REPORT

Capital Region Resource Recovery Centre

Site Servicing Brief

Submitted to:

Taggart Miller Environmental Services

Submitted by:

Golder Associates Ltd.

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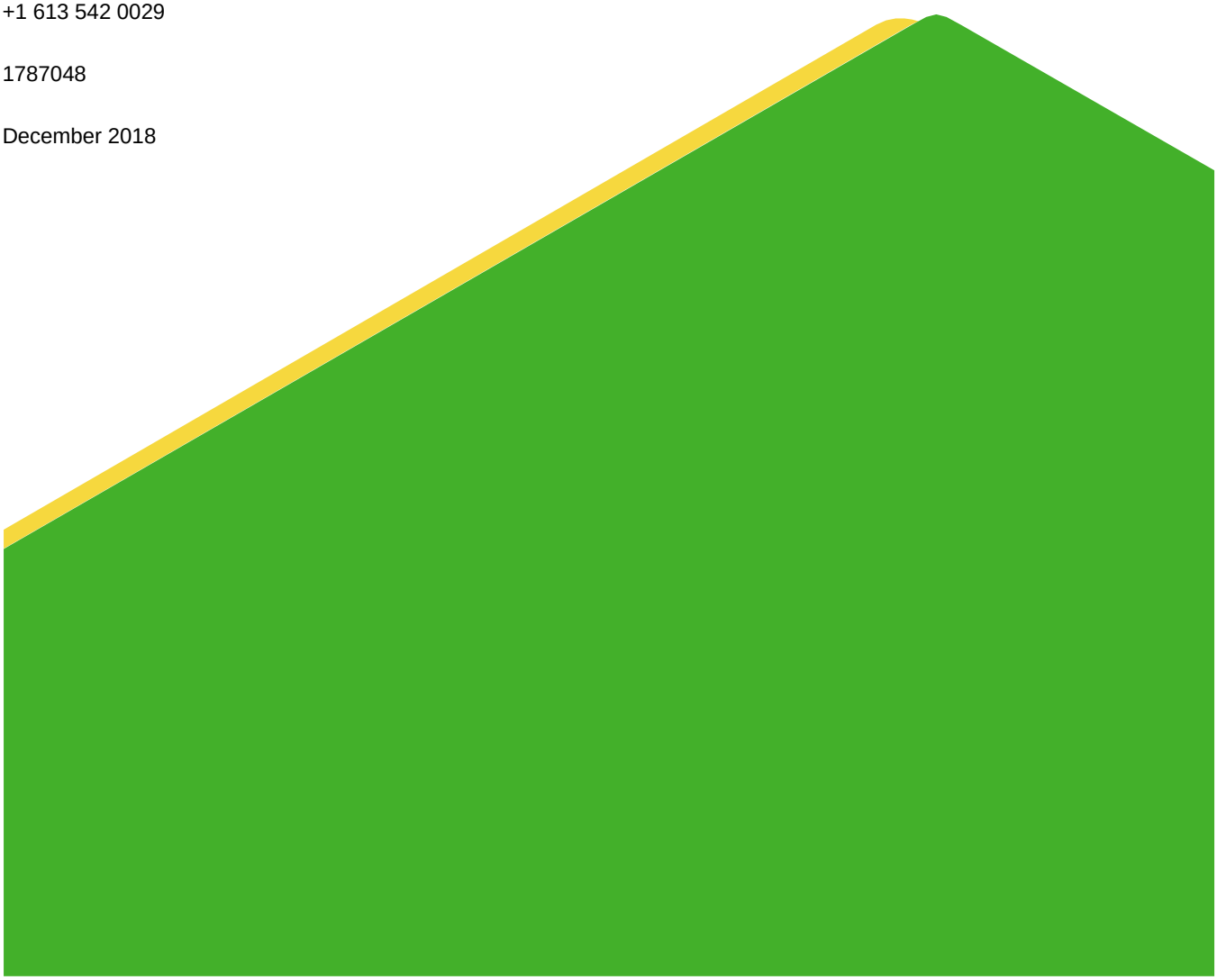
December 2018



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1.0 INTRODUCTION

A new integrated waste management facility, the Capital Region Resource Recovery Centre (CRRRC), is proposed for the Capital Region of eastern Ontario. The CRRRC will provide facilities and capacity for the recovery of resources and diversion of materials from wastes that are generated by Industrial, Commercial and Institutional (IC&I) and Construction and Demolition (C&D) sectors in Ottawa and eastern Ontario. It will also provide landfill disposal capacity on the same Site for post-diversion residuals and materials that are not diverted.

This report outlines the servicing for the proposed development: water, fire, sanitary and storm drainage. This report is being submitted in support of the Site Plan application to the City of Ottawa for the subject property and should be read in conjunction with the enclosed engineering drawings. This report has been updated to reflect changes to the fire fighting design based discussions with Ottawa Fire Services and Fire Underwriters Survey (FUS) calculations.

1.1 Site Location and Description

The proposed CRRRC Site (the Site) is located in the east part of the City of Ottawa just southeast of the Highway 417/ Boundary Road interchange. The property is located on the east side of Boundary Road, north of Devine Road and west of Frontier Road, and east of an existing industrial park, on Lots 22 to 25, Concession XI, former Township of Cumberland.

The Boundary Road Site (the Site), totalling approximately 192 hectares (ha), is located in the Bear Brook Subwatershed in the Lower Ottawa – South Nation Watershed. The area surrounding the Site primarily consists of rural and agricultural land, an industrial park, residential properties and open spaces. The Site is generally flat, and slopes from local high point elevations at the western side of the Site at Boundary Road, towards the lowest portion of the Site found along the eastern edge at Frontier Road.

The property is adjacent to an existing Industrial Park with few existing immediate neighbours. It is underlain by a surficial silty sand layer followed by a thick deposit of silty clay soil.

2.0 SITE SERVICING

The objective of the Site servicing report is to provide an overview of the proposed servicing for the development.

2.1 Water

The proposed development site is located along Boundary Road that does not currently have municipal water services. The Owner and the City have been working together to extend the Carlsbad Springs Trickle Feed Water System to service the Industrial Park area, including this Site. It is understood that the system expansion is presently being designed and is planned to be operational for the Fall of 2018. Based on pre-consultation with the City of Ottawa, the Site will be initially be provided with 15 equivalent connections from the Trickle Feed Water System, which is equivalent to 2,700 L/day x 15 = 40,500 L/day (0.47 L/s).

The municipal water system would provide potable water to the proposed Site development. The fire system will utilize the on-Site Stormwater Management (SWM) Pond 5A, which is fed by stormwater runoff.

2.1.1 Domestic Water Demand

The maximum daily flow rate for water use at the Site has been calculated based on the occupancy of each building and the values from the Ontario Building Code (OBC), Table 8.2.1.3.B. These values are shown on the Overall Site Servicing Plans, Drawings SS1 and SS2, included in Appendix E. There are no proposed staff

facilities, such as washrooms or sinks, in the PHC soil treatment, or the secondary digestor buildings. Staff working in these buildings or at the adjacent composting and organics processing areas will use facilities at the leachate pre-treatment building or the organics pre-processing building. Therefore, water use information values for these areas are summarized in the leachate pre-treatment building and organics pre-processing building values. Flows shown for some of these facilities are based on a nominal use for washdown of areas.

An average day factor of 0.33 has been applied to these values to account for actual flow rates at the Site. This factor is consistent with actual average day water use at a similar material recovery facility that Miller Waste operates for the Region of York. A peaking factor of 2.5 above maximum daily rates has been assumed for peak hour flow rates. The maximum daily flow rates, average daily flow rates and peak hourly flow rates for each building are summarized in the following table:

Table 1: Domestic Water Requirements

Building	Maximum Daily Flow Rate (L/d)	Average Daily Flow Rate (L/d)	Peak Hourly Flow Rate (L/h)
Administration	1,950	644	203
Out-Bound Scale	113	37	12
In-Bound Scale	113	37	12
C&D Processing Facility	7,950	2,624	828
Materials Recovery Facility	11,700	3,861	1,219
Maintenance Garage	2,531	835	264
Secondary Digester	100*	33	1,140**
Organics Pre-Processing	1,500	495	156
Leachate Pre-Treatment	2,438	805	254
Secondary Scale	113	37	12
Total	**28,408**	**9,408**	**4,100**

*The maximum daily flow rate has been assumed at 100 L/d as there are no staff facilities within these buildings.
**The peak hourly flow rate has been assumed at 1,140 L/h (22.7 L/m or 5 USgpm) as there are no staff facilities within these buildings.

