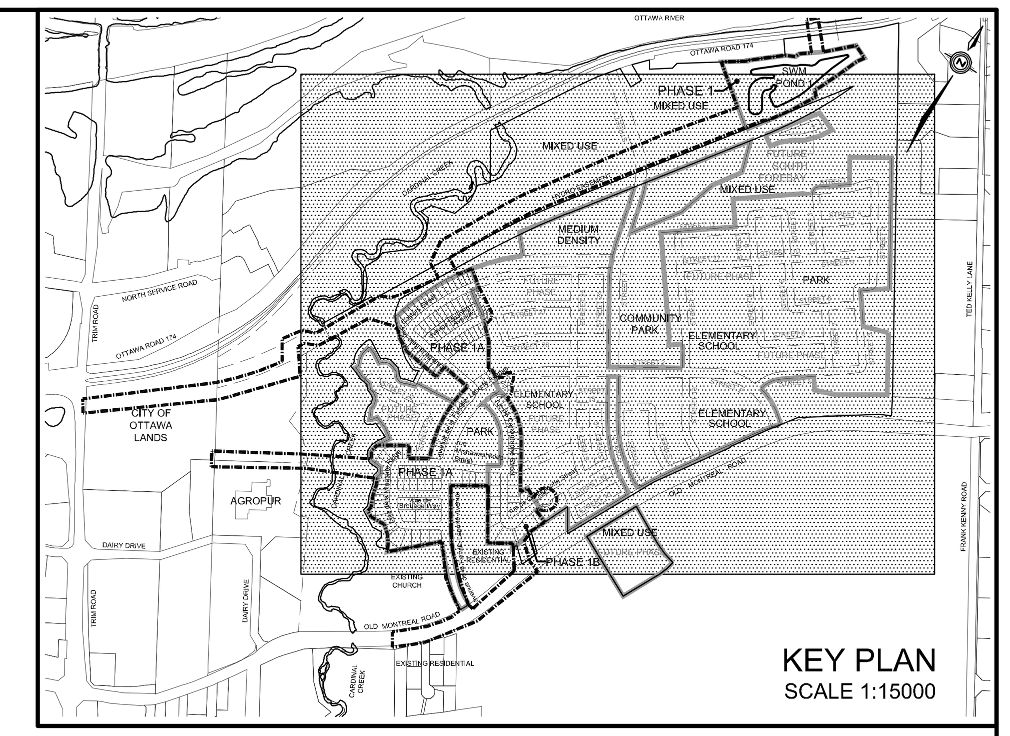

| Scale | Project Title | Drawing Title | Sheet No. |
|---|---|---|---|
| N.T.S. | DCR / PHOENIX<br>1208 OLD MONTREAL ROAD | CONCEPTUAL WATER<br>DISTRIBUTION SYSTEM | FIG 2.1 |

IBI

# APPENDIX B




# EXTERNAL SANITARY DRAINAGE PLAN




**LEGEND**

0.82Ha / 135 / 111 — Residential
- AREA IN HECTARES
- POPULATION DENSITY (PERSONS PER HECTARE)
- POPULATION

EXTERNAL SANITARY TRIBUTARY BOUNDARY

**TOPOGRAPHIC INFORMATION**

TOPOGRAPHIC INFORMATION PROVIDED BY STANTEC GEOMATICS LTD, PROJECT No. 161611900-111 RECEIVED ON JULY 6, 2012 AND PROJECT No. 16162924-111 RECEIVED ON OCTOBER 24, 2013 AND NOVEMBER 29, 2013

**LEGAL INFORMATION**

CALCULATED M-PLAN PROVIDED BY STANTEC GEOMATICS LTD, PROJECT No. 161613098-132 RECEIVED ON APRIL 23, 2014.

2nd SUBMISSION 14-05-01

## NOT FOR CONSTRUCTION

**ELEVATION NOTE**

ELEVATIONS HEREON ARE GEODETIC AND ARE DERIVED FROM THE CAN-NET VRS NETWORK.

| No. | DATE | BY | DESCRIPTION | BY |
|---|---|---|---|---|
| 2. | 14-05-01 | Z.L. | 2nd SUBMISSION | |
| 1. | 14-02-07 | Z.L. | 1st SUBMISSION | |

Ottawa CITY OF OTTAWA

PROJECT No. 11-513 B-1

LICENSED PROFESSIONAL ENGINEER Z. LI 14-05-01 PROVINCE OF ONTARIO

## EXTERNAL SANITARY DRAINAGE PLAN

© DSEL

TAMARACK (CARDINAL CREEK) CORPORATION

CARDINAL CREEK VILLAGE PHASE 1

DSEL david schaeffer engineering ltd
120 Iber Road, Unit 203
Stittsville, ON K2S 1E9
Tel. (613) 836-0856
Fax. (613) 836-7183
www.DSEL.ca

| | | | | | |
|---|---|---|---|---|---|
| DRAWN BY: | W.L./H.P. | CHECKED BY: | K.M. | DRAWING NO. | SHEET NO. |
| DESIGNED BY: | K.M. | CHECKED BY: | Z.L. | | 63A |
| SCALE: | 1:4000 | DATE: | FEBRUARY 2014 | | |

K:\11513\Phase1\Subm2\Tributary\63A_513ExtSan.dwg, 02/05/2014 12:39:03 PM, will

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

**SANITARY SEWER DESIGN SHEET**

1208 OLD MONTREAL ROAD
CITY OF OTTAWA
DCR/Phoenix Homes

| LOCATION | | | | RESIDENTIAL | | | | | | | | | | ICI AREAS | | | | | | | INFILTRATION ALLOWANCE | | | FIXED FLOW (L/s) | | TOTAL | PROPOSED SEWER DESIGN | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STREET | AREA ID | FROM MH | TO MH | AREA w/ Units (Ha) | UNIT TYPES SF | UNIT TYPES SD | UNIT TYPES TH | UNIT TYPES APT | AREA w/o Units (Ha) | POPULATION IND | POPULATION CUM | PEAK FACTOR | PEAK FLOW (L/s) | AREA (Ha) INSTITUTIONAL IND | AREA (Ha) INSTITUTIONAL CUM | AREA (Ha) COMMERCIAL IND | AREA (Ha) COMMERCIAL CUM | AREA (Ha) INDUSTRIAL IND | AREA (Ha) INDUSTRIAL CUM | PEAK FLOW (L/s) | AREA (Ha) IND | AREA (Ha) CUM | FLOW (L/s) | IND | CUM | FLOW (L/s) | CAPACITY (L/s) | LENGTH (m) | DIA (mm) | SLOPE (%) | VELOCITY (full) (m/s) | AVAILABLE CAPACITY L/s | AVAILABLE CAPACITY (%) |
| **VERIFICATION OF RESIDUAL CAPACITY IN DOWNSTREAM SEWERS** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| using 2014 design criteria | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FUTURE RES | | | | | | | | | 3.56 | 267.0 | 267.0 | | | | NOTES: | | | | | | | | | | | | | | | | | | |
| **FUTURE RES** | | | | | | | | | **5.07** | **588.0** | **588.0** | | | | 1. Population counts extracted directly from MOECC and City | | | | | | | | | | | | | | | | | | |
| FUTURE RES | | | | | | | | | 0.57 | 43.0 | 43.0 | | | | Design by DSEL (2014) | | | | | | | | | | | | | | | | | | |
| FUTURE RES | | | | | | | | | 0.96 | 72.0 | 72.0 | | | | 2. DSEL external drainage area plan shows a population of | | | | | | | | | | | | | | | | | | |
| EXTERNAL | | | | | | | | | 1.74 | 0.0 | 0.0 | | | | 227 for the arae measuring 3.02Ha. This population was | | | | | | | | | | | | | | | | | | |
| EXTERNAL | | | | | | | | | 0.11 | 0.0 | 0.0 | | | | omitted from DSEL's design sheet. | | | | | | | | | | | | | | | | | | |
| EXTERNAL | | | | | | | | | 0.03 | 0.0 | 0.0 | | | | | | | | | | | | | | | | | | | | | | |
| EXTERNAL | | | | | | | | | 0.68 | 0.0 | 0.0 | | | | | | | | | | | | | | | | | | | | | | |
| EXTERNAL | | | | | | | | | 0.20 | 18.0 | 18.0 | | | | | | | | | | | | | | | | | | | | | | |
| **FUTURE RES (DSEL MISSING 227)** | | | | | | | | | **3.02** | **227.0** | **227.0** | | | | | | | | | | | | | | | | | | | | | | |
| | | 115A | 116A | 0.07 | | | | | **15.94** | 1215.0 | 1215.0 | 3.74 | 18.43 | | 0.00 | | 0.00 | | 0.00 | 0.00 | 15.94 | 15.94 | 4.46 | | 0.00 | **22.89** | 35.89 | 53.00 | 200 | 1.10 | 1.107 | 13.00 | 36.22% |
| | | | | | | | | | | | | | | | | | | | | | | | | | **2014 DSEL Q** | **19.69** | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | **difference between Actual 2014 and DSEL spreadsheet** | **3.20** | | | | | | | |
| using 2021 design criteria | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FUTURE RES | | | | | | | | | 3.56 | 267.0 | 267.0 | | | | NOTES: | | | | | | | | | | | | | | | | | | |
| **FUTURE RES (DSEL AREA SPLIT - EXTERNAL)** | | | | | | | | | **0.19** | **22.3** | **22.3** | | | | 1. Population counts extracted directly from MOECC and City | | | | | | | | | | | | | | | | | | |
| **FUTURE RES (DSEL AREA SPLIT - DCR/PHOENIX SHARE)** | | | | | | | | | **4.88** | **565.7** | **565.7** | | | | of Ottawa approved Cardinal Creek Village Phase 1A & 1B | | | | | | | | | | | | | | | | | | |
| **FUTURE RES (Additional Intensification Population)** | | | | | | | | | **0.00** | **518.0** | **518.0** | | | | Design by DSEL (2014) | | | | | | | | | | | | | | | | | | |
| FUTURE RES | | | | | | | | | 0.57 | 43.0 | 43.0 | | | | 2. DSEL external drainage area plan shows a population of | | | | | | | | | | | | | | | | | | |
| FUTURE RES | | | | | | | | | 0.96 | 72.0 | 72.0 | | | | 227 for the arae measuring 3.02Ha. This population was | | | | | | | | | | | | | | | | | | |
| EXTERNAL | | | | | | | | | 1.74 | 0.0 | 0.0 | | | | omitted from DSEL's design sheet. | | | | | | | | | | | | | | | | | | |
| EXTERNAL | | | | | | | | | 0.11 | 0.0 | 0.0 | | | | 3. Due to intensification, DCR/Phoenix lands population | | | | | | | | | | | | | | | | | | |
| EXTERNAL | | | | | | | | | 0.03 | 0.0 | 0.0 | | | | exceeds the original design estimate. | | | | | | | | | | | | | | | | | | |
| EXTERNAL | | | | | | | | | 0.68 | 0.0 | 0.0 | | | | | | | | | | | | | | | | | | | | | | |
| EXTERNAL | | | | | | | | | 0.20 | 18.0 | 18.0 | | | | | | | | | | | | | | | | | | | | | | |
| **FUTURE RES (DSEL AREA SPLIT - EXTERNAL)** | | | | | | | | | **2.53** | **190.2** | **190.2** | | | | | | | | | | | | | | | | | | | | | | |
| **FUTURE RES (DSEL AREA SPLIT - DCR/PHOENIX SHARE)** | | | | | | | | | **0.49** | **36.8** | **36.8** | | | | | | | | | | | | | | | | | | | | | | |
| | | 115A | 116A | 0.07 | | | | | **15.94** | 1733.0 | 1733.0 | 3.63 | 20.41 | | 0.00 | | 0.00 | | 0.00 | 0.00 | 15.94 | 15.94 | 5.26 | | 0.00 | 25.67 | 35.89 | 53.00 | 200 | 1.10 | 1.107 | 10.22 | 28.48% |
| | | | | | | | | | | | | | | | | | | | | | | | | | **2021 proposed Q** | 25.67 | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | **ACTUAL INCREASED Q** | **2.78** | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | **difference between and DSEL spreadsheet AND PROPOSED 2021** | **5.98** | | | | | | | |

**Design Parameters:**

| Residential | | | ICI Areas | | | Peak Factor |
|---|---|---|---|---|---|---|
| SF | 3.4 | p/p/u | | | | |
| TH/SD | 2.7 | p/p/u | INST | 50,000 | L/Ha/day | 1.5 |
| APT | 1.8 | p/p/u | COM | 50,000 | L/Ha/day | 1.5 |
| Other | 60 | p/p/Ha | IND | 35,000 | L/Ha/day | MOE Chart |
| | | | | 17000 | L/Ha/day | |

