Westwood Village Community (Phase 2)
Brian Domm Subdivision
Hallman Subdivision

Functional Servicing Report

Project Location:
North of Blenheim Road, West of Newman Drive
City of Cambridge

Prepared for:
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and
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April 2, 2026

MTE File No.: 02534-800

Engineers, Scientists, Surveyors.

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MTE Drawing No. 02534-800-AG1.2 – Area Grading Plan No.2 ..... Encl.
MTE Drawing No. 02534-800-AG1.3 – Area Grading Plan No.3 ..... Encl.
MTE Drawing No. 02534-800-GP1.1 – Plan of General Services ..... Encl.

1.0 INTRODUCTION

1.1 Overview

MTE Consultants Inc. (MTE) was retained by Hallman Construction Limited (Hallman) and Brian Domm (Domm) to complete a Functional Servicing Report (FSR) in support of an Official Plan Amendment (OPA), Draft Plan of Subdivision (DPS), and Zoning By-law Amendment (ZBA) applications. Although separate subdivisions are proposed for each property, the lands have been comprehensively evaluated together to ensure a coordinated approach to the design and development of the Hallman and Domm lands.

The Hallman and Domm lands will ultimately be located in the City of Cambridge (after annexation from the Township of North Dumfries), and are immediately adjacent to a comprehensively planned community commonly referred to as “Westwood Village – Phase 1”. The lands owned by Hallman and Domm are generally in the northwestern portion of the Westwood Village Community. Refer to Figure 1.1 for more details. These lands represent the logical extension and second phase of the Westwood Village Community. For the purpose of this report, the two Draft Plans will be reviewed as one cohesive development herein referred to as the ‘subject lands’.

The subject lands comprise a total area of approximately 31.50ha, of which 19.44ha represents the Hallman property and 12.06ha represents the Domm property. Development plans for the subject lands include the construction of street-oriented residential units, a multiple residential block, park lands, the required roads, municipal services (storm, sanitary, and water), and open spaces. A Draft Plan of Subdivision (dated March 25, 2026) has been prepared by MHBC Planning for both proposed developments and form the basis of this report. The consolidated Draft Plan has been included in **Appendix A**.

The purpose of this FSR is to prepare a servicing strategy for the proposed subdivisions, which implements the approved Cambridge West Master Environmental Servicing Plan, and outlines how the subdivisions can be developed on full municipal services, including sanitary sewage collection, domestic water, storm drainage, and utilities. This report should be read in conjunction with the following reports:

- *Westwood Village Community (Phase 2) – Preliminary Stormwater Management Report* (MTE, April 2026)
- *Westwood Village (Phase 2) Community – Hydrogeological Assessment* (MTE, April 2021)
- *Westwood Village Community (Phase 2) - Hydrogeological Assessment Report Addendum* (MTE, April 2026)
- *Westwood Village Phase 2 – Scoped Environmental Impact Study* (April 2026, WSP)

1.2 Background Information

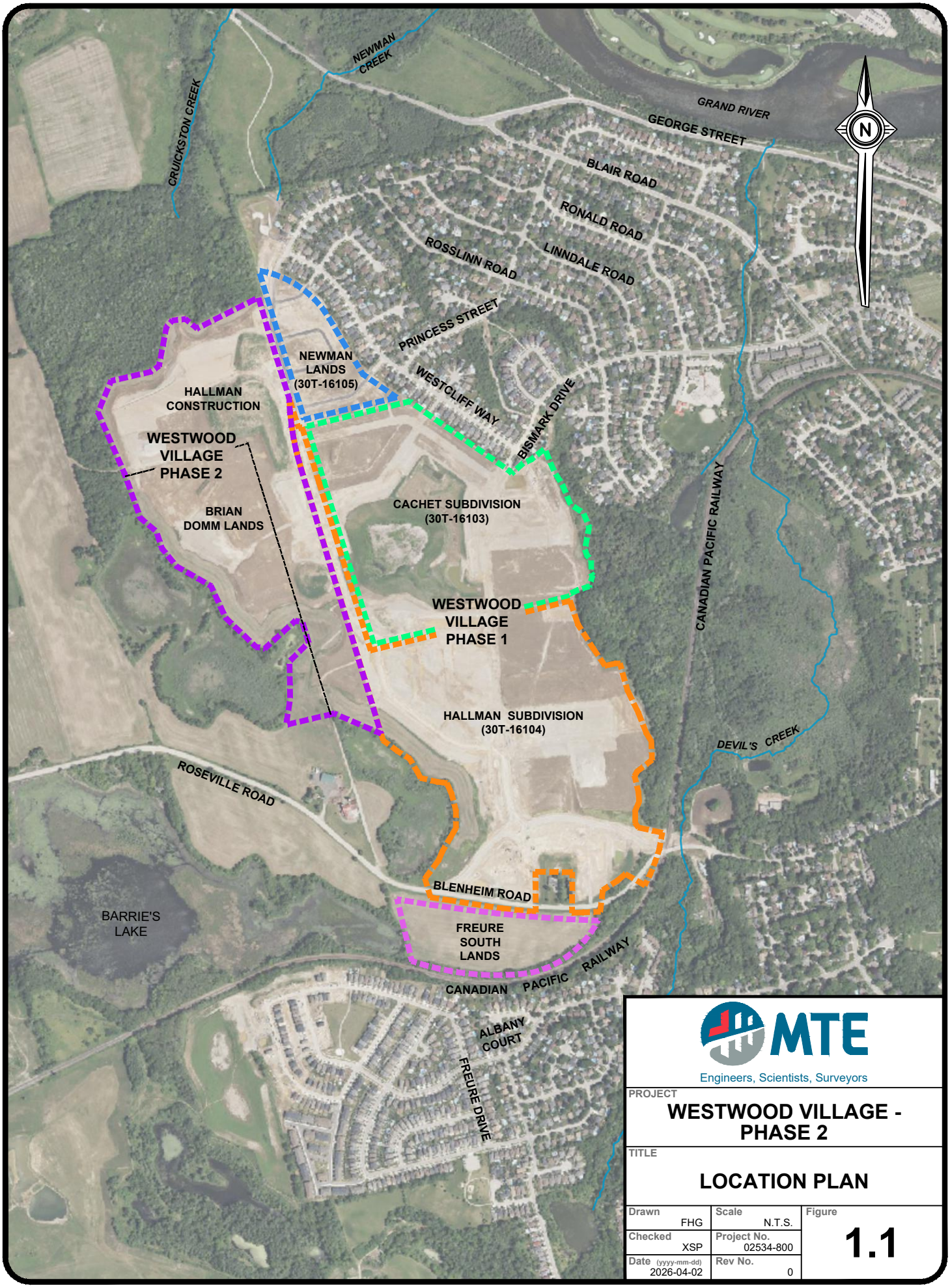
A Master Environmental Servicing Plan (MESP) was undertaken for the Cambridge West Community by the City of Cambridge and area landowners. The MESP was completed in November 2013 and approved by City Council on March 17, 2014. The purpose of the MESP was to guide the development of the remaining designated greenfield lands on the west side of the City. The MESP integrated environmental, servicing, transportation, and land use planning components to provide the basis for the preparation of a Community Plan for the Cambridge West Area, and for the preparation and processing of the future development applications.

The MESP outlined a preliminary municipal servicing strategy for the area, which included: sanitary, storm, and watermain servicing, along with a stormwater management (SWM) strategy. The preliminary design strategies for the proposed development have been developed to be in accordance with the recommended solutions within the MESP and are described within this report.

In June 2018, the applications of the adjacent Hallman Subdivision (30T-16104), Cachet Subdivision (30T-16103) and Huron Creek (30T-16105) proceeded through the Local Planning Appeal Tribunal (LPAT) as Case No. 170301. The resulting LPAT order provided approval of three Draft Plans of Subdivision on February 19, 2019.

During the Draft Plan stage of analysis for the Cachet and Hallman Subdivisions, the subject lands were considered in the sanitary, storm, water distribution and Stormwater Management designs. The sanitary and storm sewers have been adequately sized to receive drainage from the subject lands. The watermain connections and looping were designed to provide adequate pressure and fire flow to the subject lands. Stormwater Management Facility 2 (located in the Cachet Subdivision) was designed to treat and attenuate the majority of runoff from the subject lands. The servicing and Stormwater Management Facilities (SWMFs) were then constructed within the Hallman and Cachet Subdivisions with the subject lands in mind.

Area grading for the entire Westwood Village Community was completed in the summer/fall of 2020. Following area grading of the entire Westwood Village Community, municipal services and SWMFs were constructed within the Hallman Subdivision (30T-16104) and Cachet Subdivision (30T-16103). Construction was completed in 2021, with house construction currently on-going (Cachet Subdivision is nearing full build-out).



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MTE
Engineers, Scientists, Surveyors

PROJECT
WESTWOOD VILLAGE - PHASE 2

TITLE
LOCATION PLAN

Drawn: FHG	Scale: N.T.S.	Figure: 1.1
Checked: XSP	Project No.: 02534-800	
Date (yyyy-mm-dd): 2026-04-02	Rev No.: 0	

2.0 EXISTING CONDITIONS

2.1 Topographical Information

As previously discussed, the subject lands consist of approximately 31.50ha of land, which form the second phase of the overall Westwood Village Community. The subject lands are generally bound by Newman Drive and the Cachet Subdivision to the east, and by existing agricultural and woodlot/wetlands to the south, west and north. The subject lands are currently under an interim agricultural use.

MTE conducted a detailed topographical survey of the Westwood Village lands in 2010. There was some initial survey work completed in 2005, as well as supplementary surveys completed in 2013, 2014, and 2017 through to 2020. Existing topographic conditions for the Westwood Village Community are illustrated in Figure 2.1 and **MTE Drawing 02534-800-EC1.1.** Under existing conditions, the subject lands are moderately sloped throughout the majority of the site (generally between 2.0% and 10.0%). Existing elevations range between 307.0m near the wetland features in the north and 316.0m on the centralized hills in the central portion of the lands.

It should be noted, that as part of the Hallman Subdivision (30T-16104) and Cachet Subdivision (30T-16103) final design, an area grading contract for the entire Westwood Village Community was completed in the summer/fall of 2020. As part of this contract, the subject lands were filled and graded to support future development (graded to a sub-grade depth). Topsoil was placed on the sub-grade surface, and the lands were returned to an interim agricultural use. The “existing conditions” described in this report refer to the original site conditions prior to the 2020 area grading contract.

2.2 Pre-Development Conditions

The eastern portion of the subject lands primarily drain to an existing wetland feature (Wetland 2), as illustrated in Figure 2.1. This feature does not have a positively draining surface outlet, rather, it recharges and drains internally. Based on monitoring data and a hydrogeological study completed as part of the MESP, it is understood that after rainfall events, the surface water inputs in this feature create a localized groundwater mound that dissipates laterally through shallow groundwater movements to the east. During drier periods, shallow groundwater flow from the west sustains the wetland level.

The northern and western portion of the subject lands drain externally towards the adjacent woodland and wetland features (Wetland 6 and Wetland 4/5) respectively. Both the northern and western portions of the subject lands are currently within the Cruickston Creek subwatershed. However, through the MESP, it was recommended that these lands be redirected to the Grand River via SWMF 2 under post-development conditions.

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LEGEND

- PROPERTY BOUNDARY
- EXISTING CONTOURS
- SUBJECT LANDS (DRAFT PLAN LIMITS)
- LIMIT OF WETLAND
- LIMIT OF WETLAND BUFFER
- GRCA REGULATION LIMIT
- FLOODLINE LIMIT
- EXISTING EMBANKMENT (TOP) (BOTTOM)
- EXISTING DRIPLINE
- BH 08-10 / Piezometer 5 — EXISTING GEOTECHNICAL

NEWMAN LANDS (30T-16105)

CACHET SUBDIVISION (30T-16103)

HALLMAN SUBDIVISION (30T-16104)

HALLMAN SUBDIVISION

BRIAN DOMM SUBDIVISION

WETLAND 2

WETLAND 4

WETLAND 5

WETLAND LIMIT (OCT/2019)

CITY OF CAMBRIDGE

TOWNSHIP OF NORTH DUMFRIES

WESTCLIFF DR

HALE CRESCENT

MEADOW VIEW AVE

BH 08-10 Elev.=311.920

BH 20-10 Elev.=314.776

BH 06-10 Elev.=308.968

BH 16-10 Elev.=309.084

Piezometer 1

Piezometer 2

Piezometer 3

Piezometer 4

Piezometer 5

Piezometer 6

BH 07-14 Elev.=312.12

BH 03-10 Elev.=313.061

BH 15-14 Elev.=312.08

BH 69-10 Elev.=311.155

MW102-21 GS=307.23 TOC=308.066

BH 104-10 Elev.=314.266

BH 111-10 Elev.=313.887

BH 110-10 Elev.=308.946

BH 19-10 Elev.=310.384

BH 15-10 Elev.=309.739

Piezometer 10

Piezometer 11

Piezometer 12

BH 101-10 Elev.=310.125

BH 07-10 Elev.=310.737

MW101-21 GS=316.41 TOC=317.169

BH 11-10 Elev.=309.491

BH 105-10 Elev.=311.742

BH 14-10 Elev.=311.713

BH 112-10 Elev.=311.590

BH 12-10 Elev.=313.668

Piezometer 13

Piezometer 14

Piezometer 15

BH 11-10 Elev.=307.869

MP9 MP8 MP7

0 30 60 90 120 150m

Engineers, Scientists, Surveyors

PROJECT
WESTWOOD VILLAGE - PHASE 2

TITLE
EXISTING CONDITIONS PLAN

Drawn: BDO	Scale: 1:3,000	Figure: 2.1
Checked: CJC	Project No.: 02534-800	
Date (yyyy-mm-dd): 2026-04-02	Rev No.: 0	

2.3 Geotechnical and Hydrogeological Information

From 2010 to 2013, LVM Inc. carried out a hydrogeological investigation for the Westwood Village Community lands. The fieldwork for the investigation on the subject lands included: 13 boreholes to depths ranging from 4.88m to 11.89m, and nine (9) mini piezometers to depths ranging from 0.91m to 2.44m.

In the spring and summer of 2014, LVM also carried out a geotechnical investigation. The field work for this investigation included boreholes and handholes to accurately determine topsoil depths. Monitoring wells were installed to allow measurement of the stabilized groundwater levels and to support the existing hydrogeological data of the area.

MTE carried out a *Supplemental Hydrogeology Study* (October 11, 2017) for the Westwood Village Community lands. This study conducted additional fieldwork and summarizes the hydrogeological investigations performed for the development study area.

A Hydrogeological Assessment and subsequent Addendum were completed by MTE for the subject lands. The Addendum provides a summary of the monitoring completed since the original assessment and an updated impact assessment based on the gathered data. Refer to the *Westwood Village Community (Phase 2) – Hydrogeological Assessment Report Addendum* (MTE, April 2026) for more information.

Based on the results of the detailed investigations, the subsurface stratigraphy is generally described as topsoil underlain by deposits of sand or sand and gravel underlain at depth by deposits of silt/silt till. The granular deposits are extensive in areas and are typically saturated at their base, forming a shallow overburden aquifer. Groundwater in the overburden aquifer generally flows towards the Grand River, driven by topography and surface drainage features. The overburden aquifer (ranging in elevations from 305m to 308m) is separated from the bedrock aquifer (ranging in elevations from 270m to 300m) by a thick overburden aquitard.

Composite high groundwater contours, shown in **Figure 4.2**, have been generated for the subject lands based on collected groundwater level monitoring to date.

Refer to LVM's Geotechnical Investigation Report in **Appendix B** for more details.

3.0 PROPOSED DEVELOPMENT

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

- Single detached and Townhome residential dwellings.
- Multiple residential dwellings.
- A neighbourhood park, and open space buffers.
- Municipal rights-of-way (ROW) with widths of 18.5m.
- A wildlife corridor block.

Refer to the consolidated Draft Plans of Subdivision in **Appendix A** for more details.

3.1 Municipal Rights-of-Way

As shown in the consolidated Draft Plan of Subdivision, the proposed development will be serviced by local roads. The roadways will be constructed to a full urban cross-section, including: asphalt pavement, concrete curb and gutters, concrete sidewalks on both sides of all streets, roadway illumination, and boulevard landscaping. Local roads within the subject lands will consist of 18.5m right-of-way widths.

As previously mentioned, a geotechnical investigation was completed by LVM, dated February 2016. The proposed pavement structure outlined in this report is summarized in **Table 3.1** below.

Table 3.1 – Proposed Pavement Structure

Pavement Structure	Local Roads (mm)
Asphaltic Concrete - Surface	40
Asphaltic Concrete - Binder	80
Granular 'A' Base	150
Granular 'B' Sub-base	375

3.2 Wetland and Vegetation Buffers

A comprehensive analysis was undertaken in the determination of natural heritage buffers and development setbacks as part of the MESP's Natural Environmental Study (NES) report (Ecoplans 2013).

In October 2019, wetland and driplines limits along the northern and western edges of the proposed development were delineated by WSP, approved by the governing agencies, and surveyed by MTE. With wetland limits established, the appropriate buffers and setbacks were adjusted and incorporated into the existing conditions, as illustrated in the various figures and drawings included in this report.

Development setbacks, as identified in the MESP NES, were confirmed in the *Scoped Environmental Impact Study* (EIS) completed by WSP (dated April 2026) as follows;

- 50m from Provincially Significant Wetland (PSW) (marsh/pond habitats) wetland boundaries;
- 30m from PSW wetland boundaries; and
- 15m from woodland driplines (non-wetland).

These setbacks have dictated the limits of development along the entire western and northern boundaries of the subject lands. Several existing condition and design factors have influenced the overall grading, resulting in minor intrusions into the buffers in some areas. These factors include road profile/elevation, steep (3:1 max) slopes, and servicing constraints. Refer to the EIS completed by WSP for additional details.

3.3 Ecological Linkages / Wildlife Passage

Ecological linkages are intended to maintain or enhance connectivity within and between large natural areas, and to restore or create new defined linkage areas between natural areas where existing connectivity is degraded. The MESP identified a series of existing and proposed ecological linkages within the Westwood Village Community. One key linkage was proposed between Wetland 2 in the adjacent Westwood Village Phase 1 lands and Wetland 4 to the west of the subject lands; to be created through a formal ecological corridor. The east portion of that linkage is on the adjacent lands to the east (in subdivisions 30-T16103 and 30T-16104). The west portion of that linkage is identified in the Consolidated Draft Plans as Block 26 “Wildlife Corridor” within the proposed Hallman Subdivision.

As part of the final engineering design of the Hallman Subdivision (30T-16104), a box culvert was installed at the Newman Drive crossing location to accommodate herpetofaunal/small mammal passage. The Newman Drive structure consists of a 1200mm x 3600mm concrete box culvert, embedded with 0.30m of native substrate, to provide suitable conditions for migrating herpetofauna. Continuous wildlife funnel fences will be incorporated into the ecological linkage that will tie into the road crossing structure. Slopes along the corridor have been kept to a minimum to match into the surrounding proposed development grades.

Refer to the EIS completed by WSP for additional details.

4.0 PROPOSED GRADING

4.1 Grading Considerations

The following is a list of grading constraints which influenced and/or governed the grading design of the subject lands:

- Match the proposed centreline of road elevations of proposed Streets A, B, and D with centreline of road elevations along Newman Drive within the limits of the Phase 1 Community.
- Match the existing boundary grades around the perimeter of the property, while respecting the limits of existing natural heritage features.
- Minimize grading within recommended buffers associated with natural heritage features with some minor incursions in recognition of engineering design considerations.
- Ensure adequate cover is provided over municipal services.
- Ensure major storm event overland flow routes are directed towards the road rights-of-way where applicable, and towards the adjacent stormwater management facility (SWMF 2).
- Comply with City of Cambridge standards for minimum and maximum road grades.
- Ensure adequate separation between composite high groundwater and the proposed underside of house footings.
- Ensure sidewalks and walkways are AODA compliant.

4.2 Roadworks and Lot Grading

Utilizing the proposed road layout, preliminary slopes for centreline of road ranging from 0.5% (minimum) to 6.0% (maximum) were used to complete the preliminary lot grading design. Additionally, the considerations listed in Section 4.1 were incorporated into the overall preliminary grading design and is illustrated in Figure 4.1.

Preliminary lot grades range from 2.5% (minimum) to 6.0% (maximum) with a combination of traditional back to front drainage, split drainage, and walk-out type lots. The preliminary finished grades have been illustrated in the enclosed **MTE Drawings 02534-800-AG1.1 to AG1.3**.

The composite high groundwater surface was generated based on collected groundwater level monitoring to date. The preliminary house grades and underside of footing elevations were designed to maintain a minimum vertical separation of 0.75m above the composite high groundwater elevations. This separation is illustrated in Figure 4.2**.** The groundwater throughout the development lands is generally found at an elevation between 307.0m and 309.0m. Preliminary grades, especially those near anticipated building locations, range from approximately 312.0m to 318.0m. As such, the average separation between the underside of footings and composite high groundwater is more than 3.0m.

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LEGEND

- PROPERTY BOUNDARY
- MUNICIPAL BOUNDARY
- SUBJECT LANDS (DRAFT PLAN LIMITS)
- LIMIT OF WETLAND
- LIMIT OF WETLAND BUFFER
- FLOODLINE LIMIT
- Ex. Drop Curb — EXISTING CURB
- (326.00) × — PROPOSED SPOT ELEVATIONS (EX = MAINTAIN EXISTING, HP = HIGH POINT, LP = LOW POINT)
- 315.0 — EXISTING CONTOURS
- 326.0 — PROPOSED CONTOURS
- 1.0% — DIRECTION OF DRAINAGE
- (TOP) 3:1 (BOTTOM) — PROPOSED EMBANKMENT
- MAJOR OVERLAND FLOW ROUTE

NEWMAN LANDS (30T-16105)

CACHET SUBDIVISION (30T-16103)

TO SWM FACILITY #2 NORTH FOREBAY

TO SWM FACILITY #2 SOUTH FOREBAY

WETLAND 2

ECOLOGICAL LINKAGE / WILDIFE PASSAGE

HALLMAN SUBDIVISION (30T-16104)

STREET A

STREET B

STREET C

STREET D

STREET E

STREET F

STREET G

HALLMAN SUBDIVISION

BRIAN DOMM SUBDIVISION

WETLAND 4

50.0 Wetland Setback

0 25 50 75 100m

Engineers, Scientists, Surveyors

PROJECT
WESTWOOD VILLAGE - PHASE 2

TITLE
PRELIMINARY ROAD GRADE PLAN

Drawn	Scale	Figure
BDS	1:2,500	4.1
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CJC	02534-800	
Date (yyyy-mm-dd)	Rev No.	
2021-04-19	0	

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LEGEND

- PROPERTY BOUNDARY
- SUBJECT LANDS (DRAFT PLAN LIMITS)
- LIMIT OF WETLAND
- LIMIT OF WETLAND BUFFER
- FLOODLINE LIMIT
- PROPOSED EMBANKMENT (TOP / 3:1 / BOTTOM)
- −0.28 LESS THAN 3.05m
- +0.27 GREATER THAN 1. 3.05m FOR LOTS

TICKS ARE READ AS SEPARATION BETWEEN UNDERSIDE (U/S) OF FOOTING (+0.75m) AND EXISTING HIGH GROUNDWATER.

- 326 EXISTING CONTOURS
- 326 PROPOSED CONTOURS
- 300 COMPOSITE HIGH GROUNDWATER CONTOURS

NEWMAN LANDS (30T-16105)

CACHET SUBDIVISION (30T-16103)

HALLMAN SUBDIVISION (30T-16104)

HALLMAN SUBDIVISION

BRIAN DOMM SUBDIVISION

WETLAND 2

WETLAND 4

NEWMAN DRIVE

STREET A

STREET B

STREET C

STREET D

STREET E

STREET F

STREET G

50.0 Wetland Setback

0 25 50 75 100m

SURFACE INFORMATION

GROUNDWATER vs UNDERSIDE (U/S) OF FOOTING
A VOLUME SURFACE COMPARING THE LOWERED PRELIMINARY FINISHED GRADE AND THE EXISTING HIGH GROUNDWATER

COMPOSITE HIGH GROUNDWATER
GROUNDWATER CONDITIONS ADJUSTED TO INCORPORATE SEASONAL HIGH CONDITIONS BASED ON LONG TERM MONITORING.

U/S FOOTING=(FG-3.05)
PROPOSED SURFACE LOWERED 3.05m TO GENERATE A SURFACE THAT IS 0.75m BELOW UNDERSIDE OF FOOTING.

MTE
Engineers, Scientists, Surveyors

PROJECT
WESTWOOD VILLAGE - PHASE 2

TITLE
U/S FOOTING TO COMPOSITE HIGH GROUNDWATER COMPARISON

Drawn	Scale	Figure
BDS	1:2,500	4.2
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Date (yyyy-mm-dd): 2026-04-02	Rev No.: 0	

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5.0 MUNICIPAL SERVICING

Final design of Westwood Village Phase 1 was completed in the Fall/Winter of 2019 with the 1st engineering submission for lot grading and servicing made to the City of Cambridge in the Spring of 2020. As stated previously, the Westwood Village Community has been comprehensively planned and engineered, and as such, the Phase 2 lands have been fully integrated into the servicing design of the community. Construction of local services within the Phase 1 lands of Westwood Village was completed in the spring/summer of 2021. An overall general plan of services which illustrates the conceptual location of the sanitary sewers, watermains, and storm sewers within the subject lands is appended as **MTE Drawing 02534-800-GP1.1**.

5.1 Sanitary Servicing

The preliminary sanitary servicing concept for the subject lands was previously included in the overall sanitary servicing design of the Westwood Village Community. The entire Community is located within the drainage area of the Galt Wastewater Treatment Plant (GWWTP). As such, sanitary sewage flow generated within the subject lands will eventually make its way to the treatment plant; where sufficient capacity exists to accommodate sanitary flow from this area.

The development of the subject lands was considered to adequately size the sanitary sewers along Newman Drive, and all other proposed downstream sewers as part of the Westwood Village Phase 1 design. The design of the receiving sanitary sewers along Newman Drive provide for anticipated flows from the subject lands and will accommodate the proposed development size and population densities.

As part of the Westwood Village Phase 2 design, an internal sanitary sewer network was developed to ensure and confirm that previously anticipated and allocated flows were not exceeded. As a result, it is concluded that there are no capacity issues downstream of the subject lands.

The proposed drainage areas, as illustrated in Error! Reference source not found., generally flow eastward to the trunk sanitary sewer along Newman Drive. The following drainage areas are delineated with respective population densities to determine the preliminary design peak flows:

Area 1

Consisting of approximately 20.57ha and encompassing the majority of the developable lands. This area drains to the sanitary sub-trunk along Newman Drive at Street B and the southern intersection of Street A. As previously discussed, the flow from this area is conveyed through the adjacent Hallman Subdivision (30T-16104).

Area 2

Consisting of approximately 2.07ha, including the southern Multiple Residential Block (Hallman – Block 21 and Domm – Block 17). Area 2 also drains to the sanitary sub-trunk within Newman Drive. Similar to Area 1, the flow from this area is conveyed through the adjacent Hallman Subdivision (30T-16104).

Area 3

Consisting of approximately 2.54ha, and includes lots near the northern intersection of Street A with Newman Drive which will drain northward to the existing sanitary sewer along Newman Drive. These sewers were sized during the development of the Newman Lands Subdivision and considered a portion of the development lands to provide adequate capacity. Population density

was considered at approximately 94 – 98ppha, however under proposed conditions the population density has increased to 115ppha. This results in an increase in flows directed to the existing sewer. In saying that, the downstream receiving sewer was analyzed (sanitary sewer at the downstream limit of the Newman Lands Subdivision), and has adequate capacity to convey these additional flows. Refer to Table 5.1 for more information.

Table 5.1 – Newman Drive Sanitary Capacity Summary

	Phase 2 Lands Contributing Catchment Area (ha)	Phase 2 Lands Contributing Population	Proposed Flow (l/sec)	Percent of Pipe Capacity
2016 Meritech FSR	-	-	9.3	48.7%
2018 Meritech FSR	0.8	96	14.2	63.9%
2020 Final Engineering Dwgs.	1.92	192	-	-
2026 MTE FSR	2.54	292	13.3*	62.8%*

*Existing developments contributions calculated with unit counts and people per unit calculations.

Preliminary Sanitary Sewer Design Sheets have been prepared with pipe diameters and slopes for the proposed conditions. The design sheets and the corresponding drainage area plan are located in **Appendix E**.

Error! Reference source not found. illustrates a schematic of the sanitary sewer design, including proposed finished road grades and depths of sewers at key points in the sewer network. The ‘spine’ sewers located on proposed Street A, Street F, and Street G will collect and convey sanitary flows from the local streets. The depth of these sewers ranges from approximately 2.4m to 4.7m. The deepest point is located at the southern intersection of Street A and Street F. Sanitary sewers extended through the remaining local roads within the proposed road allowances are at typical depths ranging from 2.4m to 4.0m.

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LEGEND

- PROPERTY BOUNDARY
- SUBJECT LANDS (DRAFT PLAN LIMITS)
- LIMIT OF WETLAND
- LIMIT OF WETLAND BUFFER
- FLOODLINE LIMIT
- EXISTING DRIPLINE
- SANITARY DRAINAGE AREA
- AREA TO EXISTING NEWMAN DRIVE SEWER
- AREA TO NEWMAN DRIVE/ BLENHEIM ROAD TRUNK
- DRAINAGE DIRECTION
- 1 / 4.50 / 115 — CATCHMENT ID No. / AREA (ha) / POPULATION DENSITY

TO EXISTING NEWMAN DRIVE SAN SEWER

NEWMAN LANDS (30T-16105)

TO EXISTING PRINCESS STREET SAN SEWER

CACHET SUBDIVISION (30T-16103)

WETLAND 2

TO BLENHEIM ROAD SAN TRUNK (c/w LOCAL SEWER)

HALLMAN SUBDIVISION (30T-16104)

200mmø

375mmø (c/w LOCAL SEWER)

3 / 2.56 / 115

2 / 2.07 / 200

1 / 20.57 / 115/200

STREET A

STREET B

STREET C

STREET D

STREET E

STREET F

STREET G

HALLMAN SUBDIVISION

BRIAN DOMM SUBDIVISION

(3-5 Units)

(16-19 Units)

30.0 Wetland Setback

50.0 Wetland Setback

WETLAND 4

0 25 50 75 100m

Plot Date: April 2, 2026 – 4:34 PM

MTE
Engineers, Scientists, Surveyors

PROJECT
WESTWOOD VILLAGE - PHASE 2

TITLE
SAITARY DRAINAGE AREA PLAN

Drawn	Scale	Figure
BDS	1:2,500	5.1
Checked: CJC	Project No.: 02543-800	
Date (yyyy-mm-dd): 2026-04-02	Rev No.: 0	

CAD: P:\02534\800\02534-800-P-F5.2-SAN.DWG

Plot Date: April 2, 2026 - 4:31 PM

LEGEND

- PROPERTY BOUNDARY
- SUBJECT LANDS (DRAFT PLAN LIMITS)
- LIMIT OF WETLAND
- LIMIT OF WETLAND BUFFER
- FLOODLINE LIMIT
- EXISTING DRIPLINE
- F/G=314.88 / SAN OBV.=311.74± / DEPTH=3.1m± — C/L ROAD GRADE; LOCAL SANITARY OBVERT; SANITARY COVER
- SANITARY DRAINAGE AREA
- PROPOSED SANITARY SEWER (30T-16103, 30T-16104 & 30T-16105)
- PROPOSED SANITARY SEWER

TO EXISTING NEWMAN DRIVE SAN SEWER

NEWMAN LANDS (30T-16105)

TO EXISTING PRINCESS STREET SAN SEWER

BLACKLOCK STREET

BLACKBURN STREET

CACHET SUBDIVISION (30T-16103)

WETLAND 2

TO BLENHEIM ROAD SAN TRUNK

375mmØ (c/w LOCAL SEWER)

FOXLEIGH STREET

HALLMAN SUBDIVISION (30T-16104)

NEWMAN DRIVE

LANGRIDGE WAY

STREET A

STREET B

STREET C

STREET D

STREET E

STREET F

STREET G

HALLMAN SUBDIVISION

BRIAN DOMM SUBDIVISION

WETLAND 4

30.0 Wetland Setback

50.0 Wetland Setback

(3-5 Units)

(16-19 Units)

F/G=313.05 / SAN OBV.=309.90± / DEPTH=3.2m±

F/G=315.50 / SAN OBV.=310.80± / DEPTH=4.7m±

F/G=314.44 / SAN OBV.=309.92± / DEPTH=4.5m±

F/G=314.70 / SAN OBV.=310.15± / DEPTH=4.6m±

F/G=316.10 / SAN OBV.=313.27± / DEPTH=2.8m±

F/G=315.06 / SAN OBV.=311.62± / DEPTH=3.4m±

F/G=314.82 / SAN OBV.=310.56± / DEPTH=4.3m±

F/G=315.34 / SAN OBV.=312.42± / DEPTH=2.9m±

F/G=314.83 / SAN OBV.=310.68± / DEPTH=4.1m±

F/G=314.98 / SAN OBV.=311.19± / DEPTH=3.8m±

F/G=316.25 / SAN OBV.=313.45± / DEPTH=2.8m±

F/G=315.52 / SAN OBV.=312.15± / DEPTH=3.4m±

F/G=317.20 / SAN OBV.=314.13± / DEPTH=3.1m±

F/G=315.92 / SAN OBV.=311.70± / DEPTH=4.2m±

F/G=315.98 / SAN OBV.=312.46± / DEPTH=3.5m±

F/G=316.38 / SAN OBV.=312.85± / DEPTH=3.5m±

F/G=315.40 / SAN OBV.=311.67± / DEPTH=3.7m±

F/G=316.37 / SAN OBV.=312.57± / DEPTH=3.8m±

F/G=316.63 / SAN OBV.=313.07± / DEPTH=3.6m±

F/G=316.50 / SAN OBV.=313.38± / DEPTH=3.1m±

0 25 50 75 100m

MTE Engineers, Scientists, Surveyors

PROJECT: WESTWOOD VILLAGE - PHASE 2

TITLE: SANITARY SERVICING PLAN

Drawn	Scale	Figure
BDS	1:2,500	5.2
Checked: CJC	Project No.: 02534-800	
Date (yyyy-mm-dd): 2026-04-02	Rev No.: 0	

5.2 Water Distribution

A water distribution analysis was prepared to confirm that adequate pressures and flows are provided through connections to the existing water distribution network.

The Bentley water distribution system analysis program (WaterCAD CONNECT Edition) was utilized for this study. The WaterCAD model includes the proposed lot fabric and watermain connectivity to size the internal watermains, while accounting for looping and head losses in the local system.

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 water distribution network for the Westwood Village Community (including both Phase 1 and Phase 2 lands) was previously modelled as part of the final design process for the Hallman Subdivision (30T-16104) and the Cachet Subdivision (30T-16103), as documented in the *Westwood Village Community – Water Distribution Report, MTE, dated July 27, 2021.* The model included four external connection points to the existing municipal water distribution system:

- 300mm diameter – Bismark Drive and Westcliff Way
- 300mm diameter – Freure Drive (south of the CPR tracks)
- 300mm diameter – Realigned Blenheim Road
- 200mm diameter – Newman Drive and Westcliff Way

Updated modelling has been completed for the subject lands based on a proposed Draft Plan prepared by MHBC (dated March 25, 2026). The entire Westwood Village was considered in the model. This includes the Cachet and Hallman Subdivisions, the Newman lands (Huron Creek), and the Freure South lands. This approach was taken to assess system performance under ultimate build-out conditions and confirm that adequate flows and pressures are available to support the entire community.

The subject lands are proposed to connect to the existing water distribution system via the existing Newman Drive watermain, with 200mm diameter watermain connections at Street A, Street B, and Street D.

Watermain sizing is designed based on providing adequate fire flows to each demand node, while meeting DGSSMS pressure and velocity guidelines. This includes 200mm diameter watermains throughout the subject lands. The analysis concluded that the subject lands can be adequately serviced, in terms of pressures, daily flows, and fire flows, by the existing and proposed water distribution networks.

Refer to the Preliminary Water Distribution report provided in **Appendix D** for more details. Refer to Error! Reference source not found. for the water distribution network for the subject lands.

CAD: P:\P\02534\800\02534-800-P-F2-WM.DWG

Plot Date: April 2, 2026 - 4:16 PM

WATERMAIN LEGEND

- PROPERTY BOUNDARY
- SUBJECT LANDS (DRAFT PLAN LIMITS)
- LIMIT OF WETLAND
- LIMIT OF WETLAND BUFFER
- FLOODLINE LIMIT
- EX. WATERMAIN
- 200mmØ WTM / 300mmØ WTM — PROPOSED WATERMAIN
- EX. 200mmØ WTM. / EX. 300mmØ WTM. — EXISTING WATERMAIN
- JUNCTION CONTRIBUTING AREAS
- J5 — PROPOSED DEMAND NODE
- J5 — EXISTING DEMAND NODE

REG NODE 12518
REG NODE 39051
REG NODE 12800
REG NODE 12240
J100 J101 J102 J103 J104 J105 J106 J107 J108 J109 J110 J111 J112 J113 J114 J115
J200 J201 J202 J203 J204 J205 J206 J207 J208 J209 J210 J212 J213 J214 J215 J216 J217 J218 J219 J220 J221 J222 J223 J224 J225 J226 J227
J300 J301 J302 J303
J500 J501 J502 J503 J504 J505 J506 J507 J508 J509 J510 J511 J512 J513 J514 J515 J516 J517 J518
J519 J520 J521
J400 J268

GRANDVIEW HILLS SUBDIVISION
NEWMAN LANDS (30T-16105)
CACHET SUBDIVISION (30T-16103)
HALLMAN SUBDIVISION (30T-16104)
HALLMAN SUBDIVISION
BRIAN DOMM SUBDIVISION
FREURE SOUTH LANDS
EXISTING CHLORINATION & METERING STATION
FREURE DR. CONNECTION
SWM FACILITY #2
SWM FACILITY #3
SWM FACILITY #4
EX. NEWMAN DRIVE SWM FACILITY
WETLAND 2
WETLAND 3
WETLAND 4
WETLAND 5
BISMARK DRIVE
NEWMAN DRIVE
BLACKLOCK STREET
BLACKBURN STREET
CROSSMORE CRESCENT
STEARMAN STREET
RIVERGREEN CRESCENT
PILKINGTON WAY
FOXLEIGH STREET
LANGRIDGE WAY
QUEENSBROOK CRESCENT
SANDSTONE STREET
REALIGNED BLENHEIM ROAD
BLENHEIM ROAD
DEVIL'S CREEK
CANADIAN PACIFIC RAILWAY
ROSEVILLE ROAD
FREURE DRIVE
WESTCLIFF WAY
DOMM LANE
PRINCESS STREET
HALE CRESCENT
ROSECLIFF CRESCENT
WILKINSON AVENUE
STREET A
STREET B
STREET C
STREET D
STREET E
STREET F
STREET G

0 50 100 150 200 250m

MTE
Engineers, Scientists, Surveyors

PROJECT
WESTWOOD VILLAGE - PHASE 2

TITLE
WATER DISTRIBUTION PLAN

Drawn	Scale	Figure
BDS	1:5,000	5.3
Checked: CJC	Project No.: 02534-800	
Date (yyyy-mm-dd): 2026-04-02	Rev No.: 0	

5.3 Storm Drainage

Similar to the original overall sanitary servicing design discussed above, the overall storm servicing design of Westwood Village Phase 1 also considered the storm servicing requirements for the subject lands. The original intent for the subject lands was to implement a fourth stormwater management facility (SWMF) to service a small drainage area, and have the majority of the subject lands drain to SWMF 2 located within the adjacent Cachet Subdivision (30T-16103). However, as part of the pre-consultation process, MTE was requested to reconsider the need for the fourth facility and determine if SWMF 2 could service all of the Phase 2 lands. The Preliminary SWM report for the Phase 2 lands confirms the feasibility of a revised strategy that includes the elimination of SWMF 4. The majority of runoff will be diverted to SWMF 2, which will outlet through a dedicated 450mm diameter storm sewer. This runoff will eventually outlet to a 750mm diameter storm sewer located on Princess Street, and ultimately to the Grand River.

In order to adequately size the downstream storm sewers within the Cachet Subdivision (ie. flows that were directed to SWMF 2) at the time of final design of the Phase 1 lands, the subject lands were incorporated as a lumped area (future development). The design of the receiving storm sewers and downstream stormwater management facility provides for anticipated flows from the subject lands based on proposed development size and anticipated impervious cover. As part of the Westwood Village Phase 2 design, the storm sewer network was analyzed to ensure and confirm that previously anticipated and allocated flows were not exceeded. As a result of this analysis, it is concluded that there are no capacity issues downstream of the subject lands and that SWMF 2 can adequately accommodate flows from the proposed development.

The proposed drainage areas, as illustrated in Figure 5.4, generally flow eastward to the storm sewers along Newman Drive. The following drainage areas are delineated with respective runoff coefficients to determine the preliminary design peak flows:

Area 1

Consisting of approximately 17.85ha and encompassing the majority of the developable lands, this area drains to the storm sewers along Newman Drive at Street G and the southern intersection of Street A. As previously discussed, the flow from this area is conveyed through the neighbouring Hallman Subdivision (30T-16104) and Cachet Subdivision (30T-16103) towards the northern forebay of SWMF 2.

Area 2

Consisting of approximately 1.49ha, this area represents the southern Multiple Residential Block (Hallman - Block 21 and Domm – Block 17) and also drains to the existing storm sewer fronting the subject lands along Newman Drive. Similar to Area 1, the flow from this area is conveyed through the neighbouring Hallman Subdivision (30T-16104) towards the southern forebay of SWMF 2.

Area 3

Consisting of approximately 1.58ha, this area represents lots near the northern intersection of Street A with Newman Drive which will drain northward to the existing Newman stormwater management facility; which was retrofitted through the development of the Newman Lands Subdivision (30T-16105). The Newman Lands Subdivision SWMF has been designed with adequate capacity to attenuate and treat this runoff.

Preliminary Storm Sewer Design Sheets have been prepared with pipe diameters and slopes for the proposed conditions. The design sheets and the corresponding drainage area plan are located in **Appendix E**.

Figure 5.5 illustrates a schematic of the storm sewer design, including proposed finished road grades and depths of sewers at key points in the sewer network. The depth of these sewers ranges from approximately 1.5m to 3.5m. The deepest point is located at the northern intersection of Street A and Newman Drive.