The trickle feed expansion will extend with a 100mm diameter main along Boundary Road from the north, and terminate just south of the proposed Site entrance. The 75mm Site service will include a meter room in a small building on private property near the Administration Building parking lot. The building will have a segregated room for the meter arrangement with a separate access door to the outside for City staff to enter. The remainder of the building will include space for the on-Site distribution pump controls and chlorine residual addition if needed. The connection will include a flow restricting orifice such that the maximum flow from the trickle feed system to the Site will be restricted to 0.47 L/s. The proposed meter arrangement is shown on Drawing SS1. A cistern will be constructed on-Site, adjacent to the water building to provide water storage to accommodate the limited flow rate of the system supply.

2.1.2 Domestic Water Service Sizing

The water service sizing was determined by J.L. Richards & Associates Limited, based on Part 7 of the OBC. The sizes are summarized in the technical memorandum dated March 26, 2018, included in Appendix A. The truck tire wash service has been deleted since that time, as it will not be required, it will be topped up with a separate water source by tanker truck if needed.

The calculations for the sizing of the on-Site water distribution system for peak hourly flow rates and water age are included in Appendix B. Tables 2 and 3 provide a summary of the results; refer to overall Site Servicing Drawings SS1 and SS2 for section numbering.

Table 2: Domestic Water System Design Summary

Watermain Section	Peak Flow Rate (m^3/h)	Pipe Diameter (m)	Friction Loss (m)	Friction Loss (ft)	Water Age (d)
W1	4.100	0.075	0.030	0.098	0.0
W2	3.897	0.075	0.115	0.377	0.06
W3	3.873	0.075	0.102	0.335	0.05
W4	3.861	0.075	0.141	0.463	0.07
W5	3.033	0.075	0.124	0.407	0.15
W6	1.814	0.050	0.294	0.965	0.15
W7	1.404	0.050	0.138	0.453	0.29
W8	0.410	0.050	0.020	0.066	0.28
W9	0.012	0.019	0.004	0.013	1.87

Table 3: Domestic Water Service Design Summary

Building Service	Peak Flow Rate (m^3/h)	Pipe Length (m)	Total Head (m)	Total Head (psi)	Total Water Age (d)*
Administration (W10)	0.203	37.9	31.97	47.5	7.05
In-Bound Scale (W11)	0.012	9.7	31.94	47.4	7.06
C&D Processing Facility (W12)	0.828	219.7	32.32	48.0	7.27
Materials Recovery Facility (W13)	1.219	232.5	32.55	48.3	7.38
Maintenance Garage (W14)	0.264	62.0	32.39	48.1	7.85
Secondary Digester (W15)	1.140	281.5	38.40	57.0	11.88
Organics Pre-Processing (W16)	0.156	25.2	32.67	48.5	7.77
Leachate Pre-Treatment (W17)	0.254	190.0	32.27	47.9	8.13
Secondary Scale (W18)	0.012	5.7	31.84	47.3	8.95
Out-Bound Scale (W21)	0.012	205.0	31.80	47.2	8.54

*Includes an estimate of the water age to the Site of 5.43 days and a duration of 1.5 days in the on-Site cistern.

The pressure differential across the Site during peak hour flow rates is approximately 9.8 psi. Therefore, if the most remote use (secondary digestor) is kept at a minimum residual pressure of 40 psi, the closest building to the water distribution pump will have an approximate pressure of 49.8 psi. This is considered acceptable for a normal operating range of 40 to 60 psi.

The water distribution pump will need to be designed to provide a peak hourly flow rate of 4,100 L/h at a design head of 38.4 m. The pump will be equipped with a variable speed drive to allow lower flow rates during average daily flows. A pressure sensor on the water distribution system will control the pump operation with a setting of 60 psi.

An on-Site water cistern is proposed to account for peak hourly flow rates and maximum daily flow rates. The cistern is sized for 14,112 L of working capacity, which is the volume of 1.5 average day flows. This combined with the incoming flow from the trickle feed at about 16,920 L during an 10 hour shift, provides a total supply in 10 hours of 31,032 L, which is greater than the maximum daily flow rate of 28,508 L/d. As stated above, the trickle feed system will provide a maximum daily flow of 40,500 L/d. A 40,000 L cistern is proposed to account for air space and minimum levels within the tank. The cistern will be equipped with a low level shut off float for the water distribution pump and a high level shut off float valve for the incoming water from the trickle feed system.

2.1.3 Domestic Water Age

The total water age shown above for each building service ranges from approximately 7.05 to 11.88 days. This is based on an assumption that the water is 3.8 days old at the head of the trickle feed system and then is another 1.6 days in the trickle feed system before it gets to the Site, and then ages 2 days in the cistern, based on average day demand.[1] We understand the analysis for the system has not been updated based on the current projected uses for this site and the adjacent proposed warehouse site to the north. These uses may act to improve the age of the water at the Site.

The secondary digester building will be equipped with signs indicating that the water is not potable, due to the higher total water age shown. The remainder of the buildings at the site have a total water age equal to, or less than, 8 days, except for the outer scales houses and the leachate building. The typical rule of thumb is 8 days to maintain a minimum chloramine concentration for residual disinfection in the water supply. Provisions for space have been included in the water building to add injection of chlorine to the trickle feed service flow as it enters the cistern if the actual chloramine residual is below acceptable levels on-Site. It is proposed to adjust the operating range of the cistern during the initial stages of operation of the Site facilities and to monitor the residual level so that adjustments can be made as necessary.

2.1.4 Fire Suppression

On-Site fire protection storage will be provided in SWM Pond 5A. SWM Pond 5A has a total permanent pool storage volume of 12,670 m^3. A wet well will be constructed adjacent to the pond with a 600mm diameter connection at 1% slope between the pond and the wet well. The invert of the pipe at the pond will be 0.3m above the invert of the pond. The fire pump intake will be set 0.5m above the bottom of the wet well. The stage storage characteristics for the permanent pool of SWM Pond 5A are shown in Table 4 below:

Table 4: Stage Storage of Permanent Pool for SWM Pond 5A

Height (m)	Area (m^2)	Storage (m^3)
0.00	-	-
0.10	4,455	263
0.20	4,698	721

[1] Feasibility Study for an Extension of the Carlsbad Springs Trickle Feed Water System – Boundary Road Industrial Park, Stantec, April 14, 2015.

Height (m)	Area (m^2)	Storage (m^3)
0.30	4,943	1,203
0.40	5,188	1,709
0.50	5,435	2,240
0.60	5,682	2,796
0.70	5,931	3,376
0.80	6,180	3,982
0.90	6,431	4,612
1.00	6,683	5,268
1.10	6,935	5,949
1.20	7,189	6,655
1.30	7,444	7,387
1.40	7,700	8,144
1.50	7,957	8,927
1.60	8,215	9,736
1.70	10,598	10,634
1.80	14,564	11,891
1.85	16,625	12,670

The ice thickness in SWM Pond 5A has been estimated based on Stefan's Equation from the MOECC SWM Planning and Design Manual (2003), Equation 4.1, as follows:

h = α (Df)^0.5

Where,

h = ice thickness in mm

α = coefficient of ice growth = 24 (maximum value for an average lake with snow)

Df = the sum of freezing degree days = 928 (Environment Canada - Ottawa MacDonald-Cartier Int'l Airport (1981 to 2010))

Therefore,

h = 24 * (928)^0.5

h = 731 mm

The storage volume available in SWM Pond 5A, assuming the 600mm pipe is flowing half full, and the 0.731 m for the ice thickness, is 3,286 m^3.

The requirement for sprinkler systems and standpipes in the on-Site buildings was determined by J.L. Richards & Associates Limited. This information is presented in their technical memorandum, dated March 26, 2018, and the FUS summary dated December 14, 2018, included in Appendix A. The materials recovery facility will require sprinklers and standpipes at a flow rate of 4,500 USgpm, the C&D will require flow a 1,900 USgpm and the organics pre-processing and leachate pre-treatment buildings will require standpipes at flow rates of 1,250 USgpm. As per A.3.2.5.7 of the OBC, the flow rate of 4,500 USgpm will need to be maintained for a minimum duration of 30 minutes. This equates to a total required fire storage volume of approximately 511 m^3.

The C&D processing facility and the materials recovery facility will be serviced by a direct connection to the building for the sprinkler and standpipe systems. An additional fire hydrant will be provided within 45 m of the Siamese connection for each building.

The organics pre-processing and leachate pre-treatment buildings will include a fire hydrant within 45 m of the Siamese connection at each building.

The pump house/wet well is proposed adjacent to SWM Pond 5A to feed the hydrants and sprinkler systems for the C&D processing facility, materials recovery facility, organics pre-processing and leachate pre-treatment buildings. A wet well will be installed with a fire pump system capable of providing 4,500 USgpm at a total head of approximately 122.7 ft (37.4 m; refer to Appendix C). This allows for a residual pressure of 30 psi at the remote hydrants or building connections, which is greater than the minimum required pressure of 20.3 psi (140 kPa). Booster pumps will likely be required in the C&D processing facility and the materials recovery facility to feed the sprinkler systems.

The fire pump will likely be a diesel pump to ensure operation during power outages.

