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
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Table of Contents

1 INTRODUCTION 1
1.1 Objective 1
1.2 Location 1
1.3 Proposed Development 2
1.4 Previous Studies 2
1.5 Constraints to Development 3
1.6 Pre-Consultation 3
1.7 Geotechnical Consideration 3

2 WATER DISTRIBUTION 5
2.1 Existing Conditions 5
2.2 Design Criteria 5
2.2.1 Water Demands 5
2.2.2 System Pressure 5
2.2.3 Fire Flow Rate 5
2.2.4 Boundary Conditions 6
2.2.5 Hydraulic Model 6
2.2.6 Modeling Results 6
2.2.7 Watermain Layout 7

3. WASTEWATER DISPOSAL 8
3.1 Existing Conditions and Previous Studies 8
3.2 Design Criteria 9
3.2.1 Design Flow: 2014 2021 9
3.2.2 Population Density: 9
3.3 Proposed Wastewater Disposal System 10
3.3.1 Proposed Population Calculations 10
3.3.2 Residual Capacity in downstream sewers 10
3.3.3 Proposed Wastewater Plan 11

4 STORMWATER MANAGEMENT 12

Table of Contents (continued)

4.1 Existing Conditions and Previous Studies 12
4.2 Dual Drainage Design 13
4.3 Proposed Stormwater Management Plan 13
4.4 Old Montreal Road 14

5 ROADS AND GRADING 15
5.1 Site Grading 15
5.2 Road Network 15
5.3 Municipal Consent 15

6 SOURCE CONTROLS 16
6.1 General 16
6.2 Lot Grading 16
6.3 Vegetation 16
6.4 Groundwater Recharge 16

7 CONVEYANCE CONTROLS 17
7.1 General 17
7.2 Vegetated Swales 17
7.3 Catchbasins and Maintenance Hole Sumps 17

8. SEDIMENT AND EROSION CONTROL PLAN 18
8.1 General 18
8.2 Trench Dewatering 18
8.3 Bulkhead Barriers 18
8.4 Seepage Barriers 18
8.5 Surface Structure Filters 18
8.6 Stockpile Management 19

9. CONCLUSIONS 20

Table of Contents (continued)

APPENDIX A:
- M David Blakely Master Plan
- Watermain Demand Calculation Sheet
- Fire Flow Calculations
- Boundary Conditions
- Hydraulic Model
- Figure 2.1 Water Distribution Schematic

APPENDIX B:
- DSEL Sanitary Tributary plan 63A
- IBI Capacity Comparison Design Spreadsheet
- DSEL Spreadsheet (2014)
- Figure 3.1 Wastewater Disposal System
- Figure 3.2 Wastewater Tributary Areas

APPENDIX C:
- DSEL Storm sewer design sheets
- DSEL Tributary Area Drainage plan
- Figure 4.1 – Schematic of Proposed Storm Sewers

APPENDIX D:
- Figure 5.1 – Conceptual Macro Grading
- Figure 5.2 – Conceptual Sediment and Erosion Control Plan

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 stakeholders, see comment matrix prepared by Fotenn Planing. 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. 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, it is bisected by a tributary branch of the Cardinal Creek which will form the southern limit of this development, 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.

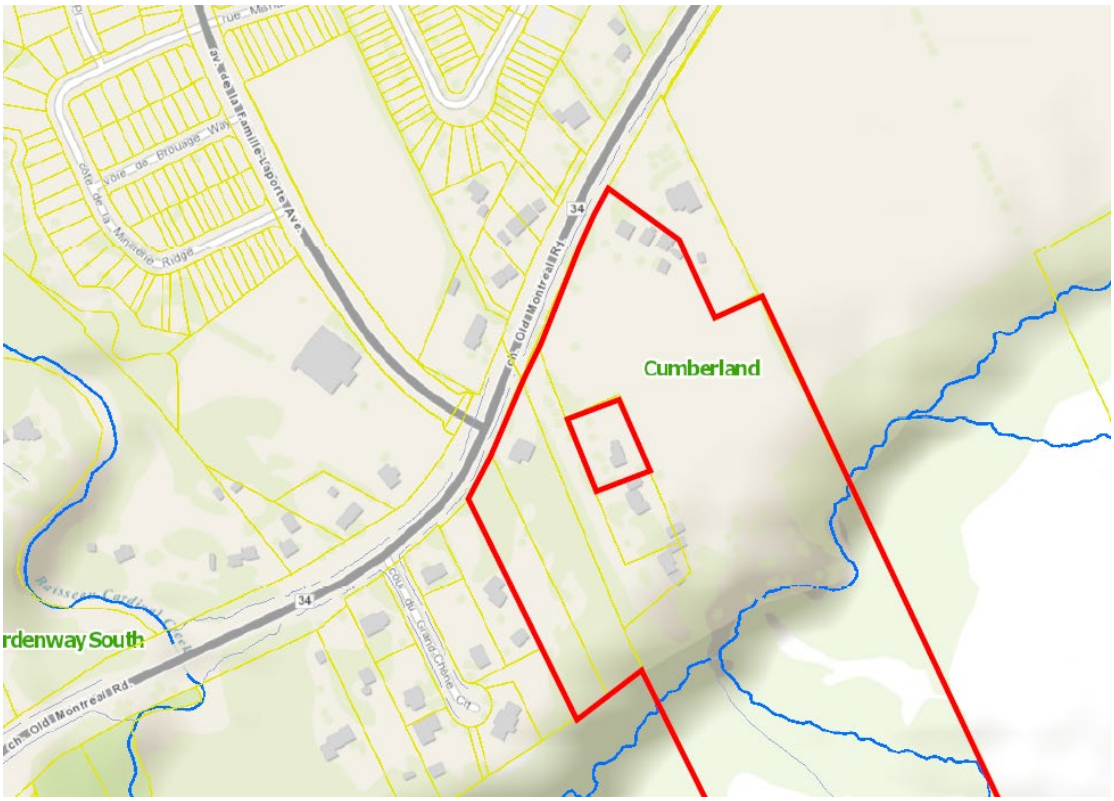


Figure 1.1 – Key Map of Subject Lands

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, the Master Plan has been prepared to support development with or without this property. This report has been prepared to demonstrate adequate servicing for the potential ultimate build out plan, and the full buildout unit count will be used for all supporting calculations. The table below illustrates the unit counts for each plan.

PLAN	UNIT TYPE	NUMBER OF UNITS
Including 1172 Old Montreal	Urban Towns/Freehold Towns/Back to Back towns	164
	Condominium Unit/Apartment	339
TOTAL		**503**

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 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 denotes Maximum Relative Density, ASTM D2041 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	3.41 l/s
Maximum Day	8.53 l/s
Peak Hour	18.77 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) Famille-Laporte Avenue	HGL (m) Cartographe Street
Maximum HGL	130.2	130.2
Minimum HGL (Peak Hour)	126.0	126.0
Max Day + Fire Flow (10,000 l/min)	124.7	124.4
Max Day + Fire Flow (15,000 l/min)	120.6	119.9

2.2.5 Hydraulic Model

A computer model for the conceptual site has been developed using the InfoWater program by Innovyze. 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.

2.2.6 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)	421.26 – 581.78
Peak Hour Pressure (kPa)	379.88 – 540.60
Minimum Design Flow for 15,000 l/min Fire Flow and 140 kPa Residual Pressure	312.78

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 including the top floors of apartment buildings.
Fire Flow:	Under the fire flow analysis all nodes exceed the required 15,000 l/min (250 l/s) flow.

2.2.7 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 diameter. 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.**

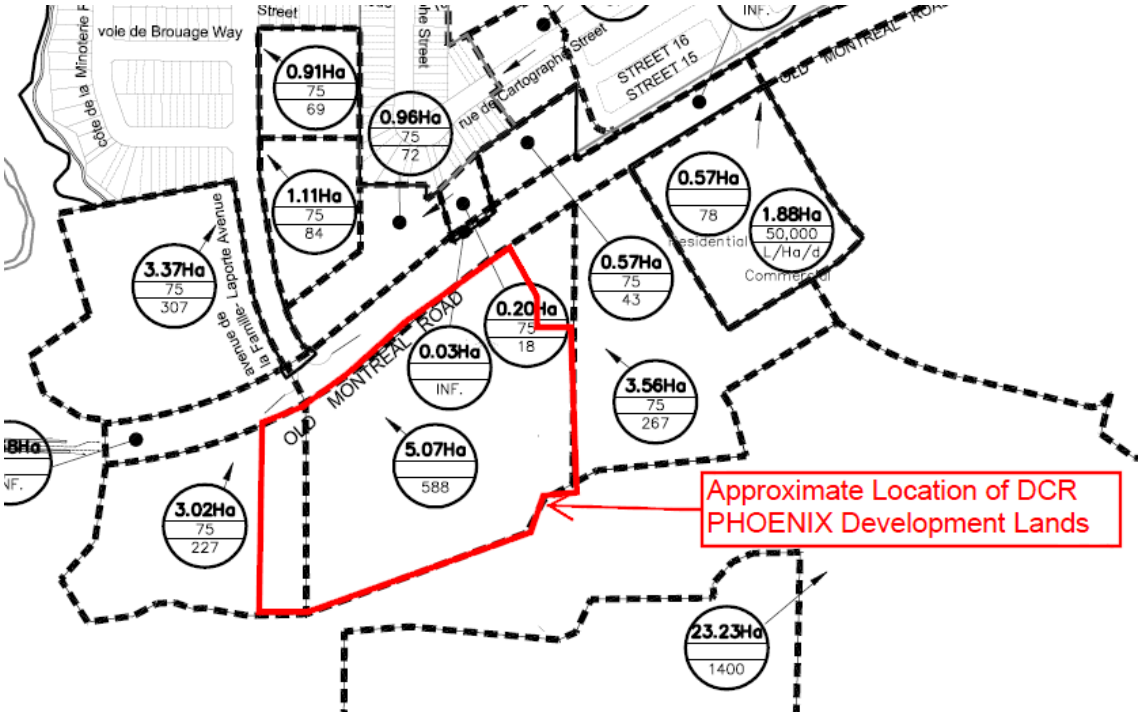


Figure 3.0 – DCR/Phoenix Lands location on DSEL External Sanitary Drainage Areas

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	164	2.7 pp/unit	442.8
Condo/Apartment	339	1.8 pp/unit	610.2
TOTAL	**554**	**-**	**1053**

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 24.94l/s which is an increase of 2.05 l/s over the corrected 2014 flow, and an increase of 5.25l/s (3.2+2.05) 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 5.25 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 exceed 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). This pond was designed and constructed to accommodate the subject lands. The DSEL report identified the area to 5.4ha area (5.03+0.37) to be designed with C=0.7. this would result in an A x C value of 3.78. figure 4.2 in Appendix C provides the conceptual tributary area, while the Master Servicing looked at the site in general this report further refines the tributary area, and a portion of the site, areas 3A and 3B will not drain to the pond due to topographic constraints but will continue to drain to the creek. The remaining areas contributing AC can be calculated as follows:

DRAINAGE AREA	AREA (HA)	C	AC
1A, 1E	1.63+0.23	0.85	1.581
1B, 1C, 1D	0.19+0.52+0.82	0.80	1.224
2A	0.51	0.70	0.357
2B	0.39	0.30	0.117
TOTAL	**4.91**		**3.279**

The DSEL design assumed an AC of 3.78, while the more refined plan estimates the AC at 3.279, the proposed development reduces the total flow volume to the existing SWM facility, therefore there should be no negative impact by this site on the facility and the site does not exceed the assumed flows in the SWM design.