**Notes:**

| | 2014 | 2021 |
|---|---|---|
| 1. Mannings coefficient (n) = | 0.013 | |
| 2. Demand (per capita): | 350 L/day | 280 L/day |
| 3. Infiltration allowance: | 0.28 L/s/Ha | 0.33 |
| 4. Residential Peaking Factor: | | |

Harmon Formula = 1+(14/(4+P^0.5))
where P = population in thousands

**Designed:** RM

**Checked:** DY

**Dwg. Reference:** 109575-FIG 3.3

| No. | Revision | Date |
|---|---|---|
| 1. | Adequacy of Public Services - Submission No. 1 | 2017-12-21 |
| 2 | Adequacy of Public Services - Submission No. 2 | 2021-02-12 |

| File Reference: | Date: | Sheet No: |
|---|---|---|
| 109575.5.7.1 | 2021-02-12 | 1 of 1 |

**SANITARY SEWER CALCULATION SHEET**

Manning's n=0.013

Ottawa

| LOCATION: STREET | FROM M.H. | TO M.H. | RESIDENTIAL AREA AND POPULATION: AREA (ha) | UNITS | POP. | CUMULATIVE AREA (ha) | CUMULATIVE POP. | PEAK FACT. | PEAK FLOW (l/s) | COMM AREA (ha) | COMM ACCU. AREA (ha) | INDUST AREA (ha) | INDUST ACCU. AREA (ha) | INSTIT AREA (ha) | INSTIT ACCU. AREA (ha) | C+I+I PEAK FLOW (l/s) | INFILTRATION TOTAL AREA (ha) | INFILTRATION ACCU. AREA (ha) | INFILT. FLOW (l/s) | TOTAL FLOW (l/s) | PIPE DIST (m) | DIA (mm) | SLOPE (%) | CAP. (FULL) (l/s) | RATIO Q act/Q cap | VEL. (FULL) (m/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **rue de Cartographe Street** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Contribution From rue de Cartographe Street (Future Phase), Pipe MH 150A -151A | | | | | | 0.68 | 56.7 | | | | | | | | | | 0.68 | | | | | | | | | |
| | 151A | 152A | 0.58 | 14 | 37.8 | 1.26 | 94.5 | 4.00 | 1.53 | | | | | | | | 0.58 | 1.26 | 0.35 | 1.88 | 81.5 | 200 | 2.50 | 51.86 | 0.04 | 1.65 |
| | 152A | 1520A | 0.19 | 3 | 8.1 | 1.45 | 102.6 | 4.00 | 1.66 | | | | | | | | 0.19 | 1.45 | 0.41 | 2.07 | 10.5 | 200 | 2.20 | 48.65 | 0.04 | 1.55 |
| | 1520A | 153A | 0.21 | 4 | 10.8 | 1.47 | 105.3 | 4.00 | 1.71 | | | | | | | | 0.21 | 1.47 | 0.41 | 2.12 | 15.5 | 200 | 2.20 | 48.65 | 0.04 | 1.55 |
| | 153A | 154A | 0.88 | 28 | 75.6 | 2.33 | 178.2 | 4.00 | 2.89 | | | | | | | | 0.88 | 2.33 | 0.65 | 3.54 | 116.0 | 200 | 1.50 | 40.17 | 0.09 | 1.28 |
| To rue de Cartographe Street, Pipe 154A - 207A | | | | | | 2.33 | 178.2 | | | | | | | | | | | 2.33 | | | | | | | | |
| **rue Mishawashkode Street** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Contribution From rue de Cartographe Street (Future Phase), Pipe MH 222A -155A | | | | | | 0.63 | 37.8 | | | | | | | | | | 0.63 | | | | | | | | | |
| | 155A | 154A | 0.07 | | | 0.70 | 37.8 | 4.00 | 0.61 | | | | | | | | 0.07 | 0.70 | 0.20 | 0.81 | 30.5 | 200 | 3.20 | 58.67 | 0.01 | 1.87 |
| To rue de Cartographe Street, Pipe 154A - 207A | | | | | | 0.70 | 37.8 | | | | | | | | | | | 0.70 | | | | | | | | |
| | | | 0.06 | | | 0.06 | 0.0 | | | | | | | | | | 0.06 | 0.06 | | | | | | | | |
| | 120A | 121A | 0.15 | 4 | 10.8 | 0.21 | 10.8 | 4.00 | 0.18 | | | | | | | | 0.15 | 0.21 | 0.06 | 0.24 | 23.5 | 200 | 4.50 | 69.58 | 0.00 | 2.21 |
| | | | | | | | | | | | | | | | | | Splash Pad 5.0 L/s Flow Allowance | | | 5.00 | | | | | | |
| Contribution from BLOCK 141 (Park) | | | | | | | | | | | | | | 1.29 | 1.29 | 0.14 | 1.29 | 1.29 | 0.36 | 5.50 | 11.0 | 200 | 1.00 | 32.80 | 0.17 | 1.04 |
| | 121A | 113A | 0.36 | 8 | 21.6 | 0.57 | 32.4 | 4.00 | 0.53 | | | | | | 1.29 | 0.14 | 0.36 | 1.86 | 0.52 | 6.19 | 79.0 | 200 | 3.00 | 56.81 | 0.11 | 1.81 |
| To côte de la Minoterie Ridge, Pipe 113A - 114A | | | | | | 0.57 | 32.4 | | | | | | | 1.29 | | | | 1.86 | | 5.00 | | | | | | |
| **rue de Cartographe Street** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Contribution From rue Mishawashkode Street, Pipe 155A -154A | | | | | | 0.70 | 37.8 | | | | | | | | | | 0.70 | | | | | | | | | |
| Contribution From rue de Cartographe Street, Pipe 153A -154A | | | | | | 2.33 | 178.2 | | | | | | | | | | 2.33 | | | | | | | | | |
| | 154A | 207A | 0.36 | 5 | 17.0 | 3.39 | 233.0 | 4.00 | 3.78 | | | | | | | | 0.36 | 3.39 | 0.95 | 4.73 | 87.0 | 200 | 1.20 | 35.93 | 0.13 | 1.14 |
| | 207A | 208A | 0.21 | 3 | 10.2 | 3.60 | 243.2 | 4.00 | 3.94 | | | | | | | | 0.21 | 3.60 | 1.01 | 4.95 | 30.5 | 200 | 1.20 | 35.93 | 0.14 | 1.14 |
| | 208A | 209A | 0.20 | 3 | 10.2 | 3.80 | 253.4 | 4.00 | 4.11 | | | | | | | | 0.20 | 3.80 | 1.06 | 5.17 | 28.5 | 200 | 2.10 | 47.53 | 0.11 | 1.51 |
| | | | 0.01 | | | 3.81 | 253.4 | 2.00 | 2.05 | | | | | | | | 0.01 | 3.81 | | | | | | | | |
| | 209A | [illegible] | [illegible] | [illegible] | 6.8 | 3.97 | 260.2 | 4.00 | 4.22 | | | | | | | | 0.16 | 3.97 | 1.11 | 5.33 | 38.5 | 200 | 0.80 | 29.34 | 0.18 | 0.93 |
| To rue de la Baie-des-Castors Street, Pipe 144A - 145A | | | | | | 3.97 | 260.2 | | | | | | | | | | | 3.97 | | | | | | | | |
| **avenue de la Famille-Laporte Avenue** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Contribution From FUTURE RESIDENTIAL | | | 3.56 | - | 207.6 | 3.56 | 207.6 | | | | | | | | | | 3.56 | 3.56 | | | | | | | | |
| Contribution From FUTURE RESIDENTIAL | | | 5.07 | - | 588.0 | 5.07 | 588.0 | | | | | | | | | | 5.07 | 5.07 | | | | | | | | |
| Contribution From FUTURE RESIDENTIAL | | | 0.57 | | 43 | 0.57 | 43.0 | | | | | | | | | | 0.57 | 0.57 | | | | | | | | |
| Contribution From FUTURE RESIDENTIAL | | | 0.96 | - | 72 | 0.96 | 72.0 | | | | | | | | | | 0.96 | 0.96 | | | | | | | | |
| Contribution From EXTERNAL | | | 1.74 | | | 1.74 | | | | | | | | | | | 1.74 | 1.74 | | | | | | | | |
| Contribution From EXTERNAL | | | 0.11 | | | 0.11 | | | | | | | | | | | 0.11 | 0.11 | | | | | | | | |
| Contribution From EXTERNAL | | | 0.03 | | | 0.03 | | | | | | | | | | | 0.03 | 0.03 | | | | | | | | |
| Contribution From EXTERNAL | | | 0.68 | | | 0.68 | | | | | | | | | | | 0.68 | 0.68 | | | | | | | | |
| Contribution From EXTERNAL | | | 0.20 | - | 18.0 | 0.20 | 18.0 | | | | | | | | | | 0.20 | 0.20 | | | | | | | | |
| Contribution From FUTURE RESIDENTIAL | | | 3.02 | | | 3.02 | 0.0 | | | | | | | | | | 3.02 | 3.02 | | | | | | | | |
| | 115A | 116A | 0.07 | | | 16.01 | 988.0 | 3.80 | 15.21 | | | | | | | | 0.07 | 16.01 | 4.48 | 19.69 | 53.0 | 200 | 1.10 | 34.40 | 0.57 | 1.09 |
| | 116A | 117A | 0.10 | | | 16.11 | 988.0 | 3.80 | 15.21 | | | | | | | | 0.10 | 16.11 | 4.51 | 19.72 | 41.5 | 200 | 1.10 | 34.40 | 0.57 | 1.09 |
| | 117A | 1170A | 0.19 | | | 16.30 | 988.0 | 3.80 | 15.21 | | | | | | | | 0.19 | 16.30 | 4.56 | 19.77 | 81.0 | 200 | 1.90 | 45.21 | 0.44 | 1.44 |

Population 227 omitted from design sheet

Portion of DCR/ Phoenix Lands

Portion of DCR/ Phoenix Lands

Residual Capacity exceeds **5.98l/s**, refer to IBI sewer design sheet for calculations

LICENSED PROFESSIONAL ENGINEER
Z. LI
PROVINCE OF ONTARIO

DESIGN PARAMETERS

| | | | | | |
|---|---|---|---|---|---|
| Average Daily Flow = | 350 | l/p/day | Industrial Peak Factor = as per MOE Graph | | |
| Commercial/Institution Flow = | 50000 | L/ha/da | Extraneous Flow = | 0.280 | L/s/ha |
| Industrial Flow = | 35000 | L/ha/da | Minimum Velocity = | 0.760 | m/s |
| Max Res. Peak Factor = | 4.00 | | Manning's n = | 0.013 | |
| Commercial/Institution peak Factor = | 1.50 | | Townhouse/Semi coeff= | 2.7 | |
| Park Average Flow = | 9300 | L/ha/da | Single house coeff= | 3.4 | |

| | | | |
|---|---|---|---|
| Designed: K.M. | PROJECT: CARDINAL CREEK VILLLAGE PHASE 1 | | |
| Checked: Z.L. | LOCATION: City of Ottawa | | |
| Dwg. Reference: Sanitary Drainage Plan, Dwg. No. 57 - 58 | File Ref: 11-513B-1 | Date: May, 2014 | Sheet No. 1 of 5 |