The calculations are based on the FUS flow requirements and are included in Appendix C. Tables 5 and 6 provide a summary of the results.

Table 5: Fire Distribution Piping Design Summary

Firemain Section	Flow Rate (USgpm)	Pipe Diameter (m)	Friction Loss (m)	Friction Loss (ft)
F1	1,900	0.300	3.09	10.14
F2	4,500	0.375	1.6	5.25
F3	4,500	0.375	0.66	2.17
F4	4,500	0.375	3.07	10.07
F5	1,250	0.200	4.32	14.17
F6	1,250	0.200	4.77	15.65
F7	1,250	0.150	2.25	7.38
F8	1,250	0.200	3.03	9.94
F9	1,250	0.200	1.79	5.87

Table 6: Fire Distribution System Pressure

Building	Total Head (m)	Total Head (ft)	Total Pressure (psi)
C&D Processing Facility	36.11	118.47	53.6
Materials Recovery Facility	36.09	118.41	43.6
Leachate Pre-Treatment	37.40	122.70	55.5
Organic Pre-Processing	35.73	117.22	53.0
Maintenance Garage	31.34	102.82	46.5

The maintenance garage and PHC soil storage buildings are both over 600 m^2 in area and will also require on-Site storage for fire protection, as per A.3.2.5.7 of the OBC. A hydrant is provided within 90 m of the entrance to the building is proposed to service the maintenance garage. It was determined through pre-consultation with Ottawa Fire Services (OFS) that the PHC soil storage building would be serviced from the hydrant located adjacent to the leachate pre-treatment building and no additional measures are required.

As well, an additional hydrant has been provided along the fire route, south of the C&D Building. A dry hydrant is also provided adjacent to the wet well such that Ottawa Fire Services can connect into the Pond 5A water storage for other nearby fires.

The building classification and internal volume are being confirmed for the maintenance garage and PHC soil storage buildings; therefore, the required storage volumes have not been calculated at this time. However, given that there is over 4,000 m^3 remaining in SWM Pond 5A for fire protection, this is not a concern.

2.2 Sanitary Sewage

The proposed development site is not within the City of Ottawa sanitary service area. Due to the number of buildings and spatial separation across the Site, a holding tank approach to storage of wastewater was considered for this Site, instead of a collection/full treatment and disposal option. Each building on the Site requiring sanitary servicing is proposed to be equipped with a septic tank for primary settling and an effluent holding tank. The effluent holding tanks will be pumped on a regular basis by facility operations staff and the sanitary effluent taken by truck to the on-Site leachate pre-treatment facility.

The sewage system proposed for the Site includes primary treatment through the septic tank and additional treatment through the leachate pre-treatment facility. The effluent from the leachate pre-treatment facility will then be hauled to the City of Ottawa Robert O. Pickard Environmental Centre (ROPEC). Therefore, the system does not classify as a Class 4 or Class 5 sewage system under the OBC, as the raw sewage receives treatment on-Site, but the treated effluent is hauled for disposal off-Site. As the combined flow rate for the buildings on-Site is greater than 10,000 L/day, the system does not fall under the jurisdiction of the OBC and an approval under the OBC is not required. Since the leachate facility only provides pre-treatment and does not include a discharge of wastewater or effluent to the environment, it does not require a permit from the MOECC.

The average day demand of the system is calculated as per Table 7 below:

Table 7: Sanitary Sewage Design Flows

CRRRC Proposed Facilities	Sanitary Sewage Design Flows (L/day) [1]	No. 8 hr. shifts	No. Employees per shift	No. Administration Staff [2]	Occasional Users [3]
Material Recovery Facility (MRF)	11,700	2	45	3	-
Construction and Demolition (C&D)	7,950	2	30	3	-
Administration Building	1,950	1	-	6	50
In-Bound Scalehouse [4]	113	1.5	-	1	-
Out-Bound Scalehouse [4]	113	1.5	-	1	-
Secondary Scalehouse [4]	113	1.5	-	1	-
Maintenance Garage [5]	2,531	2.5	9	-	-
Truck Tire Wash Station [6]	-	-	-	-	-
Organics Pre-Processing Facility [7 8]	1,500	1.5	8	-	-
Leachate Pre-Treatment Facility [7 8]	2,438	1.5	13	-	-
Organics Processing Area [9]	-	-	-	-	-
Compost Processing Area [9]	-	-	-	-	-
Secondary Digester [9]	-	-	-	-	-
Sludge Dewatering Pad [9]	-	-	-	-	-
Soil Stockpile Area [9]	-	-	-	-	-
PHC Contaminated Soil Treatment Area [9]	-	-	-	-	-

Notes:
Ontario Building Code (Table 8.2.1.3B).

1. OBC: 125 L/day for Factory (excluding process or cleaning waters) with shower – per employee per 8 hour shift.
2. OBC: 75 L/day for Factory (excluding process or cleaning waters) without shower or for Office Building – per employee per 8 hour shift.
3. Per capita demand: 30 L/day.
4. Number of 8-hour shifts for Scalehouses is based on 1 x 12-hour shift for one staff per each scalehouse (3 staff for 3 scalehouses).
5. Number of 8-hour shifts for Maintenance Garage is based on a total of 2 x 9-hour shifts.
6. Water utilized in the Truck Tire Wash Station will be recycled for reuse or topped up with a separate trucked supply.
7. Number of 8-hour shifts for the entire Organics/Soil/Leachate Processing Facilities is based on 1 x 12-hour shift.
8. 1 employee per 8-hour shift for the Leachate Pre-Treatment Facility is included in the total 13 employees per shift.
9. Included in the Organics Pre-Processing and Leachate Pre-Treatment Facility calculations.

The septic tanks have been sized to provide three times the OBC daily design flow with an actual use reduction factor of 0.33. This actual use reduction factor is based on flow data from an existing resource recovery facility operated by Miller Waste in York Region. Flow data from that facility is provided in Appendix D. The storage tanks will be sized to provide storage for seven times the OBC daily design flow reduced by an actual use reduction factor of 0.33. The seven day storage volume was selected to simplify Site operations. The tank design is summarized in Table 8 below:

Table 8: Sewage System Tank Sizing

CRRRC Proposed Facilities	Max. Day Sewage Design Flows (L/day)	Average Sewage Design Flows (L/day)	Septic Tank Size (L)	Storage Tank Size (L)
Material Recovery Facility (MRF)	11,700	3,861	11,583	27,027
Construction and Demolition (C&D)	7,950	2,624	7,871	18,365
Administration Building	1,950	644	3,600*	4,505
In-Bound Scalehouse	113	37	3,600*	259
Out-Bound Scalehouse	113	37	3,600*	259
Secondary Scalehouse	113	37	3,600*	259
Maintenance Garage	2,531	722	3,600*	5,847
Truck Tire Wash Station	-	-	-	-
Organics Pre-Processing Facility	1,500	495	3,600*	3,465
Leachate Pre-Treatment Facility	2,438	805	3,600*	5,635
Organics Processing Area**	-	-	-	-
Compost Processing Area**	-	-	-	-
Secondary Digester**	-	-	-	-
Sludge Dewatering Pad**	-	-	-	-
Soil Stockpile Area**	-	-	-	-
PHC Contaminated Soil Treatment Area**	-	-	-	-

*Minimum size of septic tank is 3,600 L as per 8.2.2.3.(1) of the OBC.
** Included in the Organics Pre-Processing and Leachate Pre-Treatment Facility calculations.

2.2.1 Leachate Pre-Treatment Facility

Leachate from the landfill will be pumped to the proposed leachate pre-treatment facility. The facility will use sequencing batch reactor technology for pre-treatment of the leachate before it is hauled to ROPEC for final treatment prior to discharge to the Ottawa River. The Owner and the City are currently negotiating terms for a discharge agreement.

The generation of leachate will increase over time as the approved landfill footprint area increases in stages and then is expected to decrease in about 30 years when the landfill is expected to be at capacity. The pre-treatment system will be constructed in stages to meet actual leachate generation rates. The expected leachate generation rate is expected to be at a maximum of 230,000 m^3/year. In addition, the system capacity will be sized to treat about 10,000 m^3/year of liquor from the on-Site organics processing building and other wash-down water from the processing buildings and about 6,000 m^3/year of sanitary wastewater, as discussed above.

During periods of high inflow from the landfill that exceed the capacity of the facility, excess leachate will be stored outside in a storage pond. This stored leachate will then be pumped back into the facility when capacity is available. The raw leachate pond will have a capacity of about two months of storage based on the maximum yearly generation rate.

Treated effluent will also be stored outside in ponds. Currently three cells are shown with a combined capacity of about 15 days. It is anticipated that there will be quality verification requirements before the effluent is hauled to ROPEC; the three cells will allow the full cell to be sampled and then emptied while the other cells are being filled.

Sludge generated from the treatment process will be dewatered on-Site in Geotubes and the dewatered solids will be disposed of in the landfill.

