River Mill Subdivision – River Mill West (Phase 4)

Preliminary
Functional Servicing Report

Project Location:
East of Speedsville Road
South of Maple Grove Road
City of Cambridge

Prepared for:
River Mill Development Corporation
2000 Garth Street, Suite 201
Hamilton, ON L9B 0C1

Prepared by:
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October 9, 2020

MTE File No.: 45244-104

Engineers, Scientists, Surveyors.

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1.0 Introduction

MTE Consultants Inc. (MTE) was retained by River Mill Development Corporation to complete a Functional Servicing Report (FSR) in support of a Plan of Subdivision Application for the proposed River Mill West – Phase 4 in the City of Cambridge. The proposed development site is referred to herein as the 'Subject Lands'. The Subject Lands comprise a total area of approximately 45.4ha and are bounded by Maple Grove Road to the North, Speedsville Road to the West, Equestrian Way to the South and Briardean Road to the East. Further east of Briardean Road is an existing residential development. The location of the proposed development is presented in **Figure 1.1**.

The Subject Lands are proposed to be developed as a mixed residential community. The Draft Plan of Subdivision has been prepared by T. Johns Consulting Group (dated September 23, 2020) and forms the basis for the proposed servicing concepts presented in this report. The Draft Plan comprises of single detached residential blocks, medium and high density multiple residential and mixed-use blocks, stormwater management facility block, park block, open space block, and municipal right-of-ways. The Draft Plan of Subdivision is included in **Appendix A**.

The purpose of this report is to prepare a servicing strategy for the subdivision utilizing full municipal services, including sanitary sewage collection, domestic water, storm drainage and utilities. This report should be read in conjunction with the *Preliminary Stormwater Management Report – River Mill Subdivision (October 16, 2020)* prepared by MTE.

2.0 Existing Conditions

The Subject Lands are generally bounded by Maple Grove Road to the North, Speedsville Road to the West, Equestrian Way to the South and Briardean Road to the East. There are a few rural residential properties on the east side of Briardean Road.

The Subject Lands were formerly licensed as an Extraction Pit under the Aggregate Resources Act (License #: 46162) but have since closed these operations. In addition, south of Equestrian Way, there was another Extraction Pit (License #: 5537 under the Aggregate Resources Act) which has also since been surrendered.

An existing municipal right-of-way (Briardean Road) follows the Eastern boundary of the Subject Lands from Maple Grove Road and extends west to Speedsville Road near the southern limit of the Subject Lands, and provides local access to the existing rural residential properties along Briardean Road. The portion of this right-of-way that is oriented East-West has been physically closed and Briardean Road is now terminated in a cul-de-sac near the south-eastern corner of the Subject Lands.

2.1 Topographical Information

MTE conducted a detailed topographical survey of the Subject Lands in 2019. Existing conditions topography is shown on the attached MTE drawing **45244-104-EC1.1**.

The Subject Lands are located within the Hespeler West Subwatershed. In the north east corner, the Subject Lands are traversed by Middle Creek along with wetlands and forested areas. Wetlands also exist in the south west portion of the Subject Lands.

Overall the Subject Lands slope from southwest to northeast, with the highest elevations of approximately 313 m being found in the south west corner, down to the lowest elevation of

approximately 303m along Middle Creek, with elevation difference of about 10m. The central portion is relatively flat, where the elevations range from 309m to approximately 311m. The southern side of the site generally slopes towards the two wetlands, from approximately 312m to 306m, with elevation difference of about 6m. On the north east corner near Middle Creek, the site slopes towards the creek with an elevation difference of about 7m (310m to 303m).

A floodplain is delineated along Middle Creek and some of the Subject Lands are within the Grand River Conservation Authority's Regulated Limit. The Subject Lands are not located within a vulnerable Source Water Protection Area.

The Subject Lands show the effects of some preliminary grading being completed, including topsoil stockpiles and temporary sediment basins.

The area surrounding Middle Creek as well as the two wetland features near the south end of the site are woodlots.

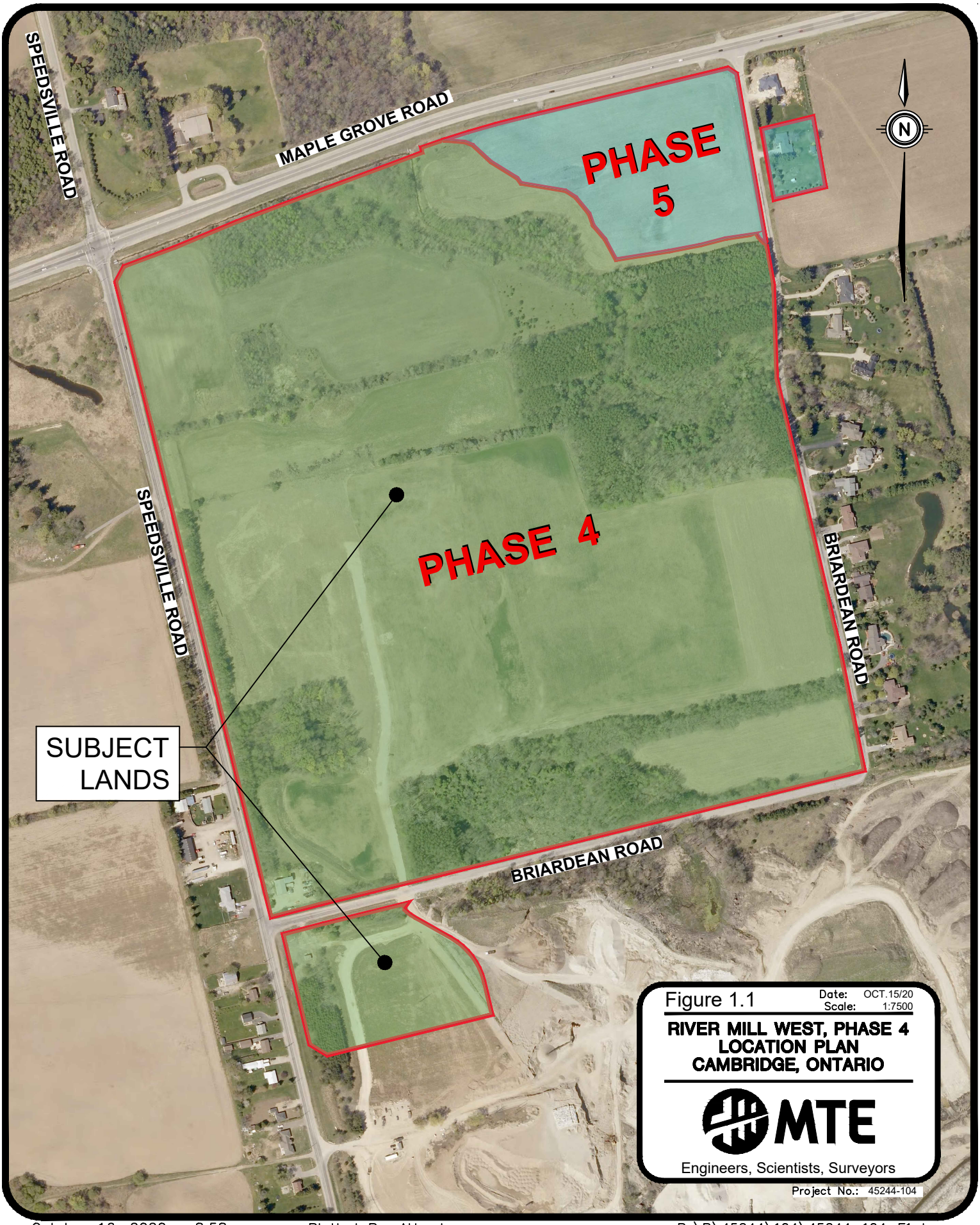

Figure 1.1

Date: OCT.15/20
Scale: 1:7500

RIVER MILL WEST, PHASE 4
LOCATION PLAN
CAMBRIDGE, ONTARIO

MTE
Engineers, Scientists, Surveyors

Project No.: 45244-104

October 16, 2020 — 8:58 a.m. — Plotted By: AHenderson

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2.2 Existing Soils Information

The northern portion of the Subject Lands is historically vacant and used for agriculture, where the southern portion is a reclaimed above-water table sand pit with multiple storage buildings.

A total of 24 boreholes were drilled on site by LVM and Lantek Limited, and an additional six (6) boreholes were drilled by MTE. All of the MTE borehole locations have been constructed as monitoring wells in order to evaluate groundwater elevations. According to LVM's Preliminary Geotechnical Investigation (refer to MTE's Preliminary Stormwater Management Report – Appendix E), the native mineral soils encountered within the site are suitable to support house foundations and buried municipal services.

According to the test pits dug during the LVM investigation, the site has been graded with surficial fill which can be found to depths up to 3.7m deep. The fill is categorized as non-organic sand and silt, with some fractional gravel and cobbles found. Below the fill there are sand deposits which spans the majority of the site. The LVM report states that the sand was typically moist with some varied concentrations of silt and gravel. Buried organic materials were discovered in some test pits, which were laboratory tested to show very high moisture contents (between 10-165%).

Based on the drilling program conducted by MTE, shallow soils at the Subject Lands consist of a thin layer of topsoil across the northern portion ranging in thickness from 0.2 to 0.8m underlain by native sand and silty sand material to the maximum depth investigated of 6.7mbgs. A thin sandy gravel/gravelly sand layer was observed at borehole locations MW101-19 and MW102-19 at depths ranging between 2.3 to 4.9m and thicknesses ranging between 1.2 to 1.4m. A layer of fill material was encountered at surface in the south portion of the Subject Lands with an approximate thickness of 1.0 to 3.0m.

2.3 Groundwater Conditions

MTE completed seven rounds of manual groundwater level measurements for selected monitoring wells between October 25, 2019 and July 20, 2020.

Groundwater levels at the Subject Lands are subject to seasonal fluctuations, with seasonal highs expected in the early spring during snow melt. Continuous monitoring of groundwater elevation data will allow for the assessment of seasonal fluctuations of the water table and provide additional information on the short-term responses to precipitation events.

Groundwater flow patterns during December 2019 indicate that a central groundwater divide is present on the Subject Lands, with flow in a northeasterly direction towards Middle Creek and in a southerly direction towards the Speed River. The regional groundwater flow is in a southeasterly direction towards the Speed River.

For more information on groundwater conditions within the Subject Lands, refer to MTE's *Hydrogeological Characterization (October 16, 2020).*

3.0 Proposed Development

The Draft Plan of Subdivision for this residential development comprises the following:

- Low-density (single family) and multiple residential dwellings;
- Neighbourhood park and open space network;
- Mixed use blocks;
- Municipal right-of-ways with widths of 18.5m or 20m; and
- Stormwater management facility.

3.1 Municipal Right-of-Ways

As shown on the Draft Plan, the proposed development is serviced by local roads. These roadways will be constructed to a full urban cross-section including asphalt pavement, concrete curb and gutters, concrete sidewalks, roadway illumination and boulevard landscaping all in accordance with the City of Cambridge Engineering and Development Standards. Local roads within River Mill West – Phase 4 will consist of either 18.5m or 20m right-of-way widths as shown in **Table 3.1**.

Table 3.1 – Road Classifications

Road	Classification	Right-of-way width
Streets A, B, E	Local	20m
Streets B, C, D	Local	18.5m

A preliminary geotechnical investigation for the proposed development has been completed by LVM Inc. (a division of Englobe) dated October 30, 2012. The proposed pavement structure outlined in this report is summarized in **Table 3.2** below.

Table 3.2 – Proposed Pavement Structure

Pavement Structure	Local Roads (mm)	Collector Roads (mm)
Asphaltic Concrete	90	100
Granular 'A' Base	150	150
Granular 'B' Sub-base	400	450

3.2 Wetland & Vegetation Buffers

Natural feature boundaries (both woodland dripline and wetland) were delineated by NRSI in 2019, and confirmed by the GRCA, City of Cambridge, and Region of Waterloo staff during site visits on August 19 and September 23, 2019. Natural feature buffers and setbacks were recommended in the Environmental Impact Study (NRSI, 2020) and have been identified on the current Draft Plan of Subdivision.

There are minor grading encroachments within buffer areas, however they are limited to the outer edge of these areas. Encroachments are located at:

- Rear yards of Block 18;
- West side of Street A;
- East side of Street E, adjacent to wildlife linkage and Wetland 3; and
- West side of Street E, adjacent to wildlife linkage and Wetland 2.

A wildlife linkage will be required to connect Wetland 2 and Wetland 3. Construction of the eco-passage for this linkage will require infrastructure to be introduced within these wetland boundaries. It is proposed that a 26m long, 2.4x1.8m rectangular culvert be installed underneath Street E in order to provide adequate habitat linkage.

Refer to **Figure 3.1** for the conceptual culvert crossing design.

4.0 Proposed Grading

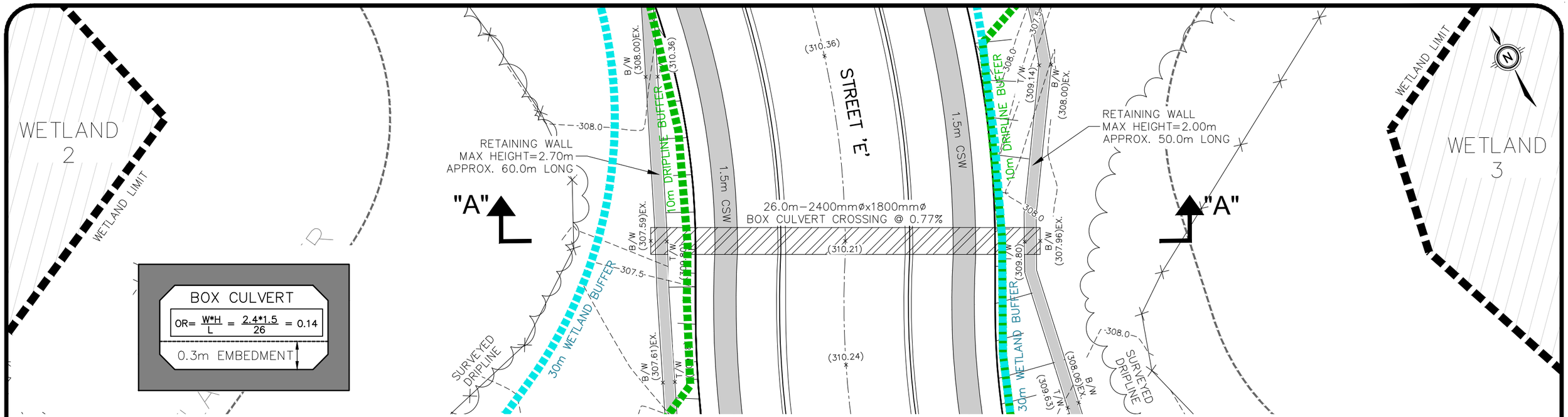
4.1 Considerations

While developing the preliminary grading design of River Mill West – Phase 4, the following is a list of considerations which influenced and/or governed the conceptual design:

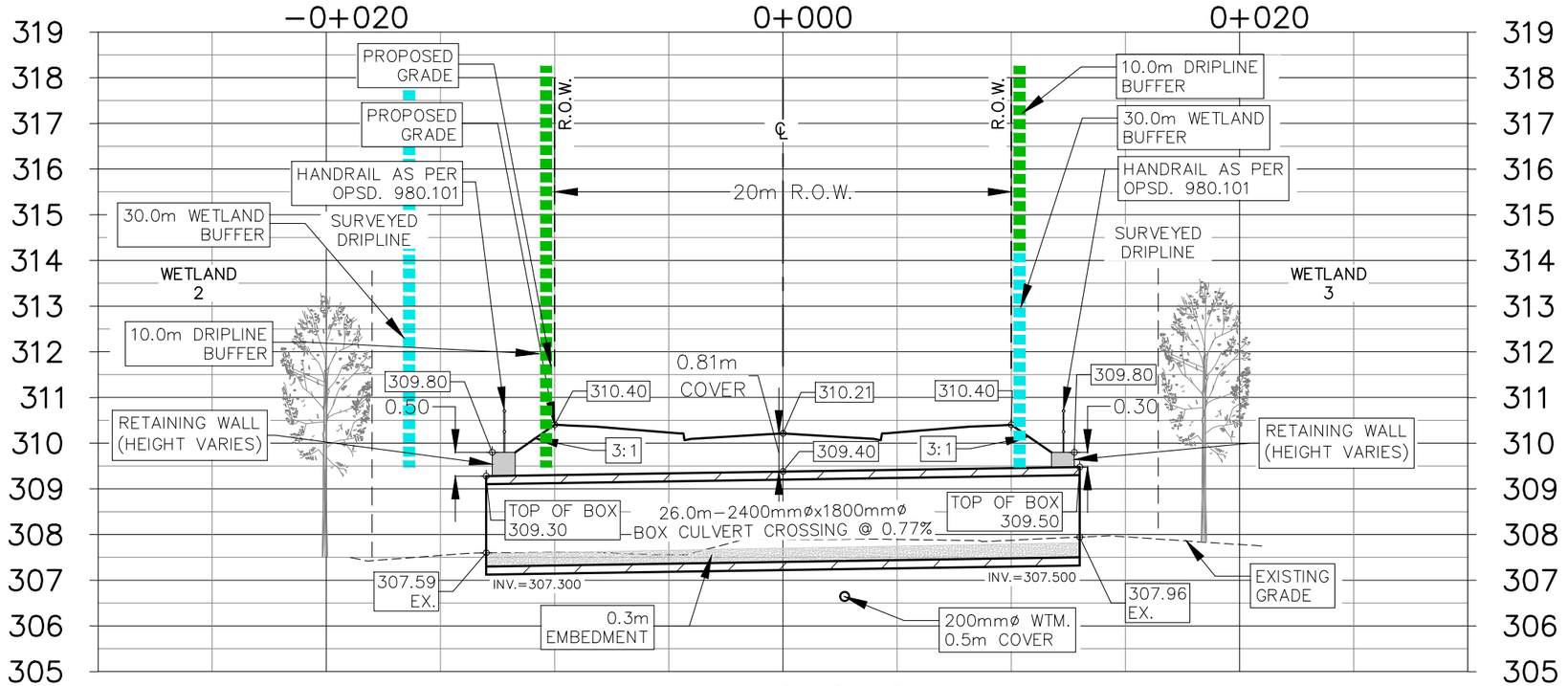
- Maintain 0.75m separation from high groundwater level to underside of footings;
- Minimize the amount of imported fill needed;
- Match centerline elevations of existing road grades;
- Ensure compatibility with the existing adjacent residential developments;
- Match existing and proposed boundary grades around the perimeter of the subdivision lands while respecting existing natural features (established buffers);
- Ensure major storm event overland flows are directed towards the existing road right-of-way where applicable, or towards the proposed stormwater management facility;
- Comply with municipal standards for minimum and maximum road grades; and
- Ensure adequate cover is provided over municipal services.

4.2 Grading

Utilizing the proposed road layout, preliminary slopes for centerline of road ranging from 0.5% (minimum) to 6.0% (maximum) were used to complete the preliminary lot grading design. In addition, the considerations listed above were incorporated into the overall preliminary grading design. Preliminary lot grades range from 2.5% (minimum) to 5.0% (maximum) with a combination of traditional back to front drainage, split drainage, and walk-out type lots. The Preliminary Area Grading Plan have been shown on the enclosed MTE **Drawings 45244-104-AG1.1** and **45244-104-AG1.2**. The groundwater surface was modeled based on MTE's *Hydrogeological Characterization (October 16, 2020)*. The preliminary underside of footing elevations were designed to maintain a minimum vertical separation of 0.75m above seasonal high groundwater elevations, therefore finished grade surface was designed to maintain vertical separation of 3.1m above high groundwater elevations. This comparison is illustrated on MTE **Drawing 45244-104-MS11.1**. In addition, it is estimated that the majority of the services will be situated above the existing groundwater level and given the required cover for pipes as per the City of Cambridge Development Manual (2017).



PLAN VIEW



SECTION A-A

FIGURE 3.1 **H-1:250 V-1:125**

CULVERT CROSSING

RIVER MILL WEST, PHASE 4
CAMBRIDGE, ON

MTE
Engineers, Scientists, Surveyors

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November 18, 2020 — 2:24 p.m. — Plotted By: anechita

5.0 Municipal Servicing

5.1 Sanitary Servicing

Sanitary service drainage areas are delineated on **Figure 5.1**. River Mill West – Phase 4 is intended to be serviced by the existing 300mm diameter sanitary sewer located along Equestrian Way. There are two existing sanitary connections of the Equestrian Way provided for the Subject Lands. The connection to the existing 200mm diameter sanitary sewer at the intersection of Equestrian Way and proposed Street E is intended to service Block 20 (high density mixed use) and Block 21 (mixed use). The connection to the existing 200mm diameter sanitary sewer at the intersection of proposed Street A and Equestrian Way is intended to service the remainder of the Subject Lands, however the size of this connection will need to be upgraded. The existing 200mm lateral and the existing 38.5m – 200mm diameter sanitary main pipe east of the proposed connection will need to be upgraded to a 300mm diameter sanitary pipe to ensure adequate capacity. The conceptual sanitary servicing design is presented on **Figure 5.2.** The figure illustrates a schematic of the sanitary sewer including proposed finished road grades and depth of sewers at key points in the sewer network. The depth of the sewer ranges from approximately 2.4m to approximately 7.0m deep, with the deepest point located on Street A and Street D intersection, which is close to a localized high point. In this area, where the proposed sanitary sewer is deeper than 5m a dual sewer system (local and deep) have been illustrated. Preliminary Sanitary Sewer Design Sheet has been prepared with pipe diameters and slopes for the preliminary proposed conditions. Refer to **Appendix B** for the Preliminary Sanitary Design sheets. The investigation revealed that with the aforementioned upgrades, there is sufficient cover and capacity in the existing sewer to service the proposed development.

5.2 Water Distribution

The Subject Lands are located at the east border of City of Cambridge Pressure Zone 2W, bordering with Pressure Zone 2E. The current pressure Zone 2W / 2E boundary is generally along Briardean Road which is the eastern boundary of the Subject Lands. The pressure zone boundary is governed by a Regional Pressure Reducing Valve (PRV) located on Maple Grove Road east of Briardean Road. The current average operating hydraulic grade line for Zone 2W and Zone 2E distribution system is approximately 364.3m and 356.1m, respectively. Water supply for the Subject Lands will be provided by Zone 2W.

Water supply for River Mill West – Phase 4 will be provided by four connection points to the existing municipal water distribution system as follows:

- 300mm diameter into existing 450mm diameter watermain on Speedsville Road at proposed Street B;
- 300mm diameter into existing 450mm diameter watermain on Speedsville Road at proposed Street A;
- 200mm diameter into existing 200mm diameter watermain on Equestrian Way at proposed Street E; and
- 300mm diameter into existing 200mm diameter watermain on Equestrian Way at proposed Street A.

The water distribution system and analysis for the proposed development is presented in the *Preliminary Water Distribution Analysis (October 16, 2020)* prepared by MTE (see **Appendix C** for the complete report). The analysis was used to determine preliminary pipe sizes for the

proposed internal water distribution network which is looped following the proposed right-of-ways as shown on **Figure 5.3**.

Based on the preliminary analysis the following conclusions can be made:

- Connections to the existing 450mm diameter watermain on Speedsville Road and to the existing 200mm diameter watermain on Equestrian Way will adequately service the proposed development;
- The proposed water distribution network will provide the required daily water demands within the respective pressure guidelines for most junctions where the centreline of road is above an elevation of 308.3m;
- Some units near the south end of Block 26, where the centreline of road elevation is below 308.3m, may require the installation of individual pressure reducing valves in order to reduce the incoming water pressure to below the *DGSSMS* recommended maximum value of 550kPa under the Average and Maximum Day demand scenarios. However, this will be confirmed as part of the Site Plan Approval process; and
- Under the proposed development conditions, the recommended *Fire Underwriter Survey (FUS)* fire flows are satisfied at the minimum Ministry of the Environment, Conservation, and Parks pressure requirement of 140kPa (20psi).

LEGEND:

- PHASE 4 BOUNDARY
- PHASE 5 BOUNDARY
- SANITARY DRAINAGE AREA
- SANITARY SEWER
- EXISTING SANITARY SEWER
- DUAL SANITARY SEWER
- SANITARY FLOW DIRECTION

EXISTING RESIDENTIAL

BRIARDEAN ROAD

EX. POINTER ROAD

MAPLE GROVE ROAD

PHASE 5

EX. 300mmø SAN.

300mmø SAN.

REMOVE AND REPLACE EXISTING 38.5m–200⌀mm SANITARY SEWER WITH 38.5m–300⌀mm @ 4.24%
W.INV.=299.36
E.INV.=297.73

CONNECT INTO EXISTING MH
S.INV.=299.52

300mmø SAN.

STREET A

300mmø SAN.

300mmø SAN.

200mmø SAN.

STREET B

200mmø SAN.

200mmø SAN.

200mmø SAN.

200mmø SAN.

STREET E

200mmø SAN.

EX. 200mmø SAN.

EQUESTRIAN WAY

PHASE 3 (MIXED USE)

PHASE 6 (INDUSTRIAL)

FUTURE RESIDENTIAL

CONNECT INTO EXISTING 200mm⌀ SANITARY PLUG
S.INV.=307.950

PHASE 4

SWM FACILITY

SPEEDSVILLE ROAD

R.O.W. WIDENING

FIGURE 5.1 1:4000

SANITARY DRAINAGE AREA PLAN

RIVER MILL WEST, PHASE 4
CAMBRIDGE, ON

MTE
Engineers, Scientists, Surveyors

October 16, 2020 — 11:19 a.m. — Plotted By: AHenderson

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LEGEND:

- PHASE 4 BOUNDARY
- PHASE 5 BOUNDARY
- SANITARY DRAINAGE AREA
- SANITARY SEWER
- EXISTING SANITARY SEWER
- DUAL SANITARY SEWER
- F/G=309.03 / SAN OBV.=304.8± / DEPTH=4.00m± — C/L ROAD GRADE; LOCAL SANITARY OBVERT; SANITARY COVER
- AREA TO PUMPING STATION

EXISTING RESIDENTIAL

EXISTING RESIDENTIAL

EXISTING RESIDENTIAL

MAPLE GROVE ROAD

PHASE 5

PHASE 4

PHASE 3 (MIXED USE)

PHASE 6 (INDUSTRIAL)

FUTURE RESIDENTIAL

SWM FACILITY

SPEEDSVILLE ROAD

STREET A

STREET B

STREET E

F/G=310.79
OBV.=308.39±
DEPTH=2.40m±

F/G=305.83
OBV.=302.30±
DEPTH=3.53m±

EX. 300mmø SAN.

F/G=302.65
OBV.=300.08±
DEPTH=2.57m±

REMOVE AND REPLACE EXISTING
38.5m–200⌀mm SANITARY SEWER
WITH 38.5m–300⌀mm @ 4.24%
W.INV.=299.36
E.INV.=297.73

CONNECT INTO
EXISTING MH
S.INV.=299.52

300mmø SAN.

300mmø SAN.

300mmø SAN.

300mmø SAN.

F/G=310.02
OBV.=304.18±
DEPTH=5.84m±

F/G=310.20
OBV.=305.57±
DEPTH=4.63m±

F/G=310.64
OBV.=303.50±
DEPTH=7.14m±

F/G=311.01
OBV.=308.19±
DEPTH=2.82m±

F/G=312.30
OBV.=309.89±
DEPTH=2.41m±

200mmø SAN.

200mmø SAN.

200mmø SAN.

200mmø SAN.

200mmø SAN.

EX. 200mmø SAN.