## SANITARY SEWER CALCULATION SHEET

Manning's n=0.013

Ottawa

| STREET (LOCATION) | FROM M.H. | TO M.H. | RESIDENTIAL AREA (ha) | UNITS | POP. | CUMULATIVE AREA (ha) | CUMULATIVE POP. | PEAK FACT. | PEAK FLOW (l/s) | COMM AREA (ha) | COMM ACCU. AREA (ha) | INDUST AREA (ha) | INDUST ACCU. AREA (ha) | INSTIT AREA (ha) | ACCU. AREA (ha) | C+I+I PEAK FLOW (l/s) | INFILTRATION TOTAL AREA (ha) | INFILTRATION ACCU. AREA (ha) | INFILT. FLOW (l/s) | TOTAL FLOW (l/s) | PIPE DIST (m) | DIA (mm) | SLOPE (%) | CAP. (FULL) (l/s) | RATIO Q act/Q cap | VEL. (FULL) (m/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Contribution From FUTURE RESIDENTIAL | | | 1.11 | - | 84.0 | 1.11 | 84.0 | 4.00 | 1.36 | | | | | | | | 1.11 | 1.11 | 0.31 | 1.67 | 12.5 | 200 | 1.00 | 32.80 | 0.05 | 1.04 |
| Contribution From FUTURE RESIDENTIAL | | | 3.37 | - | 534.0 | 3.37 | 534.0 | 3.96 | 8.57 | | | | | | | | 3.37 | 3.37 | 0.94 | 9.51 | 14.0 | 200 | 1.00 | 32.80 | 0.29 | 1.04 |
| | 1170A | 118A | 0.15 | | | 20.93 | 1606.0 | 3.66 | 23.81 | | | | | | | | 0.15 | 20.93 | 5.86 | 29.67 | 57.5 | 250 | 1.00 | 59.47 | 0.50 | 1.21 |
| | 118A | 119A | 0.19 | | | 21.12 | 1606.0 | 3.66 | 23.81 | | | | | | | | 0.19 | 21.12 | 5.91 | 29.72 | 78.5 | 250 | 1.20 | 65.14 | 0.46 | 1.33 |
| Contribution From FUTURE RESIDENTIAL | | | 0.91 | - | 69.0 | 0.91 | 69.0 | 4.00 | 1.12 | | | | | | | | 0.91 | 0.91 | 0.25 | 1.37 | 14.5 | 200 | 1.00 | 32.80 | 0.04 | 1.04 |
| To voie de Brouage Way, Pipe 119A - 109A | | | | | | 22.03 | 1675.0 | | | | | | | | | | | 22.03 | | | | | | | | |
| | 110A | 111A | 0.22 | 2 | 6.8 | 0.22 | 6.8 | 4.00 | 0.11 | | | | | | | | 0.22 | 0.22 | 0.06 | 0.17 | 48.0 | 200 | 1.20 | 35.93 | 0.00 | 1.14 |
| | 111A | 112A | 0.37 | 5 | 17.0 | 0.59 | 23.8 | 4.00 | 0.39 | | | | | | | | 0.37 | 0.59 | 0.17 | 0.56 | 66.0 | 200 | 2.80 | 54.88 | 0.01 | 1.75 |
| | | | 0.17 | 3 | 10.2 | 0.76 | 34.0 | 2.00 | 0.28 | | | | | | | | 0.17 | 0.76 | | | | | | | | |
| | | | 0.11 | 2 | 5.4 | 0.87 | 39.4 | 2.00 | 0.32 | | | | | | | | 0.11 | 0.87 | | | | | | | | |
| | 112A | 113A | 0.09 | 2 | 5.4 | 0.96 | 44.8 | 4.00 | 0.73 | | | | | | | | 0.09 | 0.96 | 0.27 | 1.00 | 64.0 | 200 | 2.50 | 51.86 | 0.02 | 1.65 |
| To côte de la Minoterie Ridge, Pipe 113A - 114A | | | | | | 0.96 | 44.8 | | | | | | | 0.00 | | | | 0.96 | | | | | | | | |
| Contribution From STREET 2 (Future Phase), Pipe MH 211A - 212A | | | | | | 71.92 | 4768.6 | | | 1.88 | | | | 12.69 | | | 86.49 | | | 5.00 | | | | | | |
| | 212A | 144A | 0.26 | 3 | 10.2 | 72.18 | 4778.8 | 3.26 | 63.11 | | 1.88 | | | | 12.69 | 10.81 | 0.26 | 86.75 | 24.29 | 108.21 | 57.0 | 375 | 1.70 | 228.60 | 0.47 | 2.07 |
| To rue de la Baie-des-Castors Street, Pipe 144A - 145A | | | | | | 72.18 | 4778.8 | | | | 1.88 | | | | 12.69 | | | 86.75 | | 5.00 | | | | | | |
| **voie de Brouage Way** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Contribution From avenue de la Famille-Laporte Avenue, Pipe118A - 119A | | | | | | 22.03 | 1675.0 | | | | | | | | | | 22.03 | | | | | | | | | |
| | 119A | 109A | 0.42 | 11 | 29.7 | 22.45 | 1704.7 | 3.64 | 25.14 | | | | | | | | 0.42 | 22.45 | 6.29 | 31.43 | 65.0 | 250 | 1.00 | 59.47 | 0.53 | 1.21 |
| | | | 0.33 | 9 | 24.3 | 22.78 | 1729.0 | 2.00 | 14.01 | | | | | | | | 0.33 | 22.78 | | | | | | | | |
| | 109A | 105A | 0.19 | 2 | 6.8 | 22.97 | 1735.8 | 3.63 | 25.52 | | | | | | | | 0.19 | 22.97 | 6.43 | 31.95 | 65.0 | 250 | 2.50 | 94.03 | 0.34 | 1.92 |
| To côte de la Minoterie Ridge, Pipe 104A - 105A | | | | | | 22.97 | 1735.8 | | | | | | | | | | | 22.97 | | | | | | | | |
| **côte de la Minoterie Ridge** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 100A | 101A | 0.95 | 27 | 72.9 | 0.95 | 72.9 | 4.00 | 1.18 | | | | | | | | 0.95 | 0.95 | 0.27 | 1.45 | 93.5 | 200 | 3.30 | 59.58 | 0.02 | 1.90 |
| | 101A | 102A | 0.11 | 1 | 2.7 | 1.06 | 75.6 | 4.00 | 1.23 | | | | | | | | 0.11 | 1.06 | 0.30 | 1.53 | 10.5 | 200 | 2.90 | 55.85 | 0.03 | 1.78 |
| | 102A | 103A | 0.29 | 4 | 13.6 | 1.35 | 89.2 | 4.00 | 1.45 | | | | | | | | 0.29 | 1.35 | 0.38 | 1.83 | 42.0 | 200 | 2.70 | 53.89 | 0.03 | 1.72 |
| | 104A | 105A | 0.22 | 3 | 10.2 | 1.57 | 99.4 | 4.00 | 1.61 | | | | | | | | 0.22 | 1.57 | 0.44 | 2.05 | 33.0 | 200 | 2.10 | 47.53 | 0.04 | 1.51 |
| Contribution From voie de Brouage Way, Pipe 109A - 105A | | | | | | 22.97 | 1735.8 | | | | | | | | | | 22.97 | | | | | | | | | |
| | 105A | 106A | 0.48 | 5 | 17.0 | 25.02 | 1852.2 | 3.61 | 27.09 | | | | | | | | 0.48 | 25.02 | 7.01 | 34.10 | 67.5 | 250 | 1.00 | 59.47 | 0.57 | 1.21 |
| | 106A | 107A | 0.12 | 1 | 3.4 | 25.14 | 1855.6 | 3.61 | 27.14 | | | | | | | | 0.12 | 25.14 | 7.04 | 34.18 | 15.5 | 250 | 0.80 | 53.19 | 0.64 | 1.08 |
| | 107A | 108A | 0.29 | 5 | 17.0 | 25.43 | 1872.6 | 3.61 | 27.38 | | | | | | | | 0.29 | 25.43 | 7.12 | 34.50 | 32.5 | 250 | 0.80 | 53.19 | 0.65 | 1.08 |
| To STREET 22, Pipe 108A - 200A | | | | | | 25.43 | 1872.6 | | | | | | | | | | | 25.43 | | | | | | | | |

LICENSED PROFESSIONAL ENGINEER
Z. LI
PROVINCE OF ONTARIO

Residual Capacity exceeds **5.98l/s**, refer to IBI sewer design sheet for calculations

DESIGN PARAMETERS

| | | | | | |
|---|---|---|---|---|---|
| Average Daily Flow = | 350 | l/p/day | Industrial Peak Factor = as per MOE Graph | | |
| Commercial/Institution Flow = | 50000 | L/ha/da | Extraneous Flow = | 0.280 | L/s/ha |
| Industrial Flow = | 35000 | L/ha/da | Minimum Velocity = | 0.760 | m/s |
| Max Res. Peak Factor = | 4.00 | | Manning's n = | 0.013 | |
| Commercial/Institution peak Factor = | 1.50 | | Townhouse/Semi coeff= | 2.7 | |
| Park Average Flow = | 9300 | L/ha/da | Single house coeff= | 3.4 | |

| | |
|---|---|
| Designed: K.M. | PROJECT: **CARDINAL CREEK VILLLAGE PHASE 1** |
| Checked: Z.L. | LOCATION: **City of Ottawa** |
| Dwg. Reference: Sanitary Drainage Plan, Dwg. No. 57 - 58 | File Ref: 11-513B-1 / Date: May, 2014 / Sheet No. 2 of 5 |

## SANITARY SEWER CALCULATION SHEET

Manning's n=0.013

Ottawa

| LOCATION | | | RESIDENTIAL AREA AND POPULATION | | | | | | | COMM | | INDUST | | INSTIT | | C+I+I | INFILTRATION | | | | PIPE | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STREET | FROM M.H. | TO M.H. | AREA (ha) | UNITS | POP. | CUMULATIVE AREA (ha) | CUMULATIVE POP. | PEAK FACT. | PEAK FLOW (l/s) | AREA (ha) | ACCU. AREA (ha) | AREA (ha) | ACCU. AREA (ha) | AREA (ha) | ACCU. AREA (ha) | PEAK FLOW (l/s) | TOTAL AREA (ha) | ACCU. AREA (ha) | INFILT. FLOW (l/s) | TOTAL FLOW (l/s) | DIST (m) | DIA (mm) | SLOPE (%) | CAP. (FULL) (l/s) | RATIO Q act/Q cap | VEL. (FULL) (m/s) |
| Contribution From avenue de la Famille-Laporte Avenue, Pipe 112A - 113A | | | | | | 0.96 | 44.8 | | | | | | | 0.00 | | | 0.96 | | | | | | | | | |
| Contribution From rue Mishawashkode Street, Pipe 121A - 113A | | | | | | 0.57 | 32.4 | | | | | | | 1.29 | | | 1.86 | | | 5.00 | | | | | | |
| | | | | | | 1.53 | 77.2 | 2.00 | 0.63 | | | | | | 1.29 | | 0.00 | 2.82 | | | | | | | | |
| | | | 0.17 | | | 1.70 | | | | | | | | | | | | | | | | | | | | |
| | 113A | 114A | 0.12 | 2 | 5.4 | 1.82 | 82.6 | 4.00 | 1.34 | | | | | | 1.29 | 0.14 | 0.12 | 2.94 | 0.82 | 7.30 | 34.0 | 200 | 0.40 | 20.74 | 0.35 | 0.66 |
| | 114A | 108A | 0.22 | 3 | 10.2 | 2.04 | 92.8 | 4.00 | 1.50 | | | | | | 1.29 | 0.14 | 0.22 | 3.16 | 0.88 | 7.52 | 50.0 | 200 | 0.40 | 20.74 | 0.36 | 0.66 |
| To STREET 22, Pipe 108A - 200A | | | | | | 2.04 | 92.8 | | | | | | | 1.29 | | | | 3.16 | | 5.00 | | | | | | |
| **STREET 22** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Contribution From côte de la Minoterie Ridge, Pipe 107A - 108A | | | | | | 25.43 | 1872.6 | | | | | | | | | | 25.43 | | | | | | | | | |
| Contribution From côte de la Minoterie Ridge, Pipe 114A - 108A | | | | | | 2.04 | 92.8 | | | | | | | 1.29 | | | 3.16 | | | 5.00 | | | | | | |
| | | | 0.01 | | | 27.48 | 1965.4 | 2.00 | 15.92 | | | | | | 1.29 | 0.14 | 0.01 | 28.60 | 8.01 | 29.07 | | | | | | |
| | 108A | 200A | 0.17 | 2 | 6.8 | 27.65 | 1972.2 | 3.59 | 28.68 | | | | | | 1.29 | 0.14 | 0.17 | 28.77 | 8.06 | 41.88 | 42.0 | 250 | 0.90 | 56.42 | 0.74 | 1.15 |
| | 200A | 201A | 0.65 | 5 | 17.0 | 28.30 | 1989.2 | 3.59 | 28.93 | | | | | | 1.29 | 0.14 | 0.65 | 29.42 | 8.24 | 42.31 | 38.5 | 250 | 0.90 | 56.42 | 0.75 | 1.15 |
| | 201A | 202A | 0.33 | 5 | 17.0 | 28.63 | 2006.2 | 3.59 | 29.18 | | | | | | 1.29 | 0.14 | 0.33 | 29.75 | 8.33 | 42.65 | 42.0 | 250 | 0.90 | 56.42 | 0.76 | 1.15 |
| | 202A | 203A | 0.26 | 2 | 6.8 | 28.89 | 2013.0 | 3.58 | 29.19 | | | | | | 1.29 | 0.14 | 0.26 | 30.01 | 8.40 | 42.73 | 13.0 | 250 | 0.90 | 56.42 | 0.76 | 1.15 |
| To BLOCK 402 (SERVICING), Pipe 203A - 204A | | | | | | 28.89 | 2013.0 | | | | | | | 1.29 | | | | 30.01 | | 5.00 | | | | | | |
| **BLOCK 402 (SERVICING)** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Contribution From STREET 22 (Future Phase), Pipe 206A - 203A | | | | | | 1.58 | 64.6 | | | | | | | | | | 1.58 | | | | | | | | | |
| Contribution From STREET 22, Pipe 202A - 203A | | | | | | 28.89 | 2013.0 | | | | | | | 1.29 | | | 30.01 | | | 5.00 | | | | | | |
| | 203A | 204A | 0.07 | | | 30.54 | 2077.6 | 3.57 | [illegible] | | | | | | 1.29 | 0.14 | 0.07 | 31.66 | 8.86 | 44.05 | 54.5 | 300 | 0.35 | 57.21 | 0.77 | 0.81 |
| | 204A | 146A | 0.72 | | | 31.26 | 2077.6 | 3.57 | [illegible] | | | | | | 1.29 | 0.14 | 0.72 | 32.38 | 9.07 | 44.26 | 76.5 | 300 | 0.35 | 57.21 | 0.77 | 0.81 |
| To rue de la Baie-des-Castors Street, Pipe 146A - 147A | | | | | | 31.26 | 2077.6 | | | | | | | 1.29 | | | | 32.38 | | 5.00 | | | | | | |
| **avenue Mashkig Avenue** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Contribution From avenue Mashkig Avenue (Future Phase), Pipe MH 804A - 1420A | | | | | | 3.55 | 207.1 | | | | | | | | | | 3.55 | | | | | | | | | |
| | 1420A | 142A | 0.17 | 3 | 10.2 | 3.72 | 217.3 | 4.00 | 3.52 | | | | | | | | 0.17 | 3.72 | 1.04 | 4.56 | 16.5 | 200 | 1.80 | 44.00 | 0.10 | 1.40 |
| | 142A | 143A | 0.48 | 9 | 30.6 | 4.20 | 247.9 | 4.00 | [illegible] | | | | | | | | 0.48 | 4.20 | 1.18 | 5.20 | 61.5 | 200 | 4.80 | 71.86 | 0.07 | 2.29 |
| | 143A | 147A | 0.52 | 8 | 27.2 | 4.72 | 275.1 | 4.00 | 4.46 | | | | | | | | 0.52 | 4.72 | 1.32 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 0.08 | 2.33 |
| To rue de la Baie-des-Castors Street, Pipe 147A - 148A | | | | | | 4.72 | 275.1 | | | | | | | | | | | 4.72 | | | | | | | | |
| **rue de la Baie-des-Castors Street** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Contribution From rue de la Baie-des-Castors Street (Future Phase), Pipe MH 709A - 1220A | | | | | | 4.38 | 231.2 | | | | | | | 3.97 | | | 8.35 | | | | | | | | | |
| | Plug | 122A | | | | 4.38 | 231.2 | 4.00 | 3.75 | | | | | | 3.97 | 0.43 | 0.00 | 8.35 | 2.34 | 16.52 | 19.5 | 200 | 1.20 | 35.93 | 0.46 | 1.14 |
| | 122A | 123A | 0.57 | 11 | 37.4 | 4.95 | 268.6 | 4.00 | 4.35 | | | | | | 3.97 | 0.43 | 0.57 | 8.92 | 2.50 | 17.28 | 64.0 | 200 | 3.50 | 61.36 | 0.28 | 1.95 |
| | 123A | 124A | 0.46 | 8 | 27.2 | 5.41 | 295.8 | 4.00 | 4.79 | | | | | | 3.97 | 0.43 | 0.46 | 9.38 | 2.63 | 17.85 | 60.0 | 200 | 3.40 | 60.48 | 0.30 | 1.93 |
| | 124A | 125A | 0.53 | 9 | 30.6 | 5.94 | 326.4 | 4.00 | 5.29 | | | | | | 3.97 | 0.43 | 0.53 | 9.91 | 2.77 | 18.49 | 70.5 | 200 | 3.50 | 61.36 | 0.30 | 1.95 |
| To BLOCK 256 (SERVICING), Pipe 125A - 126A | | | | | | 5.94 | 326.4 | | | | | | | 3.97 | | | | 9.91 | | 10.00 | | | | | | |