2.3 Stormwater Management

The proposed Site will be serviced primarily by a ditch network with culverts at road crossings and with some storm sewers provided to collect runoff from the material recovery facility and C&D building roofs and from the compost processing pad. The ditches have been sized to convey water from the 1:100 year return period design storm on the landfill, and the 1:25 year event for the diversion processing area of the Site. Culverts have been sized to convey water from the 1:25 year return period design storm, and the storm sewers have been sized to convey water from the 1:2 year return period design storm. During larger storm events, flows may surcharge to the ground surface and be directed overland to ditches and stormwater management ponds.

There will be five stormwater management ponds provided at the Site, designed to provide enhanced level water quality control (80% long-term TSS removal) and quantity control to limit post-development peak flows to pre-development levels. As well, stormwater from the composting area will discharge to a separate pond and normally be held for reuse in the curing processes.

The Stormwater Management Report dated December 14, 2018, prepared by Golder provides details of the proposed Stormwater management plan for the Site.

Signature Page

We trust that this report meets your current needs. If you have any questions, or if we may be of further assistance, please contact the undersigned.

Golder Associates Ltd.

Matt Knowles, P.Eng.
Civil Engineer

Douglas V. Kerr, P.Eng.
Associate, Senior Civil Engineer

SWT/MK/DVK/lc
https://golderassociates.sharepoint.com/sites/18733g/technical work/phase 500 detailed design/task 5.1 civil engineering/reporting/2. site servicing report/1787048-001-r-reva- crrrc site servicing report-2018dec14.docx

APPENDIX A

J.L. Richards & Associates Limited

Technical Memorandum Dated March 26, 2018 and FUS Summary Dated December 14, 2018

TECHNICAL MEMORANDUM

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

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TO: CRRRC Team

DATE: Mar. 26, 2018

JOB NO.: 24230-0.11

FROM: Jason Chahal, P.Eng

RE: Water Distribution- Site Wide

CC: Sarah Gore, JLR

Fire Protection Service:

The flow rates for the fire service utilities will be based on *NFPA 13: Installation of Sprinkler Systems*, *NFPA 14: Installation of Standpipe and Hose Systems*, and the *Ontario Building Code Div. B, Part 3: Fire Protection, Occupant Safety and Accessibility*. Based on the previous JLR code review, of each building, the following systems were determined to be required. The C&D and MRF processing buildings will include a sprinkler system. The Leachate Treatment and Organics Pre-processing buildings will include a standpipe system. According to clause 7.10.1.3.1.1 in NFPA 14, the total water demand is based on the standpipe or the sprinkler system demand in the highest hazard classification, whichever is greater.

Flow Rates (Based on Mar 26, 2018 Layouts):

Building	Occupancy Zone	Hazard Classification[4]	Sprinkler Density[1] (gpm/ft^2)	Sprinkler Flow at 2500 ft² (gpm)	Standpipe Flow [2] (gpm)	Hose Allowance[3] (gpm)	Total Flow (gpm)
C&D Processing	Processing	Extra Hazard (Group 1)	0.4	1000	-	500	1,500
	Administration	Light Hazard	0.1	-	-	-	
MRF Processing	Processing	Extra Hazard (Group 1)	0.4	1000	-	500	1,500
	Administration	Light Hazard	0.1	-	-	-	
Leachate Treatment	All Areas	Extra Hazard (Group 1)	-	-	750	500	1,250
Organics Pre-Processing	All Areas	Extra Hazard (Group 1)	-	-	750	500	1,250

[1] Based on NFPA 13: Figure 11.2.3.1.1, based on a minimum area of 1500 ft² for Ordinary hazard and 2500 ft² for Extra Hazard. These values allow for a worst-case scenario for each hazard case.
[2] Based on NFPA 14: Clause 7.10.1.1.2: Horizontal Standpipe Flow Rates
[3] Based on NFPA 13: Table 11.2.3.1.1: Hose stream allowance.
[4] Based on NFPA 13: Chapter 5: Classification of Occupancies and Commodities. The proposed classifications are based on JLR's current knowledge of each space. Classifications, areas, and sprinkler densities are subject to change as the design develops. NFPA 13 defines Hazard Classifications as:

Light Hazard: quantity and/or combustibility if contents are low and fires with relatively low rates of heat release are expected.

Extra Hazard (Group 1): quantity and combustibility of contents are very high, dust, lint, or other materials are present, introducing the probability of rapidly developing fires with high rates of heat release but with little or no combustible liquids.

Domestic Water Service:

The domestic water service is based on the Ontario Building Code Div. B, Part 7. It is assumed the water pressure will be between 40-60 psi at building entry.

Building	Connection Size
Administration Building	2" Diameter
Scale Houses	3/4" Diameter
Maintenance Garage	2" Diameter
C&D Processing Facility	2" Diameter
Materials Recovery Facility	2" Diameter
Organics Processing Facility	2" Diameter
Leachate Treatment and Sludge Dewatering	2" Diameter
Truck Tire Wash	2" Diameter

Prepared by:

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Reviewed by:

J.L. RICHARDS & ASSOCIATES LIMITED

Steve Parenteau, C.E. T.

FUS Fire Flow Calculations

CRRRC Facility Design - MRF Building

Step	Parameter	Value		Note
A	Type of Construction	Non-combustible		
	Coefficient (C)	0.8		
B	Ground Floor Area	14327	m^2	using gross area
C	Height in storeys	1	storeys	Considered as 1 storey; however, the ground floor area has been increased to include the mezzanine areas for the sorting rooms and administration building.
	Total Floor Area	14327	m^2	
D	Fire Flow Formula	$F=220C\sqrt{A}$		
	Fire Flow	21066	L/min	
	Rounded Fire Flow	21000	L/min	Flow rounded to nearest 1000 L/min.
E	Occupancy Class	Free Burning		Free-Burning - Occupancy Class C-4, input Architectural
	Occupancy Charge	15%		
	Occupancy Increase or Decrease	3150		
	Fire Flow	24150	L/min	No rounding applied.
F	Sprinkler Protection	None		Sprinklered Building (total area)
	Sprinkler Credit	-40%		Each building with sprinklers will be equipped with supervised valves indicating if a sprinkler head is triggered. The alarm valves will be connected to fire alarm panels that are central monitored and have the ability to call out
	Decrease for Sprinkler	-9660	L/min	
G	*North Side Exposure*			
	Exposing Wall:	Wood Frame		Not Applicable - No building within 45m
	Exposed Wall:	Wood Frame		Not Applicable - No building within 45m
	Length of Exposed Wall:	0.0	m	
	Height of Exposed Wall:	0	storeys	
	Length-Height Factor	0.0	m-storeys	
	Separation Distance	46	m	No building within 45m
	North Side Exposure Charge	0%		
	East Side Exposure			
	Exposing Wall:	Wood Frame		Not Applicable - No building within 45m
	Exposed Wall:	Wood Frame		Not Applicable - No building within 45m
	Length of Exposed Wall:	0.0	m	
	Height of Exposed Wall:	0	storeys	
	Length-Height Factor	0.0	m-storeys	
	Separation Distance	46	m	No building within 45m
	East Side Exposure Charge	0%		
	South Side Exposure			
	Exposing Wall:	Wood Frame		Not Applicable - No building within 45m
	Exposed Wall:	Wood Frame		Not Applicable - No building within 45m
	Length of Exposed Wall:	0.0	m	
	Height of Exposed Wall:	0	storeys	
	Length-Height Factor	0.0	m-storeys	
	Separation Distance	46	m	No building within 45m
	South Side Exposure Charge	0%		
	West Side Exposure			
	Exposing Wall:	Non-combustible		
	Exposed Wall:	Non-combustible		
	Length of Exposed Wall:	78.2	m	using full width of exposed wall of the C&D
	Height of Exposed Wall:	1	storeys	
	Length-Height Factor	78.2	m-storeys	
	Separation Distance	30	m	
	West Side Exposure Charge	9%		
	Total Exposure Charge	9%		The total exposure charge is below the maximum value of 75%.
	Increase for Exposures	2174	L/min	
H	Fire Flow	16664	L/min	
	Rounded Fire Flow	17000	L/min	Flow rounded to nearest 1000 L/min.
City Cap	**Required Fire Flow (RFF)**	**17000**	**L/min**	
		4490.924	**Usgal/min**	
		283	**L/s**	

Fire Underwriters Survey (FUS) Fire Flow Calculations
In accordance with City of Ottawa Technical Bulletin ISTB-2018-02 dated March 21, 2018

