DILLON CONSULTING

MONTGOMERY SISAM ARCHITECTS INC.

Orleans Long Term Care Facility
Functional Servicing Report

375 Famille-Laporte Avenue (Formerly 1161 Old Montreal Road)

City of Ottawa

March 2023 – 21-2647

Table of Contents

Tables

Appendices

1.0 Introduction

Dillon Consulting Limited (Dillon) was retained by Montgomery Sisam Architects Inc. to develop a functional servicing strategy for the undeveloped property fronting Famille-Laporte Avenue, located at 1161 Old Montreal Road in the City of Ottawa. This document outlines the servicing strategy including supporting studies and related information for the transportation, sanitary, stormwater management, and water main servicing for the site.

The total area of the entire site is approximately 2.01 Ha. The Developer is planning on severing the property into two separate development lots. The proposed Long Term Care development site is approximately 1.25 Ha, and the remaining undeveloped lands area are approximately 0.76 Ha. The overall site is presently zoned RI5 Rural Institutional and currently consists of a vacant/grassed field. The proposed Long Term Care Facility development will be located on the southern portion of the site within the limits of the vacant field.

This document is intended for use for the Long Term Care facility portion of the site only. A separate FSR will be prepared for the future development lands to be north.

1.1 Reference Documents

The following documents and drawings were referenced when completing this study:

- City of Ottawa– Sewer Design Guidelines (Ottawa, 2012)
- City of Ottawa – GIS Interactive Mapping (Ottawa)
- Design Guidelines for Sewage Works (MOE, 2008)
- Cardinal Creek Master Servicing Study (David Schaeffer Engineering Ltd., 2013)
- Cardinal Creek Subwatershed Management Plan (Aecom, August 2014)
- Cardinal Creek Village, Phase 1A As-Built Drawings (David Schaeffer Engineering Ltd., 2014)

2.0 Transportation Servicing

2.1 Existing Conditions

There is no existing access to the proposed development. The property is bounded on the north limit, east limit, and south limit by residential homes.

2.2 Proposed Roadways

The proposed access points to this development will be from Famille-Laporte Avenue at the west limit of the site. Staff, visitors, EMS, services and deliveries will access the site via Famille-Laporte Avenue. The site layout is shown in *Appendix A*. The pavement structure of the proposed internal roads will be consistent with geotechnical recommendations and the City's Development Manual. A Traffic Impact Study (TIS) has been completed for the site and is included as a separate submission.

3.0 Sanitary Servicing

3.1 Existing Conditions

Currently, there is an existing 200mm diameter sanitary sewer located underneath Famille-Laporte Avenue, which is located west of the proposed development. The existing sanitary sewer increases to 250mm in diameter at the service connection point and drains northwards, ultimately discharging to the City of Ottawa Robert O. Pickard Environmental Centre treatment plant.

While the existing site is undeveloped, it was identified as Existing Residential in the Cardinal Creek Master Servicing Study. Using Table 10 in Section 6.3 as a reference (included below), the site was assumed to be low-density residential. The Population Density was determined to be 86 ppl/Ha. The CCMSS assumed a residential flow rate of 350 L/s/person. Using these criteria, an estimated existing site flow was calculated to be slightly more than the proposed peak flow from the Long Term Care Facility (2.25 L/s vs. 2.16 L/s). Refer to *Appendix B* for the calculations.

Table 10: Population Estimates

Dwelling Unit Projections	Area (ha)	Density (uph)		Units		Household	Population	
		Min.	Max.	Min.	Max.	Size (ppu)	Min.	Max.
Low Density (Singles/Semis)	50	26	28	1,298	1,397	3.3	4,282	4,612
Medium Density (Multi-Family)	13	50	60	662	794	2.5	1,655	1,986
Mixed Use (Apartments)	8	60	75	464	580	1.8	835	1,044
Existing Residential - Low Density	14	26	28	351	378	3.3	1,158	1,247
Existing Residential - Medium Density	5	50	60	225	270	2.5	563	675
Total	**89**			**2,999**	**3,420**		**8,493**	**9,564**

3.2 Design Criteria

The following sanitary sewer design criteria for this property are outlined in Table 1. The design criteria was established by the City of Ottawa's Design Guidelines (2012).

Table 1: Sanitary Sewer Design Criteria

Criteria	City of Ottawa's Design Guidelines (2012)
Hydraulic Sewer Sizing	Manning's Equation
Minimum Sewer Size (mm)	135 mm diameter
Minimum Cover Depth (m)	2.5
Manning's Roughness Coefficient 'n'	0.013
Velocity: Minimum (m/s) Maximum (m/s)	 0.60 3.00
Hydraulic Losses Across Manholes: • Straight Run (m) • 45 degree turn of less (m) • Greater than 45 degree turn to 90 degree turn (m)	 Grade of Sewer 0.03 0.06
Infiltration Allowance/Peak Extraneous Flow	0.05 L/Ha/s [Dry Weather] 0.28 L/Ha/s [Wet Weather] 0.33 L/Ha/s [Total Infiltration Allowance]
Peaking Factor	1.5 For Institutional
Population Densities For Facility:	224 Bed Facility
Average Daily Sewage	450 L/Cap/Day [Per OBC 8.2.1.3.B – Long Term Care]
Sewer Surcharging	Maximum hydraulic grade line

3.3 Proposed Servicing

Refer to the attached *Appendix A* which illustrates the proposed sanitary servicing layout. The sanitary servicing for the proposed development is as follows:

- All sanitary flows from the proposed building will be conveyed via a new 200mm site sanitary sewer.
- The site sanitary sewer will outlet to the existing Private Drain Connection stub located at the Famille-Laporte Avenue right-of-way limit. The existing PDC sewer is 200mm in diameter, connects to an existing sanitary manhole within the Famille-Laporte right-of-way, and drains northerly via an existing 250mm diameter sewer.
- A new Sanitary Manhole will be installed at the property line/PDC stub.

- A 200mm diameter service connection will be installed from the west side of the building and directed to a new manhole.

The sanitary sewer functional design sheets are provided in *Appendix B*. Criteria used in flow calculation is listed in Table 1.

The future detailed design of the sanitary sewer and service is to be consistent with the requirements of the City of Ottawa, Cardinal Creek Master Servicing Study and the Ministry of Environment, Conservation and Parks (MECP).

4.0 Stormwater Servicing

4.1 Background Information

The proposed development is of approximately 1.25 Ha and is zoned RI5 Rural Institutional, currently consists of a vacant field. The City of Ottawa has previously installed a storm sewer stub for the proposed development at this location. There is an existing 1200 mm diameter municipal storm sewer within the Famille-Laporte Avenue right-of-way along east side of the road heading northwards, which drains to the downstream Cardinal Creek stormwater management facility and ultimately discharges to the Ottawa River. An outlet sewer/drain connection for the site drain to City of Ottawa manhole MHST74214. According to the as-built drawings provided by the City, the private drain connection is a 600mm diameter concrete pipe at 0.50% slope that terminates at the property with a manhole.

The development parcel is within the Cardinal Creek Development area. Cardinal Creek is subject to the Cardinal Creek Master Servicing Study (2013). As a part of that Master Servicing Study, a regional stormwater management pond was constructed. For the purposes of determining stormwater management criteria for the site, the subject parcel was assigned an existing Runoff Coefficient of 0.70 as per the Storm Drainage Plan for the Development (Sheet 65 – Cardinal Creek Village Phase 1A, David Schaeffer Engineering Ltd, 2014). The Storm Drainage Plan is included in *Appendix B*.

Areas to the south and southeast of the property presently grade towards the subject parcel. The offsite parcels are existing residential properties, mainly grassed with various structures. Overland flows from larger rain events will drain towards and onto the subject parcel. The offsite areas are also included in the Cardinal Creek Master Servicing Study (2013) and are also assigned an existing Runoff Coefficient of 0.70.

4.2 Design Criteria

The following storm sewer design criteria for this property are outlined in Table 2. The design criteria were established by the City of Ottawa's Design Guidelines (2012) and the Cardinal Creek Master Servicing Study (2013).

Table 2: Storm Sewer Design Criteria

Criteria	City of Ottawa's Design Guidelines (2012)
Hydraulic Sewer Sizing	Rational Method / Mannings Equation
Sewer Sizing Rainfall Event	5 year storm event
Minimum Cover Depth (m)	2
Manning's Roughness Coefficient 'n'	0.013

Criteria	City of Ottawa's Design Guidelines (2012)
Velocity: • Minimum (m/s) • Maximum (m/s)	 0.80 3.0
Roof Downspouts	Connected directly to site service connection
Rooftop Storage	Permitted (maximum 150mm depth)
Parking Lot Storage	Maximum 300mm depth
Inlet Times: • Institutional	 10 minute maximum
Runoff Coefficients: • Paved and Roof Surfaces • Landscaped/Open Space	Calculated per Site Conditions 0.90 0.25
Sewer Surcharging	• No surface ponding during 5 year storm event • 100 year Hydraulic Grade Line 0.3m below building footing
Stormwater Storage Requirements	• Storage of 100 year storm event • Outlet Rate per Cardinal Creek Master Servicing Study, matching 5 Year pre-development runoff rate (assuming C = 0.70)
Water Quality Treatment	• Provided downstream in Cardinal Creek SWM Facility • Per Cardinal Creek Subwatershed Management Plan, provide for first flush (5mm) on-site retention to the extent possible

4.3 Proposed Servicing

It is proposed that the site's stormwater outlet to the existing 1500 mm diameter storm sewer that is currently located within the Famille-Laporte Avenue right-of-way, located west of the site.

Refer to *Appendix A* for the proposed servicing. The stormwater servicing for the proposed development is as follows:

- The proposed site, and paved area will be serviced through a new storm sewer network constructed within the site.
- Onsite detention will be provided in accordance with City of Ottawa and Rideau Valley Conservation Authority Design Guidelines. The site storm outlet rate is to be restricted to the outlet rates recommended in the Cardinal Creek Master Servicing Study for the 5 and 100 year storm events. Site allowable outlet rate is based on an assumed predevelopment C value of 0.70 for the site.
- For the 100 Year event, a 20% increase factor has been applied to all C-values to account for soil saturation. The site average C-value for the 100 year event is 0.83.
- Required restricted flows for the 100 year storm event are to be detained in an underground storage facility. The anticipated 100 year high water line of 64.98m will be near the inside ceiling of the

detention chambers, which is below the lowest point on the site. The Detention Chambers have open grate manholes at either ends to permit access, ventilation and extreme events to surcharge to the overland flow routes.

- The site will be graded to allow for overland flow to be captured onsite and directed to the storm sewer network.
- A 20% increase to the 100 Year event was calculated, and the HGL for the event still remained in the sewer network with no site surcharging or ponding. While it is anticipated that there will be localized ponding at the catchbasins due to limited inlet capacities of the CBs, all runoff can be contained within the sewer main network.
- Rain events in excess of the 100 year + 20% event may pond onsite, then drain overland through the site to the existing City road network.

Refer to *Appendix B* for the storm sewer design and *Appendix C* for the Stormwater Management Calculations.

4.3.1 Stormwater Design Calculations

The entire development (1.25 Ha) is located within the Cardinal Creek Village, and is subject to the Cardinal Creek Master Servicing Study. The study completed in 2013, outlines the stormwater management requirements for the site. In general, the site is tributary to a downstream regional stormwater management facility. The site was assigned an existing Rational Method runoff coefficient of 0.70. As the site is presently all grassed, the Master Serving Study assumed the site was fully developed in the roadway sewer sizing and downstream detention facility design. The increased runoff coefficient allows for the LTC site to have a reduced volume of onsite detention from what would be typically expected when a grassed site is converted to a fully developed site.

All sewers within the site drain to below ground detention facilities to detain a minimum of the 100 year event. The site sewers have been oversized to better accommodate the flows from the 100 year event. As agreed upon with the City of Ottawa, the rooftop runoff will discharge directly to the proposed site sewer network and flow to the underground detention facility. The 100 year HGL at the building leads are over 1.2m below the Finished Floor Elevation.