Residual Capacity exceeds **5.98l/s**, refer to IBI sewer design sheet for calculations

LICENSED PROFESSIONAL ENGINEER
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### DESIGN PARAMETERS

| | | | | | |
|---|---|---|---|---|---|
| Average Daily Flow = | 350 | l/p/day | Industrial Peak Factor = as per MOE Graph | | |
| Commercial/Institution Flow = | 50000 | L/ha/da | Extraneous Flow = | 0.280 | L/s/ha |
| Industrial Flow = | 35000 | L/ha/da | Minimum Velocity = | 0.760 | m/s |
| Max Res. Peak Factor = | 4.00 | | Manning's n = | 0.013 | |
| Commercial/Institution peak Factor = | 1.50 | | Townhouse/Semi coeff= | 2.7 | |
| Park Average Flow = | 9300 | L/ha/da | Single house coeff= | 3.4 | |

| | | | |
|---|---|---|---|
| Designed: K.M. | PROJECT: **CARDINAL CREEK VILLLAGE PHASE 1** | | |
| Checked: Z.L. | LOCATION: **City of Ottawa** | | |
| Dwg. Reference: Sanitary Drainage Plan, Dwg. No. 57 - 58 | File Ref: 11-513B-1 | Date: May, 2014 | Sheet No. 3 of 5 |

513 san3

## SANITARY SEWER CALCULATION SHEET

Ottawa

Manning's n=0.013

| LOCATION | | | RESIDENTIAL AREA AND POPULATION | | | | | | | COMM | | INDUST | | INSTIT | | C+I+I | INFILTRATION | | | | PIPE | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STREET | FROM M.H. | TO M.H. | AREA (ha) | UNITS | POP. | CUMULATIVE AREA (ha) | CUMULATIVE POP. | PEAK FACT. | PEAK FLOW (l/s) | AREA (ha) | ACCU. AREA (ha) | AREA (ha) | ACCU. AREA (ha) | AREA (ha) | ACCU. AREA (ha) | PEAK FLOW (l/s) | TOTAL AREA (ha) | ACCU. AREA (ha) | INFILT. FLOW (l/s) | TOTAL FLOW (l/s) | DIST (m) | DIA (mm) | SLOPE (%) | CAP. (FULL) (l/s) | RATIO Q act/Q cap | VEL. (FULL) (m/s) |
| Contribution From avenue de la Famille-Laporte Avenue, Pipe 212A -144A | | | | | | 72.18 | 4778.8 | | | 1.88 | | | | 12.69 | | | 86.75 | | | 5.00 | | | | | | |
| Contribution From rue de Cartographe Street, Pipe 209A -144A | | | | | | 3.97 | 260.2 | | | | | | | | | | 3.97 | | | | | | | | | |
| | 144A | 145A | 0.03 | | | 76.18 | 5039.0 | 3.24 | 66.14 | | 1.88 | | | | 12.69 | 10.81 | 0.03 | 90.75 | 25.41 | 107.36 | 21.5 | 375 | 1.00 | 175.33 | 0.61 | 1.59 |
| | 145A | 146A | 0.17 | | | 76.35 | 5039.0 | 3.24 | 66.14 | | 1.88 | | | | 12.69 | 10.81 | 0.17 | 90.92 | 25.46 | 107.41 | 88.5 | 375 | 2.00 | 247.95 | 0.43 | 2.25 |
| Contribution From BLOCK 402 (SERVICING), Pipe 204A -146A | | | | | | 31.26 | 2077.6 | | | | | | | 1.29 | | | 32.38 | | | 5.00 | | | | | | |
| | 146A | 147A | 0.23 | 4 | 13.6 | 107.84 | 7130.2 | 3.10 | 89.54 | | 1.88 | | | | 13.98 | 10.95 | 0.23 | 123.53 | 34.59 | 145.08 | 59.5 | 450 | 0.90 | 270.48 | 0.54 | 1.70 |
| Contribution From avenue Mashkig Avenue, Pipe 143A -147A | | | | | | 4.72 | 275.1 | | | | | | | | | | 4.72 | | | | | | | | | |
| | 147A | 148A | 0.37 | 5 | 17.0 | 112.93 | 7422.3 | 3.08 | 92.61 | | 1.88 | | | | 13.98 | 10.95 | 0.37 | 128.62 | 36.01 | 149.57 | 66.5 | 450 | 0.90 | 270.48 | 0.55 | 1.70 |
| | 148A | 125A | 0.07 | | | 113.00 | 7422.3 | 3.08 | 92.61 | | 1.88 | | | | 13.98 | 10.95 | 0.07 | 128.69 | 36.03 | 149.59 | 15.5 | 450 | 0.90 | 270.48 | 0.55 | 1.70 |
| To BLOCK 256 (SERVICING), Pipe 125A - 126A | | | | | | 113.00 | 7422.3 | | | 1.88 | | | | 13.98 | | | | 128.69 | | 10.00 | | | | | | |
| **BLOCK 256 (SERVICING)** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Contribution from rue de la Baie-des-Castors Street, Pipe 124A -125A | | | | | | 5.94 | 326.4 | | | | | | | 3.97 | | | 9.91 | | | 10.00 | | | | | | |
| Contribution from rue de la Baie-des-Castors Street, Pipe 148A -125A | | | | | | 113.00 | 7422.3 | | | 1.88 | | | | 13.98 | | | 128.69 | | | 10.00 | | | | | | |
| | 125A | 126A | | | | 118.94 | 7748.7 | 3.06 | 96.05 | | 1.88 | | | | 17.95 | 11.37 | 0.00 | 138.60 | 38.81 | 166.23 | 10.0 | 450 | 0.90 | 270.48 | 0.61 | 1.70 |
| | 126A | 127A | 0.06 | | | 119.00 | 7748.7 | 3.06 | 96.05 | | 1.88 | | | | 17.95 | 11.37 | 0.06 | 138.66 | 38.82 | 166.24 | 32.5 | 450 | 0.90 | 270.48 | 0.61 | 1.70 |
| | 127A | 128A | 0.05 | | | 119.05 | 7748.7 | 3.06 | 96.05 | | 1.88 | | | | 17.95 | 11.37 | 0.05 | 138.71 | 38.84 | 166.26 | 39.0 | 450 | 2.70 | 468.48 | 0.35 | 2.95 |
| To SAN TRUNK 1 - 12.0m EASEMENT, Pipe 128A - 129A | | | | | | 119.05 | 7748.7 | | | 1.88 | | | | 17.95 | | | | 138.71 | | 20.00 | | | | | | |
| **SAN TRUNK 1 - 12.0m EASEMENT** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Contribution From SAN TRUNK (Future Phase), Pipe MH 10160A - 128A | | | | | | 30.05 | 2240.2 | | | 9.07 | | | | 4.17 | | | 43.29 | | | 5.00 | | | | | | |
| Contribution from BLOCK 256 (SERVICING), Pipe 127A - 128A | | | | | | 119.05 | 7748.7 | | | 1.88 | | | | 17.95 | | | 138.71 | | | 20.00 | | | | | | |
| | 128A | 129A | 0.02 | | | 149.12 | 9988.9 | 2.96 | 119.77 | | 10.95 | | | | 22.12 | 21.95 | 0.02 | 182.02 | 50.97 | 217.69 | 23.5 | 675 | 0.12 | 291.19 | 0.75 | 0.81 |
| | 129A | 130A | 0.14 | | | 149.26 | 9988.9 | 2.96 | 119.77 | | 10.95 | | | | 22.12 | 21.95 | 0.14 | 182.16 | 51.00 | 217.72 | 115.0 | 675 | 0.12 | 291.19 | 0.75 | 0.81 |
| | 130A | 131A | 0.04 | | | 149.30 | 9988.9 | 2.96 | 119.77 | | 10.95 | | | | 22.12 | 21.95 | 0.04 | 182.20 | 51.02 | 217.74 | 36.5 | 675 | 0.12 | 291.19 | 0.75 | 0.81 |
| | 131A | 132A | 0.04 | | | 149.34 | 9988.9 | 2.96 | 119.77 | | 10.95 | | | | 22.12 | 21.95 | 0.04 | 182.24 | 51.03 | 217.75 | 35.5 | 675 | 0.12 | 291.19 | 0.75 | 0.81 |
| | 132A | 133A | 0.05 | | | 149.39 | 9988.9 | 2.96 | 119.77 | | 10.95 | | | | 22.12 | 21.95 | 0.05 | 182.29 | 51.04 | 217.76 | 41.5 | 675 | 0.12 | 291.19 | 0.75 | 0.81 |
| | 133A | 134A | 0.06 | | | 149.45 | 9988.9 | 2.96 | 119.77 | | 10.95 | | | | 22.12 | 21.95 | 0.06 | 182.35 | 51.06 | 217.78 | 52.5 | 675 | 0.12 | 291.19 | 0.75 | 0.81 |