APPENDIX B

Site Water Distribution System Calculations

Table 9: Watermain Friction Loss Calculations

Pipe Section	Peak Flow Rate (m^3/h)	Flow Rate (m^3/s)	Pipe Diameter (m)	Hazen Williams Coefficient	Pipe Length (m)	Equivalent Length for Fittings (m)	Total Length (m)	Pipe Area (m^2)	Velocity (m/s)	Friction Loss (m)	Friction Loss (ft)
W1	4.100	0.001139	0.075	150	3.5	25.0	28.5	0.00442	0.26	0.030	0.098
W2	3.897	0.001083	0.075	150	109.2	10.0	119.2	0.00442	0.25	0.115	0.377
W3	3.873	0.001076	0.075	150	102.3	5.0	107.3	0.00442	0.24	0.102	0.335
W4	3.861	0.001073	0.075	150	143.8	5.0	148.8	0.00442	0.24	0.141	0.463
W5	3.033	0.000843	0.075	150	199.8	5.0	204.8	0.00442	0.19	0.124	0.407
W6	1.814	0.000504	0.050	150	168.6	5.0	173.6	0.00196	0.26	0.294	0.965
W7	1.404	0.000390	0.050	150	126.5	5.0	131.5	0.00196	0.2	0.138	0.453
W8	0.410	0.000114	0.050	150	170.2	5.0	175.2	0.00196	0.06	0.019	0.062
W9	0.012	0.000003	0.019	150	247.0	5.0	252.0	0.00028	0.01	0.004	0.013

Table 10: Water Service Total Head Calculations

Building	Pipe Section	Maximum Daily Flow Rate (L/d)	Peaking Factor	Peak Flow Rate (m^3/h)	Flow Rate (m^3/s)	Pipe Diameter (m)	Hazen Williams Coefficient	Pipe Length (m)	Equivalent Length for Fittings (m)	Total Length (m)	Pipe Area (m^2)	Velocity (m/s)	Friction Loss (m)	Elevation Head (m)	Residual Pressure of 40 psi (m)	Total Head (m)	Total Head (ft)	Total Head (psi)
Administration	W10	1,950	2.5	0.203	0.000056	0.050	150	37.9	5.0	42.9	0.00196	0.03	0.001	5.00	26.94	31.97	104.89	47.5
In-Bound Scale	W11	113	2.5	0.012	0.000003	0.019	150	9.7	5.0	14.7	0.00028	0.01	0.000	4.85	26.94	31.94	104.79	47.4
C&D Processing Facility	W12	7,950	2.5	0.828	0.000230	0.050	150	219.7	5.0	224.7	0.00196	0.12	0.089	4.90	26.94	32.32	106.04	48.0
Materials Recovery Facility	W13	11,700	2.5	1.219	0.000339	0.050	150	232.5	5.0	237.5	0.00196	0.17	0.193	4.90	26.94	32.55	106.79	48.3
Maintenance Garage	W14	2,531	2.5	0.264	0.000073	0.050	150	62.0	5.0	67.0	0.00196	0.04	0.003	4.50	26.94	32.39	106.27	48.1
Secondary Digester	W15			1.140	0.000317	0.025	150	281.5	5.0	286.5	0.00049	0.65	6.012	4.50	26.94	38.40	125.98	57.0

Building	Pipe Section	Maximum Daily Flow Rate (L/d)	Peaking Factor	Peak Flow Rate (m^3/h)	Flow Rate (m^3/s)	Pipe Diameter (m)	Hazen Williams Coefficient	Pipe Length (m)	Equivalent Length for Fittings (m)	Total Length (m)	Pipe Area (m^2)	Velocity (m/s)	Friction Loss (m)	Elevation Head (m)	Residual Pressure of 40 psi (m)	Total Head (m)	Total Head (ft)	Total Head (psi)
Organics Pre-Processing	W16	1,500	2.5	0.156	0.000043	0.050	150	25.2	5.0	30.2	0.00196	0.02	0.001	4.90	26.94	32.67	107.19	48.5
Leachate Pre-Treatment	W17	2,438	2.5	0.254	0.000071	0.050	150	190.0	5.0	195.0	0.00196	0.04	0.009	4.50	26.94	32.27	105.87	47.9
Secondary Scale	W18	113	2.5	0.012	0.000003	0.019	150	5.7	5.0	10.7	0.00028	0.01	0	4.65	26.94	31.84	104.46	47.3
Out Bound Scale	W21	113	2.5	0.012	0.000003	0.019	150	205.0	5.0	210.0	0.00028	0.01	0.003	4.85	26.94	31.80	104.33	47.2

Table 11: Watermain Water Age Calculations

Pipe Section	Daily Flow Rate (m^3/d)	Pipe Diameter (m)	Pipe Length (m)	Pipe Area (m^2)	Water Age (d)
W1	9.408	0.075	3.5	0.00442	0
W2	8.764	0.075	109.2	0.00442	0.06
W3	8.690	0.075	102.3	0.00442	0.05
W4	8.653	0.075	143.8	0.00442	0.07
W5	6.029	0.075	199.8	0.00442	0.15
W6	2.168	0.050	168.6	0.00196	0.15
W7	0.868	0.050	126.5	0.00196	0.29
W8	1.300	0.050	170.2	0.00196	0.26
W9	0.037	0.019	247.0	0.00028	1.87

Table 12: Water Service Total Age Calculations

Building	Pipe Section	Maximum Daily Flow Rate (L/d)	Average Daily Flow Rate (m^3/d)	Pipe Diameter (m)	Pipe Length (m)	Pipe Area (m^2)	Water Age (d)	Initial Water Age (d)	Time in Storage Tank (d)	Total Age (d)
Administration	W10	1,950	0.644	0.050	37.9	0.00196	0.12	5.43	1.50	7.05
In-Bound Scale	W11	113	0.037	0.019	9.7	0.00028	0.07	5.43	1.50	7.06
C&D Processing Facility	W12	7,950	2.624	0.050	219.7	0.00196	0.16	5.43	1.50	7.27
Materials Recovery Facility	W13	11,700	3.861	0.050	232.5	0.00196	0.12	5.43	1.50	7.38
Maintenance Garage	W14	2,531	0.835	0.050	62.0	0.00196	0.15	5.43	1.50	7.85
Secondary Digester	W15	100	0.033	0.025	281.5	0.00049	4.18	5.43	1.50	11.88
Organics Pre-Processing	W16	1,500	0.495	0.050	25.2	0.00196	0.10	5.43	1.50	7.77
Leachate Pre-Treatment	W17	2,438	0.805	0.050	190.0	0.00196	0.46	5.43	1.50	8.13
Secondary Scale	W18	113	0.037	0.019	5.7	0.00028	0.04	5.43	1.50	8.95
Out Bound Scale	W21	113	0.037	0.019	205.0	0.00028	1.55	5.43	1.50	8.54

APPENDIX C

Site Fire Distribution System Calculations

Table 13: Fire Distribution Friction Loss Calculations

Pipe Section	Flow Rate (USgpm)	Flow Rate (m^3/s)	Pipe Diameter (m)	Hazen Williams Coefficient	Pipe Length (m)	Equivalent Length for Fittings (m)	Total Length (m)	Pipe Area (m^2)	Velocity (m/s)	Friction Loss (m)	Friction Loss (ft)
F1	1,900	0.12	0.300	150	422.0	30.0	452.0	0.071	1.69	3.09	10.14
F2	4,500	0.284	0.375	150	118.0	20.0	138.0	0.110	2.58	1.60	5.25
F3	4,500	0.284	0.375	150	17.0	40.0	57.0	0.110	2.58	0.66	2.17
F4	4,500	0.284	0.375	150	236.0	30.0	266.0	0.110	2.58	3.07	10.07
F5	1,250	0.079	0.200	150	164.0	20.0	184.0	0.031	2.55	4.32	14.17
F6	1,250	0.079	0.200	150	173.0	30.0	203.0	0.031	2.55	4.77	15.65
F7	1,250	0.079	0.150	150	5.0	20.0	25.0	0.018	4.39	2.25	7.38
F8	1,250	0.079	0.200	150	99.0	30.0	129.0	0.031	2.55	3.03	9.94
F9	1,250	0.079	0.200	150	56.0	20.0	76.0	0.031	2.55	1.79	5.87

Table 14: Fire Distribution Pressure Calculations

Building	Elevation Head (m)	Residual Pressure of 30 psi (m)	Total Head (m)	Total Head (ft)	Total Pressure (psi)
C&D Processing Facility	10.55	20.21	36.11	118.47	53.6
Materials Recovery Facility	10.55	20.21	36.09	118.41	53.6
Leachate Pre-Treatment	5.65	20.21	37.40	122.7	55.5
Organic Pre-Processing	6.05	20.21	35.73	117.22	53.0
Maintenance Garage	5.65	20.21	31.34	102.82	46.5

APPENDIX D

York Region Facility Flow Data

Data from York Region Material Recovery Facility (MRF):

Design Flow [1] (L/day)	7,500

Notes:

1: Design flow per capita based on Ontario Building Code (OBC): 75 L/person/8 hour shift for Administration Staff and 125 L/person/8 hour shift for Facility Staff.