F/G=309.63
OBV.=306.86±
DEPTH=2.77m±

F/G=310.43
OBV.=308.03±
DEPTH=2.40m±

F/G=309.46
OBV.=308.17±
DEPTH=2.40m±

EX/G=311.77
EX. OBV.=308.01
DEPTH=3.76m±

CONNECT INTO
EXISTING 200mm⌀
SANITARY PLUG
S.INV.=307.950

F/G=310.07
OBV.=307.67±
DEPTH=2.40m±

F/G=310.99
OBV.=308.08±
DEPTH=2.91m±

F/G=310.59
OBV.=307.15±
DEPTH=3.44m±

FIGURE 5.2 1:4000

SANITARY SERVICING PLAN

RIVER MILL WEST, PHASE 4
CAMBRIDGE, ON

MTE
Engineers, Scientists, Surveyors

October 16, 2020 — 11:17 a.m. — Plotted By: AHenderson

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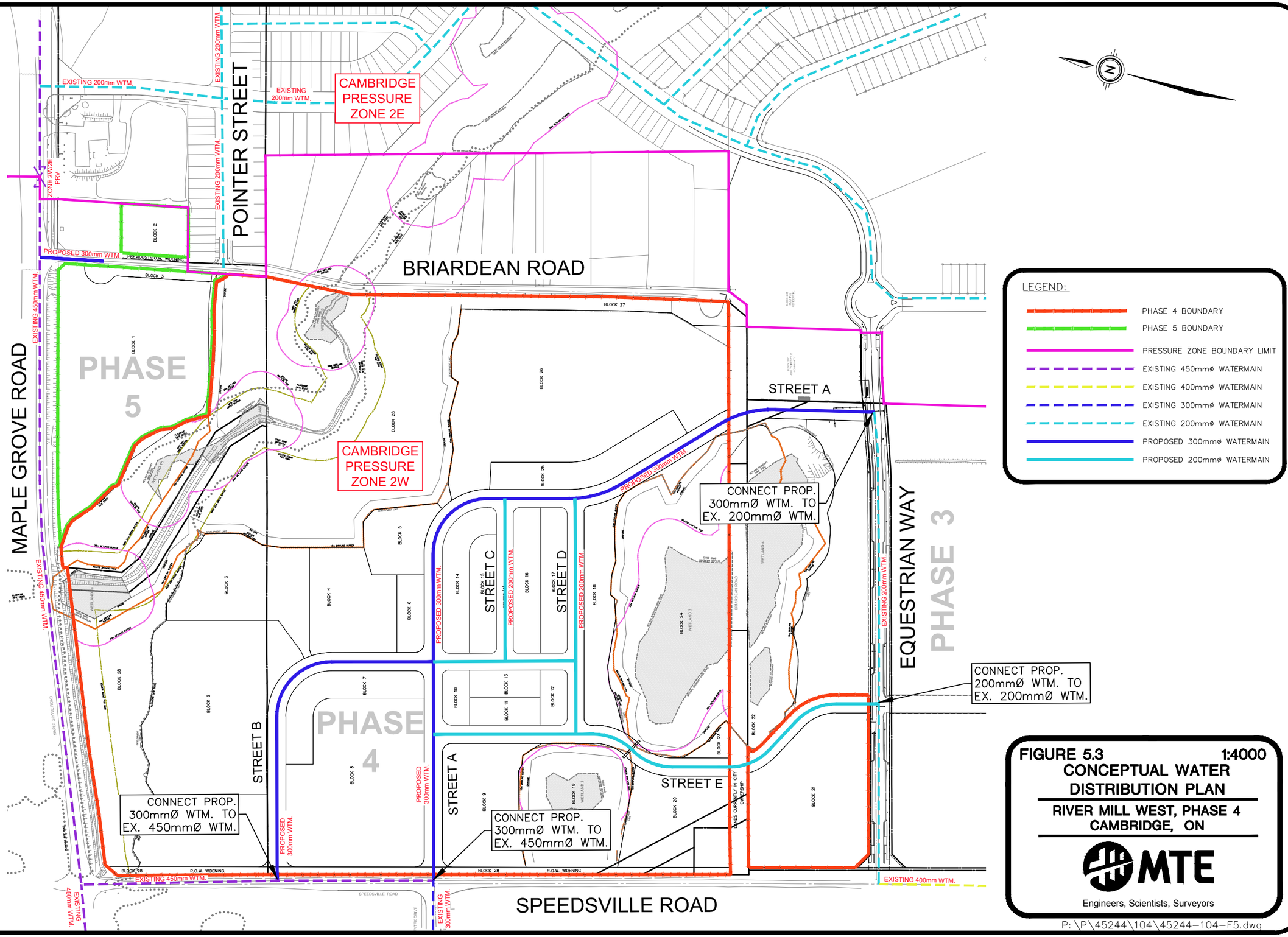

FIGURE 5.3 1:4000

CONCEPTUAL WATER DISTRIBUTION PLAN

RIVER MILL WEST, PHASE 4
CAMBRIDGE, ON

MTE
Engineers, Scientists, Surveyors

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October 16, 2020 — 11:21 a.m. — Plotted By: AHenderson

5.3 Storm Drainage

Storm service drainage areas are delineated on **Figure 5.4**. River Mill West – Phase 4 is proposed to be drained to Stormwater Management Facility 1 (SWMF1) located in Block 3 (northeast corner, south of creek) and the existing SWMF (south of Equestrian Way). SWMF1 receives flows from an 18.07ha drainage area, which is defined by sub-catchment area 202. Sub-catchment 202 is subdivided and split by a drainage divide, which directs flows to two separate SWMF inlets. As shown in **Figure 5.4**, the drainage from the western portion of area 202 will enter SWMF1 through a 1200mm diameter pipe at inlet 1, with overland flows conveyed by Street B. The drainage from the southeastern portion of area 202 will enter SWMF1 through a 900mm diameter pipe at inlet 2, with overland flows conveyed by the designed small channel through the park block and Block 4 of Phase 4. Stormwater Management Facility 1 will outlet to Middle Creek, which ultimately outlets to the Speed River and then to the Grand River.

Post-catchment areas 203 and 205 are proposed to be drained to the existing Hunt Club Valley South SWMF south of Equestrian Way. There are two existing storm connections of the Equestrian Way provided for the Subject Lands.

Catchment Area 203, included Blocks 20 and 21 with the total area of 3.58ha. The westerly connection, an existing 600mm storm stub, will service Block 21. Block 20 will be serviced with the proposed 525mm storm sewer that will outlet via Ward Avenue to the existing SWMF.

The easterly connection, an existing 525mm stub will service the Catchment Area 205 with the total area of 3.74ha.

To accommodate the proposed flows, the existing 600mm diameter storm sewer, on Equestrian Way just east of the intersection with Street A, will need to be replaced with a 750mm diameter storm sewer pipe at a slightly steeper slope. Refer to **Figure 5.5** for the conceptual storm servicing plan, and **Appendix D** for detailed storm sewer capacity and flow calculations.

A localized low point is proposed on Street E, at the location of the eco-passage culvert. This low point will decrease the height of the retaining walls needed along the right-of-way in order to minimize grading encroachments into the buffer. The storm drainage from this catchment (Subcatchment 206) will be captured and directed to a 1200mm diameter Stormceptor EFO4, which will provide quality control prior to discharging to Wetland 2.

TO THE EXISTING SWM FACILITY

EXISTING RESIDENTIAL

BRIARDEAN ROAD

MAPLE GROVE ROAD

PHASE 5

PHASE 4

PHASE 3 (MIXED USE)

PHASE 6 (INDUSTRIAL)

EQUESTRIAN WAY

STREET A

STREET B

STREET E

SPEEDSVILLE ROAD

SWM FACILITY #2

205 / 3.74

202 / 18.07

204 / 1.70

206 / 0.30

203 / 3.58

0.3ha DRAINAGE AREA TO WETLAND 2

STORMCEPTOR EF04

LEGEND:

- PHASE 4 BOUNDARY
- PHASE 5 BOUNDARY
- STORM DRAINAGE AREA
- 205 / 3.74 — CATCHMENT NUMBER / CATCHMENT AREA (HA)
- DRAINAGE DIRECTION
- AREA TO SWM FACILITY 1 INLET 1
- AREA TO SWM FACILITY 1 INLET 2
- AREA TO EXISTING SWM FACILITY
- ADDITIONAL AREA TO EXISTING SWM FACILITY
- 2 — SWM FACILITY #2 INLET 2

FIGURE 5.4 1:3000

STORM DRAINAGE AREA PLAN

RIVER MILL WEST, PHASE 4
CAMBRIDGE, ON

MTE
Engineers, Scientists, Surveyors

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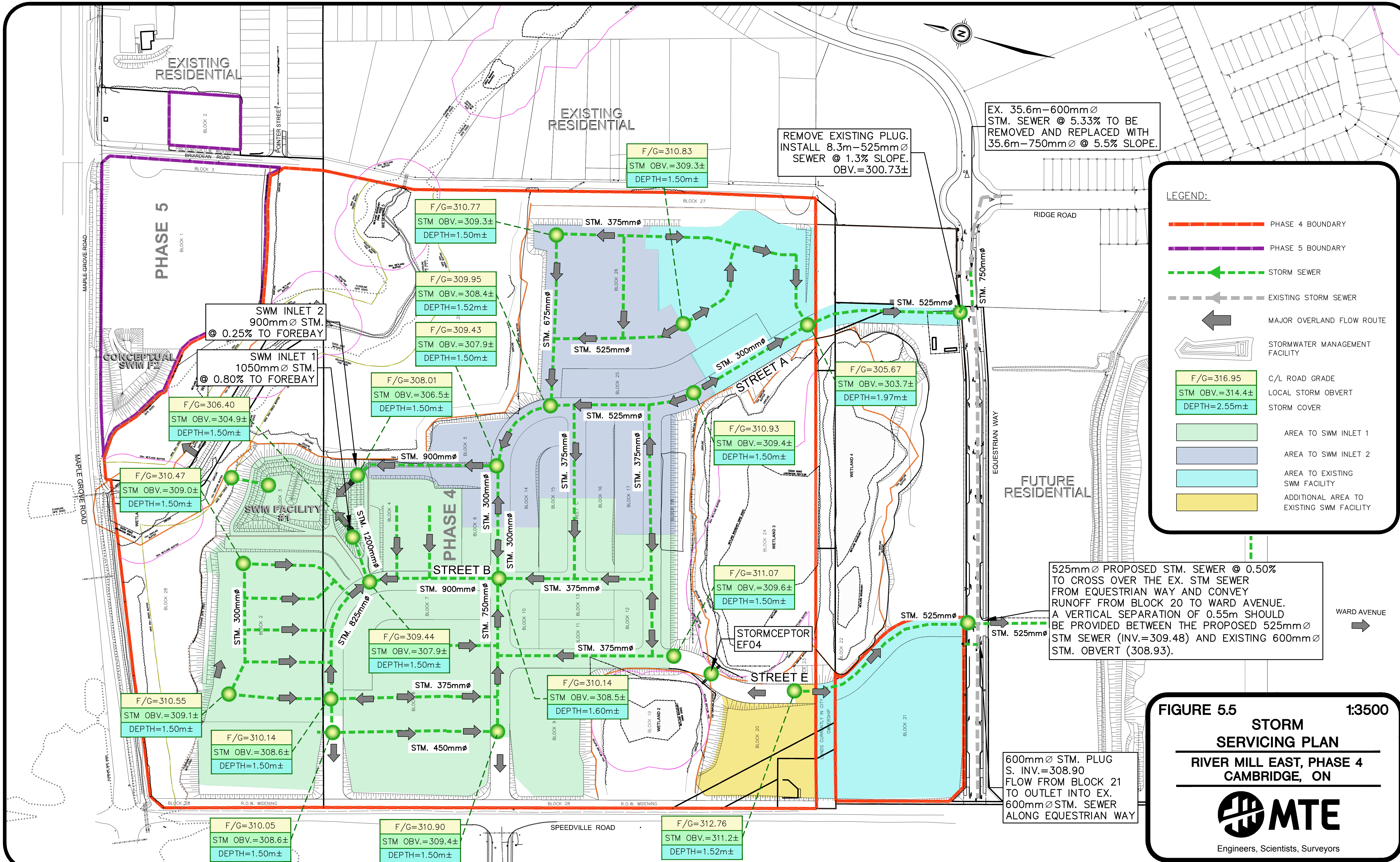

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5.4 Stormwater Management

The proposed stormwater management infrastructure on the Subject Lands will include at-source infiltration facilities (lot-level and/or block level), and a new stormwater management facility (SWMF1). The subdivision SWM criteria and a preliminary strategy for the study area are presented in the *Preliminary Stormwater Management Report – River Mill Residential Subdivision* prepared by MTE (October 16, 2020). The following summarizes the overall approach for stormwater management of the Subject Lands:

Water Quality Control

Provide an Enhanced level of stormwater quality control. This will be provided by SWMF1 and the Hunt Club Valley South SWM Facility.

Water Quantity and Erosion Control

Control peak flow rates according to the unit flow rates established in the Hespeler West Subwatershed Study, to minimize flooding and preserve hydraulic and hydrologic functions. Provide over 48 hours drawn down time for a 25mm event. This will be provided by SWMF1 and the Hunt Club Valley South SWM Facility.

Water Balance

Infiltration – maintain or enhance existing recharge rates across the development area. Infiltration facilities will be utilized and will be oversized by 15% to provide some volumetric and infiltration capacity redundancy to allow for potential loss in performance over time. Each facility should contain overflows to the storm sewer system. The infiltration facilities are to be situated to have appropriate separation to high groundwater.

Surface Water – maintain surface water inputs to the existing local wetlands and provide sufficient surface water inputs to the created wetland at the north, supported by an EIS report. The surface water inputs will be provided by runoff from the contributing roof and rear yard areas.

6.0 Utility Servicing

Utility servicing of the proposed development will be through the connection to and extension of existing services from Speedsville Road and Equestrian Way.

Hydro electrical (Energy+, formerly Cambridge Hydro), telephone (Bell Canada), natural gas (Union Gas), and cable (Rogers Cable) will be confirming that the proposed development can be adequately serviced.

7.0 Summary

The main findings of the functional servicing report for River Mill West – Phase 4 are:

1. Proposed conceptual grading will provide for 'major' overland flow conveyance to the proposed SWM Facility 1. Site grading also provides adequate cover over municipal services and will transition between proposed road and existing boundary grades with appropriate slopes.
2. Separation from the composite high groundwater and the basement finish floors has been provided throughout the development.
3. The proposed development can be adequately serviced with the planned upgrades of the existing sanitary and storm sewers along Equestrian Way.
4. Where sanitary sewers exceed 5m in depth dual sewers have been provided. Deep sanitary sewer constructed below the groundwater elevations will be constructed using concrete cut-off collars and other measures to prevent infiltration into the sewers.
5. Water supply for the proposed development will be provided by four connection points to the existing municipal water distribution system
6. Stormwater management for the development can be accommodated in the SWM Facilities proposed as outlined in the *Preliminary Stormwater Management Report – MTE, October 16, 2020.*
7. Utility servicing will be undertaken at the appropriate time, to ensure services are available prior to occupancy.

All of which is respectfully submitted,

MTE Consultants Inc.

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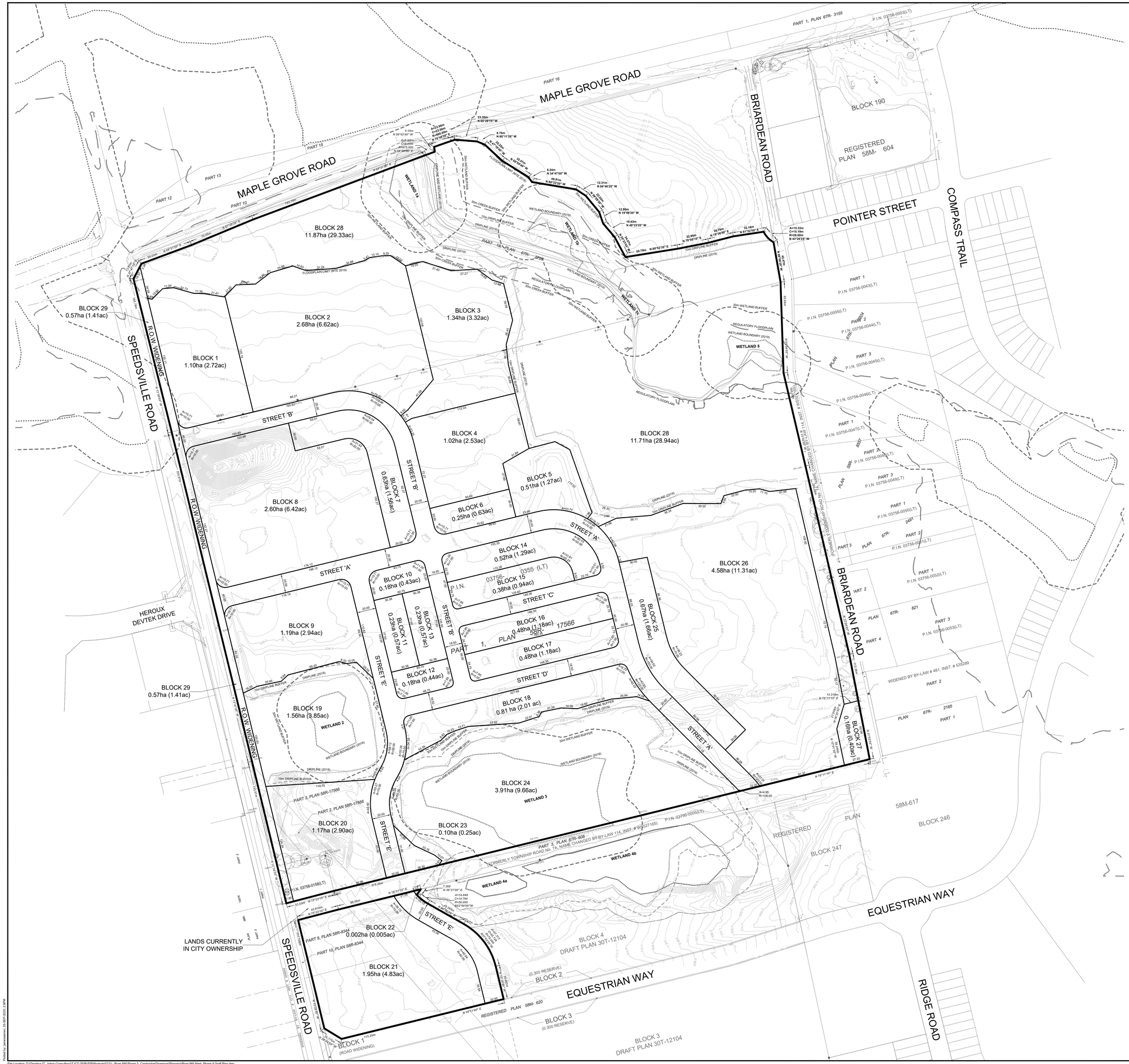
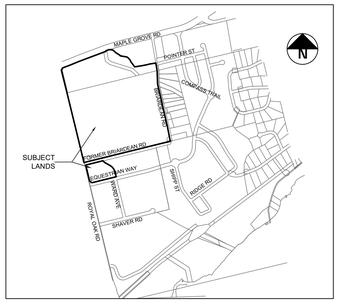
Appendix A

Draft Plan of Subdivision





KEY PLAN
1:15,000

LEGAL DESCRIPTION

PART OF LOT 9, 10 & 11, CONCESSION 1
BEASLEY'S LOWER BLOCK
FORMERLY IN THE TOWNSHIP OF WATERLOO,
NOW IN THE
CITY OF CAMBRIDGE
IN THE
REGIONAL MUNICIPALITY OF WATERLOO

LEGEND

- DRAFT PLAN BOUNDARY
- LOT/BLOCK LINE
- EXISTING PROPERTY LINE
- CREEK 30m BUFFER
- DRIPLINE (2019)
- DRIPLINE 10m BUFFER
- WETLAND BOUNDARY (2019)
- WETLAND 30m BUFFER
- FLOODPLAIN
- 32.95m N 79°06'12" E — EXISTING BEARING AND DISTANCE
- 32.95m N 79°06'12" E — PROPOSED BEARING AND DISTANCE

NOTE:
SEE SUPPORTING ENVIRONMENTAL IMPACT STATEMENT (EIS) REPORT PREPARED BY NRSI FOR DETAILED INFORMATION ON ENVIRONMENTAL BUFFERS AND BOUNDARIES.

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LANDS AS SHOWN ON THIS PLAN AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN.

SEPT. 25, 2020 — DATE
ROD LORD, O.L.S.
MacDONALD TAMBLYN LORD SURVEYING

OWNER'S CERTIFICATE

I HEREBY AUTHORIZE T. JOHNS CONSULTING GROUP LTD. TO PREPARE AND SUBMIT THIS DRAFT PLAN OF SUBDIVISION TO THE CITY OF CAMBRIDGE FOR APPROVAL.

9/25/20 — DATE
BRANDON CAMPBELL
RIVER MILL DEVELOPMENT CORPORATION

LAND USE SCHEDULE

BLOCK	DESCRIPTION	AREA (ha)	PERCENT (%)
1	RESIDENTIAL	1.10	2.42
2	RESIDENTIAL	2.68	5.91
3	S.W.M. POND	1.34	2.95
4	RESIDENTIAL	1.02	2.25
5	PARK	0.51	1.12
6	RESIDENTIAL	0.25	0.55
7	RESIDENTIAL	0.63	1.39
8	RESIDENTIAL	2.60	5.73
9	RESIDENTIAL	1.19	2.62
10	RESIDENTIAL	0.18	0.40
11	RESIDENTIAL	0.23	0.51
12	RESIDENTIAL	0.18	0.40
13	RESIDENTIAL	0.23	0.51
14	RESIDENTIAL	0.52	1.15
15	RESIDENTIAL	0.38	0.84
16	RESIDENTIAL	0.48	1.06
17	RESIDENTIAL	0.48	1.06
18	RESIDENTIAL	0.81	1.78
19	OPEN SPACE	1.56	3.44
20	MIXED-USE BLOCK FOR ASSEMBLY	1.17	2.58
21	MIXED-USE BLOCK FOR ASSEMBLY	1.95	4.30
22	MIXED-USE BLOCK FOR ASSEMBLY	0.002	0.00
23	MIXED-USE BLOCK FOR ASSEMBLY	0.10	0.22
24	OPEN SPACE	3.91	8.62
25	RESIDENTIAL	0.67	1.48
26	RESIDENTIAL	4.58	10.09
27	R.O.W. WIDENING	0.16	0.36
28	OPEN SPACE	11.71	25.80
29	R.O.W. WIDENING	0.57	1.16
	R.O.W.	3.87	8.51
	R.O.W. (SOUTH OF BRIARDEAN ROAD)	0.31	0.68
	TOTAL	**45.38**	**100.00**

PLANNING ACT

ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51(17) OF THE PLANNING ACT. OF ONTARIO RS0 1990

a SEE PLAN
b) SEE PLAN
c) SEE PLAN AND KEY PLAN
d) SEE PLAN AND LAND USE SCHEDULE
e) SEE PLAN
f) SEE PLAN
g) SEE PLAN
h) MUNICIPAL WATER SUPPLY
i) CLAY LOAM, SILTY SAND
j) SEE PLAN
k) ALL MUNICIPAL SERVICES WILL BE AVAILABLE
l) SEE PLAN

METRIC NOTE

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

REVISIONS			
G	SUBMISSION	23-SEP-2020	JW
F	REVIEW	23-SEP-2020	JW
E	REVIEW	18-SEP-2020	JW
D	UPDATED R.O.W. WIDTH	14-SEP-2020	JW
C	REVIEW	03-SEP-2020	JW
B	REVIEW	22-JUL-2020	JW
A	REVIEW	15-JUN-2020	JB
REV.	DESCRIPTION	DATE	INIT.

river mill cambridge

T. JOHNS CONSULTING GROUP | URBAN PLANNING | DESIGN | PROJECT MANAGEMENT
310 LIMERIDGE ROAD WEST, SUITE 6
HAMILTON ONTARIO, L9C 2V2
P 905-574-1993
F 905-527-9559

PROJECT TITLE
RIVER MILL WEST
(PHASE 4)
CAMBRIDGE, ONTARIO

DRAWING TITLE
DRAFT PLAN OF SUBDIVISION

DRAWN BY	DESIGNED BY
JW	JW
PRINT DATE: 25-SEP-2020	PROJECT NUMBER: 0706
REVISION: G	DRAWING NUMBER: DP1-1
SCALE: 1:1250	

Plotted by: jameswarren, 23-SEP-2020, 2:38PM

File Location: D:\Dropbox (T. Johns Consulting)\TJCG SERVER\Projects\0710 - River Mill Phase 5, Cambridge\Drawings\Planning\River Mill West_Phase 4 Draft Plan.dwg

Appendix B

Sanitary Sewer Analysis and Sanitary Pumping Station Technical Memo

MTE

River Mill Subdivision
CITY OF CAMBRIDGE
OVERALL FLOW CALCULATIONS FOR PHASE 4

Project Number: 45244-104
Date: October 9, 2020
Design By: ALN
Checked By: VAL
File: Q:\45244\104\Sanitary Sewer\45244-104 Sanitary Sewer Design-River Mill Subdivision-2020 09 08-ALN.xls

SANITARY SEWER DESIGN SHEET

ENGINEERING AND PUBLIC WORKS

Draft Plan-T Johns Consulting Group-CBP1-1

Design Parameters

Average Daily Flow

Residential	0.00405	L/s/c
Commercial	1.16	L/s/ha
Industrial	1.0	L/s/ha
School	2.5	L/s/ha
Resid. Infiltration Rate	0.25	L/s/ha

Resid. Density (ppu)

Singles	3.30	
Semi's	3.30	
Row	2.48	
Appt's	1.83	

Mannings "n"	0.013	
Min. Velocity	0.8	m/sec
Max. Velocity	3.0	m/sec

Residential Harmon Peaking Factor F = 1 + (14 / (4 + $P^{0.5}$))
Commercial Peaking Factor = 2.5