CAD: P:\P\02534\800\02534-800-P-F5.4-STM.DWG

Plot Date: April 2, 2026 - 4:27 PM

LEGEND

- PROPERTY BOUNDARY
- SUBJECT LANDS (DRAFT PLAN LIMITS)
- LIMIT OF WETLAND
- LIMIT OF WETLAND BUFFER
- FLOODLINE LIMIT
- STORM DRAINAGE AREA
- MAJOR OVERLAND FLOW ROUTE
- CONVEYANCE INFILTRATION FACILITY
- AREA TO CONVEYANCE INFILTRATION FACILITY
- AREA TO SWM FACILITY #2
- AREA TO NEWMAN DRIVE SWM FACILITY
- 1 / 16.83 — CATCHMENT ID / AREA (ha)

TO NEWMAN LANDS SWM FACILITY

NEWMAN LANDS (30T-16105)

600mmø STM.

CACHET SUBDIVISION (30T-16103)

STREET C

TO SWM FACILITY #2 NORTH FOREBAY

1350mmø STM.

STREET D

825mmø

NEWMAN DRIVE

WETLAND 2

TO SWM FACILITY #2 SOUTH FOREBAY

900mmø STM.

STREET B

HALLMAN SUBDIVISION (30T-16104)

STREET A

3 / 1.65

2 / 1.49

1 / 17.85

30.0 Wetland Setback

50.0 Wetland Setback

STREET C

STREET B

STREET A

STREET D

STREET E

STREET F

STREET G

(3-5 Units)

(16-19 Units)

HALLMAN SUBDIVISION

BRIAN DOMM SUBDIVISION

WETLAND 4

0 25 50 75 100m

MTE
Engineers, Scientists, Surveyors

PROJECT
WESTWOOD VILLAGE - PHASE 2

TITLE
STORM DRAINAGE AREA PLAN

Drawn	Scale	Figure
BDS	1:2,500	5.4
Checked: CJC	Project No.: 02534-800	
Date (yyyy-mm-dd): 2026-04-02	Rev No.: 0	

CAD: P:\P\02534\800\02534-800-P-F5-STM.DWG

Plot Date: April 2, 2026 - 4:21 PM

LEGEND

- PROPERTY BOUNDARY
- SUBJECT LANDS (DRAFT PLAN LIMITS)
- LIMIT OF WETLAND
- LIMIT OF WETLAND BUFFER
- FLOODLINE LIMIT
- EXISTING DRIPLINE
- PROPOSED STORM SEWER (30T-16103, 30T-16104 & 30T-16105)
- PROPOSED STORM SEWER
- F/G=345.00 / STM OBV.=343.200± / DEPTH=1.8m± — C/L ROAD GRADE / LOCAL STORM OBVERT / STORM COVER
- STORM DRAINAGE AREA
- CONVEYANCE INFILTRATION FACILITY
- AREA TO CONVEYANCE INFILTRATION FACILITY
- DEDICATED 3rd PIPE ROOF LEADER STORM SEWER SYSTEM

NEWMAN LANDS (30T-16105)

CACHET SUBDIVISION (30T-16103)

HALLMAN SUBDIVISION (30T-16104)

TO SWM FACILITY #2 NORTH FOREBAY

TO SWM FACILITY #2 SOUTH FOREBAY

WETLAND 2

WETLAND 4

NEWMAN DRIVE

STREET A

STREET B

STREET C

STREET D

STREET E

STREET F

STREET G

OUTLET TO WETAND

30.0 Wetland Setback

50.0 Wetland Setback

(3-5 Units)

(16-19 Units)

F/G=312.82 / STM OBV.=309.70± / DEPTH=3.1m±

F/G=314.51 / STM OBV.=312.57± / DEPTH=1.9m±

F/G=317.14 / STM OBV.=315.59± / DEPTH=1.6m±

F/G=315.40 / STM OBV.=313.72± / DEPTH=1.7m±

F/G=314.94 / STM OBV.=313.35± / DEPTH=1.6m±

F/G=315.57 / STM OBV.=314.00± / DEPTH=1.6m±

F/G=315.27 / STM OBV.=313.63± / DEPTH=1.6m±

F/G=314.37 / STM OBV.=312.54± / DEPTH=1.8m±

F/G=316.02 / STM OBV.=314.18± / DEPTH=1.8m±

F/G=315.67 / STM OBV.=313.96± / DEPTH=1.7m±

F/G=315.01 / STM OBV.=313.33± / DEPTH=1.7m±

F/G=314.53 / STM OBV.=312.96± / DEPTH=1.6m±

F/G=314.94 / STM OBV.=313.26± / DEPTH=1.7m±

F/G=316.19 / STM OBV.=314.24± / DEPTH=1.9m±

F/G=315.49 / STM OBV.=313.60± / DEPTH=1.9m±

F/G=315.92 / STM OBV.=314.03± / DEPTH=1.9m±

F/G=315.30 / STM OBV.=313.52± / DEPTH=1.8m±

F/G=316.34 / STM OBV.=314.30± / DEPTH=2.0m±

F/G=316.60 / STM OBV.=312.70± / DEPTH=1.9m±

F/G=314.46 / STM OBV.=312.76± / DEPTH=1.7m±

F/G=314.76 / STM OBV.=313.04± / DEPTH=1.7m±

F/G=315.86 / STM OBV.=313.79± / DEPTH=2.1m±

F/G=316.29 / STM OBV.=314.07± / DEPTH=2.2m±

F/G=316.34 / STM OBV.=314.54± / DEPTH=1.8m±

F/G=316.77 / STM OBV.=315.20± / DEPTH=1.6m±

F/G=316.78 / STM OBV.=315.07± / DEPTH=1.7m±

F/G=316.44 / STM OBV.=314.74± / DEPTH=1.7m±

F/G=316.83 / STM OBV.=315.04± / DEPTH=1.8m±

F/G=316.57 / STM OBV.=314.81± / DEPTH=1.8m±

F/G=317.15 / STM OBV.=315.65± / DEPTH=1.5m±

0 25 50 75 100m

Engineers, Scientists, Surveyors

PROJECT
WESTWOOD VILLAGE - PHASE 2

TITLE
STORM SERVICING PLAN

Drawn	Scale	Figure
BDS	1:2,500	5.5
Checked	Project No.	
CJC	02534-800	
Date (yyyy-mm-dd)	Rev No.	
2026-04-02	0	

5.4 Stormwater Management

The proposed SWM infrastructure for the subject lands will include lot level infiltration galleries, a conveyance infiltration gallery, and the proposed storm sewer network within the proposed rights-of-way. The storm sewer network is proposed to convey most of the stormwater flow to SWMF 2, located in the adjacent Cachet Subdivision (30T-16103). A small area (Area 3) will drain to the existing Newman SWMF. A conveyance gallery is located with Block 18 (Domm), and runoff from the storm sewers upstream will be treated through an Oil and Grit Separator (OGS) and infiltrated within the gallery during small storm events (<25mm). Refer to Figure 5.5 for the area directed to the conveyance gallery.

The SWM strategy for the proposed development is presented in the *Preliminary Stormwater Management Report* (April 2, 2026) prepared by MTE. The following summarizes the key points of the report:

- Water quantity and quality control will be provided within SWMF 2. This facility will provide quantity control of runoff from the contributing drainage area for storm events up to and including the Regional storm event.
- An Enhanced Level of water quality control will be provided in SWMF 2.
- Infiltration targets for the subject lands will be met.
- Surface water inputs to the adjacent natural areas will be maintained in the post-development condition.

Storm drainage for the proposed development will be provided through a combination of minor (piped) and major (overland) drainage systems. The proposed development area will drain via storm sewers to SWMF 2 as shown in Figure 5.5. The storm sewers will be designed for the 5-year storm event, with overland flow routes generally flowing through the proposed road allowances.

5.4.1 Roof Water Collection System

In addition to the storm sewer network described in the previous sections, a separate dedicated Roof Water Collection System (RWCS) is proposed to collect and convey specific roof runoff for use in the overall surface water balance of several wetlands. Most of the roof runoff from the proposed residential blocks will be directed to individual infiltration galleries, unless the runoff is conveyed to the surrounding wetlands to support wetland surface water balances.

Along Street A, and Street G a number of roofs will be directed to the RWCS network. Downspouts from these roofs are to be directly connected to this system. As illustrated in **Figure 5.5**, the runoff from these roofs is directed to the north of the subdivision to support Vernal Pool 7. Additionally, along Street A, Street C, Street D, and Street E roofs are also connected to the RWCS network. This internal network confluences with roof drainage from lots along Newman Drive and runoff is directed to Wetland 2.

6.0 UTILITY SERVICING

The proposed development will connect to existing services along Newman Drive. GrandBridge Energy (electrical), Bell Canada (telephone), Enbridge Gas (natural gas), and Rogers Cable (cable television) are all expected to extend their services to the subject lands during construction of the proposed development. Confirmation of utility servicing will be undertaken at the appropriate time to ensure services are available prior to occupancy.

7.0 SUMMARY

The main findings of the Functional Servicing Report for the subject lands are:

1. The subdivisions have been designed to implement the *Cambridge West Community Master Environmental Servicing Plan* (November, 2013).
2. Proposed grading – The roadworks and lot grading within the proposed development can be completed in compliance with the City of Cambridge's Design Standards while maintaining the minimum required cover over the proposed sewers, maximizing the allowable flows to existing infrastructure, minimizing the need for retaining walls, as well as minimizing grading within the buffer areas as much as possible.
3. Streets within the subdivisions will be constructed to the City of Cambridge's Design Standards.
4. Sanitary and storm sewage collection – The proposed development can be adequately serviced through the extension of the existing gravity sewers along Newman Drive.
5. There is adequate capacity in the Galt Wastewater Treatment Plant to accommodate sanitary flow from the proposed subdivisions.
6. Water Distribution – Water supply for the proposed development can satisfactorily meet the pressure and flow demands through connections to the existing municipal water distribution system.
7. Stormwater management for most of the development will be directed to and can be accommodated by the adjacent SWMF 2 within the Cachet Subdivision, as outlined in the *Preliminary Stormwater Management Report* (April 2, 2026). Area 3, as described in this report, will be directed to and can be accommodated by the existing Newman SWMF.
8. The proposed development can be adequately serviced through the extension of existing utilities, including: hydro, gas, cable TV, and telephone.

All of which is respectfully submitted,

MTE Consultants Inc.

Garett Korber, P.Eng.
Design Engineer
519-743-6500
gkorber@mte85.com

Taylor Numan, B.A.Sc.
Designer
519-743-6500
tnuman@mte85.com

https://mte85.sharepoint.com/sites/02534-800/Shared Documents/02 - Reports/MTE Reports/FSR/02534-800_rpt_2026-04-02_Functional Servicing Report.docx

Appendix A

Draft Plan of Subdivision (Consolidated)

CONSOLIDATED
DRAFT PLANS OF SUBDIVISION

LEGAL DESCRIPTION

PART OF LOTS 13 AND 14, CONCESSION 11
PART OF LOTS 17 AND 18, CONCESSION 12
AND PART OF ROAD ALLOWANCE BETWEEN CONCESSIONS 11 & 12
TOWNSHIP OF NORTH DUMFRIES
REGIONAL MUNICIPALITY OF WATERLOO

OWNER'S CERTIFICATE

I HEREBY AUTHORIZE MACNAUGHTON HERMSEN BRITTON CLARKSON PLANNING LIMITED TO SUBMIT THIS PLAN FOR APPROVAL.

Date: _____

_____
Paul Grespan, Authorized Signing Officer
(Hallman Construction Limited)

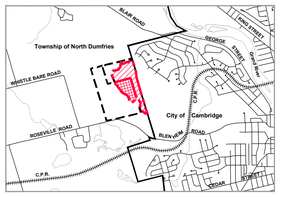
SURVEYOR'S CERTIFICATE

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

Date: _____

_____
Trevor D.A. McNeil, Surveyor, O.L.S.
MTE OLS LTD.

KEY PLAN



Hallman Construction Limited
Brian Domm
Additional Lands Owned by Applicants

Scale: 1:50,000

ADDITIONAL INFORMATION

Required Under Section 51 (17) of the Planning Act, R.S.O., 1990, c.P.13 as Amended

(a) As Shown
(b) As Shown
(c) As Shown
(d) Residential, Multiple Residential, Park, Open Space, Wildlife Corridor
(e) As Shown
(f) As Shown
(g) As Shown
(h) Municipal Water Supply
(i) Loam
(j) As Shown
(k) All Services as Required
(l) As Shown

AREA SCHEDULE - Hallman Construction Limited **30T-_____**

DESCRIPTION	LOTS/BLOCKS	UNITS	AREA
Low Density Residential	1-18	263-369	10.552 ha
Low Density Residential (Consolidation Block)	19,20	26-43	0.644 ha
Multiple Residential	21	125-165	1.852 ha
Park	22		0.339 ha
Open Space	23-25		2.490 ha
Wildlife Corridor	26		0.245 ha
0.3m Reserve	27-32		0.006 ha
Roads			3.309 ha
Total	**32**	**414-577**	**19.437 ha**

AREA SCHEDULE - Brian Domm **30T-_____**

DESCRIPTION	LOTS/BLOCKS	UNITS	AREA
Low Density Residential	1-14	144-207	5.336 ha
Low Density Residential (Consolidation Block)	15,16		0.121 ha
Multiple Residential (Consolidation Block)*	17	60-75*	0.122 ha
Park	18		0.662 ha
Open Space	19,20		3.680 ha
Roads			2.144 ha
Total	**20**	**204-282**	**12.065 ha**

AREA SCHEDULE - Total

DESCRIPTION	LOTS/BLOCKS	UNITS	AREA
Low Density Residential	32	407-576	15.888 ha
Low Density Residential (Consolidation Block)	4	26-43	0.765 ha
Multiple Residential	1	125-165	1.852 ha
Multiple Residential (Consolidation Block)*	1	60-75*	0.122 ha
Park	2		1.001 ha
Open Space	5		6.170 ha
Wildlife Corridor	1		0.245 ha
0.3m Reserve	6		0.006 ha
Roads			5.453 ha
Total	**52**	**618-859**	**31.502 ha**

*Due to multiple block configuration/size, some of the multiple residential units on the Domm Draft Plan of Subdivision are accounted for on the adjacent Hallman Draft Plan of Subdivision

NOTES

1. All dimensions are in metres unless otherwise shown.
2. Topographic Survey Base prepared by MTE.
3. Boundary information prepared by MTE (Plan 58R-22341 dated August 6, 2025)
4. Dripline and Wetland Limits provided by WSP.

Revision No.	Date	Issued / Revision	By

Stamp

Date	March 25, 2026
File No.	0800C
Plan Scale	1:1,250 (30 x 36)
Drawn By	D.G.S./SP
Checked By	D.A.

Project
WESTWOOD PHASE 2
Applicant: Hallman Construction Limited
539 Riverbend Drive
Kitchener, Ontario

File Name
DRAFT PLAN OF SUBDIVISION

Dwg No. 1 of 1

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MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE

Appendix B

Geotechnical Investigation

Soil and Materials Engineering
Environmental Engineering
Building Science
Supply Chain Quality

MTE Consultants Inc.

Cambridge West Development
Blenheim Road
Cambridge, Ontario

Geotechnical Investigation Report

Date: February 18, 2016
Ref. N°: 160-P-0003455-0-09-100-GE-R-0001-00

LVM

MTE Consultants Inc.

Cambridge West Development
Blenheim Road
Cambridge, Ontario

Geotechnical Investigation Report | 160-P-0003455-0-09-100

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INTRODUCTION

LVM, a division of Englobe Corp. (LVM) has been retained to carry out a geotechnical investigation for the first development phase of the Cambridge West Community, in Cambridge, Ontario at the location shown on the attached Location Plan, Drawing 1. This work was authorized by MTE Consultants Inc. on April 29, 2014 following submission of a fee proposal.

The purpose of this investigation was to advance boreholes and install monitoring wells at predetermined locations along the proposed roads and in three proposed stormwater management (SWM) facilities, to determine the subsurface soil and groundwater conditions at the site and, based on this information, prepare this geotechnical engineering report with recommendations pertaining to site preparation, site servicing, culvert design and construction, surface works, house construction, and stormwater management facilities.

1 GENERAL INFORMATION

This project involves the first phase of development for the Cambridge West Community. The current development plans encompass the Domm Farms Ltd. lands and Hallman Construction Limited lands. The site comprises farmed fields and extends from Blenheim Road, north to the rear of the properties on Westcliffe Way and from the westerly Cambridge city limit, east to the edge of the farmed fields.

It is understood that the new development will include low to high density residential blocks, internal roadways with culvert structures, stormwater management facilities, and a school block.

The first phase of the proposed subdivision development encompasses an area of approximately 65 hectares, comprising predominantly agricultural lands, with some wetland and treed areas. The wetland areas within this phase of the development are located along the west side, in the north-central and south regions. The east edge of the site comprises a treed area leading into the Devil's Creek wetlands. Devil's Creek runs in a north-south direction outside the southeast edge of the site and this phase will include a new culvert structure for the creek, constructed under the realigned Blenheim Road.

2 INVESTIGATION PROCEDURE

2.1 DESKTOP REVIEW

LVM inc. carried out a hydrogeological investigation for the proposed Cambridge West Community development. The results of the investigation have been review in preparation of this report and can be found in the following report:

- LVM inc. Hydrogeology Study Report – Cambridge West Community – Master Environmental Servicing Plan, Roseville/Blenheim Road, Kitchener, Ontario. (Project No. P-036589-0300-HD-R-0001-00, November 2013)

The relevant borehole locations from the LVM inc. investigation are illustrated on the appended Site Plan, Drawing 2 and the borehole logs are appended.

2.2 FIELD PROGRAM

The fieldwork for the geotechnical investigation was carried out between May 20 and June 4, 2014. The original program called for thirty-one boreholes; however, due to access constraints, one borehole (Borehole BH-21-14) was altered to two hand sampled boreholes (Borehole BH-21A-14 and BH-21B-14). The hand sampled boreholes were advanced with the combination of a manually powered handheld auger and by driving a 50 mm outside diameter split spoon sampler using a 31.75 kg weight free-falling 760 mm. The blows to drive the sampler each 150 mm were recorded and have been converted to SPT N-values as indicated on the appended logs.

The remaining thirty boreholes (Boreholes BH-01-14 to BH-20-14 and BH-22-14 to BH-31-14) were drilled to depths ranging between 3.5 and 11.1 m. The boreholes were located in the proposed stormwater management facility locations and spaced at approximately 200 m intervals along the proposed roads. The borehole locations were staked onsite by MTE Consultants Inc. and are shown on the appended Site Plan, Drawing 2. The boreholes were advanced with a CME-55 track-mounted drillrig equipped with continuous flight hollow stem augers supplied and operated by Geo-Environmental Drilling Ltd.

Soil samples were recovered from the boreholes at regular 0.75 and 1.50 m depth intervals using a 50 mm outside diameter split spoon sampler in accordance with the Standard Penetration Test (SPT) procedure. The SPT N-values are plotted on the appended borehole logs.

In addition to the boreholes, fifty handholes were advanced using a handheld auger to provide accurate topsoil depths throughout the planned development. The locations of the handholes were predetermined by laying out a 100 m by 100 m grid over the site, and are shown on the appended Drawing 3. The topsoil thickness at each test hole location is in the appended Table 1.

Local utility companies were contacted prior to the start of drilling activities in order to demarcate underground utilities near the borehole locations. A private utility locator was contracted to clear the boring locations of underground utilities.

Groundwater observations and measurements were carried out in the open boreholes during and upon completion of drilling, and the observations are summarized on the appended borehole logs.

Monitoring wells were installed in eight boreholes to allow measurement of the stabilized groundwater levels and to supplement the existing hydrogeological data of the area. The installations comprised 50 mm diameter pipes with slotted and filtered screens, as well as bentonite seals near the ground surface. Details of the installations and groundwater observations and measurements are provided on the borehole logs.

The monitoring well at Borehole BH-08-14 was tagged and a completed well record was submitted to the Ministry of Environment. A licensed well technician must properly decommission all monitoring wells before construction.

The fieldwork was observed by a member of our geotechnical engineering staff who documented the drilling and sampling procedures; recorded the SPT N-values; documented the soil stratigraphies; recorded the groundwater observations; and cared for the recovered soil samples.

The borehole locations and ground surface elevations were staked and surveyed by MTE Consultants Inc. (Drawing file: Boreholes.dwg and Excel Spreadsheet: LVM proposed borehole location – stake layout ground elevations May 2014.xlsx, received May 21 and May 14, 2014, respectively). It is understood that elevations are referenced to a geodetic benchmark.

2.3 LABORATORY TESTING

The soil samples secured during this investigation were returned to our laboratory for visual examination as well as moisture content tests. The moisture content test results are plotted on the borehole logs. The geotechnical laboratory testing also included:

- five particle size distribution analyses (ASTM D422) with results plotted on Figure 1; and,
- three standard Proctor moisture-density tests (ASTM D698-07e1) with results plotted on Figures 2 to 4.

The soil samples will be stored for a period of three months from the date of sampling. After this time, they will be discarded unless prior arrangements have been made for longer storage.

3 SUMMARIZED CONDITIONS

We refer to the appended borehole logs for detailed soil descriptions and stratigraphies; results of SPT testing; moisture content profiles; and groundwater observations.

The overall subsurface stratigraphy contacted at the site generally comprises topsoil underlain by deposits of sand, or sand and gravel. Silt was contacted in localized layers and pockets across the site and a significant silt deposit was encountered in Borehole BH-08-14. Fill was contacted in Borehole BH-04-14 advanced near the former farm house at the north of the site and in the hand sampled Boreholes BH-21A-14 and BH-21B-14, advanced at the edges of Devil's Creek, on the north side of Blenheim Road.

3.1 TOPSOIL AND FILL

Organics were contacted in all boreholes advanced at the subject site overlying the native mineral soils. In addition, fifty hand auger holes were dug in a grid pattern on the site to determine an accurate depth of topsoil. The topsoil thicknesses as encountered in the boreholes and hand holes advanced during this investigation varied between 100 and 1,070 mm. At the eighty-two test hole locations, the average topsoil thickness was found to be 366 mm. The topsoil generally ranges in composition from dark brown silt to sandy silt with some gravel and cobbles and was moist to very moist at the time of fieldwork. Traces of topsoil were also encountered at depths up to 1.5 m in Boreholes BH-07-14 to BH-10-14, surrounding the wetlands to the northwest of the site.

Fill was contacted in Boreholes BH-04-14, BH-21A-14 and BH-21B-14. In Borehole BH-04-14, the fill comprises dark brown organic silt with some sand and gravel and is remaining from the farm house formerly located on the property. In the two boreholes advanced adjacent to Devil's Creek, the fill comprises material placed as bank material, and contains some layered organics to a depth of up to 1.1 m.

3.2 SILT

Silt was contacted at the subject site in two boreholes (Boreholes BH-07-14 and BH-08-14) overlying the native granular soils, and in two boreholes (Boreholes BH-13-14 and BH-24-14) layered in the native granular soils.

The silt layer in Borehole BH-07-14 extends to a depth of 0.5 m and comprises silt with some sand, and traces of gravel and topsoil. The contacted silt deposit in Borehole BH-08-14 extends to a depth of 4.9 m and ranges in composition from silt with some sand to sandy silt, and contains some topsoil to a depth of 1.5 m. SPT N-values in the silt deposit at Borehole BH-08-14 range from 3 to 6 blows per 300 mm penetration of a split spoon sampler indicating a very loose to loose relative density. The contacted silt deposit was generally wet to saturated at the time of sampling.

Silt layers were contacted in Boreholes BH-13-14 and BH-24-14 at depths of 3.2 and 4.7 m (Elevation 309.9 and 300.8 m), respectively. The silt ranges in composition from silt with some fine sand and traces of clay and gravel to fine sandy silt. SPT N-Values in the silt layers were 22 and 27, indicating compact relative densities.

3.3 SAND/SAND AND GRAVEL

Sand and/or sand and gravel deposits were contacted in all boreholes advanced at the subject site underlying the topsoil, fill or silt soils. The granular deposits were continuous to borehole termination in all of the boreholes except Boreholes BH-13-14 and BH-24-14, where silt layers were contacted in the granular soils. Traces of topsoil or organics were contacted within the granular deposits in Boreholes BH-07-14 to BH-10-14 to depths of up to 1.5 m.

The contacted sand ranged widely in composition from silty fine sand to gravelly sand. The presence of cobbles was noted at various locations and ranged from occasional to numerous. The sand located above the stabilized groundwater was moist to wet at the time of fieldwork, and became saturated below the groundwater table. SPT N-values in the sand deposit vary from 3 blows to greater than 50 blows per 300 mm indicating variable very loose to very dense relative densities. The loose and very loose sand was contacted in Boreholes BH-09-14, BH-10-14, BH-14-14, BH-19-14, BH-23-14 and BH-31-14, and extends to depths up to 3 m. Elsewhere, the sand was generally in a compact state, with blow counts most commonly in the range of 10 to 30 blows per 300 mm penetration.

Three particle size distribution analyses were completed on representative samples of the sand and the results provided on Figure 1, appended. The results show that the samples contained 2 to 12% gravel, 82 to 91% sand, and 3 to 8% fines. The selected samples all meet the OPSS 1010 Select Subgrade Material specifications, and two of the samples meet the specifications for OPSS Granular 'B' Type I aggregate. The results of one standard Proctor moisture-density test performed on a sample of the sand is plotted on Figure 3 and shows a maximum dry density of 1.770 t/m^3 at an optimum moisture content of 13.0%.

The contacted sand and gravel ranges in composition from silty sand and gravel to sand and gravel with traces of silt. Cobbles were noted at various locations and ranged from occasional to numerous. The sand and gravel located above the stabilized groundwater was variably moist to wet at the time of fieldwork, and became saturated below the groundwater table. SPT N-values in the sand and gravel deposit vary from 4 blows to greater than 50 blows per 300 mm indicating variable loose to very dense relative densities. The loose sand and gravel was contacted in Boreholes BH-10-14, located in the area of the central SWM facility. The sand and gravel was generally in a compact state, with blow counts most commonly in the range of 20 to 30 blows per 300 mm penetration.

Two particle size distribution analyses were completed on representative samples of the sand and gravel and the results provided on Figure 1, appended. The results show that the samples contained 35 to 44% gravel, 52 to 59% sand, and 4 to 6% fines. The selected samples both meet the specifications for OPSS 1010 Select Subgrade Material, and OPSS Granular 'B' Type I aggregate. The results of two standard Proctor moisture-density tests performed on samples of the sand and gravel are plotted on Figures 2 and 4 and show maximum dry densities of 2.300 and 2.130 t/m^3 at optimum moisture contents of 6.1 and 9.1%, respectively.

3.4 GROUNDWATER

Groundwater observations and measurements carried out in the open boreholes, as well as the results of moisture content testing performed on recovered samples are provided on the appended borehole logs. The shallow groundwater table was contacted across the site, which ranges from Elevation 309.0 m at the west of the site to below Elevation 300.0 m at the southeast of the site, near Devil's Creek. Monitoring wells were installed in eight of the boreholes at the site, and stabilized groundwater measurements were taken on two occasions, with the Elevations provided in the appended Table 2.

For further details on the groundwater at this site, including shallow and deep groundwater contours, cross sections and seasonal high and low groundwater elevations, we refer the reader to the aforementioned LVM inc. hydrogeological study.

4 DISCUSSION AND RECOMMENDATIONS

The current site topography can be described as hummocky with rolling hill features. The subsurface stratigraphy encountered at the site comprises topsoil overlying native deposits of sand, and sand and gravel. Silt layers were contacted in localized areas at the site and a silt deposit was encountered surficially in Borehole BH-08-14. Fill material was contacted at the north of the proposed development, in the area where a farm was formerly located. Groundwater was measured at the west of the site as high as Elevation 308.9 m, and was not found in the monitoring well installed at BH-14-14; we refer to the aforementioned LVM inc. hydrogeological study performed at the site for further groundwater information and contours.

Based on the provided preliminary site grading plan (PDF File: Cambridge West – Preliminary Site Grading Plan.pdf, received July 11, 2014), it is understood that multiple low and high density lots are currently considered for the site. Internal roadways will be constructed to connect the new development to existing roadways (i.e. Westcliff Way and Bismark Drive in the north and the realigned Blenheim Road in the south). A school block, culvert structures and stormwater management facilities are also proposed for the development.

The purpose of this investigation is to provide geotechnical recommendations pertaining to site preparation, site servicing, culvert design, surface works, house construction, and stormwater management facilities.

4.1 SITE PREPARATION

Area grading will be required to prepare the site for the proposed residential development. Based on the provided preliminary cut-fill plan (PDF file: MTE rough cut-fill contours, February 4, 2014. Received April 9, 2014), it is understood that material will generally be cut from the higher grades (i.e. hill features, central portion of site) to raise grades in lower portions of the site, generally around the exterior areas, and wetlands. It is further understood that material excavated from the proposed stormwater management facilities will be considered for reuse on-site. Based on the provided contours, it is anticipated excess soil will be generated, and will need to be removed from site and stored elsewhere for re-use.

Prior to carrying out any area grading, the existing fill in the area of the former farm house and topsoil should be removed from below the proposed residential lots and streets. To provide an approximate quantity of topsoil to be stripped, fifty handholes were dug to determine the depth of topsoil, the topsoil thickness at the handhole and borehole locations are shown in the appended Table 1. The topsoil thickness contacted at the subject site varies from 100 to 1,070 mm. At the eighty-two test locations, the topsoil was found to have an average thickness of 366 mm. We recommend that the anticipated topsoil thickness be increased by 50 mm to account for variations and some stripping of the native mineral soil. The topsoil material could be used for landscaping fill to raise grades in the front and rear yards of house lots or in park lands.

Following removal of the fill and topsoil the exposed subgrade should be inspected by a geotechnical engineer and any loosened or soft pockets subexcavated. The finished subgrade should be sloped to promote rainwater drainage. The loose silt contacted in Borehole BH-08-14, in the location of a proposed culvert structure, is not suitable to remain below the culvert and should be removed prior to placing structural fill. It should be noted, traces of topsoil and organics were found within the upper native mineral soils in Boreholes BH-07-14 to BH-10-14 and should be removed prior to fill placement. Further, loose and very loose sand was contacted surficially in Boreholes BH-10-14, BH-12-12, BH-19-14, BH-23-14 and BH-31-14, at depths up to 3 m.

The major soil likely to be generated from the cut areas will comprise sands, and sand and gravels. Based on the results of in-situ moisture contents and standard Proctor moisture-density tests, the native soils from above the stabilized groundwater table may be drier than optimum and some water may have to be added prior to reuse as structural fill or road subgrade fill. Dewatered soils are generally not considered suitable for reuse due to the high residual moisture contents. It may be possible to mix drier than optimum soils with the dewatered soils, to achieve the desired moisture content. The fine-grained silt soils found in localized areas on the site should not be reused for structural fill but can be utilized as bulk fill in backyards or landscaped areas.

The non-cohesive, granular soils should be compacted with a smooth drum vibratory roller. The number of passes required will vary depending on the equipment used, fill material type, and moisture conditions of the fill material. If the area grading is carried out during dry weather, then water may need to be added to portions of the soils in order to achieve the specified levels of compaction.

It is recommended that construction traffic (particularly earth scrapers) be minimized on the finished subgrade, and the subgrade be sloped to promote rainwater drainage. Trafficability problems may be encountered for earth scrapers in the low-lying, wet areas of the development and tracked hydraulic excavators may be needed to remove some of the topsoil.

Any fill placed beneath structures must be placed as structural fill. Structural fill placed below residential buildings (houses), must be placed in maximum 300 mm thick lifts and compacted to a minimum of 98% standard Proctor maximum dry density (SPMDD) provided the foundations are designed as per Part 9 of the Ontario Building Code (2012). Structural fill placed below the proposed culvert structures, must be placed in maximum 300 mm thick lifts and compacted to a minimum of 100% standard Proctor maximum dry density (SPMDD).The structural fill should extend at least 1.0 m beyond the footing edge of any structure and outwards and downwards to the subgrade level at a slope of 1 horizontal to 1 vertical. A typical detail for a structural fill pad for a residential building is illustrated on Drawing 4, appended. Fill required to raise grades below the proposed streets and driveways should be compacted to 95% SPMDD.

Where higher bearing capacities are required (greater than 75 kPa) the structural fill must be compacted to a minimum 100% SPMDD. These areas will include the school block and any proposed higher density residential buildings. Further geotechnical investigation will be necessary for the design of these structures.

Where structural fill is placed on a wet subgrade, we suggest that only coarse sand and gravel material be used for the bottom few lifts. Also, the initial lift may be up to 450 mm thick in order to ensure trafficability and minimize compaction problems associated with instability of the subgrade caused by vibratory equipment.

Full-time inspection by experienced geotechnical personnel should be carried out during fill placement and compaction to examine and approve the fill material, verify the fill pad dimensions and to carefully monitor the placement and verify the compaction by insitu density testing.

4.2 SITE SERVICING

Following site grading operations, it is anticipated that the site will be provided with services including sanitary, watermain, and storm. Based on the servicing plans provided (MTE Consultants Inc., Project number 2534-100, Figure 6, Sanitary Servicing Plan, Dated December 1, 2015) it is understood that the invert levels for the sewers will be at depths up to 11.4 m below the proposed finished grades.

The proposed invert elevations for some of the services at this site are below the depths explored as part of this investigation. Once the alignment (both vertical and horizontal) of the trunk sanitary sewer has been finalized, further geotechnical investigation will be required prior to final design to confirm soil and groundwater conditions and present more detailed geotechnical recommendations.

4.2.1 Excavations and Dewatering

All trench excavations for service installation must comply with Ontario Regulation 213/91 (Construction Projects) under the Occupational Health and Safety Act. The native soils and any material placed as fill would be classified as Type 3 soils, and temporary excavation side slopes must be cut at an inclination of 1 horizontal to 1 vertical or less from the base of the excavation. Where saturated deposits are contacted in the trench sides, the soil would be classified as Type 4, and temporary side slopes should be cut at a minimum gradient of 3 horizontal to 1 vertical from the base of the excavation.

The trench side slopes should be regularly inspected for evidence of instability following periods of heavy rainfall, following periods of thawing, or when the trench has been left open for an extended period of time. Appropriate remedial action should be taken to ensure the continued stability of the slopes.

The proposed route of the trunk sewer could create hydraulic connections between groundwater regimes that are not presently connected. To stop the movement of groundwater along the pipe bedding, it is recommended that concrete or clay collars be installed around the pipes. The collars should be at least 1.0 m long and in place of the standard bedding material. Clay seals shall be compacted to 95% standard Proctor maximum dry density (SPMDD) as per OPSS 410.07.18. (Also OPSD 802.095 and OPSS 1205).

It is understood that the new services will be installed at depths up to 11.4 m below the proposed site grades. Based on the aforementioned site servicing plan, and hydrogeological studies groundwater contours, it is anticipated that excavations for the proposed service installations in the development will encounter groundwater.

Due to the coarse grained texture of the subgrade soils, significant groundwater inflow should be expected for the excavations extending into the groundwater table. A dewatering system installed by a specialist dewatering contractor would be required to lower the groundwater level prior to excavation.

The design of the dewatering system should be left to the contractor's discretion, and the system should meet a performance specification to maintain and control the groundwater at least 0.3 m below the excavation base.

A Permit to Take Water (PTTW) is required by the Ministry of Environment in the event that the daily taking of groundwater exceeds 50,000 L per day or continues for longer than 30 days. Due to the granular texture of the soils on the subject site, a PTTW will likely be required.

It is recommended that several test pits be dug during the tendering stage of the project so that prospective contractors may familiarize themselves with the soil and groundwater conditions at the site.

If required and upon request, LVM would be pleased to review the finalized site servicing plans to determine if positive dewatering would be required and to assist with preparation for securing a Permit to Take Water.

4.2.2 Pipe Bedding

The subgrade soils beneath the watermain and sewer pipes will comprise compacted approved fill placed during the area grading activities or inspected and approved native mineral soils. No support problems are anticipated for flexible or rigid pipes founded in the approved fill or compact to very dense native mineral soils.

Prior to installation of the sewers and watermain, the subgrade should be inspected by a geotechnical engineer. Any loose or soft areas noted during the inspection should be subexcavated and replaced with compacted granular material such as OPSS Granular 'A'.

Pipe bedding for water and sewer services should be conventional Class 'B' pipe bedding comprising a minimum 150 mm thick layer of OPSS Granular 'A' aggregate below the pipe invert. The bedding course may be thickened if portions of the subgrade become unduly wet during excavation. Granular 'A' type aggregate should be provided around the pipe to at least 300 mm above the pipe. The bedding aggregate should be compacted to a minimum 100% standard Proctor maximum dry density (SPMDD). Water and sewer lines installed outside of heated areas should be provided with a minimum 1.2 m of soil cover or equivalent insulation for frost protection.

4.2.3 Backfill

Trenches above the specified pipe bedding should be backfilled with inorganic on-site soil placed in 300 mm thick lifts and compacted to at least 95% SPMDD.

Based on the results of insitu moisture content tests and standard Proctor moisture-density tests carried out on the native overburden deposits, portions of the excavated material may require some water added prior to reuse as backfill material. Dewatered soils are generally not considered suitable for reuse as backfill due to the remaining high moisture contents and should be stockpiled or mixed with drier soils to dry the material to near the optimum moisture content for compaction prior to reuse on-site, where required.

Special attention must be paid to the effects of deep sewers in easements between buildings, and sewers near the proposed culvert structures. It is recommended that footings be placed below a line projected upwards at 45° from the trench base. Where a sewer trench intersects the structural fill pad for a structure, the backfill must be placed as structural fill, compacted to the specified degree under full time engineering supervision. Alternatively, the trench can be backfilled with non-shrinkable fill (0.4 MPa concrete).

To minimize potential problems, backfilling operations should follow closely after excavation so that only a minimal length of trench is exposed. Care should be taken to direct surface runoff away from the excavations. Should construction extend into the winter season, particular attention should be given to ensure that frozen material is not used as backfill.

Frequent inspection and compaction testing by experienced geotechnical personnel should be carried out to examine and approve backfill material, and to verify that the specified degree of compaction has been achieved.

4.3 CULVERT STRUCTURES

It is understood that animal crossing culvert structures are proposed within the Cambridge West development. A new culvert structure is also proposed under Blenheim Road at the Devil's Creek crossing. Boreholes were drilled in each of the proposed culvert locations, and proposed invert elevations were provided to LVM in December 2015. Due to access constraints, the borehole for the culvert at Devil's Creek was replaced with two manually driven boreholes on opposite sides of the creek.

The culvert structures are proposed to be in the areas of Boreholes BH-08-14, BH-09-14, and BH-21A-14/BH-21B-14. We refer the reader to the appended Drawing 2, Site Plan for the approximate culvert locations.

4.3.1 Culvert Subgrade

4.3.1.1 *Newman Drive Animal Crossing*

An animal crossing culvert is proposed to be located under Newman Drive, in the area of Borehole BH-08-14. It is understood that the culvert structure will be a 3.6 m wide concrete box structure, with the bottom of the culvert proposed to be at Elevation 311.95 m. The subgrade soils in this location comprise loose silt to a depth of 4.9 m (Elevation 306.8 m), overlying compact sand to the borehole termination. A monitoring well was installed in the culvert location, and on June 15, 2014 the stabilized groundwater was found to be at Elevation 308.9 m (2.8 m below grade).

The contacted silt is not suitable to remain below the culvert structure and must be removed prior to area grading operation. The subgrade for the culvert structure is expected to comprise engineered structural fill, compacted to 100% SPMDD, placed under fulltime geotechnical supervision and verified by insitu density testing. We refer the reader to Section 4.1 Site Preparation for details on structural fill placement.

Dewatering will be required to complete excavation of the loose soil and placement of the structural fill. Surface water runoff should be directed away from open excavations.

4.3.1.2 *Bismark Drive Animal Crossing*

An animal crossing culvert is proposed to be located under Bismark Drive, in the area of Borehole BH-09-14. It is understood that the culvert structure will be a 3.6 m wide concrete box structure, with the bottom of the culvert proposed to be at Elevation 310.41 m. The subgrade soils in this location comprise topsoil to a depth of 0.4 m (Elevation 309.4 m), overlying interlayered sand and gravel and sand deposits to the borehole termination. Monitoring wells were installed at adjacent boreholes to the south and northwest (Boreholes BH-06-14 and BH-12-14) and on June 15, 2014 the stabilized groundwater was found to be at Elevation 308.1 and 308.4 m, respectively. Based on observations and moisture content tests, groundwater was suspected at approximately 1.5 m below grade (Elevation 308.2 m) at the time of fieldwork, and lowering of the groundwater temporarily for construction will not likely be required at this location.

The subgrade for the culvert structure is expected to comprise engineered structural fill, compacted to 100% SPMDD, placed under fulltime geotechnical supervision and verified by insitu density testing. We refer the reader to Section 4.1 Site Preparation for details on structural fill placement.

The proposed animal crossing culvert is located above a proposed storm sewer pipe. The trench backfill in this area must be placed as structural fill, compacted to 100% SPMDD. The structural fill should extend at least 1.0 m beyond the footing edge and outwards and downwards to the subgrade level at a slope of 1 horizontal to 1 vertical. Alternatively, the trench can be backfilled with non-shrinkable fill (0.4 MPa concrete).

Shallow excavations for construction of the foundations at the depths proposed are not expected to encounter groundwater. Any minor groundwater seepage should be handled using conventional sump pumping and trenching techniques. Surface water runoff should be directed away from open excavations.

4.3.1.3 *Blenheim Road Culvert Crossing*

A culvert is proposed to be located under Blenheim Road at Devil's Creek, in the location of Boreholes BH-21A-14 and BH-21B-14. It is understood that the culvert will be an open bottom structure with the wingwall footings near Elevation 296.0 m. Hand sampled boreholes were advanced to the north of Blenheim Road, on both sides of Devil's Creek to evaluate the subgrade conditions. The subgrade soils in these locations comprise loose organic material to a depth of 1.1 to 1.2 m (Elevation 296.8 to 297.0 m), overlying dense sand and gravel to the borehole termination.

The contacted organic material is not suitable to remain below the culvert structure and must be removed. The subgrade for the culvert structure is expected to comprise native soils or engineered structural fill, placed on an inspected and approved subgrade, compacted to 100% SPMDD, placed under fulltime geotechnical supervision and verified by insitu density testing. We refer the reader to Section 4.1 Site Preparation for details on structural fill placement.