Residual Capacity exceeds **5.98l/s**, refer to IBI sewer design sheet for calculations

LICENSED PROFESSIONAL ENGINEER
Z. LI
PROVINCE OF ONTARIO

| | | | | |
|---|---|---|---|---|
| Average Daily Flow = | 350 | l/p/day | Industrial Peak Factor = as per MOE Graph | |
| Commercial/Institution Flow = | 50000 | L/ha/da | Extraneous Flow = | 0.280 L/s/ha |
| Industrial Flow = | 35000 | L/ha/da | Minimum Velocity = | 0.760 m/s |
| Max Res. Peak Factor = | 4.00 | | Manning's n = | 0.013 |
| Commercial/Institution peak Factor = | 1.50 | | Townhouse/Semi coeff= | 2.7 |
| Park Average Flow = | 9300 | L/ha/da | Single house coeff= | 3.4 |

| | | | | |
|---|---|---|---|---|
| | K.M. | CARDINAL CREEK VILLLAGE PHASE 1 | | |
| Checked: | Z.L. | LOCATION: City of Ottawa | | |
| Dwg. Reference: Sanitary Drainage Plan, Dwg. No. 57 - 58 | | File Ref: 11-513B-1 | Date: May, 2014 | Sheet No. 4 of 5 |

513_san3

**SANITARY SEWER CALCULATION SHEET**

Ottawa

Manning's n=0.013

| LOCATION | | | RESIDENTIAL AREA AND POPULATION | | | | | | | COMM | | INDUST | | INSTIT | | C+I+I | INFILTRATION | | | | PIPE | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STREET | FROM M.H. | TO M.H. | AREA (ha) | UNITS | POP. | CUMULATIVE AREA (ha) | CUMULATIVE POP. | PEAK FACT. | PEAK FLOW (l/s) | AREA (ha) | ACCU. AREA (ha) | AREA (ha) | ACCU. AREA (ha) | AREA (ha) | ACCU. AREA (ha) | PEAK FLOW (l/s) | TOTAL AREA (ha) | ACCU. AREA (ha) | INFILT. FLOW (l/s) | TOTAL FLOW (l/s) | DIST (m) | DIA (mm) | SLOPE (%) | CAP. (FULL) (l/s) | RATIO Q act/Q cap | VEL. (FULL) (m/s) |
| | 134A | 135A | 0.10 | | | 149.55 | 9988.9 | 2.96 | 119.77 | | 10.95 | | | | 22.12 | 21.95 | 0.10 | 182.45 | 51.09 | 217.81 | 82.0 | 675 | 0.12 | 291.19 | 0.75 | 0.81 |
| | 135A | 136A | 0.11 | | | 149.66 | 9988.9 | 2.96 | 119.77 | | 10.95 | | | | 22.12 | 21.95 | 0.11 | 182.56 | 51.12 | 217.84 | 96.0 | 675 | 0.12 | 291.19 | 0.75 | 0.81 |
| | 136A | 137A | 0.10 | | | 149.76 | 9988.9 | 2.96 | 119.77 | | 10.95 | | | | 22.12 | 21.95 | 0.10 | 182.66 | 51.14 | 217.86 | 105.0 | 675 | 0.12 | 291.19 | 0.75 | 0.81 |
| | 137A | 1105A (B.O.) | 0.11 | | | 149.87 | 9988.9 | 2.96 | 119.77 | | 10.95 | | | | 22.12 | 21.95 | 0.11 | 182.77 | 51.18 | 217.90 | 120.5 | 675 | 0.12 | 291.19 | 0.75 | 0.81 |
| | 1105A (B.O.) | 1104A (B.O.) | 0.05 | | | 149.92 | 9988.9 | 2.96 | 119.77 | | 10.95 | | | | 22.12 | 21.95 | 0.05 | 182.82 | 51.19 | 217.91 | 55.0 | 675 | 0.12 | 291.19 | 0.75 | 0.81 |
| | 1104A (B.O.) | 1103A (B.O.) | 0.04 | | | 149.96 | 9988.9 | 2.96 | 119.77 | | 10.95 | | | | 22.12 | 21.95 | 0.04 | 182.86 | 51.20 | 217.92 | 42.9 | 675 | 0.12 | 291.19 | 0.75 | 0.81 |
| | 1103A (B.O.) | 1102A (B.O.) | 0.05 | | | 150.01 | 9988.9 | 2.96 | 119.77 | | 10.95 | | | | 22.12 | 21.95 | 0.05 | 182.91 | 51.21 | 217.93 | 56.9 | 675 | 0.12 | 291.19 | 0.75 | 0.81 |
| | 1102A (B.O.) | 1101A (B.O.) | 0.09 | | | 150.10 | 9988.9 | 2.96 | 119.77 | | 10.95 | | | | 22.12 | 21.95 | 0.09 | 183.00 | 51.24 | 217.96 | 109.0 | 675 | 0.12 | 291.19 | 0.75 | 0.81 |
| | 1101A (B.O.) | 1100A (B.O.) | | | | 150.10 | 9988.9 | 2.96 | 119.77 | | 10.95 | | | | 22.12 | 21.95 | 0.00 | 183.00 | 51.24 | 217.96 | 12.5 | 675 | 0.12 | 291.19 | 0.75 | 0.81 |
| To EXISTING SANITARY, Pipe 1100A (B.O.) - 30A | | | | | | 150.10 | 9988.9 | | | 10.95 | | | | 22.12 | | | | 183.00 | | | | | | | | |

Residual Capacity exceeds **5.98l/s**, refer to IBI sewer design sheet for calculations

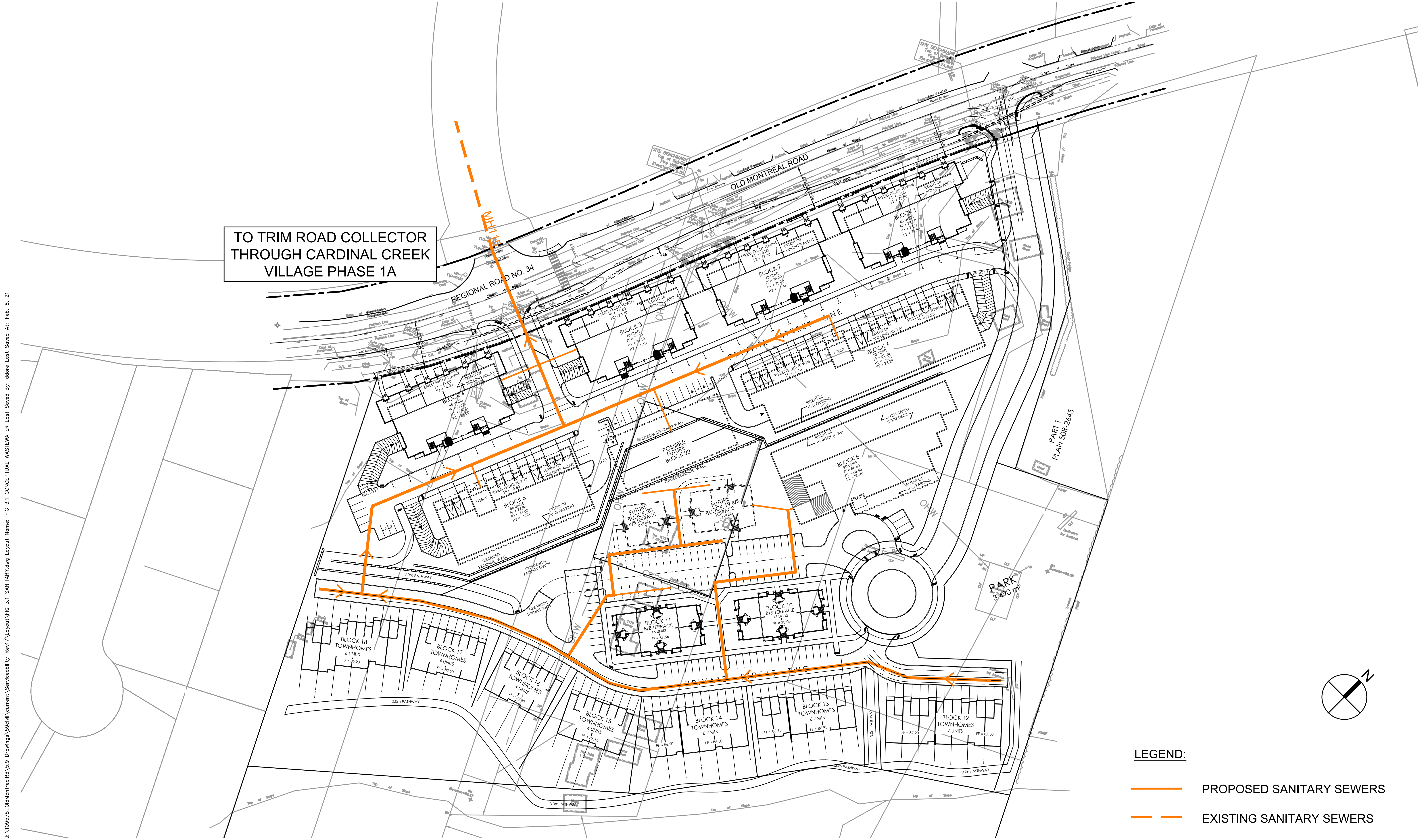
LICENSED PROFESSIONAL ENGINEER
Z. LI
MAY 27 2014
PROVINCE OF ONTARIO

DESIGN PARAMETERS

| | | | | | |
|---|---|---|---|---|---|
| Average Daily Flow = | 350 | l/p/day | Industrial Peak Factor = as per MOE Graph | | |
| Commercial/Institution Flow = | 50000 | L/ha/da | Extraneous Flow = | 0.280 | L/s/ha |
| Industrial Flow = | 35000 | L/ha/da | Minimum Velocity = | 0.760 | m/s |
| Max Res. Peak Factor = | 4.00 | | Manning's n = | 0.013 | |
| Commercial/Institution peak Factor = | 1.50 | | Townhouse/Semi coeff= | 2.7 | |
| Park Average Flow = | 9300 | L/ha/da | Single house coeff= | 3.4 | |

| | |
|---|---|
| Designed: K.M. | PROJECT: CARDINAL CREEK VILLLAGE PHASE 1 |
| Checked: Z.L. | LOCATION: City of Ottawa |
| Dwg. Reference: Sanitary Drainage Plan, Dwg. No. 57 - 58 | File Ref: 11-513B-1 |
| Date: May, 2014 | Sheet No. 5 of 5 |