LOCATION				RESIDENTIAL AREAS and POPULATION									SCHOOL, INSTITUTIONAL			COMMERCIAL			INDUSTRIAL				INFILTRATION			DESIGN						
					PROP. DENSITY								HECTARES AND FLOW OF EACH ZONING																			
														2.50 L/s/ha			1.16 L/s/ha			1.00 L/s/ha											
STREET	AREA NO.	Zonning R1-R4 115	65	AREA	SING 3.30	ROW 2.48	APT 1.83	POPUL.	CUMMULATIVE AREA	CUMMULATIVE POPUL.	PEAK FACTOR "F"	PEAK RES. FLOW	AREA	CUMUL AREA	PEAK FLOW	AREA	CUMUL AREA	PEAK FLOW	AREA	CUMUL AREA	PEAK FLOW	TOTALS-C-I FLOW	AREA	CUMUL AREA	INFIL FLOW	TOTAL VOLUME FLOW	LENGTH	SLOPE	PIPE SIZE	CAPACITY	FULL FLOW VELOCITY	ACTUAL VELOCITY
		ha	*p/ha*	*ha*	*p/unit*	*p/unit*	*p/unit*	*1000s*	*ha*	*1000s*		*L/sec*	*ha*	*ha*	*L/sec*	*ha*	*ha*	*L/sec*	*ha*	*ha*	*L/sec*	*L/sec*	*ha*	*ha*	*L/sec*	*L/sec*	*m*	*%*	*mm*	*L/sec*	*m/s*	*m/s*
Street E-Area 123	Block 22 and Block 21 (EX.PLUG-EX.MH44A)	3.330	383	0.00	0	0	0	0.383	*3.33*	*0.383*	4.0311	6.2534	0.00	0.00	0	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	3.33	3.33	0.8325	7.0859	12.5	0.56	200	24.5316	0.781	0.676
Connect into MH44A @ Equestrian Way-Ex. Inv.=307.95																																
Ex. Equestrian Way	*(EX.MH44A-EX.MH43A)*	*0.250*	*0*	*0.00*	*0*	*0*	*0*	*0.000*	*3.58*	*0.383*	*4.0311*	*6.2534*	*0.00*	*0.00*	*0*	*0.00*	*0.00*	*0.0000*	*0.00*	*0.00*	*0.0000*	*0.0000*	*0.25*	*3.58*	*0.8950*	*7.1484*	*90.0*	*1.25*	*200*	*36.6511*	*1.167*	*0.905*
Ex. Equestrian Way	*(EX.MH43A-EX.MH42A)*	*0.230*	*0*	*0.00*	*0*	*0*	*0*	*0.000*	*3.81*	*0.383*	*4.0311*	*6.2534*	*0.00*	*0.00*	*0*	*0.00*	*0.00*	*0.0000*	*0.00*	*0.00*	*0.0000*	*0.0000*	*0.23*	*3.81*	*0.9525*	*7.2059*	*89.1*	*2.00*	*200*	*46.3604*	*1.476*	*1.072*
Ex. Equestrian Way	*(EX.MH42A-EX.MH41A)*	*0.190*	*0*	*0.00*	*0*	*0*	*0*	*0.000*	*4.00*	*0.383*	*4.0311*	*6.2534*	*0.00*	*0.00*	*0*	*0.00*	*0.00*	*0.0000*	*0.00*	*0.00*	*0.0000*	*0.0000*	*0.19*	*4.00*	*1.0000*	*7.2534*	*74.6*	*3.18*	*200*	*58.4583*	*1.862*	*1.266*
Ex. Equestrian Way	*(EX.MH41A-EX.MH40A)*	*0.170*	*0*	*0.00*	*0*	*0*	*0*	*0.000*	*4.17*	*0.383*	*4.0311*	*6.2534*	*0.00*	*0.00*	*0*	*0.00*	*0.00*	*0.0000*	*0.00*	*0.00*	*0.0000*	*0.0000*	*0.17*	*4.17*	*1.0425*	*7.2959*	*54.9*	*4.40*	*200*	*68.7636*	*2.190*	*1.423*
Ex. Equestrian Way-Area 124	Block 124	1.800	117	0.00	0	0	0	0.117	*5.97*	*0.500*	3.9742	8.0489	0.00	0.00	0	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	1.80	*5.97*	1.4925	9.5414	11.6	4.40	200	68.7636	2.190	1.540
River Mill Subdivision-Phase 4																																
Street B-Area 101	Block 1	0.000	0	1.05	0	0	300	0.549	1.050	0.549	3.9530	8.7913	0.00	0.00	0	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	1.05	1.05	0.2625	9.0538	90.0	1.00	200	32.7818	1.044	0.892
Street B-Area 102	Block 2	0.000	0	2.74	0	144	0	0.357	3.79	0.906	3.8272	14.0482	0.00	0.00	0	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	2.74	3.79	0.9475	14.9957	90.0	0.70	200	27.4272	0.873	0.893
Street B-Area 106	Block 7	0.640	42	0.00	0	0	0	0.042	4.43	0.948	3.8149	14.6460	0.00	0.00	0	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.64	4.43	1.1075	15.7535	90.0	0.60	200	25.3927	0.809	0.852
Street B-Area 107	Block 4	0.000	0	1.02	0	43	0	0.107	5.450	1.054	3.7851	16.1665	0.00	0.00	0	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	1.02	5.45	1.3625	17.5290	90.0	0.60	200	25.3927	0.809	0.872
Street B-Area 108	Block 6	0.250	16	0.00	0	0	0	0.016	5.700	1.071	3.7807	16.3968	0.00	0.00	0	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.25	5.70	1.4250	17.8218	90.0	0.60	200	25.3927	0.809	0.875
Street A-Area 109	Block 5 (Park)	0.510	0	0.00	0	0	0	0.000	6.210	1.071	3.7807	16.3968	0.00	0.00	0	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.51	6.21	1.5525	17.9493	90.0	0.60	200	25.3927	0.809	0.877
Street A-Area 112	Block 14	0.520	34	0.00	0	0	0	0.034	6.730	1.104	3.7718	16.8745	0.00	0.00	0	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.52	6.73	1.6825	18.5570	90.0	0.60	200	25.3927	0.809	0.883
Street A-Area 113/2	Block 15	0.190	12	0.00	0	0	0	0.012	6.920	1.117	3.7686	17.0487	0.00	0.00	0	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.19	6.92	1.7300	18.7787	90.0	0.60	200	25.3927	0.809	0.885
Street C-Area 116/2	Block 16	0.240	16	0.00	0	0	0	0.016	7.160	1.132	3.7645	17.2684	0.00	0.00	0	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.24	7.16	1.7900	19.0584	90.0	0.60	200	25.3927	0.809	0.888
Street D-Area 120/2	Block 25	0.340	22	0.00	0	0	0	0.022	7.500	1.154	3.7589	17.5791	0.00	0.00	0	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.34	7.50	1.8750	19.4541	90.0	0.60	200	25.3927	0.809	0.891
Street B-Area 104	Block 8 - High Density	0.000	0	0.98	0	0	160	0.293	0.98	0.293	4.0829	4.8428	0.00	0.00	0	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.98	0.98	0.2450	5.0878	90.0	0.60	200	25.3927	0.809	0.632
Street B-Area 105	Block 8 - Medium Density	0.000	0	1.61	0	94	0	0.233	2.59	0.526	3.9628	8.4427	0.00	0.00	0	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	1.61	2.59	0.6475	9.0902	90.0	0.60	200	25.3927	0.809	0.741
Street A-Area 110	Block 9	0.000	0	1.19	0	0	230	0.421	3.78	0.947	3.8152	14.6331	0.00	0.00	0	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	1.19	3.78	0.9450	15.5781	90.0	0.60	300	74.8660	1.060	0.836
Street A-Area 111	Block 10	0.180	12	0.00	0	0	0	0.012	3.96	0.959	3.8118	14.8008	0.00	0.00	0	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.18	3.96	0.9900	15.7908	90.0	0.60	200	25.3927	0.809	0.852
Street A-Area 113/2	Block 15	0.190	12	0.00	0	0	0	0.012	4.15	0.971	3.8082	14.9775	0.00	0.00	0	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.19	4.15	1.0375	16.0150	90.0	0.60	200	25.3927	0.809	0.855
Street B-Area 114	Block 13	0.240	16	0.00	0	0	0	0.016	4.39	0.986	3.8038	15.2005	0.00	0.00	0	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.24	4.39	1.0975	16.2980	90.0	0.60	200	25.3927	0.809	0.858
Street E-Area 115	Block 11	0.240	16	0.00	0	0	0	0.016	4.63	1.002	3.7994	15.4230	0.00	0.00	0	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.24	4.63	1.1575	16.5805	90.0	0.60	200	25.3927	0.809	0.862
Street C-Area 116/2	Block 16	0.240	16	0.00	0	0	0	0.016	4.87	1.018	3.7951	15.6453	0.00	0.00	0	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.24	4.87	1.2175	16.8628	90.0	0.60	200	25.3927	0.809	0.865
Street C-Area 117	Block 12	0.180	12	0.00	0	0	0	0.012	5.05	1.029	3.7919	15.8117	0.00	0.00	0	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.18	5.05	1.2625	17.0742	90.0	0.60	200	25.3927	0.809	0.867
Street C-Area 118	Block 17	0.480	31	0.00	0	0	0	0.031	5.53	1.061	3.7834	16.2545	0.00	0.00	0	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.48	5.53	1.3825	17.6370	90.0	0.60	200	25.3927	0.809	0.873
Street D-Area 119	Block 18	0.810	53	0.00	0	0	0	0.053	6.34	1.113	3.7695	16.9988	0.00	0.00	0	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.81	6.34	1.5850	18.5838	90.0	0.60	200	25.3927	0.809	0.883
Street D-Area 120/2	Block 25	0.340	22	0.00	0	0	0	0.022	14.18	2.290	3.5394	32.8301	0.00	0.00	0	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.34	14.18	3.5450	36.3751	90.0	0.60	250	46.0400	0.938	1.040
Street 12,14,15,16-Area 121	Block 26	0.000	0	4.56	0	116	0	0.288	18.740	2.577	3.4976	36.5185	0.00	0.00	0	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	4.56	18.74	4.6850	41.2035	90.0	1.75	250	78.6282	1.603	1.621
All Streets (infiltration)	Area ROW's	0.000	0	4.54	0	0	0	0.000	23.280	2.577	3.4976	36.5185	0.00	0.00	0	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	4.54	23.28	5.8200	42.3385	90.0	1.75	250	78.6282	1.603	1.632
Area 156 (south of Equestrian)	156 (Existing)	1.510	174	0.00	0	0	0	0.174	1.51	0.174	4.1698	2.9332	0.00	0.00	0	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	1.51	1.51	0.3775	3.3107	10.7	0.65	200	26.4295	0.842	0.574
Ex. Equestrian Way (MH40A-MH39A)	N/A	0.000	0	0.00	0	0	0	0.000	30.76	3.25106	3.4125	44.9422	0.00	0.00	0	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.00	30.76	7.6900	52.6322	38.5	4.24	300	199.0179	2.817	2.378
Street A-Area 122	Block 247	0.000	0	1.01	0	50	0	0.124	1.010	0.124	4.2168	2.1182	0.00	0.00	0	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	1.01	1.01	0.2525	2.3707	12.9	1.00	300	96.6517	1.368	0.573
Ex. Equestrian Way (MH39A-MH38A)	N/A	0.000	0	0.00	0	0	0	0.000	31.77	3.37506	3.3984	46.4638	0.00	0.00	0	0.00	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.00	31.77	7.9425	54.4063	48.0	3.10	300	170.1728	2.409	2.141
Flow to existing Sanitary Sewer located on Equestrian Way																																

Memorandum

To: Jason Cabral

Date: October 13, 2020

From: Gemma Charlebois

Re: River Mill Developments and Speedsville Sanitary Pumping Station

The Speedsville Sanitary Pumping Station (SPS) was constructed in 2017. It was constructed to receive wastewater from the Boxwood subdivision, the Arriscraft facility, the Hunt Club Developments, and East Side Lands. The Speedsville SPS was designed for a full build-out capacity of 341.5 L/s and an initial capacity of 129 L/s (East Side Lands not included in initial capacity).

The Environmental Compliance Approval (ECA) for the SPS lists two pumps, each capable of a capacity of 129 L/s. The SPS has allocated space for three additional pumps (for a total of 4 duty pumps, 1 standby pump) for full build-out capacity.

The initial capacity of 129 L/s includes the following service areas and allocated capacities:

Sanitary Service Area	Peak Flow rate (L/s)	Average Flow Rate (L/s)
Hunt Club Development	50	17.24*
Boxwood Subdivision	75.9	75.9
Arriscraft	3.1	3.1
TOTAL	129	96.2

* Peaking factor not applied to residential flows in calculating the average flow rate

The Hunt Club development (Phases 1 and 2), to-date, has 581 units constructed and occupied out of 722 approved units.

Based on flow data provided by the City of Cambridge since operation of the SPS, the Hunt Club Development accounts for approximately 21 L/s of the incoming peak flow. The greatest peak flow rate to the SPS from all sources to-date is 2396 m^3/day (28 L/s). Once all 722 units are constructed and occupied, the estimated peak flow from the Hunt Club Development will increase to 26 L/s.

MTE understands that the proposed Phase 3 development for 310 units has been submitted for site plan approval. The estimated peak flow for the Hunt Club Developments' 1032 units would be approximately 37 L/s. This represents 74% the SPS's design capacity allotted for the Hunt Club Development.

1 977 units are proposed for Phases 4 and 5 of the Hunt Club Development. A total of 3 009 units would result in an estimated peak flow rate of 108 L/s, which would exceed the SPS's allotted design capacity for the Hunt Club Developments.

Up to and including April 2020, the greatest peak flow rate to the SPS represented 21.5% of its design capacity. Should the flows from Boxwood and Arriscraft remain consistent with historical data, it is anticipated that the peak flow rate to the SPS, following the completion of Phase 3 of the Hunt Club Development, will be 34% of its design capacity.

The Ministry of Environment, Conservation, and Parks (MECP) recommends sewage works facilities design for upgrades or expansions when the facility is at 75% of its design capacity. While the SPS will

be under 75% of its design capacity following the completion of Phase 3, an upgrade to full build-out capacity may be desirable to facilitate the construction of Phases 4 and 5.

Sincerely,

Gemma Charlebois, M.A.Sc., P.Eng.

Appendix C

Water Distribution Analysis

River Mill Subdivision

Preliminary
Water Distribution Analysis

Project Location:

East of Speedsville Road
South of Maple Grove Road
City of Cambridge

Prepared for:

River Mill Development Corporation
2000 Garth Street, Suite 201
Hamilton, ON L9B 0C1

Prepared by:

MTE Consultants
520 Bingemans Centre Drive
Kitchener, ON N2B 3X9

October 16, 2020

MTE File No.: 45244-104

Engineers, Scientists, Surveyors.

Contents

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Tables

Appendices

1.0 Introduction

1.1 Overview

MTE Consultants Inc. (MTE) was retained by River Mill Development Corporation, to complete a Preliminary Water Distribution Analysis in support of a Planning Act application for the proposed River Mill Residential Subdivision in the City of Cambridge. The proposed development consists of two (2) separate applications and Draft Plans of Subdivision, one for Phase 4 and one for Phase 5. For the purposes of this analysis and report, the two draft plans will be reviewed as one cohesive development. As such, the overall River Mill Residential Subdivision will be referred to herein as the 'subject lands'.

The subject lands comprise a total area of approximately 49.5ha. The Phase 4 lands are approximately 45.4ha, and the Phase 5 lands are approximately 4.1ha in size. The subject lands are generally bounded by Maple Grove Road to the North, Speedsville Road to the West, Equestrian Way to the South and Briardean Road to the East. Further east of Briardean Road is an existing residential development. The location of the proposed development is presented in **Figure 1.1**.

The Draft Plans of Subdivision have been prepared by T. Johns Consulting Group dated September 23 and 25, 2020 for Phase 4 and Phase 5 respectively, and forms the basis for the proposed watermain servicing design presented in this report. The Draft Plans of Subdivision include low and medium density residential blocks, high density mixed use blocks, stormwater management facility block, community park, open space block, and municipal right-of-ways.

The purpose of this Preliminary Water Distribution Analysis is to confirm that adequate pressure and water supply is available to support the proposed development through connections to the existing Region of Waterloo (Region) water distribution network. The preliminary analysis is also used to determine the pipe sizes for the proposed internal water distribution network and whether the pressures within the development under various demand scenarios, including fire flow, are within the guidelines set out by the Ministry of the Environment, Conservation and Parks (MECP), The Region, and the City of Cambridge (City).

1.2 Background Information

The subject lands are located just inside the east boundary of Cambridge Pressure Zone 2W; adjacent to Cambridge Pressure Zone 2E. Based on modeling results received from the Region, the current hydraulic grade line (HGL) of Zone 2W is approximately 364.3m, with a serviceability range of approximately 308.3m to 328.3m. The HGL of Zone 2E is approximately 356.1m, with an approximate serviceability range of 300.1m to 320.1m.

The current Zone 2W/2E interface is defined by a pressure reducing valve (PRV) on Maple Grove Road east of Briardean Road.

The current HGL information has specified that any centerline of road elevation below 308.3m in Zone 2W and 300.1m in Zone 2E may require services to be connected to individual pressure reducing valves (PRVs), as specified in section B.2.4.7 of the *Region of Waterloo and Area Municipalities Design Guidelines and Supplemental Specifications for Municipal Services (DGSSMS) (RMOW, 2020)*.

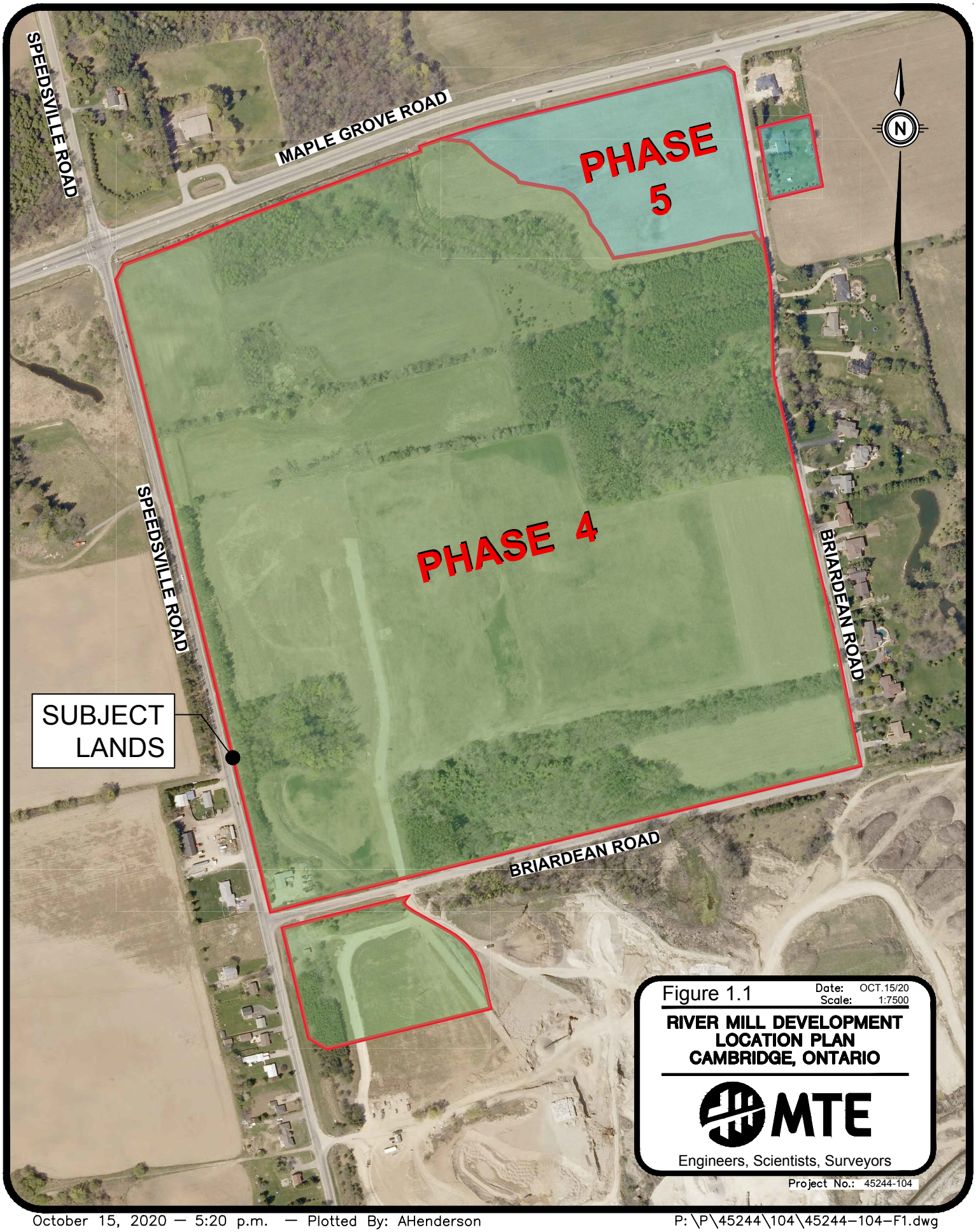

Figure 1.1

Date: OCT.15/20
Scale: 1:7500

RIVER MILL DEVELOPMENT
LOCATION PLAN
CAMBRIDGE, ONTARIO

MTE
Engineers, Scientists, Surveyors

Project No.: 45244-104

October 15, 2020 — 5:20 p.m. — Plotted By: AHenderson

P:\P\45244\104\45244-104-F1.dwg

2.0 Analysis Methodology

2.1 Model Development

The Bentley water distribution system analysis program (WaterCAD CONNECT Edition) was utilized for the analysis of the local water distribution system for this study. The model utilizes demands for the fully-developed proposed subdivision. The Region maintains a macro scale water distribution model developed for trunk supply and distribution of water. The macro scale pressure and flow information from the Region's model is used in MTE's micro scale model to ensure the system operates within the allowable pressure ranges. The WaterCAD model includes the proposed road fabric and watermain connectivity to size the internal watermains, accounting for looping and head losses in the local system. One servicing scenario was modeled for the proposed River Mill Subdivision which includes both Phase 4 and Phase 5.

2.1.1 Network Connections

Water supply for the proposed River Mill Subdivision will be provided by five connection points to the existing municipal water distribution system as follows:

- Direct connection to the existing 450mm diameter watermain along Speedsville Road, at the intersection with proposed Street B;
- Direct connection to the existing 450mm diameter watermain along Speedsville Road, at the intersection with proposed Street A;
- Direct connection to the existing 200mm diameter watermain along Equestrian Way, at the intersection with proposed Street E;
- Direct connection to the existing 200mm diameter watermain along Equestrian Way, at the intersection with proposed Street A; and
- Direct connection to the existing 450mm diameter watermain along Maple Grove Road, at the intersection with Briardean Road.

The nearest existing Region Water Distribution Model nodes are JCT_11032, JCT_39024, and JCT_39025 for Zone 2W, and JCT_39036 for Zone 2E. JCT_11032 is located at the intersection of Speedsville Road and proposed Street A. JCT_39024 is located at the intersection of Equestrian Way and proposed Street E. JCT_39025 is located at the intersection of Equestrian Way and proposed Street A. JCT_39036 is located at the intersection of Pointer Street and Briardean Road. Refer to **Figure 2.1** for more details regarding the location of the nodes, network connections and water demand contributing areas.

Connection to the existing 200mm diameter watermain on Pointer Street through JCT_39036 was explored during the analysis. However, it was determined that the existing infrastructure did not provide sufficient flow to adequately service the development. This also avoids a long dead-end watermain over the maximum *DGSSMS* (Section B.2.5.8) permitted length of 150m.

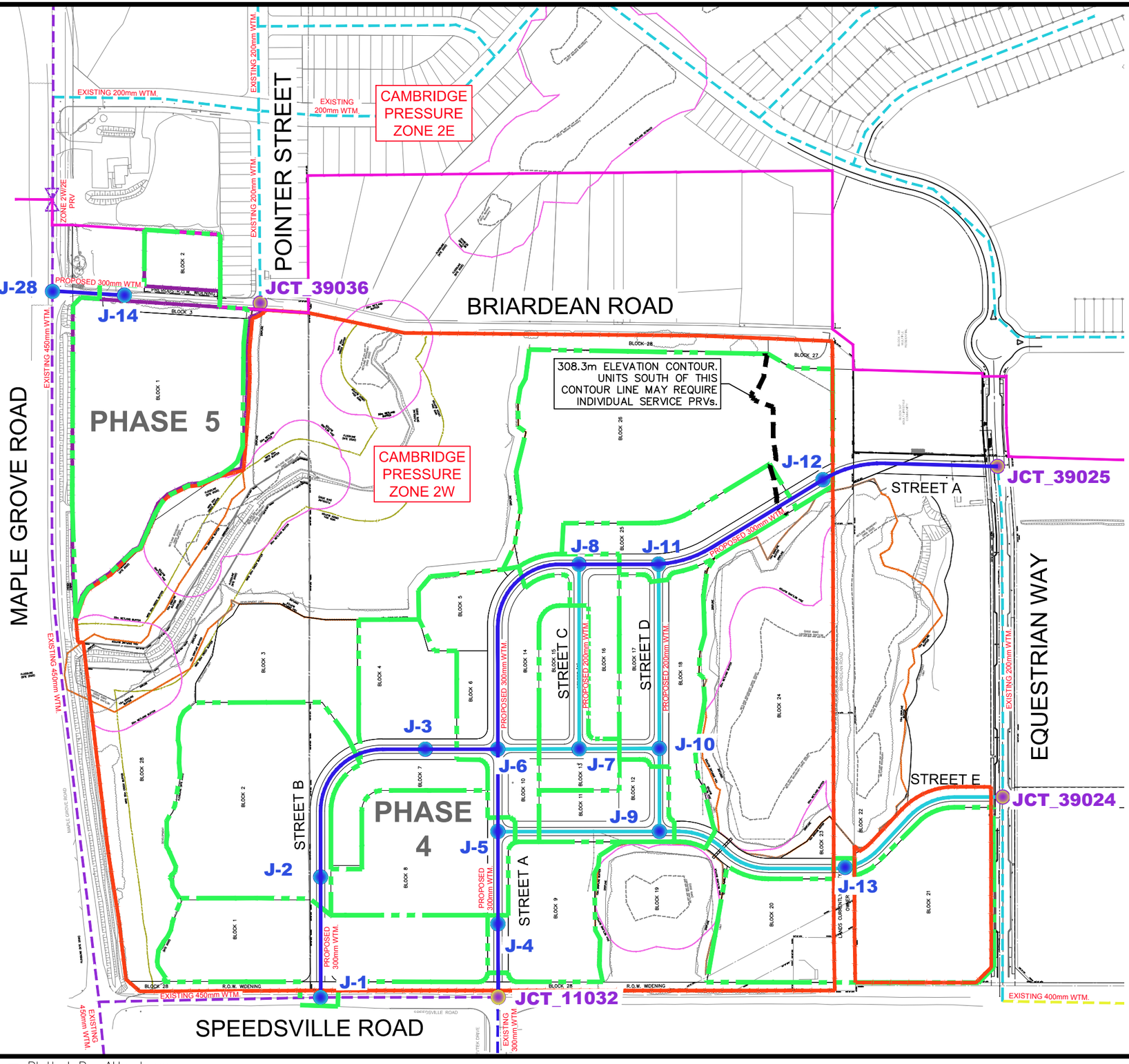

FIGURE 2.1 Date: OCT.15/20 Scale: 1:4000

RIVER MILL DEVELOPMENT

CONCEPTUAL WATER DISTRIBUTION PLAN

MTE Engineers, Scientists, Surveyors

Project No.: 45244-104

October 16, 2020 — 11:07 a.m. — Plotted By: AHenderson

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2.2 Design Criteria

The network for the analysis was developed by assigning physical parameters to each node and pipe. The model was run under five demand scenarios: Average Day, Maximum Day, Minimum Hour, Peak Hour, and Maximum Day + Fire Flow. Each scenario was checked against guidelines for pressure and fire flow availability. The model parameters, design criteria, and guidelines are outlined in the following sections.

2.2.1 System Pressure

The system pressure information used for this analysis is based on the Region's water distribution model results provided by the Region (Mr. Kevin Dolishny), on May 1, 2020 for nodes JCT_11032, JCT_39024, JCT_39025, and JCT_39036. The system pressures were determined for the Average Day, Maximum Day, Peak Hour, Minimum Hour, and Maximum Day + Fire Flow scenarios. **Table 2.1**, **Table** 2.2, **Table** 2.3 and **Table** 2.4 provide a summary of the system pressures used in the analysis at each Regional node. **Appendix A** contains the system pressure data correspondence with the Region.

Table 2.1 – System Pressures for JCT_11032 (Zone 2W)

Demand Scenario	Discharge (L/s)	HGL (m)	Head (m)
Initial	0.00	364.20	55.20
Minimum Hour	4.24	364.13	55.13
Average Day	9.02	364.56	55.56
Maximum Day	12.59	364.06	55.06
Peak Hour	22.26	363.99	54.99
Max Day + 100 L/s Fire Flow	112.72	362.40	53.40
Max Day + 200 L/s Fire Flow	212.72	358.70	49.70
Max Day + 300 L/s Fire Flow	312.72	353.10	44.10
Max Day + 400 L/s Fire Flow	412.72	345.90	36.90
Max Day + 500 L/s Fire Flow	512.72	337.00	28.00
Max Day + 600 L/s Fire Flow	612.72	326.50	17.50
Max Day + 621.6 L/s Fire Flow	634.32	324.00	15.00

Table 2.2 – System Pressures for JCT_39024 (Zone 2W)

Demand Scenario	Discharge (L/s)	HGL (m)	Head (m)
Initial	0.00	364.05	52.20
Minimum Hour	1.75	364.37	52.52
Average Day	3.72	364.49	52.64
Maximum Day	5.26	363.90	52.05
Peak Hour	9.20	363.69	51.84
Max Day + 40 L/s Fire Flow	45.26	361.75	49.90
Max Day + 80 L/s Fire Flow	85.26	356.55	44.70
Max Day + 120 L/s Fire Flow	125.26	348.95	37.10
Max Day + 160 L/s Fire Flow	165.26	338.85	27.00
Max Day + 200 L/s Fire Flow	205.26	326.55	14.70
Max Day + 201.9 L/s Fire Flow	207.16	325.85	14.00

Table 2.3 – System Pressures for JCT_39025 (Zone 2W)

Demand Scenario	Discharge (L/s)	HGL (m)	Head (m)
Initial	0.00	364.10	61.50
Minimum Hour	1.41	364.49	61.89
Average Day	3.00	364.39	61.79
Maximum Day	4.23	363.87	61.27
Peak Hour	7.40	363.59	60.99
Max Day + 40 L/s Fire Flow	44.23	359.40	56.80
Max Day + 80 L/s Fire Flow	84.23	348.40	45.80
Max Day + 120 L/s Fire Flow	124.23	331.70	29.10
Max Day + 148.4 L/s Fire Flow	152.63	316.60	14.00

Table 2.4 – System Pressures for JCT_39036 (Zone 2E)

Demand Scenario	Discharge (L/s)	HGL (m)	Head (m)
Initial	0.00	354.50	43.60
Minimum Hour	0.72	357.35	46.45
Average Day	1.54	355.52	44.62
Maximum Day	2.19	354.55	43.65
Peak Hour	3.83	352.14	41.24
Max Day + 40 L/s Fire Flow	42.19	351.80	40.90
Max Day + 80 L/s Fire Flow	82.19	345.40	34.50
Max Day + 120 L/s Fire Flow	122.19	335.60	24.70
Max Day + 153.8 L/s Fire Flow	155.99	324.90	14.00

2.2.2 System Demands

The system demands for the subdivision were determined using the proposed population, based on the Draft Plans, and specific water usage rates for the City of Cambridge from the *Tri-City Water Distribution Master Plan (AECOM, May 2009)* and *Region of Waterloo 2020 Water and Wastewater Monitoring Report (RMOW, 2020)*. Residential demands were derived for representative areas contributing to each node in the model, multiplied by the respective persons per unit designation from the *Region of Waterloo 2020 Water and Wastewater Monitoring Report* (refer to Note 2 in **Appendix B**), multiplied by 227.7L/p/d per the *Tri-City Water Distribution Master Plan* and then converted to L/s. Based on the Region's maximum unit densities, the estimated population of the subdivision is approximately 4,315. The unit densities, average usage rates, and demand calculations for each node are provided in **Appendix B**.