The footings are proposed to be near the water level in the creek. Based on observations and moisture contents in the boreholes, and the aforementioned LVM inc. hydrogeological study done on the subject site, groundwater is expected to be near the ground surface in this area. Some dewatering will be necessary for construction of this culvert structure, details of which can be found in Section 4.3.3 Excavations and Dewatering.

4.3.2 Culvert Foundation Design

It is anticipated that the subgrade soils will comprise tested and approved structural fill compacted to 100% SPMDD placed during the site grading activities or inspected and approved compact inorganic native mineral soils. Fill placed below the proposed culvert structures must be placed as structural fill compacted to a minimum of 100% standard Proctor maximum dry density (SPMDD).

The structural fill should extend at least 1.0 m beyond the footing edge and outwards and downwards to the subgrade level at a slope of 1 horizontal to 1 vertical. Fill required to raise grades below the roadways is only required to be compacted to 95% SPMDD, and full time inspection is required to confirm the culvert structural fill pad size and higher degree of compaction specifications are met.

Special attention must be paid to the effects of utility trench backfill adjacent to structures. It is recommended that footings be placed below a 45 degree line projected up from the edge of the trench base. Utility trench backfill within the structural fill for the culverts must be placed as structural fill compacted to a minimum of 100% SPMDD, under full time supervision by experienced geotechnical personnel. Alternatively, the trenches can be backfilled using unshrinkable fill (low strength concrete). The Bismark Drive animal crossing culvert is proposed to be located above a storm sewer, and care should be taken to ensure the structural fill pad location and dimensions.

Footings founded on the compact to dense native mineral soil or approved structural fill compacted to 100% SPMDD may be designed for a factored geotechnical bearing resistance at Ultimate Limit States (ULS) of 225 kPa and a soil bearing resistance for 25 mm of settlement at Serviceability Limit States (SLS) of 150 kPa.

The footing areas must be inspected by a geotechnical engineer to confirm that the soil conditions encountered at the time of construction are suitable to support the design bearing resistances. Any loose or disturbed soils identified during the inspection should be removed from the footing areas and replaced with concrete.

All exterior footings and those exposed to freezing should be provided with 1.2 m of soil cover to provide protection from freezing. If construction extends into the winter months, all founding soil must be protected from freezing during construction.

A Site Classification 'D' should be used for earthquake load and effects in accordance with Table 4.1.8.4.A of the Ontario Building Code (2012).

Material excavated during the footing construction is expected to comprise material placed as approved structural fill during the area grading activities at the site. The material would therefore be considered suitable for reuse as foundation wall backfill. Any additional material required should comprise imported granular soils such as OPSS Granular ‘B’. The backfill should be placed in maximum 300 mm thick lifts and compacted to 95% Standard Proctor Maximum Dry Density (SPMDD). The backfill should be brought up evenly on both sides of walls not designed to resist lateral earth pressure. Over-compaction must be avoided since this could cause excessive lateral earth pressure.

4.3.3 Excavations and Dewatering

Temporary excavations for culvert installation may encounter groundwater and must comply with Ontario Regulation 213/91 (Construction Projects) under the Occupational Health and Safety Act.

The native soils and any material placed as fill will be classified as Type 3 soils, and temporary side slopes must be cut at an inclination of 1 horizontal to 1 vertical or less from the base of the excavation as per O.Reg. 213/91 s. 234(2). Where saturated deposits are exposed in the excavation sides, the soils should be treated as Type 4 soils, and the sidewalls will have to be sloped back to 3 horizontal to 1 vertical to ensure stability.

Significant groundwater inflow should be expected for excavations extending into the sand and gravel found at Devil's Creek, in Boreholes BH-21A-14 and BH-21B-14. It is therefore recommended to dewater the soils to below the bottom of the lowest excavation prior to any excavation work for the structures.

The design of the dewatering system should be left to the contractor's discretion, and the system should meet a performance specification to maintain and control the groundwater at least 0.30 m below the deepest excavation in order to provide a stable base. Successful dewatering operations will depend on the contractor's own experience, construction techniques, sequencing and efficiency of work force and plant. Also the dewatering system must be in compliance with the Ontario Water Resources Act (OWRA) and the Water Taking and Transfer Regulation (O.Reg. 451/07).

Groundwater control mechanisms will impact the groundwater regime and therefore surrounding potable wells should be surveyed prior to construction to establish baseline readings in the wells.

A Permit To Take Water (PTTW) may be required from the Ministry of Environment (MOE). A PTTW is required by the MOE in the event that the daily taking of groundwater exceeds 50,000 L/day, or the pumping continues for longer than 30 days.

Details of a PTTW application are beyond the scope of this report. The application for a Category 3 Permit, for pumping longer than 30 days or at a rate greater than 400,000 L/day will require a supporting technical study addressing potential hydrogeological impact. A Category 2 Permit application requires signoff by a professional, but is less onerous in terms of technical study requirements.

4.4 SURFACE WORKS

4.4.1 Curbs and Sidewalk

The concrete for curb, gutter and sidewalks should be proportioned, mixed, placed, and cured in accordance with the requirements of City of Cambridge Specifications for Sidewalks and Curbs. The concrete should meet the following specifications:

Concrete Strength	30 MPa
Slump (curb)	60 mm Max
Slump (sidewalk)	70 ± 20 mm
Air Entrainment	7.0 ± 1.5%

The City of Cambridge requires a minimum 125 mm of OPSS 1010 Granular 'A' to be placed below curbs and sidewalks and the Granular 'A' must extend a least 150 mm beyond the concrete edges. The Granular 'A' should be compacted to 100% SPMDD.

During cold weather, the freshly placed concrete must be covered with insulating blankets to protect against freezing. Three test cylinders from each day's pour should be taken for compressive strength testing. Air entrainment, temperature, and slump tests should be made from the same batch of concrete from which test cylinders are made.

4.4.2 Pavement Design

It is understood that internal roadways and roundabouts will be constructed for the proposed development connecting the new subdivision to existing roadways. Pavement designs have been provided for various road classes. Roundabouts should be designed to the standard of the highest volume road at the intersection. The following pavement component thicknesses are recommended based on the minimum pavement design requirements for the City of Cambridge:

Table 1 Pavement Component Thicknesses (Proposed Residential Subdivision)

PAVEMENT COMPONENT	LOCAL ROADS	COLLECTOR ROADS	BUS ROUTES
Asphaltic Concrete - Surface	40 mm	40 mm	40 mm
Asphaltic Concrete - Binder	80 mm	100 mm	150 mm
Granular 'A' Base Course	150 mm	150 mm	150 mm
Granular 'B' Subbase Course	375 mm	375 mm	375 mm

The amount of Granular 'B' used in the pavement structure will depend on the subgrade conditions. If silty or saturated soils are contacted, then the subbase thickness may have to be increased. This decision should be made by a qualified geotechnical engineer at the time of street construction.

The pavement subgrade materials should be thoroughly proof-rolled prior to placement of the Granular 'B' subbase course. If the subgrade is wet or unstable, or if the road construction must be carried out during poor weather conditions, then the subbase thickness may have to be increased.

Samples of both the Granular 'A' and Granular 'B' aggregates should be checked for conformance to OPSS 1010 prior to utilization on site and during construction. The Granular 'B' subbase and Granular 'A' base courses must be compacted to 100% SPMDD, as verified by insitu density testing.

Based on The City of Cambridge design standards, the asphaltic concrete should comprise HL3 for the surface lift, and HL8 binder (two lifts). The HL3 surface mix must not contain any recycled material (RAP) and the HL8 binder mix may contain a maximum of 20% RAP. The asphaltic concrete paving materials should conform to the requirements of OPSS 1150. The asphalt should be placed and compacted in accordance with OPSS 310. The recommended Performance Graded Asphalt Cement designation for the asphaltic concrete is 58-28.

The predominant native soils on this site are free draining, and the proposed streets are anticipated to be at a minimum 2 to 3 m above the seasonal high groundwater, as found in our hydrogeological study. Therefore, subdrains should not be required below the pavement structure across most of the site. Final design grades should be reviewed with the high groundwater contours to confirm this assumption prior to construction.

4.5 HOUSE CONSTRUCTION

4.5.1 Foundations

In general, the undisturbed compact native mineral soils or approved structural fill are considered suitable to support residential house foundations. House footings must be designed as per Part 9 of the Ontario Building Code (2012).

The exterior footings or footings in unheated areas should be provided with a minimum 1.2 m of earth cover upon final grading for frost protection.

All founding surfaces for residential dwellings on structural fill or native soils should be inspected by a geotechnical engineer prior to placing concrete. The purpose of the inspection is to ensure that the subgrade soils are capable of supporting the house foundations, and to confirm that the house envelopes do not extend beyond the limits of the structural fill pads.

Additional geotechnical investigation work would be required in order to provide recommendations for larger buildings, such as schools, or apartment buildings.

4.5.2 Basements

The house basements must be provided with perimeter weeping tile systems as per the Ontario Building Code (2012). The drain tile or pipe should be laid on undisturbed or well-compacted soil so that the top of the tile or pipe is below the bottom of the basement floor slab. The weeping tile must drain to a suitable frost-free outlet or sump as per the City of Cambridge requirements.

The portion of the exterior basement wall below finished ground level must be damp proofed as per the Ontario Building Code (2012). The free-draining granular soils are well-suited for use as basement wall backfill. The basement wall backfill should be graded to allow drainage away from the foundation.

The basement walls should be designed to resist the lateral earth pressure. For calculating the lateral earth pressure, the coefficient of at rest earth pressure (k_0) may be assumed as 0.50 for cohesionless sandy soils. The bulk unit weight of the retained backfill may be taken as 21 kN/m^3 for well-compacted sandy soil. An appropriate factor of safety should be employed.

The basement floor levels must be designed at least 0.75 m above the stabilized groundwater level as per City of Cambridge requirements.

The subgrade for the basement floor slabs should comprise undisturbed native soil or well-compacted approved structural fill. A minimum 100 mm thick layer of coarse clean granular material, such as OPSS 1010 Granular Type 'A' shall be placed beneath slabs in houses as per the Ontario Building Code.

4.6 STORMWATER MANAGEMENT FACILITIES

It is understood that stormwater infiltration is proposed for this site and stormwater management (SWM) facilities are proposed in three different locations, as shown on the appended Drawing 2.

4.6.1 Central Pond

The central SWM facility is proposed as a 'wetland' design, with a permanent pool elevation of 308.3 m. The wetland cell is proposed to have a base at Elevation 308.0 m and a Regional Storm Event water level at approximately Elevation 310.7 m. The micropools and forebay areas are proposed to have a base at Elevation 306.8 m. The proposed Boreholes BH-10-14 to BH-12-14 were advanced in the area of the proposed facility and the subgrade soils comprise layered deposits of sand and sand and gravel. Groundwater was measured in monitoring wells installed during the current investigation at Elevation 308.5 m (Borehole BH-10-14) and Elevation 308.4 (Borehole BH-12-14).

Significant groundwater inflow must be expected for excavations extending into the stabilized groundwater table. The soils contacted at Elevation 306.8 m, in the boreholes advanced within the pond footprint comprise sand and gravel. Based on the results of this investigation and five particle size analyses, the general soil profile existing at the site comprises surficial topsoil overlying major native deposits of sand, and sand and gravel. Using the geometric mean of four methods of analyses the hydraulic conductivity of the soils at this site is in the range of approximately 10^{-3} to 10^{-5} m/sec.

It is recommended to dewater the soils to below the bottom of the lowest excavation prior to any excavation work for the SWM facility.

The design of the dewatering system should be left to the contractor's discretion, and the system should meet a performance specification to maintain and control the groundwater at least 0.30 m below the deepest excavation in order to provide a stable base. Successful dewatering operations will depend on the contractor's own experience, construction techniques, sequencing and efficiency of work force and plant. Also the dewatering system must be in compliance with the Ontario Water Resources Act (OWRA) and the Water Taking and Transfer Regulation (O.Reg. 451/07).

Groundwater control mechanisms will impact the groundwater regime and therefore surrounding potable wells should be surveyed prior to construction to establish baseline readings of the wells.

A Permit To Take Water (PTTW) will be required from the Ministry of Environment (MOE). A PTTW is required by the MOE in the event that the daily taking of groundwater exceeds 50,000 L/day.

Details of a PTTW application are beyond the scope of this report. The application for a Category 3 Permit, for pumping longer than 30 days or at a rate greater than 400,000 L/day will require a supporting technical study addressing potential hydrogeological impact. A Category 2 Permit application requires signoff by a professional, but is less onerous in terms of technical study requirements.

Due to the high permeability of the native soils and the groundwater conditions, excavations for the forebay and micropool areas may necessitate the use of a 'dragline excavator' to facilitate subaqueous excavations.

The native soils at the site will be classified as Type 3 soils, and temporary side slopes must be cut at an inclination of 1 horizontal to 1 vertical or less from the base of the excavation as per O.Reg. 213/91 s. 234(2). Where saturated deposits are exposed in the excavation sides, the soils should be treated as Type 4 soils, and the sidewalls will have to be sloped back to 3 horizontal to 1 vertical to ensure stability.

The slopes of the pond, below the proposed maximum water elevation (Elevation 310.7 m) should be cut to an inclination of 3 horizontal to 1 vertical or less. Above the maximum proposed water level, the slope may be increased to a maximum level of 2 horizontal to 1 vertical. The finished slopes above the permanent water level should be topsoiled and vegetated as soon as possible after construction to minimize surface erosion. Some routine maintenance of the slope surfaces will likely be required to address minor long-term weathering and erosion.

To ensure the slopes hold their shape after excavation and to provide long term stability, we recommend that a cellular confinement system (geocells) be placed over the base and any slopes proposed to be underwater. Examples of this type of product would be Terrafix's 'Terraweb' or GeoProducts 'EnviroGrid'. The mats should be placed on a clean, smooth subgrade, free of any protrusions or boulders. The mats should be attached together, and anchored to the manufactures specifications. The mats can be backfilled with the native soils on the site, however care should be taken to remove any cobbles or boulders that may be too large for the cells. The mats should be topsoiled and vegetated as soon as possible after completion. Construction traffic is not permitted over the mats and the topsoil will need to be spread either manually or using an excavator.

If dewatering is used for construction of the SWM facility, care must be taken while deactivating the dewatering system to prevent bank instability and failure by blowout. The dewatering well points should be gradually turned off in succession, allowing time for the water to stabilize. If the water is allowed to rise at a fast rate, excess pore water pressures will build up and may lead to blowout in the bottom or side embankments of the pond.

4.6.2 Southwest Pond

The proposed southwest SWM facility is proposed as a 'wet pond' design, with a proposed permanent pool Elevation of 309.6 m. The SWM facility will have wet cell, and forebay areas that will be founded at Elevation 308.1 m. Boreholes BH-26-14 and BH-27-14 were advanced in the area of the proposed facility and the subgrade soils comprise layered deposits of sand and sand and gravel. Groundwater was measured in a monitoring well installed during the current investigation at Elevation 308.3 m (Borehole BH-26-14).

Existing grades at the borehole locations in the area of the SWM pond range from Elevation 309.0 to 309.4 m (Boreholes BH-27-14 and BH-26-14, respectively). The topsoil in the area of the SWM pond is expected to be stripped during site grading operations. Following the removal of topsoil, the subgrade should be inspected and any loose or soft pockets beneath the banks should be subexcavated. It is anticipated material will be cut from the centre of the pond and that the banks will be constructed using onsite material comprising sand or sand and gravel.

Significant groundwater inflow must be expected for excavations extending into the stabilized groundwater table. Groundwater was measured in a monitoring well installed during the current investigation at Elevation 308.3 m (Borehole BH-26-14). Based on the results of this investigation and five particle size analyses, the general soil profile existing at the site comprises surficial topsoil overlying major native deposits of sand, and sand and gravel. Using the geometric mean of four methods of analyses the hydraulic conductivity of the soils at this site is in the range of approximately 10^{-3} to 10^{-5} m/sec.

It is recommended to dewater the soils to below the bottom of the lowest excavation prior to any excavation work for the SWM facility.

The design of the dewatering system should be left to the contractor's discretion, and the system should meet a performance specification to maintain and control the groundwater at least 0.30 m below the deepest excavation in order to provide a stable base. Successful dewatering operations will depend on the contractor's own experience, construction techniques, sequencing and efficiency of work force and plant. Also the dewatering system must be in compliance with the Ontario Water Resources Act (OWRA) and the Water Taking and Transfer Regulation (O.Reg. 451/07).

Groundwater control mechanisms will impact the groundwater regime and therefore surrounding potable wells should be surveyed prior to construction to establish baseline readings of the wells.

A Permit To Take Water (PTTW) will be required from the Ministry of Environment (MOE). A PTTW is required by the MOE in the event that the daily taking of groundwater exceeds 50,000 L/day.

Details of a PTTW application are beyond the scope of this report. The application for a Category 3 Permit, for pumping longer than 30 days or at a rate greater than 400,000 L/day will require a supporting technical study addressing potential hydrogeological impact. A Category 2 Permit application requires signoff by a professional, but is less onerous in terms of technical study requirements.

If dewatering is used for construction of the SWM facility, care must be taken while deactivating the dewatering system to prevent bank instability and failure by blowout. The dewatering well points should be gradually turned off in succession, allowing time for the water to stabilize. If the water is allowed to rise at a fast rate, excess pore water pressures will build up and may lead to blowout in the bottom or side embankments of the pond.

The native soils at the site will be classified as Type 3 soils, and temporary side slopes must be cut at an inclination of 1 horizontal to 1 vertical or less from the base of the excavation as per O.Reg. 213/91 s. 234(2). Where saturated deposits are exposed in the excavation sides, the soils should be treated as Type 4 soils, and the sidewalls will have to be sloped back to 3 horizontal to 1 vertical to ensure stability.

The slopes of the pond, below the proposed maximum water elevation should be cut to an inclination of 3 horizontal to 1 vertical or less. Above the maximum proposed water level, the slope may be increased to a maximum level of 2 horizontal to 1 vertical. The finished slopes above the permanent water level should be topsoiled and vegetated as soon as possible after construction to minimize surface erosion. Some routine maintenance of the slope surfaces will likely be required to address minor long-term weathering and erosion.

It is our understanding that the southwest SWM pond is designed as a wet pond with a permanent pond of collected stormwater. In general terms, the stabilized groundwater level is up to about 1.5 m below the design water level in the pond, and the base soil material is granular and permeable.

Based on these requirements we suggest that a pond liner be utilized. None of the contacted soils on site would be suitable for a pond liner and it will not be cost-effective to import soil for use in a liner. We recommend that a synthetic liner be used.

A geosynthetic liner such as Terrafix's Bentofix NW liner or equivalent could be used. These liners comprise a sandwiched composite of geotextiles and bentonite clay. Prior to installing the liner, a 150 mm thick layer of sand should be laid on the subgrade to protect the liner from being punctured. This sand layer should be free of all particles larger than 19mm. Liner panels should be overlapped by at least 300 mm and bentonite paste should be provided at all seams. The panels at the top of the slope should be anchored. The liner must be covered with at least 200mm of sand to protect it from damage after construction. The liner must be covered with a sand and gravel ballast to 0.5 m above the base of the pond to prevent blowout of the liner.

Prior to placing the liner the native subgrade should be checked to ensure that the exposed soils are suitable to support the liner. Following construction of the liner, it is recommended that the dewatering system be deactivated at a controlled pace under the supervision of qualified geotechnical personnel. The reason for this is to prevent blowout of the liner in the base of the pond.

4.6.3 Southeast Pond

The proposed central SWM facility is proposed as a 'dry pond' design, with the base of the pond at Elevation 305.0 m and the maximum water level around Elevation 306.8 m. Boreholes BH-29-14 and BH-30-14 were advanced in the area of the proposed facility and the subgrade soils comprise layered deposits of sand and sand and gravel. Further investigation, including the installation of a monitoring well at this location is recommended to determine the stabilized groundwater elevation.

Groundwater inflow should be expected for excavations extending into the stabilized groundwater table, and a dewater system will be required to facilitate these excavations.

The design of the dewatering system should be left to the contractor's discretion, and the system should meet a performance specification to maintain and control the groundwater at least 0.30 m below the deepest excavation in order to provide a stable base. Successful dewatering operations will depend on the contractor's own experience, construction techniques, sequencing and efficiency of work force and plant. Also the dewatering system must be in compliance with the Ontario Water Resources Act (OWRA) and the Water Taking and Transfer Regulation (O.Reg. 451/07).

Groundwater control mechanisms will impact the groundwater regime and therefore surrounding potable wells should be surveyed prior to construction to establish baseline readings of the wells.

A Permit To Take Water (PTTW) may be required from the Ministry of Environment (MOE). A PTTW is required by the MOE in the event that the daily taking of groundwater exceeds 50,000 L/day, or the pumping exceeds 30 days.

Details of a PTTW application are beyond the scope of this report. The application for a Category 3 Permit, for pumping longer than 30 days or at a rate greater than 400,000 L/day will require a supporting technical study addressing potential hydrogeological impact. A Category 2 Permit application requires signoff by a professional, but is less onerous in terms of technical study requirements.

Care must be taken while deactivating the dewatering system to prevent bank instability and failure by blowout. The dewatering points should be gradually turned off in succession, allowing time for the water to stabilize. If the water is allowed to rise at a fast rate, excess pore water pressures will build up and may lead to blowout in the bottom or side embankments of the pond.

The native soils at the site will be classified as Type 3 soils, and temporary side slopes must be cut at an inclination of 1 horizontal to 1 vertical or less from the base of the excavation as per O.Reg. 213/91 s. 234(2). Where saturated deposits are exposed in the excavation sides, the soils should be treated as Type 4 soils, and the sidewalls will have to be sloped back to 3 horizontal to 1 vertical to ensure stability.

The slopes of the pond, below the proposed maximum water elevation (Elevation 306.8 m) should be cut to an inclination of 3 horizontal to 1 vertical or less. Above the maximum proposed water level, the slope may be increased to a maximum level of 2 horizontal to 1 vertical. The finished slopes above the permanent water level should be topsoiled and vegetated as soon as possible after construction to minimize surface erosion. Some routine maintenance of the slope surfaces will likely be required to address minor long-term weathering and erosion.

To ensure the slopes hold their shape after excavation and to provide long term stability, we recommend that a cellular confinement system (geocells) be placed over the base and any slopes proposed to be underwater. Examples of this type of product would be Terrfix's 'Terraweb' or GeoProducts 'EnviroGrid'. The mats should be placed on a clean, smooth subgrade, free of any protrusions or boulders. The mats should be attached together, and anchored to the manufactures specifications. The mats can be backfilled with the native soils on the site, however care should be taken to remove any cobbles or boulders that may be too large for the cells. The mats should be topsoiled and vegetated as soon as possible after completion. Construction traffic is not permitted over the mats and the topsoil will need to be spread either manually or using an excavator.

4.7 CONSTRUCTION INSPECTION AND TESTING

Geotechnical inspections and insitu density testing should be conducted during site grading in order to verify that all organic and otherwise deleterious soils have been properly stripped; and, to ensure that all fill materials are being adequately compacted. During servicing contracts, daily compaction testing of pipe bedding and trench backfill should be carried out.

Appropriate laboratory and field testing of the pavement structure components (granulars and asphaltic concrete) should be conducted, as well as concrete testing for the curbs and sidewalks. All materials and construction services required for the work should be in accordance with the applicable sections of the OPSS, City of Cambridge Specifications, and Region of Waterloo Specifications.

5 STATEMENT OF LIMITATIONS

The geotechnical recommendations provided in this report are applicable only to the project described in the text and then only if constructed substantially in accordance with the details stated in this report. Since all details of the design may not be known at the time of report preparation, we recommend that we be retained during the final design stage to verify that the geotechnical recommendations have been correctly interpreted in the design. Also, if any further clarification and/or elaboration are needed concerning the geotechnical aspects of the project, LVM should be contacted. We recommend that we be retained during construction to confirm that the subsurface conditions do not deviate materially from those encountered in the test holes and to ensure that our recommendations are properly understood.

The geotechnical recommendations provided in this report are intended for the use of the owner and its retained designer. They are not intended as specifications or instructions to contractors. Any use which a contractor makes of this report, or decisions made based on it, are the responsibility of the contractor. The contractor must also accept the responsibility for means and methods of construction, seek additional information if required, and draw their own conclusions as to how the subsurface conditions may affect their work. LVM accepts no responsibility and denies any liability whatsoever for any damages arising from improper or unauthorized use of the report or parts thereof.

It is important to note that the geotechnical investigation involves a limited sampling of the site gathered at specific test hole locations and the conclusions in this report are based on this information gathered. The subsurface geotechnical, hydrogeological, environmental and geologic conditions between and beyond the test holes will differ from those encountered at the test holes. Also such conditions are not uniform and can vary over time. Should subsurface conditions be encountered which differ materially from those indicated at the test holes, we request that we be notified in order to assess the additional information and determine whether or not changes should be made as a result of the conditions.

Appendix 1 Drawings

Drawing 1: Site Location Plan
Drawing 2: Detailed Site Plan
Drawing 3: Topsoil Thickness Location Plan
Drawing 4: Typical Structural Fill Detail for Residential Buildings

NOTES :
1-REFERENCES : © OpenStreetMap contributors (2013).

0 250 500 750 1000 m
SCALE 1:25000

Project
Cambridge West Development
Blenheim Road, Cambridge, Ontario

Title
LOCATION PLAN

LVM
353, Bridge Street East
Kitchener (Ontario) N2K 2Y5
Telephone : 519.741.1313
Fax : 519.741.5422

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Drawn	E.Ciochon	Scale	1 : 25000	Sequence no.	01 of 04
Checked	D.Gonser	Date	2016-02-17		

M. dept.	Project	Disc.	Dwg no.	Rev.
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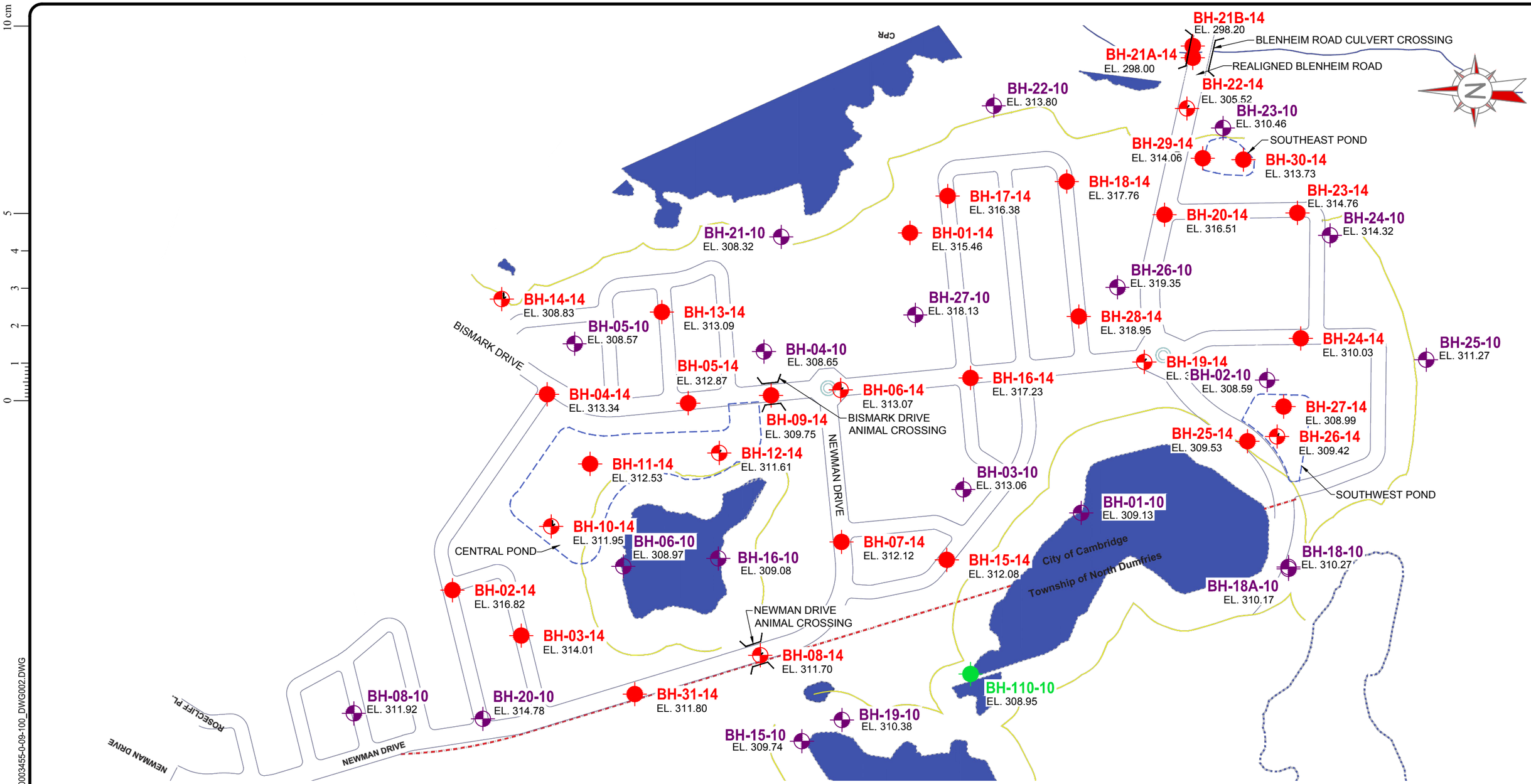

LEGEND :

- BOREHOLE LOCATION
- MONITORING WELL LOCATION
- BOREHOLE LOCATION INVESTIGATION P036589 (2010)
- BOREHOLE LOCATION INVESTIGATION P031655 (2010)
- EL. 298.00 — GROUND SURFACE ELEVATION (m)
- PROPOSED SWM FACILITIES
- PROPOSED CULVERT STRUCTURE

NOTES :

1-REFERENCES: MHBC Cambridge West, Concept Plan, 2014-03-18.

2-Drawing scale may be distorted due to file conversion and/or copying. Measurements taken from the drawing must be verified in the field.

0 50 100 150 200 m

SCALE 1:5000

Project

Cambridge West Development

Blenheim Road, Cambridge, Ontario

Title

SITE PLAN

LVM

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Sequence no.: 02 of 04

M. dept.	Project	Disc.	Dwg no.	Rev.
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LEGEND :

TOPSOIL THICKNESS TEST LOCATION

PROPOSED SWM FACILITIES

PROPOSED CULVERT STRUCTURE

NOTES :

1-REFERENCES: MHBC Cambridge West, Concept Plan, 2014-03-18.

2-Drawing scale may be distorted due to file conversion and/or copying. Measurements taken from the drawing must be verified in the field.

0 50 100 150 200 m

SCALE 1:5000

Project

Cambridge West Development

Blenheim Road, Cambridge, Ontario

Title

TOPSOIL THICKNESS LOCATION PLAN

LVM

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Checked	D.Gonser	Date	2016-02-17		

M. dept.	Project	Disc.	Dwg no.	Rev.
160	P-0003455-0-09-100	GE	003	00

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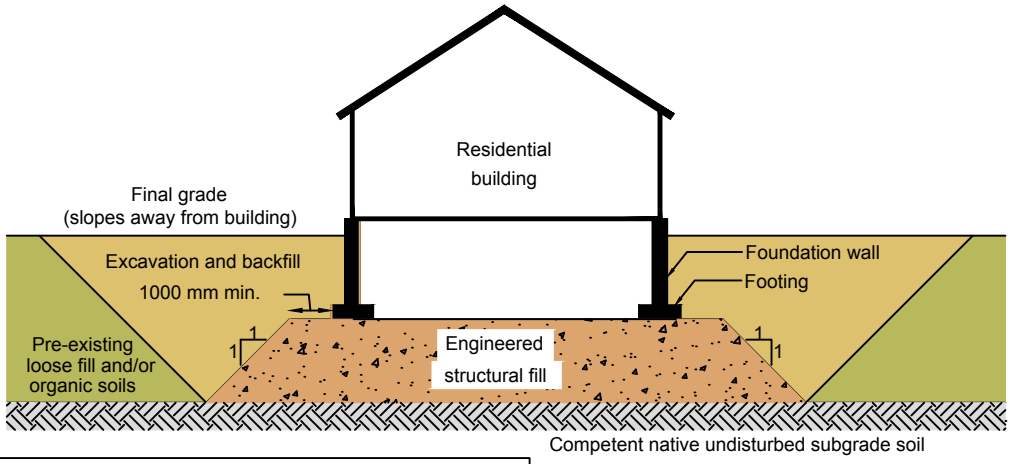
ENGINEERED STRUCTURAL FILL PAD



GENERAL REQUIREMENTS FOR ENGINEERED STRUCTURAL FILL

1. The area must be excavated of all pre-existing loose fill, topsoil, and/or organic soil until competent native undisturbed soil is reached.

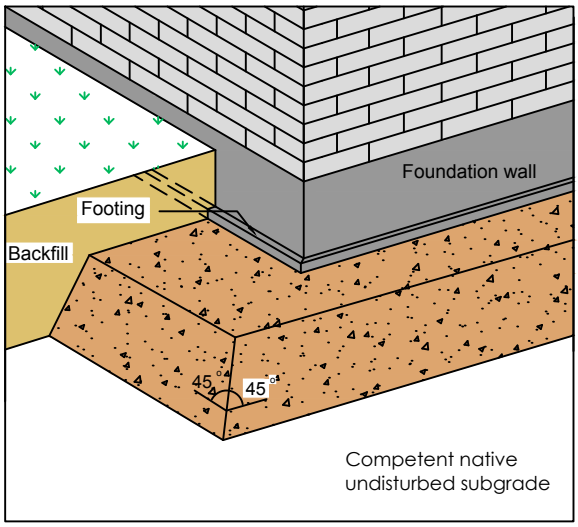
2. The excavation should allow for the structural fill to extend 1000 mm beyond the outside edge of the building footings and down to the approved subgrade soil at a slope of 1 horizontal to 1 vertical (45°).

3. The subgrade below the engineered fill should be inspected and approved by a geotechnical engineer prior to fill construction. Fill placement and compaction operations to be carried out under full-time geotechnical supervision.

4. The structural fill should comprise sand and gravel aggregate placed in 300 mm thick lifts and compacted to at least 98% Standard Proctor Maximum Dry Density (SPMDD). The exterior backfill should consist of approved inorganic soil also placed in 300 mm thick lifts and compacted to minimum 95% SPMDD.

5. All excavations must be carried out in conformance with the current Ontario Occupational Health and Safety Act and Regulations 213/91 for construction projects.

6. Exterior footings must be provided with minimum 1.2 m of soil cover for frost protection.



Project

Cambridge West Development

Blenheim Road, Cambridge, Ontario

Title

TYPICAL STRUCTURAL FILL PAD DETAIL FOR RESIDENTIAL BUILDINGS

LVM

353, Bridge Street East
Kitchener (Ontario) N2K 2Y5
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Prepared	E.Ciochon	Discipline	GEOTECHNICAL	Project manager	D.Gonser
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Checked	D.Gonser	Date	2016-02-17		

M. dept.	Project	Disc.	Dwg no.	Rev.
160	P-0003455-0-09-100	GE	004	00

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Appendix 2 Borehole Logs

List of Abbreviations

Boreholes BH-01-14 to BH-31-14

Borehole BH-110-10 (LVM Inc. Investigation P-036589-300, 2010)

Boreholes BH-01-10 to BH-06-10, BH-08-10, BH-15-10, BH-16-10, BH-18-10 to BH-27-10 (LVM Inc. Investigation P-031655-300, 2010)

LIST OF ABBREVIATIONS

The abbreviations commonly employed on the borehole logs, on the figures, and in the text of the report, are as follows:

Sample Types		Soil Tests and Properties	
AS	Auger Sample	SPT	Standard Penetration Test
CS	Core Sample	UC	Unconfined Compression
RC	Rock Core	FV	Field Vane Test
SS	Split Spoon	ø	Angle of internal friction
TW	Thinwall, Open	γ	Unit weight
WS	Wash Sample	w_p	Plastic limit
BS	Bulk Sample	w	Water content
GS	Grab Sample	w_L	Liquid limit
WC	Water Content Sample	I_L	Liquidity index
TP	Thinwall, Piston	I_p	Plasticity index
		PP	Pocket penetrometer

Penetration Resistances	
Dynamic Penetration Resistance	The number of blows by a 63.5 kg (140 lb.) hammer dropped 760 mm (30 in.) required to drive a 50 mm (2 in.) diameter 60º cone a distance 300 mm (12 in.). The cone is attached to 'A' size drill rods and casing is not used.
Standard Penetration Resistance, N (ASTM D1586)	The number of blows by a 63.5 kg (140 lb.) hammer dropped 760 mm (30 in.) required to drive a standard split spoon sampler 300 mm (12 in.)
WH	sampler advanced by static weight of hammer
PH	sampler advanced by hydraulic pressure
PM	sampler advanced by manual pressure

Soil Description			
Cohesionless Soils		**SPT N-Value**	**Relative Density (D_r)**
Compactness Condition		(blows per 0.3 m)	(%)
Very Loose		0 to 4	0 to 20
Loose		4 to 10	20 to 40
Compact		10 to 30	40 to 60
Dense		30 to 50	60 to 80
Very Dense		over 50	80 to 100
Cohesive Soils		**Undrained Shear Strength (C_u)**	
Consistency		**kPa**	**psf**
Very Soft		less than 12	less than 250
Soft		12 to 25	250 to 500
Firm		25 to 50	500 to 1000
Stiff		50 to 100	1000 to 2000
Very Stiff		100 to 200	2000 to 4000
Hard		over 200	over 4000
DTPL	Drier than plastic limit	Low Plasticity, W_L <30	
APL	About plastic limit	Medium Plasticity, 30 < W_L < 50	
WTPL	Wetter than plastic limit	High Plasticity, W_L > 50	

Ground Elevation: *315.46 m*

Borehole Number: **BH-01-14**

Job N°: *P-0003455-0-09-100*

Drill Date: *2014-05-23*

Project: *Cambridge West Development*

Field Tech: *D.Souter*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Method: *Hollow Stem Auger*

SOIL PROFILE			SAMPLE								
Depth (m)	Description	Symbol	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value	Dynamic Cone / Std Penetration (20 40 60 80)	Shear Strength (PP) kPa / Initial / Remold / Shear Strength (FV) kPa (50 100 150 200)	Water Content (%) WP WL (10 20 30)	Groundwater Observations and Standpipe Details
	Ground Elevation		315.46							
	TOPSOIL: dark brown silt, trace sand gravel and corn roots, moist		0.00 / 315.13							
			0.33							
1	***SAND:*** compact brown sand, some gravel, trace silt, moist			SS-1	5-8 9	17				native backfill
			313.94							
	trace silt and gravel, very moist		1.52	SS-2	4-5 8	13				
2			313.17							
	SAND AND GRAVEL: dense brown sand and gravel, some silt and occasional cobbles, moist		2.29	SS-3	23-20 15	35				
3			312.41							
	SAND: compact brown fine to coarse sand, some gravel, trace silt, moist		3.05	SS-4	5-6 7	13				native cave
			311.95							
	Borehole terminated at 3.50 m		3.50							
4										
5										
6										
7										
8										
9										
10										
11										
12										

Reviewed by: *D.Gonser*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes:

Ground Elevation: *316.82 m*

Borehole Number: **BH-02-14**

Job N°: *P-0003455-0-09-100*

Drill Date: *2014-05-20*

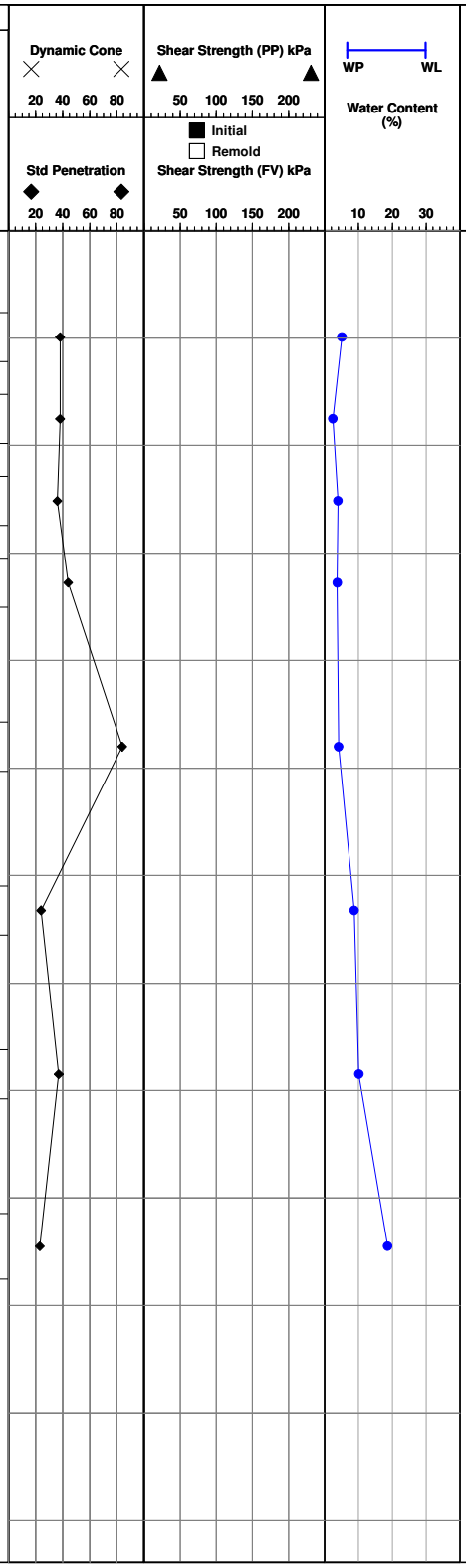
Project: *Cambridge West Development*

Field Tech: *D.Souter*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Symbol	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
	Ground Elevation		316.82			
	TOPSOIL: dark brown silt, some sand, trace gravel and corn roots, moist		0.00 / 316.41			
			0.41			
1	***SAND AND GRAVEL:*** dense brown sand and gravel, some silt, moist			SS-1	10-22 16	38
2				SS-2	12-15 23	38
3				SS-3	14-18 18	36
				SS-4	12-20 24	44
4			312.25			
	very dense		4.57	SS-5	40-42 42	84
5						
6			310.72			
	SAND: compact brown fine sand, some silt, moist		6.10	SS-6	11-12 12	24
7						
				SS-7	10-22 15	37
8			308.74			
	very moist		8.08			
9			307.68			
	saturated		9.14	SS-8	8-11 12	23
			307.07			
10	Borehole terminated at 9.75 m		9.75			
11						
12						



Groundwater Observations and Standpipe Details

Vertical Scale = 1 : 70.0

Reviewed by: *D.Gonser*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes: *Bulk sample AS-4A taken from 3.05 to 4.57 m.*

Ground Elevation: *314.01 m*

Borehole Number: **BH-03-14**

Job N°: *P-0003455-0-09-100*

Drill Date: *2014-05-20*

Project: *Cambridge West Development*

Field Tech: *D.Souter*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Symbol	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
	Ground Elevation		314.01			
	TOPSOIL: dark brown silt, some sand, trace gravel and corn roots, moist		0.00 313.76 0.25			
1	***SAND:*** compact brown sand, some gravel and silt, moist		312.49	SS-1	10-11 12	23
2	***SAND AND GRAVEL:*** compact brown sand and gravel, some silt, moist		1.52 311.72	SS-2	9-11 12	23
3	***SAND:*** compact grey and brown coarse sand, some gravel, trace silt, moist		2.29 310.96	SS-3	9-10 10	20
	dense, gravel and coarse sand		3.05	SS-4	8-11 21	32
4			309.44			
	compact, trace gravel and silt		4.57	SS-5	8-8 10	18
5						
6			307.91			
	fine sand, some silt, saturated; some grey sandy silt layers, wet		6.10 307.46	SS-6	7-9 10	19
	Borehole terminated at 6.55 m		6.55			
7						
8						
9						
10						
11						
12						

Dynamic Cone: 20 40 60 80
Std Penetration: 20 40 60 80
Shear Strength (PP) kPa: 50 100 150 200
Initial
Remold
Shear Strength (FV) kPa: 50 100 150 200
WP WL
Water Content (%): 10 20 30

Groundwater Observations and Standpipe Details

native backfill

bentonite seal

native cave

At drilling completion, dry cave at 3.35 m.