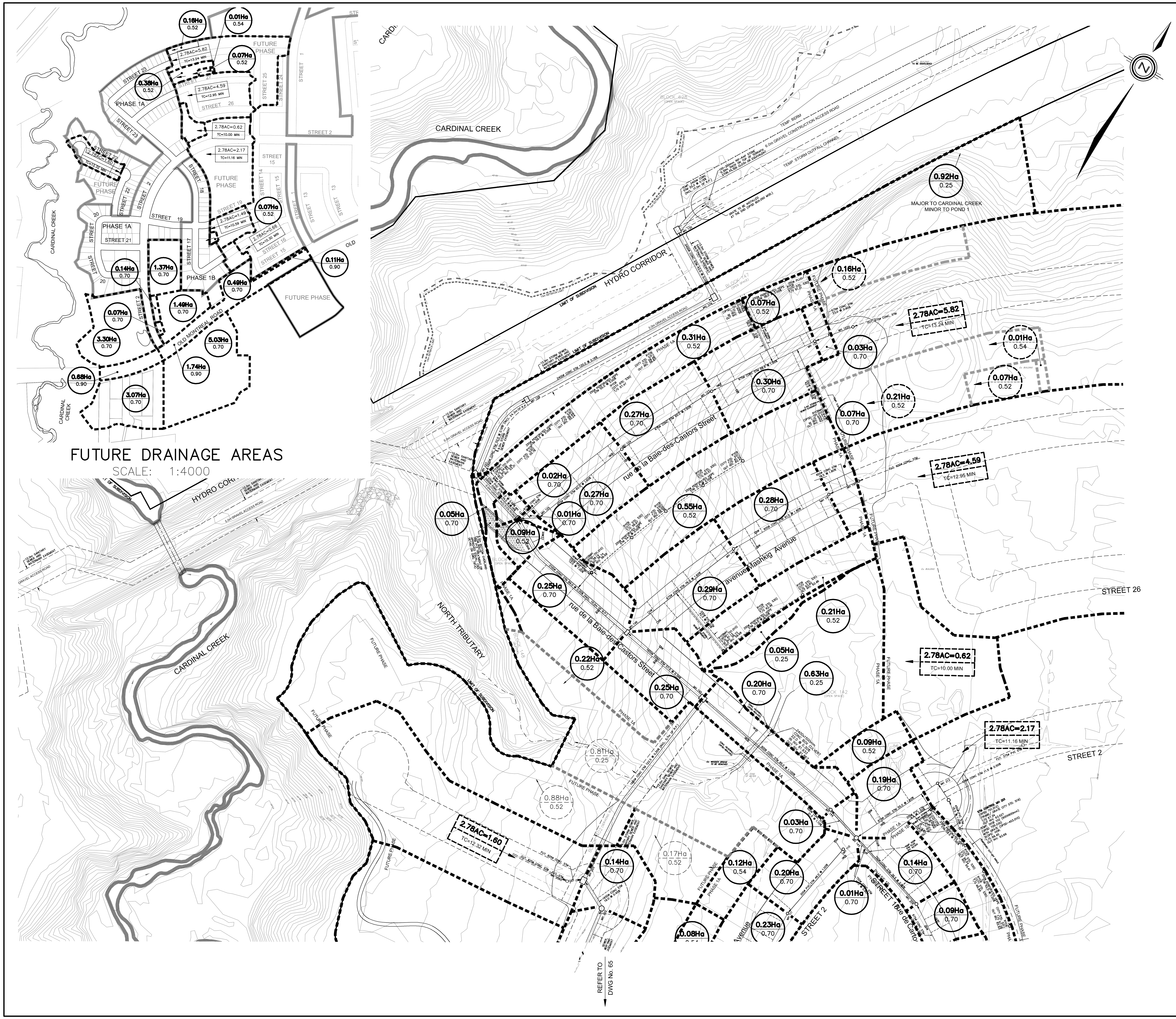
513 san3

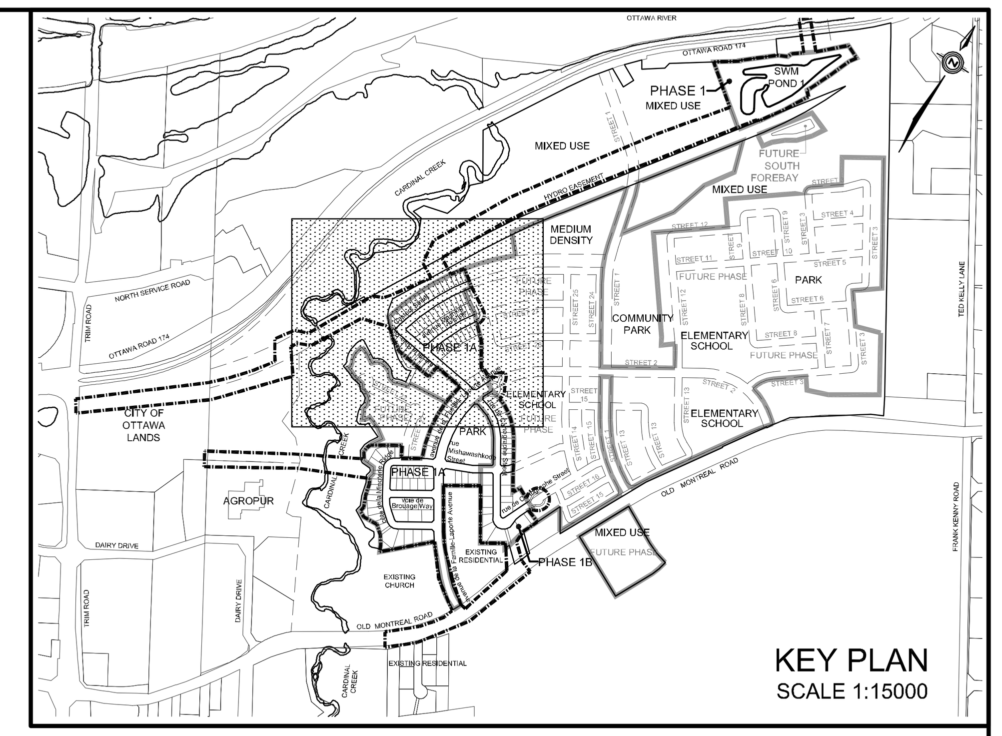



| Scale | Project Title | Drawing Title | Sheet No. |
|---|---|---|---|
| N.T.S. | DCR / PHOENIX<br>1208 OLD MONTREAL ROAD | CONCEPTUAL WASTEWATER<br>DISPOSAL SYSTEM | FIG 3.1 |


| Scale | Project Title | Drawing Title | Sheet No. |
|---|---|---|---|
| N.T.S. | DCR / PHOENIX<br>1208 OLD MONTREAL ROAD | CONCEPTUAL SANITARY<br>DRAINAGE AREA | FIG 3.2 |

# APPENDIX C




## LEGEND

| | |
|---|---|
| 0.25Ha / 0.75 | DRAINAGE AREA IN HECTARES<br>RUN-OFF COEFFICIENT |
| 0.29Ha / 0.65 | EXTERNAL DRAINAGE AREA IN HECTARES (BY OTHERS)<br>RUN-OFF COEFFICIENT |
| | OVERLAND FLOW DIRECTION |
| | EXTERNAL OVERLAND FLOW DIRECTION |
| | STORM MANHOLE |
| | STORM MANHOLE IN OTHER PHASES |
| | CATCHBASIN MANHOLE |
| | RLCBS – ELBOW SECTION (CITY STD. S31) / 'T' SECTION (CITY STD. S30), AS NOTED ON THE DRAWING |
| | SINGLE/DOUBLE CATCHBASIN |
| | CATCHBASINS WITH INLET CONTROL DEVICE IPEX TEMPEST A (Q max = 19.9 l/s) |
| | CATCHBASINS WITH INLET CONTROL DEVICE IPEX TEMPEST B (Q max = 28.4 l/s) |
| | CACHBASINS WITH INLET CONTROL DEVICE IPEX TEMPEST C (Q max = 35.5 l/s) |
| | CATCHBASINS WITH INLET CONTROL DEVICE IPEX TEMPEST D (Q max = 50.1 l/s) |
| | CATCHBASINS WITH INLET CONTROL DEVICE IPEX TEMPEST E (Q max = 69.1 l/s) |
| | STORM SEWER TRIBUTARY BOUNDARY |
| | STORM SEWER SUB TRIBUTARY BOUNDARY |
| | EXTERNAL STORM SEWER TRIBUTARY BOUNDARY |
| | PHASE LINE |
| | SINGLE STORM HOUSE CONNECTION |

### TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY STANTEC GEOMATICS LTD, PROJECT No. 161611900–111 RECEIVED ON JULY 6, 2012 AND PROJECT No. 16162924–111 RECEIVED ON OCTOBER 24, 2013 AND NOVEMBER 29, 2013

### LEGAL INFORMATION

CALCULATED M–PLAN PROVIDED BY STANTEC GEOMATICS LTD, PROJECT No. 161613098–132 RECEIVED ON APRIL 23, 2014.

2nd SUBMISSION 14–05–01

# NOT FOR CONSTRUCTION

### ELEVATION NOTE

ELEVATIONS HEREON ARE GEODETIC AND ARE DERIVED FROM THE CAN–NET VRS NETWORK.

| No. | DATE | BY | DESCRIPTION | BY |
|---|---|---|---|---|
| 2. | 14–05–01 | Z.L. | 2nd SUBMISSION | |
| 1. | 14–02–07 | Z.L. | 1st SUBMISSION | |

Ottawa CITY OF OTTAWA

PROJECT No. 11–513 B–1

LICENSED PROFESSIONAL ENGINEER Z. LI 14-05-01 PROVINCE OF ONTARIO

## STORM DRAINAGE PLAN

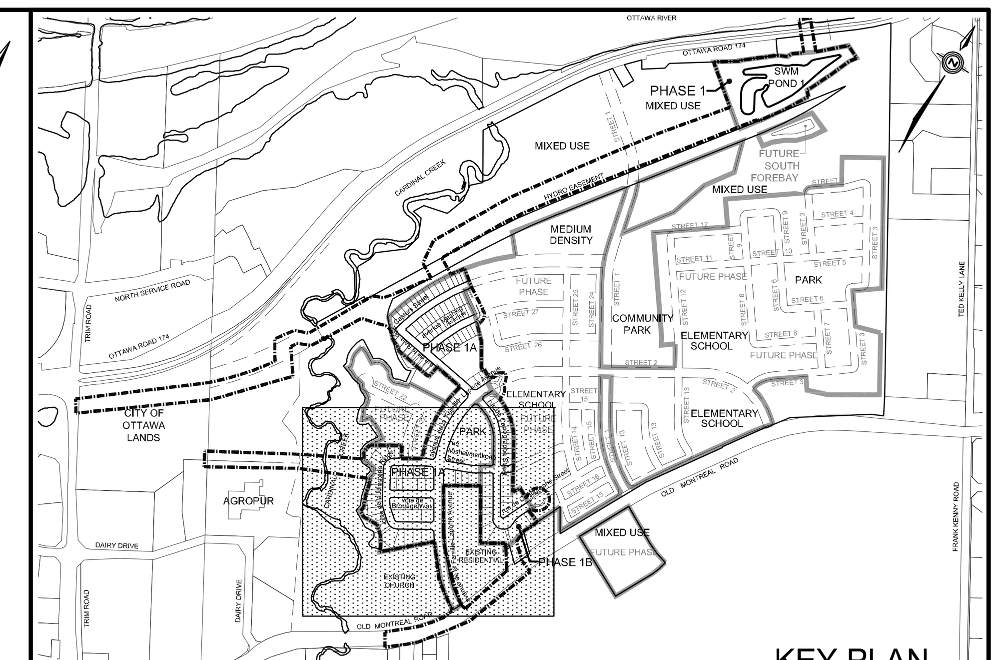


TAMARACK (CARDINAL CREEK) CORPORATION

## CARDINAL CREEK VILLAGE PHASE 1

DSEL
david schaeffer engineering ltd
120 Iber Road, Unit 203
Stittsville, ON K2S 1E9
Tel. (613) 836-0856
Fax. (613) 836-7183
www.DSEL.ca

| | | | |
|---|---|---|---|
| DRAWN BY: W.L./H.P. | CHECKED BY: K.M. | DRAWING NO. | SHEET NO. |
| DESIGNED BY: K.M. | CHECKED BY: Z.L. | | 64 |
| SCALE: 1:1000 | DATE: FEBRUARY 2014 | | |


KEY PLAN
SCALE 1:15000

## LEGEND

| | |
|---|---|
| 0.25Ha / 0.75 | DRAINAGE AREA IN HECTARES<br>RUN-OFF COEFFICIENT |
| 0.29Ha / 0.65 | EXTERNAL DRAINAGE AREA IN HECTARES (BY OTHERS)<br>RUN-OFF COEFFICIENT |
| | OVERLAND FLOW DIRECTION |
| | EXTERNAL OVERLAND FLOW DIRECTION |
| | STORM MANHOLE |
| | STORM MANHOLE IN OTHER PHASES |
| | CATCHBASIN MANHOLE |
| | RLCBS – ELBOW SECTION (CITY STD. S31) / 'T' SECTION (CITY STD. S30), AS NOTED ON THE DRAWING |
| | SINGLE/DOUBLE CATCHBASIN |
| | CATCHBASINS WITH INLET CONTROL DEVICE IPEX TEMPEST A (Q max = 19.9 l/s) |
| | CATCHBASINS WITH INLET CONTROL DEVICE IPEX TEMPEST B (Q max = 28.4 l/s) |
| | CACHBASINS WITH INLET CONTROL DEVICE IPEX TEMPEST C (Q max = 35.5 l/s) |
| | CATCHBASINS WITH INLET CONTROL DEVICE IPEX TEMPEST D (Q max = 50.1 l/s) |
| | CATCHBASINS WITH INLET CONTROL DEVICE IPEX TEMPEST E (Q max = 69.1 l/s) |
| | STORM SEWER TRIBUTARY BOUNDARY |
| | STORM SEWER SUB TRIBUTARY BOUNDARY |
| | EXTERNAL STORM SEWER TRIBUTARY BOUNDARY |
| | PHASE LINE |
| ---- | SINGLE STORM HOUSE CONNECTION |

## TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY STANTEC GEOMATICS LTD, PROJECT No. 161611900–111 RECEIVED ON JULY 6, 2012 AND PROJECT No. 16162924–111 RECEIVED ON OCTOBER 24, 2013 AND NOVEMBER 29, 2013

## LEGAL INFORMATION

CALCULATED M–PLAN PROVIDED BY STANTEC GEOMATICS LTD, PROJECT No. 161613098–132 RECEIVED ON APRIL 23, 2014.