2.2.3 Peaking Factors

The peaking factors are based on the population of the development (3,001-10,000) as outlined in Chapter 3 of the *Design Guidelines for Drinking-Water Systems (MOE, 2008).* However, the Maximum Day peaking factor is taken from the Region's *Tri-City Water Distribution Master Plan* as provided in the Recommendations. **Table 2.5** summarizes the peaking factors used in the analysis based on the population calculated in **Appendix B**.

Table 2.5 - Peaking Factors

Demand Scenario	Factor
Average Day	1.0
Maximum Day	1.44
Peak Hour	3.0
Minimum Hour	0.5

2.2.4 Pressure Requirements

As outlined in Section B.2.4 of the Region's *DGSSMS*, the pressure guidelines used for all demand scenarios are shown in **Table 2.6**. The maximum static pressure in the watermain system should not exceed 700kPa under any scenario.

Table 2.6 - DGSSMS Pressure Guidelines

Demand Scenario	Pressure Guidelines (kPa)	
	Minimum	Maximum
Average Day	350	550
Maximum Day	350	550
Peak Hour	275	700
Minimum Hour	275	700
Max Day + Fire	140	700

2.2.5 Fire Flow Requirements

Various guidelines and references exist for calculating the required water supply for firefighting purposes. In Ontario, two standards/guidelines are most often referenced. They are:

1. *Ontario Building Code (OBC)* – Provincial codes and guidelines published by the Ministry of Municipal Affairs and Housing for the Province of Ontario.
2. *The Fire Underwriters Survey (FUS)* – an insurance industry guideline.

Many municipalities in Ontario use both the *OBC* and the *FUS* fire flow requirements for assessing firefighting water supply requirements. Ideally, fire flow demands for new developments are calculated based on the *FUS* criteria, however it is not reasonable to expect that the existing municipal watermain infrastructure always has the operational capacity to

supply water at the rates prescribed in the *FUS* guidelines. As a result, at no time shall the available fire flow be less than that required by the *OBC*.

The fire flow demand for the development was determined from the *Water Supply for Public Fire Protection, A Guide to Recommended Practice (1999), Fire Underwriter's Survey (FUS)*. Based on the *FUS* manual, the required fire flow is as follows:

- High-density, multiple residential/mixed use – 12,000 L/min (200 L/s)
- Medium-density, contiguous multiple residential townhomes - 8,000 L/min (133 L/s)
- Medium-density, single family homes < 3m separation - 6,000 L/min (100 L/s)

Specific details are not currently available for the proposed multiple residential and mixed use blocks and as such, fire flow values should be confirmed when the information becomes available.

2.2.6 Friction Factors

Section B.2.3.1 of the *DGSSMS* recommends the following Hazen-Williams "C" values be used to estimate frictional losses through the system, regardless of size. The friction factors, as specified in the *DGSSMS* guidelines, include an allowance for age.

Table 2.7 - Hazen-Williams C-Factors

Material (mm)	C-Factor
PVC	150
DI	130
CPP	140
HDPE	140
Unknown	130

2.2.7 Velocity Requirements

Section B.2.3.4 of the *DGSSMS* recommends that velocities throughout the distribution system not exceed a maximum of 5.0 m/s under all flow conditions.

2.2.8 Minor Losses

Minor losses are caused by appurtenances and fittings along the length of pipe in the system. For this preliminary analysis, a conservative K value of 1.0 was used for all pipes.

3.0 Results

The model was run to analyze the pipe sizes according to the aforementioned design criteria, under the various demand scenarios. **Appendix C** provides the proposed network and a series of tables summarizing the output results of the WaterCAD analysis. **Table 3.1** provides a summary of the model results identifying the system pressures for each demand scenario.

As shown in **Table 3.1**, where the centerline of road elevation is above 308.3m near the nodes, the proposed water distribution system will adequately provide the required daily water demands within the *DGSSMS* recommended minimum and maximum pressure range guidelines of 350kPa to 550kPa for the Average and Maximum Day demand scenarios, and 275kPa to 700kPa for the Minimum and Peak Hour demand scenarios.

However, **Table 3.1** indicates that where the centerline of road elevation is below 308.3m near node J-12, the pressures for the Average and Maximum Day demand scenarios are above the recommended *DGSSMS* maximum pressure guideline of 550kPa. The maximum modeled pressure at node J-12 is approximately 568kPa, which represents the lowest elevation (305.88m) within the subdivision potentially requiring service connections. However, the absolute minimum elevation of the subject lands is south of node J-12 near Regional node JCT_39025 at an elevation of 302.60m. Therefore, the implementation of individual pressure reducing valves may be required near this location, as highlighted in **Table 3.1**, to satisfy the maximum pressure requirement.

The fire flow analysis indicates instances where the velocity in some pipes exceeds the current *DGSSMS* recommended maximum of 5.0m/s. However, the pipe sizes were not increased for the sole purpose of reducing the maximum velocity experienced under the rare fire flow condition, as this may create an environment for stagnant water conditions to arise when demands are lower (i.e. Average Day), especially where the pipes with velocities exceeding 5.0m/s feed a cul-de-sac.

Table 3.1 – Modeling Results

Node	Elev. (m)	Pressure (kPa)				Maximum Day + Fire Flow				
		Average Day	Maximum Day	Minimum Hour	Peak Hour	Fire Flow Required (L/s)	Available Fire Flow (L/s)	Residual Pressure (kPa)	Velocity of Max Pipe (m/s)	Pipe with Max. Velocity
J-1	307.52	552.0	552.0	553.0	551.0	200.00	622.00	259.0	3.21	P-47
J-2	310.24	526.0	525.0	526.0	524.0	133.00	622.00	171.0	5.47	P-48
J-3	309.83	530.0	529.0	530.0	528.0	133.00	622.00	162.0	4.95	P-50
J-4	310.97	519.0	518.0	519.0	517.0	200.00	622.00	204.0	5.69	P-32
J-5	310.59	522.0	522.0	522.0	521.0	133.00	622.00	190.0	4.50	P-32
J-6	310.21	526.0	526.0	526.0	525.0	100.00	622.00	187.0	3.83	P-34
J-7	310.61	522.0	522.0	522.0	521.0	100.00	529.05	140.0	6.87	P-35
J-8	310.18	526.0	526.0	526.0	525.0	100.00	589.20	140.0	4.27	P-39
J-9	311.01	518.0	518.0	518.0	517.0	100.00	494.55	140.0	6.32	P-37
J-10	311.04	518.0	518.0	518.0	517.0	100.00	513.28	140.0	6.07	P-36
J-11	310.64	522.0	521.0	522.0	520.0	100.00	561.05	140.0	4.81	P-42
J-12	305.88	568.0	568.0	569.0	567.0	133.00	518.07	140.0	5.48	P-43
J-13	312.79	501.0	500.0	501.0	499.0	200.00	362.57	140.0	5.82	P-46
J-14	312.56	503.0	503.0	503.0	502.0	133.00	470.57	140.0	6.66	P-57

**Highlighted row represents the junction around which individual PRVs may be required. Specifically, potential units near the south end of Block 26 with a centreline of road elevation lower than 308.3m. As concept plans are not yet finalized, this will be confirmed as part of the Site Plan Approval process.*

4.0 Conclusions and Recommendations

Based on the preliminary water distribution analysis, the following conclusions and recommendations are provided:

1. Direct connections to the existing 450mm diameter watermain on Speedsville Road, the existing 200mm diameter watermain on Equestrian Way, and the existing 450mm diameter watermain on Maple Grove Road, will adequately service the proposed subdivision.
2. The proposed water distribution network will adequately provide the required daily water demands within the respective pressure guidelines for most junctions where the centreline of road is above an elevation of 308.3m.
3. Some potential units near the south end of Block 26, where the centreline of road elevation is below 308.3m, may require the installation of individual pressure reducing valves (PRVs) in order to reduce the incoming water pressure to below the *DGSSMS* recommended maximum value of 550kPa under the Average and Maximum Day demand scenarios. However, since concept plans are not yet finalized, this will be confirmed as part of the Site Plan Approval process.
4. Water model results indicate that the proposed water distribution system will adequately provide the recommended *FUS* fire flows at the minimum MECP pressure of 140kPa.
5. Pipe velocities were generally less than the *DGSSMS* recommended maximum of 5.0m/s for most pipes within the subdivision under fire flow conditions. However, the pipe sizes experiencing pipe velocities greater than 5.0m/s, were not increased for the sole purpose of reducing the maximum velocity experienced under the rare fire flow condition, as this may create an environment for stagnant water conditions to arise under normal daily demands.

It is recommended that a final water distribution analysis report be prepared during the final design of the River Mill Subdivision.

All of which is respectfully submitted;

MTE Consultants Inc.

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Appendix A

Pressure Information (Region of Waterloo)

Region of Waterloo

TRANSPORTATION AND
ENVIRONMENTAL SERVICES
Water Services

150 Frederick Street
Kitchener ON Canada N2G 4J3
Telephone: (519) 575-4426
Fax: (519) 575-4452
www.region.waterloo.on.ca

Date: May 1, 2020
File #: E18-10/CA

Alex Cressman, E.I.T., Designer
MTE Consultants Inc.
520 Bingemans Centre Drive,
Kitchener, ON N2B 3X9
t. 5149-743-6500 x1279
e. ACressman@mte85.com

Dear: Alex

Re: Hunt Club Subd, Cambridge

Please find the updated results of the modeling simulations for boundary conditions originally requested on October 30th, 2019. The current information has some revised IDs as we reran the model under the new InfowaterPro software. This revised model was able to provide fire flow results we were unable to supply previously.

Attached are a series of spreadsheets containing results for Average Day, Maximum Day demands and available fire flows at the nodes in the table listed below. The diurnal 24 hour demand distribution accounts for the minimum hour and peak hour peaking factors. The minimum hourly demand on the average day represents the minimum hour, and the maximum hourly demand on the maximum day represents the peak hour. The results included a figure showing the locations of the nodes from the Region's model.

Watermains have been added to this model to complete connectivity in CAM 2E. Please note no watermain was included between Street A at Speedsville Rd and Equestrian Way at Speedsville Rd.

Demands from 2018 records were added to the section in Cam 2E that was recently built in the Compass Trail area (as shown in the Location Map)

Node Locations:

Node	Formerly Node	Elevation	Pressure Zone	Location
JCT_39025	JCT_39024	302.60	CAM 2W	Street A @ Equestrian Way
JCT_39024	JCT_39023	311.85	CAM 2W	Street B @ Equestrian Way
JCT_11032	JCT_11032	309.00	CAM 2W	Street A @ Speedsville Rd
JCT_39036	JCT_39027	310.90	CAM 2E	Briardean Rd @ Pointer St

Demands applied to nodes:

Node	Formerly Node	Residential Demand		Fire Flow	
		Ave Day (L/s)	Max Day (L/s)	Design Flow (L/s)	Design Pressure (m)
JCT_39025	JCT_39024	2.94	4.23	148.4	14.0
JCT_39024	JCT_39023	3.65	5.26	201.9	14.0
JCT_11032	JCT_11032	8.84	12.72	621.7	15.0
JCT_39036	JCT_39027	1.51	2.17	153.8	14.0

A fire flow analysis shows the maximum flow available at a node with a design pressure of 14.0 m during the maximum day scenario while maintaining the minimum design pressure of 14 m (140 kPa) at all nodes within the pressure zone.

Please note the proposed servicing of development Blocks N and O will result in the creation of a long dead-end watermain. Dead-end watermains are to be avoided whenever possible. DGSSMS Section B.2.5.8 states that where dead-end watermains cannot be avoided, the maximum length of a permanent dead-end watermain is 150m. The length of the long dead end here is approximately 290 m.

Also note that development Blocks N and O can be serviced from a new local watermain connected to the 450 mm regional watermain on Maple Grove in Pressure Zone Cam 2W

If you have any questions, please contact me.

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t. 519.575.4757 x 3862
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cc John Holowackyj. Region of Waterloo

CAM 2w Infowater Location: Street A @ Equestrian Way Formerly: JCT_39024

JCT_39025 Average Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	1.71	364.61	62.01
01:00 hrs	1.41	364.49	61.89
02:00 hrs	1.76	364.14	61.54
03:00 hrs	1.85	363.81	61.21
04:00 hrs	1.71	364.52	61.92
05:00 hrs	1.62	364.56	61.96
06:00 hrs	2.26	364.58	61.98
07:00 hrs	3.26	364.49	61.89
08:00 hrs	3.73	364.06	61.46
09:00 hrs	3.50	364.03	61.43
10:00 hrs	3.62	364.11	61.51
11:00 hrs	3.62	364.18	61.58
12:00 hrs	3.41	364.26	61.66
13:00 hrs	3.29	364.30	61.70
14:00 hrs	3.06	364.35	61.75
15:00 hrs	3.00	364.39	61.79
16:00 hrs	3.20	364.45	61.85
17:00 hrs	3.38	364.49	61.89
18:00 hrs	3.76	364.23	61.63
19:00 hrs	4.03	363.83	61.23
20:00 hrs	4.09	364.10	61.50
21:00 hrs	3.70	364.23	61.63
22:00 hrs	3.20	364.34	61.74
23:00 hrs	2.41	364.48	61.88
Average Day HGL:		364.29	
Minimum Hour:		364.61	

JCT_39025 Maximum Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	2.11	364.31	61.71
01:00 hrs	1.44	364.41	61.81
02:00 hrs	1.82	364.44	61.84
03:00 hrs	2.45	364.42	61.82
04:00 hrs	2.28	364.52	61.92
05:00 hrs	2.45	364.54	61.94
06:00 hrs	3.72	364.16	61.56
07:00 hrs	5.71	363.44	60.84
08:00 hrs	5.80	363.72	61.12
09:00 hrs	4.61	363.77	61.17
10:00 hrs	4.23	363.87	61.27
11:00 hrs	4.31	363.90	61.30
12:00 hrs	4.19	363.92	61.32
13:00 hrs	4.19	363.90	61.30
14:00 hrs	3.85	363.90	61.30
15:00 hrs	3.64	363.93	61.33
16:00 hrs	4.27	363.98	61.38
17:00 hrs	4.82	363.95	61.35
18:00 hrs	5.41	364.00	61.40
19:00 hrs	6.34	363.90	61.30
20:00 hrs	7.11	363.73	61.13
21:00 hrs	7.40	363.59	60.99
22:00 hrs	5.80	363.78	61.18
23:00 hrs	3.55	364.08	61.48
Maximum Day HGL:		364.01	
Peak Hour:		363.44	

CAM 2w Infowater Location: Street A @ Equestrian Way Formerly: JCT_39024

Available Flow (L/s)	Residual Pressure (m)
0.0	61.5
20.0	60.0
40.0	56.8
60.0	52.1
80.0	45.8
100.0	38.2
120.0	29.1
140.0	18.7
148.4	14.0

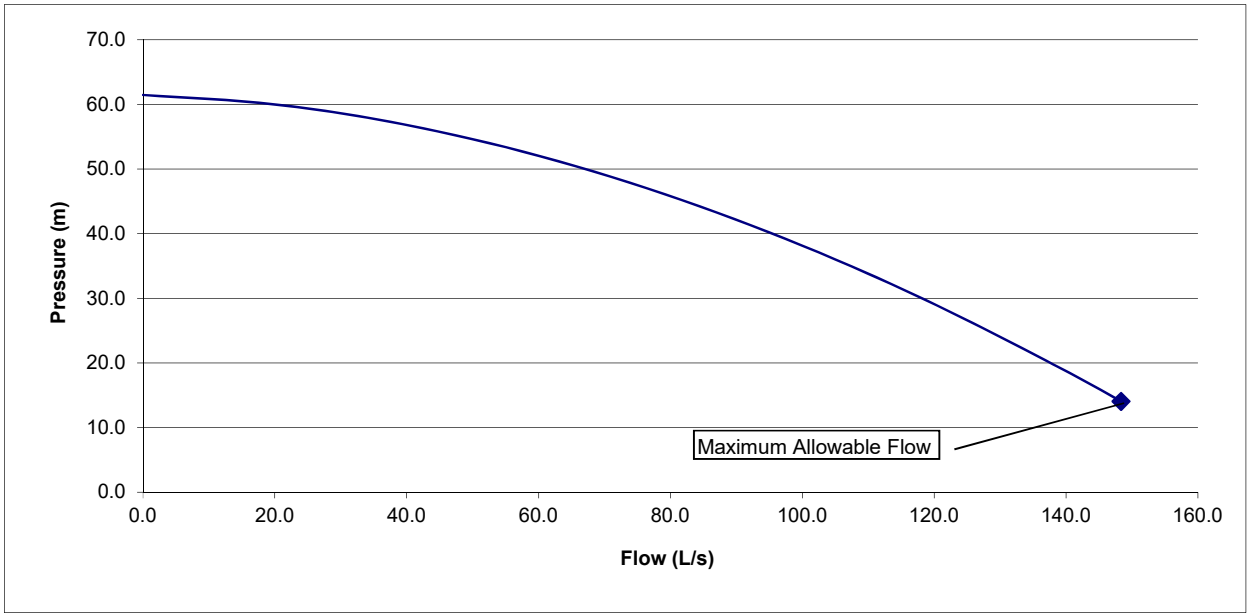
Fire Flow Analysis

Fire Flow Node:	JCT_39025
Design Flow (L/s):	148.4
Design Pressure (m):	14.0

Design Flow: *The final adjusted flow at the node to maintain the minimum design pressure (14m (140 kPa)) at ALL locations within the pressure zone.*

Design Pressure: *The lowest allowable pressure at the node to maintain the minimum design pressure (14m (140 kPa)) at ALL locations within the pressure zone.*

Critical Node ID: *The constraining node within the pressure zone that drops to the minimum design pressure of (14m (140 kPa)) during the design flow.*



CAM 2w Infowater Location: Street B @ Equestrian Way Formerly: JCT_39023

JCT_39024 Average Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	2.12	364.66	52.81
01:00 hrs	1.75	364.37	52.52
02:00 hrs	2.19	364.04	52.19
03:00 hrs	2.30	364.40	52.55
04:00 hrs	2.12	364.58	52.73
05:00 hrs	2.01	364.62	52.77
06:00 hrs	2.81	364.66	52.81
07:00 hrs	4.05	364.43	52.58
08:00 hrs	4.64	364.03	52.18
09:00 hrs	4.34	364.18	52.33
10:00 hrs	4.49	364.26	52.41
11:00 hrs	4.49	364.33	52.48
12:00 hrs	4.23	364.39	52.54
13:00 hrs	4.09	364.42	52.57
14:00 hrs	3.80	364.46	52.61
15:00 hrs	3.72	364.49	52.64
16:00 hrs	3.98	364.56	52.71
17:00 hrs	4.20	364.55	52.70
18:00 hrs	4.67	364.17	52.32
19:00 hrs	5.00	363.80	51.95
20:00 hrs	5.07	364.28	52.43
21:00 hrs	4.60	364.39	52.54
22:00 hrs	3.98	364.47	52.62
23:00 hrs	2.99	364.57	52.72
Average Day HGL:		364.38	
Minimum Hour:		364.66	

JCT_39024 Maximum Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	2.63	364.32	52.47
01:00 hrs	1.79	364.42	52.57
02:00 hrs	2.26	364.45	52.60
03:00 hrs	3.05	364.44	52.59
04:00 hrs	2.84	364.53	52.68
05:00 hrs	3.05	364.55	52.70
06:00 hrs	4.63	364.19	52.34
07:00 hrs	7.10	363.50	51.65
08:00 hrs	7.21	363.78	51.93
09:00 hrs	5.73	363.81	51.96
10:00 hrs	5.26	363.90	52.05
11:00 hrs	5.37	363.94	52.09
12:00 hrs	5.21	363.96	52.11
13:00 hrs	5.21	363.93	52.08
14:00 hrs	4.79	363.93	52.08
15:00 hrs	4.52	363.96	52.11
16:00 hrs	5.31	364.02	52.17
17:00 hrs	6.00	364.00	52.15
18:00 hrs	6.73	364.06	52.21
19:00 hrs	7.89	363.98	52.13
20:00 hrs	8.84	363.82	51.97
21:00 hrs	9.20	363.69	51.84
22:00 hrs	7.21	363.84	51.99
23:00 hrs	4.42	364.10	52.25
Maximum Day HGL:		364.05	
Peak Hour:		363.50	

CAM 2w Infowater Location: Street B @ Equestrian Way Formerly: JCT_39023

Available Flow (L/s)	Residual Pressure (m)
0.0	52.2
20.0	51.4
40.0	49.9
60.0	47.6
80.0	44.7
100.0	41.2
120.0	37.1
140.0	32.3
160.0	27.0
180.0	21.1
200.0	14.7
201.9	14.0

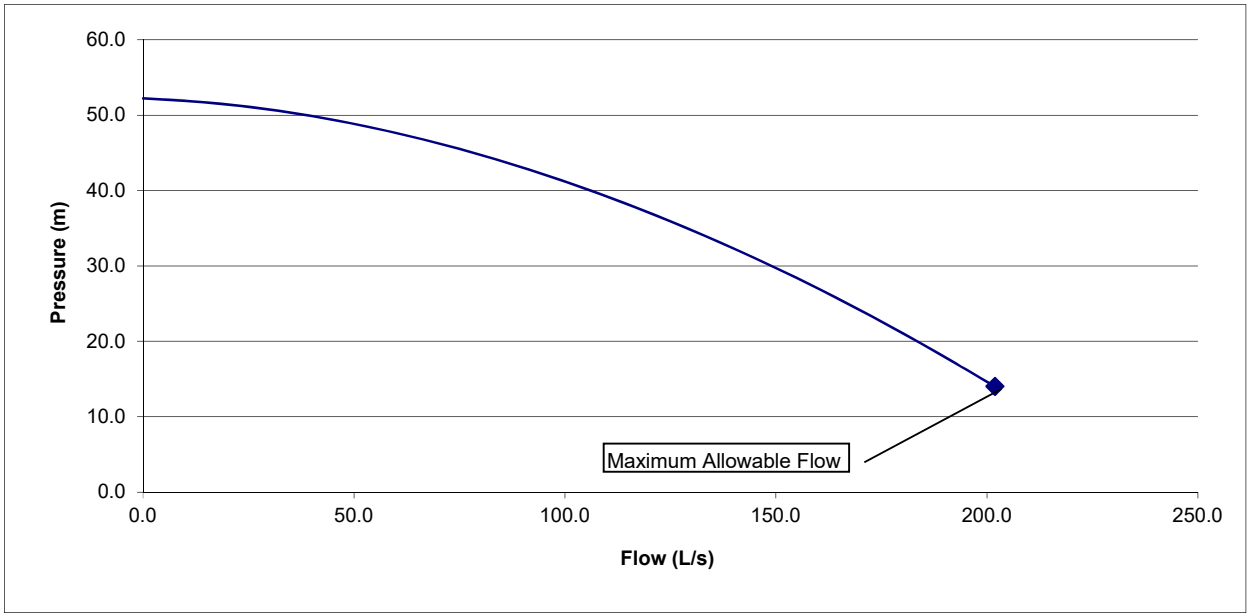
Fire Flow Analysis

Fire Flow Node:	JCT_39024
Design Flow (L/s):	201.9
Design Pressure (m):	14.0

Design Flow: *The final adjusted flow at the node to maintain the minimum design pressure (14m (140 kPa)) at ALL locations within the pressure zone.*

Design Pressure: *The lowest allowable pressure at the node to maintain the minimum design pressure (14m (140 kPa)) at ALL locations within the pressure zone.*

Critical Node ID: *The constraining node within the pressure zone that drops to the minimum design pressure of (14m (140 kPa)) during the design flow.*



CAM 2w Infowater Location: Street A @ Speedsville Rd

JCT_11032 Average Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	5.13	364.46	55.46
01:00 hrs	4.24	364.13	55.13
02:00 hrs	5.30	364.39	55.39
03:00 hrs	5.57	364.50	55.50
04:00 hrs	5.13	364.66	55.66
05:00 hrs	4.86	364.69	55.69
06:00 hrs	6.81	364.55	55.55
07:00 hrs	9.81	364.22	55.22
08:00 hrs	11.23	363.85	54.85
09:00 hrs	10.52	364.31	55.31
10:00 hrs	10.87	364.39	55.39
11:00 hrs	10.87	364.45	55.45
12:00 hrs	10.25	364.50	55.50
13:00 hrs	9.90	364.52	55.52
14:00 hrs	9.19	364.54	55.54
15:00 hrs	9.02	364.56	55.56
16:00 hrs	9.64	364.62	55.62
17:00 hrs	10.17	364.35	55.35
18:00 hrs	11.32	363.99	54.99
19:00 hrs	12.11	364.36	55.36
20:00 hrs	12.29	364.42	55.42
21:00 hrs	11.14	364.51	55.51
22:00 hrs	9.64	364.57	55.57
23:00 hrs	7.25	364.64	55.64
Average Day HGL:		364.42	
Minimum Hour:		364.69	

JCT_11032 Maximum Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	6.36	364.35	55.35
01:00 hrs	4.32	364.43	55.43
02:00 hrs	5.47	364.47	55.47
03:00 hrs	7.38	364.48	55.48
04:00 hrs	6.87	364.56	55.56
05:00 hrs	7.38	364.59	55.59
06:00 hrs	11.19	364.27	55.27
07:00 hrs	17.17	363.69	54.69
08:00 hrs	17.43	363.97	54.97
09:00 hrs	13.86	363.94	54.94
10:00 hrs	12.72	364.01	55.01
11:00 hrs	12.97	364.05	55.05
12:00 hrs	12.59	364.06	55.06
13:00 hrs	12.59	364.03	55.03
14:00 hrs	11.58	364.01	55.01
15:00 hrs	10.94	364.03	55.03
16:00 hrs	12.85	364.13	55.13
17:00 hrs	14.50	364.13	55.13
18:00 hrs	16.28	364.22	55.22
19:00 hrs	19.08	364.20	55.20
20:00 hrs	21.37	364.10	55.10
21:00 hrs	22.26	363.99	54.99
22:00 hrs	17.43	364.03	55.03
23:00 hrs	10.68	364.18	55.18
Maximum Day HGL:		364.16	
Peak Hour:		363.69	

CAM 2w Infowater Location: Street A @ Speedsville Rd

Available Flow (L/s)	Residual Pressure (m)
0.0	55.2
20.0	55.0
40.0	54.7
60.0	54.4
80.0	53.9
100.0	53.4
120.0	52.8
140.0	52.1
160.0	51.4
180.0	50.6
200.0	49.7
220.0	48.7
240.0	47.7
260.0	46.6
280.0	45.4
300.0	44.1
320.0	42.8
340.0	41.4
360.0	40.0
380.0	38.5
400.0	36.9
420.0	35.2
440.0	33.5
460.0	31.7
480.0	29.9
500.0	28.0
520.0	26.0
540.0	24.0
560.0	21.9
580.0	19.7
600.0	17.5
620.0	15.2
621.6	15.0

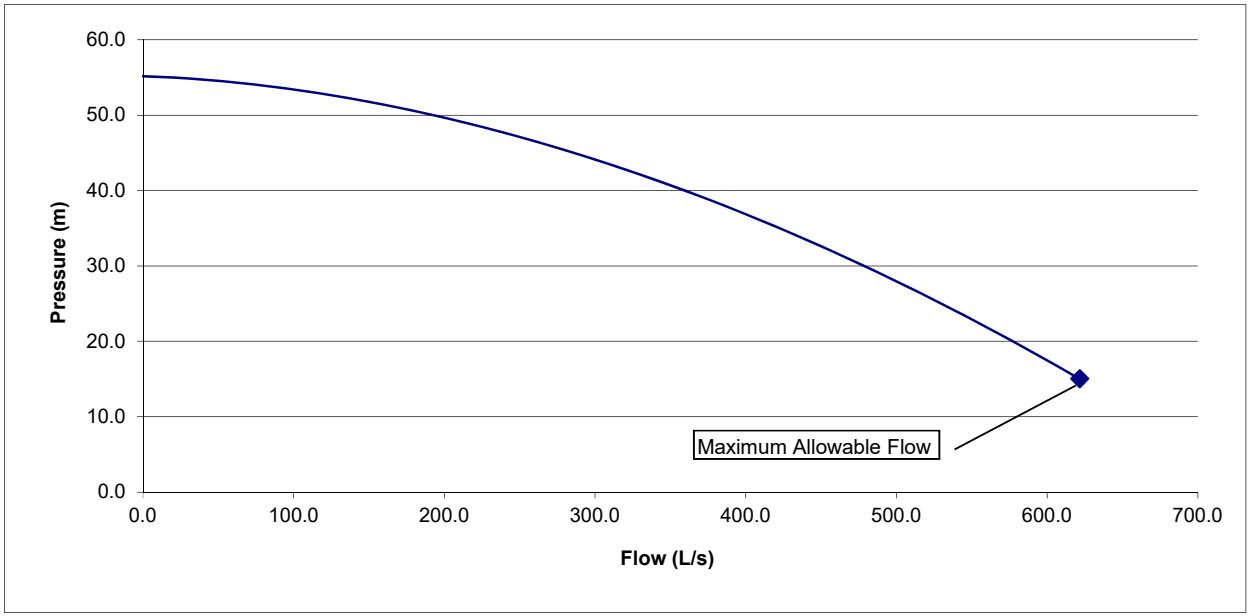
Fire Flow Analysis

Fire Flow Node:	JCT_11032
Design Flow (L/s):	621.6
Design Pressure (m):	15.0

Design Flow: *The final adjusted flow at the node to maintain the minimum design pressure (14m (140 kPa)) at ALL locations within the pressure zone.*