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, saw toothing 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) 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. Additionally, 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 consist 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 walls 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 grade 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 less than 9% 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, figure 5.1.1 illustrates the conceptual Plan and Profile of the public road, and in included in **Appendix D.** The linking walkway will be barrier free and provides a reasonable level of service to the residences of the site. The walkway will maintain a maximum 5.0% continuous slope without handrails, or 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 5.2 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:

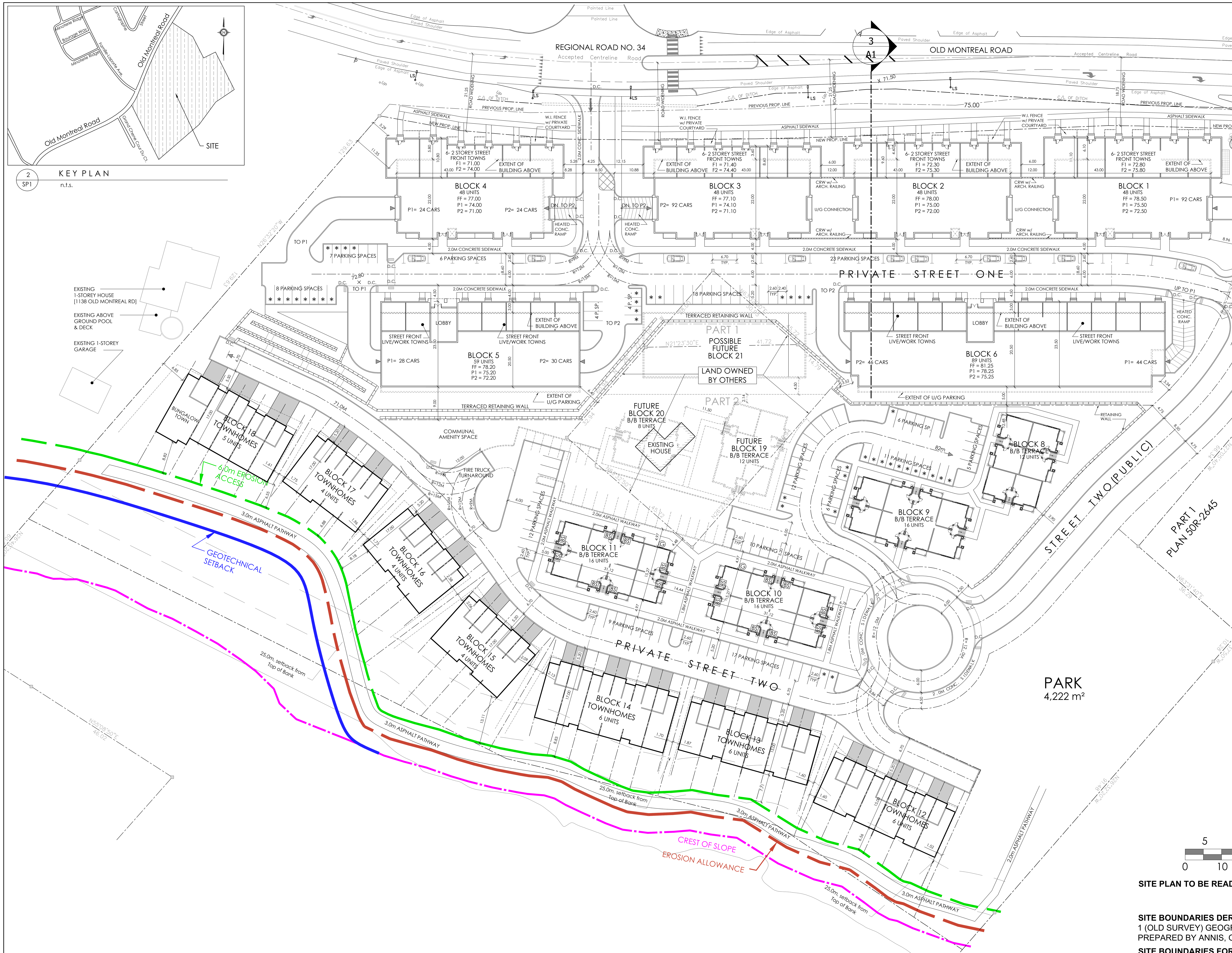
- Certificate of Authorization (C of A) for sewers and SWM: Ministry of Environment;
- Commence Work Order: City of Ottawa;
- Municipal Consent: City of Ottawa.

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_2021-12-14\KS

APPENDIX A



SITE INFORMATION:

SITE AREA = 52,724.47m² (527.25 ACRES)

UNIT COUNTS:

		APARTMENTS	URBAN TOWNS	LIVE/ WORK TOWNS	TOWNS	B/B TERRACE HOMES
BLOCK 1 =	4 LVL. APARTMENT BLDG. + 2 ST. TOWNS	42 UNITS	6 UNITS			
BLOCK 2 =	4 LVL. APARTMENT BLDG. + 2 ST. TOWNS	42 UNITS	6 UNITS			
BLOCK 3 =	4 LVL. APARTMENT BLDG. + 2 ST. TOWNS	42 UNITS	6 UNITS			
BLOCK 4 =	4 LVL. APARTMENT BLDG. + 2 ST. TOWNS	42 UNITS	6 UNITS (w/ P2 PARKING)			
BLOCK 5 =	5 LVL. APARTMENT BLDG. + 3 ST. TOWNS	52 UNITS		7 UNITS		
BLOCK 6 =	5 LVL. APARTMENT BLDG. + 3 ST. TOWNS	77 UNITS		12 UNITS (w/ P1 PARKING)		
BLOCK 8 =	BACK / BACK TERRACE HOMES					12 UNITS
BLOCK 9 =	BACK / BACK TERRACE HOMES					16 UNITS
BLOCK 10 =	BACK / BACK TERRACE HOMES					16 UNITS
BLOCK 11 =	BACK / BACK TERRACE HOMES					16 UNITS
BLOCK 12 =	TOWNHOMES				6 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				5 UNITS	
TOTAL =		297 UNITS	24 UNITS	19 UNITS	35 UNITS	60 UNITS
TOTAL ALL UNITS =		435 UNITS (NOT INCLUDING FUTURE UNITS)				

PARKING REQUIREMENTS:

BLOCKS 1-4 : APARTMENTS BDLG. + URBAN TOWNS [192 UNITS]
PARKING REQUIRED 1.2/d.u. + 0.2/d.u. VISITORS = 192 x 1.2 + .2 = 269 SPACES
PARKING PROVIDED = 269 SPACES (232 U/G, 37 SURFACE)

BLOCKS 5-6 : APARTMENTS BDLG. + LIVE/ WORK TOWNS [148 UNITS]
PARKING REQUIRED 1.2/d.u. + 0.2/d.u. VISITORS = 148 x 1.2 + .2 = 207 SPACES
PARKING PROVIDED = 181 SPACES (148 U/G, 33 SURFACE)

BLOCKS 8-11 : BACK TO BACK TERRACE HOMES (60 UNITS)
PARKING REQUIRED 1.2/d.u. + 0.2/d.u. VISITORS = 60 x 1.2 + .2 = 84 SPACES
PARKING PROVIDED = 88 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
BUILDING SERVICES LOCATION (IN LOWER LEVEL)
WALL MOUNTED LIGHT FIXTURE
FIRE HYDRANT

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.
26.	09/09/21	F.F. LEVELS REVISED AS PER IBI	MB
25.	30/08/21	ISSUED FOR RE-SUBMISION	MB
24.	13/08/21	1138 OLD MTL. STRUCTURES ADDED	MB
23.	14/07/21	GENERAL REV./ FOR COORD.	MB
22.	12/07/21	ROAD WIDENING REVISIONS FOR REVIEW	MB
21.	24/06/21	ROAD WIDENING REVISED	MB
20.	18/06/21	ROAD WIDENING OVERLAYED	MB
19.	08/06/21	BLK. 8 CONVERTED TO TERR. HOMES	MB
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
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

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: NOV., 2016 | SCALE: 1:500 | SHEET No. REV No.: SP-1

DRAWN BY: SBM | CHECKED: MDB

IBI GROUP
333 PRESTON STREET
OTTAWA, ONTARIO
K1S 5N4

WATERMAIN DEMAND CALCULATION SHEET

PROJECT : OLD MONTREAL ROAD
CLIENT : DCR PHOENIX

FILE: 109575-5.7
DATE PRINTED: 2021-09-08
DESIGN: WZ
PAGE: 1 OF 1

NODE	RESIDENTIAL				NON-RESIDENTIAL (ICI)			AVERAGE DAILY DEMAND (l/s)			MAXIMUM DAILY DEMAND (l/s)			MAXIMUM HOURLY DEMAND (l/s)			FIRE DEMAND (l/min)
	SINGLE FAMILY UNITS	TOWNHOUSE / BACK TO BACK UNITS	MEDIUM DENSITY UNITS	POPULATION	INDUST. (ha)	COMM. (ha)	INSTIT. (ha)	RESIDENTIAL	ICI	TOTAL	RESIDENTIAL	ICI	TOTAL	RESIDENTIAL	ICI	TOTAL	
Block 1		6	42	91.80				0.30		0.30	0.74		0.74	1.64		1.64	15,000
Block 2		6	42	91.80				0.30		0.30	0.74		0.74	1.64		1.64	15,000
Block 3		6	42	91.80				0.30		0.30	0.74		0.74	1.64		1.64	15,000
Block 4		6	42	91.80				0.30		0.30	0.74		0.74	1.64		1.64	15,000
Block 5		7	52	112.50				0.36		0.36	0.91		0.91	2.01		2.01	15,000
Block 6		12	77	171.00				0.55		0.55	1.39		1.39	3.05		3.05	15,000
Block 8		14		37.80				0.12		0.12	0.31		0.31	0.67		0.67	15,000
Block 9		14		37.80				0.12		0.12	0.31		0.31	0.67		0.67	15,000
Block 10		16		43.20				0.14		0.14	0.35		0.35	0.77		0.77	15,000
Block 11		16		43.20				0.14		0.14	0.35		0.35	0.77		0.77	15,000
Block 12		6		16.20				0.05		0.05	0.13		0.13	0.29		0.29	10,000
Block 13		6		16.20				0.05		0.05	0.13		0.13	0.29		0.29	10,000
Block 14		6		16.20				0.05		0.05	0.13		0.13	0.29		0.29	10,000
Block 15		4		10.80				0.04		0.04	0.09		0.09	0.19		0.19	10,000
Block 16		4		10.80				0.04		0.04	0.09		0.09	0.19		0.19	10,000
Block 17		4		10.80				0.04		0.04	0.09		0.09	0.19		0.19	10,000
Block 18		5		13.50				0.04		0.04	0.11		0.11	0.24		0.24	10,000
Future Block 19		10		27.00				0.09		0.09	0.22		0.22	0.48		0.48	10,000
Future Block 20		10		27.00				0.09		0.09	0.22		0.22	0.48		0.48	10,000
Future Block 21		6	42	91.80				0.30		0.30	0.74		0.74	1.64		1.64	15,000
Total		**164**	**339**	**1053.00**				**3.41**		**3.41**	**8.53**		**8.53**	**18.77**		**18.77**	

POPULATION DENSITY

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

WATER DEMAND RATES

Residential	280 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)
Semi Detached & Townhouse	10,000 l/min (166.7 l/s)
Medium Density	15,000 l/min (250 l/s)

Block 2 Fire Flow Requirement from Fire Underwriters Survey

Building Floor Area Block 2

	Apartment	Urban Towns	Total
width	43.0 m	49.0 m	
depth	22.0 m	9.6 m	
stories	4	2	
Area	3,784 m^2	940.8 m^2	4,724.8 m^2

$F = 220C\sqrt{A}$

C	0.8	C =	1.5 wood frame
A	4,725 m^2		1.0 ordinary
			0.8 non-combustile
F	12,098 l/min		0.6 fire-resistive
use	12,000 l/min		

Occupancy Adjustment

	-25%	non-combustile
	-15%	limited combustile
Use	0%	combustile
	+15%	free burning
Adjustment	+25%	rapid burning

Use	-15%	
Adjustment	-1800	l/min
Fire flow	10,200	l/min

Sprinkler Adjustment

Use	-30%	
Adjustment	-3060	l/min

Exposure Adjustment

Building Face	Separation (m)	Adjacent Exposed Wall			Exposure Charge *
		Length	Stories	L*H Factor	
north	6	28	4	112	19%
east	17	88	5	440	15%
south	6	26	4	102	19%
west	>45				0%
Total					53%

Adjustment	5,406	l/min
Total adjustments	2,346	l/min
Fire flow	12,546	l/min
Use	**13,000**	**l/min**
	216.7	**l/s**

* Exposure charges from Techinical Bulletin ISTB 2018-02 Table G5

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	20.5 m	8.0 m	
stories	5	2	
Area	8,610 m^2	1,408.0 m^2	10,018.0 m^2

$F = 220C\sqrt{A}$

C	0.8	C =	1.5 wood frame
A	10,018 m^2		1.0 ordinary
			0.8 non-combustile
F	17,616 l/min		0.6 fire-resistive
use	18,000 l/min		

Occupancy Adjustment

	-25%	non-combustile
	-15%	limited combustile
Use -15%	0%	combustile
	+15%	free burning
Adjustment -2700 l/min	+25%	rapid burning
Fire flow 15,300 l/min		

Sprinkler Adjustment

Use	-30%
Adjustment	-4590 l/min

Exposure Adjustment

Building Face	Separation (m)	Adjacent Exposed Wall			Exposure Charge *
		Length	Stories	L*H Factor	
north	>45				0%
east	7	17	3	50	16%
south	>45				0%
west	17	43	4	172	15%
Total					31%

Adjustment	4,743	l/min
Total adjustments	153	l/min
Fire flow	15,453	l/min
Use	**15,000**	**l/min**
	250.0	**l/s**

* Exposure charges from Techinical Bulletin ISTB 2018-02 Table G5

Block 11 Fire Flow Requirement from Fire Underwriters Survey

Building Floor Area Block 11 Back to Back Terrace Towns

width	30.2	m
depth	15.3	m
stories	3	
Area	1,387.7	m^2

$F = 220C\sqrt{A}$

C	1.5	
A	1,388	m^2
F	12,293	l/min
use	12,000	l/min

C =

1.5	wood frame
1.0	ordinary
0.8	non-combustile
0.6	fire-resistive

Occupancy Adjustment

Use	-15%	
Adjustment	-1800	l/min
Fire flow	10,200	l/min

-25%	non-combustile
-15%	limited combustile
0%	combustile
+15%	free burning
+25%	rapid burning

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	13	15	3	46	11%
east	21	37	2	74	8%
south	17.2	24	2	49	11%
west	18	15	3	46	11%
Total					41%

Adjustment	4,182	l/min
Total adjustments	4,182	l/min
Fire flow	14,382	l/min
Use	**14,000**	**l/min**
	233.3	**l/s**