Presently there are residential lands to the south and southeast of the site that have overland drainage towards the subject parcel. The properties are 1171, 1183, 1195, 1199 and 1201 Old Montreal Road. The total additional area that drains to the site is approximately 0.92 Ha of mainly grassed lots with homes and structures. Per City comments, the offsite flows are not required to be included in the site storage requirements and have been excluded. These offsite lands were also included in the Cardinal Creek Master Servicing Study, as such, the tributary area to the existing City sewers and pond will not be increased. Like the LTC site, the residential lands have been allocated an existing runoff coefficient of 0.70. If these lands were to be redeveloped in the future, it is understood that the properties would accommodate their own site drainage and regrade the lands to prevent overland flows from reaching the LTC site.

As shown in the design calculation in *Appendix C*, the calculated permissible outlet rate for the 5 year event for the LTC site is 0.254 m^3/s. The 5 year design requirements utilized for the site were identified in the Cardinal Creek Master Servicing Study. Due to the high permitted release rate, a conventional inlet control device is too small to utilize. In order to control flows from the site to the City sewer system, a 600mm diameter control pipe with a 300mm diameter orifice will be implemented. Refer to the design drawings for the location of the outlet controls and *Appendix C* for orifice sizing calculations. Based on the calculated high water line and orifice size, the actual outflow from the orifice will be a maximum of 0.247 m^3/s. This outlet rate, which is slightly lower than the maximum permitted, was used to calculate the required volume of storage for the site.

4.3.2 Drainage Areas

The proposed site drainage areas can be found on Sheet DRG-1 in *Appendix B*. These can be read in conjunction with the sewer design sheets for the development area. The drainage areas tributary to the site include the above noted offsite residential lands/areas that presently drain overland to the subject parcel. These offsite lands will be deleted from the overall site drainage area if/when the offsite lands redevelop or are regraded.

4.3.3 Site Detention

The required site 100 year event detention volume was calculated using the outlet rate detailed in Section 4.3.1. The total required volume for the LTC site only, excluding the identified offsite residential areas, is 161.9 m^3. The site architect has confirmed that there is no planned rooftop storage.

The total required storage will be provided in underground concrete stormwater management chambers along the west side of the site. Details for the detention chambers are included with Civil Design Plans.

The chambers allow for low flow outlet of first flush events (see following section). Larger storm events will overtop the baffle walls which will act as a weir, and outlet at the Famille-Laporte storm sewer at the above noted release rate.

4.3.4 High Water Line

Per the Cardinal Creek as-built drawings provided by the City, the 100-year hydraulic grade line (HGL) of the 1500mm diameter sewer in the Famille-Laporte storm sewer is 63.325m. This is below the roadway sewer obvert (63.71m). The site 100 year storm event high water line is 64.98m in the Stormwater Chambers. The hydraulic grade line (HGL) for the 5, 100 and 100 + 20% event can be found in the sewer design sheets in *Appendix B*.

For the 100 Year + 20% scenario, an estimated roadway HGL of 64.00m was used. As we do not have the design information for the Cardinal Creek development, this conservative roadway HGL estimate was assumed.

Under all scenarios, the HGL is maintained within the LTC site sewer system. As previously noted, temporary surface ponding may occur during larger events due to the CB inlet capacities.

4.3.5 Water Quality

Based on the Cardinal Creek Master Servicing Study, the drainage area requires enhanced quality treatment, with a long-term average removal of 80% of suspended solids. The existing Cardinal Creek detention facility includes a wet pond to permit removal of TSS. As such, previous reviews by City staff indicated that no Water Quality Measures are required for this development, and indicated that the proposed OGS unit be removed from the LTC site.

The third City review comments (March 1, 2023) referenced The Cardinal Creek Subwatershed Management Plan which indicates:

> *"To the extent possible, provide for on-site retention of the first 5 mm of all rainfall events (ie, first flush)."*

As the site is largely impervious (asphalt and building), implementation of Low Impact Development (LID) measures to detain the first flush event would require substantive alterations to the site and stormwater management plans. As such, the plans have been updated to include for first flush detention in the Stormwater Management Chambers (SMC). Baffle walls will be installed in each SMC to detain the volume of flows corresponding to 5mm of rainfall over the entire site.

First Flush Volume = 1.25 Ha x 10,000 m^2/Ha x 0.005m = 62.5 m^3

Low flow outlets are included in the baffle walls to outlet the First Flush event at a reduced rate. This will promote settlement of suspended solids into the SMC permanent pool/sediment deposit area behind the baffle walls. Refer to "Stormwater Chamber Maintenance" section of this report for recommended maintenance and cleaning of the SMC and sediment deposit area.

SMC low flow outlets are set at an invert elevation of 63.56m.
The tops of baffle walls are set at 64.26m.
The sediment deposit/permanent pool depth in each SMC is approximately 200mm deep.

Volume of First Flush Detention SMC 1 (63.56m to 64.26m) = 44.5 m^3
Volume of First Flush Detention SMC 2 (63.56m to 64.26m) = 19.3 m^3
Total Volume of First Flush Detention = 63.8 m^3 (Exceeds 62.5 m^3)

Refer to *Appendix C* calculations for additional information.

4.3.6 Stormwater Chamber Maintenance

There are two Stormwater Management Chambers (SMC) proposed on the site. They are both located just upstream of the site outlet, in the landscaped area between the building and the Famille-Laporte right-of-way. Each SMC has two (2) manhole/access locations: one (1) downstream of baffle wall, and one (1) near upstream end in sedimentation area.

As previously discussed, the SMCs will have permanent pool areas for deposition of suspended solids. Over time, the deposit area will accumulate sediment and become less effective. As such, it is recommended that the chamber be inspected on a yearly basis.

The chambers are to be considered a confined space as defined by the Occupational Health and Safety Act. As such, all required safety measures and procedures must be adhered to prior to opening, **inspecting or entering the SMCs. Chambers must only be inspected/maintained a minimum of 2 days after a rain event (ie when the chamber is empty), and when no rain/precipitation is forecast.**

The manhole at the outlet side of the chambers can be used to inspect the low-flow orifice in the concrete baffle walls. Any blockages in the orifice should be removed to provide a clear opening. The height of the baffle wall is 900mm. As such, the upstream/wet well side of the chamber will be visible from the downstream (dry) side of the baffle wall using appropriate lighting. The approximate depth of sediment on the pool side of the wall can be confirmed. When the depth of sediment accumulation reaches approximately 150mm deep, removal of the sediment should be scheduled.

Sediment can be removed via a vacuum truck. Due to the location of the chambers, access to the chambers is likely best achieved from Famille-Laporte Avenue.

The outlet control orifice in MH 5 should also be inspected on a yearly basis to confirm there is no debris restricting the passageway.

4.3.7 Erosion Controls

Erosion and sediment controls will be implemented by the General Contractor onsite, and within the Famille-Laporte right-of-way, prior to any earth disturbances on the site. Erosion control requirements are detailed within the civil plan drawing set. Erosion controls, including all catch basin silt bags, are to be inspected on a daily basis and/or after major rain events. Any repairs or required maintenance shall be completed promptly. Site erosion controls are to remain in place until site works and vegetative restoration has been completed and approved.

4.3.8 Conservation Authority

Comment letters on the proposed development from the Rideau Valley Conservation Authority (RVCA) were provided on May 4th, 2022, and October 26th, 2022. The provided comments are included in *Appendix E* for reference.

5.0 Watermain Servicing

5.1 Existing Conditions

An existing 400 mm diameter watermain is located within the Famille-Laporte Avenue right-of-way, located in the west boulevard. The site currently has two (2) 200mm diameter service connection terminated with a valve at the property line. One service connection is located in front of the proposed development area, the other is located in the lands to the north which are to remain undeveloped at this time.

5.2 Proposed Servicing

Please refer to the attached *Appendix A* which illustrates the proposed watermain servicing. The watermain servicing for the proposed development is as follows:

- The new building will be serviced by a new 150 mm watermain connected to the existing 200mm service stub located at the property line. The building service line will be split into domestic and fire after entering the building. A backflow preventer will be installed inside the building mechanical room. A meter chamber per City Standard W3 will be installed prior to the building.
- One new water service crossing of Famille-Laporte Avenue will be completed via open cut to the roadway. The new water service will connect to the existing 400mm main. The roadway will be restored to its predevelopment condition following the connection. The Site Contractor will be responsible for acquiring all necessary City permits and traffic controls prior to commencement of work within the roadway.
- Two (2) new fire hydrants and 150 mm diameter leads are proposed for the site. One is located in the south parking area to be in close proximity to the building FDC connection, the second is located at the north end of the development area off of the parking.
- A second existing water service to the north end of the property will remain in place to service the future development of the open land to the north of the LTC.

A Fire Flow Demand Analysis was completed/estimated for the proposed four storey structure using the Fire Underwriters Survey Guidelines (2020). The inputs and results can be found in *Appendix D*.

Table 3: **Water Demand Information**

Item	Results
Gross Floor Area (All Floors)	12,516 m^2
Average Daily Demand	1.17 L/s (70 L/m)
Maximum Daily Demand	2.92 L/s (175 L/m)
Fire Flow (FUS 2020)	209.2 L/s (12,552 L/m)

Item	Results
Maximum Day + Fire Flow	212.0 L/s (12,727 L/m)

A Boundary Conditions Analysis can also be found in *Appendix D*.

The detailed design of the watermain service are to be consistent with the requirements of the City of Ottawa and will be coordinated during the detailed design process.

6.0 Utilities

6.1 Gas

Existing natural gas infrastructure is located along the Famille-Laporte Avenue right-of-way, located west of the site. There is no existing natural gas service currently servicing the proposed site. During detailed design, future conversation on loading will be required with Enbridge.

6.2 Telecommunications

The existing site is not currently serviced by telecommunications. It is anticipated that existing telecommunications infrastructure exists within the Famille-Laporte Avenue right-of-way, located west of the site. Detailed design, additional consultation will be held with utility owner to confirm internal servicing requirements.

6.3 Hydro

Existing hydro infrastructure is buried along the east side of the Famille-Laporte Avenue right-of-way. There is no existing hydro currently servicing the proposed site. During detailed design, future conversation on loading will be required with the hydro provider.

7.0 Conclusion

The review of the adjacent services have been found to be sufficient for the proposed development. The design of the proposed internal services will be finalized during detailed design.

Yours sincerely,

DILLON CONSULTING LIMITED

Chris Patten, P.Eng.
Project Manager

Appendix A

Functional Servicing Plan

UTILITY CROSSING

1. 300mm STORM INV=64.51
   150mm WATER T/P=63.80
   CLEAR=0.73m
2. 450mm STORM INV=64.10
   150mm WATER T/P=63.30
   CLEAR=0.80m
3. 600mm STORM T/P=63.955
   150mm WATER B/P=64.50
   CLEAR 0.545m
4. 600mm STORM INV=64.347
   200mm SANITARY T/P=62.47
   CLEAR=1.48m
5. 150mm WATER BOTT/P=65.35
   200mm SANITARY T/P=62.57
   CLEAR=2.78m
6. 150mm WATER B/P=65.45
   750mm STORM T/P=64.866
   CLEAR=0.56m
7. 150mm WATER T/P=65.25
   200mm STORM INV=65.75
   CLEAR=0.5m

LEGEND:

- WV — WATER VALVE
- HYD — FIRE HYDRANT
- CB — CATCH BASIN
- MH — MANHOLE
- CBMH — CATCHBASIN MANHOLE
- OF — OVERFLOW MANHOLE