Actual Water Use:

Date	Water Meter Reading	Period (days)	Water Consumption (m^3)	Water Consumption (L/day)
06-Feb-15	7,290	-	-	-
03-Feb-16	8,182	362	892	2,464
03-Feb-17	9,099	366	917	2,505
			Average =	**2,485**

Based on Data from York Region Material Recovery Facility (MRF):

Actual Water Use [1] (L/day)	2,500
Design Flow (L/day)	7,500
Actual Use/Design Flow Ratio (%)	33%

Notes:

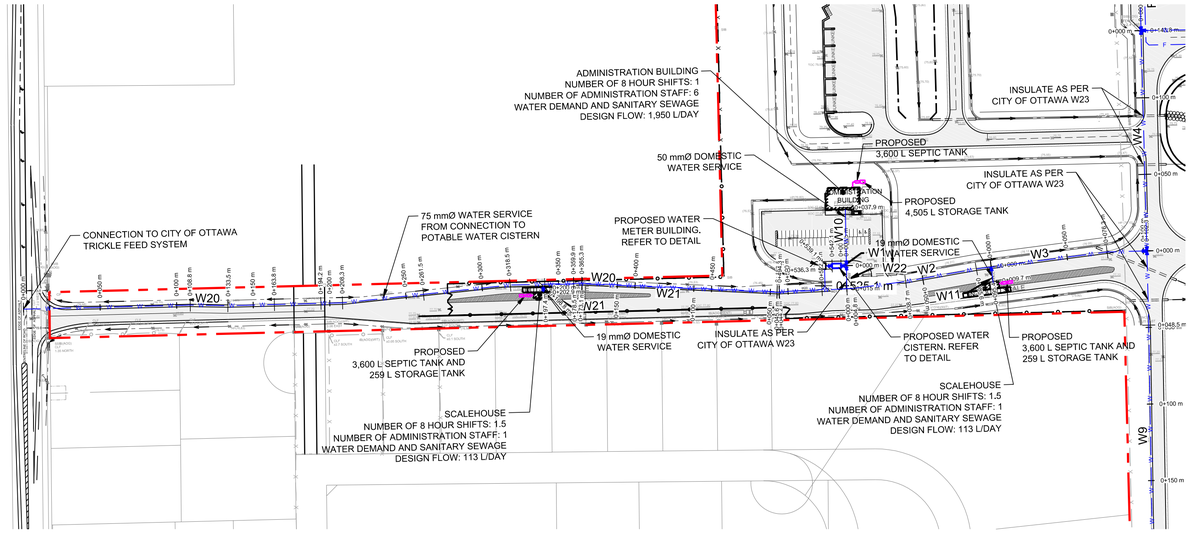
1: Based on average water reading of 2,485 L/day

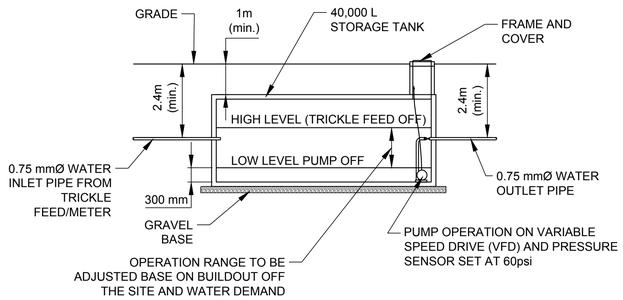
APPENDIX E

Drawings

Overall Site Servicing Plan, SS1

Overall Site Servicing Plan, SS2





SECTION OF CISTERN TANK
SCALE NTS

LEGEND

- PROPERTY BOUNDARY
- EXISTING CONTOUR (0.25 m INTERVAL)
- TERRACING (SLOPE AS INDICATED)
- RIP-RAP 200 mmØ, 300 M THICK (NOMINAL) AS PER OPSD 810.010 TYPE 'B
- DITCH
- 600 mmØ CULVERT OR AS NOTED
- EXISTING CULVERT AS NOTED
- PROPOSED FIREMAIN
- PROPOSED WATERMAIN
- PROPOSED WATERMAIN VALVE
- CATCH BASIN (OPSD 705.010 C/W 600 mm SUMP)
- MAINTENANCE HOLE (OPSD 707.020)
- STORM SEWER LOCATION
- PROPOSED SIAMESE CONNECTION
- PROPOSED FIRE HYDRANT
- PROPOSED DRY HYDRANT

75 mm DIA. HDPE DR17 WATERMAIN FOR W1 TO W5, W20 AND W22 TABLE

WATERMAIN LINE	STATION	PROPOSED ELEVATION	PROPOSED TOP OF WATERMAIN / SERVICE	DESCRIPTION
W1	0+000	77.00	74.60	N/A
	0.003.5	77.00	74.60	TEE CONNECTION AT W10 AND W22
W2	0+000	77.00	74.60	TEE CONNECTION AT W1 AND W10
	0+004.8	77.20	74.80	MINOR BEND
	0+038.7	77.20	74.80	MINOR BEND
	0+050	77.25	74.85	N/A
	0+085.6	77.25	74.85	MINOR BEND
	0+095.4	77.25	74.85	TEE CONNECTION AT W3 AND W11
W3	0+000	77.25	74.85	TEE CONNECTION AT W2 AND W11
	0+050	77.15	74.75	N/A
	0+076.3	77.10	74.70	MINOR BEND
	0+100	76.90	74.50	N/A
	0+102.3	76.90	74.50	TEE CONNECTION AT W4 AND W9
W4	0+000	76.90	74.50	TEE CONNECTION AT W3 AND W9
	0+050	76.70	74.30	N/A
	0+100	76.65	74.25	MINOE BEND
	0+143.8	76.50	74.10	TEE CONNECTION AT W5 AND W12
W5	0+000	76.50	74.10	TEE CONNECTION AT W4 AND W12
	0+050	76.70	74.30	N/A
	0+100	76.70	74.30	N/A
	0+150	76.70	74.30	N/A
	0+199.8	76.70	74.30	TEE CONNECTION AT W6 AND W13
W20	0+000	77.00	74.60	CONNECTION AT BOUNDARY ROAD WM
	0+050	77.55	75.15	N/A
	0+100	77.55	75.15	N/A
	0+108.8	77.55	75.15	MINOR BEND
	0+133.5	77.45	75.05	MINOR BEND
	0+150	77.45	75.05	N/A
	0+163.8	77.45	75.05	MINOR BEND
	0+194.2	77.40	75.00	MINOR BEND
	0+200	77.40	75.00	N/A
	0+208.3	77.40	75.00	MINOR BEND
	0+250	77.20	74.80	N/A
	0+261.5	77.20	74.80	MINOR BEND
	0+300	77.20	74.80	N/A
	0+318.5	77.20	74.80	MINOR BEND
	0+350	77.20	74.80	N/A
	0+359.9	77.20	74.80	MINOR BEND
	0+365.3	77.20	74.80	MINOR BEND
	0+400	77.20	74.80	N/A
	0+450	77.20	74.80	N/A
	0+492.8	77.00	74.60	MINOR BEND
	0+494.3	77.00	74.60	MINOR BEND
	0+500	77.00	74.60	N/A
	0+522.2	76.90	74.50	45 DEG. HORZ. BEND
	0+525.1	76.80	74.40	45 DEG. HORZ. BEND
	0+536.3	77.00	74.60	45 DEG. HORZ. BEND
	0+539.1	77.00	74.60	45 DEG. HORZ. BEND
	0.542.1	77.00	74.60	CONNECTION AT CISTERN
W22	0+000	77.00	74.60	TEE CONNECTION AT W1 AND W10
	0+015	77.00	74.60	TEE CONNECTION AT W2 AND W21

50 mm DIA. HDPE DR17 WATER SERVICE FOR W10, W12 TO W17 TABLE

WATERMAIN LINE	STATION	PROPOSED ELEVATION	PROPOSED TOP OF WATERMAIN / SERVICE	DESCRIPTION
W10	0+000	77.00	74.60	TEE CONNECTION AT W1 AND W22
	0+037.90	77.38	74.98	CONNECTION AT BUILDING
W12	0+000	76.50	74.10	TEE CONNECTION AT W4 AND W5
	0+050	77.00	74.60	N/A
	0+100	77.00	74.60	N/A
	0+125.8	77.00	74.60	45 DEG. HORZ. BEND
	0+128.7	77.00	74.60	45 DEG. HORZ. BEND
	0+150	77.10	74.70	N/A
	0+200	77.15	74.75	N/A
	0+219.7	77.25	74.85	TEE CONNECTION AT W3 AND W11
W13	0+000	76.70	74.30	TEE CONNECTION AT W5 AND W6
	0+050	77.10	74.70	N/A
	0+100	77.10	74.70	N/A
	0+110.5	77.20	74.80	45 DEG. HORZ. BEND
	0+113.3	77.20	74.80	45 DEG. HORZ. BEND
	0+150	77.15	74.75	N/A
	0+200	77.15	74.75	N/A
	0+232.5	77.25	74.85	CONNECTION AT BUILDING
W14	0+000	76.70	74.30	TEE CONNECTION AT W7 AND W15
	0+050	76.80	74.40	N/A
	0+056.5	76.80	74.40	45 DEG. HORZ. BEND
	0+059.4	76.85	74.45	45 DEG. HORZ. BEND
	0+062	76.90	74.50	CONNECTION AT BUILDING
W16	0+000	77.20	74.80	TEE CONNECTION AT W8 AND W17
	0+025.2	77.20	74.80	CONNECTION AT BUILDING
W17	0+000	77.20	74.80	TEE CONNECTION AT W8 AND W16
	0+050	77.15	74.75	N/A
	0+100	77.10	74.70	N/A
	0+150	76.50	74.10	N/A
	0+0155.9	76.50	74.10	45 DEG. HORZ. BEND
	0+185	76.80	74.40	45 DEG. HORZ. BEND
	0+190	76.80	74.40	CONNECTION AT BUILDING