* Exposure charges from Techinical Bulletin ISTB 2018-02 Table G5

Block 14 Fire Flow Requirement from Fire Underwriters Survey

Building Floor Area Block 14 Street townhouses

width	36.8	m
depth	15.8	m
stories	2	
Area	1,166.3	m^2

$F = 220C\sqrt{A}$

C	1.5	
A	1,166	m^2
F	11,270	l/min
use	11,000	l/min

C = 1.5 wood frame
1.0 ordinary
0.8 non-combustile
0.6 fire-resistive

Occupancy Adjustment

Use	-15%	
Adjustment	-1650	l/min
Fire flow	9,350	l/min

-25% non-combustile
-15% limited combustile
0% combustile
+15% free burning
+25% rapid burning

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	14	2	28	15%
east	>45				0%
south	4	16	2	32	16%
west	20	30	3	91	9%
Total					40%

Adjustment	3,740	l/min
Total adjustments	3,740	l/min
Fire flow	13,090	l/min
Use	**13,000**	**l/min**
	216.7	**l/s**

* Exposure charges from Techinical Bulletin ISTB 2018-02 Table G5

Boundary Conditions
1208 Old Montreal Road

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	205	3.41
Maximum Daily Demand	512	8.53
Peak Hour	1,126	18.77
Fire Flow Demand #1	10,000	166.67
Fire Flow Demand #2	15,000	250.00

Location

Results

Connection 1 – Old Montreal Rd. / Famille-Laporte Ave.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.2	86.3
Peak Hour	126.0	80.3
Max Day plus Fire 1	124.7	78.5
Max Day plus Fire 2	120.6	72.6

Ground Elevation = 69.5 m

Connection 2 – Old Montreal Rd. / Cartographe St.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.2	80.6
Peak Hour	126.0	74.6
Max Day plus Fire 1	124.4	72.4
Max Day plus Fire 2	119.9	66.0

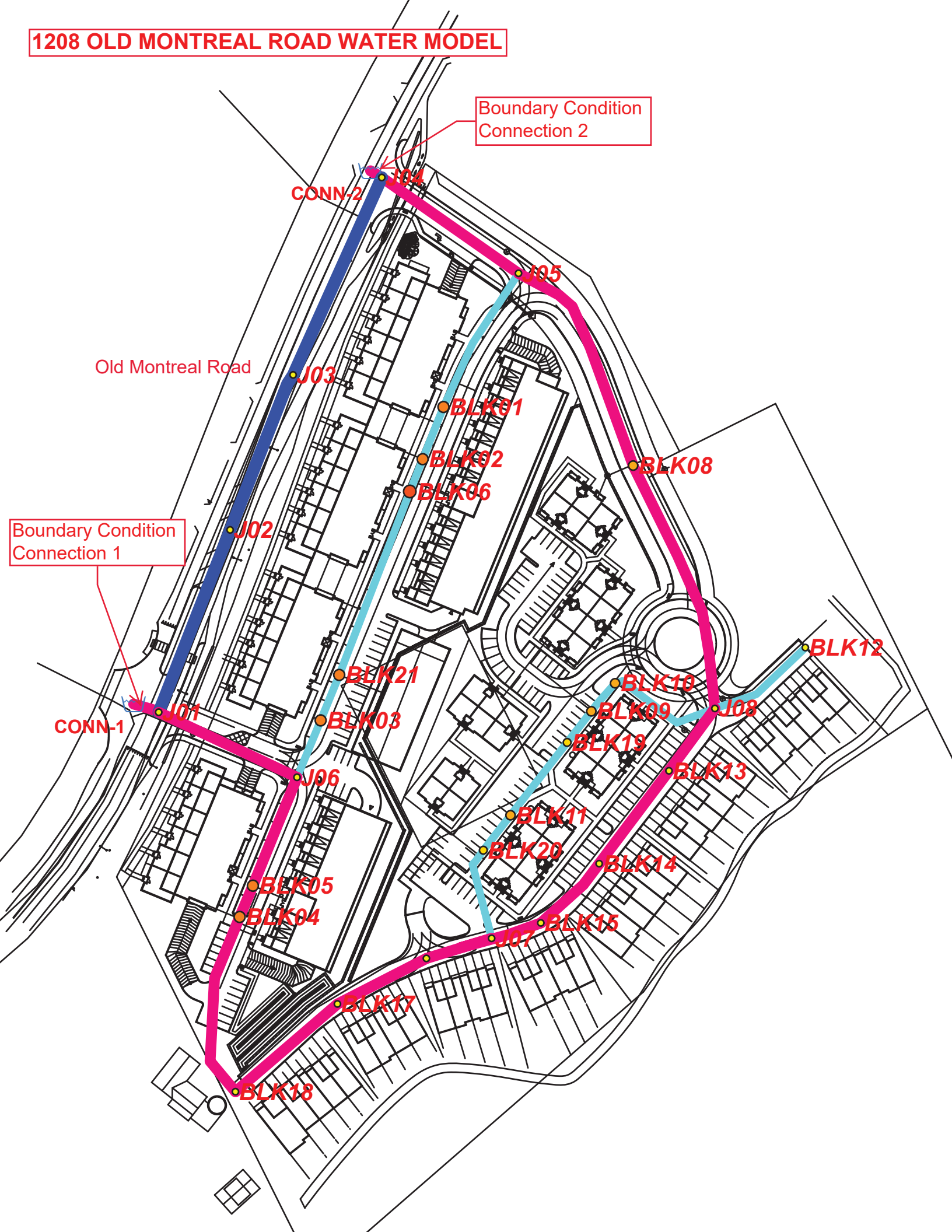
Ground Elevation = 73.5 m

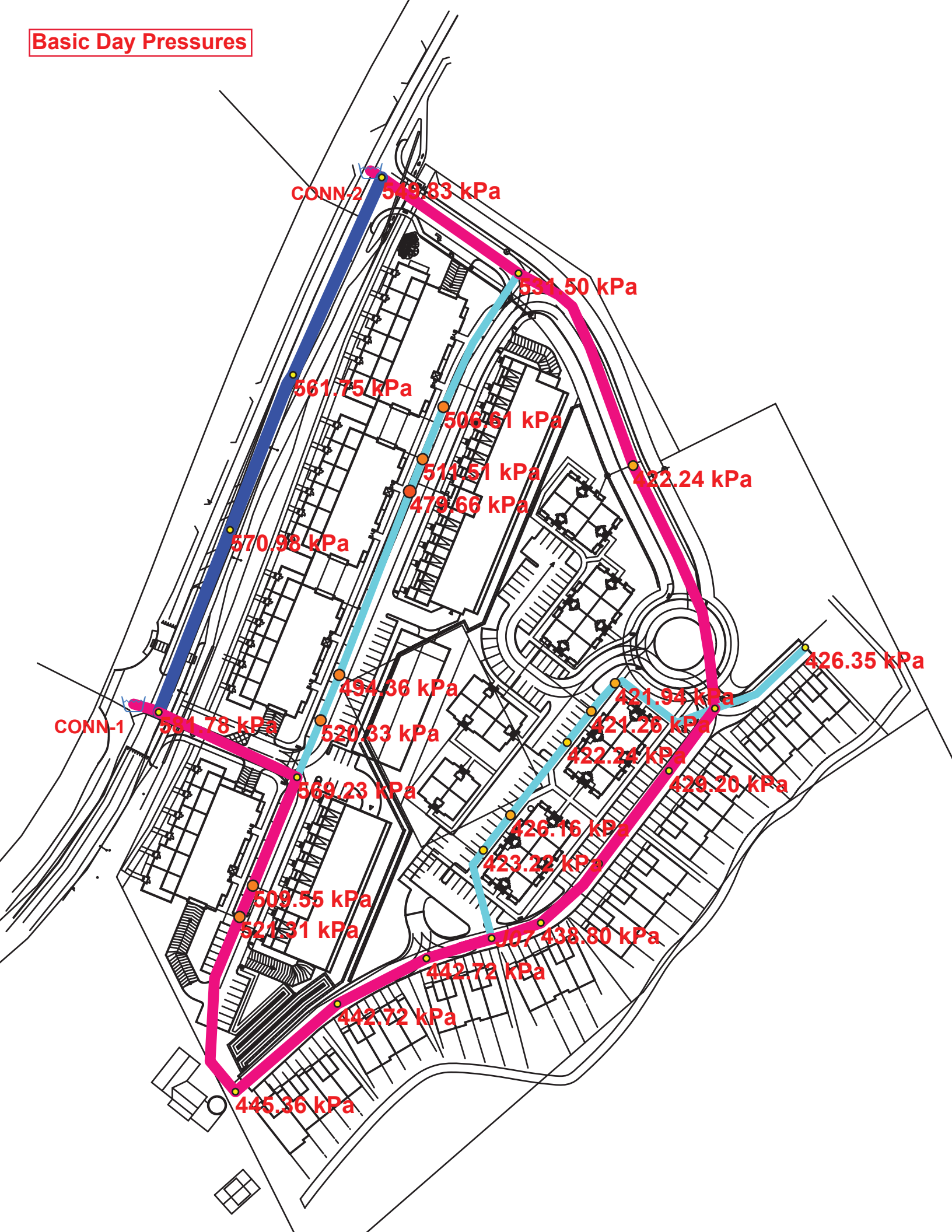
Notes

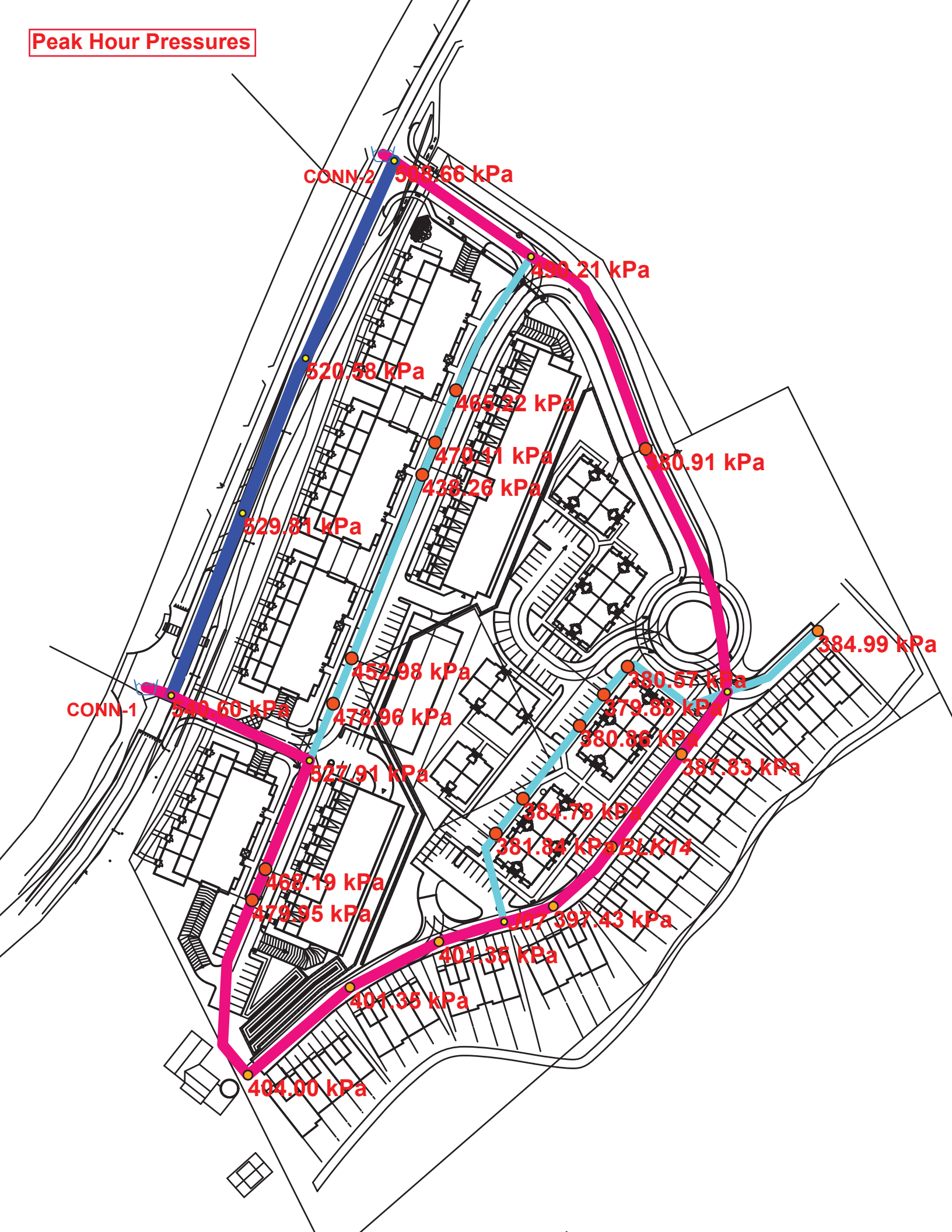
1. As per the Ontario Building Code in areas that may be occupied, the static pressure at any fixture shall not exceed 552 kPa (80 psi.) Pressure control measures to be considered are as follows, in order of preference:
    a. If possible, systems to be designed to residual pressures of 345 to 552 kPa (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.