Vertical Scale = 1 : 70.0

Reviewed by: *D.Gonser*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes:

Ground Elevation: *313.34 m*

Borehole Number: **BH-04-14**

Job N°: *P-0003455-0-09-100*

Drill Date: *2014-05-21*

Project: *Cambridge West Development*

Field Tech: *D.Souter*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Elevation (m)	Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
	Ground Elevation	313.34				
	FILL: dark brown silt (topsoil), some sand and gravel, moist	313.11	0.00 0.23			
1	***SAND AND GRAVEL:*** compact brown sand and gravel, some silt, moist			SS-1	7-8 9	17
		311.82	1.52			
2	***SAND:*** compact brown medium sand, some silt, trace gravel, moist			SS-2	5-7 7	14
	trace silt and gravel, very moist	311.05	2.29	SS-3	4-5 6	11
3		310.29				
	medium to coarse sand		3.05	SS-4	5-5 6	11
4						
		308.77	4.57			
	fine sand, trace silt			SS-5	6-7 10	17
5						
6		307.24				
	gravelly coarse sand, some silt, saturated		6.10	SS-6	6-9 12	21
7						
		305.72	7.62			
	silty fine sand, some dark grey stains			SS-7	3-4 6	10
8						
9		304.20				
	brown, wet to saturated		9.14	SS-8	6-10 12	22
		303.43				
10	saturated		9.91	SS-9	3-6 8	14
		302.98				
	Borehole terminated at 10.36 m		10.36			
11						
12						

Dynamic Cone: 20 40 60 80
Std Penetration: 20 40 60 80
Shear Strength (PP) kPa: 50 100 150 200
Initial
Remold
Shear Strength (FV) kPa: 50 100 150 200
WP WL
Water Content (%): 10 20 30

Groundwater Observations and Standpipe Details

native backfill

bentonite seal

native cave

At drilling completion, wet cave at 5.49 m.

Vertical Scale = 1 : 70.0

Reviewed by: *D.Gonser*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes: *Bulk sample AS-4A taken from 3.05 to 4.57 m.*

Ground Elevation: *312.87 m*

Borehole Number: **BH-05-14**

Job N°: *P-0003455-0-09-100*

Drill Date: *2014-05-21*

Project: *Cambridge West Development*

Field Tech: *D.Souter*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Symbol	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
	Ground Elevation		312.87			
	TOPSOIL: dark brown silt, some sand and gravel, moist		0.00 / 312.67 / 0.20			
1	***SAND:*** compact brown gravelly sand, some silt, moist			SS-1	5-7 10	17
				SS-2	6-8 8	16
2			310.58			
	SAND AND GRAVEL: compact brown sand and gravel, some silt, moist		2.29	SS-3	6-10 16	26
3	very dense		309.82 / 3.05	SS-4	25-50 /150 mm	
4			308.30			
	saturated		4.57	SS-5	10-14 21	35
5						
6			306.77			
	SAND: dense brown coarse sand, some silt and gravel, saturated		6.10 / 306.32	SS-6	11-15 16	31
	Borehole terminated at 6.55 m		6.55			
7						
8						
9						
10						
11						
12						

Dynamic Cone / Std Penetration: 20 40 60 80

Shear Strength (PP) kPa / Shear Strength (FV) kPa: 50 100 150 200 — Initial / Remold

Water Content (%): WP WL — 10 20 30

Groundwater Observations and Standpipe Details

native backfill

bentonite seal

native cave

At drilling completion, dry cave at 2.13 m.

Vertical Scale = 1 : 70.0

Reviewed by: *D.Gonser*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes: *Bulk sample AS-3A taken from 2.29 to 3.05 m.*

Ground Elevation: *313.07 m*

Borehole Number: **BH-06-14**

Job N°: *P-0003455-0-09-100*

Drill Date: *2014-05-22*

Project: *Cambridge West Development*

Field Tech: *D.Souter*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Symbol	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
	Ground Elevation		313.07			
	TOPSOIL: dark brown silt, some sand and gravel, trace corn roots, moist		0.00 / 312.79 / 0.28			
1	***SAND AND GRAVEL:*** compact brown sand and gravel, some silt, occasional cobbles, moist			SS-1	9-12 13	
				SS-2	7-9 10	
2	dense		310.78 / 2.29	SS-3	8-10 25	
3				SS-4	12-15 16	
4	compact, very moist		308.50 / 4.57	SS-5	8-10 18	
5	wet to saturated		308.19 / 4.88			
6	saturated		306.97 / 6.10	SS-6	9-11 10	
	Borehole terminated at 6.55 m		306.52 / 6.55			
7						
8						
9						
10						
11						
12						

Dynamic Cone / Std Penetration: 20 40 60 80

Shear Strength (PP) kPa / Shear Strength (FV) kPa: 50 100 150 200 — Initial / Remold

Water Content (%): WP WL — 10 20 30

Groundwater Observations and Standpipe Details

- protective cover and concrete
- bentonite seal
- el. 308.05 m 2014-06-15
- 50 mm pipe
- sand pack
- 1.52 m slotted screen
- July 9, 2014 groundwater at Elevation 307.86 m.

Vertical Scale = 1 : 70.0

Reviewed by: *D.Gonser*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes:

Ground Elevation: *312.12 m*

Borehole Number: **BH-07-14**

Job N°: *P-0003455-0-09-100*

Drill Date: *2014-05-21*

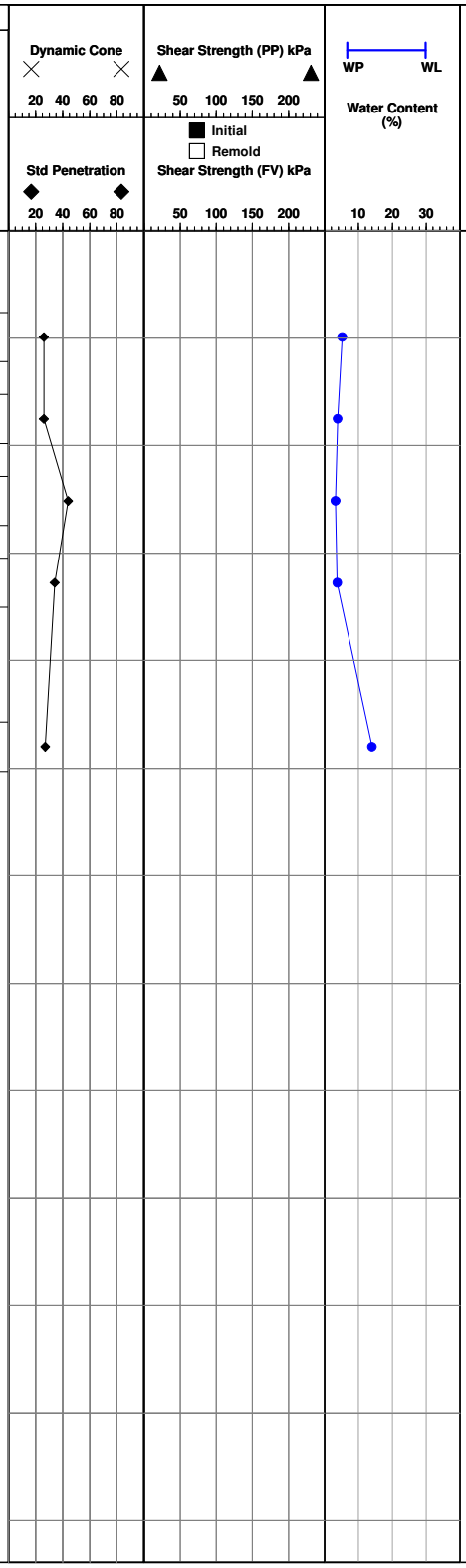
Project: *Cambridge West Development*

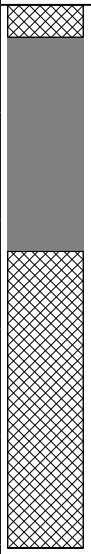
Field Tech: *D.Souter*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Symbol	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
	Ground Elevation		312.12			
	TOPSOIL: dark brown silt, some sand, gravel and corn roots, moist		0.00 / 311.97			
			0.15 / 311.66			
	SILT: brown silt, some sand, trace gravel and topsoil, moist		0.46			
1				SS-1	8-10 16	26
	SAND AND GRAVEL: compact brown sand and gravel, trace silt and cobbles, moist					
2				SS-2	9-12 14	26
	dense		309.83 / 2.29			
3				SS-3	15-18 26	44
			308.77 / 3.35	SS-4	32-21 13	34
	SAND: compact brown coarse sand, some silt, trace gravel, moist					
4			307.85 / 4.27			
	dark brown silty sand, some gravel, saturated					
			307.24 / 4.88	SS-5	8-12 15	27
5	brown, trace cobbles		307.09 / 5.03			
	Borehole terminated at 5.03 m					
6						
7						
8						
9						
10						
11						
12						





Reviewed by: *D.Gonser*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes:

Ground Elevation: *311.70 m*

Borehole Number: **BH-08-14**

Job N°: *P-0003455-0-09-100*

Drill Date: *2014-05-22*

Project: *Cambridge West Development*

Field Tech: *D.Souter*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Symbol	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
	Ground Elevation		311.70			
	TOPSOIL: dark brown silt, trace sand, gravel and corn roots, moist		0.00 311.29 0.41			
1	***SILT:*** dark brown silt, some topsoil and sand, wet to saturated			SS-1	2-1 2	
	loose brown sandy silt, saturated		310.18 1.52	SS-2	2-3 3	
2	wet		309.41 2.29	SS-3	3-2 2	
3	mottled grey and brown, wet		308.65 3.05	SS-4	2-3 3	
4						
	some saturated gravel and silty sand in spoon		307.13 4.57 306.82	SS-5	4-5 5	
5	***SAND:*** compact brown gravelly sand, some silt, saturated		4.88			
6				SS-6	5-8 10	
7						
				SS-7	4-6 9	
8	Borehole terminated at 8.08 m		303.62 8.08			
9						
10						
11						
12						

Dynamic Cone: 20 40 60 80
Std Penetration: 20 40 60 80
Shear Strength (PP) kPa: 50 100 150 200
Initial
Remold
Shear Strength (FV) kPa: 50 100 150 200
WP WL
Water Content (%): 10 20 30

Groundwater Observations and Standpipe Details

- protective cover and concrete
- bentonite seal
- el. 308.89 m 2014-06-15
- el. 308.68 m 2014-06-15
- sand pack 19 mm pipe 1.52 m slotted screen
- bentonite seal
- sand pack 50 mm pipe 1.52 m slotted screen
- native cave
- July 9, 2014 shallow standpipe dry, groundwater at Elevation 308.49 m in deep standpipe.

Vertical Scale = 1 : 70.0

Reviewed by: *D.Gonser*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes: *Bulk sample AS-3A taken from 2.29 to 3.05 m.*

Ground Elevation: *309.76 m*

Borehole Number: **BH-09-14**

Job N°: *P-0003455-0-09-100*

Drill Date: *2014-05-21*

Project: *Cambridge West Development*

Field Tech: *D.Souter*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Method: *Hollow Stem Auger*

SOIL PROFILE			SAMPLE								
Depth (m)	Description	Symbol	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value	Dynamic Cone / Std Penetration	Shear Strength (PP) kPa / Initial / Remold / Shear Strength (FV) kPa	WP WL / Water Content (%)	Groundwater Observations and Standpipe Details
	Ground Elevation		309.76							
	TOPSOIL: dark brown silt, some sand and gravel, moist		309.40 / 0.00							native backfill
			0.36							
1	***SAND AND GRAVEL:*** compact brown sand and gravel, some silt, trace topsoil, moist			SS-1	6-10 11	21				bentonite seal
			308.24							
	silty sand and gravel, wet		1.52	SS-2	6-5 6	11				
2			307.47							
	SAND: loose grey and brown coarse sand, some gravel, trace silt		2.29	SS-3	2-4 5	9				
			306.71							
3	***SAND AND GRAVEL:*** compact grey and brown sand and gravel, some silt, saturated		3.05	SS-4	3-5 6	11				
4			305.19							native cave
	SAND: compact brown silty sand, some gravel, saturated		4.57	SS-5	5-10 10	20				
5										
6			303.66							
	greenish brown coarse sand, some silt and gravel		6.10	SS-6	6-9 11	20				
			303.21							
	Borehole terminated at 6.55 m		6.55							At drilling completion, wet cave at 1.83 m.
7										
8										
9										
10										
11										
12										

Dynamic Cone / Std Penetration: 20 40 60 80

Shear Strength (PP) kPa / Shear Strength (FV) kPa: 50 100 150 200 — Initial, Remold

Water Content (%): WP WL; 10 20 30

Vertical Scale = 1 : 70.0

Reviewed by: *D.Gonser*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes:

Ground Elevation: *311.95 m*

Borehole Number: **BH-10-14**

Job N°: *P-0003455-0-09-100*

Drill Date: *2014-05-22*

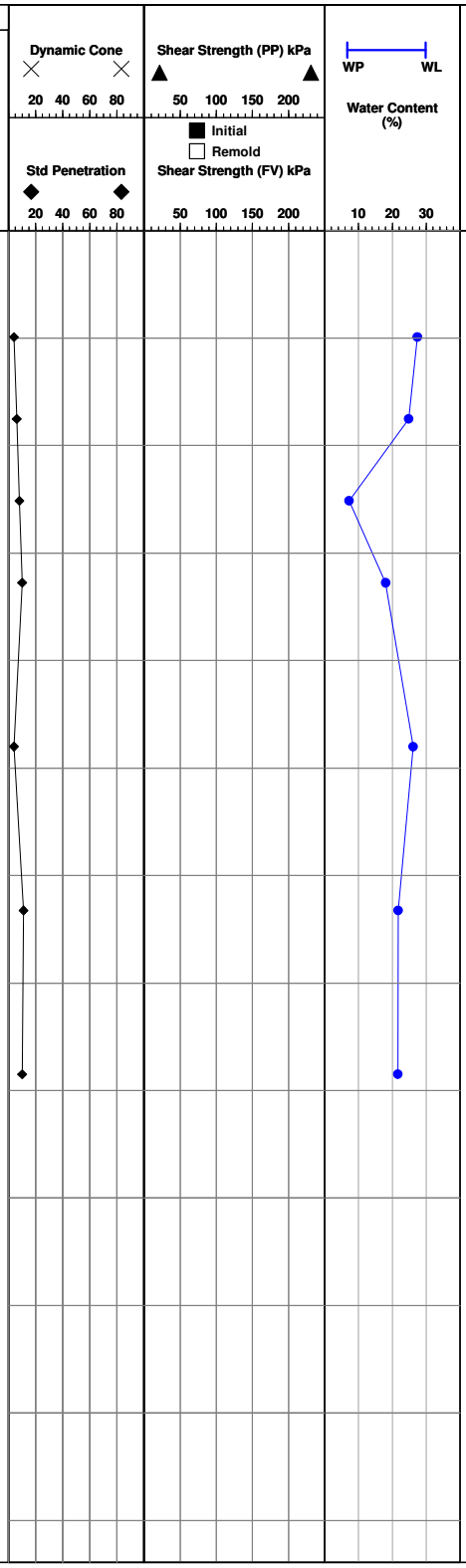
Project: *Cambridge West Development*

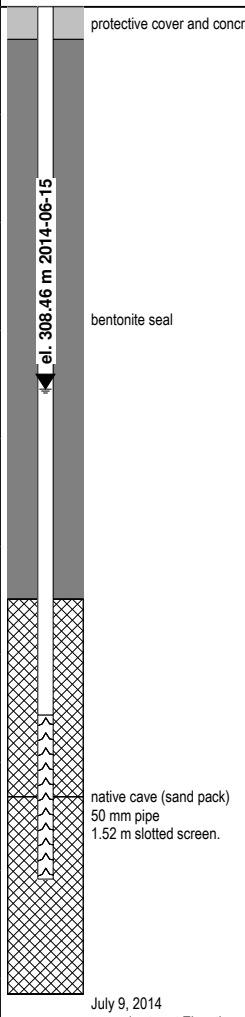
Field Tech: *D.Souter*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Symbol	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
	Ground Elevation		311.95			
	TOPSOIL: dark brown silt, some sand and gravel, trace corn roots, moist		0.00 / 310.88	SS-1	2-2 2	
1	***SAND:*** loose brown and dark brown silty sand, some gravel, trace topsoil, very moist		1.07 / 310.43	SS-2	1-2 4	
	brown silty fine sand, trace clay and gravel, very moist to wet		1.52 / 309.66			
2	coarse sand, trace silt and gravel, moist		2.29 / 308.90	SS-3	3-4 4	
	compact, some gravel		3.05 / 308.60	SS-4	3-5 5	
3	wet		3.35 / 307.38			
4						
	SAND AND GRAVEL: loose grey/brown coarse sand and fine gravel, trace silt, saturated		4.57 / 305.85	SS-5	2-2 2	
5						
	SAND: compact grey/brown medium sand, trace silt and gravel, saturated		6.10 / 302.81	SS-6	3-5 6	
6						
7						
				SS-7	6-4 6	
8						
9						
	Borehole terminated at 9.14 m		9.14			
10						
11						
12						





Groundwater Observations and Standpipe Details

Vertical Scale = 1 : 70.0

Reviewed by: *D.Gonser*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes: *Bulk sample AS-8 taken at 9.14 m (moisture content=14.2%).*

Ground Elevation: *312.53 m*

Borehole Number: **BH-11-14**

Job N°: *P-0003455-0-09-100*

Drill Date: *2014-05-21*

Project: *Cambridge West Development*

Field Tech: *D.Souter*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Symbol	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
	Ground Elevation		312.53			
	TOPSOIL: dark brown silt, some sand, trace gravel and corn roots, moist		0.00 / 312.33			
			0.20 / 312.12			
1	some gravel		0.41	SS-1	5-7 17	24
	SAND AND GRAVEL: compact brown sand and gravel, some silt, moist to very moist			SS-2	7-9 18	27
2			310.24			
	SAND: compact brown coarse sand, trace silt and gravel, very moist		2.29	SS-3	6-7 8	15
			309.48			
3	some gravel		3.05	SS-4	6-7 8	15
4			307.96			
	SAND AND GRAVEL: compact brown sand and gravel, some silt, saturated		4.57	SS-5	9-11 12	23
5						
6			306.43			
	SAND: compact brown silty fine sand, saturated		6.10	SS-6	8-9 11	20
7						
				SS-7	6-7 8	15
8			304.45			
	Borehole terminated at 8.08 m		8.08			
9						
10						
11						
12						

Dynamic Cone — Std Penetration: 20 40 60 80

Shear Strength (PP) kPa: 50 100 150 200 — Initial / Remold — Shear Strength (FV) kPa: 50 100 150 200

WP WL — Water Content (%): 10 20 30

Groundwater Observations and Standpipe Details

native backfill

bentonite seal

native cave

At drilling completion, dry cave at 2.59 m.

Vertical Scale = 1 : 70.0

Reviewed by: *D.Gonser*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes:

Ground Elevation: *311.61 m*

Borehole Number: **BH-12-14**

Job N°: *P-0003455-0-09-100*

Drill Date: *2014-05-22*

Project: *Cambridge West Development*

Field Tech: *D.Souter*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
Ground Elevation		311.61			
	TOPSOIL: dark brown silt, some sand and gravel, trace corn roots, moist	0.00 / 311.23			
	SAND AND GRAVEL: compact brown sand and gravel, some silt, moist to very moist	0.38	SS-1	6-10 13	
	dense, trace silt, numerous cobbles, moist	310.09 / 1.52	SS-2	12-20 22	
	compact, grey and brown	309.32 / 2.29	SS-3	8-12 14	
	saturated	308.56 / 3.05	SS-4	8-8 8	
	SAND: compact brown coarse sand, some gravel, trace silt, saturated	308.26 / 3.35			
	SAND AND GRAVEL: dense brown and grey coarse sand and fine gravel, trace silt, saturated	307.04 / 4.57	SS-5	8-12 19	
	yellowish brown sand and coarse gravel, some silt	306.73 / 4.88			
	compact greyish brown sand and gravel, some silt	305.51 / 6.10	SS-6	8-10 10	
	Borehole terminated at 6.55 m	305.06 / 6.55			

Dynamic Cone / Std Penetration: 20 40 60 80

Shear Strength (PP) kPa / Initial / Remold / Shear Strength (FV) kPa: 50 100 150 200

WP WL / Water Content (%): 10 20 30

Groundwater Observations and Standpipe Details

- protective cover and concrete
- el. 308.38 m 2014-06-15
- bentonite seal
- sand pack
- 50 mm pipe
- 1.52 m slotted screen
- native cave
- July 9, 2014 groundwater at Elevation 308.19 m.

Reviewed by: *D.Gonser*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes:

Ground Elevation: *313.09 m*

Borehole Number: **BH-13-14**

Job N°: *P-0003455-0-09-100*

Drill Date: *2014-05-21*

Project: *Cambridge West Development*

Field Tech: *D.Souter*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
	Ground Elevation	313.09			
	TOPSOIL: dark brown silt, some sand and gravel, trace corn roots, moist	0.00 / 312.63			
	SAND: compact grey and brown coarse sand, some gravel, trace silt, moist	0.46	SS-1	6-9 10	19
			SS-2	7-9 9	18
			SS-3	7-8 9	17
	fine sand, some silt	310.04 / 3.05			
	SILT: compact brown fine sandy silt, moist	309.89 / 3.20	SS-4	8-11 11	22
	wet	309.66 / 3.43			
	SAND: compact brown fine sand, trace silt, moist	308.52 / 4.57	SS-5	10-12 15	27
	layers of grey/brown silt, some sand, clay and gravel, moist	306.99 / 6.10	SS-6	11-12 16	28
	silty fine sand, wet	306.54 / 6.55			
	dense brown, saturated	305.47 / 7.62	SS-7	13-18 22	40
	wet	303.95 / 9.14	SS-8	11-13 16	29
	Borehole terminated at 9.60 m	303.49 / 9.60			

Dynamic Cone: 20 40 60 80
Std Penetration: 20 40 60 80
Shear Strength (PP) kPa: 50 100 150 200
Initial
Remold
Shear Strength (FV) kPa: 50 100 150 200
WP WL
Water Content (%): 10 20 30

Groundwater Observations and Standpipe Details

native backfill
bentonite seal
native cave
At drilling completion, dry cave at 6.40 m.

Vertical Scale = 1 : 70.0

Reviewed by: *D.Gonser*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes:

Ground Elevation: *308.83 m*

Borehole Number: **BH-14-14**

Job N°: *P-0003455-0-09-100*

Drill Date: *2014-05-22*

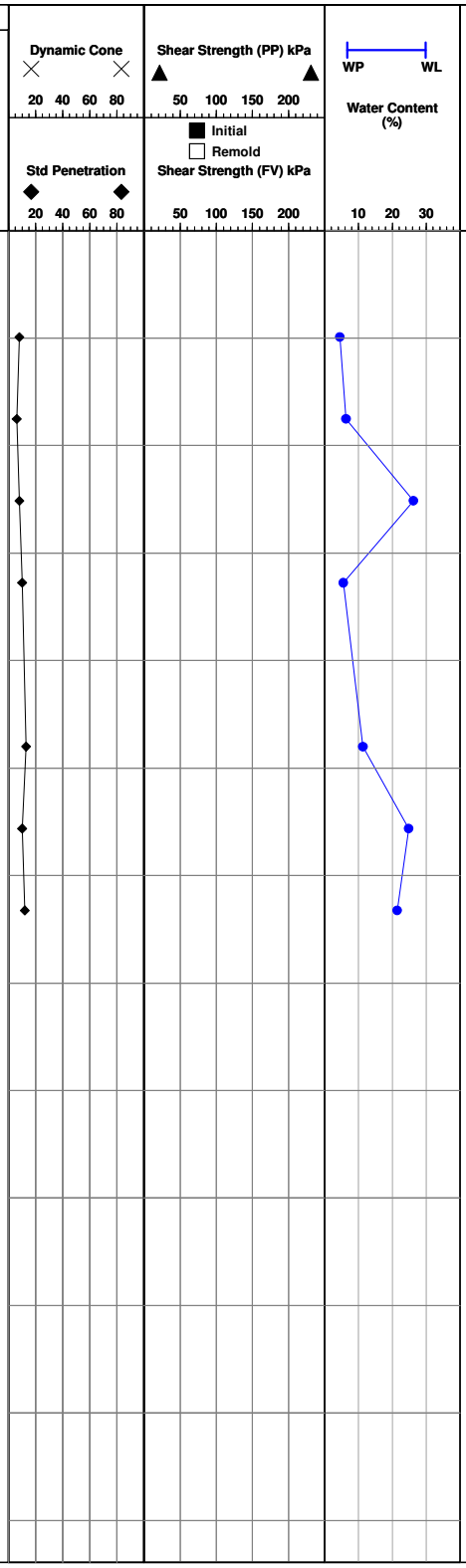
Project: *Cambridge West Development*

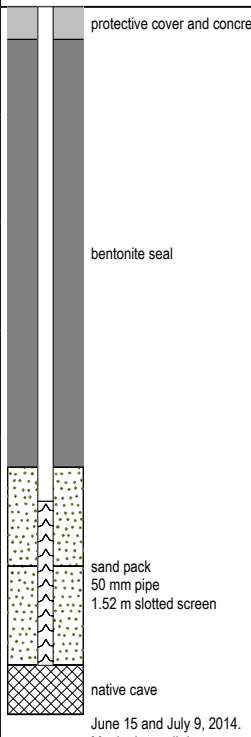
Field Tech: *D.Souter*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Elevation (m)	Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
	Ground Elevation	308.83				
	TOPSOIL: dark brown silt, trace sand, moist	308.52	0.30			
1	***SAND:*** loose brown coarse sand, some gravel, trace silt, moist			SS-1	4-4 4	
		307.31	1.52	SS-2	2-3 3	
2	medium sand, trace silt and gravel	306.54	2.29			
	fine sand, some silt	306.24	2.59	SS-3	3-3 5	
	silty fine sand, very moist	305.63	3.20			
3	compact fine sand, some silt, moist			SS-4	3-5 5	
4						
		303.90	4.93	SS-5	5-6 7	
5	silty fine sand, trace gravel, very moist to wet	303.50	5.33			
	loose to compact, wet			SS-6	4-6 4	
6		302.73	6.10			
	some silt, trace sand and clay layers, very moist to wet	302.43	6.40	SS-7	5-6 6	
	fine sand, trace silt, moist	302.28	6.55			
7	Borehole terminated at 6.55 m					
8						
9						
10						
11						
12						





Reviewed by: *D.Gonser*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes:

Ground Elevation: *312.08 m*

Borehole Number: **BH-15-14**

Job N°: *P-0003455-0-09-100*

Drill Date: *2014-05-21*

Project: *Cambridge West Development*

Field Tech: *D.Souter*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
	Ground Elevation	312.08			
	TOPSOIL: dark brown silt, some gravel, trace sand, very moist	0.00 / 311.57			
	SAND AND GRAVEL: compact brown sand and gravel, some silt, moist	0.51 / 310.56	SS-1	7-8 9	
	SAND: compact brown sand, some silt, trace gravel, moist to very moist	1.52 / 309.79	SS-2	5-6 8	
	some gravel, trace silt, moist	2.29 / 309.03	SS-3	7-11 12	
	very dense coarse sand, very moist	3.05 / 308.27	SS-4	16-22 32	
	saturated	3.81 / 307.96	SS-5	12-10 8	
	compact brown and dark brown sand, some silt, trace gravel, saturated	4.12 / 307.81			
	Borehole terminated at 4.27 m	4.27			

Dynamic Cone — Std Penetration: 20 40 60 80

Shear Strength (PP) kPa: 50 100 150 200 — Initial / Remold — Shear Strength (FV) kPa: 50 100 150 200

WP WL — Water Content (%): 10 20 30

Groundwater Observations and Standpipe Details

- native backfill
- bentonite seal
- native cave
- At drilling completion, dry cave at 2.44 m.

Vertical Scale = 1 : 70.0

Reviewed by: *D.Gonser*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes:

Ground Elevation: *317.23 m*

Borehole Number: **BH-16-14**

Job N°: *P-0003455-0-09-100*

Drill Date: *2014-05-23*

Project: *Cambridge West Development*

Field Tech: *D.Souter*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Symbol	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
	Ground Elevation		317.23			
	TOPSOIL: dark brown silt, trace sand, gravel and corn roots, moist		316.90 / 0.33			
1	***SAND AND GRAVEL:*** dense brown sand and gravel, some silt, occasional cobbles, moist			SS-1	5-11 20	31
2				SS-2	16-16 16	32
3				SS-3	5-16 20	36
	compact		314.18 / 3.05	SS-4	16-12 11	23
4						
	dense, coarse sand and gravel, trace silt		312.66 / 4.57	SS-5	20-26 16	42
5						
6				SS-6	9-15 19	34
7			309.61			
	SAND: dense brown sand, some silt, moist		7.62	SS-7	8-17 28	45
8						
9			308.09			
	dense light brown fine sand, trace silt, moist		9.14 / 307.63	AS-8		
	Borehole terminated at 9.60 m		9.60			
10						
11						
12						

Dynamic Cone / Std Penetration: 20 40 60 80

Shear Strength (PP) kPa / Shear Strength (FV) kPa: 50 100 150 200 — Initial / Remold

Water Content (%): WP WL — 10 20 30

Groundwater Observations and Standpipe Details

native backfill

bentonite seal

native cave

At drilling completion, dry cave at 2.29 m.

Vertical Scale = 1 : 70.0

Reviewed by: *D.Gonser*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes:

Ground Elevation: *316.38 m*

Borehole Number: **BH-17-14**

Job N°: *P-0003455-0-09-100*

Drill Date: *2014-05-23*

Project: *Cambridge West Development*

Field Tech: *D.Souter*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Symbol	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
	Ground Elevation		316.38			
	TOPSOIL: dark brown silt, trace sand, gravel and roots, moist		0.00 / 316.07			
			0.30			
1	***SAND AND GRAVEL:*** compact brown sand and gravel, trace silt, occasional cobbles, moist			SS-1	3-6 12	18
			314.86			
	dense		1.52	SS-2	7-15 17	32
2						
				SS-3	13-17 23	40
3			313.33			
	SAND: compact brown coarse sand, some gravel, trace silt, moist		3.05	SS-4	8-8 10	18
4						
			311.81			
	dense medium sand, trace silt and gravel		4.57	SS-5	9-12 18	30
5						
6			310.28			
	compact, some gravel		6.10	SS-6	8-11 13	24
7						
			308.76			
	coarse sand		7.62	SS-7	12-10 12	22
8			308.30			
	Borehole terminated at 8.08 m		8.08			
9						
10						
11						
12						

Dynamic Cone: 20 40 60 80

Std Penetration: 20 40 60 80

Shear Strength (PP) kPa: 50 100 150 200

Initial

Remold

Shear Strength (FV) kPa: 50 100 150 200

WP WL

Water Content (%): 10 20 30

Groundwater Observations and Standpipe Details

native backfill

bentonite seal

native cave

At drilling completion, dry cave at 4.57 m.

Vertical Scale = 1 : 70.0

Reviewed by: *D.Gonser*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes:

Ground Elevation: *317.76 m*

Borehole Number: **BH-18-14**

Job N°: *P-0003455-0-09-100*

Drill Date: *2014-05-23*

Project: *Cambridge West Development*

Field Tech: *D.Souter*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Elevation (m)	Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
	Ground Elevation	317.76				
	TOPSOIL: dark brown silt, trace sand, gravel and roots, moist	317.40	0.00			
			0.36			
1	***SAND AND GRAVEL:*** compact brown sand and gravel, trace silt, moist			SS-1	13-14 12	26
		316.54	1.22			
	occasional cobbles	316.24	1.52			
2	dense			SS-2	11-16 18	34
		315.47	2.29			
	compact sand, some silt, wet	315.17	2.59	SS-3	7-11 13	24
3	some gravel, trace silt, moist	314.71	3.05			
	SAND: compact brown coarse sand, some gravel, trace silt, moist			SS-4	10-11 16	27
4						
				SS-5	10-12 12	24
5						
		311.66	6.10			
6	grey/brown			SS-6	11-12 12	24
7						
		310.14	7.62			
	brown fine sand, some silt, very moist	309.68		SS-7	9-12 14	26
8	Borehole terminated at 8.08 m		8.08			
9						
10						
11						
12						

Dynamic Cone / Std Penetration: 20 40 60 80

Shear Strength (PP) kPa / Shear Strength (FV) kPa: 50 100 150 200 — Initial / Remold

Water Content (%): WP WL — 10 20 30

Groundwater Observations and Standpipe Details

- native backfill
- bentonite seal
- native cave
- At drilling completion, dry cave at 5.49 m.

Vertical Scale = 1 : 70.0

Reviewed by: *D.Gonser*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes:

Ground Elevation: *312.99 m*

Borehole Number: **BH-19-14**

Job N°: *P-0003455-0-09-100*

Drill Date: *2014-05-27*

Project: *Cambridge West Development*

Field Tech: *D.Souter*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Symbol	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
	Ground Elevation		312.99			
	TOPSOIL: dark brown silt, some sand, trace gravel and corn roots, moist		0.00 / 312.63			
			0.36			
1	***SAND:*** loose brown medium sand, some silt, trace gravel, moist			SS-1	4-4 4	
				SS-2	4-4 5	
2			310.70			
	SAND AND GRAVEL: very dense brown sand and gravel, some silt, occasional cobbles, moist		2.29	SS-3	21-30 33	
3			309.94			
	dense		3.05	SS-4	22-14 20	
4						
			308.42			
	compact, saturated		4.57	SS-5	12-12 14	
5						
6			306.89			
	SAND: compact brown silty fine sand, saturated		6.10	SS-6	9-10 12	
			306.44			
	Borehole terminated at 6.55 m		6.55			
7						
8						
9						
10						
11						
12						

Dynamic Cone / Std Penetration: 20 40 60 80

Shear Strength (PP) kPa / Shear Strength (FV) kPa: 50 100 150 200 — Initial — Remold

Water Content (%): WP WL — 10 20 30

Groundwater Observations and Standpipe Details

- protective cover and concrete
- bentonite seal
- el. 308.46 m 2014-06-15
- sand pack
- 50 mm pipe
- 1.52 m slotted screen
- native cave
- July 9, 2014 groundwater at Elevation 308.31 m.

Vertical Scale = 1 : 70.0

Reviewed by: *D.Gonser*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes:

Ground Elevation: *316.51 m*

Borehole Number: **BH-20-14**

Job N°: *P-0003455-0-09-100*

Drill Date: *2014-05-26*

Project: *Cambridge West Development*

Field Tech: *D.Souter*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Symbol	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
	Ground Elevation		316.51			
	TOPSOIL: dark brown silt, some sand, trace gravel and corn roots, moist		0.00 / 316.15			
			0.36			
1	***SAND:*** compact brown sand, some silt, trace gravel, moist			SS-1	5-8 8	16
				SS-2	4-5 6	11
2			314.22			
	SAND AND GRAVEL: dense brown sand and gravel, trace silt and cobbles, moist		2.29	SS-3	16-24 18	42
3			313.46			
	compact to dense		3.05	SS-4	11-14 14	28
4						
				SS-5	11-13 15	28
5						
6			310.41			
	SAND: compact brown coarse sand, some gravel, trace silt, moist		6.10	SS-6	6-9 9	18
7						
			308.89			
	gravelly sand, saturated		7.62	SS-7	5-6 10	16
8						
9			307.37			
	silty fine sand		9.14	SS-8	7-6 7	13
10						
			305.84			
	fine sand, some silt, moist to very moist		10.67	SS-9	7-10 12	22
11			305.38			
	Borehole terminated at 11.13 m		11.13			
12						

Dynamic Cone: 20 40 60 80
Std Penetration: 20 40 60 80
Shear Strength (PP) kPa: 50 100 150 200
Initial
Remold
Shear Strength (FV) kPa: 50 100 150 200
WP WL
Water Content (%): 10 20 30

Groundwater Observations and Standpipe Details

native backfill

bentonite seal

native cave

At drilling completion, dry cave at 6.71 m.

Vertical Scale = 1 : 70.0

Reviewed by: *D.Gonser*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes:

LVM

Ground Elevation: *298.00 m*

Borehole Number: **BH-21A-14**

Job N°: *P-0003455-0-09-100*

Drill Date: *2014-06-04*

Project: *Cambridge West Development*

Field Tech: *D.Gonser*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Method: *Hand Sampled Borehole*

SOIL PROFILE			SAMPLE							
Depth (m)	Description	Symbol	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value	Dynamic Cone / Std Penetration (20 40 60 80)	Shear Strength (PP) kPa / Initial / Remold / Shear Strength (FV) kPa (50 100 150 200)	Water Content (%) WP WL (10 20 30)	Groundwater Observations and Standpipe Details
	Ground Elevation		298.00							
	FILL: dark brown organic silt (topsoil), moist		0.00 / 297.39							
	light brown silty fine sand to silty clay		0.61 / 297.24	SS-1	3-3 4-3					
1	some layered organics and roots		0.76 / 296.93							
	SAND: brown silty fine sand, trace clay and gravel, very moist		1.07 / 296.78	SS-2	6-21 22-50					native backfill
			1.22 / 296.35	SS-3	50 /125 mm					At drilling completion, wet cave at 1.07 m.
2	***SAND AND GRAVEL:*** dense brown to grey sand and gravel, trace silt, saturated		1.65							
	Borehole terminated at 1.65 m									
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										

Reviewed by: *D.Gonser*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes:

Ground Elevation: *298.20 m*

Borehole Number: **BH-21B-14**

Job N°: *P-0003455-0-09-100*

Drill Date: *2014-06-04*

Project: *Cambridge West Development*

Field Tech: *D.Gonser*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Method: *Hand Sampled Borehole*

SOIL PROFILE		SAMPLE								
Depth (m)	Description	Symbol	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value	Dynamic Cone / Std Penetration	Shear Strength (PP) kPa / Shear Strength (FV) kPa	Water Content (%)	Groundwater Observations and Standpipe Details
	Ground Elevation		298.20							
0	***FILL:*** dark brown organic silt (topsoil), very moist		0.00 / 298.05							native backfill
	light brown silty fine sand, very moist		0.15 / 297.59	SS-1	1-2 1-3					
1	saturated		0.61 / 296.98	SS-2	16-12 20-35					
	SAND AND GRAVEL: dense brown sand and gravel, some silt, saturated		1.22 / 296.68	SS-3	31-50 /75 mm					
2	Borehole terminated at 1.52 m		1.52							At drilling completion, water level at 0.71 m.
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										

Dynamic Cone / Std Penetration: 20 40 60 80

Shear Strength (PP) kPa / Shear Strength (FV) kPa: 50 100 150 200 — Initial, Remold

Water Content (%): WP, WL; 10 20 30

Reviewed by: *D.Gonser*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes:

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Vertical Scale = 1 : 70.0

EQ-09-Ge-72 R.1 18.02.2011

Ground Elevation: *305.52 m*

Borehole Number: **BH-22-14**

Job N°: *P-0003455-0-09-100*

Drill Date: *2014-05-27*

Project: *Cambridge West Development*

Field Tech: *D.Souter*

Location: *Blenheim Road, Cambridge, Ontario*

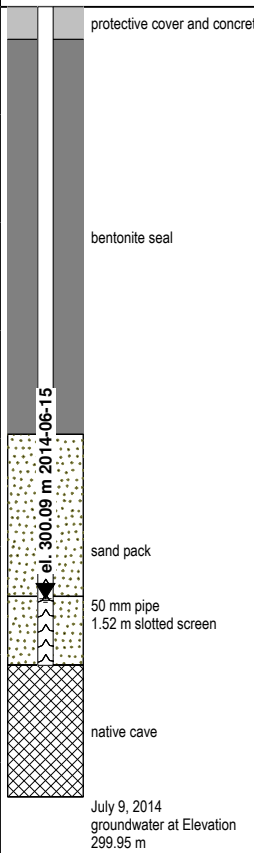
Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
	Ground Elevation	305.52			
	TOPSOIL: dark brown silt, some sand, gravel and cobbles, moist	0.00 305.11 0.41			
1	***SAND:*** compact brown medium sand, trace silt and gravel, moist		SS-1	3-6 8	
			SS-2	9-10 11	
2			SS-3	6-8 9	
3		302.47			
	some gravel and silt, wet	3.05	SS-4	12-12 13	
		302.01			
	fine sand, some silt	3.50			
4					
		300.80			
	SILT: compact brown silt, some fine sand, trace clay and gravel, very moist	4.72 300.49	SS-5	15-17 10	
5		5.03			
	SAND: compact brown fine sand, some silt, wet				
6		299.42			
	saturated	6.10	SS-6	6-6 7	
			SS-7	4-5 7	
7		298.20			
	Borehole terminated 7.32 m	7.32			
8					
9					
10					
11					
12					

Dynamic Cone — Std Penetration: 20 40 60 80

Shear Strength (PP) kPa: 50 100 150 200 — Initial / Remold — Shear Strength (FV) kPa: 50 100 150 200

WP WL — Water Content (%): 10 20 30



Groundwater Observations and Standpipe Details

Vertical Scale = 1 : 70.0

Reviewed by: *D.Gonser*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes:

Ground Elevation: *314.76 m*

Borehole Number: **BH-23-14**

Job N°: *P-0003455-0-09-100*

Drill Date: *2014-05-26*

Project: *Cambridge West Development*

Field Tech: *D.Souter*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Symbol	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
	Ground Elevation		314.76			
	TOPSOIL: dark brown silt, trace sand and gravel, moist		0.00 / 314.45			
			0.30			
1	***SAND:*** loose brown sand, some silt, trace gravel, very moist			SS-1	2-2 2	4
			313.24			
	compact, very moist to wet		1.52	SS-2	2-5 6	11
2			312.47			
	SAND AND GRAVEL: compact brown sand and gravel, trace silt and cobbles, moist		2.29	SS-3	13-10 11	21
			311.71			
3	very dense, numerous cobbles		3.05	SS-4	30-37 30	67
4			310.49			
	SAND: dense brown coarse sand, some gravel, trace silt, moist		4.27	SS-5	19-20 22	42
5						
6			308.66			
	medium sand		6.10	SS-6	13-16 17	33
7						
			307.14			
	compact fine sand, some silt, wet		7.62	SS-7	12-13 15	28
8						
9			305.62			
	dense, saturated		9.14	SS-8	10-16 17	33
10				SS-9	9-13 21	34
			304.40			
	Borehole terminated at 10.40 m		10.36			
11						
12						

Dynamic Cone / Std Penetration: 20 40 60 80

Shear Strength (PP) kPa / Shear Strength (FV) kPa: 50 100 150 200 — Initial / Remold

WP WL — Water Content (%): 10 20 30

Groundwater Observations and Standpipe Details

native backfill

bentonite seal

native cave

At drilling completion, dry cave at 4.57 m.