19 mm DIA. HDPE DR 17 WATER SERVICE FOR W9, W11 AND W21 TABLE

WATERMAIN LINE	STATION	PROPOSED ELEVATION	PROPOSED TOP OF WATERMAIN / SERVICE	DESCRIPTION
W11	0+000	77.15	74.75	TEE CONNECTION AT W2 AND W3
	0+009.7	77.25	74.85	45 DEG. HORZ. BEND
W9	0+000	76.90	74.50	45 DEG. HORZ. BEND
	0+048.5	77.10	74.70	MINOR BEND
	0+050	77.10	74.70	N/A
	0+100	76.80	74.40	N/A
	0+150	76.60	74.20	N/A
	0+200	76.50	74.10	N/A
	0+203.2	76.50	74.10	MINOR BEND
	0+204.8	76.50	74.10	MINOR BEND
	0+221.8	76.50	74.10	MINOR BEND
	0+246	76.90	74.50	45 DEG. HORZ. BEND
	0+247.5	76.90	74.50	45 DEG. HORZ. BEND
	0+250	77.00	74.60	MINOR BEND
	0+252.2	77.15	74.75	CONNECTION AT BUILDING
W21	0+000	76.90	74.50	TEE CONNECTION AT W2 AND W22
	0+044.2	76.90	74.50	MINOR BEND
	0+045.6	76.90	74.50	MINOR BEND
	0+050	76.90	74.50	N/A
	0+100	77.20	74.80	N/A
	0+150	77.20	74.80	N/A
	0+173.1	77.20	74.80	MINOR BEND
	0+178.5	77.20	74.80	MINOR BEND
	0+197.4	77.30	74.90	45 DEG. HORZ. BEND
	0+198.8	77.40	75.00	45 DEG. HORZ. BEND
	0+200	77.50	75.10	N/A
	0+202.9	77.50	75.10	CONNECTION AT BUILDING

25 mm DIA. HDPE DR17 WATER SERVICE FOR W15 TABLE

WATERMAIN LINE	STATION	PROPOSED ELEVATION	PROPOSED TOP OF WATERMAIN / SERVICE	DESCRIPTION
W15	0+000	76.70	74.30	TEE CONNECTION AT W7 AND W14
	0+050	76.55	74.15	N/A
	0+100	76.45	74.05	N/A
	0+105.5	76.45	74.05	N/A
	0+123	76.55	74.15	45 DEG. HORZ. BEND
	0+125.9	76.55	74.15	45 DEG. HORZ. BEND
	0+150	76.40	74.00	N/A
	0+200	76.70	74.30	N/A
	0+236.9	76.65	74.25	45 DEG. HORZ. BEND
	0+239.8	76.00	73.60	45 DEG. HORZ. BEND
	0+250	76.90	74.50	N/A
	0+281.5	76.90	74.50	CONNECTION AT BUILDING

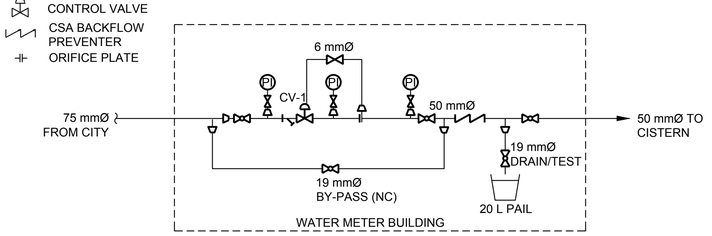
50 mm DIA. HDPE DR17 WATERMAIN FOR W6 TO W8 TABLE

WATERMAIN LINE	STATION	PROPOSED ELEVATION	PROPOSED TOP OF WATERMAIN / SERVICE	DESCRIPTION
W6	0+000	76.70	74.30	TEE CONNECTION AT W5 AND W13
	0+050	76.70	74.30	N/A
	0+100	76.70	74.30	N/A
	0+150	76.70	74.30	N/A
	0+168.5	76.70	74.30	TEE CONNECTION AT W7 AND W8
W7	0+000	76.70	74.30	TEE CONNECTION AT W6 AND W8
	0+050	76.70	74.30	N/A
	0+100	76.70	74.30	N/A
	0+126.4	76.70	74.30	TEE CONNECTION AT W14 AND W15
W8	0+000	76.70	74.30	TEE CONNECTION AT W6 AND W7
	0+050	77.00	74.60	N/A
	0+083.6	76.00	73.60	45 DEG. HORZ. BEND
	0+091.9	76.00	73.60	45 DEG. HORZ. BEND
	0+100	77.40	75.00	N/A
	0+150	77.10	74.70	N/A
	0+170.2	77.10	74.70	TEE CONNECTION AT W16 AND W17

PIPE REFERENCE TABLE FOR F1 TO F7

F1	422.0 m - 300 mm DIA. HDPE DR17 PIPE
F2	118.0 m - 375 mm DIA. HDPE DR17 PIPE
F3	17.0 m - 375 mm DIA. HDPE DR17 PIPE
F4	236.0 m - 375 mm DIA. HDPE DR17 PIPE
F5	164.0 m - 200 mm DIA. HDPE DR17 PIPE
F6	173.0 m - 200 mm DIA. HDPE DR17 PIPE
F7	5.0 m - 150 mm DIA. HDPE DR17 PIPE
F8	99.0 m - 200 mm DIA. HDPE DR17 PIPE
F9	56.0 m - 200 mm DIA. HDPE DR17 PIPE
F10	3.0 m - 150 mm DIA. HDPE DR17 PIPE
F11	3.0 m - 150 mm DIA. HDPE DR17 PIPE
F12	20.0 m - 150 mm DIA. HDPE DR17 PIPE
F13	20.0 m - 150 mm DIA. HDPE DR17 PIPE

LEGEND
- GATE VALVE
- STRAINER
- REDUCER
- BALL VALVE
- CONTROL VALVE
- CSA BACKFLOW PREVENTER
- ORIFICE PLATE



FLOW CONTROL SCHEMATIC
SCALE NTS

WATERMAIN AND FIRE SERVICE

1) CONSTRUCTION SHALL BE IN ACCORDANCE WITH CITY STANDARDS AND SPECIFICATIONS AND ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS WHERE APPLICABLE. ONTARIO PROVINCIAL STANDARDS SHALL APPLY WHERE NO CITY STANDARDS ARE AVAILABLE. ALL DRAWINGS TO BE CHECKED FOR CONFIRMATION WITH APPLICABLE BUILDING CODES. NO ALTERATION OR GRADING OF SITE IS TO OCCUR PRIOR TO APPROVAL BY CITY.

2) THE CONTRACTOR IS RESPONSIBLE FOR ALL REMOVALS NECESSARY TO SATISFY ENGINEERING AND LANDSCAPE WORKS. CONTRACTOR TO OBTAIN PERMIT FOR CONNECTING TO SEWERS AND CONNECTION TO WATERMAIN. CONTRACTOR TO VISIT SITE PRIOR TO TENDERING AND CONFIRM SITE CONDITIONS. CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL PERMITS REQUIRED AND BEAR COST OF SAME.

3) LOCATION OF SERVICES ARE NOT ALL SHOWN. LOCATION OF UTILITIES AND UNDERGROUND WORKS THAT ARE SHOWN ARE APPROXIMATE. CONTRACTOR TO VERIFY LOCATION AND ELEVATION OF ALL SERVICES, UTILITIES AND UNDERGROUND STRUCTURES PRIOR TO ANY CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE FOR PROTECTION AND REINSTATEMENT.