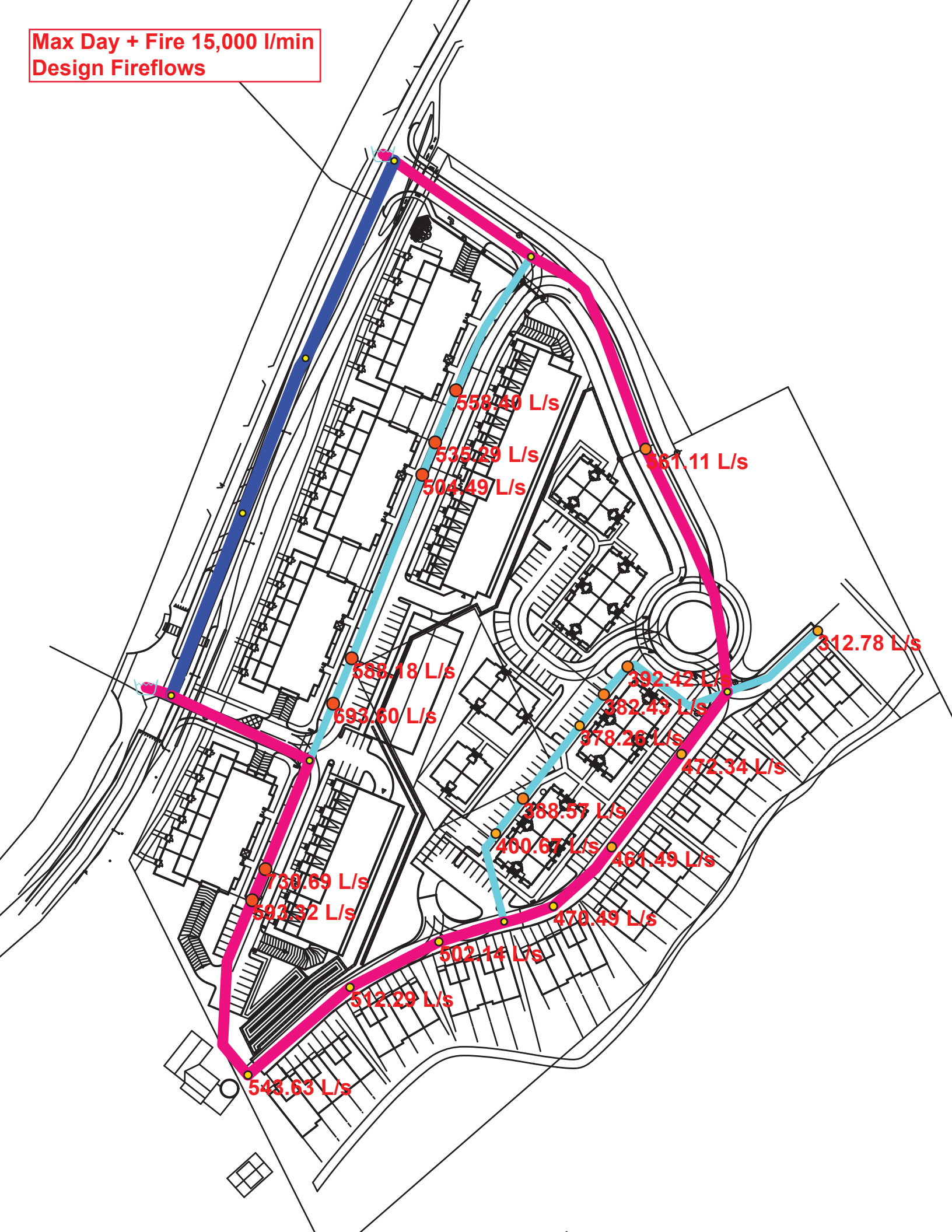
Disclaimer

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
J04
J05
Old Montreal Road
J03
BLK01
BLK02
BLK06
BLK08
Boundary Condition
Connection 1
J02
BLK12
BLK21
BLK10
CONN-1
J01
BLK03
BLK09
J08
BLK19
BLK13
J06
BLK11
BLK20
BLK14
BLK05
BLK04
BLK15
J07
BLK17
BLK18


Basic Day Pressures
CONN-2
548.83 kPa
531.50 kPa
561.75 kPa
506.61 kPa
511.51 kPa
422.24 kPa
479.66 kPa
570.98 kPa
426.35 kPa
494.36 kPa
421.94 kPa
CONN-1
534.78 kPa
520.33 kPa
421.26 kPa
422.24 kPa
569.23 kPa
429.20 kPa
426.16 kPa
423.22 kPa
509.55 kPa
521.31 kPa
J07 438.80 kPa
442.72 kPa
442.72 kPa
445.36 kPa

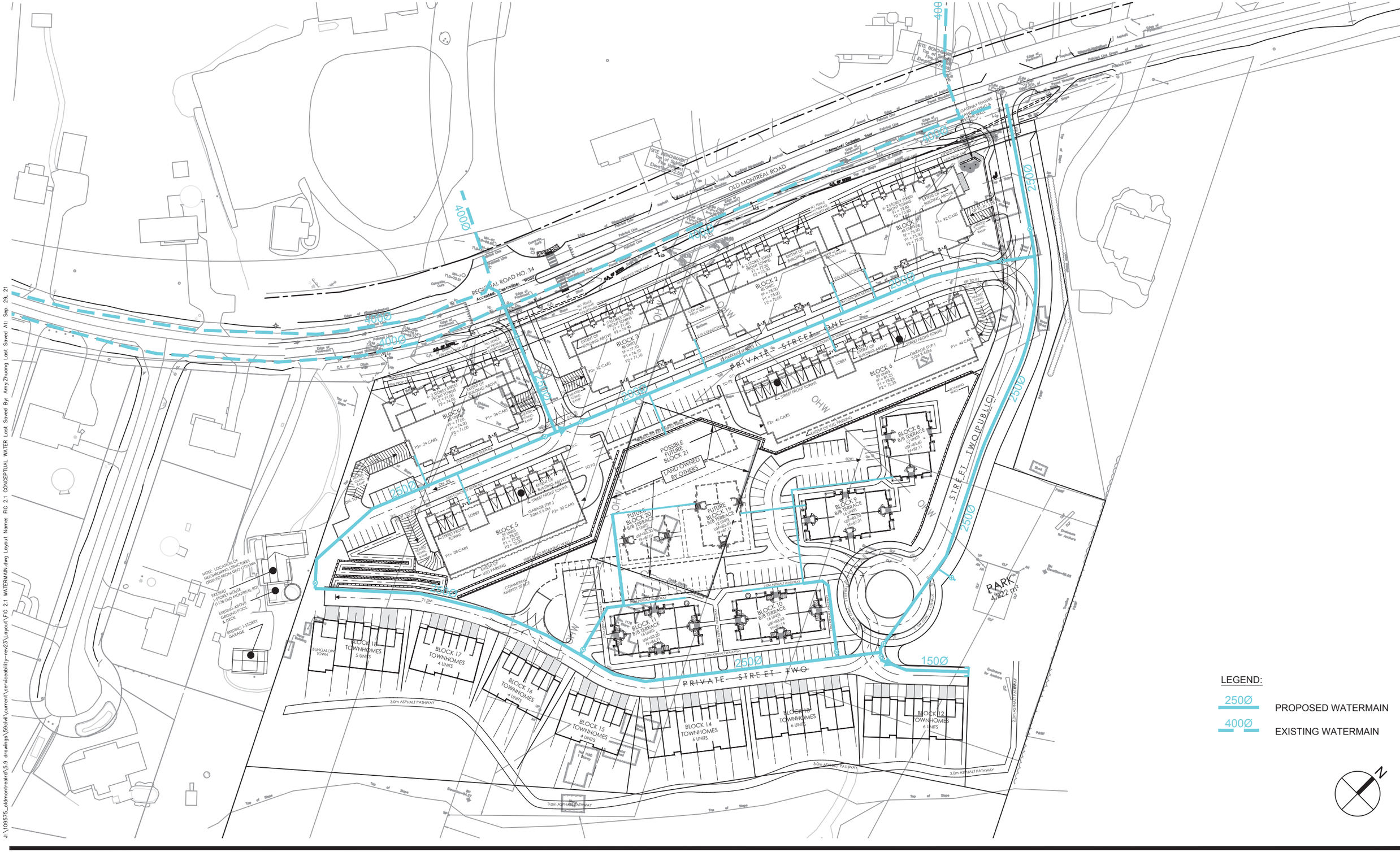

Peak Hour Pressures
CONN-2
508.66 kPa
490.21 kPa
520.58 kPa
465.22 kPa
470.11 kPa
438.26 kPa
380.91 kPa
529.81 kPa
384.99 kPa
452.98 kPa
380.57 kPa
CONN-1
540.60 kPa
478.96 kPa
379.88 kPa
380.86 kPa
527.91 kPa
387.83 kPa
384.78 kPa
381.84 kPa
BLK14
468.19 kPa
479.95 kPa
J07
397.43 kPa
401.35 kPa
401.35 kPa
404.00 kPa


Max Day + Fire 15,000 l/min
Design Fireflows
558.40 L/s
535.29 L/s
504.49 L/s
561.11 L/s
312.78 L/s
588.18 L/s
693.60 L/s
392.42 L/s
382.43 L/s
378.26 L/s
472.34 L/s
388.57 L/s
400.67 L/s
461.49 L/s
730.69 L/s
593.32 L/s
470.49 L/s
502.14 L/s
512.29 L/s
543.63 L/s

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1	☐	BLK01	0.30	78.50	130.20	506.61
2	☐	BLK02	0.30	78.00	130.20	511.51
3	☐	BLK03	0.30	77.10	130.20	520.33
4	☐	BLK04	0.30	77.00	130.20	521.31
5	☐	BLK05	0.36	78.20	130.20	509.55
6	☐	BLK06	0.55	81.25	130.20	479.66
7	☐	BLK08	0.12	87.11	130.20	422.24
8	☐	BLK09	0.12	87.21	130.20	421.26
9	☐	BLK10	0.14	87.14	130.20	421.94
10	☐	BLK11	0.14	86.71	130.20	426.16
11	☐	BLK12	0.05	86.69	130.20	426.35
12	☐	BLK13	0.05	86.40	130.20	429.20
13	☐	BLK14	0.05	86.00	130.20	433.12
14	☐	BLK15	0.04	85.42	130.20	438.80
15	☐	BLK16	0.04	85.02	130.20	442.72
16	☐	BLK17	0.04	85.02	130.20	442.72
17	☐	BLK18	0.04	84.75	130.20	445.36
18	☐	BLK19	0.09	87.11	130.20	422.24
19	☐	BLK20	0.09	87.01	130.20	423.22
20	☐	BLK21	0.30	79.75	130.20	494.36
21	☐	J01	0.00	70.83	130.20	581.78
22	☐	J02	0.00	71.93	130.20	570.98
23	☐	J03	0.00	72.87	130.20	561.75
24	☐	J04	0.00	74.09	130.20	549.83
25	☐	J05	0.00	75.96	130.20	531.50
26	☐	J06	0.00	72.11	130.20	569.23
27	☐	J07	0.00	84.35	130.20	449.28
28	☐	J08	0.00	85.60	130.20	437.04

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1	☐	BLK01	1.64	78.50	125.98	465.22
2	☐	BLK02	1.64	78.00	125.97	470.11
3	☐	BLK03	1.64	77.10	125.98	478.96
4	☐	BLK04	1.64	77.00	125.98	479.95
5	☐	BLK05	2.01	78.20	125.98	468.19
6	☐	BLK06	3.05	81.25	125.97	438.26
7	☐	BLK08	0.67	87.11	125.98	380.91
8	☐	BLK09	0.67	87.21	125.98	379.88
9	☐	BLK10	0.77	87.14	125.98	380.57
10	☐	BLK11	0.77	86.71	125.98	384.78
11	☐	BLK12	0.29	86.69	125.98	384.99
12	☐	BLK13	0.29	86.40	125.98	387.83
13	☐	BLK14	0.29	86.00	125.98	391.75
14	☐	BLK15	0.19	85.42	125.98	397.43
15	☐	BLK16	0.19	85.02	125.98	401.35
16	☐	BLK17	0.19	85.02	125.98	401.35
17	☐	BLK18	0.24	84.75	125.98	404.00
18	☐	BLK19	0.48	87.11	125.98	380.86
19	☐	BLK20	0.48	87.01	125.98	381.84
20	☐	BLK21	1.64	79.75	125.98	452.98
21	☐	J01	0.00	70.83	126.00	540.60
22	☐	J02	0.00	71.93	126.00	529.81
23	☐	J03	0.00	72.87	126.00	520.58
24	☐	J04	0.00	74.09	126.00	508.66
25	☐	J05	0.00	75.96	125.99	490.21
26	☐	J06	0.00	72.11	125.98	527.91
27	☐	J07	0.00	84.35	125.98	407.91
28	☐	J08	0.00	85.60	125.98	395.67

		ID	Total Demand (L/s)	Hydrant Available Flow (L/s)	Critical Node Pressure at Available Flow (kPa)	Hydrant Design Flow (L/s)	Critical Node Pressure at Fire Demand (kPa)	Hydrant Pressure at Design Flow (kPa)
1	☐	BLK01	250.74	456.71	139.96	558.40	318.61	139.96
2	☐	BLK02	250.74	439.09	139.96	535.29	315.05	20.00
3	☐	BLK03	250.74	572.17	139.96	693.60	359.41	20.00
4	☐	BLK04	250.74	593.32	98.30	593.32	295.05	139.96
5	☐	BLK05	250.91	609.35	112.81	730.69	300.24	32.22
6	☐	BLK06	251.39	405.09	139.96	504.49	280.54	139.96
7	☐	BLK08	250.31	426.91	139.96	561.11	254.44	139.96
8	☐	BLK09	250.31	290.52	139.96	382.43	183.59	139.96
9	☐	BLK10	250.35	298.36	139.96	392.42	190.36	139.96
10	☐	BLK11	250.35	296.89	139.96	388.57	190.29	139.96
11	☐	BLK12	166.80	239.11	139.96	312.78	230.63	139.96
12	☐	BLK13	166.80	362.07	139.96	472.34	284.01	139.96
13	☐	BLK14	166.80	355.28	139.96	461.49	285.36	139.96
14	☐	BLK15	166.76	364.36	139.96	470.49	291.88	139.96
15	☐	BLK16	166.76	390.38	139.96	502.14	300.59	139.96
16	☐	BLK17	166.76	398.28	139.96	512.29	302.17	139.96
17	☐	BLK18	166.78	423.79	139.96	543.63	308.78	139.96
18	☐	BLK19	250.22	287.67	139.96	378.26	181.37	139.96
19	☐	BLK20	250.22	305.06	139.96	400.67	196.15	139.96
20	☐	BLK21	250.74	477.30	139.96	588.18	316.99	139.96



J:\109575_oldmontrealrd\5.9 drawings\59civil\current\serviceability-rev23\Layout\FIG 2.1 WATERMAIN.dwg Layout Name: FIG 2.1 CONCEPTUAL WATER Last Saved By: AmyZhuang Last Saved At: Sep. 29, 21

IBI

Scale

N.T.S.