Design Pressure: *The lowest allowable pressure at the node to maintain the minimum design pressure (14m (140 kPa)) at ALL locations within the pressure zone.*

Critical Node ID: *The constraining node within the pressure zone that drops to the minimum design pressure of (14m (140 kPa)) during the design flow.*



CAM 2e Infowater Location: Briardean Rd @ Pointer St Formerly: JCT_39027

JCT_39036 Average Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	0.88	356.94	46.04
01:00 hrs	0.72	357.35	46.45
02:00 hrs	0.91	357.75	46.85
03:00 hrs	0.95	357.85	46.95
04:00 hrs	0.88	357.40	46.50
05:00 hrs	0.83	357.00	46.10
06:00 hrs	1.16	356.48	45.58
07:00 hrs	1.68	355.56	44.66
08:00 hrs	1.92	355.93	45.03
09:00 hrs	1.80	355.94	45.04
10:00 hrs	1.86	355.88	44.98
11:00 hrs	1.86	355.77	44.87
12:00 hrs	1.75	355.65	44.75
13:00 hrs	1.69	355.57	44.67
14:00 hrs	1.57	355.53	44.63
15:00 hrs	1.54	355.52	44.62
16:00 hrs	1.65	355.51	44.61
17:00 hrs	1.74	355.52	44.62
18:00 hrs	1.93	355.53	44.63
19:00 hrs	2.07	355.51	44.61
20:00 hrs	2.10	355.50	44.60
21:00 hrs	1.90	355.54	44.64
22:00 hrs	1.65	355.63	44.73
23:00 hrs	1.24	355.78	44.88
Average Day HGL:		356.11	
Minimum Hour:		357.85	

JCT_39036 Maximum Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	1.09	351.15	40.25
01:00 hrs	0.74	351.89	40.99
02:00 hrs	0.94	352.52	41.62
03:00 hrs	1.27	353.02	42.12
04:00 hrs	1.18	353.61	42.71
05:00 hrs	1.27	354.42	43.52
06:00 hrs	1.93	354.87	43.97
07:00 hrs	2.95	354.93	44.03
08:00 hrs	3.00	354.76	43.86
09:00 hrs	2.38	354.58	43.68
10:00 hrs	2.19	354.55	43.65
11:00 hrs	2.23	354.53	43.63
12:00 hrs	2.17	354.50	43.60
13:00 hrs	2.17	354.42	43.52
14:00 hrs	1.99	354.43	43.53
15:00 hrs	1.88	354.54	43.64
16:00 hrs	2.21	354.58	43.68
17:00 hrs	2.49	354.31	43.41
18:00 hrs	2.80	354.02	43.12
19:00 hrs	3.28	353.64	42.74
20:00 hrs	3.68	352.94	42.04
21:00 hrs	3.83	352.14	41.24
22:00 hrs	3.00	352.00	41.10
23:00 hrs	1.84	352.19	41.29
Maximum Day HGL:		353.69	
Peak Hour:		351.15	

CAM 2e Infowater Location: Briardean Rd @ Pointer St Formerly: JCT_39027

Available Flow (L/s)	Residual Pressure (m)
0.0	43.6
20.0	42.7
40.0	40.9
60.0	38.1
80.0	34.5
100.0	30.0
120.0	24.7
140.0	18.6
153.8	14.0

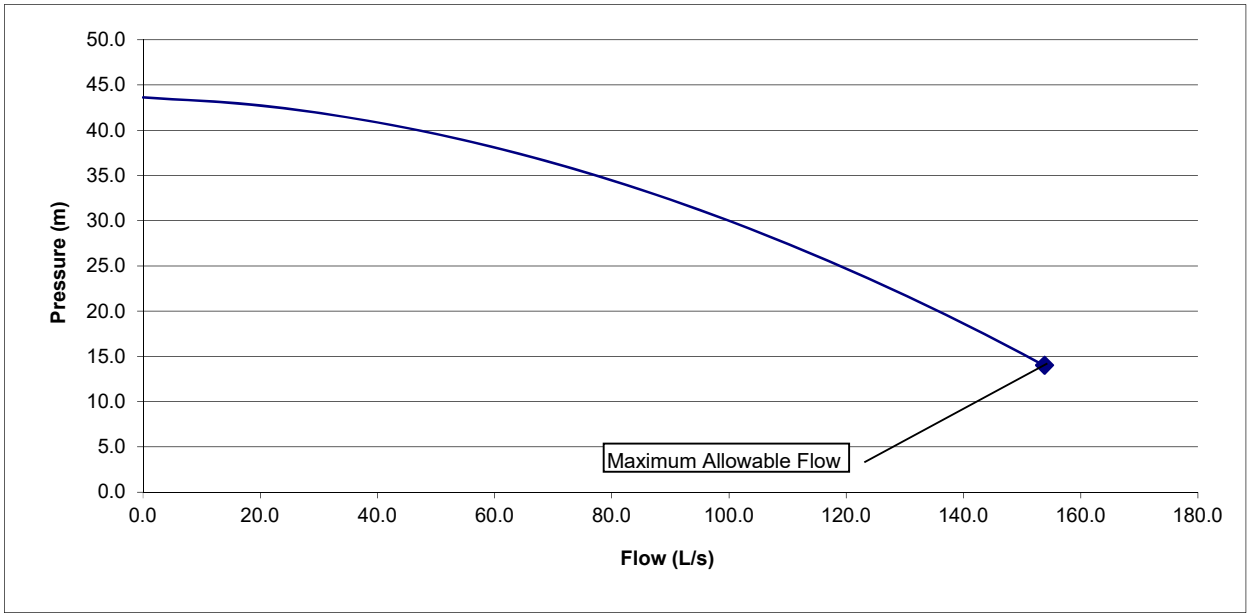
Fire Flow Analysis

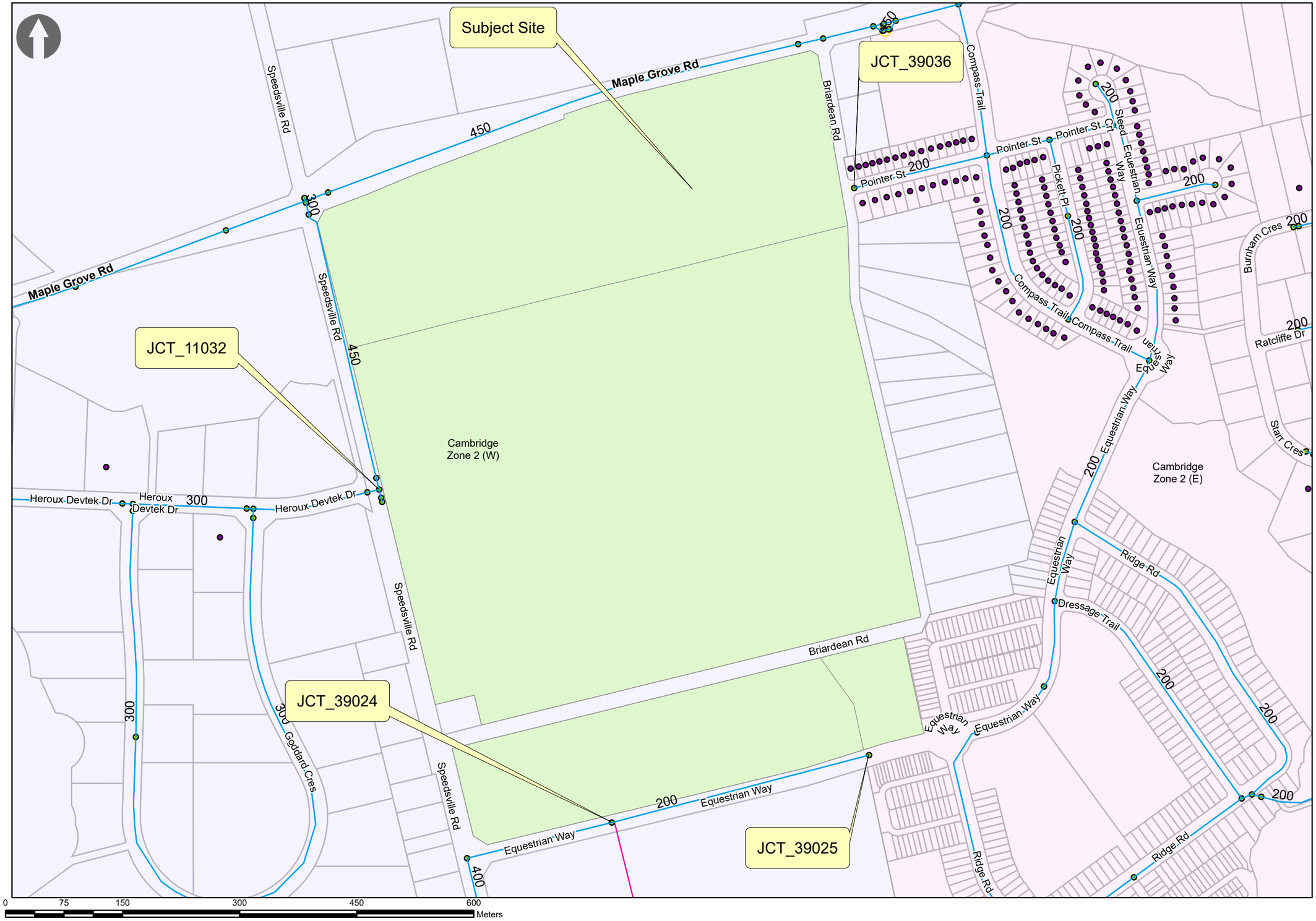
Fire Flow Node:	JCT_39036
Design Flow (L/s):	153.8
Design Pressure (m):	14.0

Design Flow: *The final adjusted flow at the node to maintain the minimum design pressure (14m (140 kPa)) at ALL locations within the pressure zone.*

Design Pressure: *The lowest allowable pressure at the node to maintain the minimum design pressure (14m (140 kPa)) at ALL locations within the pressure zone.*

Critical Node ID: *The constraining node within the pressure zone that drops to the minimum design pressure of (14m (140 kPa)) during the design flow.*





Region of Waterloo

TRANSPORTATION AND ENVIRONMENTAL SERVICES
Water Services
150 Frederick Street
Kitchener ON Canada N2G 4J3
Telephone: (519) 575-4426
Fax: (519) 575-4452
www.regionofwaterloo.ca

Legend

- CAM Billing 2018

Junction
- Active
- Domain

Tank
- Active
- Domain

Reservoir
- Active
- Domain

Pump
- Active
- Domain

Valve
- Active
- Domain

Pipe
- Active
- Domain

Roads
- Highway
- Arterial/Collector
- Local
- Private
- Proposed Roads

Pressure Zone
- Cam 2e
- Cam 2w
- Assessment Parcels (MPAC)
- Subject Site

Revised Hunt Club, Cambridge

Time: 3:52 PM Date: 2020-04-28 Author: NLena Document Path: I:\InfoWater\Modeling Requests\2020\MTE\Hunt Club revised\All_Pipes_20200304_HuntClubSubd_CAM_V3.aprx

Appendix B

Usage Rates/Water Demands & Design Values

River Mill Subdivision - Phase 4 and Phase 5

City of Cambridge
Project No: 45244-104
Date: October 13, 2020
By: MXF
File: Q:\45244\104\Water Distribution\45244-104 Water Demands.xlsx

Node ID	Residential									Commercial		Final Demands[4] (l/s)					Road Elevation (m)
	Single Detached and Semi-detached			Medium Density - Townhomes			High Density - Apartment			Area (ha)	Demand (l/s)	Average Day Q_{avg}	Maximum Day $Q_{max.day}$	Minimum Hour $Q_{min.hr}$	Peak Hour Q_{peak}	Max Day + Fire Flow[5] $Q_{max.day+fire}$	
	# Units[1]	# Persons[2]	Demand[3] (l/s)	# Units[1]	# Persons[2]	Demand[3] (l/s)	# Units[1]	# Persons[2]	Demand[3] (l/s)								
J-1							460	814	2.146			2.146	3.090	1.073	6.437	203.09	307.52
J-2				144	351	0.926						0.926	1.333	0.463	2.778	134.67	310.24
J-3	28	91	0.240	43	105	0.277						0.516	0.744	0.258	1.549	134.08	309.83
J-4							230	407	1.073			1.073	1.545	0.536	3.219	201.54	310.97
J-5				94	229	0.604						0.604	0.870	0.302	1.813	134.20	310.59
J-6	28	91	0.240									0.240	0.345	0.120	0.719	100.35	310.21
J-7	20	65	0.171									0.171	0.247	0.086	0.514	100.25	310.61
J-8	15	49	0.128									0.128	0.185	0.064	0.385	100.19	310.18
J-9	13	42	0.111									0.111	0.160	0.056	0.334	100.16	311.01
J-10	38	124	0.325									0.325	0.469	0.163	0.976	100.47	311.04
J-11	22	72	0.188									0.188	0.271	0.094	0.565	100.27	310.64
J-12				116	283	0.746						0.746	1.074	0.373	2.238	134.41	305.88
J-13							640	1133	2.985	0.215	0.070	3.055	4.399	1.528	9.165	204.40	312.79
J-14				188	459	1.209						1.209	1.741	0.604	3.627	135.07	312.56
J-28												0.000	0.000	0.000	0.000	0.00	311.90
JCT_11032												0.000	0.000	0.000	0.000	0.00	309.00
JCT_39024												0.000	0.000	0.000	0.000	0.00	311.85
JCT_39025												0.000	0.000	0.000	0.000	0.00	302.60
Total	**164**	**533**	**1.405**	**585**	**1427**	**3.762**	**1330**	**2354**	**6.204**	**0.22**	**0.07**	**11.440**	**16.474**	**5.720**	**34.321**		
				Total Units =		**2079**											
				Total Population =		**4315**											

Table Notes:

1. Unit Count based on T.Johns Conuslting Group document: Draft Plans of Subdivision - Phase 4 (September 23, 2020) and Phase 5 (September 25, 2020)

2. Population Density	
Structure Type	**PPU**
Single, detached	3.25
Semi-detached	3.25
Townhouse	2.44
Apartment	1.77
Multiple Unit Types	2.11
Unspecified Unit Type	3.05

Reference: Region of Waterloo 2020 Water and Wastewater Monitoring Report (Region of Waterloo, June 2020)

3. Water Demand	
Residential	227.7 l/d/person 0.00264 l/s/person
Commercial	28 m^3/ha/day 0.324 l/s/ha

Reference: Residential - *Tri-City Distribution System Study (AECOM, May 2009)*
Commercial - *Design Guidelines for Drinking-Water Systems (MOE, 2008)*

4. Peaking Factors	
Average Day	1.00
Maximum Day*	1.44
Minimum Hour	0.50
Peak Hour	3.00

Reference: *Design Guidelines for Drinking-Water Systems (MOE, 2008)* . Table 3-1: Peaking Factors (population 3001 to 10000)
*Max Day Peak Factor taken from *Tri-City Distribution System Study (AECOM, May 2009)*

5. Fire Flow	
Single Family <3m separation	6,000 l/min 100 l/s
Medium-density / Townhomes (contiguous)	8,000 l/min 133 l/s
High-density (Multi-residential/Mixed Use)	12,000 l/min 200 l/s
Commercial	9,000 l/min 150 l/s

Reference: *Water Supply for Public Fire Protection, A Guide to Recommended Practice (1999), Fire Underwriter's Survey (FUS)* .

River Mill Subdivision
CITY OF CAMBRIDGE - PRESSURE ZONE 2W
Pump Curve Design Sheet

Project No.: 45244-104
Date: 27-May-20
Design By: MXF
File: Q:\45244\104\Water Distribution\45244-104 Region Pressures & Pump Curves.xlsx
Note: System pressure information is from correspondence to Alex Cressman from Kevin Dolishny at the Region of Waterloo on May 1, 2020.

Node 11032 ***Speedsville Road at Proposed Street A***
Elevation = ***309.00*** **m**

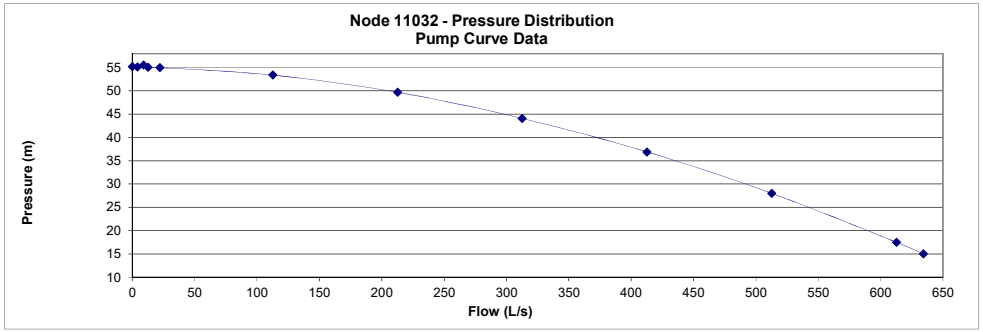
Average Day				
Time	Flow (L/s)	Head (m)	Residual Pressure (m)	
00:00 hrs	5.13	364.46	55.46	
01:00 hrs	**4.24**	**364.13**	**55.13**	**Min Hr**
02:00 hrs	5.30	364.39	55.39	
03:00 hrs	5.57	364.50	55.50	
04:00 hrs	5.13	364.66	55.66	
05:00 hrs	4.86	364.69	55.69	
06:00 hrs	6.81	364.55	55.55	
07:00 hrs	9.81	364.22	55.22	
08:00 hrs	11.23	363.85	54.85	
09:00 hrs	10.52	364.31	55.31	
10:00 hrs	10.87	364.39	55.39	
11:00 hrs	10.87	364.45	55.45	
12:00 hrs	10.25	364.50	55.50	
13:00 hrs	9.90	364.52	55.52	
14:00 hrs	9.19	364.54	55.54	
15:00 hrs	**9.02**	**364.56**	**55.56**	**Avg Day**
16:00 hrs	9.64	364.62	55.62	
17:00 hrs	10.17	364.35	55.35	
18:00 hrs	11.32	363.99	54.99	
19:00 hrs	12.11	364.36	55.36	
20:00 hrs	12.29	364.42	55.42	
21:00 hrs	11.14	364.51	55.51	
22:00 hrs	9.64	364.57	55.57	
23:00 hrs	7.25	364.64	55.64	
Average =	**8.84**	364.42	55.42	
Minimum =	**4.24**	364.69	55.69	

Maximum Day				
Time	Flow (L/s)	Head (m)	Residual Pressure (m)	
00:00 hrs	6.36	364.35	55.35	
01:00 hrs	4.32	364.43	55.43	
02:00 hrs	5.47	364.47	55.47	
03:00 hrs	7.38	364.48	55.48	
04:00 hrs	6.87	364.56	55.56	
05:00 hrs	7.38	364.59	55.59	
06:00 hrs	11.19	364.27	55.27	
07:00 hrs	17.17	363.69	54.69	
08:00 hrs	17.43	363.97	54.97	
09:00 hrs	13.86	363.94	54.94	
10:00 hrs	12.72	364.01	55.01	
11:00 hrs	12.97	364.05	55.05	
12:00 hrs	**12.59**	**364.06**	**55.06**	**Max Day**
13:00 hrs	12.59	364.03	55.03	
14:00 hrs	11.58	364.01	55.01	
15:00 hrs	10.94	364.03	55.03	
16:00 hrs	12.85	364.13	55.13	
17:00 hrs	14.50	364.13	55.13	
18:00 hrs	16.28	364.22	55.22	
19:00 hrs	19.08	364.20	55.20	
20:00 hrs	21.37	364.10	55.10	
21:00 hrs	**22.26**	**363.99**	**54.99**	**Peak Hr**
22:00 hrs	17.43	364.03	55.03	
23:00 hrs	10.68	364.18	55.18	
Max Day =	**12.72**	364.16	55.16	
Peak Hour =	**22.26**	363.69	54.69	

Fire Flow Analysis		
Available Flow (L/s)	Head (m)	Residual Pressure (m)
0.0	364.20	55.20
20.0	364.00	55.00
40.0	363.70	54.70
60.0	363.40	54.40
80.0	362.90	53.90
100.0	362.40	53.40
120.0	361.80	52.80
140.0	361.10	52.10
160.0	360.40	51.40
180.0	359.60	50.60
200.0	358.70	49.70
220.0	357.70	48.70
240.0	356.70	47.70
260.0	355.60	46.60
280.0	354.40	45.40
300.0	353.10	44.10
320.0	351.80	42.80
340.0	350.40	41.40
360.0	349.00	40.00
380.0	347.50	38.50
400.0	345.90	36.90
420.0	344.20	35.20
440.0	342.50	33.50
460.0	340.70	31.70
480.0	338.90	29.90
500.0	337.00	28.00
520.0	335.00	26.00
540.0	333.00	24.00
560.0	330.90	21.90
580.0	328.70	19.70
600.0	326.50	17.50
620.0	324.20	15.20
621.6	324.00	15.00

Fire Flow Analysis Adjusted for Maximum Day Flows		
Available Flow (L/s)	Head (m)	Residual Pressure (m)
12.7	364.20	55.20
32.7	364.00	55.00
52.7	363.70	54.70
72.7	363.40	54.40
92.7	362.90	53.90
112.7	362.40	53.40
132.7	361.80	52.80
152.7	361.10	52.10
172.7	360.40	51.40
192.7	359.60	50.60
212.7	358.70	49.70
232.7	357.70	48.70
252.7	356.70	47.70
272.7	355.60	46.60
292.7	354.40	45.40
312.7	353.10	44.10
332.7	351.80	42.80
352.7	350.40	41.40
372.7	349.00	40.00
392.7	347.50	38.50
412.7	345.90	36.90
432.7	344.20	35.20
452.7	342.50	33.50
472.7	340.70	31.70
492.7	338.90	29.90
512.7	337.00	28.00
532.7	335.00	26.00
552.7	333.00	24.00
572.7	330.90	21.90
592.7	328.70	19.70
612.7	326.50	17.50
632.7	324.20	15.20
634.3	324.00	15.00

Node 11032 - Pump Curve Pressure Distribution			
Demand Scenario	Discharge (L/s)	HGL (m)	Head (m)
0 (Est.)	0.00	364.20	55.20
Minimum Hour	4.24	364.13	55.13
Average Day	9.02	364.56	55.56
Maximum Day	12.59	364.06	55.06
Peak Hour	22.26	363.99	54.99
Max Day + 100 L/s Fire Flow	112.72	362.40	53.40
Max Day + 200 L/s Fire Flow	212.72	358.70	49.70
Max Day + 300 L/s Fire Flow	312.72	353.10	44.10
Max Day + 400 L/s Fire Flow	412.72	345.90	36.90
Max Day + 500 L/s Fire Flow	512.72	337.00	28.00
Max Day + 600 L/s Fire Flow	612.72	326.50	17.50
Max Day + 621.6 L/s Fire Flow	634.32	324.00	15.00



River Mill Subdivision
CITY OF CAMBRIDGE - PRESSURE ZONE 2W
Pump Curve Design Sheet

Project No.: 45244-104
Date: 27-May-20
Design By: MXF
File: Q:\45244\104\Water Distribution\45244-104 Region Pressures & Pump Curves.xlsx
Note: System pressure information is from correspondence to Alex Cressman from Kevin Dolishny at the Region of Waterloo on May 1, 2020.

Node 39024 Equestrian Way at Proposed Street B
Elevation = *311.85* m

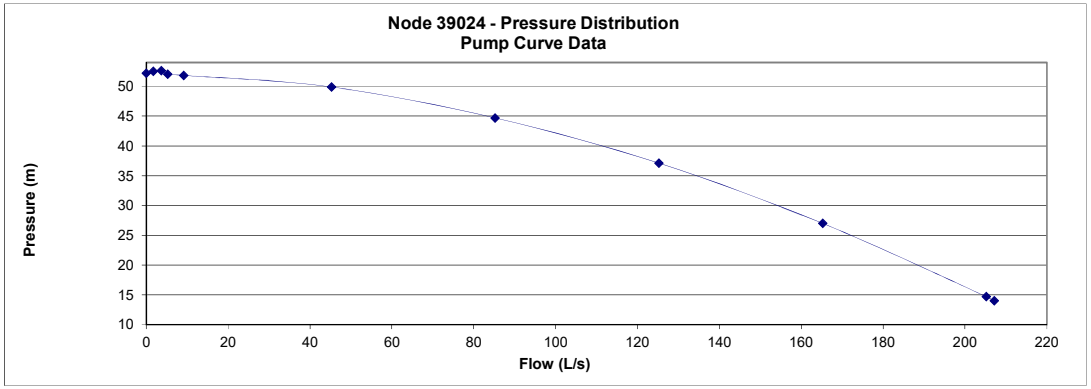
Average Day				
Time	Flow (L/s)	Head (m)	Residual Pressure (m)	
00:00 hrs	2.12	364.66	52.81	
01:00 hrs	**1.75**	**364.37**	**52.52**	**Min Hr**
02:00 hrs	2.19	364.04	52.19	
03:00 hrs	2.30	364.40	52.55	
04:00 hrs	2.12	364.58	52.73	
05:00 hrs	2.01	364.62	52.77	
06:00 hrs	2.81	364.66	52.81	
07:00 hrs	4.05	364.43	52.58	
08:00 hrs	4.64	364.03	52.18	
09:00 hrs	4.34	364.18	52.33	
10:00 hrs	4.49	364.26	52.41	
11:00 hrs	4.49	364.33	52.48	
12:00 hrs	4.23	364.39	52.54	
13:00 hrs	4.09	364.42	52.57	
14:00 hrs	3.80	364.46	52.61	
15:00 hrs	**3.72**	**364.49**	**52.64**	**Avg Day**
16:00 hrs	3.98	364.56	52.71	
17:00 hrs	4.20	364.55	52.70	
18:00 hrs	4.67	364.17	52.32	
19:00 hrs	5.00	363.80	51.95	
20:00 hrs	5.07	364.28	52.43	
21:00 hrs	4.60	364.39	52.54	
22:00 hrs	3.98	364.47	52.62	
23:00 hrs	2.99	364.57	52.72	
Average =	**3.65**	364.38	52.53	
Minimum =	**1.75**	364.66	52.81	

Maximum Day				
Time	Flow (L/s)	Head (m)	Residual Pressure (m)	
00:00 hrs	2.63	364.32	52.47	
01:00 hrs	1.79	364.42	52.57	
02:00 hrs	2.26	364.45	52.60	
03:00 hrs	3.05	364.44	52.59	
04:00 hrs	2.84	364.53	52.68	
05:00 hrs	3.05	364.55	52.70	
06:00 hrs	4.63	364.19	52.34	
07:00 hrs	7.10	363.50	51.65	
08:00 hrs	7.21	363.78	51.93	
09:00 hrs	5.73	363.81	51.96	
10:00 hrs	**5.26**	**363.90**	**52.05**	**Max Day**
11:00 hrs	5.37	363.94	52.09	
12:00 hrs	5.21	363.96	52.11	
13:00 hrs	5.21	363.93	52.08	
14:00 hrs	4.79	363.93	52.08	
15:00 hrs	4.52	363.96	52.11	
16:00 hrs	5.31	364.02	52.17	
17:00 hrs	6.00	364.00	52.15	
18:00 hrs	6.73	364.06	52.21	
19:00 hrs	7.89	363.98	52.13	
20:00 hrs	8.84	363.82	51.97	
21:00 hrs	**9.20**	**363.69**	**51.84**	**Peak Hr**
22:00 hrs	7.21	363.84	51.99	
23:00 hrs	4.42	364.10	52.25	
Max Day =	**5.26**	364.05	52.20	
Peak Hour =	**9.20**	363.50	51.65	

Fire Flow Analysis		
Available Flow (L/s)	Head (m)	Residual Pressure (m)
0.0	364.05	52.20
20.0	363.25	51.40
40.0	361.75	49.90
60.0	359.45	47.60
80.0	356.55	44.70
100.0	353.05	41.20
120.0	348.95	37.10
140.0	344.15	32.30
160.0	338.85	27.00
180.0	332.95	21.10
200.0	326.55	14.70
201.9	325.85	14.00

Fire Flow Analysis Adjusted for Maximum Day Flows		
Available Flow (L/s)	Head (m)	Residual Pressure (m)
5.3	364.05	52.20
25.3	363.25	51.40
45.3	361.75	49.90
65.3	359.45	47.60
85.3	356.55	44.70
105.3	353.05	41.20
125.3	348.95	37.10
145.3	344.15	32.30
165.3	338.85	27.00
185.3	332.95	21.10
205.3	326.55	14.70
207.2	325.85	14.00

Node 39024 - Pump Curve Pressure Distribution			
Demand Scenario	Discharge (L/s)	HGL (m)	Head (m)
0 (Est.)	0.00	364.05	52.20
Minimum Hour	1.75	364.37	52.52
Average Day	3.72	364.49	52.64
Maximum Day	5.26	363.90	52.05
Peak Hour	9.20	363.69	51.84
Max Day + 40 L/s Fire Flow	45.26	361.75	49.90
Max Day + 80 L/s Fire Flow	85.26	356.55	44.70
Max Day + 120 L/s Fire Flow	125.26	348.95	37.10
Max Day + 160 L/s Fire Flow	165.26	338.85	27.00
Max Day + 200 L/s Fire Flow	205.26	326.55	14.70
Max Day + 201.9 L/s Fire Flow	207.16	325.85	14.00



River Mill Subdivision
CITY OF CAMBRIDGE - PRESSURE ZONE 2W
Pump Curve Design Sheet

Project No.: 45244-104
Date: 27-May-20
Design By: MXF
File: Q:\45244\104\Water Distribution\45244-104 Region Pressures & Pump Curves.xlsx
Note: System pressure information is from correspondence to Alex Cressman from Kevin Dolishny at the Region of Waterloo on May 1, 2020.