2nd SUBMISSION 14–05–01

# NOT FOR CONSTRUCTION

## ELEVATION NOTE

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| No. | DATE | BY | DESCRIPTION | BY |
|---|---|---|---|---|
| 2. | 14–05–01 | Z.L. | 2nd SUBMISSION | |
| 1. | 14–02–07 | Z.L. | 1st SUBMISSION | |

CITY OF OTTAWA

PROJECT No. 11–513 B–1

LICENSED PROFESSIONAL ENGINEER
Z. LI
14-05-01
PROVINCE OF ONTARIO

# STORM DRAINAGE PLAN



TAMARACK (CARDINAL CREEK) CORPORATION

# CARDINAL CREEK VILLAGE PHASE 1

david schaeffer engineering ltd
120 Iber Road, Unit 203
Stittsville, ON K2S 1E9
Tel. (613) 836-0856
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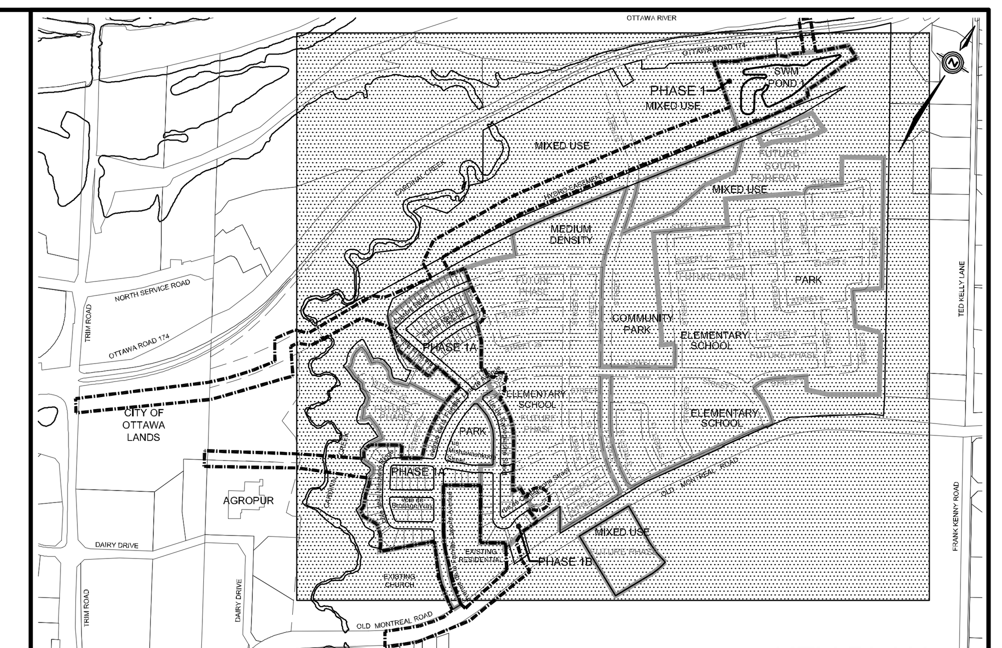
www.DSEL.ca

| | | | |
|---|---|---|---|
| DRAWN BY: W.L./H.P. | CHECKED BY: K.M. | DRAWING NO. | SHEET NO. |
| DESIGNED BY: K.M. | CHECKED BY: Z.L. | | 65 |
| SCALE: 1:1000 | DATE: FEBRUARY 2014 | | |

KEY PLAN
SCALE 1:15000

2.64Ha 0.25 — DRAINAGE AREA IN HECTARES / RUN-OFF COEFFICIENT

EXTERNAL STORM TRIBUTARY BOUNDARY

## TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY STANTEC GEOMATICS LTD, PROJECT No. 161611900–111 RECEIVED ON JULY 6, 2012 AND PROJECT No. 16162924–111 RECEIVED ON OCTOBER 24, 2013 AND NOVEMBER 29, 2013

## LEGAL INFORMATION

CALCULATED M–PLAN PROVIDED BY STANTEC GEOMATICS LTD, PROJECT No. 161613098–132 RECEIVED ON APRIL 23, 2014.

2nd SUBMISSION 14–05–01

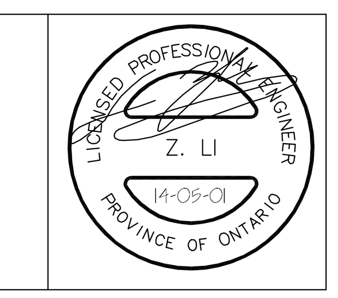
# NOT FOR CONSTRUCTION

## ELEVATION NOTE

ELEVATIONS HEREON ARE GEODETIC AND ARE DERIVED FROM THE CAN–NET VRS NETWORK.

| No. | DATE | BY | DESCRIPTION | BY |
|---|---|---|---|---|
| 2. | 14–05–01 | Z.L. | 2nd SUBMISSION | |
| 1. | 14–02–07 | Z.L. | 1st SUBMISSION | |

Ottawa CITY OF OTTAWA




PROJECT No. 11–513 B–1

# EXTERNAL PRE-DEVELOPMENT STORM DRAINAGE PLAN



TAMARACK (CARDINAL CREEK) CORPORATION

CARDINAL CREEK VILLAGE PHASE 1

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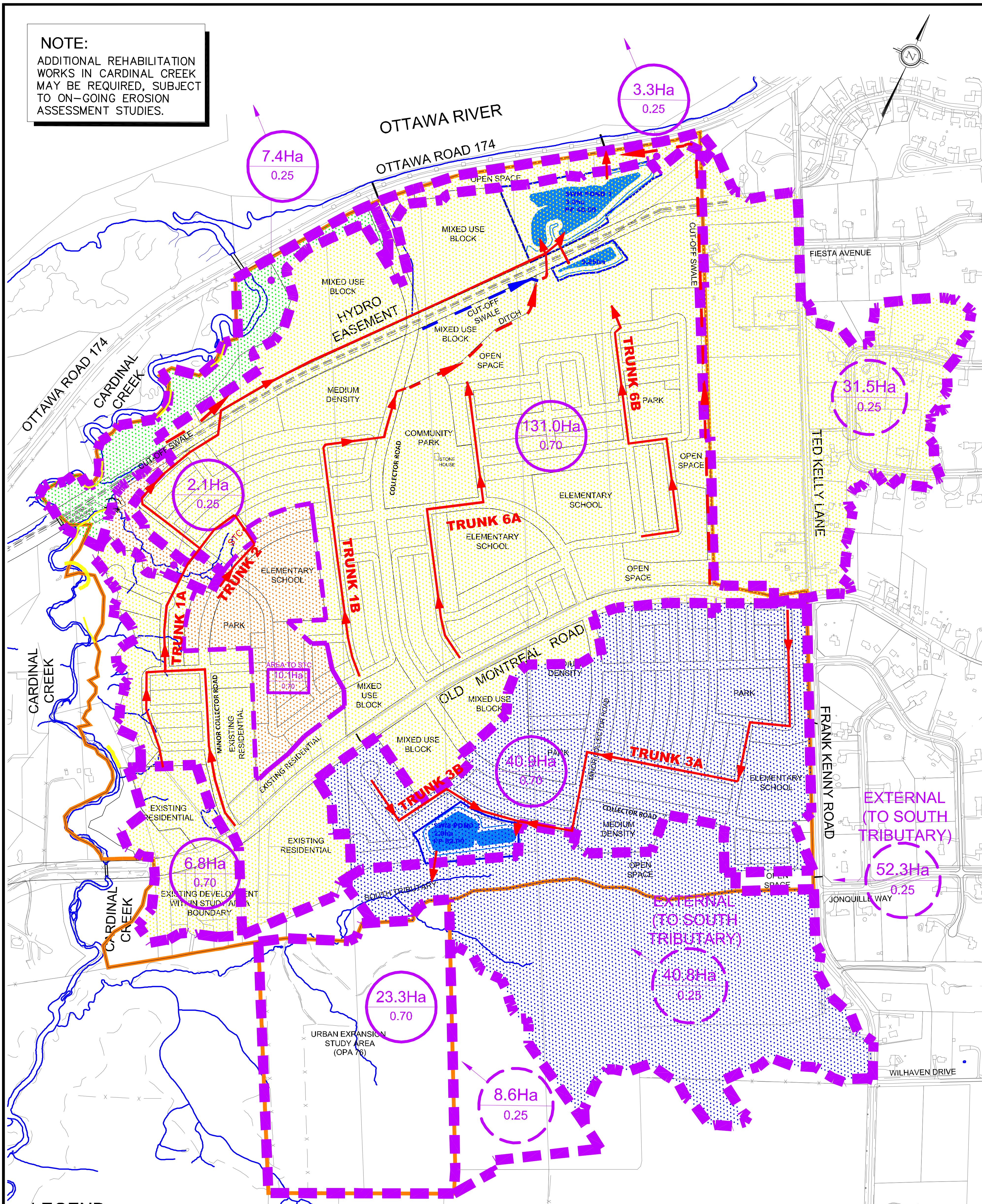
Tel. (613) 836-0856
Fax. (613) 836-7183
www.DSEL.ca

| DRAWN BY: W.L./H.P. | CHECKED BY: K.M. | DRAWING NO. | SHEET NO. |
|---|---|---|---|
| DESIGNED BY: K.M. | CHECKED BY: Z.L. | | 70A |
| SCALE: 1:4000 | DATE: FEBRUARY 2014 | | |

NOTE:
ADDITIONAL REHABILITATION WORKS IN CARDINAL CREEK MAY BE REQUIRED, SUBJECT TO ON-GOING EROSION ASSESSMENT STUDIES.




LEGEND:

| | |
|---|---|
| SUBJECT LANDS | EXTERNAL DRAINAGE AREA (23.2Ha) RUN-OFF COEFFICENT (0.70) |
| STORM SEWER TRUNK | SPECIFIED DRAINAGE AREA RUN-OFF COEFFICENT (AREA TO STC 10.1Ha 0.70) |
| DRAINAGE AREA BOUNDARY | EROSION MITIGATION MEASURES |
| DRAINAGE AREA (39.9Ha) RUN-OFF COEFFICENT (0.70) | STC OIL & GRIT SEPERATOR UNIT |
| OTTAWA RIVER | NORTH TRIBUTARY OF CARDINAL CREEK |
| CARDINAL CREEK | SOUTH TRIBUTARY OF CARDINAL CREEK |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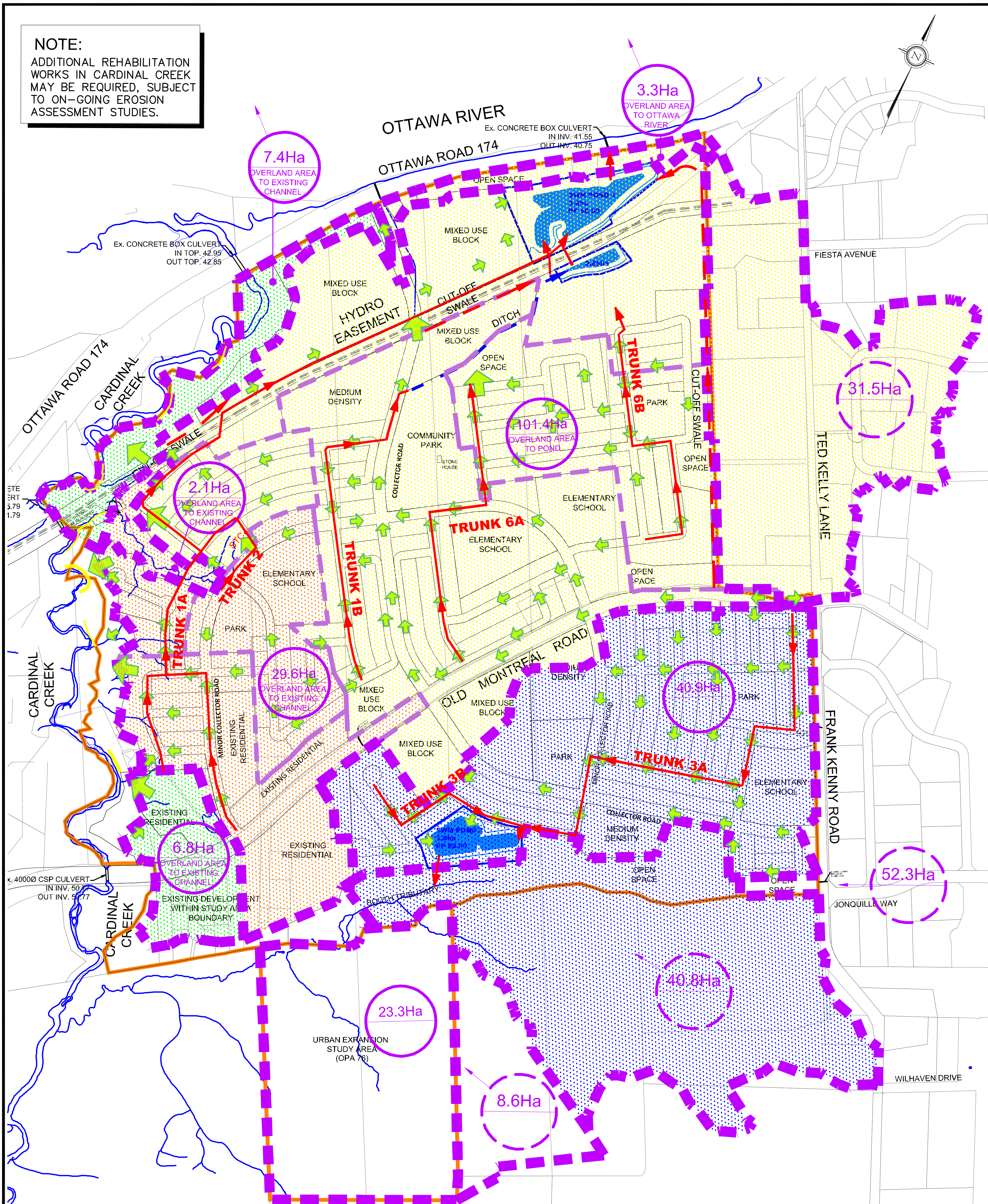
# CARDINAL VILLAGE CONCEPTUAL STORM DRAINAGE (MINOR SYSTEM) CITY OF OTTAWA