SANITARY SEWER INVERTS

MH-A – 1200 DIA.
FRAME S25/COVER S24
EX. SW INV. 61.55m
E INV. 62.10m
RIM ELEV. 67.00m

MH-B – 1200 DIA.
FRAME S25/COVER S24
NE INV. 63.00m TOP
W INV. 62.43m BOTTOM
RIM ELEV. 67.30m

SERVICE STUB
1.4m–200mm DIA. PVC BUILDING SANITARY SERVICE AT 3.0%
INV. 63.04m

STORM SEWER INVERTS

EXISTING MH
NE INV. 63.308m
EX. SW INV. 63.258m
(OUTLET)
RIM ELEV. 67.18m

MH 1 – 1200mm DIA.
FRAME S25/COVER S24.1
NW INV. 65.07
NE INV. 64.93
SE INV. 64.99
RIM ELEV. 66.58m

MH 2 – 1200mm DIA.
FRAME S25/COVER S24.1
SW INV. 65.35m
NW INV. 64.90m
SE INV. 64.70m
RIM ELEV. 67.18m

MH 3 – 1800mm DIA.
FRAME S25/COVER S24.1
SE INV. 64.50m
NW INV. 64.35m
SW INV. 64.35m
RIM ELEV. 67.42m

MH 4B – 1800mm DIA.
FRAME S25/COVER S24.1
NW INV. 65.94m
NE INV. 64.28m
SW INV. 64.18m
RIM ELEV. 67.24m

MH 4A – 1800mm DIA.
FRAME S25/COVER S24.1
NW INV. 65.95m
NE INV. 64.17m
SW INV. 64.17m
RIM ELEV. 67.38m

MH 4 – 1800mm DIA.
FRAME S25/COVER S24.1
SE INV. 65.70m
NE INV. 64.12m
NW INV. 64.12m
RIM ELEV. 67.20m

MH 5 – 1200mm DIA.
FRAME S25/COVER S24.1
NW INV. 63.34m
SE INV. 63.31m
SW INV. 63.309m
W/300mm ORIFICE
RIM ELEV. 67.28m

MH 6 – 1200mm DIA.
FRAME S25/COVER S24.1
NE INV. 65.82
NW INV. 64.05m
SE INV. 64.05m
RIM ELEV. 66.60m

MH 7 – 1200mm DIA.
FRAME S25/COVER S24.1
NW INV. 64.38m
NE INV. 64.26m
SE INV. 64.11
RIM ELEV. 65.70

MH 8 – 1200mm DIA.
FRAME S25/COVER
S24.15W. NW INV. 65.07m
SW INV. 64.63m
RIM ELEV. 66.55m

STORAGE CHAMBER 1 –
30m 2400mmx1800mm
CONCRETE BOX
NW INV. 63.37m
SW INV. 63.34m

STORAGE CHAMBER 2 –
15m 2400mmx1800mm
CONCRETE BOX
NW INV. 64.02m
SE INV. 63.37m
NW INV. 63.36m
SE INV. 63.36m

OF1– OVERFLOW MANHOLE
INV 65.20m
RIM 67.11m

OF2– OVERFLOW MANHOLE
INV 65.17m
RIM 67.00m

OF3– OVERFLOW MANHOLE
INV 65.19m
RIM 66.95m

OF4– OVERFLOW MANHOLE
INV 65.20m
RIM 66.80m

TWCB 10
600x600mm COVER S19.1
SE INV. 64.35m
RIM ELEV. 65.55m

CB 11
600x600mm COVER S19.1
SE INV. 64.65m
RIM ELEV. 65.85m

CB 12
600x600mm COVER S19.1
SE INV. 65.20m
RIM ELEV. 66.40m

CB 13
600x600mm COVER S19.1
NE INV. 65.17m
S INV. 65.12m
RIM ELEV. 66.50m

CB 14
600x600mm COVER S19.1
SE INV. 65.20m
RIM ELEV. 66.40m

CB 15
600x600mm COVER S19.1
NE INV. 65.50m
RIM ELEV. 67.00m

CB 16
600x600mm COVER S19.1
NE INV. 65.90m
RIM ELEV. 67.10m

CB 17
600x600mm COVER S19.1
NE INV. 66.00m
RIM ELEV. 67.10m

CB 18
600x600mm COVER S19.1
NW INV. 66.95m
RIM ELEV. 67.10m

CB 21
600x600mm COVER S19.1
NW INV. 65.80m
RIM ELEV. 67.15m

CB 22
600x600mm COVER S19.1
NW INV. 65.68m
RIM ELEV. 67.08m

CB 23
600x600mm COVER S19.1
NW INV. 65.80m
RIM ELEV. 67.00m

CBMH 24 – 1200mm DIA.
FRAME S25/COVER S24.1
NW INV. 66.13m
RIM ELEV. 67.80m

CB 25
600x600mm COVER S19.1
NW INV. 66.40m
RIM ELEV. 67.70m

CB 26
300mmø COVER S31
NW INV. 65.90m
RIM ELEV. 67.10m

CB 27
300mmø COVER S31
NW INV. 65.15m
RIM ELEV. 66.35m

CB 28
300mmø COVER S31
NW INV. 64.44m
RIM ELEV. 65.50m

CB 29
300mmø COVER S31
NW INV. 65.90m
RIM ELEV. 67.10m

CB 30
300mmø COVER S31
NW INV. 66.10m
RIM ELEV. 67.30m

ALL EXISTING INVERTS TO BE FIELD CHECKED PRIOR TO CONSTRUCTION

SWM CRITERIA

5 YEAR RELEASE RATE = 254.3 L/S
100 YEAR RELEASE RATE = 254.3 L/S
100 YEAR STORAGE VOLUME = 161.9m³

BUILDING

USF = 11,789 m2

PROPOSED 4 STOREY LONG TERM CARE
FFE = 67.50

POTENTIALLY LOT SEVERANCE (SEPARATE FUTURE SUBMISSION)

COURT YARD DRAINAGE. REFER TO MECHANICAL DRAWINGS. (TYP.)

EXISTING SIGN AND BUS STOP SIGN TO BE RELOCATED PER CITY OF OTTAWA COORDINATION

REPAIR OPEN CUT PER CITY DETAIL R10 FROM CURB TO WEST CURB RUNNING LINE

CONNECT TO EXISTING 400mm WATERMAIN WITH TAPPING SLEEVE

INTERNAL STAIRS REQUIRED

CORE INTO EXISTING MANHOLE (TYP)

ACCESS OVERFLOW MANHOLE (OF) (TYP. OF 4)

MAIN ENTRANCE

SITE BENCHMARK 'B'
T/S FIRE HYDRANT
ELEV.=67.83m

SITE BENCHMARK 'C'
T/S FIRE HYDRANT
ELEV.=68.29m

FAMILY LAPORTE AVENUE

MONTERIERE RIDGE

FILENAME: C:\PW WORKING DIRECTORY\PROJECTS 2021\33053\IMSG260\212647-00-CIV-CON.DWG
PLOT DATE: 2023-03-24 @ 3:39:33 PM PLOT STYLE: DILLON-STANDARD.CTB PLOTTED BY: STOICA, DORINA

DILLON CONSULTING

Conditions of Use

Verify elevations and/or dimensions on drawing prior to use. Report any discrepancies to Dillon Consulting Limited.

Do not scale dimensions from drawing.

Do not modify drawing, re-use it, or use it for purposes other than those intended at the time of its preparation without prior written permission from Dillon Consulting Limited.

#	date:	revision:	by:
5	24/03/2023	RE-ISSUED FOR SITE PLAN CONTROL APPLICATION AND ZONING BY-LAW AMENDMENT	CDP, DS
4	27/01/2023	RE-ISSUED FOR SITE PLAN CONTROL APPLICATION AND ZONING BY-LAW AMENDMENT	CDP, DS
3	27/01/2023	ISSUED FOR BUILDING PERMIT	CDP, DS
2	19/08/2022	RE-ISSUED FOR SITE PLAN CONTROL APPLICATION AND ZONING BY-LAW AMENDMENT	CDP, DS
1	12/02/2021	SPA / ZBA SUBMISSION	CDP

revisions

LICENSED PROFESSIONAL ENGINEER — C.D. PATTEN — 100083837 — 24-MAR-2023 — PROVINCE OF ONTARIO

Arch Corp - Orleans

375 FAMILLE-LAPORTE AVENUE (formerly 1161 OLD MONTREAL RD.), ORLEANS ON, K4A 3N6

SITE SERVICING PLAN

scale:	1 : 250
drawn by:	DS
reviewed by:	CDP
job number:	21-2647
plot date:	March 24, 2023

drawing number:

CIV-1

18697

DD1-20-22-0006

Appendix B

Sanitary Sewer and Storm Sewer Design Sheets

ORLEANS LONG TERM CARE FACILITY - CITY OF OTTAWA
SANITARY SEWER DESIGN SHEET - EXISTING CONDITIONS ASSESSMENT (LOW DENSITY RESIDENTIAL)

Project Name: Orleans LTC
Project No: 21-4926

City of Ottawa

The Peaking Factor was derived:
Using Harmon Formula= Y (Y or N)
From a Table= N
Value from table=

Residential Average Daily Flow= 350 L/Cap.D
Peak Extraneous Flow= 0.330 L/Ha.S

Outlet Invert Elevation= 61.422
Mannings 'n'= 0.013
Total Area= 1.250

Basement Floor Elevation = 0.000
or
Hydraulic Grade Line Cover = 2.00

Ground Elevation at Outlet = 66.790
HGL at Outlet = 61.600

Location			Flow Characteristics								Sewer Design/Profile										Cover			Hydraulic Grade Line		
ROAD/STN	LOCATION		INDIVIDUAL		CUMULATIVE		PEAKING FACTOR M	POP FLOW Q(p) (L/s)	PEAK EXTR. FLOW Q(i) (L/s)	PEAK DESIGN FLOW Q(d) (L/s)	SEWER CAPACITY (L/s)	LENGTH (m)	PIPE DIA. (mm)	Wall Thickness (mm)	SLOPE (%)	UPPER INVERT (m)	LOWER INVERT (m)	FALL (m)	VELOCITY (m/s)	DROP IN LOWER MANHOLE (m)	Ground Elevation Upper MH	Cover @ Up MH (m)	Cover @ Low MH (m)	HGL Elev at Upstream MH	HGL Elev vs. Grnd Elev @ Up MH	HGL Elev vs. Obvert @ Up MH
	FROM MH	TO MH	POP	AREA (ha.)	POP	AREA (ha.)																				
LTC	BLDG	MH A	107.0	1.25	107	1.25	4.235	1.836	0.413	**2.25**	**56.81**	1.0	200	15	3.00	63.030	63.000	0.030	1.81	0.570	67.450	4.205	4.085	61.601	OKAY	OKAY

Existing Site Assumed Residential Flows

ORLEANS LONG TERM CARE FACILITY - CITY OF OTTAWA
SANITARY SEWER DESIGN SHEET

Project Name: Orleans LTC
Project No: 21-4926

City of Ottawa

The Peaking Factor was derived:
Using Harmon Formula= N (Y or N)
From a Table= Y
Value from table= 1.500

Residential Average Daily Flow= 450 L/Cap.D
Peak Extraneous Flow= 0.330 L/Ha.S

Outlet Invert Elevation= 61.422
Mannings 'n'= 0.013
Total Area= 1.250

Basement Floor Elevation = 0.000
or
Hydraulic Grade Line Cover = 2.00

Ground Elevation at Outlet = 66.790
HGL at Outlet = 61.600

Location			Flow Characteristics								Sewer Design/Profile										Cover			Hydraulic Grade Line		
ROAD/STN	LOCATION		INDIVIDUAL		CUMULATIVE		PEAKING FACTOR M	POP FLOW Q(p) (L/s)	PEAK EXTR. FLOW Q(i) (L/s)	PEAK DESIGN FLOW Q(d) (L/s)	SEWER CAPACITY (L/s)	LENGTH (m)	PIPE DIA. (mm)	Wall Thickness (mm)	SLOPE (%)	UPPER INVERT (m)	LOWER INVERT (m)	FALL (m)	VELOCITY (m/s)	DROP IN LOWER MANHOLE (m)	Ground Elevation Upper MH	Cover @ Up MH (m)	Cover @ Low MH (m)	HGL Elev at Upstream MH	HGL Elev vs. Grnd Elev @ Up MH	HGL Elev vs. Obvert @ Up MH
	FROM MH	TO MH	POP	AREA (ha.)	POP	AREA (ha.)																				
LTC	BLDG	MH A	224.0	1.25	224	1.25	1.500	1.750	0.413	**2.16**	**56.81**	1.0	200	15	3.00	63.030	63.000	0.030	1.81	0.570	67.450	4.205	4.085	61.601	OKAY	OKAY
MH A	MH A	MH B	0.0	0.00	224	1.25	1.500	1.750	0.413	**2.16**	**56.81**	11.0	200	15	3.00	62.430	62.100	0.330	1.81	0.560	67.300	4.655	4.685	61.601	OKAY	OKAY