Vertical Scale = 1 : 70.0

Reviewed by: *D.Gonser*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes: *Bulk sample AS-2A taken from 1.52 to 2.29 m.*

Ground Elevation: *310.03 m*

Borehole Number: **BH-24-14**

Job N°: *P-0003455-0-09-100*

Drill Date: *2014-05-26*

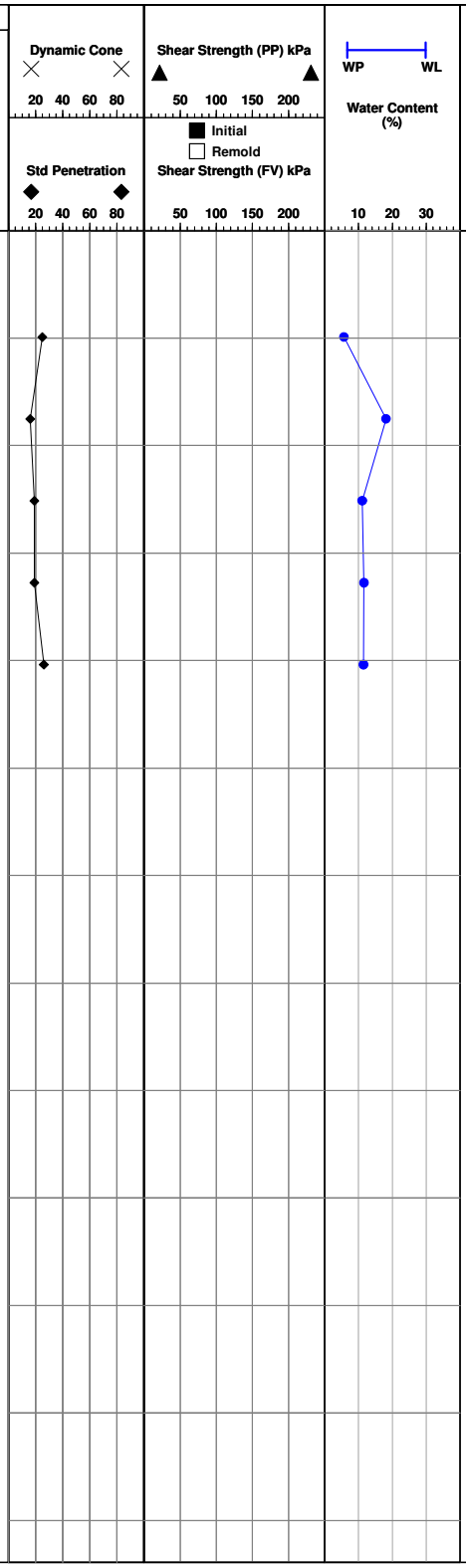
Project: *Cambridge West Development*

Field Tech: *D.Souter*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Symbol	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
	Ground Elevation		310.03			
	TOPSOIL: dark brown silt, trace sand and gravel, moist		0.00 / 309.80			
			0.23			
1	***SAND AND GRAVEL:*** compact brown sand and gravel, trace silt and cobbles, moist			SS-1	6-10 15	
			308.51			
2	***SAND:*** compact brown fine to coarse sand, some silt, saturated		1.52	SS-2	5-6 10	
			307.74			
	coarse sand, trace gravel and silt		2.29	SS-3	5-7 12	
			307.29			
3	***SAND AND GRAVEL:*** compact brown sand and gravel, some silt, occasional cobbles, saturated		2.74	SS-4	6-9 10	
4				SS-5	10-12 14	
			305.76			
	Borehole terminated at 4.27 m		4.27			



Groundwater Observations and Standpipe Details

native backfill

native cave

At drilling completion, wet cave at 1.98 m.

Vertical Scale = 1 : 70.0

Reviewed by: *D.Gonser*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes:

Ground Elevation: *309.53 m*

Borehole Number: **BH-25-14**

Job N°: *P-0003455-0-09-100*

Drill Date: *2014-05-26*

Project: *Cambridge West Development*

Field Tech: *D.Souter*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Method: *Hollow Stem Auger*

SOIL PROFILE			SAMPLE							
Depth (m)	Description	Symbol	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value	Dynamic Cone / Std Penetration (20 40 60 80)	Shear Strength (PP) kPa / Shear Strength (FV) kPa (50 100 150 200)	Water Content (%) (10 20 30)	Groundwater Observations and Standpipe Details
	Ground Elevation		309.53					Initial / Remold	WP WL	
	TOPSOIL: dark brown silt, trace sand, gravel, corn roots and cobbles, moist		0.00 / 309.17 / 0.36 / 308.77							native backfill
1	brown silty sand, some gravel, moist		0.76	SS-1	5-6 7	13				
	SAND AND GRAVEL: compact brown sand and gravel, some silt, saturated		308.01 / 1.52	SS-2	8-10 12	22				
2	occasional cobbles		307.24							
	SAND: compact grey and brown coarse sand, some gravel, trace silt, saturated		2.29	SS-3	6-8 9	17				
3				SS-4	5-6 6	12				native cave
4			304.96							
	dense		4.57 / 304.50	SS-5	8-12 25	37				
5	Borehole terminated at 5.03 m		5.03							At drilling completion, wet cave at 1.00 m.
6										
7										
8										
9										
10										
11										
12										

Vertical Scale = 1 : 70.0

Reviewed by: *D.Gonser*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes:

Ground Elevation: *309.42 m*

Borehole Number: **BH-26-14**

Job N°: *P-0003455-0-09-100*

Drill Date: *2014-05-27*

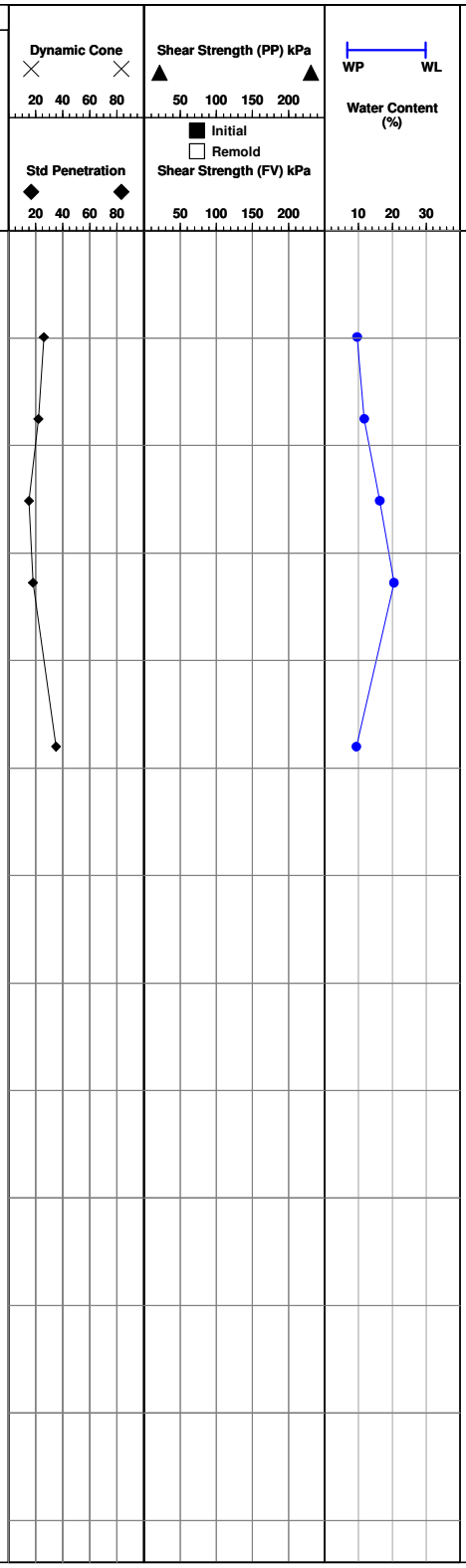
Project: *Cambridge West Development*

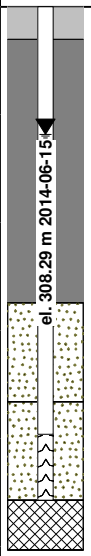
Field Tech: *D.Souter*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Symbol	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
	Ground Elevation		309.42			
	TOPSOIL: dark brown silt, trace sand, gravel and corn roots, moist		0.00 309.19 0.23 308.81			
1	***SAND:*** brown silty sand, moist		0.61	SS-1	11-12 14	
	SAND AND GRAVEL: compact grey and brown sand and gravel, some silt, wet to saturated			SS-2	8-11 11	
2			307.13			
	SAND: compact brown fine to coarse sand, some silt and gravel, saturated		2.29 306.37	SS-3	6-6 9	
3	***SAND AND GRAVEL:*** compact grey/brown sand and gravel, some silt and occasional cobbles, saturated		3.05	SS-4	5-6 12	
4			304.85			
	dense		4.57 304.39	SS-5	10-11 24	
5	Borehole terminated at 5.03 m		5.03			
6						
7						
8						
9						
10						
11						
12						





Groundwater Observations and Standpipe Details

Vertical Scale = 1 : 70.0

Reviewed by: *D.Gonser*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes:

Ground Elevation: *308.99 m*

Borehole Number: **BH-27-14**

Job N°: *P-0003455-0-09-100*

Drill Date: *2014-05-27*

Project: *Cambridge West Development*

Field Tech: *D.Souter*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Symbol	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
	Ground Elevation		308.99			
	TOPSOIL: dark brown silt, trace sand, gravel and corn roots, moist		0.00 / 308.81			
			0.18 / 308.58			
	SAND: grey/brown silty sand, trace roots, moist		0.41	SS-1	4-5 5	10
	compact brown coarse sand, some gravel and silt, saturated		307.47			
	loose to compact, trace silt		1.52	SS-2	3-4 5	9
			306.70			
	compact		2.29	SS-3	11-7 10	17
			305.94			
	SAND AND GRAVEL: compact brown sand and gravel, some silt, saturated		3.05	SS-4	8-7 8	15
			304.42			
	grey		4.57	SS-5	4-6 8	14
			302.89			
	dense, trace silt		6.10	SS-6	9-21 20	41
				SS-7	7-16 24	40
			301.67			
	Borehole terminated at 7.32 m		7.32			

Dynamic Cone / Std Penetration: 20 40 60 80

Shear Strength (PP) kPa / Shear Strength (FV) kPa: 50 100 150 200 — Initial / Remold

WP WL — Water Content (%): 10 20 30

Groundwater Observations and Standpipe Details

bentonite seal

native cave

At drilling completion, wet cave at 0.76 m.

Vertical Scale = 1 : 70.0

Reviewed by: *D.Gonser*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes:

Ground Elevation: *318.95 m*

Borehole Number: **BH-28-14**

Job N°: *P-0003455-0-09-100*

Drill Date: *2014-05-23*

Project: *Cambridge West Development*

Field Tech: *D.Souter*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Symbol	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
	Ground Elevation		318.95			
	TOPSOIL: dark brown silt, trace sand, gravel and corn roots, moist		0.00 / 318.67			
			0.28			
1	***SAND AND GRAVEL:*** compact brown sand and gravel, some silt, moist			SS-1	5-6 6	12
			317.43			
	trace silt		1.52	SS-2	6-8 9	17
2			316.66			
	dense, coarse sand and gravel		2.29	SS-3	9-17 13	30
3			315.90			
	compact		3.05	SS-4	7-10 14	24
4						
			314.38			
	very dense, occasional cobbles		4.57	SS-5	36-25 31	56
5						
6			312.85			
	dense		6.10	SS-6	11-21 20	41
7						
			311.33			
	very dense		7.62	SS-7	43-36 31	67
8						
9			309.81			
	SAND: compact brown fine sand, some silt, trace gravel, wet		9.14	SS-8	10-13 15	28
10						
			308.28			
	silty fine sand, saturated		10.67	SS-9	12-13 15	28
11			307.82			
	Borehole terminated at 11.13 m		11.13			
12						

Dynamic Cone / Std Penetration: 20 40 60 80

Shear Strength (PP) kPa / Shear Strength (FV) kPa: 50 100 150 200 — Initial / Remold

Water Content (%): WP WL — 10 20 30

Groundwater Observations and Standpipe Details

native backfill

bentonite seal

native cave

At drilling completion, dry cave at 3.35 m.

Reviewed by: *D.Gonser*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes: *Bulk sample AS-4A taken from 3.05 to 4.57 m.*

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Vertical Scale = 1 : 70.0

EQ-09-Ge-72 R.1 18.02.2011

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Vertical Scale = 1 : 70.0

EQ-09-Ge-72 R.1 18.02.2011

Ground Elevation: *314.06 m*

Borehole Number: **BH-29-14**

Job N°: *P-0003455-0-09-100*

Drill Date: *2014-05-26*

Project: *Cambridge West Development*

Field Tech: *D.Souter*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Symbol	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
	Ground Elevation		314.06			
	TOPSOIL: dark brown silt, some sand, trace gravel and corn roots, moist		0.00 313.81 0.25			
1	***SAND:*** compact brown sand, some gravel and silt, moist to very moist		312.84 1.22	SS-1	6-7 7	14
2	***SAND AND GRAVEL:*** dense brown sand and gravel, trace silt and cobbles, moist			SS-2 SS-3	8-21 22 16-18 23	43 41
3			311.01			
	SAND: very dense brown coarse sand, some gravel, trace silt and cobbles, moist		3.05	SS-4	13-21 40	61
4			309.49			
	dense		4.57	SS-5	16-15 15	30
5						
6			307.96			
	compact fine sand, trace silt, moist		6.10 307.51	SS-6	9-9 15	24
	wet		6.55			
7						
			306.44			
	dense silty fine sand, saturated		7.62 306.13	SS-7	10-14 17	31
8	fine sand, some silt, wet		7.92			
9			304.92			
	saturated		9.14	SS-8	8-14 22	36
	Borehole terminated at 9.60 m		304.46 9.60			
10						
11						
12						

Dynamic Cone / Std Penetration: 20 40 60 80

Shear Strength (PP) kPa / Shear Strength (FV) kPa: 50 100 150 200 — Initial / Remold

Water Content (%): WP WL — 10 20 30

Groundwater Observations and Standpipe Details

native backfill

bentonite seal

native cave

At drilling completion, dry cave at 3.96 m.

Reviewed by: *D.Gonser*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes:

Ground Elevation: *313.73 m*

Borehole Number: **BH-30-14**

Job N°: *P-0003455-0-09-100*

Drill Date: *2014-05-26*

Project: *Cambridge West Development*

Field Tech: *D.Souter*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Symbol	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
	Ground Elevation		313.73			
	TOPSOIL: dark brown silt, some sand and gravel, moist		0.00 / 313.48			
			0.25			
1	***SAND:*** compact brown sand, some gravel, trace silt, moist			SS-1	5-5 10	15
			312.21			
	SAND AND GRAVEL: compact brown sand and gravel, trace silt and cobbles, moist		1.52	SS-2	6-9 10	19
2			311.44			
	dense, numerous cobbles		2.29	SS-3	9-15 15	30
3			310.68			
	very dense		3.05	SS-4	50 /125 mm	
4			309.16			
	SAND: dense brown coarse sand, some gravel, trace silt, moist		4.57	SS-5	9-18 15	33
5						
6			307.63			
	silty fine sand, very moist to wet		6.10	SS-6	6-10 23	33
7			306.11			
	moist to very moist		7.62	SS-7	12-20 21	41
	moist		305.81 / 7.92			
8						
9			304.59			
	silty fine sand		9.14	SS-8	7-15 16	31
	Borehole terminated at 9.60 m		304.13 / 9.60			
10						
11						
12						

Dynamic Cone: 20 40 60 80
Std Penetration: 20 40 60 80
Shear Strength (PP) kPa: 50 100 150 200
Initial
Remold
Shear Strength (FV) kPa: 50 100 150 200
WP WL
Water Content (%): 10 20 30

Groundwater Observations and Standpipe Details:
- native backfill
- bentonite seal
- native cave
- At drilling completion, dry cave at 3.05 m.

Vertical Scale = 1 : 70.0

Reviewed by: *D.Gonser*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes: *Bulk sample AS-4A taken from 3.05 to 4.57 m, moisture content = 6.4%.*

Ground Elevation: *311.80 m*

Borehole Number: **BH-31-14**

Job N°: *P-0003455-0-09-100*

Drill Date: *2014-05-20*

Project: *Cambridge West Development*

Field Tech: *D.Souter*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
	Ground Elevation	311.80			
	TOPSOIL: dark brown and black silt, some sand, trace gravel and corn roots, moist	311.44 / 0.36			
1	***SAND:*** very loose brown silty fine to coarse sand, trace gravel, very moist	310.58 / 1.22	SS-1	1-2 1	3
	some silt, moist	309.97 / 1.83	SS-2	1-6 9	15
2	***SAND AND GRAVEL:*** compact brown sand and gravel, trace silt, moist		SS-3	20-12 12	24
3	***SAND:*** loose grey and brown sand, some silt and gravel, saturated	308.75 / 3.05	SS-4	4-4 4	8
4					
	compact, brown, trace silt and gravel	307.23 / 4.57	SS-5	6-8 8-8	16
5					
6	gravelly coarse sand, some silt	305.70 / 6.10	SS-6	6-8 9	17
			SS-7	7-8 10	18
7	Borehole terminated at 7.32 m	304.48 / 7.32			
8					
9					
10					
11					
12					

Dynamic Cone / Std Penetration: 20 40 60 80

Shear Strength (PP) kPa / Shear Strength (FV) kPa: 50 100 150 200 — Initial / Remold

Water Content (%): WP WL — 10 20 30

Groundwater Observations and Standpipe Details

- native backfill
- bentonite seal
- native cave

At drilling completion, wet cave at 3.20 m.

Vertical Scale = 1 : 70.0

Reviewed by: *D.Gonser*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes:

Borehole Number: 110-10

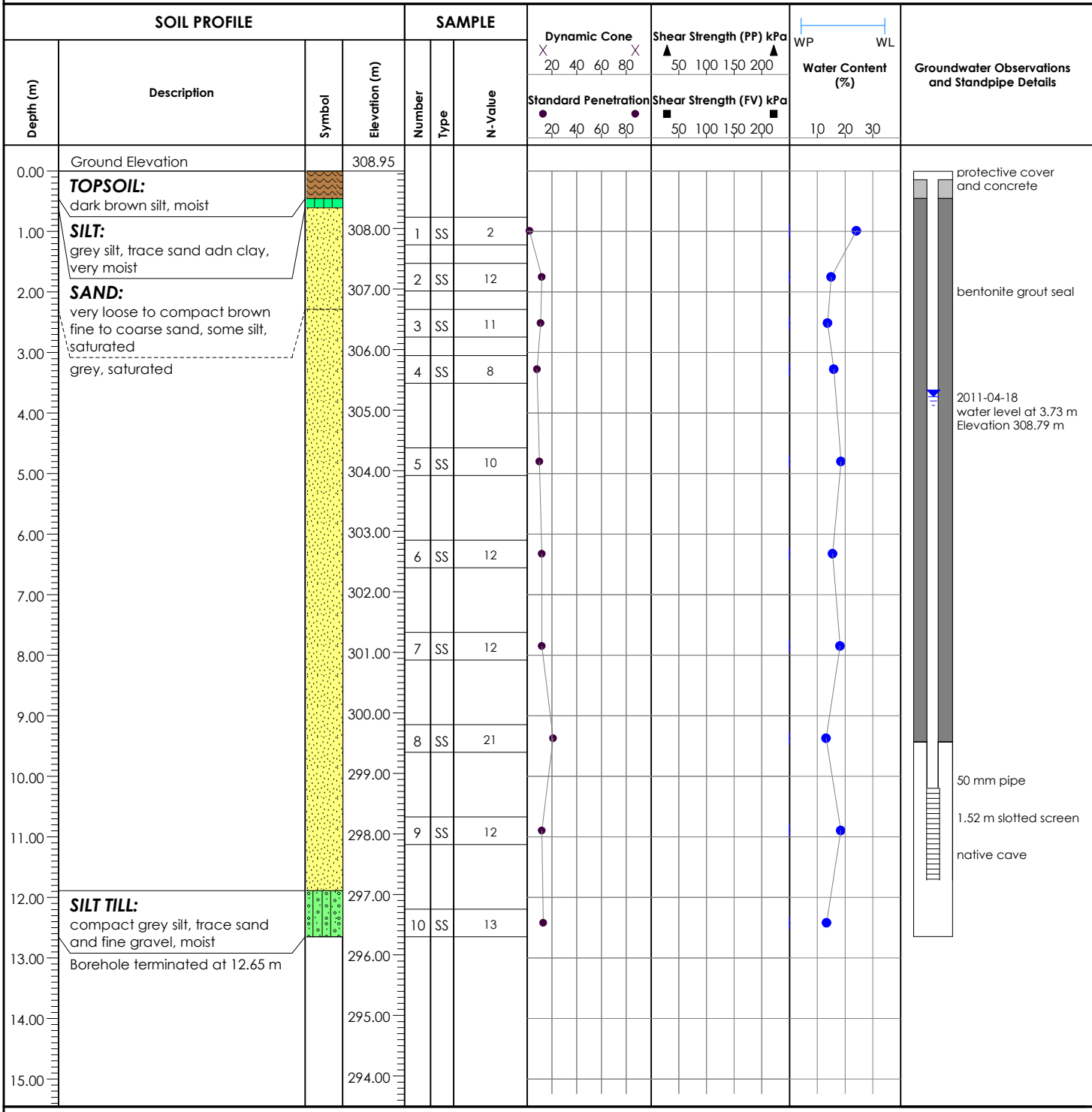
Ground Elevation: *308.95 m*

Project: *Supplementary Borehole Drilling - Cambridge West*

Job No.: *P036589-300*

Location: *Roseville Road / Blenheim Road, Cambridge, Ontario*

Drill Date: *2010-10-18*



Reviewed by: *CHelmer*

Drill Method: *Hollow Stem Auger*

Notes:

Field Tech.: *RMcMillan*

Sheet: *1 of 1*

Drafted by: *SMeteer*

Borehole Number: 01-10

Ground Elevation: *309.13 mASL*

Project: *Scoped Hydrogeology Study - Cambridge West Community*

Job No.: *P031655-300*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Date: *February 11, 2010*

Depth (m)	Description	Elevation (m)	Number	Type	N-Value
0.00	Ground Elevation	309.13			
0.00	***TOPSOIL:*** dark brown silt, frozen				
1.00	***SILT:*** firm brown clayey silt, trace sand, APL	308.00	1	SS	8
2.00	***SAND:*** compact brown fine to coarse sand, some silt, trace fine gravel, saturated	307.00	2	SS	18
			3	SS	22
3.00	***SAND AND GRAVEL:*** compact brown sand and gravel, some silt, saturated	306.00	4	SS	29
4.00		305.00			
5.00		304.00	5	SS	23
6.00		303.00			
7.00		302.00			
8.00	Borehole terminated at 7.62 m	301.00			
9.00		300.00			
10.00		299.00			
11.00		298.00			

Dynamic Cone / Standard Penetration: 20 40 60 80

Shear Strength (PP) kPa / Shear Strength (FV) kPa: 50 100 150 200

Water Content (%): WP WL; 10 20 30

Groundwater Observations and Standpipe Details

- protective cover and concrete
- bentonite seal
- 19 mm pipe
- 0.30 m slotted filter
- sand pack
- bentonite seal
- 2010-03-04 upper standpipe water level at 0.91 m Elev. 308.22 m
- lower standpipe water level at 0.97 m Elev. 308.16 m
- 50 mm pipe
- 1.52 m slotted screen
- native cave
- At drilling completion, water level at 0.61 m

Reviewed by: *CH*

Drill Method: *Hollow Stem Auger*

Notes:

Field Tech.: *RM*

Sheet: *1 of 1*

Drafted by: *SM*

Borehole Number: 02-10

Ground Elevation: *308.59 mASL*

Project: *Scoped Hydrogeology Study - Cambridge West Community*

Job No.: *P031655-300*

Location: *Blenheim Road, Cambridge, Ontario*

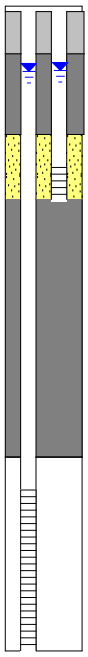
Drill Date: *February 11, 2010*

Depth (m)	Description	Symbol	Elevation (m)	Sample Number	Sample Type	N-Value
0.00	Ground Elevation		308.59			
	TOPSOIL: black peaty topsoil, WTPL					
1.00	***SILT:*** very loose brown silt, some sand and organics		308.00	1	SS	2
2.00	***SAND AND GRAVEL:*** compact brown sand and gravel, some silt, saturated		307.00	2	SS	12
	some cobbles					
3.00			306.00	3	SS	22
	frequent cobbles		305.00			
4.00			304.00			
5.00			303.00			
6.00	Borehole terminated at 6.10 m		302.00			
7.00			301.00			
8.00			300.00			
9.00			299.00			
10.00			298.00			
11.00			297.00			

Dynamic Cone / Standard Penetration: 20 40 60 80

Shear Strength (PP) kPa / Shear Strength (FV) kPa: 50 100 150 200

Water Content (%): WP WL; 10 20 30



Groundwater Observations and Standpipe Details

- protective cover and concrete
- bentonite seal
- 19 mm pipe
- 0.30 m slotted filter
- sand pack
- bentonite seal
- 2010-03-14
- upper standpipe water level at 0.62 m Elev. 307.97 m
- lower standpipe water level at 0.62 m Elev. 307.97 m
- 50 mm pipe
- 1.52 m slotted screen
- native cave
- At drilling completion, water level at 0.61 m

Reviewed by: *CH*

Drill Method: *Hollow Stem Auger*

Notes:

Field Tech.: *RM*

Sheet: *1 of 1*

Drafted by: *SM*

Borehole Number: 03-10

Ground Elevation: *313.06 mASL*

Project: *Scoped Hydrogeology Study - Cambridge West Community*

Job No.: *P031655-300*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Date: *February 11-12, 2010*

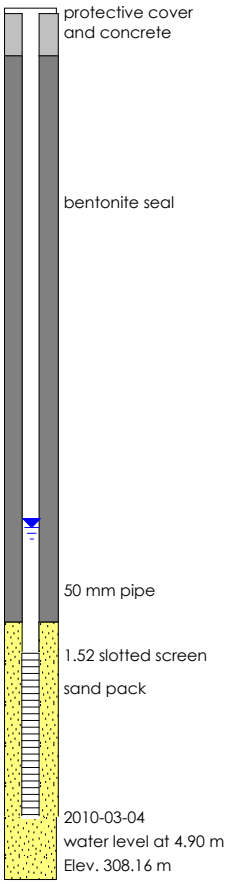
Depth (m)	Description	Symbol	Elevation (m)	Sample Number	Sample Type	N-Value
0.00	Ground Elevation		313.06			
0.00	***TOPSOIL:*** dark brown silt, frozen					
1.00	***SAND:*** compact rusty brown fine to coarse sand, trace silt and fine gravel, damp		312.00	1	SS	13
	some gravel			2	SS	20
2.00			311.00			
3.00	***SAND AND GRAVEL:*** very dense brown sand and gravel		310.00	3	SS	27\150mm
4.00			309.00			
5.00	moist			4	SS	33
	saturated		308.00			
6.00	some silt		307.00	5	SS	27
7.00			306.00			
8.00	***SILT:*** compact grey silt, trace clay; some sand layers, saturated		305.00	6	SS	23
	Borehole terminated at 8.23 m					
9.00			304.00			
10.00			303.00			
11.00			302.00			

Dynamic Cone / Standard Penetration: 20 40 60 80

Shear Strength (PP) kPa / Shear Strength (FV) kPa: 50 100 150 200

Water Content (%): WP WL; 10 20 30

Groundwater Observations and Standpipe Details



Reviewed by: *CH*

Drill Method: *Hollow Stem Auger*

Notes:

Field Tech.: *RM*

Sheet: *1 of 1*

Drafted by: *SM*

Borehole Number: 04-10

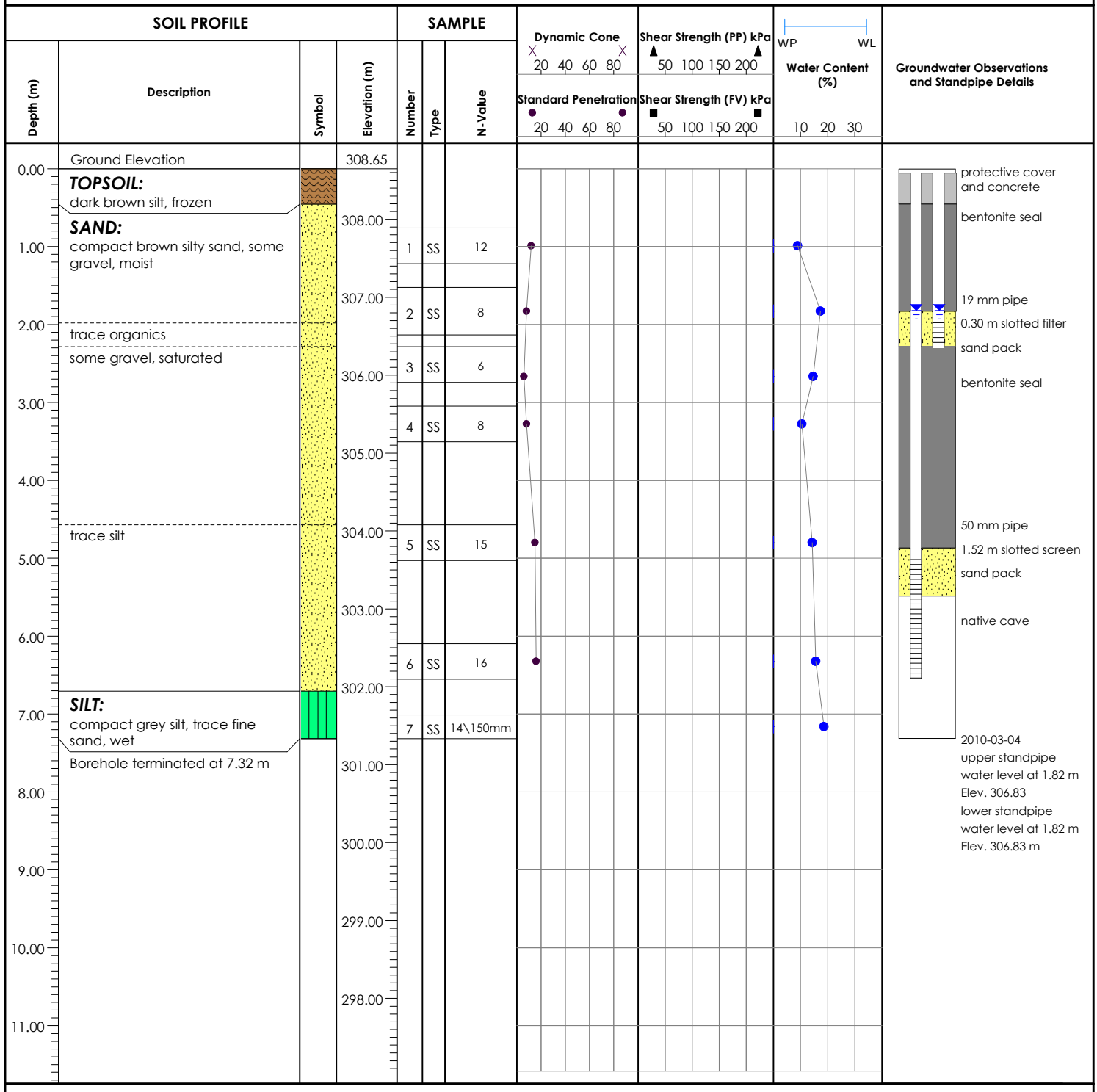
Ground Elevation: *308.65 mASL*

Project: *Scoped Hydrogeology Study - Cambridge West Community*

Job No.: *P031655-300*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Date: *February 12, 2010*



Reviewed by: *CH*

Drill Method: *Hollow Stem Auger*

Notes:

Field Tech.: *RM*

Sheet: *1 of 1*

Drafted by: *SM*

Borehole Number: 05-10

Ground Elevation: *308.57 mASL*

Project: *Scoped Hydrogeology Study - Cambridge West Community*

Job No.: *P031655-300*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Date: *February 12, 2010*

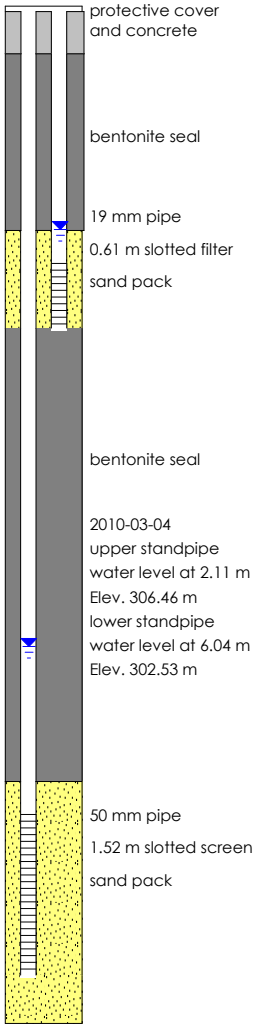
Depth (m)	Description	Elevation (m)	Number	Type	N-Value
0.00	Ground Elevation	308.57			
	FILL: loose brown and rusty brown sand and silty sand, damp to moist	308.00	1	SS	4
1.00					
		307.00	2	SS	6
2.00	***SILT:*** compact grey silt, trace sand, saturated				
		306.00	3	SS	16
3.00	trace clay				
			4	SS	21
4.00		305.00			
		304.00	5	SS	14
5.00	***SAND:*** compact brown fine sand, trace silt, damp				
		303.00			
6.00	saturated		6	SS	16
		302.00			
7.00		301.00			
			7	SS	20
8.00	some gravel				
		300.00			
9.00					
		299.00	8	SS	22
	Borehole terminated at 9.60 m				
10.00		298.00			
11.00		297.00			

Dynamic Cone / Standard Penetration: 20 40 60 80

Shear Strength (PP) kPa / Shear Strength (FV) kPa: 50 100 150 200

Water Content (%): WP WL; 10 20 30

Groundwater Observations and Standpipe Details



Reviewed by: *CH*

Drill Method: *Hollow Stem Auger*

Notes:

Field Tech.: *RM*

Sheet: *1 of 1*

Drafted by: *SM*

Borehole Number: 06-10

Ground Elevation: *308.97 mASL*

Project: *Scoped Hydrogeology Study - Cambridge West Community*

Job No.: *P031655-300*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Date: *February 12, 2010*

Depth (m)	Description	Elevation (m)	Number	Type	N-Value
0.00	Ground Elevation	308.97			
	TOPSOIL: dark brown silt, frozen				
1.00	***SILT:*** loose brown silt, some sand and clay, very moist to wet	308.00	1	SS	4
2.00	***SAND:*** loose grey fine to coarse sand, some silt and gravel, saturated	307.00	2	SS	4
			3	SS	16
3.00		306.00			
			4	SS	17
4.00		305.00			
5.00		304.00	5	SS	36
6.00	Borehole terminated at 6.10 m	303.00			
7.00		302.00			
8.00		301.00			
9.00		300.00			
10.00		299.00			
11.00		298.00			

Dynamic Cone / Standard Penetration: 20 40 60 80

Shear Strength (PP) kPa / Shear Strength (FV) kPa: 50 100 150 200

Water Content (%): WP WL; 10 20 30

Groundwater Observations and Standpipe Details

- protective cover and concrete
- bentonite seal
- 19 mm pipe
- 0.30 m slotted filter
- sand pack
- bentonite seal
- 50 mm pipe
- 1.52 m slotted screen
- native cave

2010-03-04
upper standpipe
water level at 0.91 m
Elev. 308.06 m
lower standpipe
water level at 0.92
Elev. 308.05 m

Reviewed by: *CH*

Drill Method: *Hollow Stem Auger*

Notes:

Field Tech.: *RM*

Sheet: *1 of 1*

Drafted by: *SM*

Borehole Number: 08-10

Ground Elevation: *311.92 mASL*

Project: *Scoped Hydrogeology Study - Cambridge West Community*

Job No.: *P031655-300*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Date: *February 16, 2010*

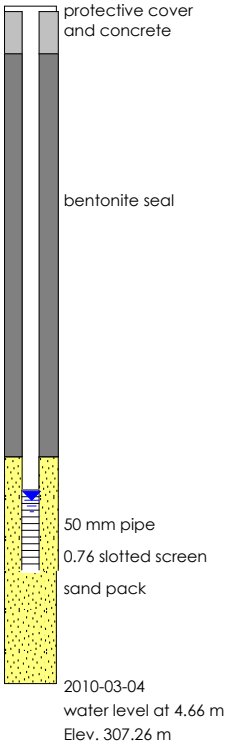
Depth (m)	Description	Elevation (m)	Sample Number	Sample Type	N-Value
0.00	Ground Elevation	311.92			
0.00	***TOPSOIL:*** dark brown silt, frozen				
1.00	***SILT:*** loose brown silt, trace sand and clay, moist	311.00	1	SS	6
1.00	***SAND:*** compact brown fine to coarse sand, trace silt and fine gravel, damp		2	SS	13
2.00		310.00	3	SS	17
3.00		309.00	4	SS	15
4.00		308.00			
	saturated		5	SS	10
5.00		307.00			
5.00	***SILT TILL:*** compact brown sandy silt, some gravel, moist		6	SS	18
6.00		306.00	7	SS	27
6.00	Borehole terminated at 6.40 m				
7.00		305.00			
8.00		304.00			
9.00		303.00			
10.00		302.00			
11.00		301.00			

Dynamic Cone / Standard Penetration: 20 40 60 80

Shear Strength (PP) kPa / Shear Strength (FV) kPa: 50 100 150 200

Water Content (%): WP WL; 10 20 30

Groundwater Observations and Standpipe Details



Reviewed by: *CH*

Drill Method: *Hollow Stem Auger*

Notes:

Field Tech.: *RM*

Sheet: *1 of 1*

Drafted by: *SM*

Borehole Number: 15-10

Ground Elevation: *309.74 mASL*

Project: *Scoped Hydrogeology Study - Cambridge West Community*

Job No.: *P031655-300*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Date: *February 18, 2010*

Depth (m)	Description	Elevation (m)	Number	Type	N-Value
0.00	Ground Elevation	309.74			
0.00	***TOPSOIL:*** dark brown silt, frozen				
0.80	***SILT:*** firm brown silt, some clay, trace sand and gravel, APL	309.00	1	SS	7
1.80	***SAND:*** loose brown fine to coarse sand, trace silt, moist	308.00	2	SS	8
2.00	saturated				
2.30	compact	307.00	3	SS	11
3.80	***SAND AND GRAVEL:*** compact brown sand and gravel, trace silt, saturated	306.00	4	SS	16
5.00	Borehole terminated at 5.03 m	305.00	5	SS	26

Dynamic Cone: 20 40 60 80

Standard Penetration: 20 40 60 80

Shear Strength (PP) kPa: 50 100 150 200

Shear Strength (FV) kPa: 50 100 150 200

WP WL

Water Content (%): 10 20 30

Groundwater Observations and Standpipe Details

- protective cover and concrete
- bentonite seal
- 50 mm pipe
- 1.52 m slotted screen
- native cave

2010-03-04
water level at 1.40 m
Elev. 308.34 m

Reviewed by: *CH*

Drill Method: *Hollow Stem Auger*

Notes:

Field Tech.: *RM*

Sheet: *1 of 1*

Drafted by: *SM*

Borehole Number: 16-10

Ground Elevation: *309.08 mASL*

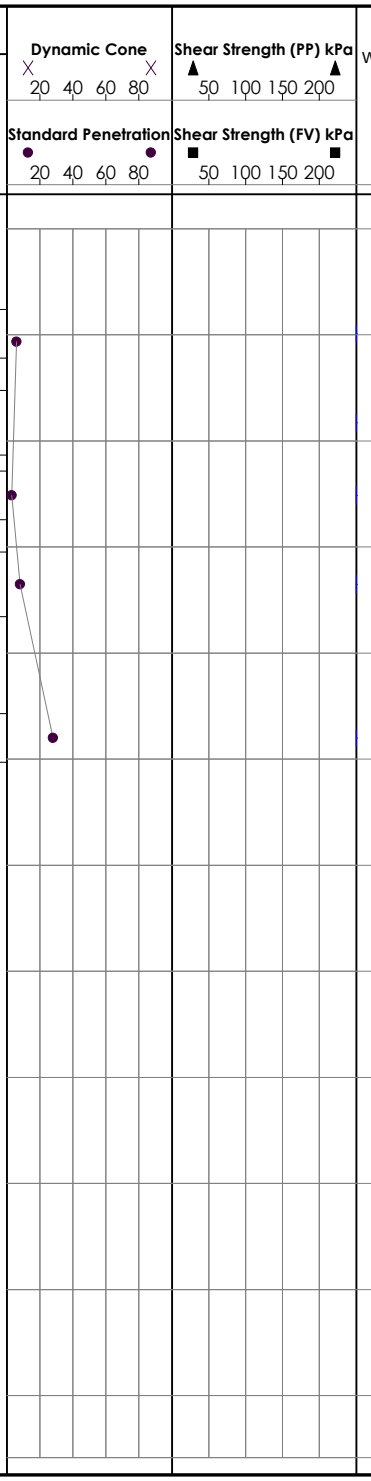
Project: *Scoped Hydrogeology Study - Cambridge West Community*

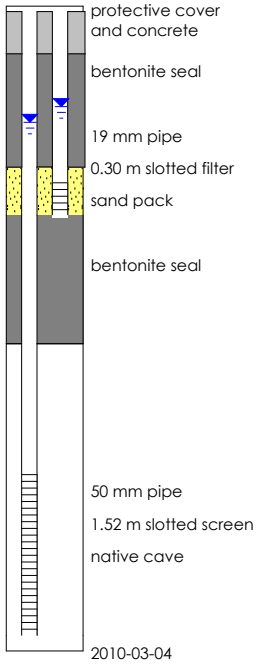
Job No.: *P031655-300*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Date: *February 18, 2010*

Depth (m)	Description	Symbol	Elevation (m)	Sample Number	Sample Type	N-Value
	Ground Elevation		309.08			
0.00	***PEAT:*** firm black amorphous peat, WTPL					
1.00			308.00	1	SS	6
				2	SS	WH
2.00	***SAND:*** very loose brown silty sand, saturated		307.00			
	trace gravel			3	SS	3
3.00			306.00	4	SS	8
4.00	***SAND AND GRAVEL:*** compact brown sand and gravel, some cobbles and silt, saturated		305.00			
				5	SS	28
5.00			304.00			
	SAND: brown sand, trace silt and fine gravel, saturated					
6.00	Borehole terminated at 6.10 m		303.00			
7.00			302.00			
8.00			301.00			
9.00			300.00			
10.00			299.00			
11.00			298.00			





2010-03-04
upper standpipe
water level at 0.95 m
Elev. 308.13 m
lower standpipe
water level at 1.10 m
Elev. 307.98 m

Reviewed by: *CH*

Drill Method: *Hollow Stem Auger*

Notes:

Field Tech.: *RM*

Sheet: *1 of 1*

Drafted by: *SM*

Borehole Number: 18-10

Ground Elevation: *310.17 mASL*

Project: *Scoped Hydrogeology Study - Cambridge West Community*

Job No.: *P031655-300*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Date: *February 24, 2010*

Depth (m)	Description	Symbol	Elevation (m)	Sample Number	Sample Type	N-Value
0.00	Ground Elevation		310.17			
0.00	***TOPSOIL:*** dark brown silt, frozen					
1.00	***SILT:*** brown silt, some sand and gravel, moist		309.00	1	SS	47
				2	SS	32\150mm
2.00			308.00	3	AS	
3.00	***SAND AND GRAVEL:*** dense to very dense brown sand and gravel, some cobbles, trace silt, damp		307.00	4	SS	23
4.00	saturated		306.00			
5.00	***SAND:*** compact brown fine to coarse sand, some gravel, trace silt, saturated		305.00	5	SS	27
6.00	trace fine gravel		304.00	6	SS	38
7.00	***SAND AND GRAVEL:*** dense brown sand and gravel, trace silt, saturated		303.00	7	SS	40
8.00			302.00			
9.00	***SAND:*** compact brown fine to coarse sand, trace silt, saturated		301.00	8	SS	22
10.00	***SILT:*** dense brown fine sandy silt, saturated		300.00	9	SS	33
11.00			299.00			
12.00	grey, saturated		298.00	10	SS	20
13.00			297.00			
14.00			296.00	11	SS	7
15.00			295.00			
16.00			294.00			
17.00			293.00			
18.00	***SILT TILL:*** very dense grey silt, some sand and gravel, moist		292.00	12	SS	10\25mm
19.00			291.00			
20.00	Borehole terminated at 19.51 m upon auger refusal on bedrock or boulder		290.00			

Dynamic Cone: 20 40 60 80

Standard Penetration: 20 40 60 80

Shear Strength (PP) kPa: 50 100 150 200

Shear Strength (FV) kPa: 50 100 150 200

WP WL

Water Content (%): 10 20 30

Groundwater Observations and Standpipe Details

- protective cover and concrete
- bentonite seal
- 2010-03-04 water level at 2.08 m Elev. 307.98 m
- bentonite grout
- 50 mm pipe
- 1.52 slotted screen
- sand pack

Reviewed by: *CH*

Drill Method: *Hollow Stem Auger*

Notes:

Field Tech.: *RM*

Sheet: *1 of 1*

Drafted by: *SM*

Borehole Number: 18A-10

Ground Elevation: *310.27 mASL*

Project: *Scoped Hydrogeology Study - Cambridge West Community*

Job No.: *P031655-300*

Location: *Blenheim Road, Cambridge, Ontario*

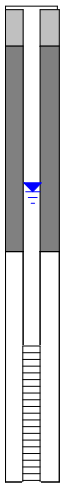
Drill Date: *March 2, 2010*

Depth (m)	Description	Elevation (m)	Number	Type	N-Value
0.00	Ground Elevation	310.27			
0.00	***TOPSOIL:*** dark brown silt, frozen				
1.00	***SILT:*** brown silt, some sand and gravel, moist	309.00	1	SS	47
			2	SS	32\150mm
2.00	***SAND AND GRAVEL:*** dense to very dense brown sand and gravel, some cobbles, trace silt, damp	308.00	3	AS	
3.00	saturated	307.00	4	SS	23
4.00	***SAND:*** compact brown fine to coarse sand, some gravel, trace silt, saturated	306.00			
	trace fine gravel		5	SS	27
5.00	Borehole terminated at 5.33 m	305.00			
6.00		304.00			
7.00		303.00			
8.00		302.00			
9.00		301.00			
10.00		300.00			
11.00		299.00			
12.00		298.00			
13.00		297.00			

Dynamic Cone / Standard Penetration: 20 40 60 80

Shear Strength (PP) kPa / Shear Strength (FV) kPa: 50 100 150 200

WP WL — Water Content (%): 10 20 30



2010-03-04
water level at 2.08 m
Elev. 308.19 m

Reviewed by: *CH*

Drill Method: *Hollow Stem Auger*

Notes:

Field Tech.: *RM/KT*

Sheet: *1 of 1*

Drafted by: *SM*

Borehole Number: 19-10

Ground Elevation: *310.38 mASL*

Project: *Scoped Hydrogeology Study - Cambridge West Community*

Job No.: *P031655-300*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Date: *February 25, 2010*

Depth (m)	Description	Symbol	Elevation (m)	Sample Number	Sample Type	N-Value
0.00	Ground Elevation		310.38			
	FILL: brown sandy silt, trace gravel and topsoil, frozen					
1.00	***TOPSOIL:*** dark brown silt, moist			1	SS	6
	SAND AND GRAVEL: compact brown silty sand and gravel, damp		309.00	2	SS	11
2.00	***SAND:*** loose to compact brown fine to coarse sand, some silt, trace fine gravel, saturated		308.00	3	SS	14
3.00						
4.00			307.00	4	SS	8
			306.00			
5.00	***SAND AND GRAVEL:*** compact grey fine to coarse sand and gravel, trace silt, saturated		305.00	5	SS	24
6.00	***SAND:*** compact grey fine to coarse sand, trace silt and fine gravel, saturated		304.00	6	SS	16
7.00			303.00			
8.00	***SILT TILL:*** compact grey silt, some sand, clay and gravel, moist		302.00	7	SS	28
9.00			301.00	8	SS	26
10.00	very dense		300.00			
11.00				9	SS	52
	Borehole terminated at 11.13 m		299.00			

Dynamic Cone: 20 40 60 80
Standard Penetration: 20 40 60 80
Shear Strength (PP) kPa: 50 100 150 200
Shear Strength (FV) kPa: 50 100 150 200
WP WL
Water Content (%): 10 20 30

Groundwater Observations and Standpipe Details:
- protective cover and concrete
- bentonite seal
- bentonite grout
- bentonite seal
- 50 mm pipe
- 1.52 slotted screen
- sand pack
- 2010-03-04 water level at 2.18 m Elev. 308.20 m

Reviewed by: *CH*

Drill Method: *Hollow Stem Auger*

Notes:

Field Tech.: *RM*

Sheet: *1 of 1*

Drafted by: *SM*

Borehole Number: 20-10

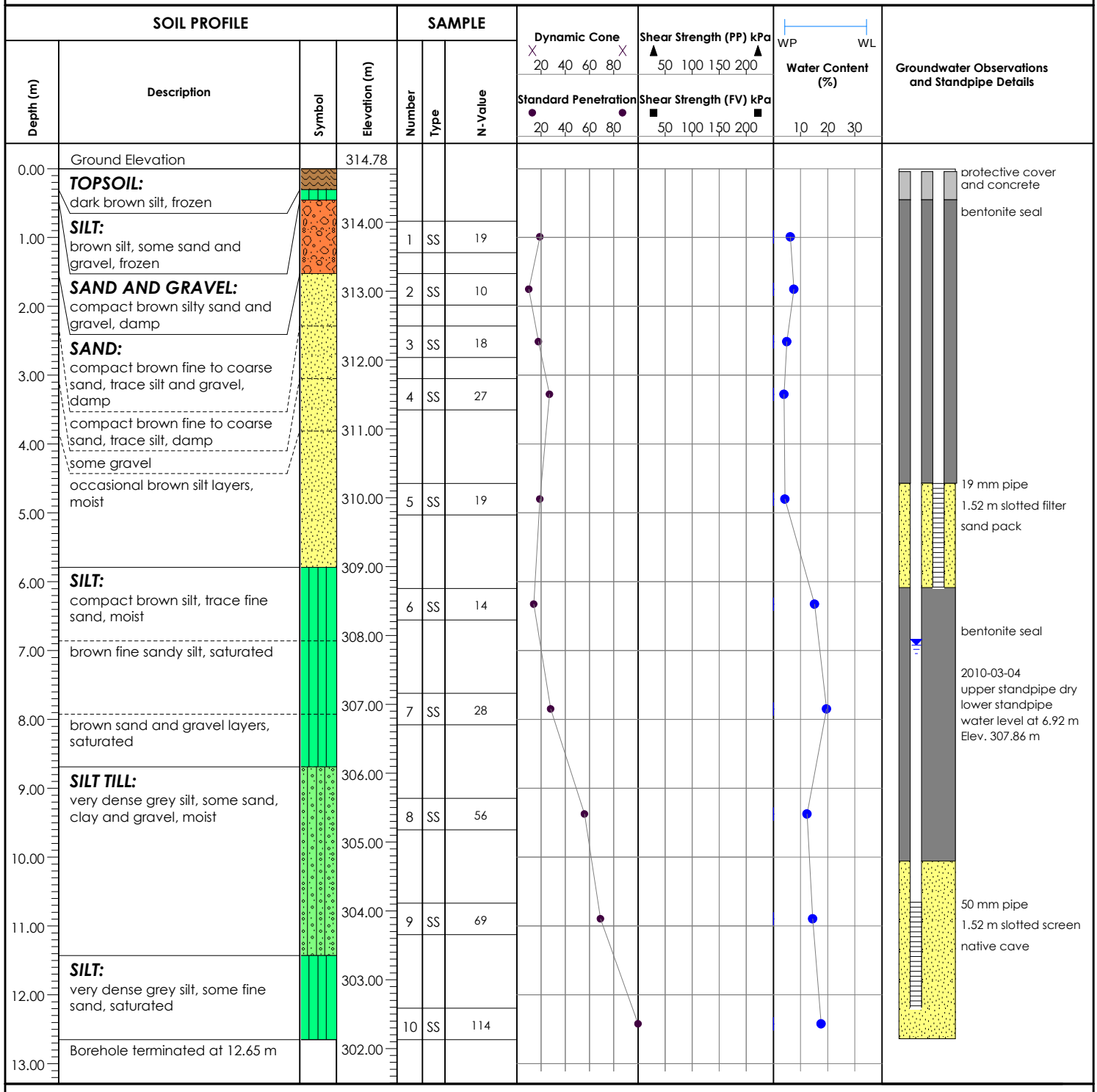
Ground Elevation: *314.78 mASL*

Project: *Scoped Hydrogeology Study - Cambridge West Community*

Job No.: *P031655-300*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Date: *February 25, 2010*



Reviewed by: *CH*

Drill Method: *Hollow Stem Auger*

Notes:

Field Tech.: *RM*

Sheet: *1 of 1*

Drafted by: *SM*

Borehole Number: 21-10

Ground Elevation: *308.32 mASL*

Project: *Scoped Hydrogeology Study - Cambridge West Community*

Job No.: *P031655-300*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Date: *February 26, 2010*

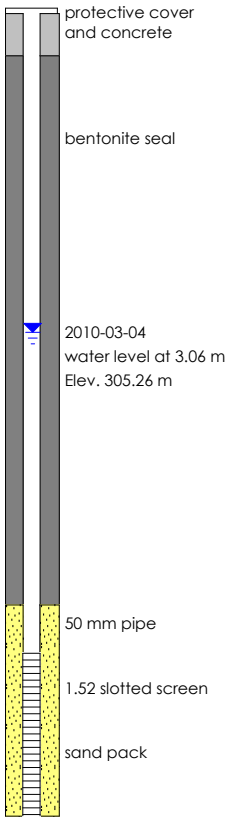
Depth (m)	Description	Symbol	Elevation (m)	Sample Number	Sample Type	N-Value
0.00	Ground Elevation		308.32			
	TOPSOIL: dark brown silt, frozen					
1.00	***SILT:*** brown silt, trace sand and gravel, frozen		307.00	1	SS	9
	SAND AND GRAVEL: compact brown sand and gravel, trace silt, damp			2	SS	12
2.00			306.00	3	SS	27
3.00	saturated					
			305.00	4	SS	26
4.00			304.00			
5.00	***SAND:*** compact brown fine to coarse sand, trace silt and fine gravel, saturated		303.00	5	SS	33
6.00			302.00	6	SS	24
7.00			301.00			
	Borehole terminated at 7.62 m					
8.00			300.00			
9.00			299.00			
10.00			298.00			
11.00			297.00			

Dynamic Cone / Standard Penetration: 20 40 60 80

Shear Strength (PP) kPa / Shear Strength (FV) kPa: 50 100 150 200

Water Content (%): WP WL; 10 20 30

Groundwater Observations and Standpipe Details



Reviewed by: *CH*

Drill Method: *Hollow Stem Auger*

Notes:

Field Tech.: *RM*

Sheet: *1 of 1*

Drafted by: *SM*

Borehole Number: 22-10

Ground Elevation: *313.80 mASL*

Project: *Scoped Hydrogeology Study - Cambridge West Community*

Job No.: *P031655-300*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Date: *Feb 26 and Mar 1, 2010*

Depth (m)	Description	Elevation (m)	Number	Type	N-Value
0.00	Ground Elevation	313.80			
0.00	***TOPSOIL:*** dark brown silt, frozen				
1.00			1	SS	6
1.00	***SILT:*** loose reddish brown silt, some sand, moist	312.00	2	SS	21
2.00					
2.00	***SAND:*** compact brown fine to coarse sand, trace silt, damp	311.00	3	AS	27
3.00			4	SS	*
4.00	***SAND AND GRAVEL:*** compact to dense brown fine to coarse sand and gravel, some cobbles, trace silt, damp	310.00			
5.00		309.00	5	SS	31
6.00	***SAND:*** compact brown fine to coarse sand, trace silt and fine gravel, damp	308.00			
6.00			6	SS	22
7.00		307.00			
7.00	some gravel, damp				
8.00		306.00	7	SS	71
8.00	very dense brown fine to coarse sand, some gravel, trace silt, damp				
9.00		305.00			
9.00	compact brown fine to coarse sand, trace gravel and silt, damp		8	SS	27
10.00		304.00			
11.00	***SAND AND SILT:*** dense to very dense light brown fine sand and silt, moist	303.00	9	SS	50
12.00		302.00			
12.00	dense, brown, moist		10	SS	45
13.00		301.00			
14.00	***SAND:*** compact brown to reddish brown silty fine sand, saturated	300.00	11	SS	21
15.00		299.00			
15.00	***SILT:*** dense brown silt, trace fine sand, saturated, dilatant		12	SS	31
16.00		298.00			
17.00	dense to very dense grey and brown silt, saturated	297.00	13	SS	50
18.00	***SAND:*** dense brown fine sand, some silt, saturated	296.00			
19.00		295.00			
19.00	Borehole terminated at 17.22 m				
20.00		294.00			
		293.00			

Dynamic Cone / Standard Penetration: 20 40 60 80

Shear Strength (PP) kPa / Shear Strength (FV) kPa: 50 100 150 200

Water Content (%): WP WL; 10 20 30

Groundwater Observations and Standpipe Details:
- protective cover and concrete
- bentonite seal
- 2010-03-04 water level at 13.29 m Elev. 300.51 m
- 50 mm pipe
- 1.52 slotted screen
- sand pack

Reviewed by: *CH*

Drill Method: *Hollow Stem Auger*

Notes: **Sampler bouncing on cobble*

Field Tech.: *RM/KT*

Sheet: *1 of 1*

Drafted by: *SM*

Borehole Number: 23-10

Ground Elevation: *310.46 mASL*

Project: *Scoped Hydrogeology Study - Cambridge West Community*

Job No.: *P031655-300*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Date: *March 1, 2010*

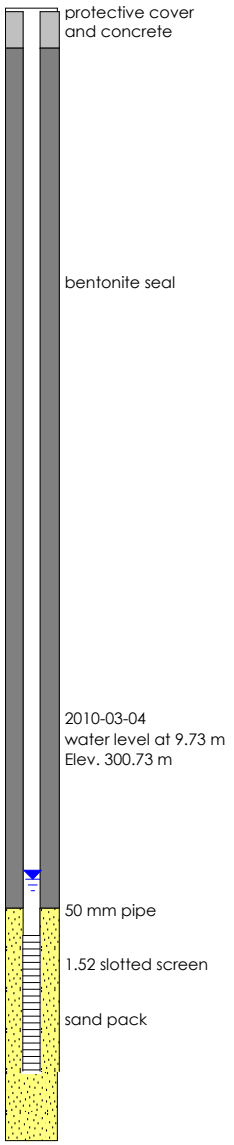
Depth (m)	Description	Symbol	Elevation (m)	SAMPLE Number	Type	N-Value
0.00	Ground Elevation		310.46			
0.00	***TOPSOIL:*** dark brown silt, frozen					
1.00	***SILT:*** brown silt, trace sand and gravel, moist		309.00	1	SS	21
2.00	***SAND AND GRAVEL:*** compact brown sand and gravel, trace silt, damp			2	SS	18
	some cobbles		308.00	3	SS	30
3.00				4	SS	24
4.00			307.00			
5.00	boulders		306.00	5	SS	50\150mm*
6.00	***SILT:*** compact brown silt, trace fine sand, moist		305.00			
7.00	some gravel		304.00	6	SS	26
	some fine sand layers, saturated		303.00	7	SS	25
8.00			302.00			
9.00	***SAND:*** dense brown silty fine sand, saturated		301.00	8	SS	35
10.00			300.00			
	compact			9	SS	19
11.00			299.00			
12.00			298.00	10	SS	21
13.00	Borehole terminated at 12.65 m		297.00			

Dynamic Cone / Standard Penetration: 20 40 60 80

Shear Strength (PP) kPa / Shear Strength (FV) kPa: 50 100 150 200

Water Content (%): WP WL; 10 20 30

Groundwater Observations and Standpipe Details



Reviewed by: *CH*

Drill Method: *Hollow Stem Auger*

Notes: **Sampler bouncing on gravel*

Field Tech.: *RM/KT*

Sheet: *1 of 1*

Drafted by: *SM*

Borehole Number: 24-10

Ground Elevation: *314.32 mASL*

Project: *Scoped Hydrogeology Study - Cambridge West Community*

Job No.: *P031655-300*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Date: *March 1, 2010*

Depth (m)	Description	Elevation (m)	Sample Number	Sample Type	N-Value
0.00	Ground Elevation	314.32			
0.00	***TOPSOIL:*** dark brown silt, frozen				
1.00	***SILT:*** loose brown sandy silt, damp	313.00	1	SS	5
			2	SS	17
2.00	***SAND:*** compact brown fine to medium sand, trace fine gravel and silt, damp	312.00	3	SS	31
3.00	***SAND TILL:*** compact to dense brown silty fine sand, trace fine gravel, moist	311.00	4	SS	25
4.00	***SILT:*** compact brown fine sandy silt, trace gravel, damp	310.00			
5.00	dense, damp to moist	309.00	5	SS	32
6.00	compact brown silt, trace fine sand, very moist	308.00	6	SS	16
7.00		307.00			
8.00	saturated, dilatant	306.00	7	SS	20
9.00		305.00	8	SS	21
10.00		304.00			
11.00		303.00	9	SS	26
11.00	Borehole terminated at 11.13 m				
12.00		302.00			
13.00		301.00			

Dynamic Cone / Standard Penetration: 20 40 60 80

Shear Strength (PP) kPa / Shear Strength (FV) kPa: 50 100 150 200

Water Content (%): WP WL; 10 20 30

Groundwater Observations and Standpipe Details:
- protective cover and concrete
- bentonite seal
- 50 mm pipe
- 1.52 slotted screen
- sand pack
- 2010-03-04 water level at 8.19 m Elev. 306.13 m

Reviewed by: *CH*

Drill Method: *Hollow Stem Auger*

Notes:

Field Tech.: *RM/KT*

Sheet: *1 of 1*

Drafted by: *SM*

Borehole Number: 25-10

Ground Elevation: *311.27 mASL*

Project: *Scoped Hydrogeology Study - Cambridge West Community*

Job No.: *P031655-300*

Location: *Blenheim Road, Cambridge, Ontario*

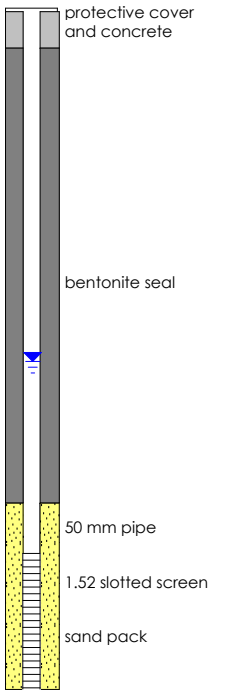
Drill Date: *March 2, 2010*

Depth (m)	Description	Elevation (m)	Number	Type	N-Value
0.00	Ground Elevation	311.27			
0.00	***TOPSOIL:*** dark brown silt, frozen				
1.00	***SILT:*** loose brown to dark brown silt, some clay, trace sand, moist	310.00	1	SS	4
			2	SS	29
2.00	***SAND AND GRAVEL:*** compact brown fine to coarse sand and gravel, trace silt, some cobbles, damp	309.00	3	SS	61
3.00	very dense	308.00	4	SS	33
	dense				
4.00	saturated	307.00			
5.00		306.00	5	SS	46
6.00		305.00	6	SS	27
7.00		304.00			
7.62	Borehole terminated at 7.62 m				
8.00		303.00			
9.00		302.00			
10.00		301.00			
11.00		300.00			
12.00		299.00			
13.00		298.00			

Dynamic Cone / Standard Penetration: 20 40 60 80

Shear Strength (PP) kPa / Shear Strength (FV) kPa: 50 100 150 200

Water Content (%): WP WL; 10 20 30



2010-03-04
water level at 3.95 m
Elev. 307.32 m

Reviewed by: *CH*

Drill Method: *Hollow Stem Auger*

Notes:

Field Tech.: *RM/KT*

Sheet: *1 of 1*

Drafted by: *SM*

Borehole Number: 26-10

Ground Elevation: *319.35 mASL*

Project: *Scoped Hydrogeology Study - Cambridge West Community*

Job No.: *P031655-300*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Date: *March 2, 2010*

Depth (m)	Description	Symbol	Elevation (m)	Sample Number	Sample Type	N-Value
0.00	Ground Elevation		319.35			
0.00	***TOPSOIL:*** dark brown silt, frozen					
1.00	***SILT:*** brown sandy silt, moist		318.00	1	SS	24
2.00				2	SS	3
2.00	***SAND AND GRAVEL:*** dense brown fine to coarse sand and gravel, trace silt, damp		317.00	3	AS	37
3.00						
3.00	some sand layers, damp		316.00	4	SS	15\75mm*
4.00	some cobbles					
4.00	very dense		315.00	5	SS	35\75mm
5.00						
6.00			314.00	6	SS	38\150mm
7.00	***SILT:*** dense brown silt, some fine sand, damp to moist		313.00			
8.00			312.00	7	SS	34
9.00			311.00			
10.00			310.00	8	SS	46
11.00	compact, moist		309.00			
11.00				9	SS	29
12.00			308.00			
13.00	dense brown fine sandy silt, wet, dilatant		307.00	10	SS	49
13.00						
14.00	very dense silt, trace to some fine sand, wet, dilatant		306.00	11	SS	72
15.00			305.00			
15.00	compact, trace fine sand, saturated					
16.00			304.00	12	SS	19
16.00			303.00			
17.00	***SILT AND SAND:*** compact brown silt and fine sand, saturated			13	SS	16
18.00			302.00			
18.00			301.00	14	SS	17
19.00	Borehole terminated at 18.75 m					
20.00			300.00			
			299.00			

Dynamic Cone / Standard Penetration: 20 40 60 80

Shear Strength (PP) kPa / Shear Strength (FV) kPa: 50 100 150 200

Water Content (%): WP WL; 10 20 30

Groundwater Observations and Standpipe Details:
- protective cover and concrete
- bentonite seal
- 2010-03-04 water level at 15.03 m Elev. 304.32m
- 50 mm pipe
- 1.52 slotted screen
- native cave

Reviewed by: *CH*

Drill Method: *Hollow Stem Auger*

Notes: **Sampler bouncing on gravel*

Field Tech.: *RM/KT*

Sheet: *1 of 1*

Drafted by: *SM*

Borehole Number: 27-10

Ground Elevation: *318.13 mASL*

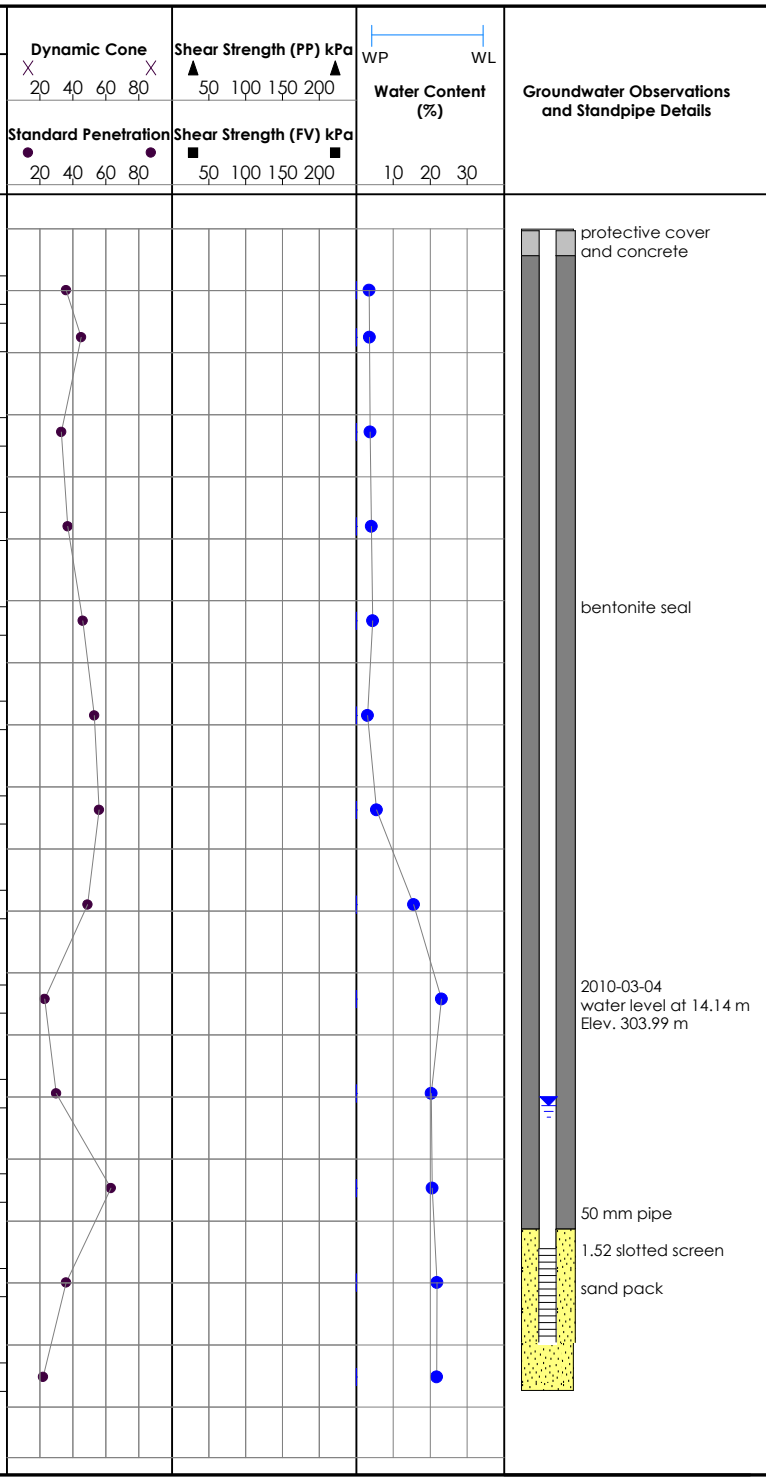
Project: *Scoped Hydrogeology Study - Cambridge West Community*

Job No.: *P031655-300*

Location: *Blenheim Road, Cambridge, Ontario*

Drill Date: *March 10, 2010*

Depth (m)	Description	Symbol	Elevation (m)	Sample Number	Sample Type	N-Value
0.00	Ground Elevation		318.13			
0.00	***TOPSOIL:*** dark brown silt, frozen					
1.00	***SILT:*** brown silt, trace sand and clay, frozen		317.00	1	SS	36
2.00			316.00	2	SS	45
3.00	***SAND AND GRAVEL:*** dense brown sand and gravel, some cobbles, trace silt, damp		315.00	3	SS	33
4.00	***SAND:*** dense brown fine to coarse sand, some fine gravel, trace silt, damp		314.00	4	SS	37
5.00			313.00			
6.00			312.00	5	SS	46
7.00			311.00			
8.00	very dense		310.00	6	SS	53
9.00	very dense brown fine to medium sand, trace silt, damp; some brown silt layers, moist		309.00	7	SS	56
10.00			308.00			
11.00	dense brown silty fine to medium sand, moist; some sand layers, damp		307.00	8	SS	49
12.00	compact brown silty fine sand, saturated		306.00	9	SS	23
13.00			305.00			
14.00	some silt layers		304.00	10	SS	30
15.00			303.00			
16.00	dense to very dense, saturated		302.00	11	SS	63
17.00			301.00	12	SS	36
18.00			300.00			
18.00	grey			13	SS	22
19.00	Borehole terminated at 18.75 m		299.00			



Reviewed by: *CH*

Drill Method: *Hollow Stem Auger*

Notes:

Field Tech.: *RM*

Sheet: *1 of 1*

Drafted by: *SM*

Appendix 3 Tables

Table 1: Topsoil Thicknesses
Table 2: Groundwater Elevation

TABLE 1
TOPSOIL THICKNESSES

Cambridge West Development
Blenheim Road
Cambridge, Ontario

Test Hole Number	Topsoil Thickness (mm)
BH-01-14	330
BH-02-14	410
BH-03-14	250
BH-04-14	230
BH-05-14	200
BH-06-14	280
BH-07-14	460
BH-08-14	410
BH-09-14	360
BH-10-14	1070
BH-11-14	410
BH-12-14	380
BH-13-14	460
BH-14-14	300
BH-15-14	510
BH-16-14	330
BH-17-14	300
BH-18-14	360
BH-19-14	360
BH-20-14	360
BH-21A-14	610
BH-21B-14	150
BH-22-14	410
BH-23-14	300
BH-24-14	230
BH-25-14	360
BH-26-14	230
BH-27-14	180

Test Hole Number	Topsoil Thickness (mm)
BH-28-14	280
BH-29-14	250
BH-30-14	250
BH-31-14	330
HH-01-14	610
HH 02-14	410
HH 03-14	560
HH 04-14	150
HH 05-14	580
HH 06-14	480
HH 07-14	130
HH 08-14	710
HH 09-14	230
HH 10-14	180
HH 11-14	560
HH 12-14	250
HH 13-14	660
HH 14-14	230
HH 15-14	230
HH 16-14	360
HH 17-14	530
HH 18-14	480
HH 19-14	560
HH 20-14	360
HH 21-14	710
HH 22-14	330
HH 23-14	250
HH 24-14	230

Test Hole Number	Topsoil Thickness (mm)
HH 25-14	100
HH 26-14	360
HH 27-14	250
HH 28-14	230
HH 29-14	380
HH 30-14	230
HH 31-14	480
HH 32-14	200
HH 33-14	280
HH 34-14	230
HH 35-14	200
HH 36-14	460
HH 37-14	230
HH 38-14	360
HH 39-14	640
HH 40-14	460
HH 41-14	300
HH 42-14	360
HH 43-14	130
HH 44-14	300
HH 45-14	360
HH 46-14	360
HH 47-14	610
HH 48-14	460
HH 49-14	690
HH 50-14	230
Average	**366**
Median	**360**

TABLE 2
GROUNDWATER ELEVATION

Cambridge West Development
Blenheim Road
Cambridge, Ontario

Monitoring Well	Groundwater Elevation (m) June 15, 2014	Groundwater Elevation (m) July 9, 2014
BH-06-14	308.05	307.86
BH-08-14 shallow	308.89	Dry
BH-08-14 deep	308.68	308.49
BH-10-14	308.46	308.25
BH-12-14	308.38	308.19
BH-14-14	Dry	Dry
BH-19-14	308.46	308.31
BH-22-14	300.09	299.95
BH-26-14	308.29	308.19

Appendix 4 Figures

Figure 1: Particle Size Distribution Analyses
Figure 2 to 4: Standard Proctor Moisture-Density Test Results

PARTICLE SIZE ANALYSIS

Project: **Cambridge West Development**

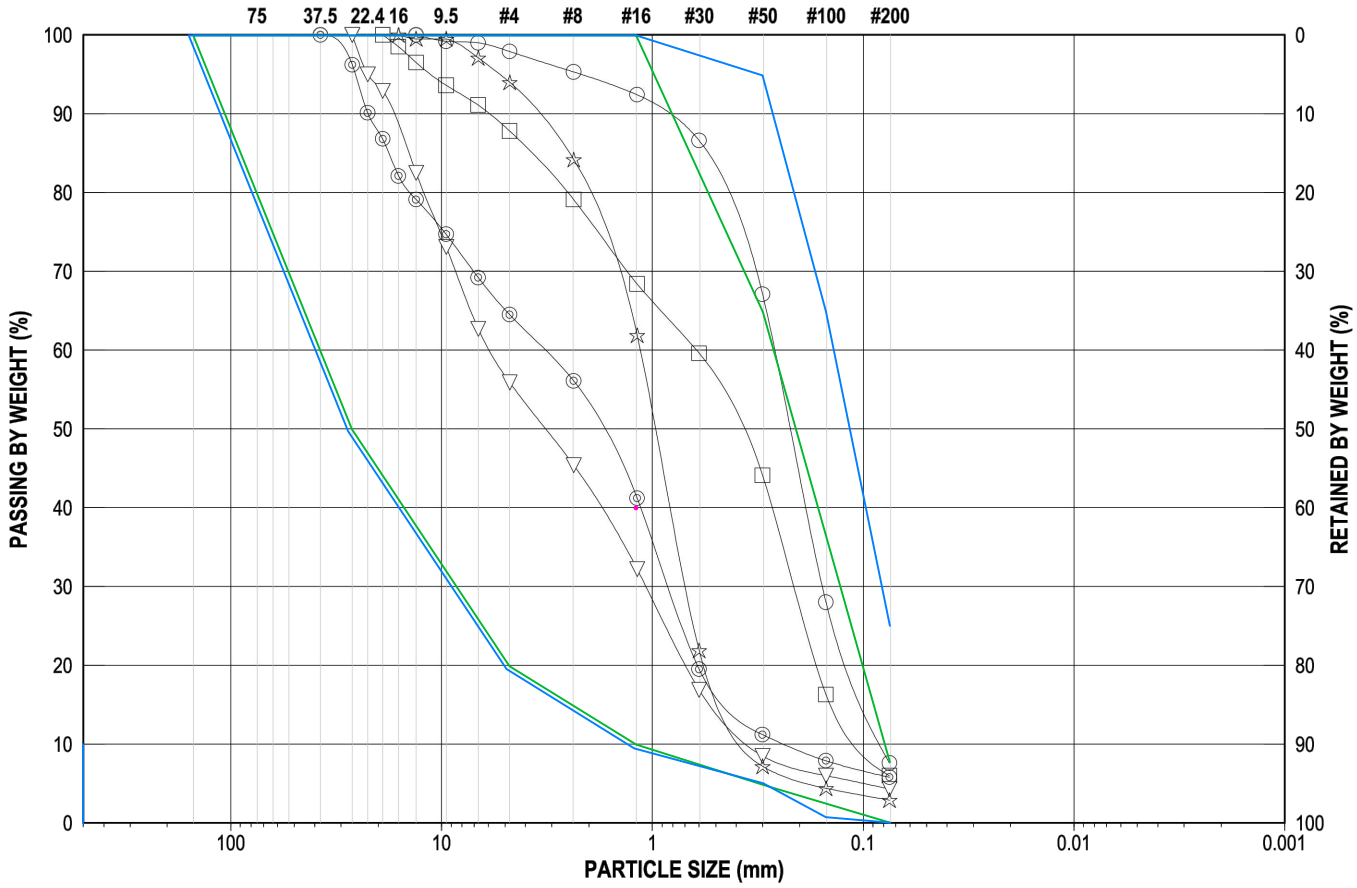
Figure No : **1**

Location: **Blenheim Road, Cambridge, Ontario**

File No : **P-0003455-0-09-100**

UNIFIED SOIL CLASSIFICATION

COBBLES	*GRAVEL*		*SAND*			*SILT OR CLAY*
	COARSE	FINE	COARSE	MEDIUM	FINE	
U.S. SIEVE SIZE IN MILLIMETRES			*U.S. STANDARD SIEVE No.*			*HYDROMETER*



Symbol	Borehole n°	Sample n°	Depth (m)	Description
○	BH-01-14	SS-2	1.52 - 1.98	SAND, trace Gravel and Silt
□	BH-01-14	SS-4	3.05 - 3.51	SAND, some Gravel, trace Silt
▽	BH-12-14	SS-3	2.29 - 2.74	SAND and GRAVEL, trace Silt
☆	BH-26-14	SS-5	4.57 - 5.03	SAND, trace Gravel and Silt
◎	BH-29-14	SS-4	3.05 - 3.51	SAND and GRAVEL, trace Silt
—				OPSS 1010 Select Subgrade Material
—				OPSS 1010 Granular 'B' Type 1

FIGURE NO. 2

LABORATORY PROCTOR MOISTURE–DENSITY TEST

PROJECT Cambridge West Development

LOCATION Blenheim Road, Cambridge, Ontario JOB NO.P-0003455-0-09-100

SAMPLED FROM BH-02-14 BS-4a depth 3.0 – 4.6 m

DATE SAMPLED 2014-05-20 SAMPLED BY D.Souter

DATE TESTED 2014-06-14 TESTED BY J.Taylor

SOIL TYPE Sand and Gravel, some Silt MOISTURE CONTENT 5.0%

REMARKS

METHOD LS – 706

PROCEDURE: 1☐ 2☐ 3☑

Procedure 1 (Mold ø – 101.6 mm)
Procedure 2 (Mold ø – 101.6 mm)
Procedure 3 (Mold ø – 152.4 mm)

MAXIMUM DRY DENSITY 2.300 t/m³

OPTIMUM MOISTURE 6.1%

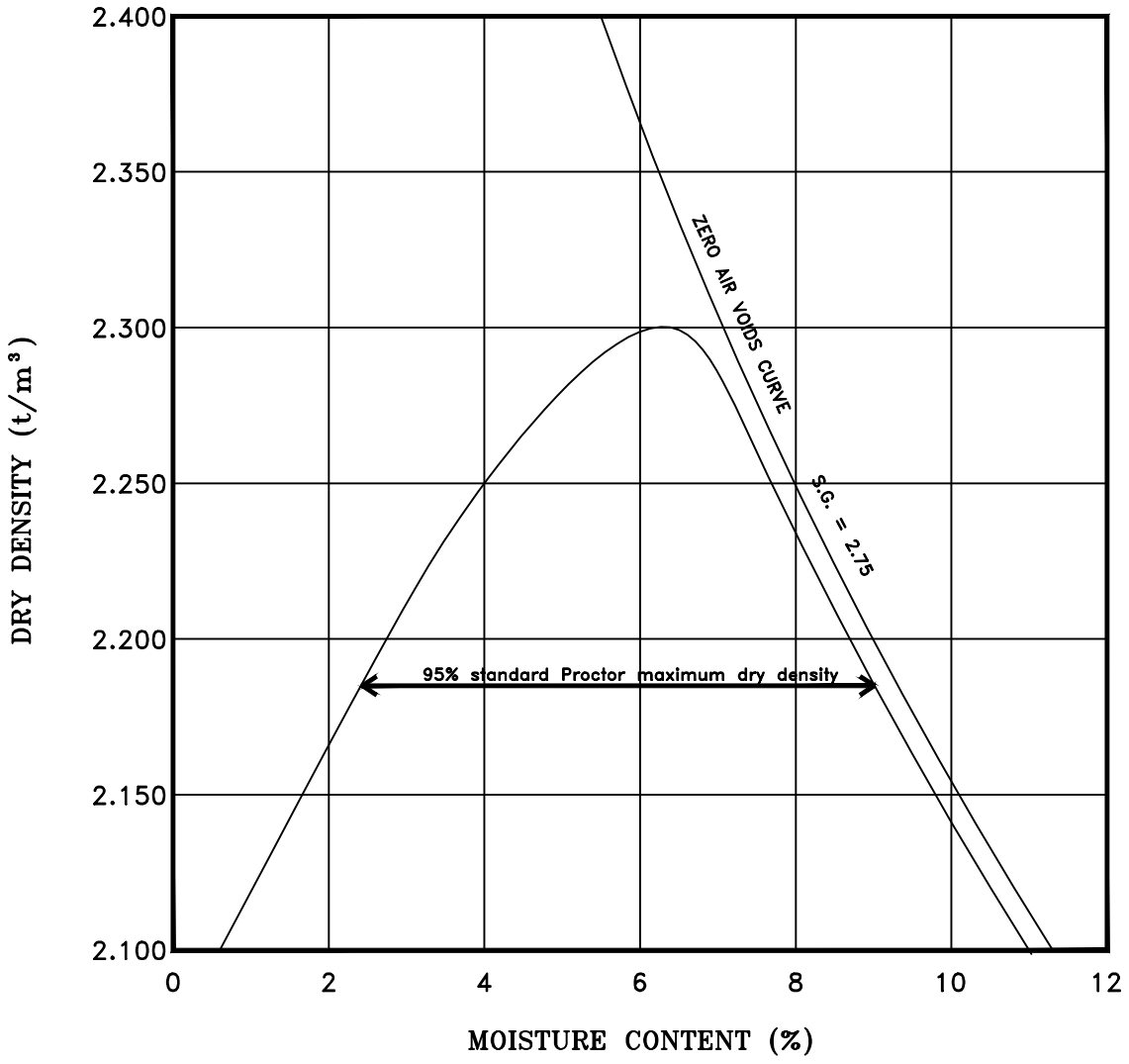


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FIGURE NO. 3

LABORATORY PROCTOR MOISTURE–DENSITY TEST

PROJECT Cambridge West Development

LOCATION Blenheim Road, Cambridge, Ontario JOB NO.P-0003455-0-09-100

SAMPLED FROM BH-14-14 BS-4a depth 3.0 – 4.6 m

DATE SAMPLED 2014-05-22 SAMPLED BY D.Souter

DATE TESTED 2014-06-16 TESTED BY K.F.