Project Title

DCR / PHOENIX
1208 OLD MONTREAL ROAD

Drawing Title

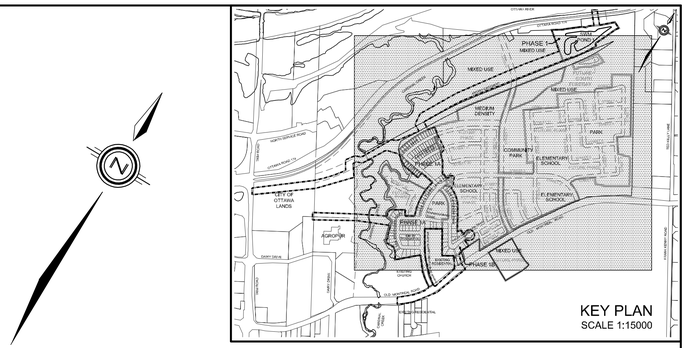
CONCEPTUAL WATER
DISTRIBUTION SYSTEM

Sheet No.

FIG 2.1

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	

CITY OF OTTAWA

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

PROJECT No. 11-513 B-1

EXTERNAL SANITARY 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.		63A
SCALE: 1:4000	DATE: FEBRUARY 2014		

SANITARY SEWER CALCULATION SHEET

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)
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
Contribution from BLOCK 141 (Park)																Splash Pad 5.0 L/s Flow Allowance				5.00						
	121A	113A	0.36	8	21.6	0.57	32.4	4.00	0.53					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
															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	1			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~~		~~267.0~~	~~3.56~~	~~267.0~~										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								
	~~116A~~	~~118A~~	~~0.07~~			~~16.01~~	~~960.0~~	~~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

Portion of DCR/ Phoenix Lands

Portion of DCR/ Phoenix Lands

Population 227 omitted from design sheet

Residual Capacity exceeds **5.25l/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.

Checked: Z.L.

Dwg. Reference: Sanitary Drainage Plan, Dwg. No. 57 - 58

PROJECT: **CARDINAL CREEK VILLLAGE PHASE 1**

LOCATION: **City of Ottawa**

File Ref: 11-513B-1 | Date: May, 2014 | Sheet No. 1 of 5

513 san3.xls

SANITARY SEWER CALCULATION SHEET

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 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	0.51	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	1.67	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								

Residual Capacity exceeds **5.25l/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

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	29.87						
	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	30.85						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	30.85						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	4.05								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	6.06	76.5	200	4.80	71.86	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 **5.25l/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. 3 of 5

513 san3

SANITARY SEWER CALCULATION SHEET

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	3.08	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	3.08	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 **5.25l/s**, refer to IBI sewer design sheet for calculations

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

SANITARY SEWER CALCULATION SHEET

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 **5.25l/s**, refer to IBI sewer design sheet for calculations

LICENSED PROFESSIONAL ENGINEER
Z. LI
JULY 2, 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

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 FLOW	PROPOSED SEWER DESIGN							
				AREA w/ Units (Ha)	UNIT TYPES				AREA w/o Units (Ha)	POPULATION		PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)						PEAK FLOW (L/s)	AREA (Ha)		FLOW				CAPACITY	LENGTH	DIA	SLOPE	VELOCITY	AVAILABLE CAPACITY	
STREET	AREA ID	FROM MH	TO MH		SF	SD	TH	APT		IND	CUM			INSTITUTIONAL		COMMERCIAL		INDUSTRIAL			IND	CUM	(L/s)	IND	CUM	(L/s)	(L/s)	(m)	(mm)	(%)	(full) (m/s)	L/s	(%)
														IND	CUM	IND	CUM	IND	CUM														
VERIFICATION OF RESIDUAL CAPACITY IN DOWNSTREAM SEWERS																																	
using 2014 design criteria																																	
FUTURE RES									3.56	267.0	267.0																						
FUTURE RES									**5.07**	**588.0**	**588.0**																						
FUTURE RES									0.57	43.0	43.0																						
FUTURE RES									0.96	72.0	72.0																						
EXTERNAL									1.74	0.0	0.0																						
EXTERNAL									0.11	0.0	0.0																						
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																						
FUTURE RES (DSEL AREA SPLIT - EXTERNAL)									**0.19**	**22.3**	**22.3**																						
FUTURE RES (DSEL AREA SPLIT - DCR/PHOENIX SHARE)									**4.88**	**565.7**	**565.7**																						
FUTURE RES (Additional Intensification Population)									**0.00**	**450.5**	**450.5**																						
FUTURE RES									0.57	43.0	43.0																						
FUTURE RES									0.96	72.0	72.0																						
EXTERNAL									1.74	0.0	0.0																						
EXTERNAL									0.11	0.0	0.0																						
EXTERNAL									0.03	0.0	0.0																						
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**	1665.5	1665.5	3.65	19.68		0.00		0.00		0.00	0.00	15.94	15.94	5.26		0.00	24.94	35.89	53.00	200	1.10	1.107	10.95	30.50%
																									2021 proposed Q	24.94						
																										ACTUAL INCREASED Q	**2.05**						
																										difference between and DSEL spreadsheet AND PROPOSED 2021	**5.25**						

Design Parameters:

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

Notes:

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

4. Residential Peaking Factor:
Harmon Formula = 1+(14/(4+P^0.5))
where P = population in thousands

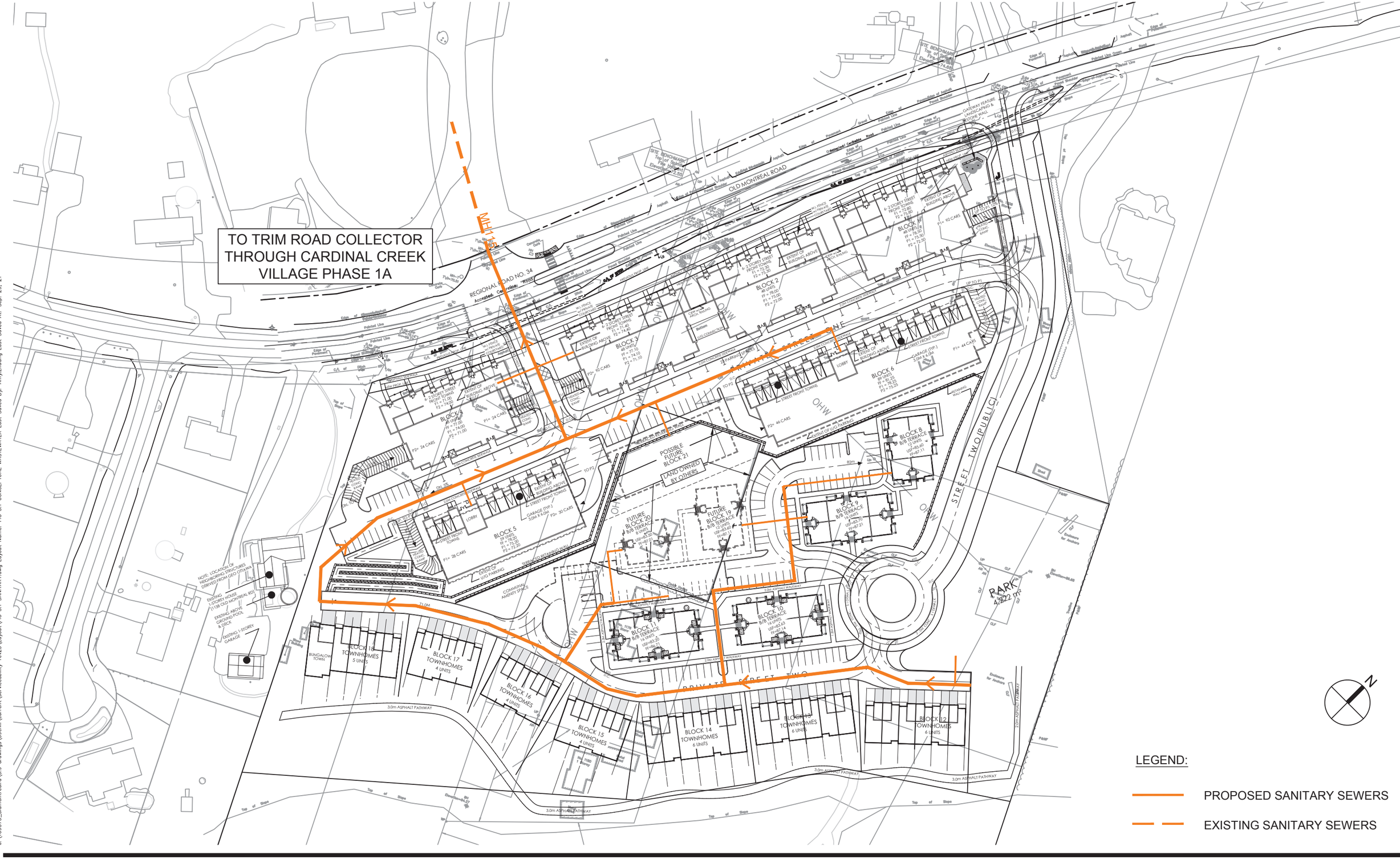
Designed: RM

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
3	Adequacy of Public Services - Submission No. 3	2021-09-30

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



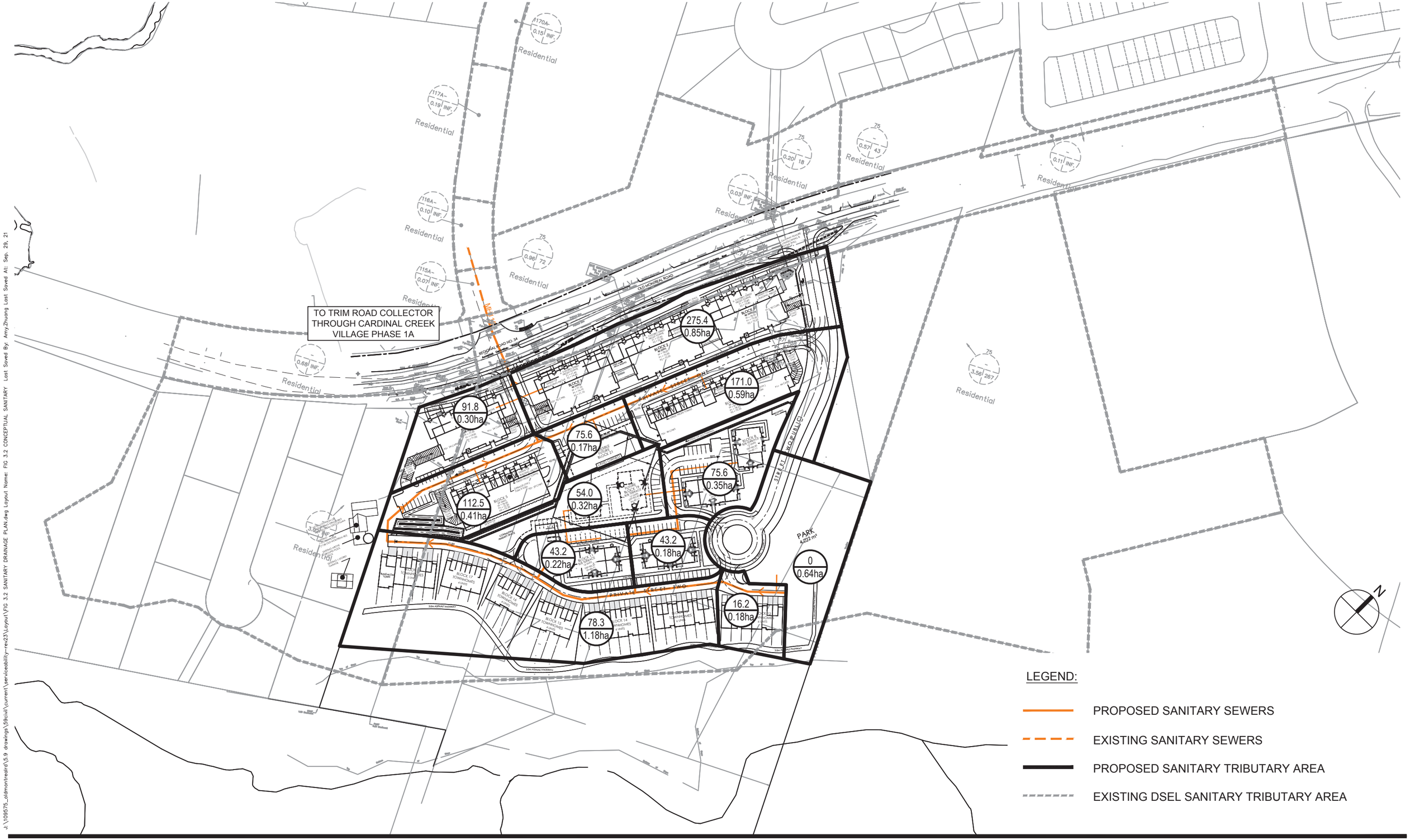
LEGEND:

PROPOSED SANITARY SEWERS

EXISTING SANITARY SEWERS

IBI	Scale: N.T.S.	Project Title: DCR / PHOENIX 1208 OLD MONTREAL ROAD	Drawing Title: CONCEPTUAL WASTEWATER DISPOSAL SYSTEM	Sheet No.: FIG 3.1

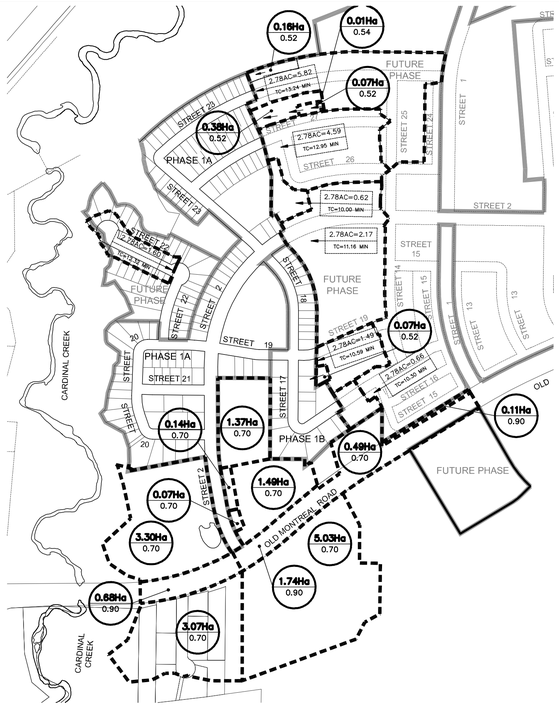
J:\109575_oldmontrealrd\5.9 drawings\59civil\current\serviceability-rev23\Layout\FIG 3.1 SANITARY.dwg Layout Name: FIG 3.1 CONCEPTUAL WASTEWATER Saved By: AmyLZhuang Last Saved At: Sep. 29, 21



J: \109575_oldmontrealrd\5.9 drawings\59civil\current\servicesibility--rev23\Layout\FIG 3.2 SANITARY DRAINAGE PLAN.dwg Layout Name: FIG 3.2 CONCEPTUAL SANITARY Last Saved By: AmyZhuang Last Saved At: Sep. 29, 21

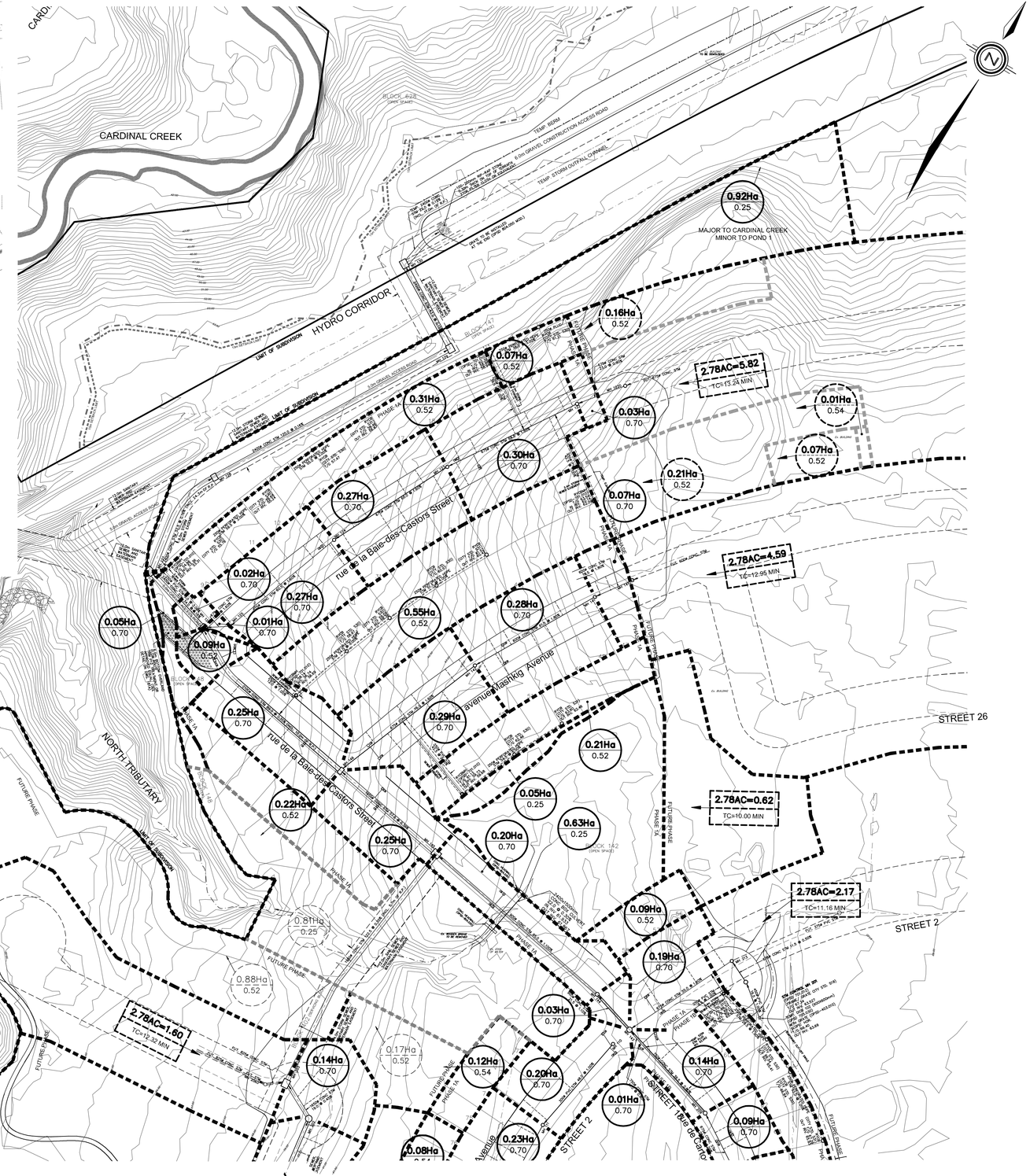
Scale	Project Title	Drawing Title	Sheet No.
N.T.S.	DCR / PHOENIX 1208 OLD MONTREAL ROAD	CONCEPTUAL SANITARY DRAINAGE AREA	FIG 3.2

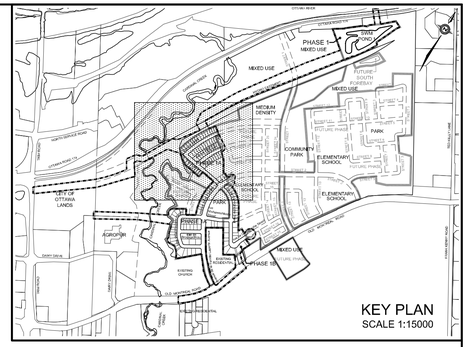
APPENDIX C



FUTURE DRAINAGE AREAS

SCALE: 1:4000





KEY PLAN
SCALE 1:15000

LEGEND

- 0.25Ha / 0.75 — DRAINAGE AREA IN HECTARES, RUN-OFF COEFFICIENT
- 0.29Ha / 0.65 — EXTERNAL DRAINAGE AREA IN HECTARES (BY OTHERS), 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	

CITY OF OTTAWA

PROJECT No. 11-513 B-1

LICENSED PROFESSIONAL ENGINEER — Z. LI — 100136 — 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
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		

LEGEND

- 0.25Ha / 0.75 — DRAINAGE AREA IN HECTARES, RUN-OFF COEFFICIENT
- 0.29Ha / 0.65 — EXTERNAL DRAINAGE AREA IN HECTARES (BY OTHERS), 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)
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- 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.

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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

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DSEL
david schaeffer engineering ltd
120 Iber Road, Unit 203
Stittsville, ON K2S 1E9
Tel. (613) 836-0856
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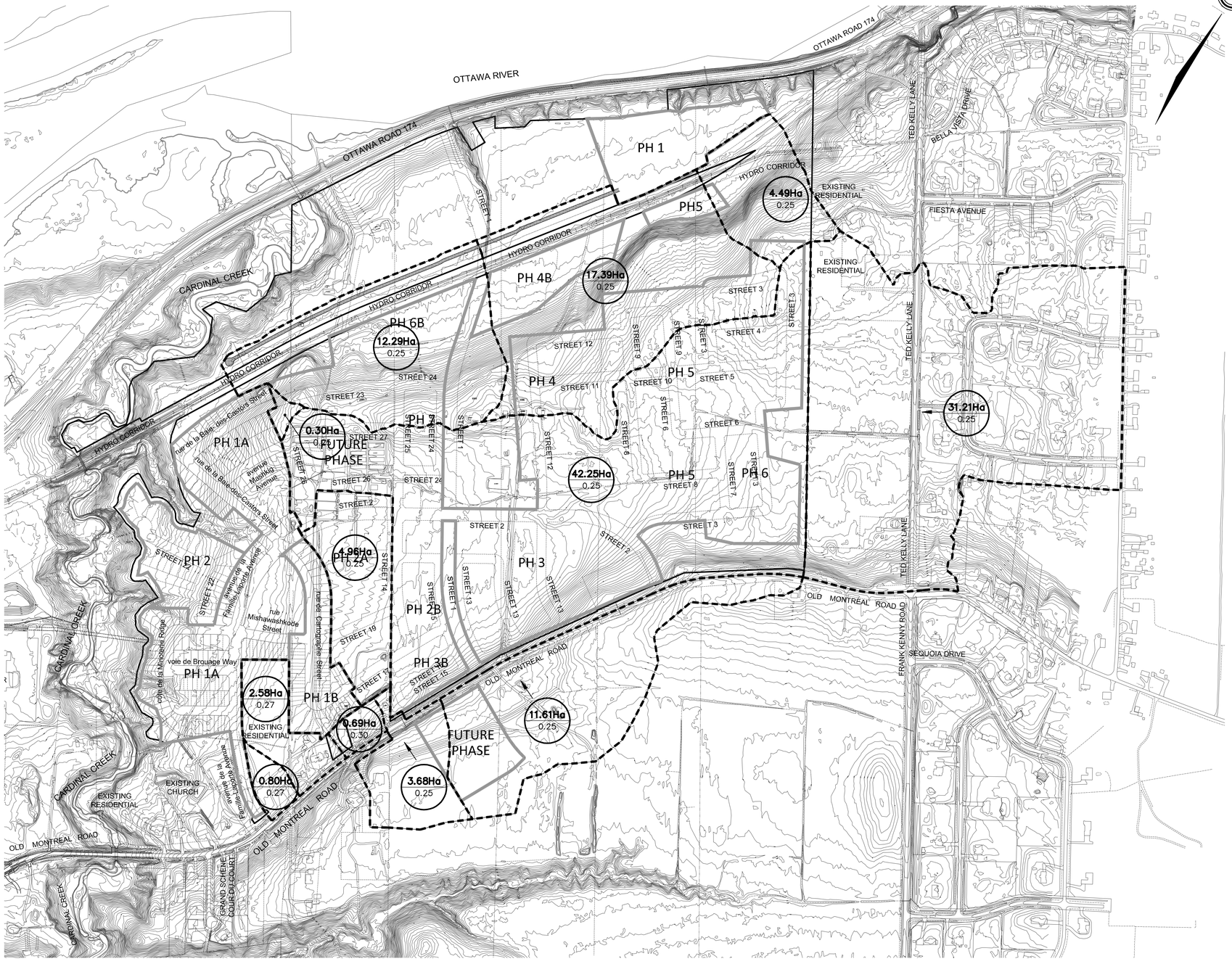
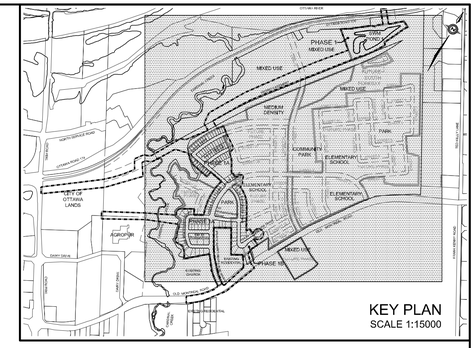
DRAWN BY: W.L./H.P.	CHECKED BY: K.M.	DRAWING NO.	SHEET NO.
DESIGNED BY: K.M.	CHECKED BY: Z.L.		65
SCALE: 1:1000	DATE: FEBRUARY 2014		