ORLEANS LTCF
1:5 YEAR STORM SEWER DESIGN SHEET

Project Name: Orleans LTCF
Project Number: 21-2647

Based on 1:5 Year Storm Event
City of Ottawa

Intensity Option # 1

1) Intensity (i) = a/(t+b)^c **2) Intensity (i) = a*t^b** **3) Insert Intensity**

a= 998.071 **a=** **i=**
b= 6.053 **b=**
c= 0.814

Manning's n = 0.013

Total Area (ha)= 1.25 Outlet Invert Elevation= 63.200 Ground Elevation @ Outlet = 67.25 High Water Level at Outlet= 63.33

HGL From Cardinal Creek AB Drawings

	Location											**Sewer Design / Profile**										**Cover**			**Hydraulic Grade Line**	
Downstream 1	**Road /Stations**	**From MH**	**To MH**	**Area (ha)**	**Run. Coef.**	**2.78AC**	**Accum. 2.78AC**	**T of In (min)**	**T of F (min)**	**T of Conc. (min)**	**Intensity (mm/hr)**	**Exp. Flow (L/s)**	**Pipe Capacity (L/s)**	**Velocity (m/s)**	**Wall Thickness (mm)**	**Length (m)**	**Pipe Dia. (mm)**	**Slope (%)**	**Invert Up MH**	**Invert Low MH**	**Fall (m)**	**Drop Across Low MH (m)**	**Ground Elev Up MH**	**Cover @ Up MH (m)**	**Cover @ Low MH (m)**	**HGL Elevation at Upstream MH**	**HGL Elev vs. Grnd Elev @ Up MH**
15		MH1	MH2	0.08	0.70	0.16	0.16	10.0	0.32	10.00	104.19	**16.22**	**57.21**	0.81	11	15.6	300	0.35	64.96	64.90	0.05	0.200	66.500	1.23	1.94	65.31	Okay
16		MH2	MH3	0.26	0.76	0.55	0.71	10.0	1.08	10.32	102.53	**72.28**	**388.33**	1.37	15	89.0	600	0.40	64.70	64.35	0.36		67.150	1.83	2.39	65.30	Okay
17		MH3	MH4B	0.07	0.82	0.16	0.86	10.0	0.55	11.40	97.33	**84.15**	**274.59**	0.97	100	31.8	600	0.20	64.35	64.28	0.06	0.100	67.350	2.30	2.37	65.18	Okay
18		MH4B	MH4A	0.05	0.89	0.12	1.11	10.0	0.20	11.95	94.92	**105.69**	**431.17**	0.98	100	12.0	750	0.15	64.18	64.17	0.02		67.350	2.32	2.33	65.17	Okay
19		MH 4A	MH4	0.13	0.75	0.27	1.81	10.0	0.30	12.15	94.05	**170.21**	**497.87**	1.13	100	20.6	750	0.20	64.17	64.12	0.04		67.350	2.33	2.38	65.17	Okay
20		MH4	STOR 1	0.06	0.29	0.05	1.86	10.0	0.04	12.46	92.79	**172.42**	**497.87**	1.13	200	3.0	750	0.20	64.12	64.12	0.01	0.750	67.350	2.28	1.93	65.17	Okay
21	CHAMBER	STOR 1	STOR 1	0.00	0.29	0.00	1.86	10.0	0.35	12.50	92.61	**172.09**	**3634.96**	1.43	100	30.0	1800	0.10	63.37	63.34	0.03		67.000	1.73	1.86	65.17	Okay
22		STOR 1	MH5	0.00	0.29	0.00	1.86	10.0	0.06	12.85	91.21	**169.50**	**434.17**	1.54	100	5.8	600	0.50	63.34	63.31	0.03		67.100	3.06	2.99	63.94	Okay
23		MH5	EX. MH	0.00	0.29	0.00	2.63	10.0	0.02	12.91	90.96	**239.38**	**253.16**	0.90	100	1.0	600	0.17	63.309	63.308	0.00	0.050	67.000	2.99	3.17	63.91	Okay
	EX STUB	EX. MH	MAIN	0.00	0.90	0.30	2.93	10.0	0.12	12.93	90.89	**266.47**	**434.17**	1.54	100	11.5	600	0.50	63.258	63.200	0.06		67.180	3.22	3.35	63.86	Okay
26		MH8	MH7	0.12	0.71	0.24	0.24	10.0	0.45	10.00	104.19	**24.68**	**96.70**	1.37	15	37.0	300	1.00	64.631	64.261	0.37	0.150	66.550	1.60	1.12	65.20	Okay
27		MH7	MH6	0.00	0.71	0.00	0.24	10.0	0.67	10.45	101.87	**24.13**	**127.50**	0.80	100	32.2	450	0.20	64.11	64.05	0.06		65.700	1.04	1.65	65.18	Okay
28		MH6	STOR 2	0.06	0.29	0.05	0.46	10.0	0.23	11.12	98.63	**45.41**	**127.50**	0.80	100	11.0	450	0.20	64.05	64.02	0.02	0.650	66.250	1.65	1.93	65.18	Okay
29	CHAMBER	STOR 2	STOR 2	0.00	0.29	0.00	0.77	10.0	0.18	11.35	97.57	**75.44**	**3634.96**	1.43	200	15.0	1800	0.10	63.37	63.36	0.02		66.500	1.13	1.64	65.17	Okay
21		STOR 2	MH5	0.00	0.29	0.00	0.77	10.0	0.28	11.52	96.78	**74.83**	**237.81**	0.84	100	14.2	600	0.15	63.36	63.34	0.02		67.000	2.94	3.06	63.96	Okay
26	CY (NORTH)	CYCB	MH 6	0.07	0.90	0.18	0.18	10.0	0.10	10.00	104.19	**18.25**	**68.38**	0.97	15	5.7	300	0.50	65.850	65.822	0.03	1.711	67.450	1.28	-0.44	66.15	Okay
17	CY (SOUTH)	CYCB	MH 4B	0.05	0.90	0.13	0.13	10.0	0.05	10.00	104.19	**13.03**	**136.76**	1.93	15	6.0	300	2.00	66.060	65.940	0.12	1.757	67.450	1.07	1.09	66.36	Okay
28	BLDG A	ROOF	STOR 2	0.13	0.90	0.31	0.31	10.0	0.02	10.00	104.19	**32.59**	**235.18**	4.79	15	5.5	250	15.64	65.710	64.850	0.86	1.475	67.450	1.48	1.39	65.96	Okay
18	BLDG B	ROOF	MH 4A	0.17	0.90	0.43	0.43	10.0	0.06	10.00	104.19	**44.32**	**84.10**	1.71	15	6.0	250	2.00	65.985	65.865	0.12	1.700	67.450	1.20	1.22	66.24	Okay

- FLOW RESTRICTION PIPE

ORLEANS LTCF
1:100 YEAR STORM SEWER DESIGN SHEET

Project Name: Orleans LTCF
Project Number: 21-2647

Based on 1:100 Year Storm Event
City of Ottawa

Intensity Option # 1

1) Intensity (i) = a/(t+b)^c **2) Intensity (i) = a*t^b** **3) Insert Intensity**

a= 1735.700 **a=** **i=**
b= 6.014 **b=**
c= 0.820

Manning's n = 0.013

Total Area (ha)= 1.25 Outlet Invert Elevation= 63.200 Ground Elevation @ Outlet = 67.25 High Water Level at Outlet= 63.33

HGL From Cardinal Creek AB Drawings

	Location			Sewer Design / Profile																Cover		Hydraulic Grade Line	
Downstream 1	Road /Stations	From MH	To MH	Area (ha)	Run. Coef.	2.78AC	Accum. 2.78AC	T of In (min)	T of F (min)	T of Conc. (min)	Intensity (mm/hr)	Exp. Flow (L/s)	Pipe Capacity (L/s)	Velocity (m/s)	Wall Thickness (mm)	Length (m)	Pipe Dia. (mm)	Slope (%)	Invert Up MH	Invert Low MH	Fall (m)	Drop Across Low MH (m)	Ground Elev Up MH	Cover @ Up MH (m)	Cover @ Low MH (m)	HGL Elevation at Upstream MH	HGL Elev vs. Grnd Elev @ Up MH
15		MH1	MH2	0.08	0.70	0.16	0.16	10.0	0.32	10.00	178.56	**27.80**	**57.21**	0.81	11	15.6	300	0.35	64.96	64.90	0.05	0.200	66.500	1.23	1.94	65.32	Okay
16		MH2	MH3	0.26	0.76	0.55	0.71	10.0	1.08	10.32	175.68	**123.85**	**388.33**	1.37	15	89.0	600	0.40	64.70	64.35	0.36		67.150	1.83	2.39	65.30	Okay
17		MH3	MH4B	0.07	0.82	0.16	0.86	10.0	0.55	11.40	166.69	**144.12**	**274.59**	0.97	100	31.8	600	0.20	64.35	64.28	0.06	0.100	67.350	2.30	2.37	65.21	Okay
18		MH4B	MH4A	0.05	0.89	0.12	1.11	10.0	0.20	11.95	162.53	**180.96**	**431.17**	0.98	100	12.0	750	0.15	64.18	64.17	0.02		67.350	2.32	2.33	65.19	Okay
19		MH 4A	MH4	0.13	0.75	0.27	1.81	10.0	0.30	12.15	161.02	**291.41**	**497.87**	1.13	100	20.6	750	0.20	64.17	64.12	0.04		67.350	2.33	2.38	65.18	Okay
20		MH4	STOR 1	0.06	0.29	0.05	1.86	10.0	0.04	12.46	158.84	**295.15**	**497.87**	1.13	200	3.0	750	0.20	64.12	64.12	0.01	0.750	67.350	2.28	1.93	65.17	Okay
21	CHAMBER	STOR 1	STOR 1	0.00	0.29	0.00	1.86	10.0	0.35	12.50	158.53	**294.58**	**3634.96**	1.43	100	30.0	1800	0.10	63.37	63.34	0.03		67.000	1.73	1.86	65.17	Okay
22		STOR 1	MH5	0.00	0.29	0.00	1.86	10.0	0.06	12.85	156.11	**290.11**	**434.17**	1.54	100	5.8	600	0.50	63.34	63.31	0.03		67.100	3.06	2.99	63.94	Okay
23		MH5	EX. MH	0.00	0.29	0.00	2.63	10.0	0.02	12.91	155.69	**409.69**	**253.16**	0.90	100	1.0	600	0.17	63.309	63.308	0.00	0.050	67.000	2.99	3.17	63.91	Okay
	EX STUB	EX. MH	MAIN	0.00	0.90	0.30	2.93	10.0	0.12	12.93	155.56	**456.07**	**434.17**	1.54	100	11.5	600	0.50	63.258	63.200	0.06		67.180	3.22	3.35	63.86	Okay
26		MH8	MH7	0.12	0.71	0.24	0.24	10.0	0.45	10.00	178.56	**42.29**	**96.70**	1.37	15	37.0	300	1.00	64.631	64.261	0.37	0.150	66.550	1.60	1.12	65.26	Okay
27		MH7	MH6	0.00	0.71	0.00	0.24	10.0	0.67	10.45	174.54	**41.34**	**127.50**	0.80	100	32.2	450	0.20	64.11	64.05	0.06		65.700	1.04	1.65	65.19	Okay
28		MH6	STOR 2	0.06	0.29	0.05	0.46	10.0	0.23	11.12	168.94	**77.77**	**127.50**	0.80	100	11.0	450	0.20	64.05	64.02	0.02	0.650	66.250	1.65	1.93	65.18	Okay
29	CHAMBER	STOR 2	STOR 2	0.00	0.29	0.00	0.77	10.0	0.18	11.35	167.11	**129.20**	**3634.96**	1.43	200	15.0	1800	0.10	63.37	63.36	0.02		66.500	1.13	1.64	65.17	Okay
21		STOR 2	MH5	0.00	0.29	0.00	0.77	10.0	0.28	11.52	165.74	**128.14**	**237.81**	0.84	100	14.2	600	0.15	63.36	63.34	0.02		67.000	2.94	3.06	63.96	Okay
26	CY (NORTH)	CYCB	MH 6	0.07	0.90	0.18	0.18	10.0	0.10	10.00	178.56	**31.27**	**68.38**	0.97	15	5.7	300	0.50	65.850	65.822	0.03	1.711	67.450	1.28	-0.44	66.15	Okay
17	CY (SOUTH)	CYCB	MH 4B	0.05	0.90	0.13	0.13	10.0	0.05	10.00	178.56	**22.34**	**136.76**	1.93	15	6.0	300	2.00	66.060	65.940	0.12	1.757	67.450	1.07	1.09	66.36	Okay
28	BLDG A	ROOF	STOR 2	0.13	0.90	0.31	0.31	10.0	0.02	10.00	178.56	**55.84**	**235.18**	4.79	15	5.5	250	15.64	65.710	64.850	0.86	1.475	67.450	1.48	1.39	65.96	Okay
18	BLDG B	ROOF	MH 4A	0.17	0.90	0.43	0.43	10.0	0.06	10.00	178.56	**75.95**	**84.10**	1.71	15	6.0	250	2.00	65.985	65.865	0.12	1.700	67.450	1.20	1.22	66.24	Okay