4) THE CONTRACTOR SHALL CONSTRUCT WATERMAINS, FIREMAINS WATER SERVICES, CONNECTION, AND APPURTENANCES AS PER THE CITY SPECIFICATIONS AND SHALL COORDINATE AND PAY ALL RELATED COSTS INCLUDING THE COST OF CONNECTION, INSPECTION, DISINFECTION AND WATER METER SUPPLY AND INSTALLATION BY CITY PERSONNEL. WATERMAINS SHALL BE INSTALLED AS PER W17, W25, W25.3, W25.4, W25.5 AND W25.6. HYDRANTS TO BE INSTALLED AS PER W18, W19 AND W20. SERVICE CONNECTION SHALL BE INSTALLED A MINIMUM 2400 mm FROM ANY CATCH BASIN, MANHOLE OR OBJECT THAT MAY CONTRIBUTE TO FREEZING. THERMAL INSULATION SHALL ONLY BE INSTALLED WHERE SHOWN ON THE DRAWING OR OTHERWISE APPROVED BY THE CITY AS PER THE CITY SPECIFICATIONS W21, W22 AND W23. (WATER METER AND APPURTENANCES AS PER W-30, 31 AND 32)

5) ALL DISTURBED AREAS TO BE REINSTATED TO EQUAL OR BETTER CONDITION. PAVEMENT REINSTATEMENT FOR UTILITY CUTS SHALL BE IN ACCORDANCE WITH R10. ALL NEW WORK SHALL BLEND INTO EXISTING (TO BE APPROVED BY CONSULTANT).

6) ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE STATED. DRAWINGS SHOULD NOT BE SCALED BY THE CONTRACTOR. ANY MISSING OR QUESTIONABLE DIMENSIONS ARE TO BE CONFIRMED WITH THE CONSULTANT IN WRITING.

7) SITE WORKS CONTRACTOR IS RESPONSIBLE FOR ALL WORKS, UTILITY AND SERVICE CONNECTIONS TO THE BUILDING. CONNECTIONS TO BE COORDINATED WITH BUILDING CONTRACTOR.

8) THE CONTRACTOR SHOULD ENSURE THAT THESE DRAWINGS ARE SUPPLEMENTED FOR ARCHITECTURAL, AND STRUCTURAL HEATING/AIR CONDITIONING, AND ELECTRICAL, REQUIREMENTS TO SUIT MUNICIPAL, AND PROVINCIAL REQUIREMENTS.

9) SIDE SLOPE OF EXCAVATIONS SHOULD BE SLOPED IN ACCORDANCE WITH THE REQUIREMENTS OF ONT. REG. 213/91 UNDER THE OCCUPATIONAL HEALTH AND SAFETY ACT. REFER TO GEOTECHNICAL REPORT FOR CONSTRUCTION DETAILS.

0 100 200
1:2,000 METRES

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
2	2018-12-14	REVISED FOR SITE PLAN APPROVAL	MHK	MLF	DVK	DVK
1	2018-06-15	ISSUED FOR SITE PLAN APPROVAL	MHK	MLF	DVK	DVK

SEAL

LICENSED PROFESSIONAL ENGINEER
M. H. H. KNOWLES
100113790
2018/12/14
PROVINCE OF ONTARIO

CLIENT
TAGGART MILLER ENVIRONMENTAL SERVICES

CONSULTANT
GOLDER
GOLDER ASSOCIATES LTD.
1931 ROBERSON ROAD
OTTAWA, ONTARIO
CANADA
[+1] (613) 592 9600
www.golder.com

PROJECT
CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE
OVERALL SITE SERVICING PLAN

PROJECT NO.	CONTROL	REV.	of	DRAWING
1787048	0007	2		SS1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI D
0 25 mm

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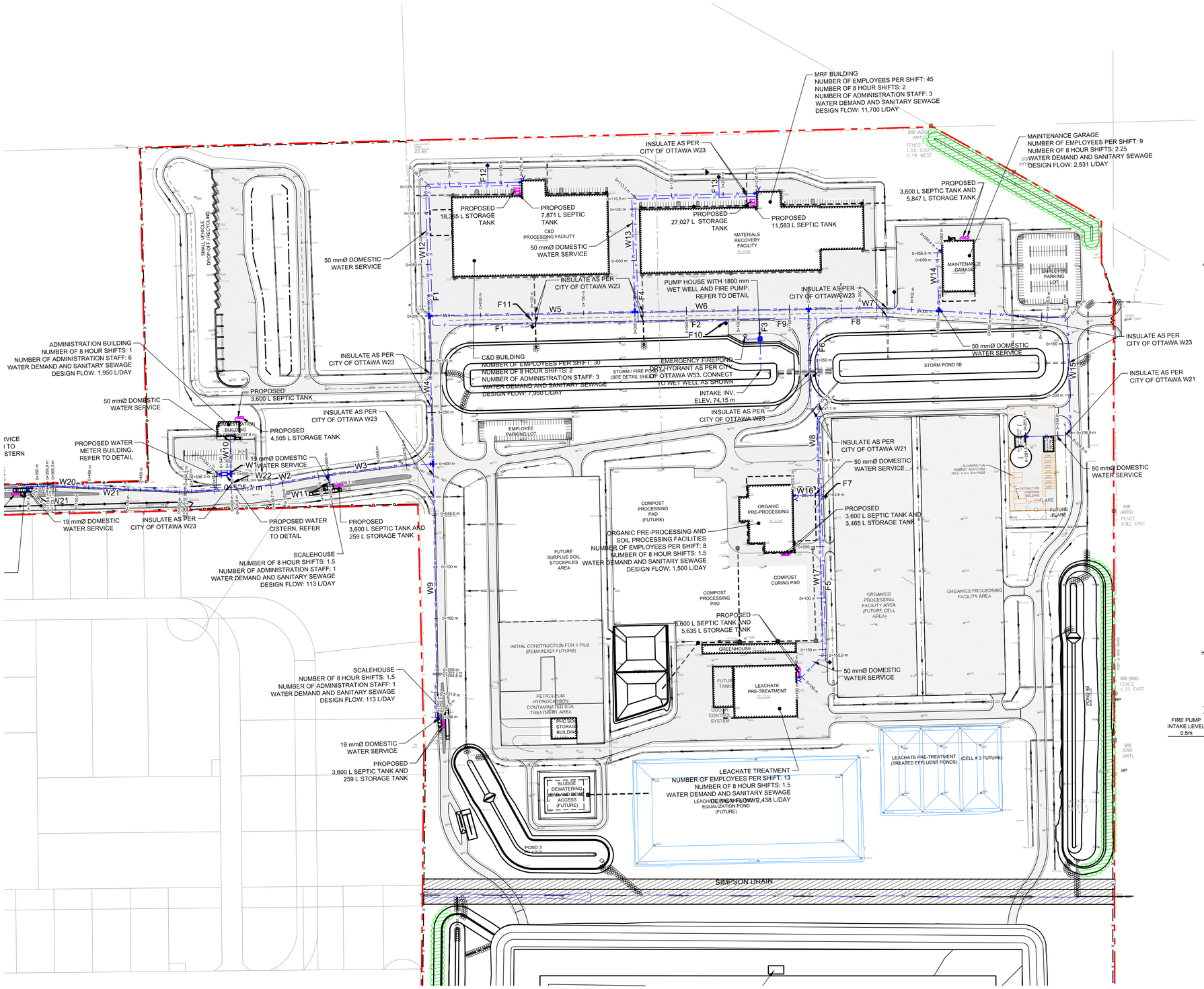

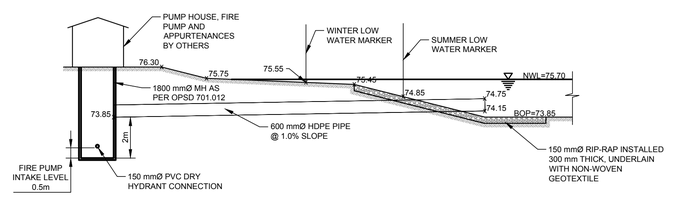

FIRE INTAKE AND WET WELL DETAIL

SCALE NTS

LEGEND

- PROPERTY BOUNDARY
- EXISTING CONTOUR (0.25 m INTERVAL)
- TERRACING (SLOPE AS INDICATED)
- RIP-RAP 200 mmØ, 300 M THICK (NOMINAL) AS PER OPSD 810.010 TYPE 'B
- DITCH
- 600 mmØ CULVERT OR AS NOTED
- EXISTING CULVERT AS NOTED
- PROPOSED FIREMAIN
- PROPOSED WATERMAIN
- PROPOSED WATERMAIN VALVE
- CATCH BASIN (OPSD 705.010 C/W 600 mm SUMP)
- MAINTENANCE HOLE (OPSD 707.020)
- STORM SEWER LOCATION
- PROPOSED SIAMESE CONNECTION
- PROPOSED FIRE HYDRANT
- PROPOSED DRY HYDRANT

0 100 200

1:2,000 METRES

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
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PROJECT
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TITLE
OVERALL SITE SERVICING PLAN

PROJECT NO.	CONTROL	REV.	of	DRAWING
1787048	0007	2		SS2

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D

0 25 mm

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