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	

CITY OF OTTAWA

PROJECT No. 11-513 B-1

LICENSED PROFESSIONAL ENGINEER — Z. LI — 14-09-09 — PROVINCE OF ONTARIO

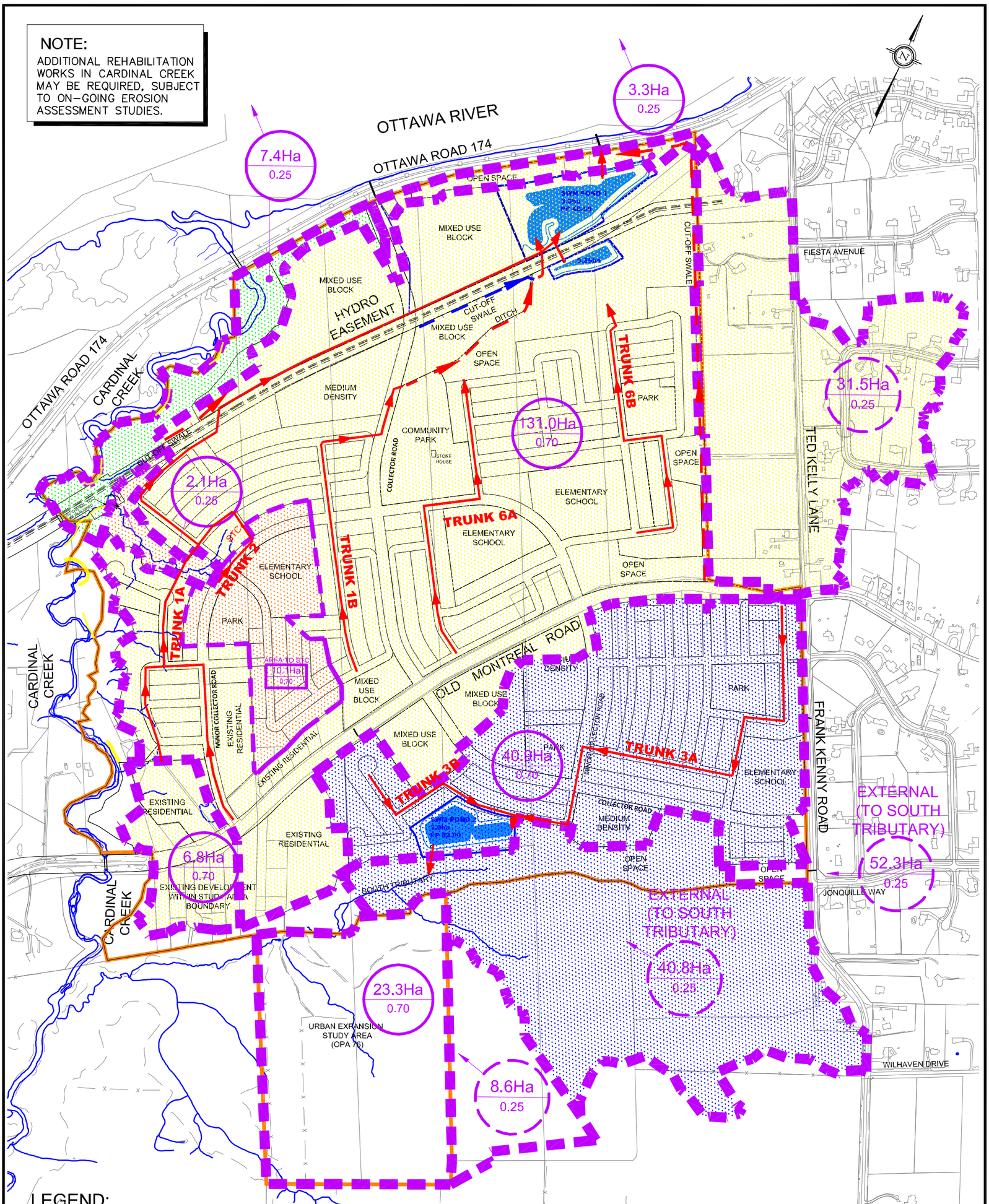
EXTERNAL PRE-DEVELOPMENT STORM DRAINAGE PLAN

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
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		



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120 Iber Road, Unit 203
Stittsville, ON K2S 1E9
Tel. (613) 836-0856
Fax. (613) 836-7183
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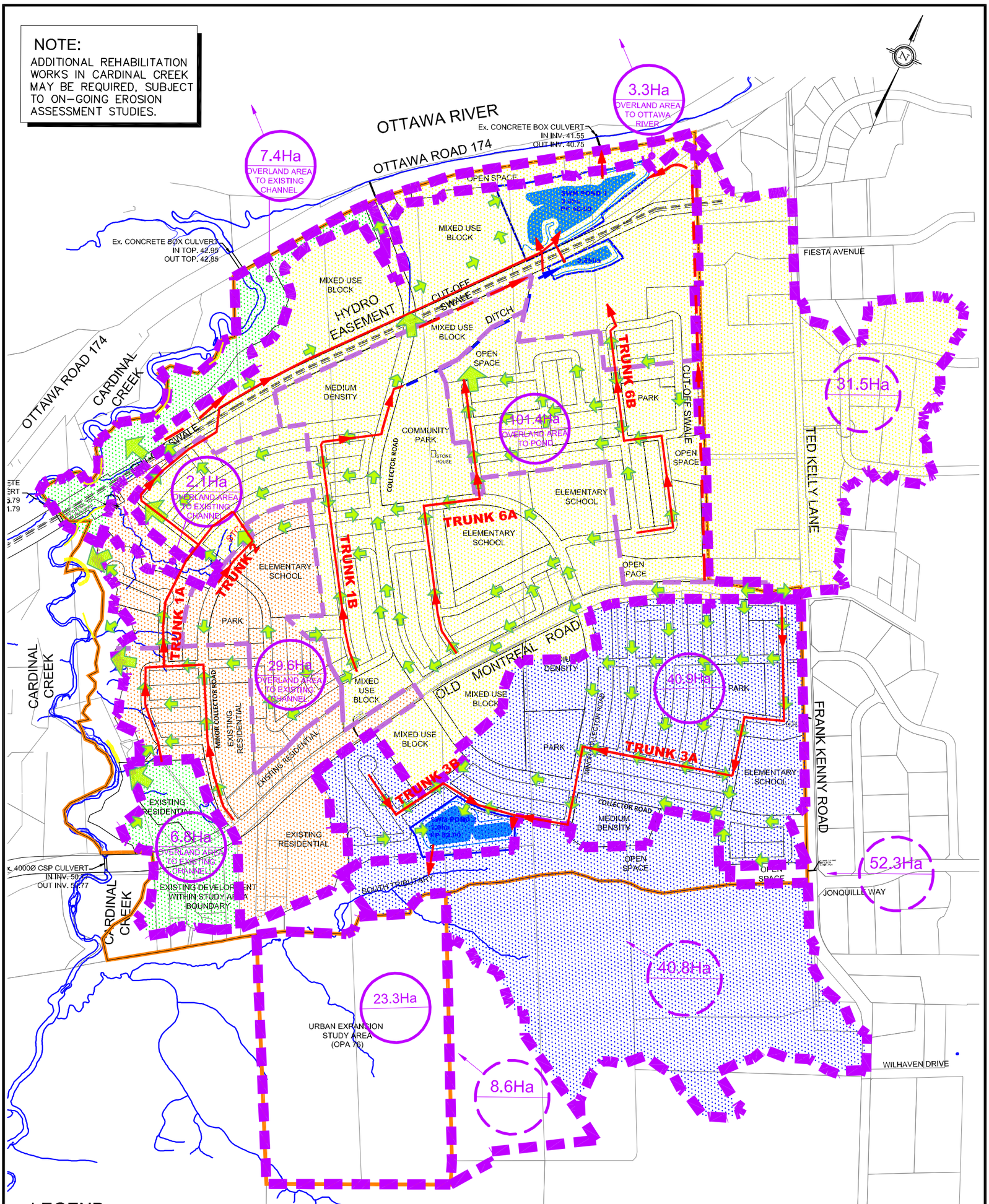
CARDINAL VILLAGE
CONCEPTUAL STORM DRAINAGE (MINOR SYSTEM)
CITY OF OTTAWA

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



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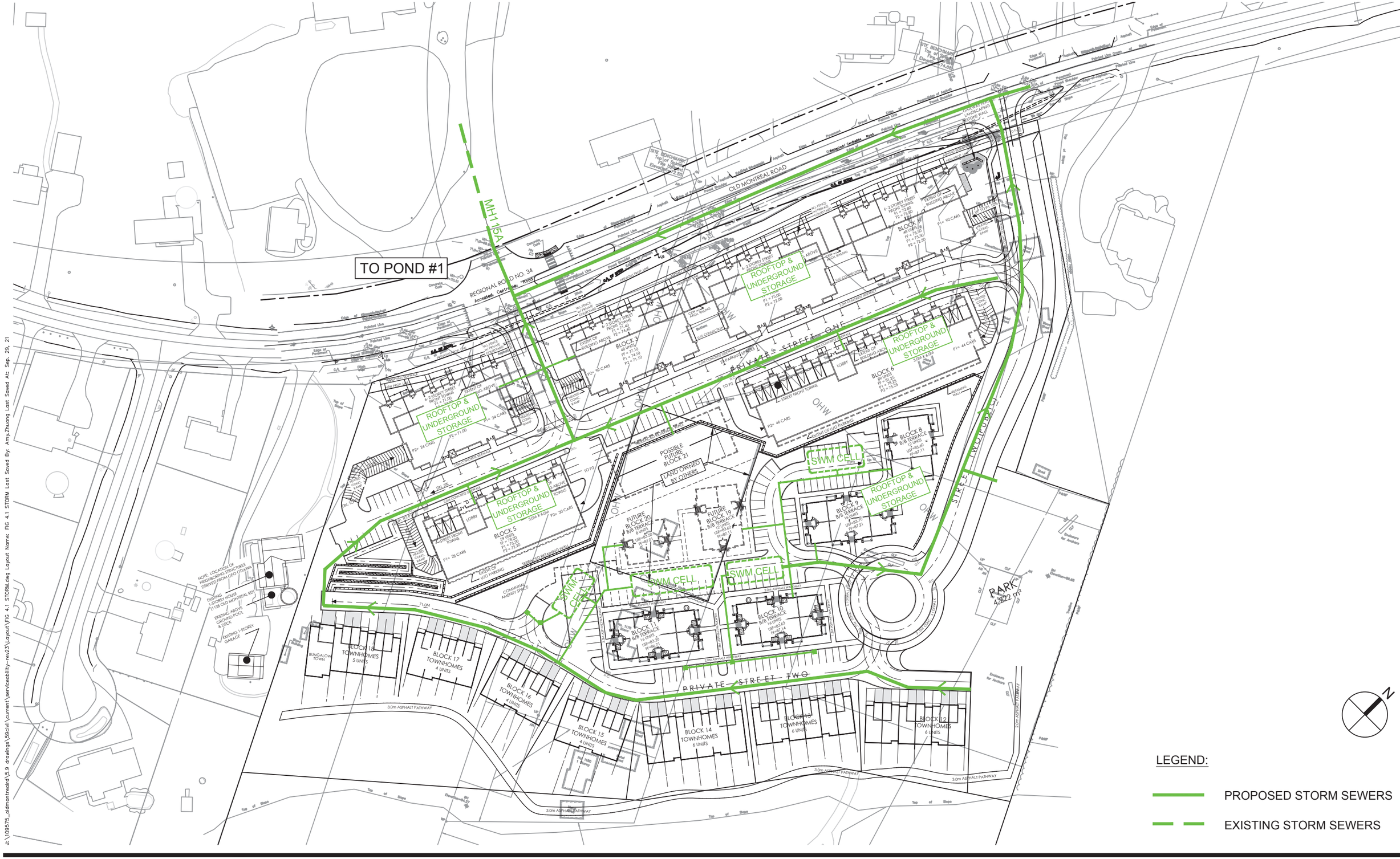
david schaeffer engineering ltd
120 Iber Road, Unit 203
Stittsville, ON K2S 1E9
Tel. (613) 836-0856
Fax. (613) 836-7183
www.DSEL.ca

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

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



J:\109575_oldmontrealrd\5.9 drawings\59civil\current\serviceability-rev23\Layout\FIG 4.1 STORM.dwg Layout Name: FIG 4.1 STORM Last Saved By: AmyZhuang Last Saved At: Sep. 29, 21

IBI

Scale

N.T.S.