- FLOW RESTRICTION PIPE

ORLEANS LTCF
1:100 YEAR + 20% STORM SEWER DESIGN SHEET

Project Name: Orleans LTCF
Project Number: 21-2647

Based on 1:100 Year Storm Event + 20%
City of Ottawa

Intensity Option # 1

1) Intensity (i) = a/(t+b)^c — **a=** 1735.700, **b=** 6.014, **c=** 0.820
2) Intensity (i) = a*t^b — **a=**
3) Insert Intensity — **i=**

Manning's n = 0.013

Total Area (ha)= 1.25 | Outlet Invert Elevation= 63.200 | Ground Elevation @ Outlet = 67.25 | High Water Level at Outlet= 63.33

HGL From Cardinal Creek AB Drawings

	Location			Sewer Design / Profile																Cover		Hydraulic Grade Line	
Downstream 1	Road /Stations	From MH	To MH	Area (ha)	Run. Coef.	2.78AC	Accum. 2.78AC	T of In (min)	T of F (min)	T of Conc. (min)	Intensity (mm/hr)	Exp. Flow (L/s)	Pipe Capacity (L/s)	Velocity (m/s)	Wall Thickness (mm)	Length (m)	Pipe Dia. (mm)	Slope (%)	Invert Up MH	Invert Low MH	Fall (m)	Drop Across Low MH (m)	Ground Elev Up MH	Cover @ Up MH (m)	Cover @ Low MH (m)	HGL Elevation at Upstream MH	HGL Elev vs. Grnd Elev @ Up MH
15		MH1	MH2	0.08	0.84	0.19	0.19	10.0	0.32	10.00	178.56	**33.36**	**57.21**	0.81	11	15.6	300	0.35	64.96	64.90	0.05	0.200	66.500	1.23	1.94	65.32	Okay
16		MH2	MH3	0.26	0.91	0.66	0.85	10.0	1.08	10.32	175.68	**148.62**	**388.33**	1.37	15	89.0	600	0.40	64.70	64.35	0.36		67.150	1.83	2.39	65.30	Okay
17		MH3	MH4B	0.07	0.98	0.19	1.04	10.0	0.55	11.40	166.69	**172.94**	**274.59**	0.97	100	31.8	600	0.20	64.35	64.28	0.06	0.100	67.350	2.30	2.37	65.22	Okay
18		MH4B	MH4A	0.05	1.00	0.14	1.32	10.0	0.20	11.95	162.53	**213.80**	**431.17**	0.98	100	12.0	750	0.15	64.18	64.17	0.02		67.350	2.32	2.33	65.19	Okay
19		MH 4A	MH4	0.13	0.90	0.33	2.11	10.0	0.30	12.15	161.02	**340.30**	**497.87**	1.13	100	20.6	750	0.20	64.17	64.12	0.04		67.350	2.33	2.38	65.19	Okay
20		MH4	STOR 1	0.06	0.35	0.06	2.17	10.0	0.04	12.46	158.84	**344.91**	**497.87**	1.13	200	3.0	750	0.20	64.12	64.12	0.01	0.750	67.350	2.28	1.93	65.17	Okay
21	CHAMBER	STOR 1	STOR 1	0.00	0.35	0.00	2.17	10.0	0.35	12.50	158.53	**344.24**	**3634.96**	1.43	100	30.0	1800	0.10	63.37	63.34	0.03		67.000	1.73	1.86	65.17	Okay
22		STOR 1	MH5	0.00	0.35	0.00	2.17	10.0	0.06	12.85	156.11	**339.01**	**434.17**	1.54	100	5.8	600	0.50	63.34	63.31	0.03		67.100	3.06	2.99	63.94	Okay
23		MH5	EX. MH	0.00	0.35	0.00	3.06	10.0	0.02	12.91	155.69	**475.79**	**253.16**	0.90	100	1.0	600	0.17	63.309	63.308	0.00	0.050	67.000	2.99	3.17	63.91	Okay
	EX STUB	EX. MH	MAIN	0.00	1.00	0.33	3.39	10.0	0.12	12.93	155.56	**527.30**	**434.17**	1.54	100	11.5	600	0.50	63.258	63.200	0.06		67.180	3.22	3.35	63.86	Okay
26		MH8	MH7	0.12	0.85	0.28	0.28	10.0	0.45	10.00	178.56	**50.75**	**96.70**	1.37	15	37.0	300	1.00	64.631	64.261	0.37	0.150	66.550	1.60	1.12	65.31	Okay
27		MH7	MH6	0.00	0.85	0.00	0.28	10.0	0.29	10.45	174.54	**49.61**	**127.50**	0.80	100	14.0	450	0.20	64.11	64.08	0.03		65.700	1.04	1.62	65.21	Okay
28		MH6	STOR 2	0.06	0.35	0.06	0.54	10.0	0.61	10.74	172.05	**92.37**	**127.50**	0.80	100	29.2	450	0.20	64.08	64.02	0.06	0.650	66.250	1.62	1.93	65.21	Okay
29	CHAMBER	STOR 2	STOR 2	0.00	0.35	0.00	0.88	10.0	0.18	11.35	167.10	**147.78**	**3634.96**	1.43	200	15.0	1800	0.10	63.37	63.36	0.02		66.500	1.13	1.64	65.17	Okay
21		STOR 2	MH5	0.00	0.35	0.00	0.88	10.0	0.28	11.52	165.73	**146.57**	**237.81**	0.84	100	14.2	600	0.15	63.36	63.34	0.02		67.000	2.94	3.06	63.96	Okay
26	CY (NORTH)	CYCB	MH 6	0.07	1.00	0.19	0.19	10.0	0.10	10.00	178.56	**34.75**	**68.38**	0.97	15	5.7	300	0.50	65.850	65.822	0.03	1.711	67.450	1.28	-0.44	66.15	Okay
17	CY (SOUTH)	CYCB	MH 4B	0.05	1.00	0.14	0.14	10.0	0.05	10.00	178.56	**24.82**	**136.76**	1.93	15	6.0	300	2.00	66.060	65.940	0.12	1.757	67.450	1.07	1.09	66.36	Okay
28	BLDG A	ROOF	STOR 2	0.13	1.00	0.35	0.35	10.0	0.02	10.00	178.56	**62.05**	**235.18**	4.79	15	5.5	250	15.64	65.710	64.850	0.86	1.475	67.450	1.48	1.39	65.96	Okay
18	BLDG B	ROOF	MH 4A	0.17	1.00	0.47	0.47	10.0	0.06	10.00	178.56	**84.39**	**84.10**	1.71	15	6.0	250	2.00	65.985	65.865	0.12	1.700	67.450	1.20	1.22	66.24	Okay

- FLOW RESTRICTION PIPE

ORLEANS LTCF
1:100 YEAR + 20% STORM SEWER DESIGN SHEET

Project Name: Orleans LTCF
Project Number: 21-2647

Based on 1:100 Year Storm Event + 20%
City of Ottawa

Intensity Option # 1

1) Intensity (i) = a/(t+b)^c **2) Intensity (i) = a*t^b** **3) Insert Intensity**

a= 1735.700 **a=** **i=**
b= 6.014 **b=**
c= 0.820

Manning's n = 0.013

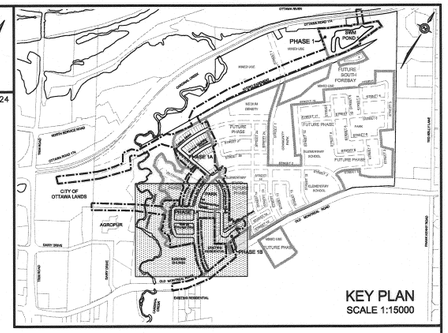
Total Area (ha)= 1.25 Outlet Invert Elevation= 63.200 Ground Elevation @ Outlet = 67.25 High Water Level at Outlet= 64.00