Node 39025 Equestrian Way at Proposed Street A
Elevation = *302.60* m

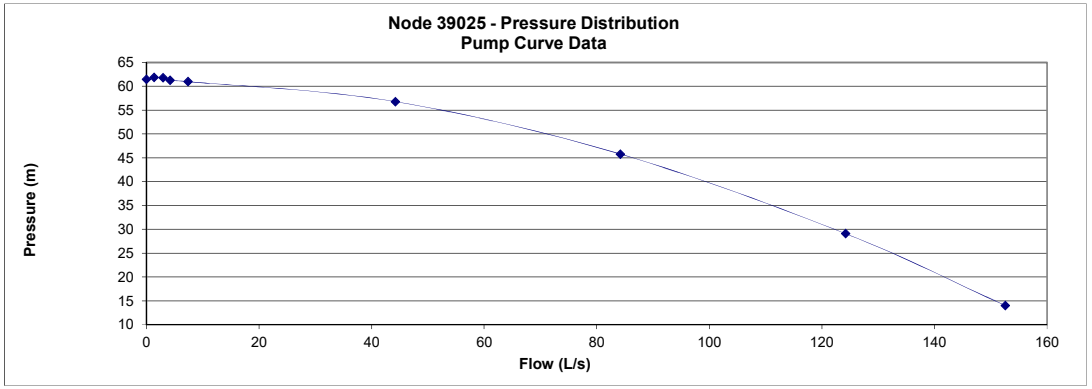
Average Day				
Time	Flow (L/s)	Head (m)	Residual Pressure (m)	
00:00 hrs	1.71	364.61	62.01	
01:00 hrs	**1.41**	**364.49**	**61.89**	**Min Hr**
02:00 hrs	1.76	364.14	61.54	
03:00 hrs	1.85	363.81	61.21	
04:00 hrs	1.71	364.52	61.92	
05:00 hrs	1.62	364.56	61.96	
06:00 hrs	2.26	364.58	61.98	
07:00 hrs	3.26	364.49	61.89	
08:00 hrs	3.73	364.06	61.46	
09:00 hrs	3.50	364.03	61.43	
10:00 hrs	3.62	364.11	61.51	
11:00 hrs	3.62	364.18	61.58	
12:00 hrs	3.41	364.26	61.66	
13:00 hrs	3.29	364.30	61.70	
14:00 hrs	3.06	364.35	61.75	
15:00 hrs	**3.00**	**364.39**	**61.79**	**Avg Day**
16:00 hrs	3.20	364.45	61.85	
17:00 hrs	3.38	364.49	61.89	
18:00 hrs	3.76	364.23	61.63	
19:00 hrs	4.03	363.83	61.23	
20:00 hrs	4.09	364.10	61.50	
21:00 hrs	3.70	364.23	61.63	
22:00 hrs	3.20	364.34	61.74	
23:00 hrs	2.41	364.48	61.88	
Average =	**2.94**	364.29	61.69	
Minimum =	**1.41**	364.61	62.01	

Maximum Day				
Time	Flow (L/s)	Head (m)	Residual Pressure (m)	
00:00 hrs	2.11	364.31	61.71	
01:00 hrs	1.44	364.41	61.81	
02:00 hrs	1.82	364.44	61.84	
03:00 hrs	2.45	364.42	61.82	
04:00 hrs	2.28	364.52	61.92	
05:00 hrs	2.45	364.54	61.94	
06:00 hrs	3.72	364.16	61.56	
07:00 hrs	5.71	363.44	60.84	
08:00 hrs	5.80	363.72	61.12	
09:00 hrs	4.61	363.77	61.17	
10:00 hrs	**4.23**	**363.87**	**61.27**	**Max Day**
11:00 hrs	4.31	363.90	61.30	
12:00 hrs	4.19	363.92	61.32	
13:00 hrs	4.19	363.90	61.30	
14:00 hrs	3.85	363.90	61.30	
15:00 hrs	3.64	363.93	61.33	
16:00 hrs	4.27	363.98	61.38	
17:00 hrs	4.82	363.95	61.35	
18:00 hrs	5.41	364.00	61.40	
19:00 hrs	6.34	363.90	61.30	
20:00 hrs	7.11	363.73	61.13	
21:00 hrs	**7.40**	**363.59**	**60.99**	**Peak Hr**
22:00 hrs	5.80	363.78	61.18	
23:00 hrs	3.55	364.08	61.48	
Max Day =	**4.23**	364.01	61.41	
Peak Hour =	**7.40**	363.44	60.84	

Fire Flow Analysis		
Available Flow (L/s)	Head (m)	Residual Pressure (m)
0.0	364.10	61.50
20.0	362.60	60.00
40.0	359.40	56.80
60.0	354.70	52.10
80.0	348.40	45.80
100.0	340.80	38.20
120.0	331.70	29.10
140.0	321.30	18.70
148.4	316.60	14.00

Fire Flow Analysis Adjusted for Maximum Day Flows		
Available Flow (L/s)	Head (m)	Residual Pressure (m)
4.2	364.10	61.50
24.2	362.60	60.00
44.2	359.40	56.80
64.2	354.70	52.10
84.2	348.40	45.80
104.2	340.80	38.20
124.2	331.70	29.10
144.2	321.30	18.70
152.6	316.60	14.00

Node 39025 - Pump Curve Pressure Distribution			
Demand Scenario	Discharge (L/s)	HGL (m)	Head (m)
0 (Est.)	0.00	364.10	61.50
Minimum Hour	1.41	364.49	61.89
Average Day	3.00	364.39	61.79
Maximum Day	4.23	363.87	61.27
Peak Hour	7.40	363.59	60.99
Max Day + 40 L/s Fire Flow	44.23	359.40	56.80
Max Day + 80 L/s Fire Flow	84.23	348.40	45.80
Max Day + 120 L/s Fire Flow	124.23	331.70	29.10
Max Day + 148.4 L/s Fire Flow	152.63	316.60	14.00



River Mill Subdivision
CITY OF CAMBRIDGE - PRESSURE ZONE 2E
Pump Curve Design Sheet

Project No.: 45244-104
Date: 27-May-20
Design By: MXF
File: Q:\45244\104\Water Distribution\45244-104 Region Pressures & Pump Curves.xlsx
Note: System pressure information is from correspondence to Alex Cressman from Kevin Dolishny at the Region of Waterloo on May 1, 2020.

Node 39036 Pointer Street at Briardean Road
Elevation = *310.90* m

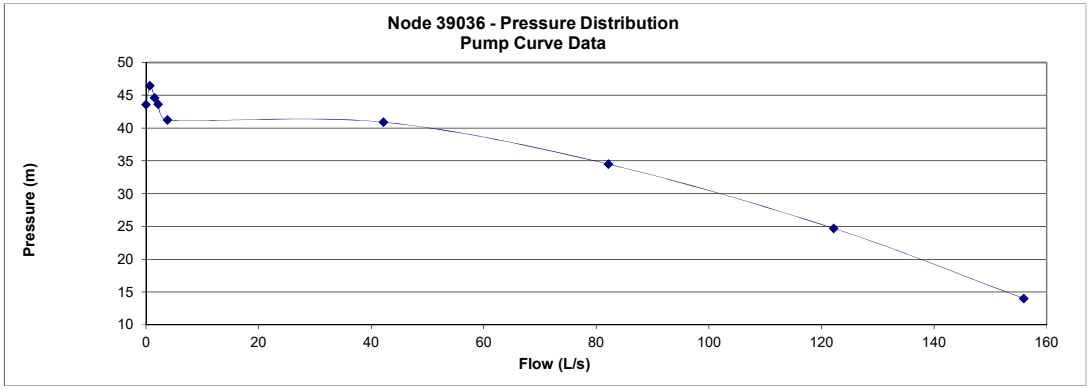
Average Day				
Time	Flow (L/s)	Head (m)	Residual Pressure (m)	
00:00 hrs	0.88	356.94	46.04	
01:00 hrs	**0.72**	**357.35**	**46.45**	**Min Hr**
02:00 hrs	0.91	357.75	46.85	
03:00 hrs	0.95	357.85	46.95	
04:00 hrs	0.88	357.40	46.50	
05:00 hrs	0.83	357.00	46.10	
06:00 hrs	1.16	356.48	45.58	
07:00 hrs	1.68	355.56	44.66	
08:00 hrs	1.92	355.93	45.03	
09:00 hrs	1.80	355.94	45.04	
10:00 hrs	1.86	355.88	44.98	
11:00 hrs	1.86	355.77	44.87	
12:00 hrs	1.75	355.65	44.75	
13:00 hrs	1.69	355.57	44.67	
14:00 hrs	1.57	355.53	44.63	
15:00 hrs	**1.54**	**355.52**	**44.62**	**Avg Day**
16:00 hrs	1.65	355.51	44.61	
17:00 hrs	1.74	355.52	44.62	
18:00 hrs	1.93	355.53	44.63	
19:00 hrs	2.07	355.51	44.61	
20:00 hrs	2.10	355.50	44.60	
21:00 hrs	1.90	355.54	44.64	
22:00 hrs	1.65	355.63	44.73	
23:00 hrs	1.24	355.78	44.88	
Average =	**1.51**	356.11	45.21	
Minimum =	**0.72**	357.85	46.95	

Maximum Day				
Time	Flow (L/s)	Head (m)	Residual Pressure (m)	
00:00 hrs	1.09	351.15	40.25	
01:00 hrs	0.74	351.89	40.99	
02:00 hrs	0.94	352.52	41.62	
03:00 hrs	1.27	353.02	42.12	
04:00 hrs	1.18	353.61	42.71	
05:00 hrs	1.27	354.42	43.52	
06:00 hrs	1.93	354.87	43.97	
07:00 hrs	2.95	354.93	44.03	
08:00 hrs	3.00	354.76	43.86	
09:00 hrs	2.38	354.58	43.68	
10:00 hrs	**2.19**	**354.55**	**43.65**	**Max Day**
11:00 hrs	2.23	354.53	43.63	
12:00 hrs	2.17	354.50	43.60	
13:00 hrs	2.17	354.42	43.52	
14:00 hrs	1.99	354.43	43.53	
15:00 hrs	1.88	354.54	43.64	
16:00 hrs	2.21	354.58	43.68	
17:00 hrs	2.49	354.31	43.41	
18:00 hrs	2.80	354.02	43.12	
19:00 hrs	3.28	353.64	42.74	
20:00 hrs	3.68	352.94	42.04	
21:00 hrs	**3.83**	**352.14**	**41.24**	**Peak Hr**
22:00 hrs	3.00	352.00	41.10	
23:00 hrs	1.84	352.19	41.29	
Max Day =	**2.19**	353.69	42.79	
Peak Hour =	**3.83**	351.15	40.25	

Fire Flow Analysis		
Available Flow (L/s)	Head (m)	Residual Pressure (m)
0.0	354.50	43.60
20.0	353.60	42.70
40.0	351.80	40.90
60.0	349.00	38.10
80.0	345.40	34.50
100.0	340.90	30.00
120.0	335.60	24.70
140.0	329.50	18.60
153.8	324.90	14.00

Fire Flow Analysis Adjusted for Maximum Day Flows		
Available Flow (L/s)	Head (m)	Residual Pressure (m)
2.2	354.50	43.60
22.2	353.60	42.70
42.2	351.80	40.90
62.2	349.00	38.10
82.2	345.40	34.50
102.2	340.90	30.00
122.2	335.60	24.70
142.2	329.50	18.60
156.0	324.90	14.00

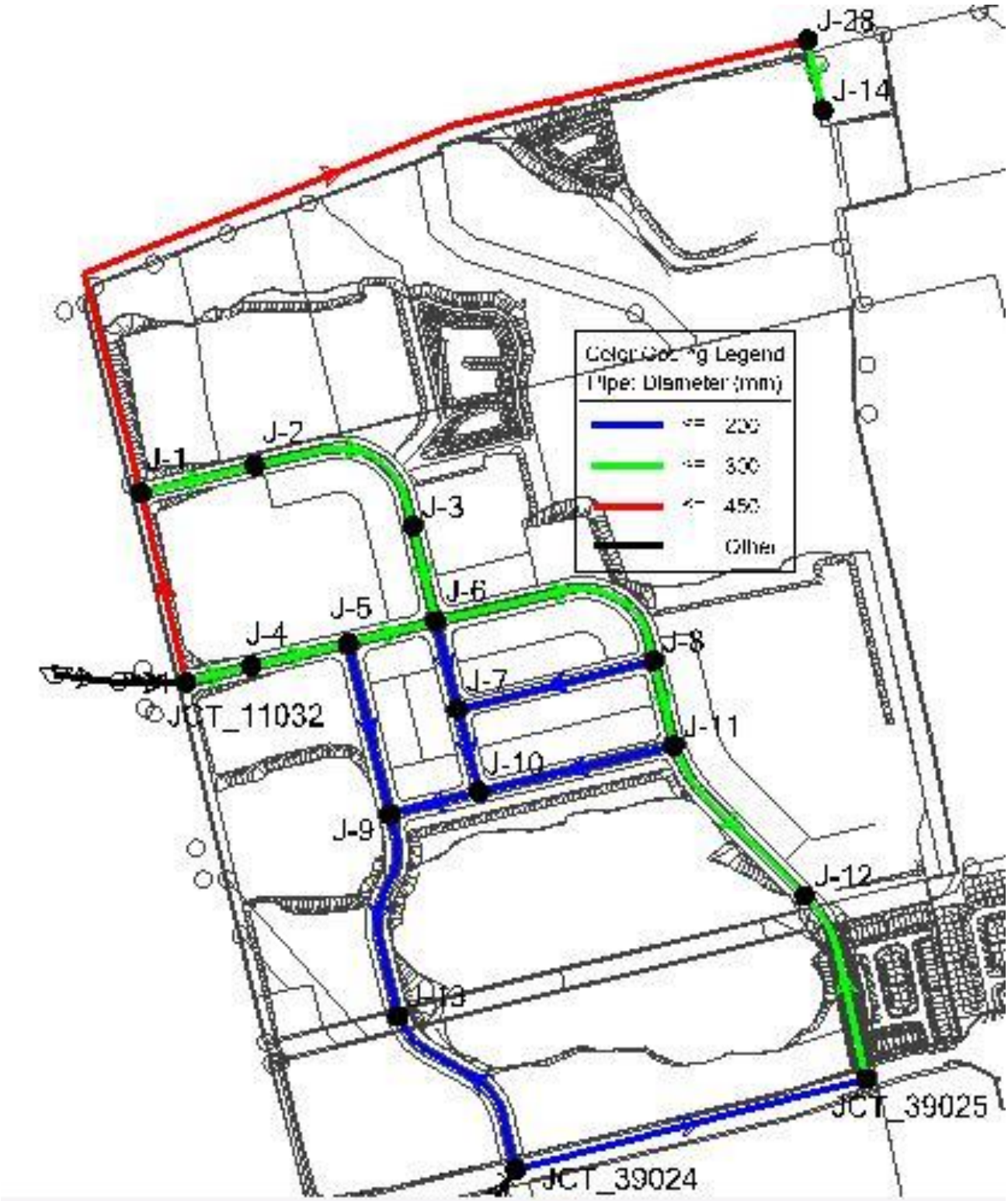
Node 39036- Pump Curve Pressure Distribution			
Demand Scenario	Discharge (L/s)	HGL (m)	Head (m)
0 (Est.)	0.00	354.50	43.60
Minimum Hour	0.72	357.35	46.45
Average Day	1.54	355.52	44.62
Maximum Day	2.19	354.55	43.65
Peak Hour	3.83	352.14	41.24
Max Day + 40 L/s Fire Flow	42.19	351.80	40.90
Max Day + 80 L/s Fire Flow	82.19	345.40	34.50
Max Day + 120 L/s Fire Flow	122.19	335.60	24.70
Max Day + 153.8 L/s Fire Flow	155.99	324.90	14.00



Appendix C

WaterCAD Output Files

Water Distribution Network



River Mill Subdivision

Active Scenario: Avg Day

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (kPa)
J-1	307.52	2.15	363.95	552
J-2	310.24	0.93	363.95	526
J-3	309.83	0.52	363.95	530
J-4	310.97	1.07	363.95	519
J-5	310.59	0.60	363.95	522
J-6	310.21	0.24	363.95	526
J-7	310.61	0.17	363.95	522
J-8	310.18	0.13	363.95	526
J-9	311.01	0.11	363.95	518
J-10	311.04	0.32	363.95	518
J-11	310.64	0.19	363.95	522
J-12	305.88	0.75	363.95	568
J-13	312.79	3.06	363.94	501
J-14	312.56	1.21	363.95	503

River Mill Subdivision

Active Scenario: Max Day

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (kPa)
J-1	307.52	3.09	363.92	552
J-2	310.24	1.33	363.92	525
J-3	309.83	0.74	363.92	529
J-4	310.97	1.54	363.92	518
J-5	310.59	0.87	363.92	522
J-6	310.21	0.34	363.92	526
J-7	310.61	0.25	363.92	522
J-8	310.18	0.19	363.92	526
J-9	311.01	0.16	363.92	518
J-10	311.04	0.47	363.92	518
J-11	310.64	0.27	363.92	521
J-12	305.88	1.07	363.92	568
J-13	312.79	4.40	363.91	500
J-14	312.56	1.74	363.92	503

River Mill Subdivision

Active Scenario: Min Hour

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (kPa)
J-1	307.52	1.07	363.98	553
J-2	310.24	0.46	363.97	526
J-3	309.83	0.26	363.97	530
J-4	310.97	0.54	363.98	519
J-5	310.59	0.30	363.97	522
J-6	310.21	0.12	363.97	526
J-7	310.61	0.09	363.97	522
J-8	310.18	0.06	363.97	526
J-9	311.01	0.06	363.97	518
J-10	311.04	0.16	363.97	518
J-11	310.64	0.09	363.97	522
J-12	305.88	0.37	363.97	569
J-13	312.79	1.53	363.97	501
J-14	312.56	0.60	363.98	503

River Mill Subdivision

Active Scenario: Peak Hour

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (kPa)
J-1	307.52	6.44	363.83	551
J-2	310.24	2.78	363.82	524
J-3	309.83	1.55	363.82	528
J-4	310.97	3.22	363.83	517
J-5	310.59	1.81	363.82	521
J-6	310.21	0.72	363.82	525
J-7	310.61	0.51	363.82	521
J-8	310.18	0.38	363.82	525
J-9	311.01	0.33	363.82	517
J-10	311.04	0.98	363.82	517
J-11	310.64	0.57	363.82	520
J-12	305.88	2.24	363.82	567
J-13	312.79	9.16	363.80	499
J-14	312.56	3.63	363.83	502

River Mill Subdivision

Active Scenario: Max Day + Fire

Label	Elevation (m)	Fire Flow Iterations	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (L/s)	Flow (Total Needed) (L/s)	Flow (Total Available) (L/s)	Pressure (Calculated Residual) (kPa)	Pressure (Calculated System Lower Limit) (kPa)	Velocity of Maximum Pipe (m/s)	Pipe w/ Maximum Velocity
J-1	307.52	2	True	200.00	203.09	625.09	259	210	3.21	P-47
J-2	310.24	3	True	133.00	134.33	623.33	171	224	5.47	P-48
J-3	309.83	3	True	133.00	133.74	622.74	162	213	4.95	P-50
J-4	310.97	2	True	200.00	201.54	623.54	204	232	5.69	P-32
J-5	310.59	3	True	133.00	133.87	622.87	190	214	4.50	P-32
J-6	310.21	3	True	100.00	100.34	622.34	187	193	3.83	P-34
J-7	310.61	4	True	100.00	100.25	529.05	140	228	6.87	P-35
J-8	310.18	4	True	100.00	100.18	589.20	140	151	4.27	P-39
J-9	311.01	4	True	100.00	100.16	494.55	140	210	6.32	P-37
J-10	311.04	4	True	100.00	100.47	513.28	140	240	6.07	P-36
J-11	310.64	4	True	100.00	100.27	561.05	140	192	4.81	P-42
J-12	305.88	4	True	133.00	134.07	518.07	140	188	5.48	P-43
J-13	312.79	3	True	200.00	204.40	362.57	140	353	5.82	P-46
J-14	312.56	4	True	133.00	134.74	470.57	140	223	6.66	P-57

Appendix D

Storm Sewer Analysis

River Mill Subdivision
CITY OF CAMBRIDGE

STORM SEWER DESIGN SHEET

ENGINEERING AND PUBLIC WORKS

Project Number: 45244-104
Date: October 5, 2020
Design By: ALN
Checked By: VAL
File: -104 Storm Sewer Design River Mill Subdivision-2020 09 10.xlsx

Drainage Area Plan No: 45244-104 W1.1

Design Parameters

5 YEAR STORM

Q=kAIC, k=0.00278
Intensity (I) = a/(tc+b)^c
a = 1219.8
b = 10.5
c = 0.823

Manning's "n" 0.013
Min. Velocity 0.800 m/s
Max. Velocity 6.000 m/s

LOCATION				STORMWATER FLOW								DESIGN					
STREET	AREA NUMBER	MANHOLE LOCATION FROM MH	MANHOLE LOCATION TO MH	AREA (A)	RUNOFF COEFF. (C)	A x C	CUMUL. A x C	CONCENTRATION TIME TOTAL	CONCENTRATION TIME IN PIPE	RAIN INTENSITY (I)	FLOW (Q)	PIPE SIZE	LENGTH	SLOPE	CAPACITY	FULL FLOW VELOCITY	PIPE FULL
				ha		*ha*	*ha*	*min*	*min*	*mm/hr*	*L/sec*	*mm*	*m*	*%*	*L/sec*	*m/s*	*%*
BLOCK 1	1	MH	MH	0.930	0.75	0.6975	0.6975	10.0000	0.1327	101.5582	196.9265	450	15.4	1.00	285.10614	1.7926	69.07
								10.1327									
Street 100	2	MH	MH	0.239	0.75	0.1793	0.1793	10.0000	0.2988	101.5582	50.6080	300	24.8	1.00	96.70076	1.3680	52.33
Street 100	3	MH	MH	0.388	0.69	0.2677	0.4470	10.2988	0.5459	100.3560	124.7000	450	43.7	0.50	201.60049	1.2676	61.85
Street 100	N/A	MH	MH	0.000	0.00	0.0000	0.4470	10.8447	0.4670	98.2387	122.0691	450	37.2	0.50	201.60049	1.2676	60.55
								11.3118									
Street B	4	MH	MH	0.378	0.75	0.2835	1.4280	11.3118	0.2762	96.5042	383.0981	525	37.2	1.00	430.06227	1.9867	89.08
								11.5879									
Street 200	5	MH	MH	0.334	0.68	0.2271	0.2271	10.0000	0.5907	101.5582	64.1232	300	42.2	0.60	74.90409	1.0597	85.61
Street 200	N/A	MH	MH	0.000	0.00	0.0000	0.2271	10.5907	0.6472	99.2113	62.6414	375	43.7	0.50	123.97713	1.1225	50.53
								11.2379									
Street B	6	MH	MH	0.300	0.69	0.2070	1.8621	11.3118	0.3143	96.5042	499.5645	675	35.1	0.50	594.38558	1.6610	84.05
								11.6261									
Street 17	7	MH	MH	0.095	0.70	0.0665	0.0665	10.0000	0.8248	101.5582	18.7751	300	43.6	0.60	74.90409	1.0597	25.07
Street 500	8	MH	MH	0.279	0.70	0.1953	0.2618	10.8248	0.6839	98.3143	71.5536	375	47.7	0.50	123.97713	1.1225	57.72
								11.5087									
Street B	9	MH	MH	0.167	0.69	0.1152	2.2391	11.6261	0.2716	95.3744	593.6822	750	31.9	0.50	787.20572	1.7819	75.42
								11.8977									
Street 300	10	MH	MH	0.379	0.69	0.2615	0.2615	10.0000	0.3983	101.5582	73.8326	300	36.0	1.00	96.70076	1.3680	76.35
Street 300	N/A	MH	MH	0.000	0.00	0.0000	0.2615	10.3983	0.4914	99.9627	72.6726	375	34.4	0.50	123.97713	1.1225	58.62
Street 300	11	MH	MH	0.126	0.70	0.0882	0.3497	10.8896	0.3694	98.0689	95.3420	450	27.7	0.50	201.60049	1.2676	47.29
								11.2591									
Street B	12	MH	MH	0.110	0.70	0.0770	3.3633	11.8977	0.2018	94.4216	882.8472	825	25.9	0.50	1015.00629	1.8988	86.98
Street B	N/A	MH	MH	0.000	0.00	0.0000	3.3633	12.0995	0.1069	93.7270	876.3529	825	13.7	0.50	1015.00629	1.8988	86.34
								12.2064									
Street 400	13	MH	MH	0.476	0.69	0.3284	0.3284	10.0000	0.3349	101.5582	92.7291	300	31.3	1.00	96.70076	1.3680	95.89
Street 400	N/A	MH	MH	0.000	0.00	0.0000	0.3284	10.3349	0.5186	100.2126	91.5005	375	38.2	0.50	123.97713	1.1225	73.80
Street 400	N/A	MH	MH	0.000	0.00	0.0000	0.3284	10.8535	0.2330	98.2054	89.6678	450	17.2	0.50	201.60049	1.2676	44.48
Street 400	N/A	MH	MH	0.000	0.00	0.0000	0.3284	11.0865	0.1385	97.3321	88.8704	450	10.2	0.50	201.60049	1.2676	44.08
								11.2250									
Street B	N/A	MH	MH	0.000	0.00	0.0000	3.6918	12.2064	0.1428	93.3637	958.2033	825	18.5	0.50	1015.00629	1.8988	94.40
Street B	N/A	MH	MH	0.000	0.00	0.0000	3.6918	12.3492	0.0533	92.8833	953.2729	825	6.9	0.50	1015.00629	1.8988	93.92
								12.4025									
Street E	11	MH	MH	0.300	0.75	0.2250	0.2250	10.0000	0.3825	101.5582	63.5247	300	33.5	1.00	96.70076	1.3680	65.69
								10.3825									
FLOW TO STORMCEPTOR EFO4				**0.064**	cu.m./sec.												
Street E	12	MH	MH	0.242	0.55	0.1331	0.1331	10.0000	1.3214	101.5582	37.5784	375	78.0	0.50	123.97713	1.1225	30.31