Project Title

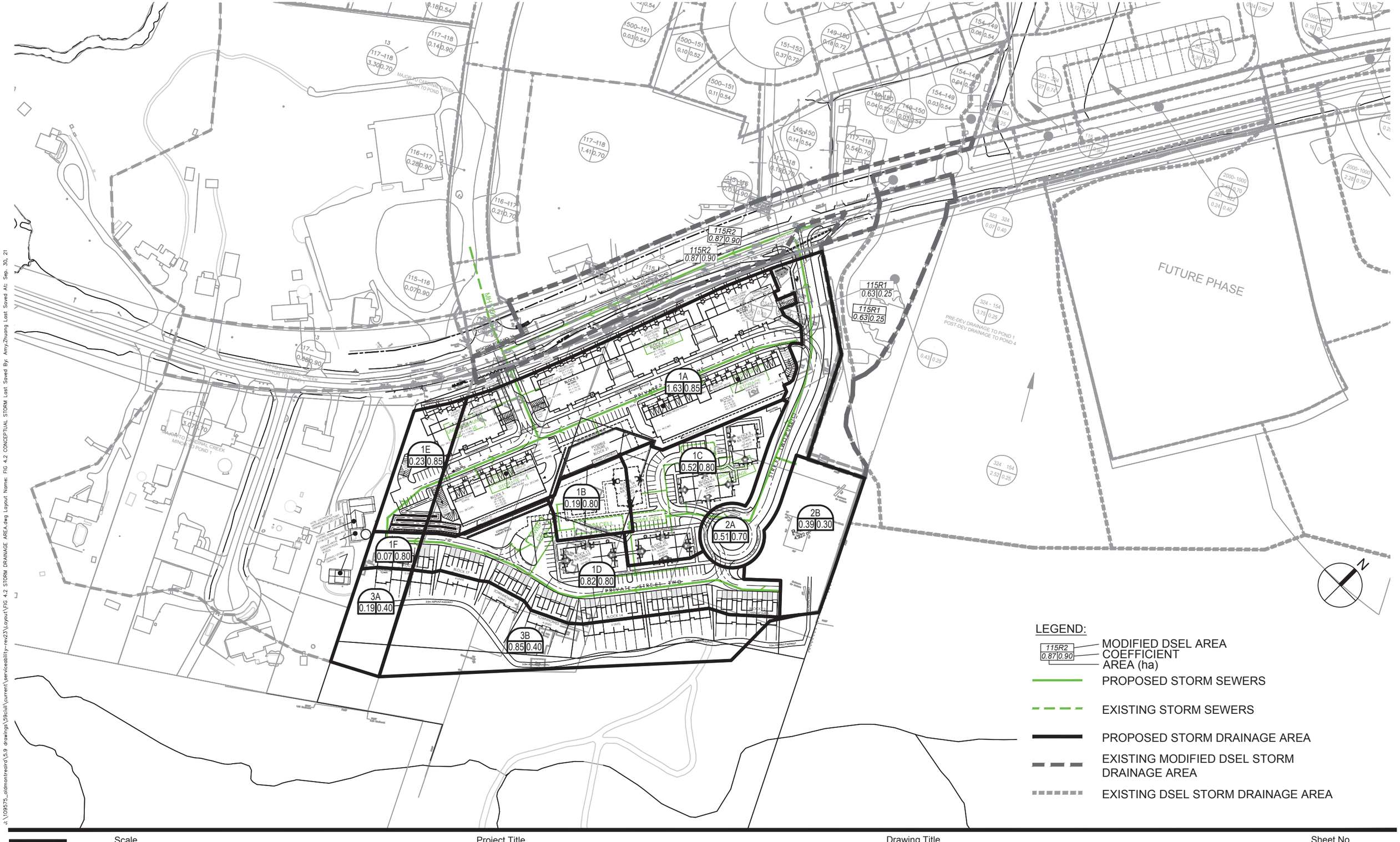
DCR / PHOENIX
1208 OLD MONTREAL ROAD

Drawing Title

CONCEPTUAL STORMWATER DISPOSAL SYSTEM

Sheet No.

FIG 4.1



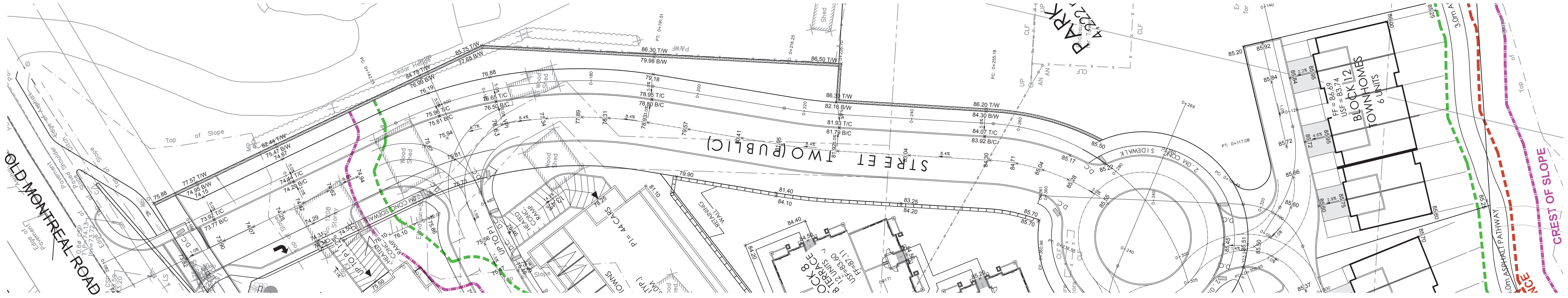
J:\109575_oldmontreal\5.9 drawings\5Bcivil\current\servicability-rev23\Layout\FIG 4.2 STORM DRAINAGE AREA.dwg Layout Name: FIG 4.2 CONCEPTUAL STORM Last Saved By: AmyZhuang Last Saved At: Sep. 30, 21

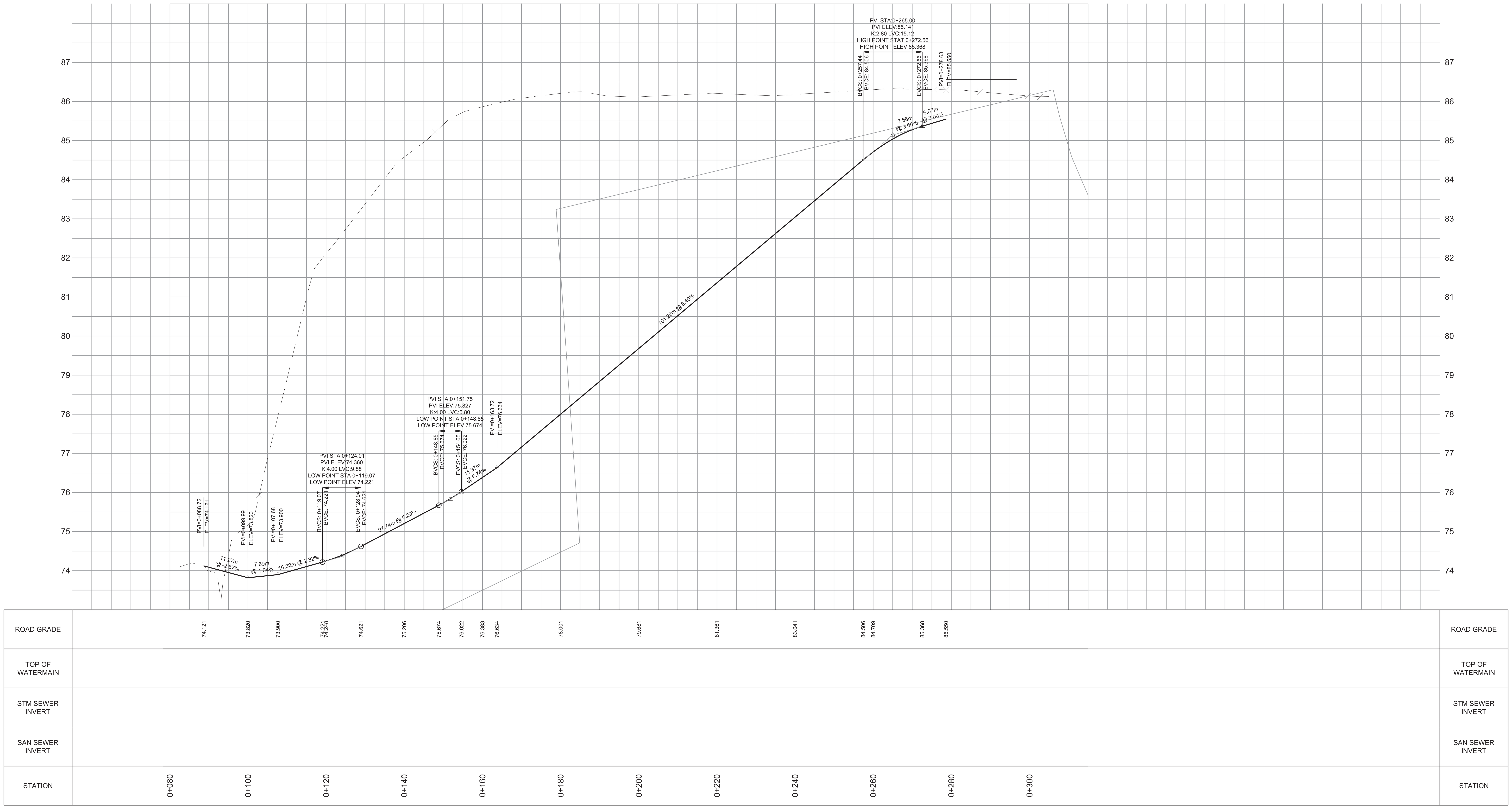
Scale	Project Title	Drawing Title	Sheet No.
N.T.S.	DCR / PHOENIX 1208 OLD MONTREAL ROAD	CONCEPTUAL STORM DRAINAGE AREA	FIG 4.2

APPENDIX D

d:\109575_OldMontrealRd\5.9 Drawings\59civil\current\Serviceability-Rev23\Layout\FIG 5.2 MACRO GRADING.dwg Layout Name: FIG 5.1 CONCEPTUAL MACRO GRADING PLAN Last Saved By: AmyZhuang Last Saved At: Sep. 30, 21

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





Scale

IBI

1 : 500

Project Title

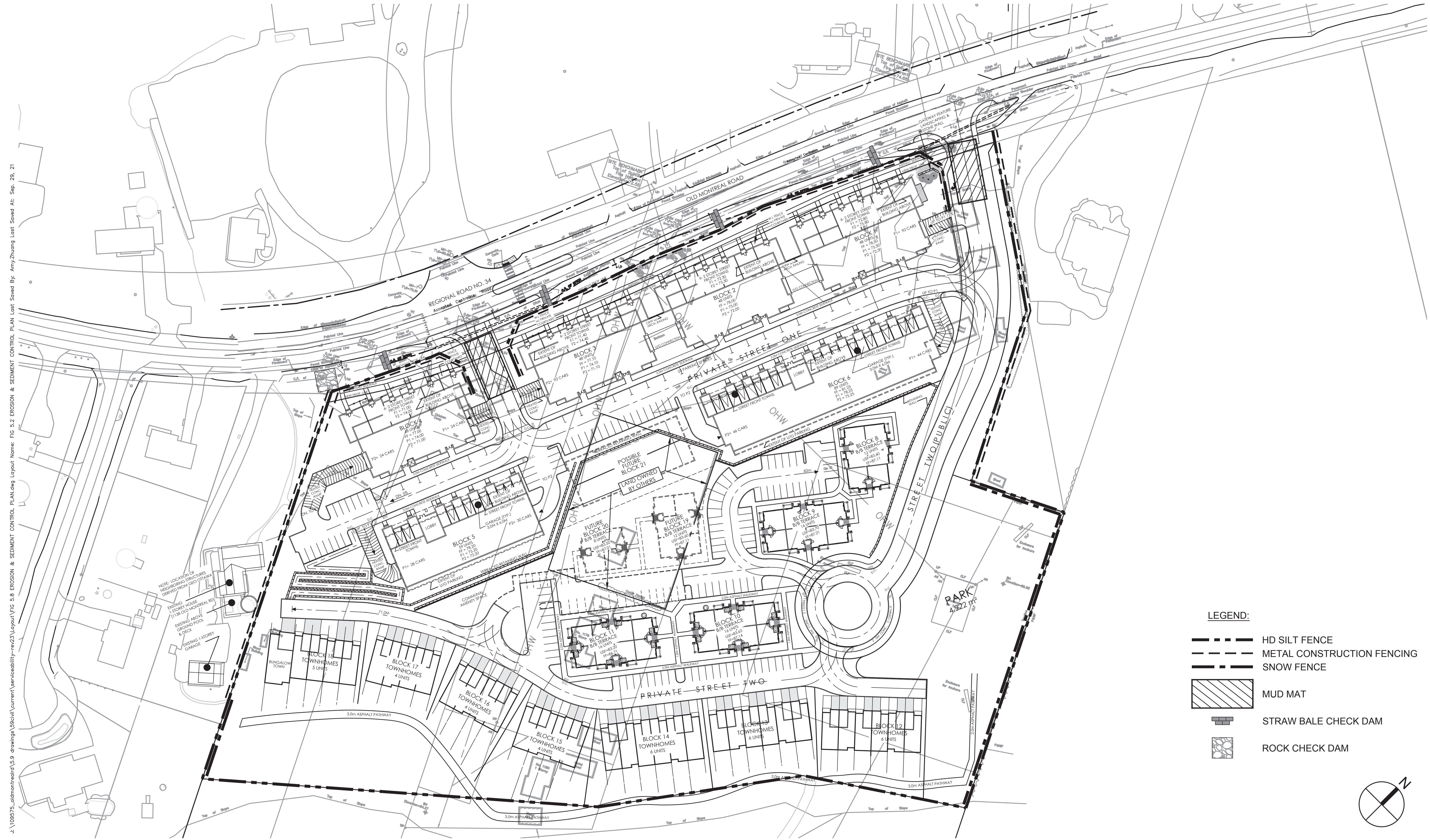
DCR / PHOENIX
1208 OLD MONTREAL ROAD

Drawing Title

CONCEPTUAL PUBLIC ROAD PROFILE

Sheet No.

FIG. 5.1.1



IBI

Scale

N.T.S.

Project Title

DCR / PHOENIX
1208 OLD MONTREAL ROAD

Drawing Title

EROSION & SEDIMENT
CONTROL PLAN

Sheet No.

FIG 5.2