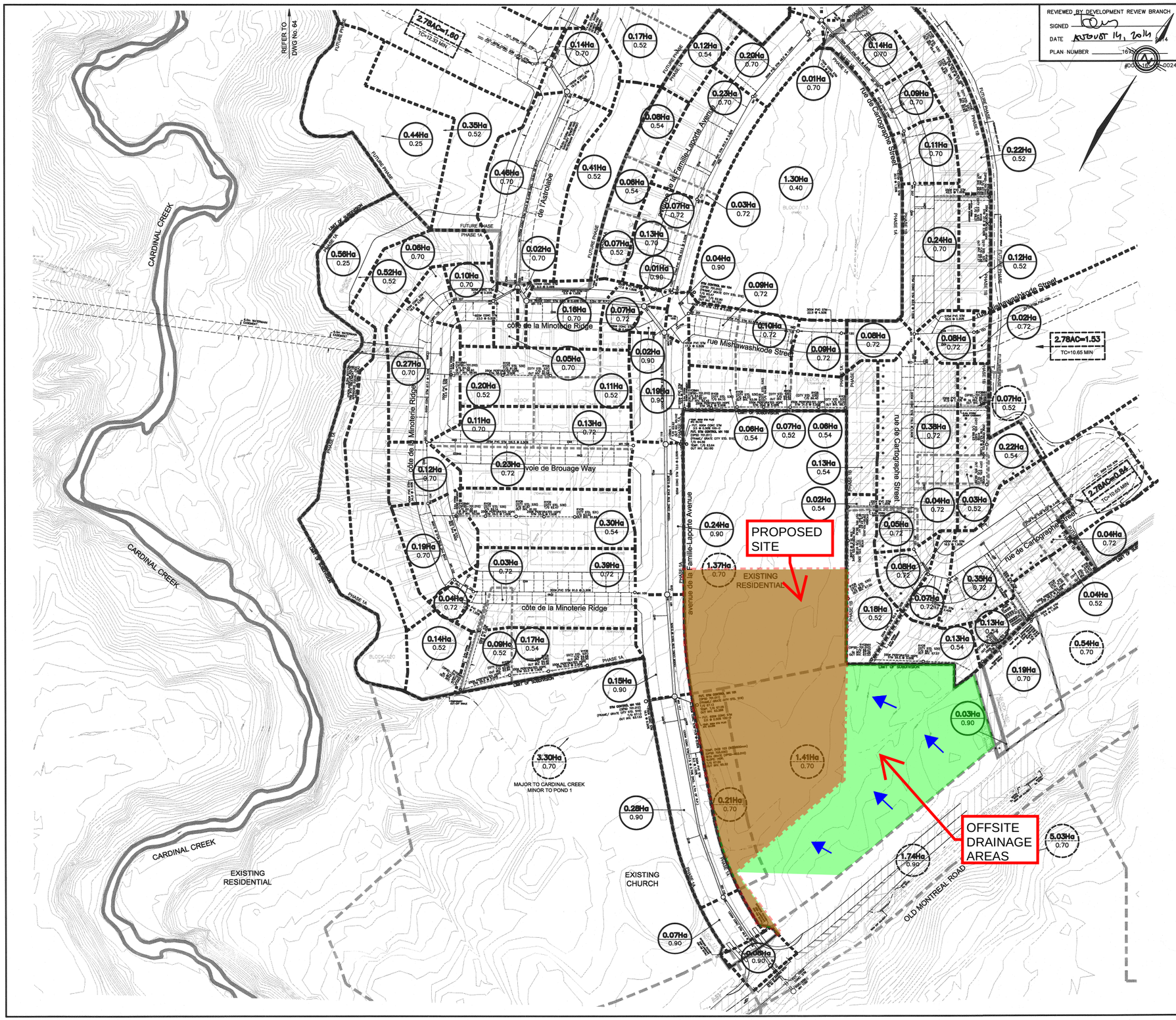
HGL From Cardinal Creek AB Drawings

	Location			Sewer Design / Profile																Cover		Hydraulic Grade Line	
Downstream 1	Road /Stations	From MH	To MH	Area (ha)	Run. Coef.	2.78AC	Accum. 2.78AC	T of In (min)	T of F (min)	T of Conc. (min)	Intensity (mm/hr)	Exp. Flow (L/s)	Pipe Capacity (L/s)	Velocity (m/s)	Wall Thickness (mm)	Length (m)	Pipe Dia. (mm)	Slope (%)	Invert Up MH	Invert Low MH	Fall (m)	Drop Across Low MH (m)	Ground Elev Up MH	Cover @ Up MH (m)	Cover @ Low MH (m)	HGL Elevation at Upstream MH	HGL Elev vs. Grnd Elev @ Up MH
15		MH1	MH2	0.08	0.84	0.19	0.19	10.0	0.32	10.00	178.56	**33.36**	**57.21**	0.81	11	15.6	300	0.35	64.96	64.90	0.05	0.200	66.500	1.23	1.94	65.32	Okay
16		MH2	MH3	0.26	0.91	0.66	0.85	10.0	1.08	10.32	175.68	**148.62**	**388.33**	1.37	15	89.0	600	0.40	64.70	64.35	0.36		67.150	1.83	2.39	65.30	Okay
17		MH3	MH4B	0.07	0.98	0.19	1.04	10.0	0.55	11.40	166.69	**172.94**	**274.59**	0.97	100	31.8	600	0.20	64.35	64.28	0.06	0.100	67.350	2.30	2.37	65.22	Okay
18		MH4B	MH4A	0.05	1.00	0.14	1.32	10.0	0.20	11.95	162.53	**213.80**	**431.17**	0.98	100	12.0	750	0.15	64.18	64.17	0.02		67.350	2.32	2.33	65.19	Okay
19		MH 4A	MH4	0.13	0.90	0.33	2.11	10.0	0.30	12.15	161.02	**340.30**	**497.87**	1.13	100	20.6	750	0.20	64.17	64.12	0.04		67.350	2.33	2.38	65.19	Okay
20		MH4	STOR 1	0.06	0.35	0.06	2.17	10.0	0.04	12.46	158.84	**344.91**	**497.87**	1.13	200	3.0	750	0.20	64.12	64.12	0.01	0.750	67.350	2.28	1.93	65.17	Okay
21	CHAMBER	STOR 1	STOR 1	0.00	0.35	0.00	2.17	10.0	0.35	12.50	158.53	**344.24**	**3634.96**	1.43	100	30.0	1800	0.10	63.37	63.34	0.03		67.000	1.73	1.86	65.17	Okay
22		STOR 1	MH5	0.00	0.35	0.00	2.17	10.0	0.06	12.85	156.11	**339.01**	**434.17**	1.54	100	5.8	600	0.50	63.34	63.31	0.03		67.100	3.06	2.99	64.11	Okay
23		MH5	EX. MH	0.00	0.35	0.00	3.06	10.0	0.02	12.91	155.69	**475.79**	**253.16**	0.90	100	1.0	600	0.17	63.309	63.308	0.00	0.050	67.000	2.99	3.17	64.09	Okay
	EX STUB	EX. MH	MAIN	0.00	1.00	0.33	3.39	10.0	0.12	12.93	155.56	**527.30**	**434.17**	1.54	100	11.5	600	0.50	63.258	63.200	0.06		67.180	3.22	3.35	64.08	Okay
26		MH8	MH7	0.12	0.85	0.28	0.28	10.0	0.45	10.00	178.56	**50.75**	**96.70**	1.37	15	37.0	300	1.00	64.631	64.261	0.37	0.150	66.550	1.60	1.12	65.31	Okay
27		MH7	MH6	0.00	0.85	0.00	0.28	10.0	0.29	10.45	174.54	**49.61**	**127.50**	0.80	100	14.0	450	0.20	64.11	64.08	0.03		65.700	1.04	1.62	65.21	Okay
28		MH6	STOR 2	0.06	0.35	0.06	0.54	10.0	0.61	10.74	172.05	**92.37**	**127.50**	0.80	100	29.2	450	0.20	64.08	64.02	0.06	0.650	66.250	1.62	1.93	65.21	Okay
29	CHAMBER	STOR 2	STOR 2	0.00	0.35	0.00	0.88	10.0	0.18	11.35	167.10	**147.78**	**3634.96**	1.43	200	15.0	1800	0.10	63.37	63.36	0.02		66.500	1.13	1.64	65.17	Okay
21		STOR 2	MH5	0.00	0.35	0.00	0.88	10.0	0.28	11.52	165.73	**146.57**	**237.81**	0.84	100	14.2	600	0.15	63.36	63.34	0.02		67.000	2.94	3.06	64.12	Okay
26	CY (NORTH)	CYCB	MH 6	0.07	1.00	0.19	0.19	10.0	0.10	10.00	178.56	**34.75**	**68.38**	0.97	15	5.7	300	0.50	65.850	65.822	0.03	1.711	67.450	1.28	-0.44	66.15	Okay
17	CY (SOUTH)	CYCB	MH 4B	0.05	1.00	0.14	0.14	10.0	0.05	10.00	178.56	**24.82**	**136.76**	1.93	15	6.0	300	2.00	66.060	65.940	0.12	1.757	67.450	1.07	1.09	66.36	Okay
28	BLDG A	ROOF	STOR 2	0.13	1.00	0.35	0.35	10.0	0.02	10.00	178.56	**62.05**	**235.18**	4.79	15	5.5	250	15.64	65.710	64.850	0.86	1.475	67.450	1.48	1.39	65.96	Okay
18	BLDG B	ROOF	MH 4A	0.17	1.00	0.47	0.47	10.0	0.06	10.00	178.56	**84.39**	**84.10**	1.71	15	6.0	250	2.00	65.985	65.865	0.12	1.700	67.450	1.20	1.22	66.24	Okay

- FLOW RESTRICTION PIPE

REVIEWED BY DEVELOPMENT REVIEW BRANCH
SIGNED
DATE August 14, 2014
PLAN NUMBER 167





LEGEND

- 0.25Ha / 0.75 — DRAINAGE AREA IN HECTARES, RUN-OFF COEFFICIENT
- 0.29Ha / 0.65 — EXTERNAL DRAINAGE AREA IN HECTARES, 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
- NOT INCLUDED IN PRE-SERVICING AGREEMENT FOR PHASE 1A

TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY STANTEC GEOMATICS LTD, PROJECT No. 161611900-111 RECEIVED ON JULY 6, 2012 AND PROJECT No. 161629244-111 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 JUNE 27, 2014.

PRE-SERVICING SUBMISSION FOR PHASE 1A ONLY 14-08-13

ELEVATION NOTE

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

No.	DATE	BY	DESCRIPTION	BY
4.	14-08-13	Z.L.	PRE-SERVICING SUBMISSION FOR PHASE 1A	
3.	14-05-27	Z.L.	3rd SUBMISSION	
2.	14-05-01	Z.L.	2nd SUBMISSION	
1.	14-02-07	Z.L.	1st SUBMISSION	

Ottawa CITY OF OTTAWA

PROJECT No. 11-513 B-1

LICENSED PROFESSIONAL ENGINEER Z. LI 14-08-15 PROVINCE OF ONTARIO

STORM DRAINAGE PLAN

TAMARACK (CARDINAL CREEK) CORPORATION

CARDINAL CREEK VILLAGE PHASE 1A

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.		65
SCALE:	1:1000	DATE:	FEBRUARY 2014		

16715

DRAIN AREA
AREA (Ha) RUNOFF COEFICIENT

OS1
0.56 0.33

OS2
0.36 0.33

MH1
0.08 0.70

MH2
0.26 0.76

MH3
0.07 0.82

MH4B
0.05 0.89

CB24
0.02 0.20

MH8
0.12 0.71

MH4A
0.11 0.75

MH4
0.06 0.29

MH6
0.06 0.29

CY N
0.07 0.90

CY S
0.05 0.90

BLDG A
0.13 0.90

BLDG B
0.17 0.90

PROPOSED 6 STOREY LONG TERM CARE
FFE = 67.50

SITE BENCHMARK "A"
T/S FIRE HYDRANT
ELEV.=65.74m

SITE BENCHMARK "B"
T/S FIRE HYDRANT
ELEV.=67.63m

SITE BENCHMARK "C"
T/S FIRE HYDRANT
ELEV.=68.29m

DILLON CONSULTING

Conditions of Use

Verify elevations and/or dimensions on drawing prior to use. Report any discrepancies to Dillon Consulting Limited.

Do not scale dimensions from drawing.

Do not modify drawing, re-use it, or use it for purposes other than those intended at the time of its preparation without prior written permission from Dillon Consulting Limited.

#	date:	revision:	by:
5	24/03/2023	RE-ISSUED FOR SITE PLAN CONTROL APPLICATION AND ZONING BY-LAW AMENDMENT	CDP, DS
4	27/01/2023	RE-ISSUED FOR SITE PLAN CONTROL APPLICATION AND ZONING BY-LAW AMENDMENT	CDP, DS
3	27/01/2023	ISSUED FOR BUILDING PERMIT	CDP, DS
2	19/08/2022	RE-ISSUED FOR SITE PLAN CONTROL APPLICATION AND ZONING BY-LAW AMENDMENT	CDP, DS
1	12/02/2021	SPA / ZBA SUBMISSION	CDP

revisions

LICENSED PROFESSIONAL ENGINEER
C.D. PATTEN
100083837
24-MAR-2023
PROVINCE OF ONTARIO

All drawing and specifications are the property of the architect. The contractor shall verify all dimensions and information on site and report any discrepancy to architect before proceeding.

Arch Corp - Orleans

375 FAMILLE-LAPORTE AVENUE (formerly 1161 OLD MONTREAL RD.), ORLEANS ON, K4A 3N6

SITE DRAINAGE PLAN

scale:	1 : 350
drawn by:	AAM
reviewed by:	CDP
job number:	21-2647
plot date:	March 24, 2023

drawing number:

DRG-1

D07-12-22-0006

18697

Appendix C

Stormwater Management Calculations

DILLON CONSULTING	Stormwater Management Calculations	Project:	Perth LTCF	No.:	212317	
	Rational Method Calculations Pre-Development	By:	SZ	Date:	2023-03-24	Page:
		Checked:	JVM	Scenario:	Existing	1

Calculation of existing runoff rate is undertaken using the Rational Method: **Q = CiA**

Where: Q = Peak flow rate (litres/second)
C = Runoff coefficient
I = Rainfall intensity (mm/hour)
A = Catchment area (hectares)

Project Area, A	1.25	hectares	Soil type	Silty Clay	Agg Maps D

Composite Runoff Coefficient			
Land Use	Area (m^2)	C*	
Existing Site	12,543	0.70	
Composite Runoff Coefficient	12,543	0.70	<- C Factor assumed for site in Cardinal Creek MP

* - Per the Cardinal Creek Master Servicing Study

Time of Concentration		
Per Cardinal Creek Master Servicing Study	t_c (min) =	10.0

Rainfall intensity calculated in accordance with the Governing Standards/Reports:
(if only two paramters are provided, enter B as "0" and C as positive number)

$$I = \frac{A}{(B + t_c)^C}$$

Where: A, B, and C = IDF Parameters From Local Municipality Guidelines
I = Rainfall intensity (mm/hour)
T = Time of concentration (hours)