DATE: JUNE 2013
SCALE: 1:8000
PROJECT No.: 11-513
FIGURE: 17




LEGEND:

- SUBJECT LANDS
- DRAINAGE AREA BOUNDARY
- 39.9Ha DRAINAGE AREA
- OVERLAND FLOW ROUTE
- 23.2Ha EXTERNAL DRAINAGE AREA / RUN-OFF COEFFICENT
- EROSION MITIGATION MEASURES
- SOUTH TRIBUTARY OF CARDINAL CREEK
- OTTAWA RIVER
- CARDINAL CREEK
- NORTH TRIBUTARY OF CARDINAL CREEK
- STC OIL & GRIT SEPERATOR UNIT

DSEL
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Stittsville, ON K2S 1E9
Tel. (613) 836-0856
Fax. (613) 836-7183
www.DSEL.ca

# CARDINAL VILLAGE
# CONCEPTUAL STORM DRAINAGE (MAJOR SYSTEM)
# CITY OF OTTAWA

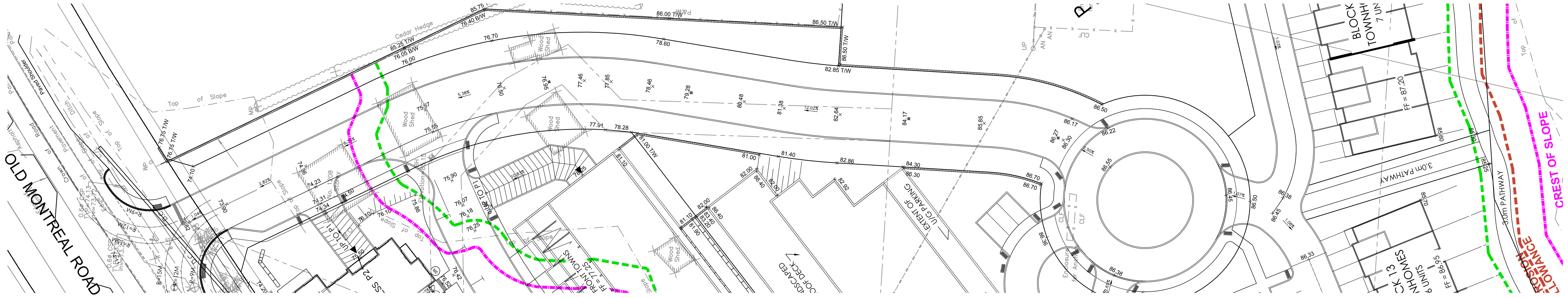
| | |
|---|---|
| DATE: | JUNE 2013 |
| SCALE: | 1:8000 |
| PROJECT No.: | 11-513 |
| FIGURE: | 18 |

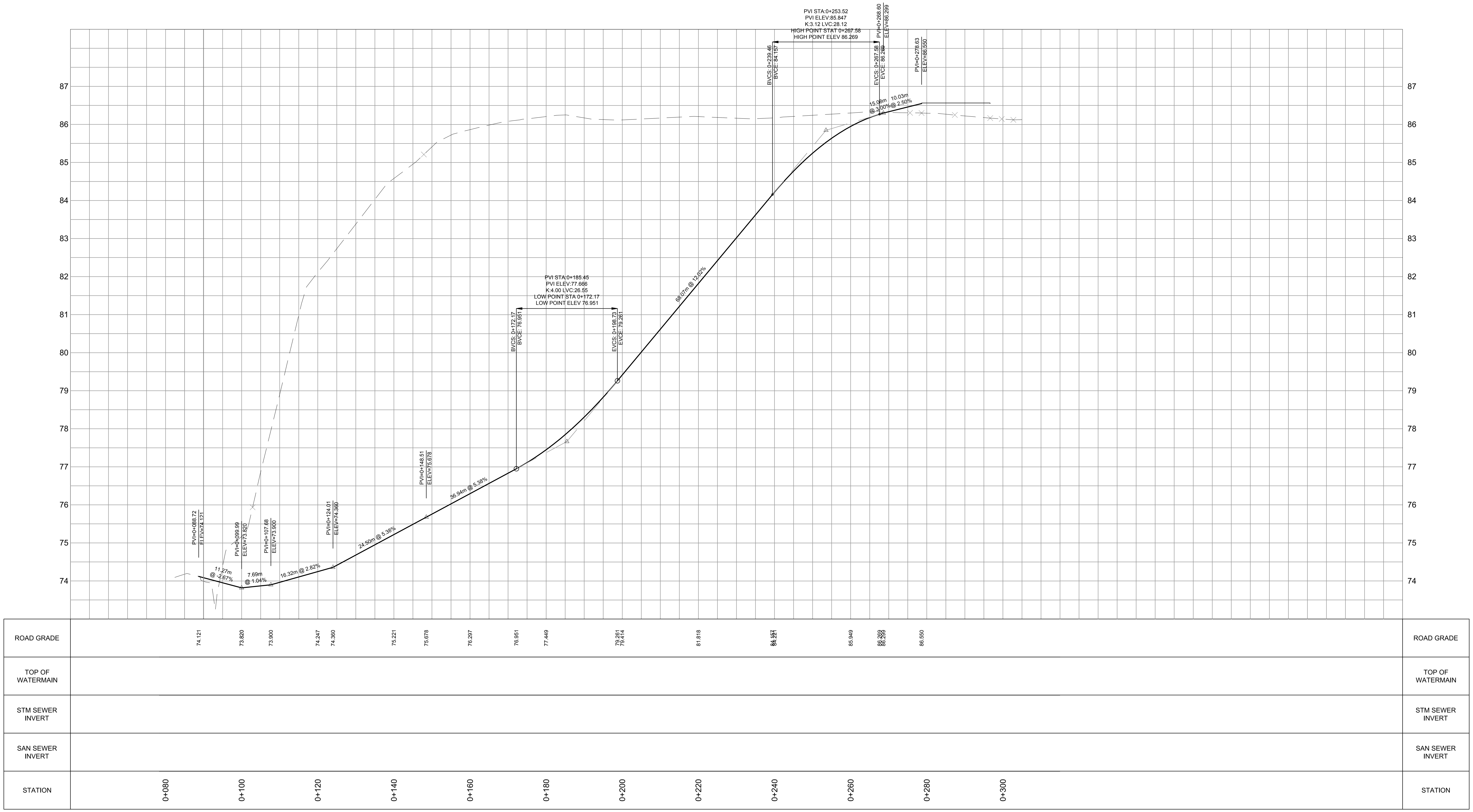

| Scale | Project Title | Drawing Title | Sheet No. |
|---|---|---|---|
| N.T.S. | DCR / PHOENIX<br>1208 OLD MONTREAL ROAD | CONCEPTUAL STORMWATER<br>DISPOSAL SYSTEM | FIG 4.1 |

# APPENDIX D


IBI

| Scale | Project Title | Drawing Title | Sheet No. |
|---|---|---|---|
| N.T.S. | DCR / PHOENIX<br>1208 OLD MONTREAL ROAD | CONCEPTUAL MACRO GRADING PLAN<br>---- | FIG 5.1 |




IBI

Scale

1 : 500

Project Title

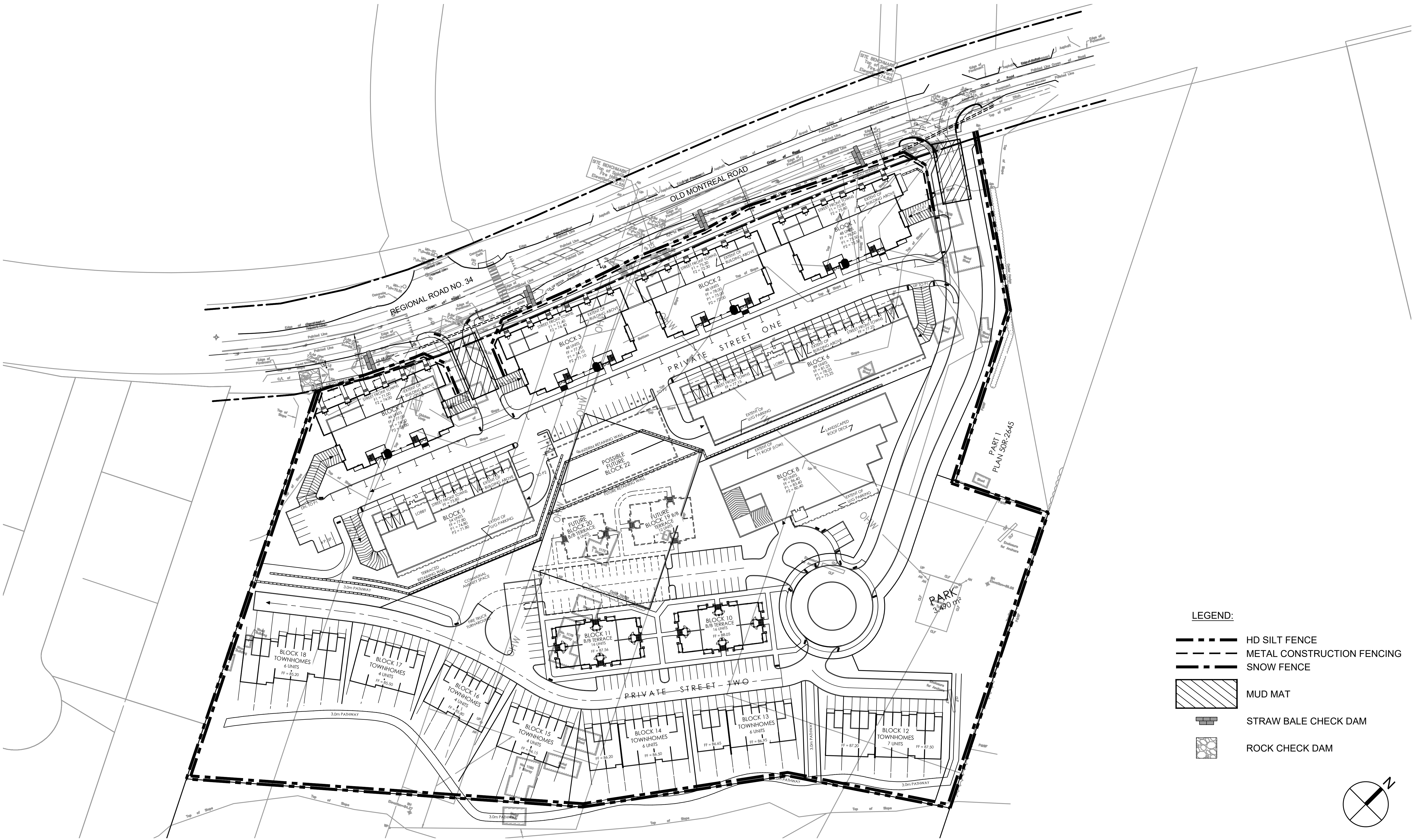
DCR / PHOENIX
1208 OLD MONTREAL ROAD

Drawing Title

CONCEPTUAL PUBLIC ROAD PROFILE

Sheet No.

FIG. 5.1.1




| Scale | Project Title | Drawing Title | Sheet No. |
|---|---|---|---|
| N.T.S. | DCR / PHOENIX<br>1208 OLD MONTREAL ROAD | EROSION & SEDIMENT<br>CONTROL PLAN | FIG 5.2 |

IBI