LOCATION				STORMWATER FLOW								DESIGN					
STREET	AREA NUMBER	MANHOLE LOCATION FROM MH	MANHOLE LOCATION TO MH	AREA (A)	RUNOFF COEFF. (C)	A x C	CUMUL. A x C	CONCENTRATION TIME TOTAL	CONCENTRATION TIME IN PIPE	RAIN INTENSITY (I)	FLOW (Q)	PIPE SIZE	LENGTH	SLOPE	CAPACITY	FULL FLOW VELOCITY	PIPE FULL
				ha		*ha*	*ha*	*min*	*min*	*mm/hr*	*L/sec*	*mm*	*m*	*%*	*L/sec*	*m/s*	*%*
Street E	13	MH	MH	0.808	0.55	0.4444	0.5775	11.3214	0.6212	96.4692	154.8765	450	68.2	1.00	285.10614	1.7926	54.32
								11.9426									
Street A	14	MH	MH	0.829	0.75	0.6218	0.6218	10.0000	0.1514	101.5582	175.5399	450	14.0	0.60	220.84227	1.3886	79.49
Street A	15	MH	MH	1.058	0.75	0.7935	1.4153	10.1514	0.3354	100.9450	397.1573	675	35.8	0.50	594.38558	1.6610	66.82
Street A	16	MH	MH	0.508	0.70	0.3556	1.7709	10.4868	0.3836	99.6154	490.4031	675	42.7	0.50	594.38558	1.6610	82.51
Street A	17	MH	MH	0.524	0.70	0.3668	2.1377	10.8704	0.4728	98.1414	583.2218	675	53.7	0.50	594.38558	1.6610	98.12
								11.3432									
Street A	18	MH	MH	0.046	0.75	0.0345	2.7497	11.9426	0.5741	94.2661	720.5725	750	69.6	0.50	787.20572	1.7819	91.54
								12.5167									
Street B	19	MH	MH	0.686	0.55	0.3773	0.3773	10.0000	0.6782	101.5582	106.5238	375	67.7	1.00	175.33014	1.5875	60.76
								10.6782									
Street B	20	MH	MH	0.552	0.55	0.3036	0.3036	10.0000	0.9666	101.5582	85.7160	300	89.6	1.00	96.70076	1.3680	88.64
								10.9666									
Street B	21	MH	MH	0.308	0.55	0.1694	0.8503	10.9666	0.6901	97.7794	231.1342	525	64.0	0.50	304.09995	1.4048	76.01
Street B	N/A	MH	MH	0.000	0.00	0.0000	0.8503	11.6567	0.1680	95.2659	225.1928	525	15.5	0.50	304.09995	1.4048	74.05
								11.8247									
Street B	22	MH	MH	0.293	0.55	0.1612	0.1612	10.0000	0.8743	101.5582	45.4978	300	54.3	0.50	68.37776	0.9673	66.54
								10.8743									
Street B	23	MH	MH	0.479	0.60	0.2874	4.0485	12.5167	0.2759	92.3266	1039.1200	900	37.1	0.50	1280.08329	2.0122	81.18
Street B	N/A	MH	MH	0.000	0.00	0.0000	4.0485	12.7926	0.2473	91.4256	1028.9791	900	33.2	0.50	1280.08329	2.0122	80.38
								13.0400									
Street 7	24	MH	MH	0.461	0.68	0.3135	0.3135	10.0000	0.3728	101.5582	88.5054	300	34.7	1.00	96.70076	1.3680	91.53
Street 7	N/A	MH	MH	0.000	0.00	0.0000	0.3135	10.3728	0.5512	100.0629	87.2023	375	40.2	0.50	123.97713	1.1225	70.34
								10.9240									
Street B	25	MH	MH	0.211	0.60	0.1266	4.4886	13.0400	0.2473	90.6343	1130.9573	900	33.7	0.50	1280.08329	2.0122	88.35
								13.2872									
Street 6	26	MH	MH	0.323	0.70	0.2261	0.2261	10.0000	0.5323	101.5582	63.8352	300	35.1	0.50	68.37776	0.9673	93.36
Street 6	N/A	MH	MH	0.000	0.00	0.0000	0.2261	10.5323	0.5913	99.4381	62.5026	375	39.9	0.50	123.97713	1.1225	50.41
								11.1236									
Street B	27	MH	MH	0.108	0.60	0.0648	4.7795	13.2872	0.1181	89.8581	1193.9408	900	16.2	0.50	1280.08329	2.0122	93.27
Street B	N/A	MH	MH	0.000	0.00	0.0000	4.7795	13.4054	0.1029	89.4925	1189.0834	900	14.1	0.50	1280.08329	2.0122	92.89
								13.5082									
SWM 1 BLOCK	N/A	MH	HW	0.000	0.00	0.0000	8.4713	13.5082	0.3606	89.1769	2100.1227	1200	50.0	0.35	2306.51994	2.0394	91.05
FLOW TO INLET 1				**2.100**	cu.m./sec.												
Street A	50	MH	MH	0.315	0.55	0.1733	0.1733	10.0000	0.4896	101.5582	48.9140	300	40.3	1.00	96.70076	1.3680	50.58
Street A	N/A	MH	MH	0.000	0.00	0.0000	0.1733	10.0000	0.4137	101.5582	48.9140	300	26.1	0.50	68.37776	0.9673	71.53
								10.4137									
Street D	51	MH	MH	0.696	0.55	0.3828	0.3828	10.0000	0.9896	101.5582	108.0767	375	75.1	0.50	123.97713	1.1225	87.17
								10.9896									
Street A	52	MH	MH	0.429	0.55	0.2360	0.7920	10.9896	0.8425	97.6932	215.0969	525	77.0	0.50	304.09995	1.4048	70.73
								11.8322									
Street C	53	MH	MH	0.577	0.55	0.3174	0.3174	10.0000	1.0333	101.5582	89.5980	375	75.8	0.50	123.97713	1.1225	72.27
Street C	N/A	MH	MH	0.000	0.00	0.0000	0.3174	11.0333	0.2833	97.5299	86.0441	375	20.6	0.50	123.97713	1.1225	69.40

LOCATION				STORMWATER FLOW								DESIGN					
STREET	AREA NUMBER	MANHOLE LOCATION FROM MH	MANHOLE LOCATION TO MH	AREA (A)	RUNOFF COEFF. (C)	A x C	CUMUL. A x C	CONCENTRATION TIME TOTAL	CONCENTRATION TIME IN PIPE	RAIN INTENSITY (I)	FLOW (Q)	PIPE SIZE	LENGTH	SLOPE	CAPACITY	FULL FLOW VELOCITY	PIPE FULL
				ha		*ha*	*ha*	*min*	*min*	*mm/hr*	*L/sec*	*mm*	*m*	*%*	*L/sec*	*m/s*	*%*
								11.3166									
Street A	N/A	MH	MH	0.000	0.00	0.0000	1.1094	11.8322	0.2510	94.6495	291.8984	600	24.8	0.50	434.17173	1.5356	67.23
								12.0831									
Street 14	54	MH	MH	0.435	0.70	0.3045	0.3045	10.0000	0.5122	101.5582	85.9701	300	47.5	1.00	96.70076	1.3680	88.90
Street 14	N/A	MH	MH	0.000	0.00	0.0000	0.3045	10.5122	0.4793	99.5162	84.2415	375	34.7	0.50	123.97713	1.1225	67.95
								10.9915									
Street 13	55	MH	MH	0.662	0.70	0.4634	0.4634	10.0000	0.3567	101.5582	130.8326	375	41.3	1.30	199.90712	1.8100	65.45
Street 13	N/A	MH	MH	0.000	0.00	0.0000	0.4634	10.3567	0.3558	100.1265	128.9881	375	34.7	0.85	161.64640	1.4636	79.80
								10.7126									
Street 14	56	MH	MH	0.253	0.70	0.1771	0.9450	10.9915	0.7619	97.6861	256.6311	525	72.0	0.50	304.09995	1.4048	84.39
								11.7535									
Street 12	57	MH	MH	0.718	0.75	0.5385	0.5385	10.0000	0.4347	101.5582	152.0357	450	47.5	1.00	285.10614	1.7926	53.33
Street 12	N/A	MH	MH	0.000	0.00	0.0000	0.5385	10.4347	0.4168	99.8195	149.4328	450	34.7	0.50	201.60049	1.2676	74.12
								10.8515									
Street 12	58	MH	MH	0.285	0.70	0.1995	1.6830	11.7535	0.6415	94.9249	444.1292	675	70.1	0.50	594.38558	1.6610	74.72
								12.3949									
Street A	N/A	MH	MH	0.000	0.00	0.0000	2.7924	12.3949	0.1526	92.7306	719.8429	750	18.5	0.50	787.20572	1.7819	91.44
Street A	59	MH	MH	0.238	0.55	0.1309	2.9233	12.5476	0.1757	92.2249	749.4783	825	21.9	0.50	1015.00629	1.8988	73.84
Street A	N/A	MH	MH	0.000	0.00	0.0000	2.9233	12.7233	0.1960	91.6502	744.8076	825	24.4	0.50	1015.00629	1.8988	73.38
								12.9193									
Street A	60	MH	MH	0.447	0.55	0.2459	0.2459	10.0000	0.6181	101.5582	69.4113	300	62.9	1.40	114.41788	1.6187	60.66
								10.6181									
Park Block 6	61	MH	MH	0.568	0.30	0.1704	3.3395	12.9193	0.5887	91.0183	844.9967	900	57.1	0.25	905.15558	1.4228	93.35
Park Block 6	N/A	MH	MH	0.000	0.00	0.0000	3.3395	13.5081	0.7780	89.1773	827.9054	900	75.3	0.25	905.15558	1.4228	91.47
Park Block 6	N/A	MH	HW	0.000	0.00	0.0000	3.3395	14.2860	0.7806	86.8673	806.4592	900	75.3	0.25	905.15558	1.4228	89.10
FLOW TO INLET 2				**0.806**	cu.m./sec.												
Multi Residential	50	MH	MH	1.121	0.75	0.8408	0.8408	10.0000	0.1887	101.5582	237.3706	450	22.7	1.00	285.10614	1.7926	83.26
Multi Residential	N/A	MH	MH	0.000	0.00	0.0000	0.8408	10.1887	0.3137	100.7954	235.5877	525	29.2	0.50	304.09995	1.4048	77.47
Multi Residential	N/A	MH	MH	0.000	0.00	0.0000	0.8408	10.5024	0.1906	99.5546	232.6875	525	17.7	0.50	304.09995	1.4048	76.52
Multi Residential	N/A	MH	MH	0.000	0.00	0.0000	0.8408	10.6930	0.4680	98.8171	230.9637	525	43.4	0.50	304.09995	1.4048	75.95
Multi Residential	N/A	MH	MH	0.000	0.00	0.0000	0.8408	11.1611	0.2728	97.0564	226.8485	525	25.2	0.50	304.09995	1.4048	74.60
Multi Residential	N/A	MH	MH	0.000	0.00	0.0000	0.8408	11.4338	0.3026	96.0620	224.5243	525	27.9	0.50	304.09995	1.4048	73.83
Multi Residential	N/A	MH	MH	0.000	0.00	0.0000	0.8408	11.7364	0.3881	94.9848	222.0066	525	35.7	0.50	304.09995	1.4048	73.00
Multi Residential	N/A	MH	MH	0.000	0.00	0.0000	0.8408	12.1245	0.2747	93.6418	218.8675	525	25.2	0.50	304.09995	1.4048	71.97
								12.3993									
The proposed 525mm diameter STM Sewer pipe from Area 50 to pass over existing Storm Sewer on Equestrian Avenue. The approximate vertical clearance=0.55m																	
Storm sewer along Ward Avenue to increase from WF proposed design 300mm diameter to 525mm. The total flow at the end of Ward Anenue has been increased from 0.528 cu.m./s to 0.883 cu.m./sec due to addition of Block 21 (Area=1.121ha)																	
This flow addition will have to outlet into existing SWM Facillity																	
Ward Avenue	342	73	74	0.035	0.90	0.0315	0.8723	12.3993	0.3380	92.7162	224.8233	525	55.0	2.25	645.09341	2.9800	34.85
Ward Avenue	343	74	75	0.110	0.90	0.0990	0.9713	12.7373	0.2985	91.6048	247.3400	525	58.0	3.41	794.16096	3.6686	31.14
Ward Avenue	344	75	76	2.570	0.90	2.3130	3.2843	13.0357	0.2086	90.6477	827.6326	600	60.0	4.30	1273.24144	4.5032	65.00
Ward Avenue	345	76	77	0.120	0.90	0.1080	3.3923	13.2444	0.3650	89.9916	848.6622	675	82.0	2.20	1246.79371	3.4842	68.07
Ward Avenue	346	77	81	0.200	0.90	0.1800	3.5723	13.6093	0.0917	88.8689	882.5445	750	14.0	0.80	995.74522	2.2539	88.63
FLOW TO Shaver Road				**0.883**	cu.m./sec.												
EXISTING STORM SEWER ALONG EQUESTRIAN WAY																	
Equestrian Way	200	MH	MH	0.220	0.85	0.1870	0.1870	10.0000	0.9490	101.5582	52.7961	300	79.6	1.00	96.70076	1.3680	54.60
Equestrian Way	201	MH	MH	0.207	0.85	0.1760	0.3630	10.9490	1.0540	97.8455	98.7262	375	78.8	0.50	123.97713	1.1225	79.63
								12.0030									

LOCATION				STORMWATER FLOW								DESIGN					
STREET	AREA NUMBER	MANHOLE LOCATION FROM MH	MANHOLE LOCATION TO MH	AREA (A)	RUNOFF COEFF. (C)	A x C	CUMUL. A x C	CONCENTRATION TIME TOTAL	CONCENTRATION TIME IN PIPE	RAIN INTENSITY (I)	FLOW (Q)	PIPE SIZE	LENGTH	SLOPE	CAPACITY	FULL FLOW VELOCITY	PIPE FULL
				ha		*ha*	*ha*	*min*	*min*	*mm/hr*	*L/sec*	*mm*	*m*	*%*	*L/sec*	*m/s*	*%*
Multi Residential	51	MH	MH	2.454	0.75	1.8405	1.8405	10.0000	0.0385	101.5582	519.6319	600	6.0	1.17	664.15503	2.3490	78.24
Equestrian Way	N/A	MH	MH	0.000	0.00	0.0000	1.8405	10.0385	0.0631	101.4016	518.8305	600	10.2	1.28	694.67476	2.4569	74.69
								10.1016									
Ex. Equestrian Way	202	MH	MH	0.161	0.85	0.1369	2.3403	12.0030	0.4000	94.0578	611.9433	600	67.2	1.31	702.76833	2.4855	87.08
Ex. Equestrian Way	203	MH	MH	0.236	0.85	0.2006	2.5409	12.4030	0.5052	92.7038	654.8319	600	88.7	1.42	731.67920	2.5878	89.50
Ex. Equestrian Way	204	MH	MH	0.127	0.85	0.1080	2.6489	12.9082	0.2741	91.0539	670.5027	600	50.0	1.54	761.96829	2.6949	88.00
Ex. Equestrian Way	205	MH	MH	0.114	0.85	0.0969	2.7458	13.1823	0.2414	90.1857	688.4042	600	44.8	1.59	774.23910	2.7383	88.91
Ex. Equestrian Way	206	MH	MH	0.146	0.85	0.1241	2.8699	13.4237	0.2028	89.4362	713.5385	600	56.8	4.39	1286.49705	4.5501	55.46
								13.6265									
Multi Residential	52	MH	MH	1.693	0.75	1.2698	1.2698	10.0000	0.0596	101.5582	358.4910	525	13.4	3.87	846.03207	3.9082	42.37
								10.0596									
Ex. Equestrian Way	207	MH	PROP. MH	0.108	0.85	0.0918	4.2314	13.6265	0.0739	88.8169	1044.7792	600	22.7	4.50	1302.51518	4.6067	80.21
Ex. Equestrian Way	N/A	PROP. MH	MH	0.000	0.00	0.0000	4.2314	13.7004	0.0645	88.5937	1042.1531	600	19.8	4.50	1302.51518	4.6067	80.01
								13.7649									
Block 26	53	MH	MH	0.334	0.70	0.2338	0.2338	10.0000	0.1942	101.5582	66.0092	300	31.6	5.13	219.02242	3.0985	30.14
								10.1942									
Block 26	54	MH	MH	0.270	0.70	0.1890	0.1890	10.0000	0.4526	101.5582	53.3607	300	69.4	5.13	219.02242	3.0985	24.36
Block 26	N/A	MH	MH	0.000	0.00	0.0000	0.1890	10.4526	0.0972	99.7494	52.4103	300	14.7	5.00	216.22947	3.0590	24.24
Block 26	N/A	MH	MH	0.000	0.00	0.0000	0.1890	10.5498	0.2330	99.3700	52.2110	300	28.0	2.66	157.71416	2.2312	33.10
Block 26	N/A	MH	MH	0.000	0.00	0.0000	0.1890	10.7828	0.2649	98.4738	51.7401	300	16.9	0.50	68.37776	0.9673	75.67
								11.0477									
Block 26	55	MH	MH	0.287	0.70	0.2009	0.6237	11.0477	0.2707	97.4766	169.0133	375	47.2	3.24	315.59425	2.8574	53.55
Block 26	N/A	MH	MH	0.000	0.00	0.0000	0.6237	11.3184	0.2011	96.4802	167.2856	450	17.1	0.50	201.60049	1.2676	82.98
Block 26	N/A	MH	MH	0.000	0.00	0.0000	0.6237	11.5195	0.3810	95.7544	166.0272	450	52.8	1.78	380.37904	2.3917	43.65
Block 26	N/A	MH	MH	0.000	0.00	0.0000	0.6237	11.9004	0.2739	94.4120	163.6997	450	23.2	0.50	201.60049	1.2676	81.20
								12.1743									
Block 26	56	MH	MH	0.595	0.55	0.3273	0.3273	10.0000	0.2811	101.5582	92.3931	300	45.0	3.86	189.98685	2.6878	48.63
Block 26	N/A	MH	MH	0.000	0.00	0.0000	0.3273	10.2811	0.2420	100.4265	91.3635	300	45.0	5.82	233.34757	3.3012	39.15
Block 26	57	MH	MH	0.428	0.70	0.2996	0.6269	10.5231	0.1981	99.4740	173.3477	375	39.9	4.68	379.29709	3.4342	45.70
								10.7212									
Block 26	58	MH	MH	0.337	0.40	0.1348	1.3854	12.1743	0.1631	93.4725	359.9881	525	29.7	2.20	637.88543	2.9467	56.43
Street A	59	MH	MH	0.197	0.80	0.1576	1.5430	12.3374	0.4703	92.9227	398.5829	525	71.2	1.30	490.34643	2.2651	81.29
Street A	N/A	MH	MH	0.000	0.00	0.0000	1.5430	12.8077	0.2020	91.3770	391.9524	525	30.5	1.30	490.34643	2.2651	79.93
Street A	N/A	MH	ex. MH	0.000	0.00	0.0000	1.5430	13.0097	0.0551	90.7302	389.1783	525	8.3	1.30	490.34643	2.2651	79.37
Street A	N/A	MH	MH	0.000	0.00	0.0000	1.5430	13.0648	0.0650	90.5557	388.4298	525	9.8	1.30	490.34643	2.2651	79.22
								13.1298									
Ex. Equestrian Way	208	MH	MH	0.080	0.85	0.0680	5.8424	13.7649	0.0981	88.3999	1435.7670	750	35.6	5.50	2610.86600	5.9098	54.99
								13.8630									
Block 247	80-81-82	MH	MH	0.932	0.75	0.6990	0.6990	10.0000	0.1408	101.5582	197.3500	675	16.2	1.00	840.58815	2.3490	23.48
								10.1408									
Ex. Equestrian Way	209	MH	MH	0.080	0.85	0.0680	6.6094	13.8630	0.1541	88.1069	1618.8749	825	40.9	2.25	2153.15349	4.0279	75.19
Ex. Equestrian Way	210	MH	MH	0.317	0.85	0.2695	6.8788	14.0171	0.1380	87.6507	1676.1503	825	37.0	2.27	2162.70189	4.0457	77.50
									Outlet to Ridge Road								

Stormceptor®

FORTERRA

Stormceptor® EF Sizing Report

STORMCEPTOR®
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

10/01/2020

Province:	Ontario
City:	Cambridge
Nearest Rainfall Station:	WATERLOO WELLINGTON AP
NCDC Rainfall Station Id:	9387
Years of Rainfall Data:	34

Site Name:	

Drainage Area (ha):	0.30
% Imperviousness:	80.00

Runoff Coefficient 'c': 0.78

Particle Size Distribution:	Fine
Target TSS Removal (%):	80.0

Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	9.17
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	
Site Sediment Transport Rate (kg/ha/yr):	

Project Name:	River Mill Subdivision
Project Number:	45244-104
Designer Name:	Alin Nechita
Designer Company:	MTE Consultants Inc.
Designer Email:	anechita@mte85.com
Designer Phone:	519-743-6500
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	83
EFO6	88
EFO8	90
EFO10	92
EFO12	92

Recommended Stormceptor EFO Model: EFO4

Estimated Net Annual Sediment (TSS) Load Reduction (%): 83

Water Quality Runoff Volume Capture (%): > 90

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THIRD-PARTY TESTING AND VERIFICATION

►**Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

►**Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterwavs.

PARTICLE SIZE DISTRIBUTION (PSD)

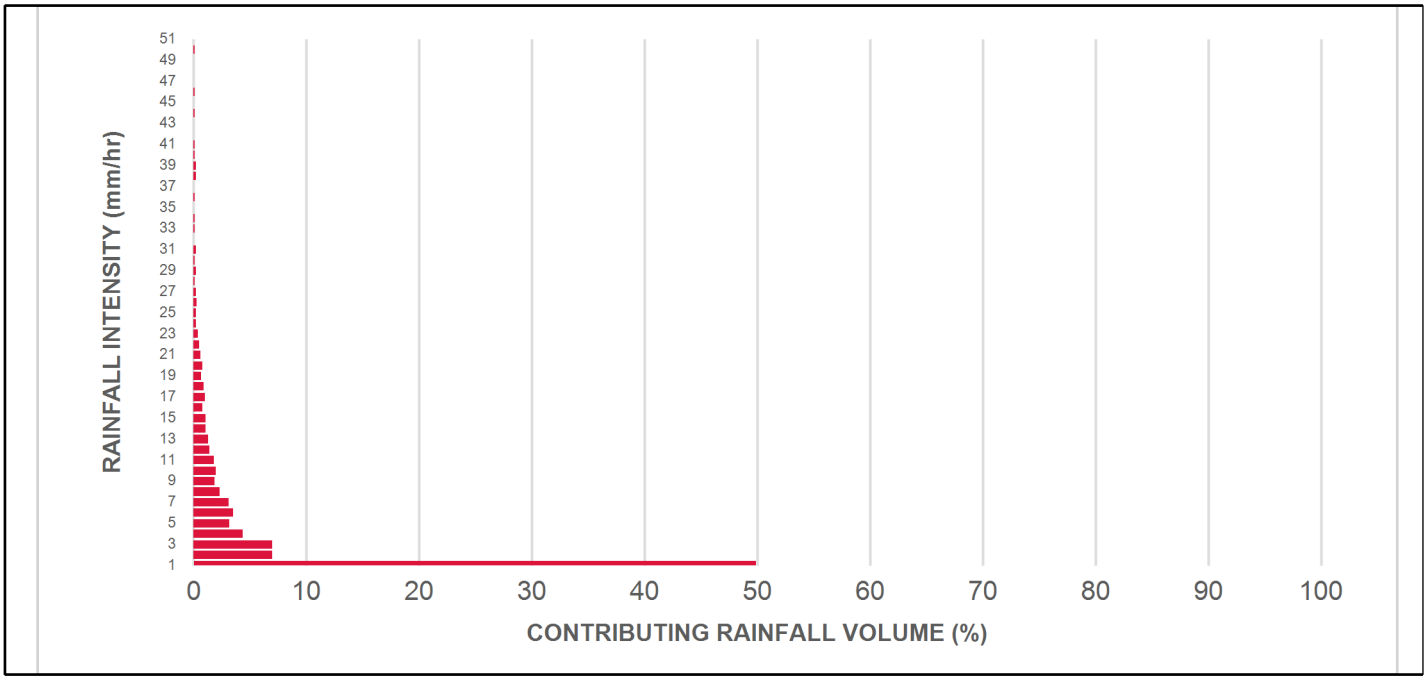
►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

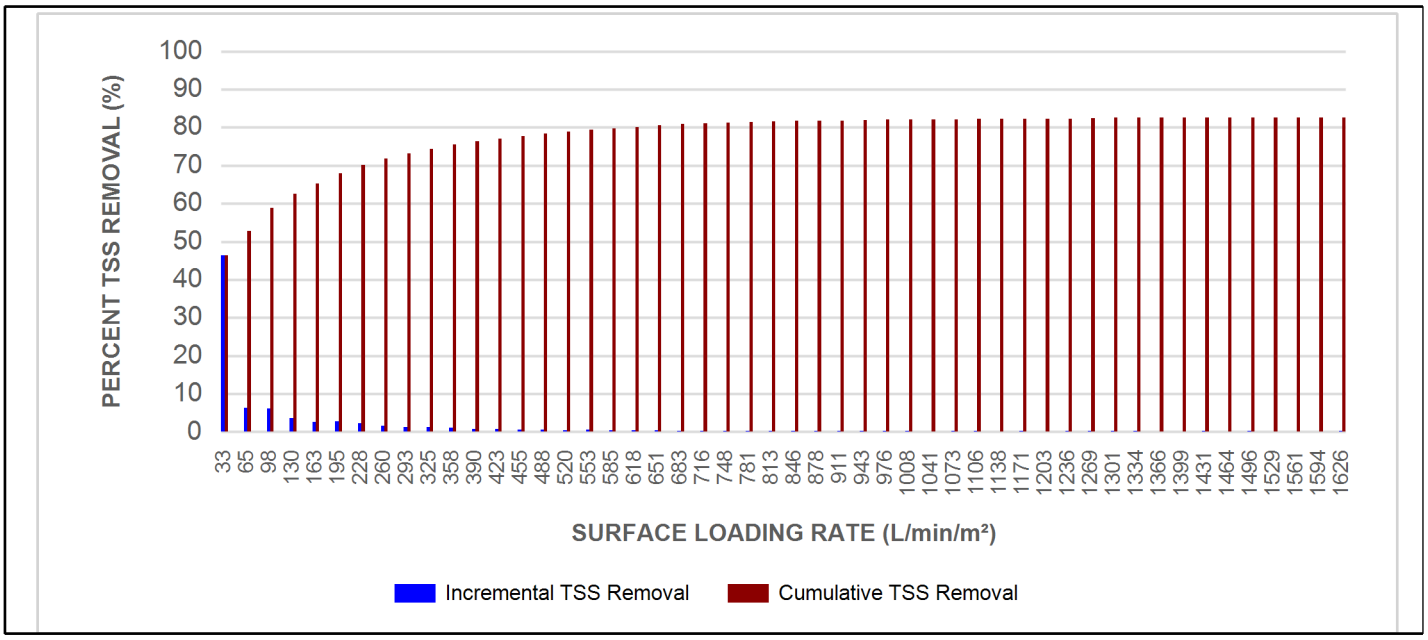
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
1	49.9	49.9	0.65	39.0	33.0	93	46.4	46.4
2	7.0	56.9	1.30	78.0	65.0	91	6.4	52.8
3	7.0	63.9	1.95	117.0	98.0	88	6.2	58.9
4	4.4	68.3	2.60	156.0	130.0	84	3.7	62.6
5	3.2	71.5	3.25	195.0	163.0	80	2.6	65.2
6	3.5	75.0	3.90	234.0	195.0	77	2.7	67.9
7	3.1	78.1	4.55	273.0	228.0	74	2.3	70.2
8	2.3	80.4	5.20	312.0	260.0	71	1.6	71.8
9	1.9	82.3	5.85	351.0	293.0	68	1.3	73.1
10	2.0	84.3	6.51	390.0	325.0	65	1.3	74.4
11	1.8	86.1	7.16	429.0	358.0	63	1.1	75.5
12	1.4	87.5	7.81	468.0	390.0	59	0.8	76.3
13	1.3	88.8	8.46	507.0	423.0	57	0.7	77.1
14	1.1	89.9	9.11	546.0	455.0	57	0.6	77.7
15	1.1	91.0	9.76	585.0	488.0	56	0.6	78.3
16	0.8	91.8	10.41	624.0	520.0	54	0.4	78.8
17	1.0	92.8	11.06	664.0	553.0	54	0.5	79.3
18	0.9	93.7	11.71	703.0	585.0	53	0.5	79.8
19	0.7	94.4	12.36	742.0	618.0	52	0.4	80.1
20	0.8	95.2	13.01	781.0	651.0	52	0.4	80.5
21	0.6	95.8	13.66	820.0	683.0	52	0.3	80.9
22	0.5	96.3	14.31	859.0	716.0	51	0.3	81.1
23	0.4	96.7	14.96	898.0	748.0	51	0.2	81.3
24	0.2	96.9	15.61	937.0	781.0	51	0.1	81.4
25	0.2	97.1	16.26	976.0	813.0	51	0.1	81.5

Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
26	0.3	97.4	16.91	1015.0	846.0	51	0.2	81.7
27	0.2	97.6	17.56	1054.0	878.0	51	0.1	81.8
28	0.1	97.7	18.21	1093.0	911.0	50	0.1	81.8
29	0.2	97.9	18.87	1132.0	943.0	50	0.1	81.9
30	0.1	98.0	19.52	1171.0	976.0	50	0.1	82.0
31	0.2	98.2	20.17	1210.0	1008.0	50	0.1	82.1
32	0.0	98.2	20.82	1249.0	1041.0	50	0.0	82.1
33	0.1	98.3	21.47	1288.0	1073.0	49	0.0	82.1
34	0.1	98.4	22.12	1327.0	1106.0	49	0.0	82.2
35	0.0	98.4	22.77	1366.0	1138.0	49	0.0	82.2
36	0.1	98.5	23.42	1405.0	1171.0	48	0.0	82.2
37	0.0	98.5	24.07	1444.0	1203.0	48	0.0	82.2
38	0.2	98.7	24.72	1483.0	1236.0	48	0.1	82.3
39	0.2	98.9	25.37	1522.0	1269.0	47	0.1	82.4
40	0.1	99.0	26.02	1561.0	1301.0	47	0.0	82.5
41	0.1	99.1	26.67	1600.0	1334.0	47	0.0	82.5
42	0.0	99.1	27.32	1639.0	1366.0	46	0.0	82.5
43	0.0	99.1	27.97	1678.0	1399.0	46	0.0	82.5
44	0.1	99.2	28.62	1717.0	1431.0	45	0.0	82.6
45	0.0	99.2	29.27	1756.0	1464.0	44	0.0	82.6
46	0.1	99.3	29.92	1795.0	1496.0	43	0.0	82.6
47	0.0	99.3	30.57	1834.0	1529.0	42	0.0	82.6
48	0.0	99.3	31.22	1873.0	1561.0	41	0.0	82.6
49	0.0	99.3	31.88	1913.0	1594.0	41	0.0	82.6
50	0.1	99.4	32.53	1952.0	1626.0	40	0.0	82.6
						Estimated Net Annual Sediment (TSS) Load Reduction =		**83 %**

RAINFALL DATA FROM WATERLOO WELLINGTON AP RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



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Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

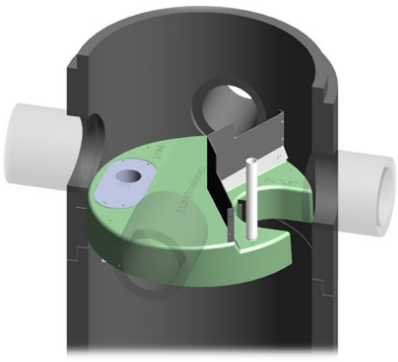
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

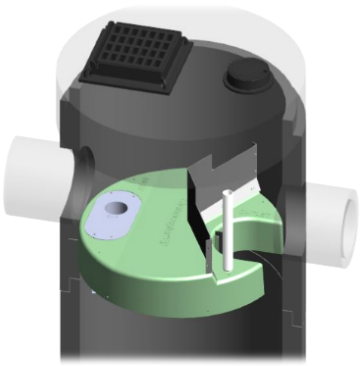
DESIGN FLEXIBILITY

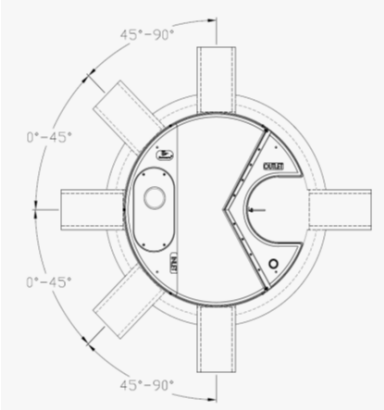
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

OIL CAPTURE AND RETENTION

►While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff,**Stormceptor® EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.







INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.
0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.
45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1. For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft^3)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity
** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft^3)

Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

STANDARD STORMCEPTOR EF/EFO DRAWINGS

For standard details, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

For specifications, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD PERFORMANCE SPECIFICATION FOR "OIL GRIT SEPARATOR" (OGS) STORMWATER QUALITY TREATMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit Separators**

1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The minimum sediment & petroleum hydrocarbon storage capacity shall be as follows:

2.1.1	4 ft (1219 mm) Diameter OGS Units:	1.19 m^3 sediment / 265 L oil
	6 ft (1829 mm) Diameter OGS Units:	3.48 m^3 sediment / 609 L oil
	8 ft (2438 mm) Diameter OGS Units:	8.78 m^3 sediment / 1,071 L oil
	10 ft (3048 mm) Diameter OGS Units:	17.78 m^3 sediment / 1,673 L oil
	12 ft (3657 mm) Diameter OGS Units:	31.23 m^3 sediment / 2,476 L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall

remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing shall be determined using historical rainfall data and a sediment removal performance curve derived from the actual third-party verified laboratory testing data. The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m^2.

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid Re-entrainment Simulation Testing in accordance with the Canadian ETV **Program's Procedure for Laboratory Testing of Oil-Grit Separators,** with results reported within the Canadian ETV or ISO 14034 ETV verification. This re-entrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to assess whether light liquids captured after a spill are effectively retained at high flow rates.

3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m2 to 2600 L/min/m2) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.

MTE FILE No:
P:\P\45244\104\45244-104-AG1

MAPLE GROVE ROAD

SPEEDSVILLE ROAD

HEROUX DEVTEK DRIVE

PHASE 4

PHASE 5

WETLAND 1a

WETLAND 1b

WETLAND 1c

WETLAND 5

CONCEPTUAL SWM F2

PROPOSED RETAINING WALL
APPROX. 56.0m LONG
MAX HEIGHT=3.50m
EXPOSED FACE AREA=110sq.m

MATCH INTO EXISTING GRADES

BLOCK 28

PROPOSED RETAINING WALL
APPROX. 110.0m LONG
MAX HEIGHT=3.20m
EXPOSED FACE AREA=250sq.m

THE RETAINING WALL DESIGN WILL BE FINALIZED THROUGH THE SITE PLAN APPROVAL PROCESS.

BLOCK 1

BLOCK 2

BLOCK 3

SWM F1
Bottom of Pond = 305.00
PPE = 306.50

BLOCK 4

BLOCK 5

BLOCK 6

BLOCK 7

BLOCK 8

BLOCK 9

BLOCK 10

BLOCK 11

BLOCK 13

BLOCK 14

BLOCK 15

BLOCK 16

STREET A

STREET B

STREET C

STREET E

PROPOSED RETAINING WALL
APPROX. 75.0m LONG
MAX HEIGHT=2.0m
EXPOSED FACE AREA=100sq.m

FLOODLINE (MTE 2020)

NRSI 30m CREEK BUFFER

30m WETLAND BUFFER

10m DRIPLINE BUFFER

WETLAND BOUNDARY (NRSI 2020)

FOR CONTINUATION
SEE MTE DWG. 45244-104-AG1.2

CITY OF CAMBRIDGE

SITE

KEY PLAN N.T.S.

GEODETIC BM ELEV. =300.480m
STATION 0011963308
CONCRETE CYLINDER WITH TOPOGRAPHICAL TABLET ON NORTH SIDE OF GRANT STREET, 10.9m EAST OF INTERSECTION WITH KENMORE AVENUE, IN GRASSED AREA BETWEEN ROADWAY AND SIDEWALK, 1.6m NORTH OF ROADWAY, 1.0m WEST FROM CONCRETE LIGHT STANDARD AND 19.6m FROM CENTRELINE OF DRIVEWAY TO No. 56 GRANT STREET.

SITE BENCHMARK ELEV. =306.341m
CUT CROSS IN CONCRETE SIDEWALK ON EAST CORNER OF BISMARK DRIVE AND WESTCLIFF WAY INTERSECTION, LOCATED APPROX. 14.7m SOUTH EAST ALONG WESTCLIFF WAY CENTRELINE FROM INTERSECTION AND 8.4m NORTH EAST ALONG BISMARK DRIVE CENTRELINE FROM INTERSECTION.

NOTE TO CONTRACTOR :

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LEGEND

- PHASE 4-SUBJECT LANDS
- PHASE 5-SUBJECT LANDS
- FLOODLINE LIMIT
- NRSI 30.0m CREEK BUFFER
- WETLAND BOUNDARY
- 30m WETLAND BUFFER
- 10.0m DRIPLINE BUFFER
- 312.0 EXISTING CONTOURS
- 312.0 PROPOSED FINISHED GRADE CONTOURS
- OVERLAND FLOW ROUTE
- (325.93) PROPOSED ELEVATION
- (325.93)EX. EXISTING ELEVATION

No.	REVISION	BY	YYYY-MM-DD
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CITY of CAMBRIDGE

MTE
Engineers, Scientists, Surveyors
519-743-6500

OWNER
RIVER MILL DEVELOPMENT CORPORATION
CAMBRIDGE

PROJECT
RIVER MILL WEST, PHASE 4 SUBDIVISION
STAGE Ontario

DRAWING
PRELIMINARY AREA GRADING PLAN No.1

Project Manager J.CABRAL	Project No. 45244-104
Design By ALN	Checked By VAL
Drawn By AXH	Checked By GMK
Surveyed By MTE	Drawing No. AG1.1
Date Sep.03/20	
Scale 1:750	Sheet of

MTE FILE No:
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FOR CONTINUATION
SEE MTE DWG. 45244-104-AG1.1

K DEVTEK DRIVE

STREET A

BLOCK 6

STREET A

BLOCK 28

MATCH INTO EXISTING GRADES

BLOCK 9

BLOCK 10

BLOCK 14

BLOCK 15

STREET E

STREET B

STREET C

BLOCK 11

BLOCK 13

BLOCK 16

PHASE 4

BLOCK 12

BLOCK 17

STREET D

BLOCK 25

BLOCK 26

BRIARDEAN ROAD

SPEEDSVILLE ROAD (FORMERLY TOWNSHIP ROAD No. 7)

MATCH INTO EXISTING GRADES

WETLAND 2

PROPOSED RETAINING WALL
APPROX. 60.0m LONG
MAX HEIGHT=2.70m
EXPOSED FACE AREA=130sq.m

BLOCK 18

PROPOSED RETAINING WALL
APPROX. 50.0m LONG
MAX HEIGHT=2.00m
EXPOSED FACE AREA=80sq.m

STREET A

MATCH INTO EXISTING GRADES

WETLAND 3

BLOCK 20

STREET E

BLOCK 23

MATCH INTO EXISTING GRADES

BRIARDEAN ROAD

WETLAND 4

PROPOSED RETAINING WALL
APPROX. 60.0m LONG
MAX HEIGHT=1.30m
EXPOSED FACE AREA=64sq.m

STREET E

BLOCK 21

MATCH INTO EXISTING GRADES

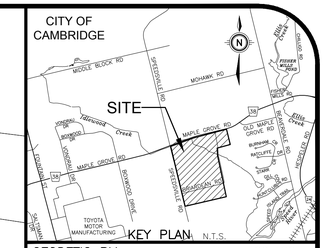
STREET A

BLOCK 247
ADULT LIFESTYLE
COMMUNITY

BLOCK 246
MULTIPLE
RESIDENTIAL

EQUESTRIAN ROAD

CITY OF CAMBRIDGE



KEY PLAN N.T.S.

GEODETIC BM ELEV. =300.480m
STATION 0011966.330
CONCRETE CYLINDER WITH TOPOGRAPHICAL TABLET ON NORTH SIDE OF GRANT STREET, 10.9m EAST OF INTERSECTION WITH KENMORE AVENUE, IN GRASSED AREA BETWEEN ROADWAY AND SIDEWALK, 1.6m NORTH OF ROADWAY, 1.0m WEST FROM CONCRETE LIGHT STANDARD AND 19.6m FROM CENTRELINE OF DRIVEWAY TO No. 56 GRANT STREET.

SITE BENCHMARK ELEV. =306.341m
CUT CROSS IN CONCRETE SIDEWALK ON EAST CORNER OF BISMARK DRIVE AND WESTCLIFF WAY INTERSECTION, LOCATED APPROX. 14.7m SOUTH EAST ALONG WESTCLIFF WAY CENTRELINE FROM INTERSECTION AND 8.4m NORTH EAST ALONG BISMARK DRIVE CENTRELINE FROM INTERSECTION.

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LEGEND

- PHASE 4-SUBJECT LANDS
- PHASE 5-SUBJECT LANDS
- FLOODLINE LIMIT
- NRSI 30.0m CREEK BUFFER
- WETLAND BOUNDARY
- 30m WETLAND BUFFER
- 10.0m DRIPLINE BUFFER
- 312.0 EXISTING CONTOURS
- 312.0 PROPOSED FINISHED GRADE CONTOURS
- OVERLAND FLOW ROUTE
- (325.93) PROPOSED ELEVATION
- (325.93)Ex. EXISTING ELEVATION

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CITY of CAMBRIDGE

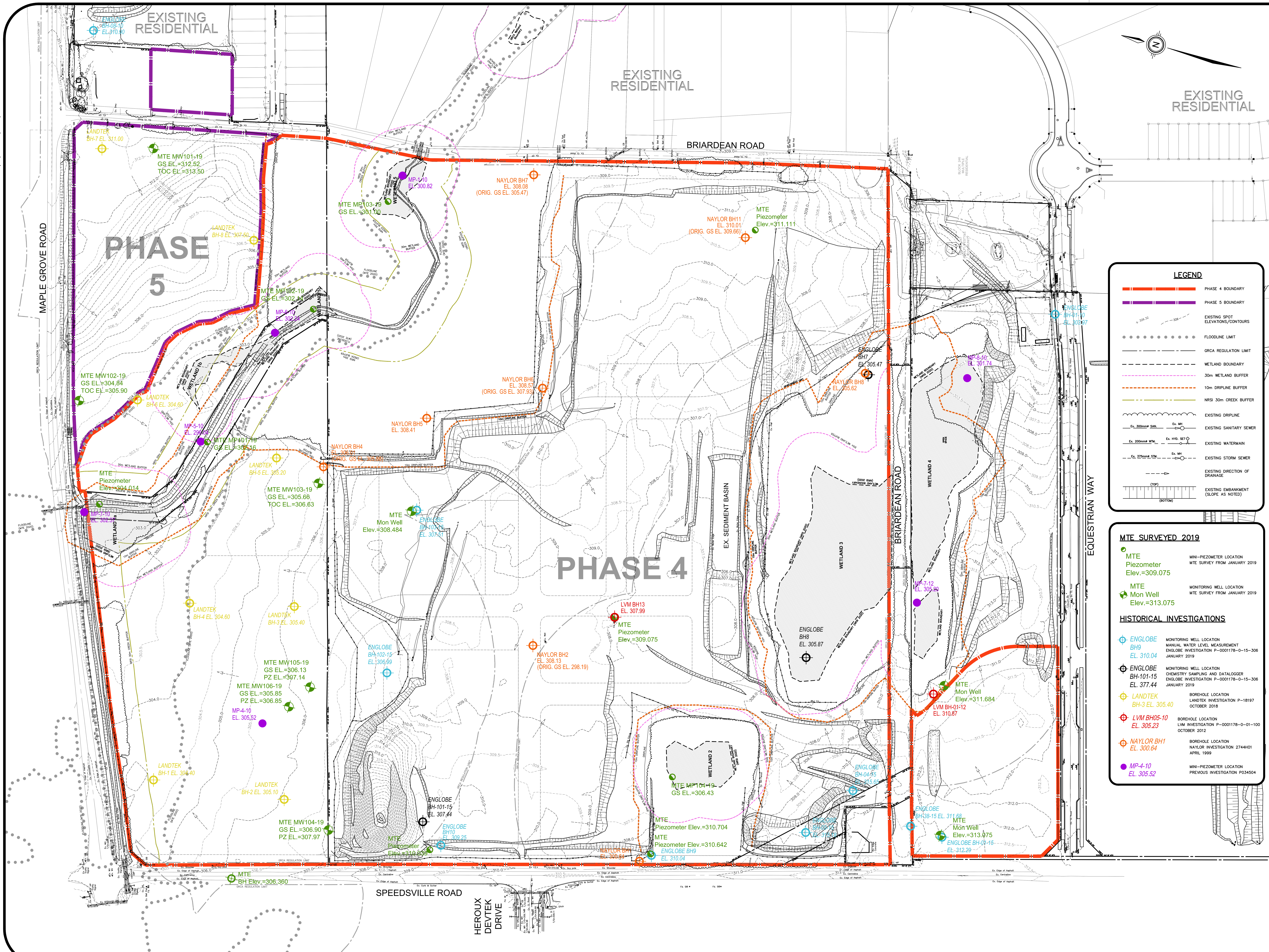
MTE
Engineers, Scientists, Surveyors
519-743-6500

OWNER
RIVER MILL
DEVELOPMENT CORPORATION
CAMBRIDGE

PROJECT
RIVER MILL WEST, PHASE 4
SUBDIVISION
STAGE Ontario

DRAWING
PRELIMINARY
AREA GRADING
PLAN No.2

Project Manager J.CABRAL	Project No. 45244-104
Design By ALN	Checked By VAL
Drawn By AXH	Checked By GMK
Surveyed By MTE	Drawing No. AG1.2
Date Sep.03/20	
Scale 1:1000	Sheet of


EXISTING RESIDENTIAL
EXISTING RESIDENTIAL
EXISTING RESIDENTIAL
BRIARDEAN ROAD
MAPLE GROVE ROAD
PHASE 5
PHASE 4
EX. SEDIMENT BASIN
WETLAND 2
WETLAND 3
WETLAND 4
BRIARDEAN ROAD
EQUESTRIAN WAY
SPEEDSVILLE ROAD
HEROUX DEVTEK DRIVE
LEGEND
PHASE 4 BOUNDARY
PHASE 5 BOUNDARY
EXISTING SPOT ELEVATIONS/CONTOURS
FLOODLINE LIMIT
GRCA REGULATION LIMIT
WETLAND BOUNDARY
30m WETLAND BUFFER
10m DRIPLINE BUFFER
NRSI 30m CREEK BUFFER
EXISTING DRIPLINE
EXISTING SANITARY SEWER
EXISTING WATERMAIN
EXISTING STORM SEWER
EXISTING DIRECTION OF DRAINAGE
EXISTING EMBANKMENT (SLOPE AS NOTED)
MTE SURVEYED 2019
MTE Piezometer Elev.=309.075
MINI-PIEZOMETER LOCATION MTE SURVEY FROM JANUARY 2019
MTE Mon Well Elev.=313.075
MONITORING WELL LOCATION MTE SURVEY FROM JANUARY 2019
HISTORICAL INVESTIGATIONS
ENGLOBE BH9 EL. 310.04
MONITORING WELL LOCATION MANUAL WATER LEVEL MEASUREMENT ENGLOBE INVESTIGATION P-0001178-0-15-306 JANUARY 2019
ENGLOBE BH-101-15 EL. 377.44
MONITORING WELL LOCATION CHEMISTRY SAMPLING AND DATALOGGER ENGLOBE INVESTIGATION P-0001178-0-15-306 JANUARY 2019
LANDTEK BH-3 EL. 305.40
BOREHOLE LOCATION LANDTEK INVESTIGATION P-18197 OCTOBER 2018
LVM BH05-10 EL. 305.23
BOREHOLE LOCATION LVM INVESTIGATION P-0001178-0-01-100 OCTOBER 2012
NAYLOR BH1 EL. 300.64
BOREHOLE LOCATION NAYLOR INVESTIGATION 2744H01 APRIL 1999
MP-4-10 EL. 305.52
MINI-PIEZOMETER LOCATION PREVIOUS INVESTIGATION P034504

MTE FILE No: P:\P\45244\104\45244-104-EC1

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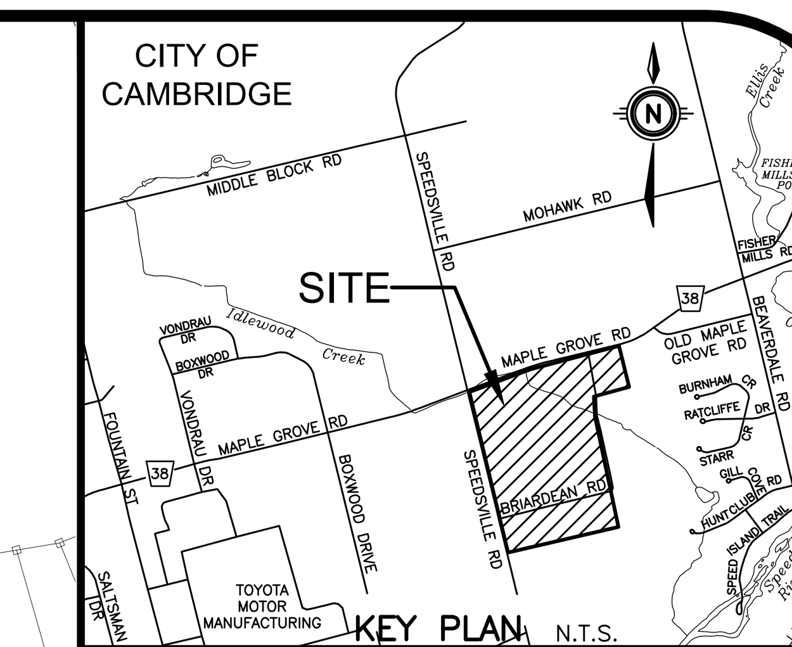

KEY PLAN N.T.S.

GEODETIC BM ELEV. =300.480m

STATION 00119663308
CONCRETE CYLINDER WITH TOPOGRAPHICAL TABLET ON NORTH SIDE OF GRANT STREET, 10.9m EAST OF INTERSECTION WITH KENMORE AVENUE, IN GRASSED AREA BETWEEN ROADWAY AND SIDEWALK, 1.6m NORTH OF ROADWAY, 1.0m WEST FROM CONCRETE LIGHT STANDARD AND 19.6m FROM CENTRELINE OF DRIVEWAY TO No. 56 GRANT STREET.

SITE BENCHMARK ELEV. =306.341m

CUT CROSS IN CONCRETE SIDEWALK ON EAST CORNER OF BISMARK DRIVE AND WESTCLIFF WAY INTERSECTION. LOCATED APPROX. 14.7m SOUTH EAST ALONG WESTCLIFF WAY CENTRELINE FROM INTERSECTION AND 8.4m NORTH EAST ALONG BISMARK DRIVE CENTRELINE FROM INTERSECTION.

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CITY of CAMBRIDGE

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519-743-6500

OWNER
RIVER MILL DEVELOPMENT CORPORATION
CAMBRIDGE

PROJECT
RIVER MILL WEST, PHASE 4 SUBDIVISION

STAGE
Ontario

DRAWING
EXISTING CONDITIONS PLAN

Project Manager J.CABRAL	Project No. 45244-104
Design By ALN	Checked By VAL
Drawn By ALN	Checked By GMK
Surveyed By MTE	Drawing No.
Date Jan.21/20	EC1.1
Scale 1:1500	Sheet of

MTE FILE No:
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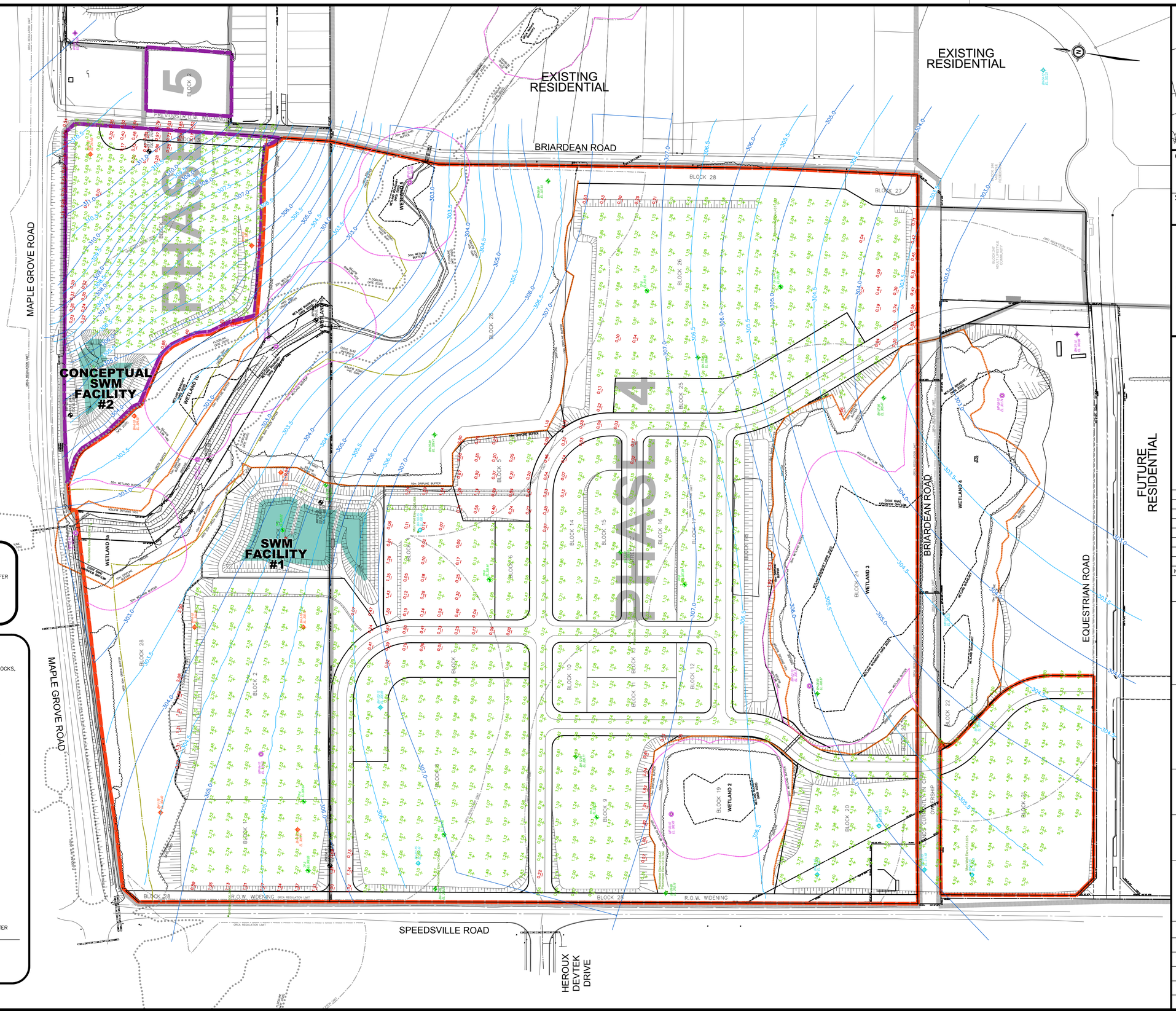
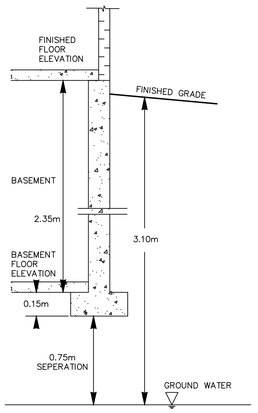


LEGEND OF NATURAL FEATURES:

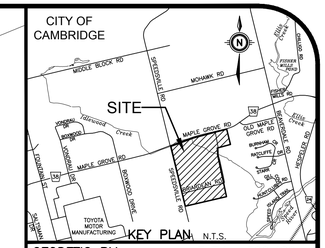
- FLOODLINE LIMIT (MTE)
- NRSI 30.0m CREEK BUFFER
- 30.0m WETLAND BOUNDARY
- WETLAND BOUNDARY
- 10.0m DRIPLINE BUFFER

NOTE:

1. NOT APPLICABLE ON; STREETS, PARK BLOCKS, SWM BLOCK.



DETAIL
SINGLE RESIDENTIAL
N.T.S.



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STATION 00119663308
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LEGEND:

- PHASE 4 BOUNDARY
- PHASE 5 BOUNDARY
- 312.0 GROUNDWATER CONTOURS
- 5.20 + DEPTH TO GROUNDWATER

NOTE:
DEPTHS TO BE READ AS DISTANCE FROM UNDERSIDE OF FOOTINGS TO AVERAGE GROUNDWATER ELEVATIONS.

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CITY of CAMBRIDGE

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OWNER
RIVER MILL DEVELOPMENT CORPORATION
CAMBRIDGE

PROJECT
RIVER MILL WEST, PHASE 4 SUBDIVISION
STAGE Ontario

DRAWING
U/S FOOTING TO GROUNDWATER COMPARISON

Project Manager: J.CABRAL	Project No.: 45244-104
Design By: ALN	Checked By
Drawn By: ALN	Checked By
Surveyed By: MTE	Drawing No.: MS11.1
Date: May.07/20	
Scale: 1:1500	Sheet of