Return Period (Years)	5*	100**	
A	998.071	1735.688	
B	6.053	6.014	
C	0.814	0.820	
T (mins) **	10.0	10.0	
I (mm/hr)	104.2	178.6	
Q (L/s)	**254.3**	**435.9**	<- Allowable Release Rate for LTC Site Only (1.25 Ha)
Q (m_3/s)	0.254	0.436	

Notes:
* - Per the Cardinal Creek Master Servicing Study
** - Per the City of Ottawa Sewer Design Standards

DILLON CONSULTING	Stormwater Management Calculations	Project: Orleans LTCF	No.: 21-2647	
	Storage Calculations	By: SZ	Date: 2023-03-24	Page:
		Checked: JVM	Scenario: Proposed	2

Calculation of existing runoff rate is undertaken using the Rational Method: **Q = CiA**

Where: Q = Peak flow rate (litres/second)
C = Runoff coefficient
I = Rainfall intensity (mm/hour)
A = Catchment area (hectares)

Site Area	**1.25**	hectares
Drainage Area	**2.17**	hectares [Includes 1.25 Ha onsite and 0.92 Ha from offisite]

Composite Runoff Coefficient			**Runoff Coeff Adjustment**	
Land Use	Area (m^2)	C	**100 Year Adjust. Factor**	**Design C***
Building (Excluding Courtyard)	2,959	0.90	25%	1.00
Courtyard Concrete	639	0.90	25%	1.00
Courtyard Landscaping	611	0.30	25%	0.38
Asphalt/Concrete Pavement	4,630	0.90	25%	1.00
Rocks, Misc Landscape	1,211	0.80	25%	1.00
Grass	2,494	0.25	25%	0.31
Composite Runoff Coefficient	12,543	0.73		0.83

* Adjusted C Factors rounded down to be no higher than 1.0

Offiste (South and Southeast of Site)	9,200	0.30	Not controlled or Stored Onsite

Runoff Coefficient Adjustment:	25%
Design Runoff Coefficient:	0.83

Allowable Discharge, Qa (m^3/s):	0.254	<- 1:5 Year Existing Design Storm Outlet Rate For Subject Parcel Only
Orifice Discharge, Qo (m^3/s):	0.247	<- Refer to Page 3 of Calculations for Actual Site Discharge

Design Event

100-Year Storm - From Ottawa SWM Guidelines 2012 /Cardinal Creek Master Servicing Study

A =	1735.7
B =	6.014
C =	0.820
Time Step =	10 min

(if only two paramters are provided, enter B as "0" and C as positive number)

$$I = \frac{A}{(B + t_c)^C}$$

Where: A, B, and C = IDF Parameters From City
I = Rainfall intensity (mm/hour)
t_c = Time of concentration (hours)

Event Duration (mins)	Rainfall Intensity (mm/hr)	Peak Runoff Rate (L/s)	Release Rate (Q_o) (L/s)	Storage Rate (L/s)	Required Storage Volume (m3)
10	178.56	516.79	247.0	269.8	161.9
15	142.89	413.57	247.0	166.6	149.9
20	119.95	347.17	247.0	100.2	120.2
25	103.85	300.56	247.0	53.6	80.3
30	91.87	265.89	247.0	18.9	34.0
35	82.58	239.00	247.0	-8.0	-16.8
40	75.15	217.49	247.0	-29.5	-70.8
45	69.05	199.85	247.0	-47.2	-127.3
50	63.95	185.10	247.0	-61.9	-185.7
55	59.62	172.57	247.0	-74.4	-245.6
60	55.89	161.77	247.0	-85.2	-306.8
65	52.65	152.37	247.0	-94.6	-369.0

Maximum Required Storage (m^3)	Peak Duration
161.9	10

DILLON CONSULTING	Stormwater Management Calculations	Project:	Orleans LTCF	No.:	21-2647	
	Orifice Calculations & Storage Calculations	By:	CDP	Date:	2023-03-24	Page:
		Checked:	JVM	Scenario:	Proposed	3

Calculation of Required Orifice Diamater

Q (cms) = 0.61 x A x sqrt(2 x g x H)

Where: Q = Peak flow rate (cubic metres/second)
0.61 = Orifice Coefficient
A = Area of Orifice (m2)
g = Gravitational Constant (9.81 m/s2)
H = Maximum Head above the centerline of the orifice (m)

Maximum Allowable Outlet Rate (Qt) = **0.254** m3 / s <- Total Site Release Rate including rooftop area

Equation Inputs		
Input	Value	Unit
H1 = Outlet Sewer Invert (at Outlet MH)	63.308	m
H2 = 100 Year High Water Line	64.98	m
100 Year Head (H2 - H1)	1.67	m
Trial Orifice Diameter	0.300	m

Orifice Equation (Peak Outflow)	0.247	m^3 / s

Peak Site Outflow is less than Maximum Allowable Site Outlet Rate
Utilize an orifice of 300mm in diameter.

Outlet Pipe has a capacity of 253 m3/s. Reduced orifice will restrict flows including allowance for head
Larger diameter Outlet Pipe will provide generally the same flow rate under free flow conditions.

Provided Storage

All site detention will be provided by the underground Concrete Culvert Chambers.
Proposed Culvert are to be 2.4m Wide x 1.8m High Box Culverts.
Per the Manufactuer information, the cross-section area of the chambers are 4.38 m^2 / m

Available Detention Chamber Storage				
Chamber	Size	Cross-Sectional Area (m^2)	Length (m)	Volume (m^3)
Chamber 1	2.4m x 1.8m	4.38	30.000	131.40
Chamber 2	2.4m x 1.8m	4.38	15.000	65.70
Total Available Storage (Incl Permanent Pool Volume)				197.10

Req. Storage (m^3)
161.9

Permanent Pool Volume (200mm Depth)	16.72	m^3
Remaining Available Storage	180.38	m^3
100 Year High Water Line	64.98	m

Calculation of Required Orifice Diamater

Q (cms) = 0.61 x A x sqrt(2 x g x H)

Where: Q = Peak flow rate (cubic metres/second)
0.61 = Orifice Coefficient
A = Area of Orifice (m2)
g = Gravitational Constant (9.81 m/s2)
H = Maximum Head above the centerline of the orifice (m)

Equation Inputs		
Input	Value	Unit
H1 = Outlet Sewer Invert (at Outlet MH)	63.560	m
H2 = First Flush Volume HWL	64.260	m
First Flush Head (H2 - H1)	0.70	m
Trial Orifice Diameter	0.100	m

Orifice Equation (Peak Outflow)	0.018	m^3 / s	<- Outlet from Each Storage Chamber
Total First Flush Site Outlet	0.036	m^3 / s	

Utilize an orifice of 100mm in diameter in both Storage Chambers.

First Flush Detention

Available First Flush Storage				
Chamber	Permanent Pool Dimensions	Cross-Sectional Area (m^2)	Length (Behind Baffle) (m)	Volume (m^3)
Chamber 1	2.4m x 0.7m	1.68	26.500	44.5
Chamber 2	2.4m x 0.7m	1.68	11.500	19.3
Total Available Storage				63.8

Req. First Flush Volume (m^3) (5mm on Site Area, 1.25 Ha)
62.5

First Flush High Water Line	64.26	m
100 Year High Water Line	64.98	m

Appendix D

Water Service and Boundary Condition

Water Demand Calculations

Project: Long Term Care Home, Famile-Laporte Avenue, Orleans ON
Project #: 21-2647
Location: Orleans, Ontario

Watermains shall be sized to accommodate the greater of:
1. Maximum day demand plus fire flow or;
2. Peak Hour Demand

Water Demand Design Criteria (Ottawa Water Distribution Design Guidelines, July 2010):

Maximum Hour Factor	2.2
Maximum Day Factor	2.5
Average Daily Demand per Capita (per OBC 8.2.1.3.B - Long Term Care) (L/Bed/d)	450
Persons Per Bed (1 + employees)	1

Water Demand Calculations:

Building	Gross Floor Area (m^2)	Number of Beds	Population	Avg. Daily Demand (L/s)	Max Daily Demand (L/s)	Peak Hourly Demand (L/s)	Fire Flow (L/s)	Fire Flow Duration (hr.)	Max Day + Fire Flow (L/s)
Long Term Care Facility	11,789	224	224	1.17	2.92	2.57	209.2	3	212
Total				70 L/m	175 L/m	154 L/m	12,552 L/m		12,727 L/m

FUS Calculations

Project: Long Term Care Home, Famile-Laporte Avenue, Orleans ON
Project #: 21-2647
Location: Orleans, Ontario

Buildling Footprint 3,031 m^2 (Main Floor)
Number of Floors 4
Gross Floor Area 11789 m^2 (Excluding Basement)

Building Information					System Type							Occupancy/ Contents Charges	
Building	NBC Occupancy	Gross Floor Area (m²)	# of Storeys	Construction Class	NFPA 13 Sprinkler	Credit	Standard Water Supply	Credit	Fully Supervised	Credit	Total Credits	Contents Factor	Contents Charge
Long Term Care Facility	B3	11,789	4	NC	Yes	30%	Yes	10%	No	0%	40%	Care Occ	-15%

Exposure Charge									Unadjusted Fire Flow F=220CvA			Correction Factors			
East		West		North		South									
Distance (m)	Charge	Distance (m)	Charge	Distance (m)	Charge	Distance (m)	Charge	Total Charges	C	A (m²)	F (L/min)	Occupancy	FF Adjusted Occupancy	Sprinkler Decrease	Exposure Charge
>30m	0%	>30m	0%	20.1-30m	15%	>30m	0%	15%	0.8	12,516	19,690	- 2,954	16,737	- 6,695	2,510

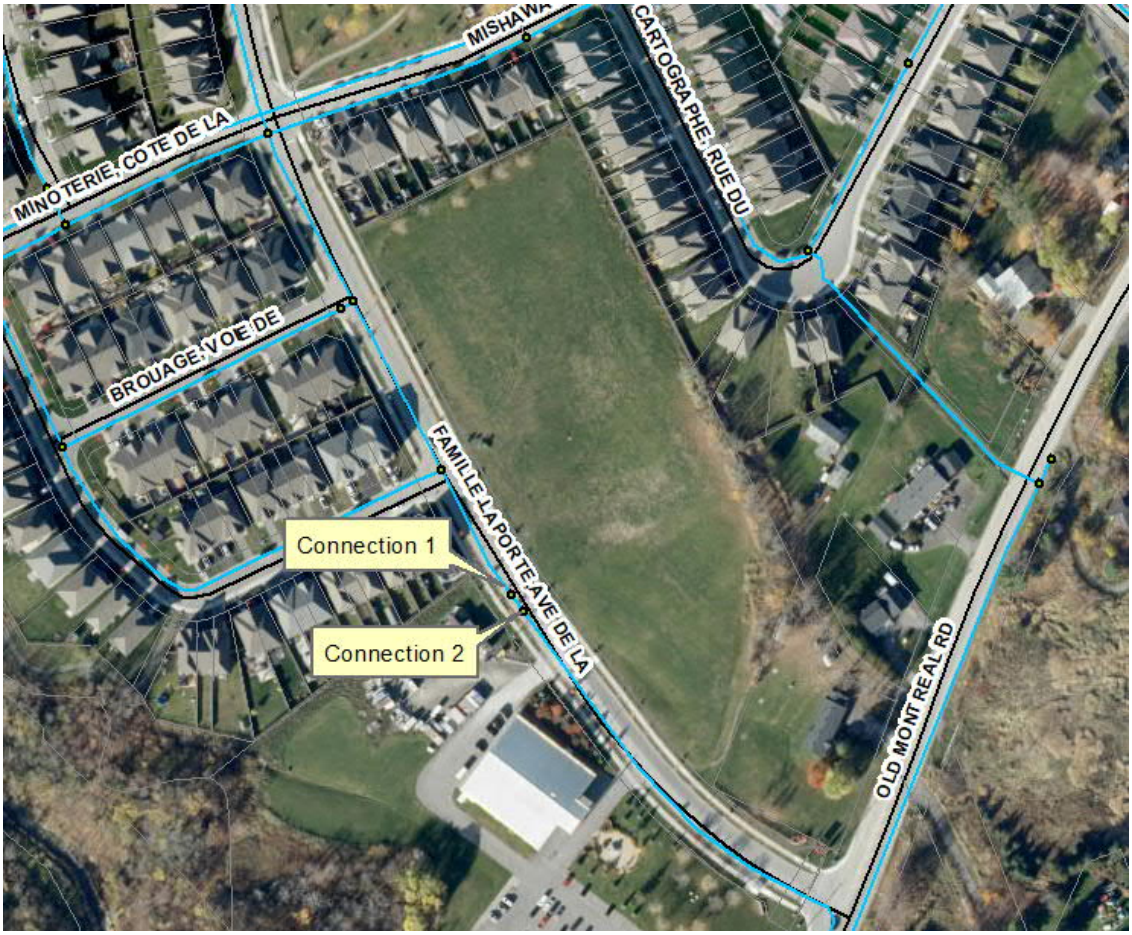
Required Flow	
L/min	L/s
12,552	209.21

Boundary Conditions
1161 Old Montreal Road

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	70	1.17
Maximum Daily Demand	175	2.92
Peak Hour	154	2.57
Fire Flow Demand #1	12,727	212.0

Location



Results

Connection 1 – Famille-Laporte Ave.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	114.0	68.8
Peak Hour	108.9	61.6
Max Day plus Fire 1	99.1	45.9

Ground Elevation = 65.6 m

Connection 2 – Famille-Laporte Ave.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	114.0	68.8
Peak Hour	108.9	61.6
Max Day plus Fire 1	99.1	45.9

Ground Elevation = 64.1 m

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.