SOIL TYPE Sand, trace Gravel and Silt MOISTURE CONTENT 7.4%

REMARKS

METHOD LS – 706

PROCEDURE: 1☑ 2☐ 3☐

Procedure 1 (Mold ø – 101.6 mm)
Procedure 2 (Mold ø – 101.6 mm)
Procedure 3 (Mold ø – 152.4 mm)

MAXIMUM DRY DENSITY 1.770 t/m³

OPTIMUM MOISTURE 13.0%

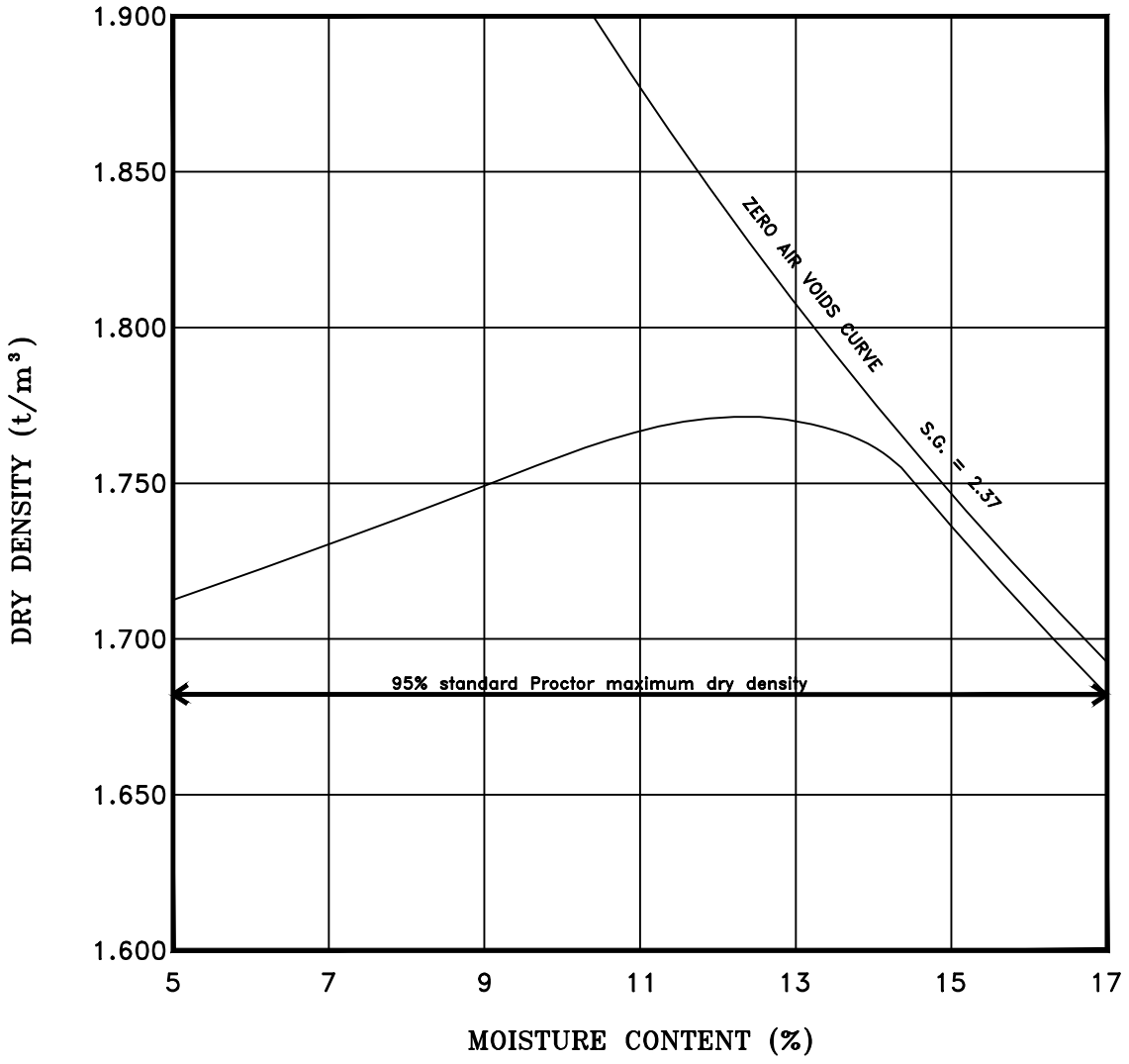

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FIGURE NO. 4

LABORATORY PROCTOR MOISTURE-DENSITY TEST

PROJECT Cambridge West Development

LOCATION Blenheim Road, Cambridge, Ontario JOB NO.P-0003455-0-09-100

SAMPLED FROM BH-28-14 BS-4a depth 3.0 - 4.6 m

DATE SAMPLED 2014-05-23 SAMPLED BY D.Souter

DATE TESTED 2014-06-16 TESTED BY K.F.

SOIL TYPE Sand and Gravel, trace Silt MOISTURE CONTENT 3.6%

REMARKS

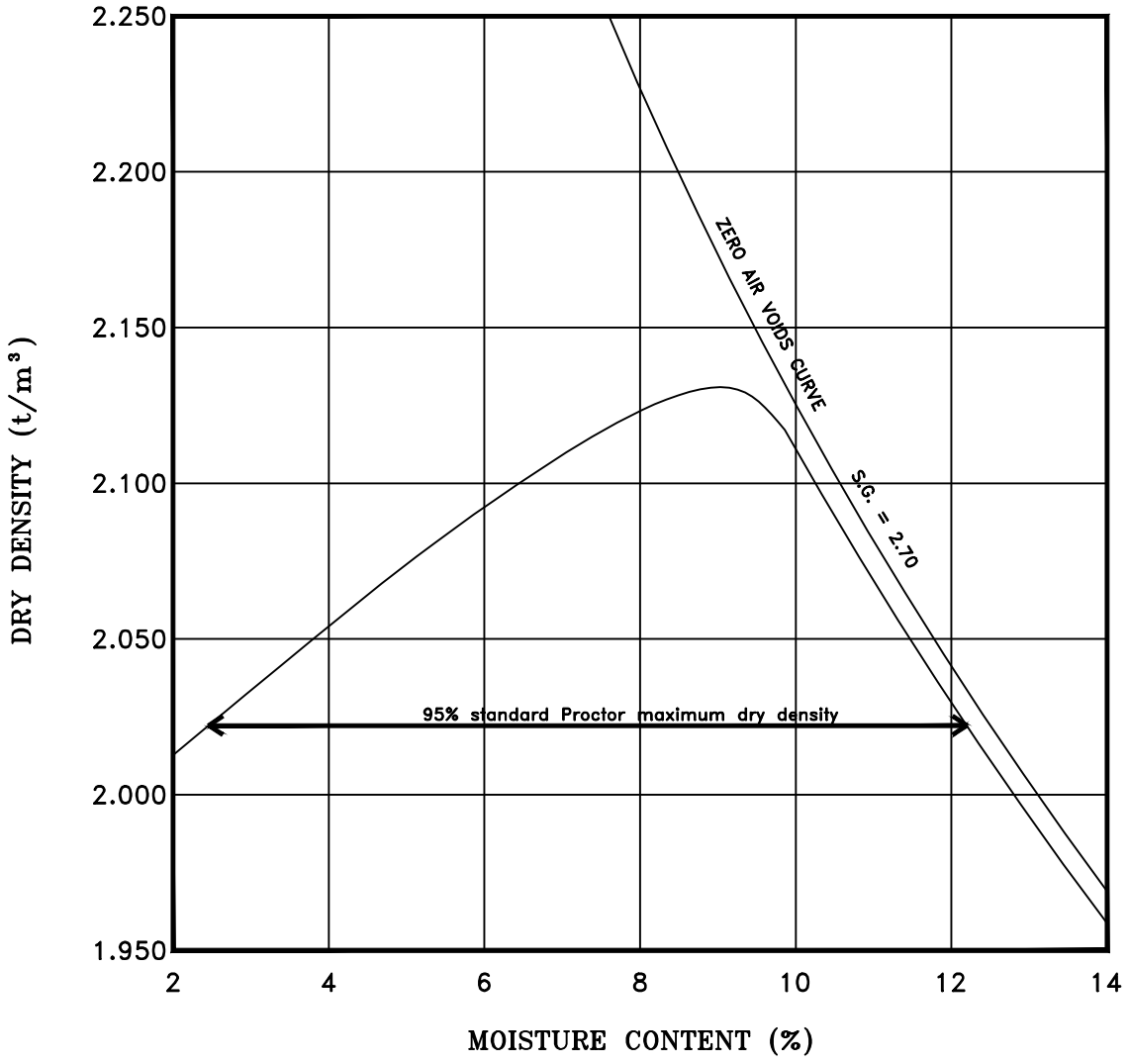
METHOD LS - 706

PROCEDURE: 1☐ 2☐ 3☑

Procedure 1 (Mold ø - 101.6 mm)
Procedure 2 (Mold ø - 101.6 mm)
Procedure 3 (Mold ø - 152.4 mm)

MAXIMUM DRY DENSITY 2.130 t/m³

OPTIMUM MOISTURE 9.1%



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Appendix C

Proposed Sanitary Sewer Analysis

Westwood Village Phase 2

City of Cambridge

Project Number: 02534-800
Date: March 30, 2026
Design By: TRN
Checked By: CJC
File: Q:\02534\800\SAN\02534-800 Sanitary Sewer Design Sheet 03-19-2026.xlsx

SANITARY SEWER DESIGN SHEET

ENGINEERING AND PUBLIC WORKS

Drainage Area Plan No: xxxx-xxxx

Design Parameters

Average Daily Flow

Residential	0.00318	L/s/c
Commercial	0.95	L/s/ha
Industrial	0.40	L/s/ha
Inst. / School	0.25	L/s/ha

Mannings "*n*" 0.013
Min. Velocity 0.6 m/sec
Max. Velocity 3.0 m/sec
Residential Harmon Peaking Factor (F) $F = 1 + 14/(4 + P^{0.5})$
Commercial Peaking Factor = 2.5
Residential Areas Infiltration 0.25 L/s/ha

LOCATION				RESIDENTIAL AREAS AND POPULATION							SCHOOL, INSTITUTIONAL			COMMERCIAL			INDUSTRIAL				INFILTRATION			DESIGN				
											HECTARES AND FLOW OF EACH ZONING																
											0.25 *L/s/ha*			0.95 *L/s/ha*			0.40 *L/s/ha*										
STREET	AREA NO.	MANHOLE LOCATION FROM MH	MANHOLE LOCATION TO MH	AREA	No. UNITS @ 3.25 PPU	No. UNITS @ 2.44 PPU	POPUL.	CUMUL 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	SLOPE	PIPE SIZE	CAPACITY	FULL FLOW VELOCITY
				ha			*1000s*	*1000s*		*L/sec*	*ha*	*ha*	*L/sec*	*ha*	*ha*	*L/sec*	*ha*	*ha*	*L/sec*	*L/sec*	*ha*	*ha*	*L/sec*	*L/sec*	*%*	*mm*	*L/sec.*	*m/s*
	1	2A	1A	0.49		16.00	0.039	0.039	4.335251	0.5387		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.49	0.49	0.1225	0.6612	0.50	200	23.1802	0.738
	3	1A	5A	0.49		17.00	0.041	0.081	4.268157	1.0939		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.49	0.98	0.2450	1.3389	0.50	200	23.1802	0.738
	4	6A	7A	0.13	2.00		0.007	0.007	4.430849	0.0917		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.13	0.13	0.0325	0.1242	0.50	200	23.1802	0.738
	5	7A	8A	0.43	8.00		0.026	0.033	4.34906	0.4499		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.43	0.56	0.1400	0.5899	0.50	200	23.1802	0.738
	6	8A	9A	0.18	2.00		0.007	0.039	4.335331	0.5382		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.18	0.74	0.1850	0.7232	0.50	200	23.1802	0.738
	7	6A	10A	0.22	3.00		0.010	0.010	4.415682	0.1370		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.22	0.22	0.0550	0.1920	0.50	200	23.1802	0.738
	8	10A	11A	0.30	5.00		0.016	0.026	4.364378	0.3612		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.30	0.52	0.1300	0.4912	0.50	200	23.1802	0.738
	9	11A	12A	0.07	1.00		0.003	0.029	4.356488	0.4056		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.07	0.59	0.1475	0.5531	0.50	200	23.1802	0.738
	10	12A	13A	0.18	2.00		0.007	0.036	4.342025	0.4941		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.18	0.77	0.1925	0.6866	0.50	200	23.1802	0.738
	11	13A	14A	0.40	7.00		0.023	0.059	4.300433	0.8007		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.40	1.17	0.2925	1.0932	0.50	200	23.1802	0.738
	12	14A	15A	0.17	2.00		0.007	0.065	4.290285	0.8876		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.17	1.34	0.3350	1.2226	0.50	200	23.1802	0.738
	13	17A	18A	0.16	2.00		0.007	0.007	4.430849	0.0917		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.16	0.16	0.0400	0.1317	0.50	200	23.1802	0.738
	14	18A	19A	0.27	4.00		0.013	0.020	4.381935	0.2720		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.27	0.43	0.1075	0.3795	0.50	200	23.1802	0.738
	15	19A	21A	0.25	3.00		0.010	0.029	4.356488	0.4056		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.25	0.68	0.1700	0.5756	0.50	200	23.1802	0.738
	16	4A	5A	0.33			0.038	0.038	4.337459	0.5239		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.33	0.33	0.0825	0.6064	0.50	200	23.1802	0.738
	17	5A	9A	0.88	5.00		0.117	0.236	4.121018	3.0945		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.88	2.19	0.5475	3.6420	0.50	200	23.1802	0.738
EXT.1				0.72			0.083	0.083	4.265116	1.1240											0.72	0.72	0.1800					
	18	9A	15A	1.05	5.00		0.039	0.397	4.023603	5.0868		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	1.05	4.70	1.1750	6.2618	0.50	200	23.1802	0.738
EXT. 2				1.48			0.170	0.253	4.109045	3.3089											1.48	1.48	0.3700					
	19	15A	16A	0.28	2.00		0.039	0.501	3.973824	6.3355		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.28	7.80	1.9500	8.2855	0.50	200	23.1802	0.738
	20	16A	21A	0.32			0.037	0.538	3.95778	6.7735		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.32	8.12	2.0300	8.8035	0.50	200	23.1802	0.738
	21	21A	22A	0.22	2.00		0.007	0.573	3.942867	7.1966		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.22	9.02	2.2550	9.4516	0.50	200	23.1802	0.738
	22	22A	23A	0.25	8.00		0.026	0.599	3.932403	7.5029		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.25	9.27	2.3175	9.8204	0.50	200	23.1802	0.738
	23	23A	S-14	0.30	4.00		0.013	0.612	3.927283	7.6556		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.30	9.57	2.3925	10.0481	0.50	200	23.1802	0.738
			S-14	7.50	30.00		0.098	0.098	4.246565	1.3178		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	7.50	7.50	1.8750	3.1928	0.50	200	23.1802	0.738
	24	S-14	S-15	0.49	4.00		0.013	0.723	3.88644	8.9429		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.49	17.56	4.3900	13.3329	0.42	200	21.2450	0.677
		S-15		8.27	53.00		0.172	0.895	3.830484	10.9142		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	8.27	25.83	6.4575	17.3717	0.50	200	23.1802	0.738

Notes:
External Drainage Areas and Pipe Information taken from Meritech Drawing 3023-San (Sanitary Drainage Area Plan, June 11, 2020) for Newman Lands Subdivision

Westwood Village Phase 2

City of Cambridge

SANITARY SEWER DESIGN SHEET

ENGINEERING AND PUBLIC WORKS

Project Number: 02534-800
Date: March 30, 2026
Design By: TRN
Checked By: CJC
File: Q:\02534\800\SAN\02534-800 Sanitary Sewer Design Sheet 03-19-2026.xlsx

Drainage Area Plan No: SA1.1

Design Parameters

Average Daily Flow				Mannings "*n*"	0.0130
Residential	0.00318	L/s/c		Min. Velocity	0.8 m/sec
Resid. Density	3.5	p/unit	(single/semi)	Max. Velocity	3.0 m/sec
	3.0	p/unit	(towns)	Residential Harmon Peaking Factor (F)	
Commercial	1.5	L/s/ha		Residential Areas Infiltration	0.25 L/s/ha
Industrial	1.0	L/s/ha		Extraneous Flow - Infiltration	2.03L/mm.dia/100m/hr.
Inst. / School	2.5	L/s/ha			

LOCATION				RESIDENTIAL AREAS and POPULATION							SCHOOL, INSTITUTIONAL			COMMERCIAL			INDUSTRIAL				INFILTRATION			DESIGN							ERRORS
											HECTARES AND FLOW OF EACH ZONING																				
											2.50 *L/s/ha*			1.50 *L/s/ha*			1.00 *L/s/ha*													
STREET	AREA NO.	MANHOLE LOCATION FROM MH	MANHOLE LOCATION TO MH	0.003 L/s/person AREA	DENSITY	POPUL.	CUMMULATIVE AREA	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	% PIPE FULL
				ha	*p/ha*	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*	
Drainage Area to Hallman Lands (South through Newman Drive)																														
To Street B/Newman Drive Intersection																														
	1	1A	2A	0.256	115	0.029	0.26	0.029	4.3560	0.4078		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.26	0.26	0.0640	0.4718	21.9	1.00	200	32.7818	1.044	1.44%
	2	2A	3A	0.350	115	0.040	0.61	0.070	4.2833	0.9492		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.35	0.61	0.1515	1.1007	25.4	0.60	200	25.3927	0.809	4.33%
	3	3A	4A	0.333	115	0.038	0.94	0.108	4.2343	1.4540		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.33	0.94	0.2348	1.6888	26.1	0.60	200	25.3927	0.809	6.65%
	4	4A	5A	0.252	115	0.029	1.19	0.137	4.2036	1.8309		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.25	1.19	0.2978	2.1286	25.9	0.60	200	25.3927	0.809	8.38%
	5	5A	6A	0.234	115	0.027	1.43	0.164	4.1783	2.1774		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.23	1.43	0.3563	2.5337	23.0	0.60	200	25.3927	0.809	9.98%
	6	6A	10A	0.191	115	0.022	1.62	0.186	4.1595	2.4581		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.19	1.62	0.4040	2.8621	25.2	0.60	200	25.3927	0.809	11.27%
	7a			0.275	115	0.032	0.28	0.032	4.3510	0.4376		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.28	0.28	0.0688							
	7b	7A	8A	0.214	200	0.043	0.49	0.074	4.2765	1.0121		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.21	0.49	0.1223	1.1344	49.9	1.00	200	32.7818	1.044	3.46%
	8a			0.227	115	0.026	0.72	0.101	4.2429	1.3564		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.23	0.72	0.1790							
	8b	8A	10A	0.215	200	0.043	0.93	0.144	4.1972	1.9157		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.22	0.93	0.2328	2.1485	51.8	0.60	200	25.3927	0.809	8.46%
	9	7A	12A	0.228	115	0.026	0.23	0.026	4.3638	0.3639		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.23	0.23	0.0570	0.4209	10.7	1.00	200	32.7818	1.044	1.28%
	10	12A	13A	0.158	115	0.018	0.39	0.044	4.3249	0.6105		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.16	0.39	0.0965	0.7070	9.4	0.60	200	25.3927	0.809	2.78%
	11	13A	14A	0.157	115	0.018	0.54	0.062	4.2942	0.8527		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.16	0.54	0.1358	0.9885	23.5	0.60	200	25.3927	0.809	3.89%
	12	14A	16A	0.264	115	0.030	0.81	0.093	4.2523	1.2549		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.26	0.81	0.2018	1.4567	44.8	0.60	200	25.3927	0.809	5.74%
	13	15A	16A	0.303	115	0.035	0.30	0.035	4.3439	0.4813		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.30	0.30	0.0758	0.5571	55.8	1.00	200	32.7818	1.044	1.70%
	14	16A	17A	0.495	200	0.099	1.61	0.099	4.2448	1.3363		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.50	1.61	0.4013	1.7376	72.2	0.60	200	25.3927	0.809	6.84%
	15	17A	18A	0.362	200	0.072	1.97	0.171	4.1717	2.2738		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.36	1.97	0.4918	2.7656	55.8	0.60	200	25.3927	0.809	10.89%
	16	10A	11A	0.107	115	0.012	2.65	0.342	4.0537	4.4045		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.11	2.65	0.6635	5.0680	22.6	0.60	200	25.3927	0.809	19.96%
	17	11A	18A	0.263	115	0.030	2.92	0.372	4.0370	4.7746		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.26	2.92	0.7293	5.5038	54.9	0.60	200	25.3927	0.809	21.67%
	18	18A	19A	0.257	115	0.030	5.14	0.573	3.9431	7.1833		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.26	5.14	1.2853	8.4686	54.3	0.60	200	25.3927	0.809	33.35%
	19b			0.807		0.000	5.95	0.573	3.9431	7.1833		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.81	5.95	1.4870							
	19a	19A	21A	0.272	115	0.031	6.22	0.604	3.9305	7.5514		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.27	6.22	1.5550	9.1064	61.7	0.60	200	25.3927	0.809	35.86%
	20a			0.190		0.000	0.19	0.000	4.5000	0.0000		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.19	0.19	0.0475							
	20b			0.260	115	0.030	0.45	0.030	4.3550	0.4141		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.26	0.45	0.1125							
	20c	20A	21A	0.235	115	0.027	0.69	0.057	4.3030	0.7789		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.24	0.69	0.1713	0.9502	71.1	1.40	200	38.7879	1.235	2.45%
	21	21A	28A	0.126	0	0.000	7.03	0.661	3.9087	8.2171		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.13	7.03	1.7578	9.9749	76.0	0.60	200	25.3927	0.809	39.28%

LOCATION				RESIDENTIAL AREAS and POPULATION							SCHOOL, INSTITUTIONAL			COMMERCIAL			INDUSTRIAL				INFILTRATION			DESIGN						ERRORS
STREET	AREA NO.	MANHOLE LOCATION		0.003 L/s/person			CUMMULATIVE		PEAK FACTOR "F"	PEAK RES. FLOW	HECTARES AND FLOW OF EACH ZONING									TOTALS-C-I FLOW	AREA	CUMUL AREA	INFIL FLOW	TOTAL VOLUME FLOW	LENGTH	SLOPE	PIPE SIZE	CAPACITY	FULL FLOW VELOCITY	% PIPE FULL
		FROM MH	TO MH	AREA	DENSITY	POPUL.	AREA	POPUL.			2.50 *L/s/ha*			1.50 *L/s/ha*			1.00 *L/s/ha*												
											AREA	CUMUL AREA	PEAK FLOW	AREA	CUMUL AREA	PEAK FLOW	AREA	CUMUL AREA	PEAK FLOW										
				ha	*p/ha*	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*	
	23	22A	24A	0.194	115	0.022	0.19	0.022	4.3740	0.3103		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.19	0.19	0.0485	0.3588	21.4	0.60	200	25.3927	0.809	1.41%
	24a			0.327	200	0.065	0.52	0.088	4.2587	1.1878		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.33	0.52	0.1303							
	24b	24A	25A	0.305	115	0.035	0.83	0.123	4.2181	1.6470		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.31	0.83	0.2065	1.8535	75.4	0.60	200	25.3927	0.809	7.30%
	25a			0.338	200	0.068	1.16	0.190	4.1558	2.5160		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.34	1.16	0.2910							
	25b	25A	28A	0.315	115	0.036	1.48	0.227	4.1278	2.9746		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.32	1.48	0.3698	3.3443	90.0	0.60	200	25.3927	0.809	13.17%
	26	27A	28A	0.523	200	0.105	0.52	0.105	4.2382	1.4097		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.52	0.52	0.1308	1.5405	75.9	1.00	200	32.7818	1.044	4.70%
	27	28A	32A	0.129	0	0.000	9.16	0.992	3.8022	11.9977		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.13	9.16	2.2905	14.2882	78.5	0.60	200	25.3927	0.809	56.27%
	22	22A	29A	0.317	115	0.036	0.32	0.036	4.3405	0.5032		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.32	0.32	0.0793	0.5824	63.6	1.00	200	32.7818	1.044	1.78%
	28	29A	30A	0.538	200	0.108	0.86	0.144	4.1967	1.9225		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.54	0.86	0.2138	2.1362	85.8	0.60	200	25.3927	0.809	8.41%
	29	30A	32A	0.675	200	0.135	1.53	0.279	4.0917	3.6310		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.68	1.53	0.3825	4.0135	90.0	0.60	200	25.3927	0.809	15.81%
	31	31A	32A	0.550	200	0.110	0.55	0.110	4.2320	1.4804		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.55	0.55	0.1375	1.6179	79.3	2.55	200	52.3483	1.667	3.09%
	33	32A	Ex. 2A	0.127	0	0.000	11.37	1.381	3.7052	16.2755		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.13	11.37	2.8423	19.1178	72.3	0.60	200	25.3927	0.809	75.29%
To Street A/Newman Drive Intersection																														
	34	15A	35A	0.066	115	0.008	0.07	0.008	4.4254	0.1068		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.07	0.07	0.0165	0.1233	11.3	1.00	200	32.7818	1.044	0.38%
	35	35A	36A	0.207	115	0.024	0.27	0.031	4.3515	0.4344		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.21	0.27	0.0683	0.5027	29.7	0.60	200	25.3927	0.809	1.98%
	36	36A	37A	0.234	115	0.027	0.51	0.058	4.3007	0.7974		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.23	0.51	0.1268	0.9242	49.2	0.60	200	25.3927	0.809	3.64%
	37	37A	38A	0.653	115	0.075	1.16	0.133	4.2072	1.7847		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.65	1.16	0.2900	2.0747	90.0	0.60	200	25.3927	0.809	8.17%
	38	38A	40A	0.213	115	0.024	1.37	0.158	4.1837	2.1007		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.21	1.37	0.3433	2.4439	18.6	0.60	200	25.3927	0.809	9.62%
	39	40A	41A	0.389	115	0.045	1.76	0.203	4.1460	2.6715		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.39	1.76	0.4405	3.1120	54.2	0.60	200	25.3927	0.809	12.26%
	40	20A	41A	0.230	200	0.046	0.23	0.046	4.3219	0.6322		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.23	0.23	0.0575	0.6897	48.8	1.00	200	32.7818	1.044	2.10%
	41	41A	42A	0.195	200	0.039	2.19	0.288	4.0862	3.7375		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.20	2.19	0.5468	4.2843	41.8	0.50	250	42.0285	0.857	10.19%
	42a			0.462	115	0.053	2.65	0.341	4.0543	4.3933		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.46	2.65	0.6623							
	42b	42A	45A	0.284	200	0.057	2.93	0.398	4.0234	5.0866		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.28	2.93	0.7333	5.8198	102.0	0.50	250	42.0285	0.857	13.85%
	43	45A	46A	0.349	115	0.040	3.28	0.438	4.0033	5.5720		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.35	3.28	0.8205	6.3925	68.5	0.50	250	42.0285	0.857	15.21%
	44	46A	49A	0.683	115	0.079	3.97	0.516	3.9670	6.5125		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.68	3.97	0.9913	7.5037	65.2	0.50	250	42.0285	0.857	17.85%
	45	49A	55A	0.505	115	0.058	4.47	0.574	3.9425	7.2003		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.51	4.47	1.1175	8.3178	64.6	0.50	250	42.0285	0.857	19.79%
	46	45A	52A	0.195	115	0.022	0.20	0.022	4.3737	0.3119		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.20	0.20	0.0488	0.3606	46.8	1.00	200	32.7818	1.044	1.10%
	47	27A	26A	0.385	200	0.077	0.39	0.077	4.2729	1.0463		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.39	0.39	0.0963	1.1425	49.1	1.00	200	32.7818	1.044	3.49%
	48	26A	51A	0.454	200	0.091	0.84	0.168	4.1749	2.2277		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.45	0.84	0.2098	2.4375	49.9	0.60	200	25.3927	0.809	9.60%
	49	51A	52A	0.454	200	0.091	1.29	0.259	4.1052	3.3759		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.45	1.29	0.3233	3.6992	65.0	0.60	200	25.3927	0.809	14.57%
	50	52A	54A	0.346	115	0.040	1.83	0.321	4.0659	4.1480		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.35	1.83	0.4585	4.6065	69.4	1.00	200	32.7818	1.044	14.05%
	51	31A	53A	0.557	200	0.111	0.56	0.111	4.2304	1.4986		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.56	0.56	0.1393	1.6379	70.8	1.00	200	32.7818	1.044	5.00%
	52	53A	54A	0.677	200	0.135	1.23	0.247	4.1133	3.2282		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.68	1.23	0.3085	3.5367	90.0	0.60	200	25.3927	0.809	13.93%
	53	54A	55A	0.346	200	0.069	3.41	0.637	3.9179	7.9340		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.35	3.41	0.8535	8.7875	78.5	0.60	200	25.3927	0.809	34.61%
	54	55A	Ex. 12A	0.285	115	0.033	8.17	1.244	3.7369	14.7817		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.29	8.17	2.0423	16.8239	81.1	0.50	250	42.0285	0.857	40.03%
Drainage Area to Newman Lands (North through Newman Drive)																														
	EXT. 1	1A	Ex. 15A	1.476	115	0.170	1.48	0.170	4.1732	2.2526		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	1.48	1.48	0.3690	2.6216	136.4	0.60	200	25.3927	0.809	10.32%
	EXT. 2	29A	53A	0.719	115	0.083	0.72	0.083	4.2653	1.1215		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.72	0.72	0.1798	1.3013	102.5	0.60	200	25.3927	0.809	5.12%

SANITARY SEWER CATCHMENT AREAS

MTE
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PROJ. NO.	02534-800
DATE	Apr.01/26
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BY	Taylor Numan
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February 1, 2021 — 7:42 p.m. — Plotted By: CCarre

Appendix D

Water Distribution Report

Westwood Village Community (Phase 2)
Brian Domm Subdivision
Hallman Subdivision

Preliminary Water Distribution Report

Project Location:

North of Blenheim Road, West of Newman Drive
City of Cambridge

Prepared for:

Brian Domm
and
Hallman Construction Limited
c/o Paul Grespan
539 Riverbend Drive
Kitchener, ON N2K 3S3

Prepared by:

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

April 2, 2026

MTE File No.: 02534-800

Engineers, Scientists, Surveyors.

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Appendix C Usage Rates, Water Demands, and Design Values
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1.0 INTRODUCTION

1.1 Overview

MTE Consultants Inc. (MTE) was retained by Hallman Construction Limited (Hallman) and Brian Domm (Domm) to complete a Preliminary Water Distribution Analysis in support of an Official Plan Amendment (OPA), Draft Plan of Subdivision (DPS), and Zoning By-law Amendment (ZBA) applications. Although separate subdivisions are proposed for each property, the lands have been comprehensively evaluated together to ensure a coordinated approach to the design and development of the Hallman and Domm lands.

The Hallman and Domm lands will ultimately be located in the City of Cambridge (after annexation from the Township of North Dumfries), and are immediately adjacent to a comprehensively planned community commonly referred to as “Westwood Village – Phase 1”. The lands owned by Hallman and Domm are generally in the northwestern portion of the Westwood Village Community. Refer to Error! Reference source not found. for more details. These lands represent the logical extension and second phase of the Westwood Village Community. For the purpose of this report, the two Draft Plans will be reviewed as one cohesive development herein referred to as the ‘subject lands’.

The subject lands comprise a total area of approximately 31.50ha, of which 19.44ha represents the Hallman property and 12.06ha represents the Domm property. Development plans for the subject lands include the construction of street-oriented residential units, a multiple residential block, park lands, the required roads, municipal services (storm, sanitary, and water), and open spaces. A Draft Plan of Subdivision (dated March 25, 2026) has been prepared by MHBC Planning for both proposed developments and form the basis of this report. The consolidated Draft Plan has been included in **Appendix A**.

The purpose of this Preliminary Water Distribution Analysis is to confirm that adequate pressure and water supply is available to support the proposed developments through connections to the existing water distribution network. This analysis will consider the entire water distribution network for the Westwood Village Community and be used to determine the pipe sizes for the proposed internal water distribution network. The guidelines for the minimum and maximum pressures within the developments, under various demand scenarios including fire flows, are set out by the Ministry of the Environment, Conservation and Parks (MECP), Region of Waterloo (Region), and the City of Cambridge (City).

1.2 Background Information

A Master Environmental Servicing Plan (MESP) was undertaken for the Cambridge West Community by the City of Cambridge and area landowners. The MESP was completed in November 2013 and approved by City Council on March 17, 2014. The purpose of the MESP was to guide the development of the remaining designated greenfield lands on the west side of the City. The MESP integrated environmental, servicing, transportation, and land use planning components to provide the basis for the preparation of a Community Plan for the Cambridge West Area, and for the preparation and processing of the future development applications.

The MESP outlined preliminary water demands, servicing, system pressures, and recommendations. Key recommendations for the development included a 300mm diameter north-south watermain spine from Bismark Drive to Freure Drive, and the construction of a check valve between pressure zones CAM 1 and CAM 3 at the intersection of Bismark Drive and Blair Road (refer to the Region's Technical Memo: *"Sizing of Mains and Distribution Operations in CAM 3"* – Stantec, June 2012 for additional details). These recommendations were primarily to provide adequate fire flow for the existing St. Augustine Catholic School to the northeast, which currently represents the highest fire flow requirement in the area.

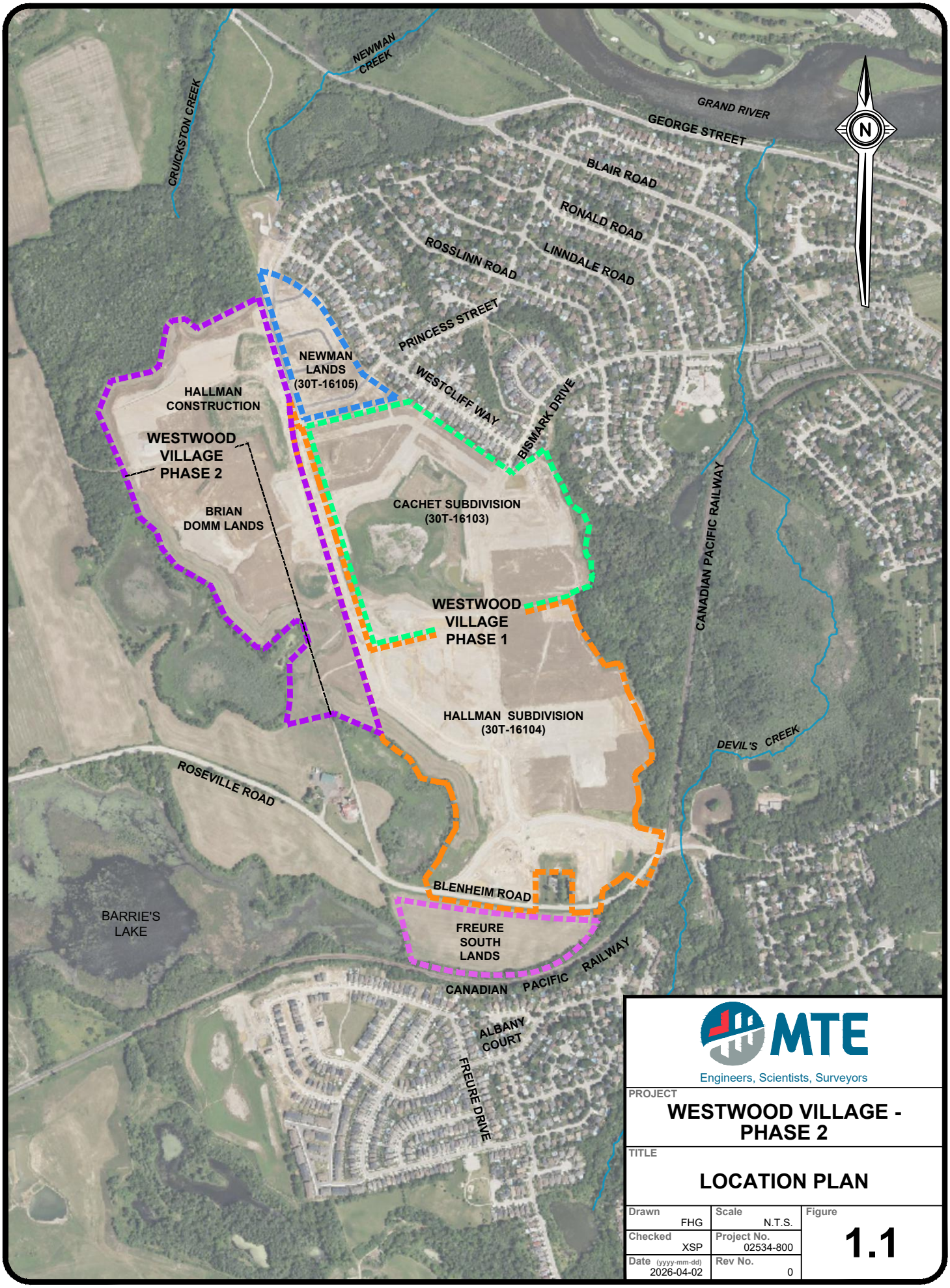
A Water Distribution Analysis was completed by MTE, dated July 27, 2021, for the Westwood Village Community – Cachet Subdivision (30T-16103) and Hallman Subdivision (30T-16104). This report and analysis included the additional Phase 2 lands. Assumptions were made, based on unit counts from the most current MHBC Draft Plans available at the time, to estimate the demand requirements for the subject lands. The internal water distribution network for the Phase 2 lands was modelled concurrently with the network required for the entire Westwood Village Community lands. The conclusions and recommendations that arose from the aforementioned analysis will be reiterated within this report, with the only changes (if any) being attributed to minor revisions to the Westwood Village Phase 2 Draft Plans.

1.3 Macro Water Distribution System Overview

The subject lands will be serviced from the City of Cambridge's Water Pressure Zone 3 (CAM 3). Zone CAM 3 currently services the southwestern area of Cambridge, west of Cambridge Pressure Zone 1 (CAM 1), where the ground elevation ranges from approximately 288.0m to 329.0m.

The current average operating hydraulic grade line (HGL) in CAM 3 is approximately 365.8m. As such, any development with a finished road elevation below 308.00m may require individual pressure reducing valves (PRVs) on water services, in accordance with Section B.2.4.7 of the *Design Guidelines and Supplemental Specifications for Municipal Services (DGSSMS)* (Region, 2026). Proposed elevations within the subject lands are above 312.90m, so the need for PRVs is not anticipated.

The subdivision demands were incorporated into the Region's model and the results of the modelling simulation can be found in **Appendix B**.



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PROJECT
WESTWOOD VILLAGE - PHASE 2

TITLE
LOCATION PLAN

Drawn: FHG	Scale: N.T.S.	Figure: 1.1
Checked: XSP	Project No.: 02534-800	
Date (yyyy-mm-dd): 2026-04-02	Rev No.: 0	

2.0 ANALYSIS METHODOLOGY

2.1 Micro Water Distribution System Model Development

The Bentley water distribution system analysis program (WaterCAD Connect Edition) was utilized for the analysis of this study. The network used for the analysis was developed by assigning physical parameters to each node and pipe. The model utilizes proposed demands for the build-out of the entire Westwood Village Community development, while focusing on the latest revised parameters and results for the Phase 2 lands. Refer to **Figure 2.1** for the proposed model of the water distribution network.

2.1.1 Network Connections

The water distribution network for the Westwood Village Community (including both Phase 1 and Phase 2 lands) was previously modelled as part of the final design process for the Hallman Subdivision (30T-16104) and the Cachet Subdivision (30T-16103), as documented in the *Westwood Village Community – Water Distribution Report, MTE, dated July 27, 2021.* The model included four external connection points to the existing municipal water distribution system:

- 300mm diameter – Bismark Drive and Westcliff Way
- 300mm diameter – Freure Drive (south of the CPR tracks)
- 300mm diameter – Realigned Blenheim Road
- 200mm diameter – Newman Drive and Westcliff Way

This approach was taken to assess system performance under ultimate build-out conditions and confirm that adequate flows and pressures are available to support the entire community.