Appendix E

RVCA Comments

Conservation Partners
Partenaires en conservation

Mississippi Valley Conservation Authority | Rideau Valley Conservation Authority | South Nation Conservation / Conservation de la Nation Sud

File: 22-OTT-SPC-0018
22-OTT-ZBA-0017

May 4th, 2022

City of Ottawa
Planning, Infrastructure and Economic Development Department
110 Laurier Avenue West, 4th Floor
Ottawa, ON K1P 1J1

Attention: Kelly Livingstone

Subject: DTOC II Facility Inc.
Site Plan Control Application D07-12-22-0006
Zoning By-law Amendment Application D02-02-22-0004
1161 Old Montreal Road, formerly Cumberland, now City of Ottawa

Dear Ms. Livingstone:

The Conservation Partners Planning and Development Review Team has completed a review of the above noted applications to permit residential care facility and retirement home uses and to construct on the southerly part of the site, a 4-storey long-term care facility of 12,500 sq. metres in gross floor area, consisting of 224 residential units/beds.

We have undertaken our review within the context of Sections 1.6.6 Sewage, Water and Stormwater, 2.1 Natural Heritage, 2.2 Water and 3.1 Natural Hazards of the Provincial Policy Statement, 2020 issued under Section 3 of the *Planning Act*, and from the perspective of the Conservation Authority regulations. The following comments are offered for your consideration.

Natural Heritage

There have been no natural heritage features identified on this property which would preclude this application.

3889 Rideau Valley Drive, P.O. Box 599
Manotick, Ontario, K4M 1A5
Tel: 613-692-3571
Fax: 613-692-0831

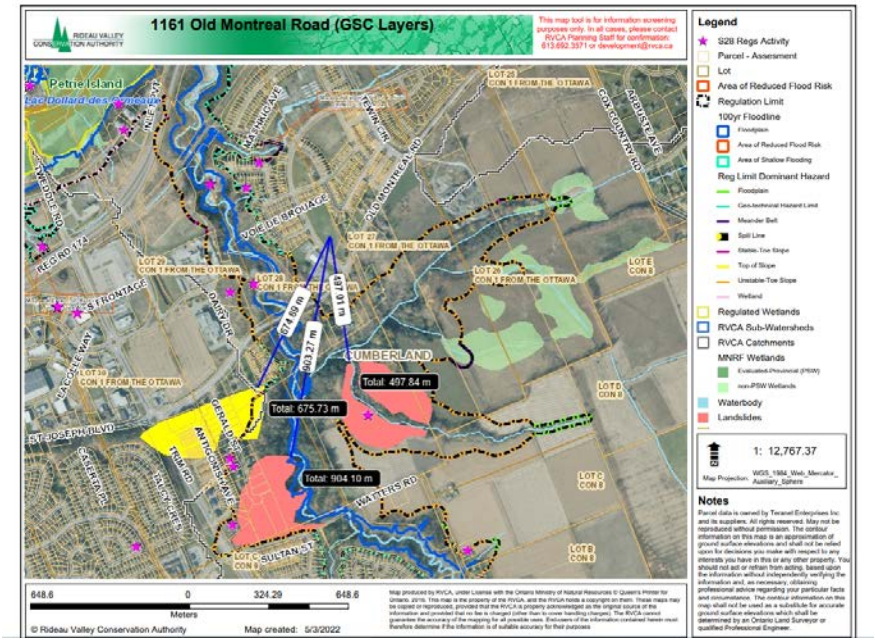
Natural Hazards

Conservation Authorities were delegated natural hazard responsibilities by the Minister of Natural Resources (now known as Ministry of Natural Resources and Forestry). This includes flood plain management, hazardous slopes, Great Lakes shorelines, unstable soils and erosion which are now encompassed by Section 3.1 “Natural Hazards” of the Provincial Policy Statement.

<u>Landslide Risk</u>

In 2017, there were several slope failures within the Bilberry Creek valley lands which resulted in significant remedial measures required to render portions of the valley lands stable. In response, since 2018, the Conservation Authority has been investigating landslide risk within the Ottawa area and has sought the expertise from a third party consultant with extensive expertise in landslide hazard and risk assessments. As a result, the Conservation Authority has a much greater understanding of sensitive marine clay and landslide risk in the Ottawa area.

The proposed development is approximatley 200 metres of Cardinal Creek. The site has also been identified as being within less than 1 km of two documented landslides and one potential landslide based on information documented by the Geological Survey of Canada. The closest landslide being less than 500 metres away.



Based on the information available, the documented landslides extended between 150 to 230 metres beyond the original slope face. Given the history of landslides in the area, the RVCA would like to engage a third party consultant with expertise in landslide hazards to determine what/if additional information will be required from the applicant to support this application.

Stormwater Management

The stormwater management report "*Functional Servicing Report – Orleans Long Term Care Facility, Montgomery Sisam Architects Inc, City of Ottawa*" dated November 2021, prepared by Dillon Consulting indicates stormwater from this site will be directed to the existing storm sewer along Famille-Laporte Avenue. However, the report indicates that the stormwater ultimately outlets to Cardinal Creek and then the Ottawa River. It is our understanding that the stormwater from this area is to be directed to a stormwater management facility. Therefore, confirmation on the above statements is required. The report also does not make reference to the Master Servicing Study for this area. The report should confirm that it is in conformity with the assumptions of the Master Servicing Study.

Conclusion

In conclusion, the RVCA recommends that the application be place ON HOLD until the above noted matters are addressed. The Conservation Authority kindly requests to be kept informed on the status of this file. For any questions regarding the information contained in this letter, please feel free to contact me.

Respectfully,

Jamie Batchelor, MCIP, RPP
Planner, Planning and Watershed Science
Rideau Valley Conservation Authority
613-692-3571 ext. 1191
Jamie.batchelor@rvca.ca

Cc: David McKay: MHBC Planning

Conservation Partners
Partenaires en conservation

Mississippi Valley Conservation Authority | Rideau Valley Conservation Authority | South Nation Conservation / Conservation de la Nation Sud

File: 22-OTT-SPC-0018
22-OTT-ZBA-0017

October 26th, 2022

City of Ottawa
Planning, Infrastructure and Economic Development Department
110 Laurier Avenue West, 4th Floor
Ottawa, ON K1P 1J1

Attention: Kelly Livingstone

Subject: DTOC II Facility Inc.
Site Plan Control Application D07-12-22-0006
Zoning By-law Amendment Application D02-02-22-0004
1161 Old Montreal Road, formerly Cumberland, now City of Ottawa

Dear Ms. Livingstone:

The Conservation Partners Planning and Development Review Team has completed a review of the resubmission for the above noted applications to permit residential care facility and retirement home uses and to construct on the southerly part of the site, a 4-storey long-term care facility of 12,500 sq. metres in gross floor area, consisting of 224 residential units/beds. This letter should be read in conjunction with our letter dated May 4th, 2022 for context.

We have undertaken our review within the context of Sections 1.6.6 Sewage, Water and Stormwater, 2.1 Natural Heritage, 2.2 Water and 3.1 Natural Hazards of the Provincial Policy Statement, 2020 issued under Section 3 of the *Planning Act*, and from the perspective of the Conservation Authority regulations. The following comments are offered for your consideration.

Natural Heritage

There have been no natural heritage features identified on this property which would preclude this application.

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Natural Hazards

Conservation Authorities were delegated natural hazard responsibilities by the Minister of Natural Resources (now known as Ministry of Natural Resources and Forestry). This includes flood plain management, hazardous slopes, Great Lakes shorelines, unstable soils and erosion which are now encompassed by Section 3.1 "Natural Hazards" of the Provincial Policy Statement.

Landslide Risk

In our previous letter, we had brought to the City's attention concerns related to landslide risk for this site given its proximity to Cardinal Creek, and an escarpment to the south. To properly evaluate the risk, the Conservation Authority sought the opinion from BGC Engineering Inc. who specialize in landslide and hazard risks. The assessment evaluated three slopes:

1. Slope #1: The east valley slope of Cardinal Creek.
2. Slope #2: The escarpment slope southeast of the site.
3. Slope #3: An unnamed creek present southeast of the escarpment slope (Slope #2).

The assessment concluded that the probability of a large landslide occurring at Slope #1 and reaching the site to be $< 1 \times 10^{-6}$ per year, and potentially lower. The assessment concluded that the probability of a large landslide occurring and reaching the site at Slope #2 to be $< 1 \times 10^{-6}$ per year, and potentially lower. The assessment concluded that the probability of a large landslide occurring at Slope #3 and reaching the site were likely non-credible as the escarpment (Slope #2) represents a reverse break in slope that would be expected to limit the extent of retrogression from Slope #3 (Quinn, 2022).

The report has identified that while there is a low probability of a large landslide occurring and reaching the site for Slopes #1 and #2, there still is a credible risk, albeit low. There has not been any formal policy or guidelines developed locally with respect to risk tolerance by the City, Conservation Authority or Province for large landslides. In lieu of any local guidelines, the RVCA has in the past referenced guidelines in other jurisdictions, most notably the "*Hazard Acceptability Thresholds for Development Approvals*" (FVRD) dated June 2017, prepared by the Fraser Valley Regional District. While the estimated frequency may fall within the acceptable range within the FVRD guidelines, the City itself must determine whether the risk tolerance is appropriate for the proposed development.

Stormwater Management

The stormwater management report "*Functional Servicing Report – Orleans Long Term Care Facility, Montgomery Sisam Architects Inc, City of Ottawa*" dated August 2022, prepared by Dillon

Consulting indicates stormwater from this site will be directed to the existing storm sewer along Famille-Laporte Avenue. However, the report indicates that the stormwater ultimately outlets to Cardinal Creek and then the Ottawa River. It is our that the water quality objective of 'enhanced' (80% TSS Removal) will be achieved through an-site water quality treatment through the installation of a Hydro International First Defence unit as well as some treatment from the downstream stormwater management pond. The water quality objective is appropriate for the downstream receiving watercourse.

The RVCA did not conduct a technical review of the stormwater management report for this site. We will rely on the City to ensure that the stormwater management design is in conformity with the design assumptions of the receiving storm sewers and in accordance with the Cardinal Creek Master Servicing Study.

Conclusion

In conclusion, the RVCA has no objection to these applications. The Conservation Authority kindly requests to be kept informed on the status of this file. For any questions regarding the information contained in this letter, please feel free to contact me.

Respectfully,

Jamie Batchelor, MCIP, RPP
Planner, Planning and Watershed Science
Rideau Valley Conservation Authority
613-692-3571 ext. 1191
Jamie.batchelor@rvca.ca

Cc: David McKay: MHBC Planning
Stefan Staicu: MHBC Planning

References

Quinn, P. (2022). *RE: Landslide hazards affecting 1161 Old Montreal Road.* Vancouver, BC: BGC Engineering Inc.