Since then, municipal services have been constructed within the Phase 1 lands, including a 200mm / 300mm diameter watermain along Newman Drive (frontage of the subject lands).

Updated modelling has been completed for the subject lands only, based on the proposed Draft Plans which include approximately 289 single family dwellings, 330 townhomes, and 240 multiple residential units. The subject lands are proposed to connect to the existing water distribution system along Newman Drive in four locations, with 200mm watermain connections at Street A (north and south), Street B, and Street D.

2.1.2 System Pressure

The system pressure information for this analysis is based on the Region's nodal information provided by Kevin Dolishny on June 25, 2021. The Regional nodes used are as follows:

- JCT_12800 – Intersection of Westcliffe Way and Newman Drive.
- JCT_12518 – Intersection of Westcliffe Way and Bismark Drive.
- JCT_12240 – End of Freure Drive.
- JCT_39051 – Blenheim Road, east of CP Railway at Sawmill Property.

Refer to **Figure 2.1** for the location of the Regional nodes used in the model. Hydraulic grade lines were determined for the average day, maximum day, peak hour, minimum hour, and maximum day plus fire flow scenarios. **Table 2.1 to** Error! Reference source not found. provide a summary of the hydraulic grade lines used for the nodes in the analysis.

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WATERMAIN LEGEND

- PROPERTY BOUNDARY
- SUBJECT LANDS (DRAFT PLAN LIMITS)
- LIMIT OF WETLAND
- LIMIT OF WETLAND BUFFER
- FLOODLINE LIMIT
- EX. WATERMAIN
- 200mmØ WTM / 300mmØ WTM — PROPOSED WATERMAIN
- EX. 200mmØ WTM. / EX. 300mmØ WTM. — EXISTING WATERMAIN
- JUNCTION CONTRIBUTING AREAS
- J5 — PROPOSED DEMAND NODE
- J5 — EXISTING DEMAND NODE

REG NODE 12518
REG NODE 39051
REG NODE 12800
REG NODE 12240
J100 J101 J102 J103 J104 J105 J106 J107 J108 J109 J110 J111 J112 J113 J114 J115
J200 J201 J202 J203 J204 J205 J206 J207 J208 J209 J210 J212 J213 J214 J215 J216 J217 J218 J219 J220 J221 J222 J223 J224 J225 J226 J227
J300 J301 J302 J303
J500 J501 J502 J503 J504 J505 J506 J507 J508 J509 J510 J511 J512 J513 J514 J515 J516 J517 J518
J519 J520 J521
J400 J268

GRANDVIEW HILLS SUBDIVISION
NEWMAN LANDS (30T-16105)
CACHET SUBDIVISION (30T-16103)
HALLMAN SUBDIVISION (30T-16104)
HALLMAN SUBDIVISION
BRIAN DOMM SUBDIVISION
FREURE SOUTH LANDS
EXISTING CHLORINATION & METERING STATION
FREURE DR. CONNECTION
SWM FACILITY #2
SWM FACILITY #3
SWM FACILITY #4
EX. NEWMAN DRIVE SWM FACILITY
WETLAND 2
WETLAND 3
WETLAND 4
WETLAND 5
BISMARK DRIVE
NEWMAN DRIVE
BLACKLOCK STREET
BLACKBURN STREET
CROSSMORE CRESCENT
STEARMAN STREET
WESTCLIFF WAY
DOMM LANE
PRINCESS STREET
ROSECLIFF CRESCENT
HALE CRESCENT
WILKINSON AVENUE
RIVERGREEN CRESCENT
PILKINGTON WAY
FOXLEIGH STREET
LANGRIDGE WAY
SANDSTONE STREET
QUEENSBROOK CRESCENT
REALIGNED BLENHEIM ROAD
DEVIL'S CREEK
CANADIAN PACIFIC RAILWAY
ROSEVILLE ROAD
FREURE DRIVE
STREET A
STREET B
STREET C
STREET D
STREET E
STREET F
STREET G

0 50 100 150 200 250m

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PROJECT
WESTWOOD VILLAGE - PHASE 2

TITLE
WATER DISTRIBUTION PLAN

Drawn	Scale	Figure
BDS	1:5,000	2.1
Checked: CJC	Project No.: 02534-800	
Date (yyyy-mm-dd): 2026-04-02	Rev No.: 0	

Table 2.1 – System Pressures for JCT_12800

Demand Scenario	Discharge (L/s)	HGL (m)	Head (m)
Initial	0.00	365.50	56.50
Minimum Hour	1.58	365.33	56.33
Average Day	2.55	363.48	54.48
Maximum Day	4.94	362.93	53.93
Peak Hour	8.72	359.24	50.24
Max Day + 40.0L/s Fire Flow	44.94	359.80	50.80
Max Day + 80.0L/s Fire Flow	84.94	353.10	44.10
Max Day + 120.0L/s Fire Flow	124.94	343.60	34.60
Max Day + 160.0L/s Fire Flow	164.94	331.40	22.40
Max Day + 170.0L/s Fire Flow	174.94	327.90	18.90

Table 2.2 – System Pressures for JCT_12518

Demand Scenario	Discharge (L/s)	HGL (m)	Head (m)
Initial	0.00	365.50	58.50
Minimum Hour	0.67	365.34	58.34
Average Day	1.09	363.48	56.48
Maximum Day	2.11	362.95	55.95
Peak Hour	3.72	359.29	52.29
Max Day + 40.0L/s Fire Flow	42.11	360.00	53.00
Max Day + 80.0L/s Fire Flow	82.11	354.70	47.70
Max Day + 120.0L/s Fire Flow	122.11	347.30	40.30
Max Day + 160.0L/s Fire Flow	162.11	337.90	30.90
Max Day + 182.8L/s Fire Flow	184.91	330.10	23.10

Table 2.3 – System Pressures for JCT_12240

Demand Scenario	Discharge (L/s)	HGL (m)	Head (m)
Initial	0.00	365.50	45.50
Minimum Hour	0.70	365.28	45.28
Average Day	1.14	363.69	43.69
Maximum Day	1.77	362.79	42.79
Peak Hour	2.84	360.10	40.10
Max Day + 40.0L/s Fire Flow	41.77	361.00	41.00
Max Day + 80.0L/s Fire Flow	81.77	357.30	37.30
Max Day + 120.0L/s Fire Flow	121.77	352.30	32.30
Max Day + 160.0L/s Fire Flow	161.77	345.90	25.90
Max Day + 220.0L/s Fire Flow	221.77	334.00	14.00

Table 2.4 – System Pressures for JCT_39051

Demand Scenario	Discharge (L/s)	HGL (m)	Head (m)
Initial	0.00	365.50	61.00
Minimum Hour	1.31	365.32	60.82
Average Day	1.95	363.72	59.22
Maximum Day	3.68	363.11	58.61
Peak Hour	5.39	359.65	55.15
Max Day + 30.0L/s Fire Flow	33.68	360.90	56.40
Max Day + 90.0L/s Fire Flow	93.68	352.80	48.30
Max Day + 150.0L/s Fire Flow	153.68	340.10	35.60
Max Day + 180.0L/s Fire Flow	183.68	332.10	27.60
Max Day + 210.0L/s Fire Flow	213.68	323.90	19.40

2.2 Design Criteria

The water network for the analysis was developed by assigning physical parameters to each node and pipe within the proposed ultimate build-out of the development. The model was run under five demand scenarios (average day, minimum hour, maximum day, peak hour, and maximum day plus fire flow) and each was checked against design guidelines for pressure, velocity, and fire flow availability. The parameters and criteria are outlined below.

2.2.1 Unit Count and Population

The population per unit modelled for the development was based on 3.25 persons per unit (medium density), 2.44 persons per unit (high density), and 1.77 persons per unit (apartment), as specified in the Region's *2025 Water and Wastewater Monitoring Report*. These densities are listed below in **Table 2.5**.

Table 2.5 – Population Densities

Structure Type	PPU
Single, detached	3.25
Townhouse	2.44
Apartment	1.77

The Draft Plan of Subdivision for the subject lands (dated March 25, 2026), were used to determine the number of residential and multi-residential units assigned to each node in the model. The total unit count and corresponding densities listed above were then used to estimate a total population of 2,169 people for the subject lands. Additional details on unit counts and the population estimate are provided in the Demand Calculations in **Appendix C**.

2.2.2 System Demands

System demands for the subject lands were based on water usage rates of 227.7L/person/day from the *Tri-City Water Distribution Master Plan Final Report* (AECOM, 2009). Using the usage rate, residential water demands were calculated from the number of units contributing to each node within the model, multiplied by the number of persons per unit, multiplied by 227.7L/p/d, and then converted to L/s. For the multi-residential block, a separate demand junction was modelled to determine the flow and pressure within the service connection. The usage rates and demand calculations for each node are provided in **Appendix C.**

2.2.3 Peaking Factors

Peaking factors were obtained from Chapter 3 of the *Design Guidelines for Drinking Water Systems* (MOE, 2008) for a population of 3,001-10,000 (based on the population of both Phases). **Table 2.6** summarizes the peaking factors used based on the population estimates from the combined development plans.

Table 2.6 – Peaking Factors

Demand Scenario	Factor
Average Day	1.0
Maximum Day	2.0
Peak Hour	3.0
Minimum Hour	0.5

2.2.4 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:

- Ontario Building Code (*OBC*) – Provincial codes and guidelines published by the Ministry of Municipal Affairs and Housing for the Province of Ontario.
- 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 Ontario Building Code.

The fire demand for the development was determined from the *Water Supply for Public Fire Protection, A Guide to Recommended Practice in Canada (2020), Fire Underwriters Survey (FUS)*. Based on the *FUS* manual, the required fire flow is as follows:

Residential:

- Medium-density, contiguous multi-block townhomes – 8,000L/min (133L/s)
- Medium-density, single family homes < 3.0m separation – 6,000L/min (100L/s)
- Medium-density, single family homes > 3.0m separation – 4,000L/min (67L/s)

Previous modelling for Westwood Village Phase 1 followed the *FUS* guideline fire flow of 133L/s for contiguous multi-block townhomes. Based on recent analyses of the ever-changing building layouts, sizes, and unit configurations, this value may be restrictive for some of the townhouse blocks proposed within the subject lands. As a result, a required fire flow of 150L/s has been applied to townhomes to provide a more conservative assessment of system performance under future conditions. This design fire flow is used in the modelling of the subject lands.

In addition, boundary conditions provided by the Region establish a maximum flow of 217L/s available within the system. As such, the design of the proposed multi-residential block may be restricted by this value. As final building plans are not available at this time, a required fire flow of 200L/s is used for this block until further building details become available.

2.2.5 Friction Factors

As outlined in Section B2.3 of the *DGSSMS*, the watermain shall be designed using the Hazen-Williams friction C-factors listed in **Table 2.7**. A value of 150 for the PVC pipes was used in this analysis.

Table 2.7 – DGSSMS Hazen-Williams C-factors

Material	Factor
PVC/PVCO	150
DI	130
CPP	140
HDPE	140

2.2.6 Minor Losses

Minor Losses are caused by appurtenances and fittings along the length of the pipe in the system. For Phase 1 of the Westwood Village Community, the calculations were provided in the original report, dated (July 27, 2021)**.** For the Newman lands (Huron Creek), Freure, and the subject lands, a conservative K-value of 1.0 was used for all pipes.

2.2.7 Pressure Requirements

As outlined in Section B2.4 of the *DGSSMS*, the pressure guidelines used for all demand scenarios are shown below in **Table 2.8**.

Table 2.8 – 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

The maximum static pressure in the watermain system should not exceed 700kPa (100psi) under any scenario.

2.2.8 Velocity Requirements

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

3.0 RESULTS

The model was run to analyze the pipe sizes, system pressures, and available flows according to the design criteria under the various demands and fire flow scenarios. **Appendix D** 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 well as the maximum pipe velocities for the fire flow scenarios. It should be noted that the following results only pertain to the subject lands. Please refer to the Final Water Distribution Report for Phase 1 of the Westwood Village Community for more details.

3.1 Daily Demand Scenarios

As shown in **Table 3.1**, the proposed water distribution system will be able to adequately provide the required daily water demands within the *DGSSMS*'s 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.

Based on these results, the implementation of PRVs is not required within the subject lands.

Watermains were sized to be 200mm diameter for all streets within the subject lands. The fire flow analysis indicates instances where the pipe velocity exceeds the recommended maximum of 5.0m/s. However, the increase is found in the service stub used to model flow into the multi-residential block. As such, the pipe sizes have not been changed 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.

Table 3.1 – Modelling 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-200	314.47	474.4	473.8	475.0	472.9	133.40	217.00	440.2	1.67	P-77h
J-201	313.81	480.8	480.3	481.5	479.3	100.39	217.00	443.8	1.65	P-17
J-300	311.10	507.3	507.0	508.0	506.5	100.36	217.00	439	3.79	P-77h
J-301	313.05	488.2	487.8	488.9	486.9	100.67	217.00	429.1	2.64	P-77h
J-302	313.70	481.9	481.4	482.5	480.5	133.53	217.00	423.8	2.27	P-77h
J-303	314.55	473.6	473.1	474.2	472.1	133.79	217.00	397.1	3.73	P-83h
J-500	315.34	465.8	465.3	466.5	464.3	150.27	217.00	389.6	2.95	P-74
J-501	314.59	473.1	472.6	473.8	471.7	150.55	217.00	416.3	2.80	P-83
J-502	315.67	462.6	462.1	463.3	461.1	150.67	217.00	354.1	3.56	P-76
J-503	315.06	468.5	468.0	469.2	467.0	150.46	217.00	390.5	2.82	P-73
J-504	314.85	470.6	470.1	471.3	469.1	150.24	217.00	401.6	3.47	P-73
J-505	315.62	463.0	462.5	463.7	461.5	150.33	217.00	353.5	3.80	P-79
J-506	314.98	469.3	468.8	470.0	467.8	150.45	217.00	402.2	2.53	P-82
J-507	315.93	460.0	459.5	460.7	458.5	150.67	217.00	345.9	3.56	P-84
J-508	315.52	464.1	463.5	464.7	462.5	150.45	217.00	384.2	2.64	P-73
J-509	317.21	447.5	447.0	448.2	446.1	100.43	217.00	317.3	3.84	P-59
J-510	316.38	455.6	455.1	456.3	454.1	150.45	217.00	334.1	2.73	P-59
J-511	315.98	459.5	459.0	460.2	458.0	150.41	217.00	343.3	3.08	P-65
J-512	315.40	465.2	464.7	465.9	463.7	150.29	217.00	374.8	3.36	P-81
J-513	316.37	455.7	455.2	456.4	454.2	150.45	217.00	352.5	2.86	P-69
J-514	315.92	460.1	459.6	460.8	458.6	150.31	217.00	377.0	2.95	P-70
J-515	315.40	465.2	464.7	465.9	463.7	100.41	217.00	357.5	3.54	P-71
J-516	316.85	451.0	450.5	451.7	449.5	150.32	217.00	295.1	3.77	P-63
J-517	316.51	454.4	453.9	455.1	452.9	150.42	217.00	320.7	2.67	P-81
J-518	317.30	446.6	446.1	447.3	445.1	100.34	217.00	285.5	3.58	P-67
J-519	314.70	472.1	471.5	472.8	470.5	100.33	217.00	436.2	1.62	P-17
J-520	315.81	461.3	460.7	461.9	459.6	201.54	217.00	306.2	***6.96***	P-87
J-521	314.25	476.5	475.9	477.2	474.9	100.00	217.00	440.1	1.70	P-25

**Cells that are bold and italicized identify pipes in the model where the maximum recommended velocity of 5.0m/s is exceeded.*

4.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the preliminary water distribution analysis, it is concluded that:

- Direct connection to the existing 200mm / 300mm diameter watermain along Newman Drive (MTE Nodes 200, 301, 302, and 519) will adequately service the proposed water distribution network for the Hallman and Domm Subdivisions.
- The proposed water distribution network will adequately provide the required daily water demands within the *DGSSMS* recommended minimum and maximum pressure range guidelines of 350kPa to 550kPa for both the average and maximum day demand scenarios, and 275kPa to 700kPa for the minimum and peak hour demand scenarios for all junctions within the subject lands.
- The installation of pressure reducing valves is not required within the subject lands.
- The pipe sizing for the development is all 200mm diameter. As such, pipe velocities were less than the *DGSSMS* maximum recommended 5.0m/s for most pipes under the fire flow conditions. However, 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 under normal daily demands.
- 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.

All of which is respectfully submitted,

MTE Consultants Inc.

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Design Engineer
519-743-6500
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Design Engineer
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gkorber@mte85.com

https://mte85.sharepoint.com/sites/02534-800/Shared Documents/02 - Reports/MTE Reports/Water Distribution/02534-800_rpt_2026-04-02 Preliminary Water Distribution Report.docx

Appendix A

Draft Plans of Subdivision (Consolidated)

CONSOLIDATED
DRAFT PLANS OF SUBDIVISION

LEGAL DESCRIPTION

PART OF LOTS 13 AND 14, CONCESSION 11
PART OF LOTS 17 AND 18, CONCESSION 12
AND PART OF ROAD ALLOWANCE BETWEEN CONCESSIONS 11 & 12
TOWNSHIP OF NORTH DUMFRIES
REGIONAL MUNICIPALITY OF WATERLOO

OWNER'S CERTIFICATE

I HEREBY AUTHORIZE MACNAUGHTON HERMSEN BRITTON CLARKSON PLANNING LIMITED TO SUBMIT THIS PLAN FOR APPROVAL.

Date: _____

_____
Paul Grespan, Authorized Signing Officer
(Hallman Construction Limited)

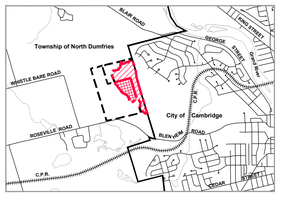
SURVEYOR'S CERTIFICATE

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

Date: _____

_____
Trevor D.A. McNeil, Surveyor, O.L.S.
MTE OLS LTD.

KEY PLAN



Hallman Construction Limited
Brian Domm
Additional Lands Owned by Applicants

Scale: 1:50,000

ADDITIONAL INFORMATION

Required Under Section 51 (17) of the Planning Act, R.S.O., 1990, c.P.13 as Amended

(a) As Shown
(b) As Shown
(c) As Shown
(d) Residential, Multiple Residential, Park, Open Space, Wildlife Corridor
(e) As Shown
(f) As Shown
(g) As Shown
(h) Municipal Water Supply
(i) Loam
(j) As Shown
(k) All Services as Required
(l) As Shown

AREA SCHEDULE - Hallman Construction Limited **30T-_____**

DESCRIPTION	LOTS/BLOCKS	UNITS	AREA
Low Density Residential	1-18	263-369	10.552 ha
Low Density Residential (Consolidation Block)	19,20	26-43	0.644 ha
Multiple Residential	21	125-165	1.852 ha
Park	22		0.339 ha
Open Space	23-25		2.490 ha
Wildlife Corridor	26		0.245 ha
0.3m Reserve	27-32		0.006 ha
Roads			3.309 ha
Total	**32**	**414-577**	**19.437 ha**

AREA SCHEDULE - Brian Domm **30T-_____**

DESCRIPTION	LOTS/BLOCKS	UNITS	AREA
Low Density Residential	1-14	144-207	5.336 ha
Low Density Residential (Consolidation Block)	15,16		0.121 ha
Multiple Residential (Consolidation Block)*	17	60-75*	0.122 ha
Park	18		0.662 ha
Open Space	19,20		3.680 ha
Roads			2.144 ha
Total	**20**	**204-282**	**12.065 ha**

AREA SCHEDULE - Total

DESCRIPTION	LOTS/BLOCKS	UNITS	AREA
Low Density Residential	32	407-576	15.888 ha
Low Density Residential (Consolidation Block)	4	26-43	0.765 ha
Multiple Residential	1	125-165	1.852 ha
Multiple Residential (Consolidation Block)*	1	60-75*	0.122 ha
Park	2		1.001 ha
Open Space	5		6.170 ha
Wildlife Corridor	1		0.245 ha
0.3m Reserve	6		0.006 ha
Roads			5.453 ha
Total	**52**	**618-859**	**31.502 ha**

*Due to multiple block configuration/size, some of the multiple residential units on the Domm Draft Plan of Subdivision are accounted for on the adjacent Hallman Draft Plan of Subdivision

NOTES

1. All dimensions are in metres unless otherwise shown.
2. Topographic Survey Base prepared by MTE.
3. Boundary information prepared by MTE (Plan 58R-22341 dated August 6, 2025)
4. Dripline and Wetland Limits provided by WSP.

Revision No.	Date	Issued / Revision	By

Stamp

Date	March 25, 2026
File No.	0800C
Plan Scale	1:1,250 (30 x 36)
Drawn By	D.G.S./SP
Checked By	D.A.

Project
WESTWOOD PHASE 2
Applicant: Hallman Construction Limited
539 Riverbend Drive
Kitchener, Ontario

File Name
DRAFT PLAN OF SUBDIVISION

Dwg No. 1 of 1

Scale Bar 0 10 25 50 75 100

K:\0800C-Gatestone Developments-North Dumfries Lands\DP\Westwood2 Consolidated Draft Plan 23March2026.dwg

MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE

Appendix B

Region of Waterloo Modelling Simulation Results

Region of Waterloo

TRANSPORTATION AND
ENVIRONMENTAL SERVICES
Water Services
150 Frederick Street 7th Floor
Kitchener Ontario N2G 4J3 Canada
Telephone: 519-575-4400
TTY: 519-575-4608
Fax: 519-575-4452
www.regionofwaterloo.ca

Garett Korber, P.Eng., CET,
Vice President
MTE Consultants Inc.
520 Bingemans Centre Dr.
Kitchener, ON N2B 3X9
t. 519-743-6500 x1292
e. gkorber@mte85.com

Date: June 25, 2021
File #: E18-10/CA

Dear: Garett

Re: Draft comments-Cambridge West System Update with a new spine location including Additional North Dumfries Lands, Cambridge

Please find the results of the modeling simulations for boundary conditions originally requested on December 11th, 2020 with revised demands supplied on Feb 5, 2021. The results include a figure showing the location of the node from the Region's model. Attached are a series of spreadsheets containing results for Average Day, Maximum Day demands and available fire flows at various nodes (see tables for node details) 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. Results will compare 2019 vs 2021 models.

Table 1: Comparison of Nodes 2019 vs 2021

Location	2019 Node Id	Elev (m)	2020 Node Id	Elev (m)
End of Freure Dr	JCT_12240	320.0	JCT_12240	320.0
Westcliffe Way @ Bismark Dr	JCT_12518	307.0	JCT_12518	307.0
Westcliffe Way @ Newman Dr	JCT_12800	309.0	JCT_12800	309.0
New Junction on Blenheim Rd	na	na	JCT_39051	304.5

Table 2: Demands applied to nodes 2019 vs 2021

Node	2019 model				2021 model			
	Ave Day		Max Day		Ave Day		Max Day	
	Res (L/s)	Emp (L/s)	Res L/s)	Emp (L/s)	Res L/s)	Emp (L/s)	Res L/s)	Emp (L/s)
JCT_12240	1.06	0.00	1.53	0.00	1.06	0.00	1.53	0.00
JCT_12518	0.99	0.00	1.97	0.00	1.02	0.00	2.05	0.00
JCT_12800	2.50	0.00	4.99	0.00	2.46	0.00	4.92	0.00
JCT_39051	0.00	0.00	0.00	0.00	1.17	0.64	2.34	1.28
JCT_MTE_J211	4.13	3.46	8.26	6.92	0.00	0.00	0.00	0.00
JCT_MTE_J205	0.00	0.00	0.00	0.00	Renamed JCT_MTE_J207			
JCT_MTE_J207	Old JCT_MTE_J205				3.83	2.85	7.66	5.70
JCT_11362	0.93	0.00	1.34	0.00	0.93	0.00	1.34	0.00
JCT_MTE_J505	3.68	0.00	7.35	0.00	3.60	0.00	7.21	0.00
JCT_MTE_J400	0.99	0.00	1.98	0.00	0.99	0.00	1.98	0.00
JCT_13658	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
JCT_13162	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**14.28**	**3.46**	**27.42**	**6.92**	**15.07**	**3.49**	**29.03**	**6.98**

The demands applied to the 2021 model are only negligibly different from the demands applied to the 2019 model.

Table 3 below summarizes the results from the fire flow analysis for each scenario. 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. Note Options 2+ and 3 both included the upsized internal loop (Cachet loop).

Table 3: Fire Flow Results

Node	Option 1 2021 Model		Option 2+ 2021 Model Sawmill only		Option 3 2021 Model Sawmill + Freure	
	Design Flow (L/s)	Design Pressure (m)	Design Flow (L/s)	Design Pressure (m)	Design Flow (L/s)	Design Pressure (m)
JCT_12240	217.0	14.0	-	-	220.2	14.0
JCT_12518	182.8	23.1	157.8	20.9	196.0	20.8
JCT_12800	168.9	18.9	149.7	16.4	178.6	15.8
JCT_39051	209.7	20.3	189.9	24.8	223.4	26.7

If you have any questions, please contact me.

Kevin Dolishny P.Eng.
Senior Engineer, Servicing and Development Planning
t. 519.575.4757 x 3862
e-mail: kdolishny@regionofwaterloo.ca

cc Nicole Sapeta, Region of Waterloo
Sylvia Rafalski-Misch, Region of Waterloo
Sarah Austin, City of Cambridge
Jeff Martens, MTE
Charles Carre, MTE

CAM 3 Infowater Location: Westcliffe Way @ Newman Dr

JCT_12800 Average Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	1.45	363.70	54.70
01:00 hrs	1.20	364.09	55.09
02:00 hrs	1.50	363.84	54.84
03:00 hrs	1.58	365.33	56.33
04:00 hrs	1.45	363.96	54.96
05:00 hrs	1.38	363.80	54.80
06:00 hrs	1.93	363.92	54.92
07:00 hrs	2.78	363.07	54.07
08:00 hrs	3.18	362.85	53.85
09:00 hrs	2.98	362.97	53.97
10:00 hrs	3.08	362.86	53.86
11:00 hrs	3.08	362.83	53.83
12:00 hrs	2.90	363.01	54.01
13:00 hrs	2.80	363.14	54.14
14:00 hrs	2.60	363.37	54.37
15:00 hrs	2.55	363.48	54.48
16:00 hrs	2.73	363.49	54.49
17:00 hrs	2.88	364.11	55.11
18:00 hrs	3.20	363.80	54.80
19:00 hrs	3.43	363.56	54.56
20:00 hrs	3.48	363.49	54.49
21:00 hrs	3.15	363.71	54.71
22:00 hrs	2.73	363.96	54.96
23:00 hrs	2.05	363.53	54.53
Average Day HGL:		363.58	
Minimum Hour:		365.33	

JCT_12800 Maximum Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	2.49	363.95	54.95
01:00 hrs	1.69	364.42	55.42
02:00 hrs	2.14	363.94	54.94
03:00 hrs	2.89	363.27	54.27
04:00 hrs	2.69	363.50	54.50
05:00 hrs	2.89	363.63	54.63
06:00 hrs	4.39	363.04	54.04
07:00 hrs	6.73	361.37	52.37
08:00 hrs	6.83	361.91	52.91
09:00 hrs	5.43	362.49	53.49
10:00 hrs	4.99	362.96	53.96
11:00 hrs	5.08	363.16	54.16
12:00 hrs	4.94	362.93	53.93
13:00 hrs	4.94	363.12	54.12
14:00 hrs	4.54	363.06	54.06
15:00 hrs	4.29	363.53	54.53
16:00 hrs	5.03	363.01	54.01
17:00 hrs	5.68	361.80	52.80
18:00 hrs	6.38	361.99	52.99
19:00 hrs	7.48	361.14	52.14
20:00 hrs	8.37	359.84	50.84
21:00 hrs	8.72	359.24	50.24
22:00 hrs	6.83	360.50	51.50
23:00 hrs	4.19	362.04	53.04
Maximum Day HGL:		362.49	
Peak Hour:		359.24	

CAM 3 Infowater Location: Westcliffe Way @ Newman Dr

Available Flow (L/s)	Residual Pressure (m)
0.0	54.3
10.0	53.7
20.0	52.9
30.0	51.9
40.0	50.8
50.0	49.4
60.0	47.8
70.0	46.1
80.0	44.1
90.0	42.0
100.0	39.7
110.0	37.3
120.0	34.6
130.0	31.8
140.0	28.8
150.0	25.7
160.0	22.4
170.0	18.9

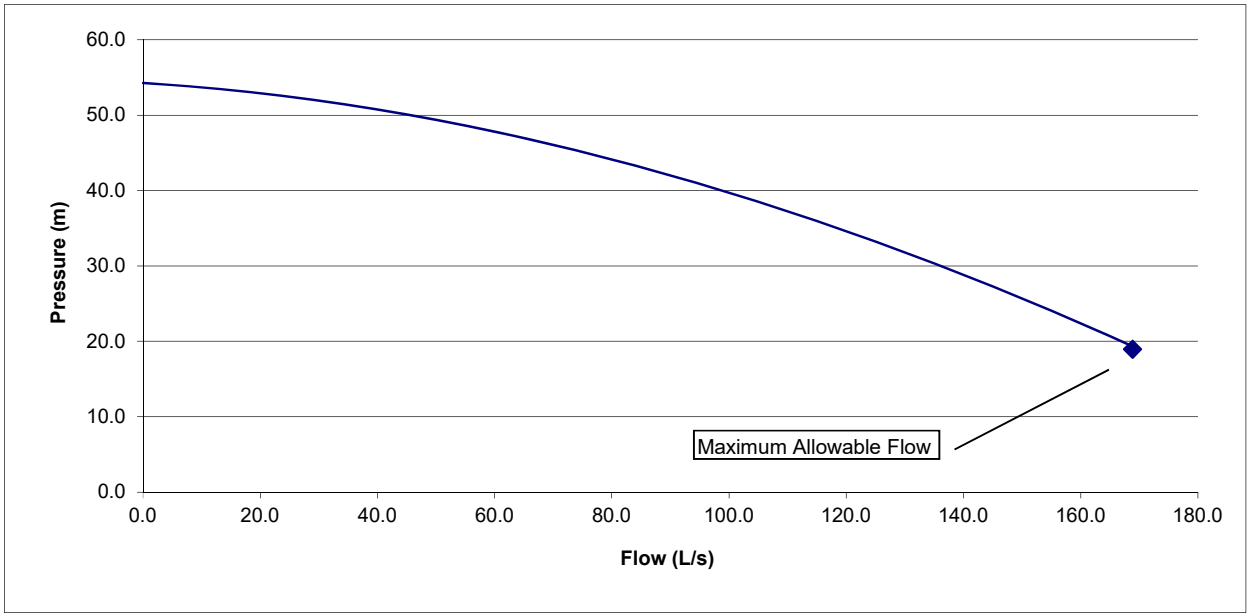
Fire Flow Analysis

Fire Flow Node:	JCT_12800
Design Flow (L/s):	168.9
Design Pressure (m):	18.9

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 3 Infowater Location: Westcliffe Way @ Bismark Dr

JCT_12518 Average Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	0.62	363.70	56.70
01:00 hrs	0.51	364.09	57.09
02:00 hrs	0.64	363.85	56.85
03:00 hrs	0.67	365.34	58.34
04:00 hrs	0.62	363.96	56.96
05:00 hrs	0.59	363.81	56.81
06:00 hrs	0.82	363.92	56.92
07:00 hrs	1.19	363.08	56.08
08:00 hrs	1.36	362.86	55.86
09:00 hrs	1.27	362.97	55.97
10:00 hrs	1.32	362.86	55.86
11:00 hrs	1.32	362.84	55.84
12:00 hrs	1.24	363.02	56.02
13:00 hrs	1.20	363.15	56.15
14:00 hrs	1.11	363.37	56.37
15:00 hrs	1.09	363.48	56.48
16:00 hrs	1.17	363.49	56.49
17:00 hrs	1.23	364.12	57.12
18:00 hrs	1.37	363.80	56.80
19:00 hrs	1.47	363.56	56.56
20:00 hrs	1.49	363.50	56.50
21:00 hrs	1.35	363.71	56.71
22:00 hrs	1.17	363.97	56.97
23:00 hrs	0.88	363.53	56.53
Average Day HGL:		363.58	
Minimum Hour:		365.34	

JCT_12518 Maximum Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	1.06	363.96	56.96
01:00 hrs	0.72	364.42	57.42
02:00 hrs	0.91	363.94	56.94
03:00 hrs	1.23	363.27	56.27
04:00 hrs	1.15	363.50	56.50
05:00 hrs	1.23	363.64	56.64
06:00 hrs	1.87	363.05	56.05
07:00 hrs	2.87	361.40	54.40
08:00 hrs	2.92	361.94	54.94
09:00 hrs	2.32	362.50	55.50
10:00 hrs	2.13	362.98	55.98
11:00 hrs	2.17	363.18	56.18
12:00 hrs	2.11	362.95	55.95
13:00 hrs	2.11	363.13	56.13
14:00 hrs	1.94	363.07	56.07
15:00 hrs	1.83	363.54	56.54
16:00 hrs	2.15	363.02	56.02
17:00 hrs	2.43	361.82	54.82
18:00 hrs	2.72	362.01	55.01
19:00 hrs	3.19	361.17	54.17
20:00 hrs	3.57	359.88	52.88
21:00 hrs	3.72	359.29	52.29
22:00 hrs	2.92	360.53	53.53
23:00 hrs	1.79	362.05	55.05
Maximum Day HGL:		362.51	
Peak Hour:		359.29	

CAM 3 Infowater Location: Westcliffe Way @ Bismark Dr

Available Flow (L/s)	Residual Pressure (m)
0.0	56.1
10.0	55.6
20.0	54.9
30.0	54.0
40.0	53.0
50.0	51.9
60.0	50.6
70.0	49.2
80.0	47.7
90.0	46.0
100.0	44.2
110.0	42.3
120.0	40.3
130.0	38.1
140.0	35.8
150.0	33.4
160.0	30.9
170.0	28.2
180.0	25.4
182.8	23.1

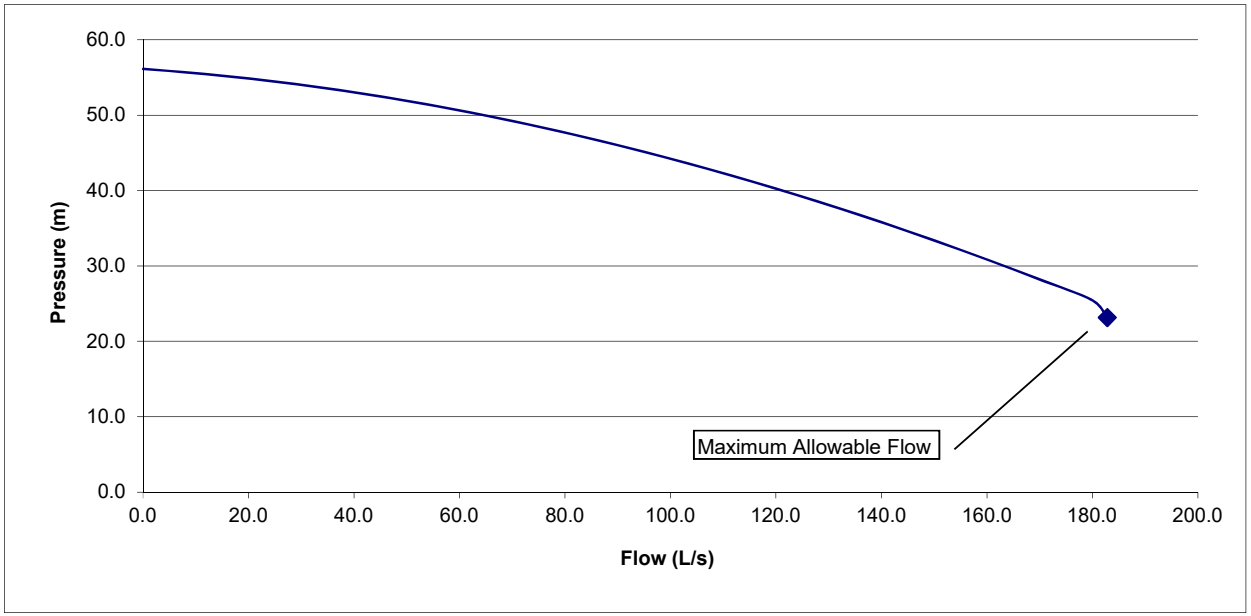
Fire Flow Analysis

Fire Flow Node:	JCT_12518
Design Flow (L/s):	182.8
Design Pressure (m):	23.1

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 3 Infowater Location: End of Freure Dr

JCT_12240 Average Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	0.65	363.63	43.63
01:00 hrs	0.54	363.94	43.94
02:00 hrs	0.67	363.78	43.78
03:00 hrs	0.70	365.28	45.28
04:00 hrs	0.65	363.83	43.83
05:00 hrs	0.62	363.66	43.66
06:00 hrs	0.86	363.91	43.91
07:00 hrs	1.24	363.33	43.33
08:00 hrs	1.42	363.25	43.25
09:00 hrs	1.33	363.31	43.31
10:00 hrs	1.38	363.28	43.28
11:00 hrs	1.38	363.29	43.29
12:00 hrs	1.30	363.38	43.38
13:00 hrs	1.25	363.46	43.46
14:00 hrs	1.16	363.59	43.59
15:00 hrs	1.14	363.69	43.69
16:00 hrs	1.22	363.74	43.74
17:00 hrs	1.29	364.41	44.41
18:00 hrs	1.43	364.23	44.23
19:00 hrs	1.53	364.10	44.10
20:00 hrs	1.56	364.03	44.03
21:00 hrs	1.41	364.08	44.08
22:00 hrs	1.22	364.18	44.18
23:00 hrs	0.92	363.55	43.55
Average Day HGL:		363.79	
Minimum Hour:		365.28	

JCT_12240 Maximum Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	0.81	363.96	43.96
01:00 hrs	0.55	364.41	44.41
02:00 hrs	0.70	363.94	43.94
03:00 hrs	0.94	363.31	43.31
04:00 hrs	0.88	363.52	43.52
05:00 hrs	0.94	363.65	43.65
06:00 hrs	1.43	363.16	43.16
07:00 hrs	2.19	361.77	41.77
08:00 hrs	2.22	362.35	42.35
09:00 hrs	1.77	362.79	42.79
10:00 hrs	1.62	363.19	43.19
11:00 hrs	1.65	363.40	43.40
12:00 hrs	1.60	363.15	43.15
13:00 hrs	1.60	363.35	43.35
14:00 hrs	1.48	363.24	43.24
15:00 hrs	1.39	363.68	43.68
16:00 hrs	1.64	363.23	43.23
17:00 hrs	1.85	362.14	42.14
18:00 hrs	2.07	362.40	42.40
19:00 hrs	2.43	361.71	41.71
20:00 hrs	2.72	360.61	40.61
21:00 hrs	2.84	360.10	40.10
22:00 hrs	2.22	360.96	40.96
23:00 hrs	1.36	362.16	42.16
Maximum Day HGL:		362.76	
Peak Hour:		360.10	

CAM 3 Infowater Location: End of Freure Dr

Available Flow (L/s)	Residual Pressure (m)
0.0	43.2
10.0	42.8
20.0	42.3
30.0	41.7
40.0	41.0
50.0	40.2
60.0	39.3
70.0	38.4
80.0	37.3
90.0	36.2
100.0	35.0
110.0	33.7
120.0	32.3
130.0	30.8
140.0	29.2
150.0	27.6
160.0	25.9
170.0	24.1
180.0	22.3
190.0	20.3
200.0	18.3
210.0	16.2
220.0	14.0

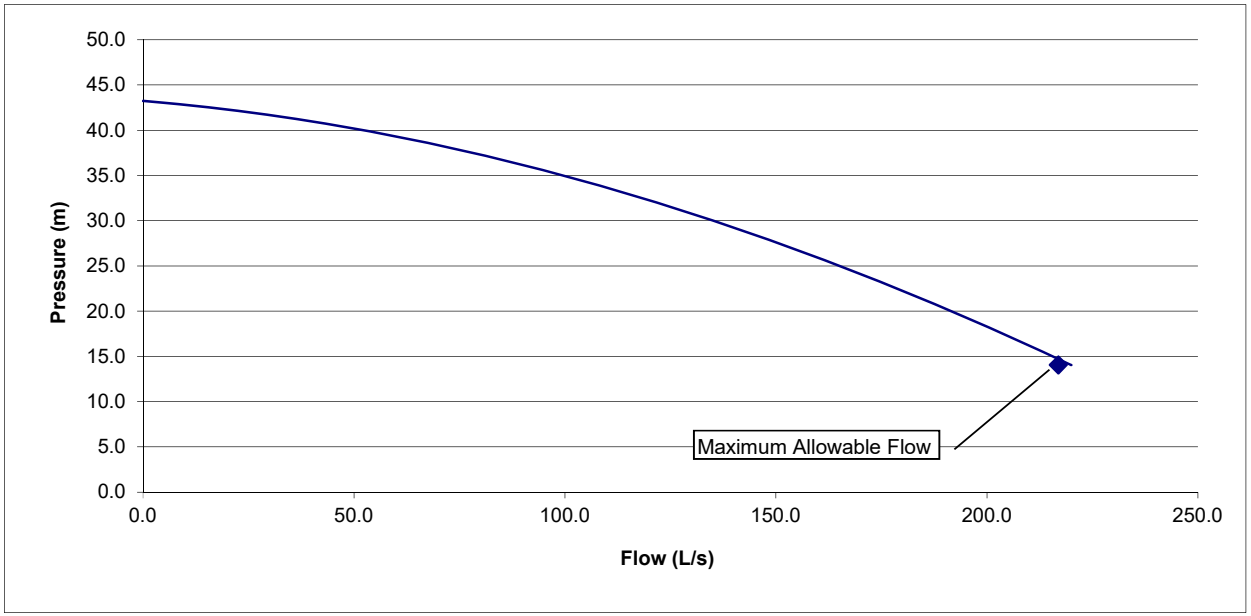
Fire Flow Analysis

Fire Flow Node:	JCT_12240
Design Flow (L/s):	217.0
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 3 Infowater Location: Blenheim Rd at new connection

JCT_39051 Average Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	1.39	363.68	59.18
01:00 hrs	1.27	364.06	59.56
02:00 hrs	1.38	363.82	59.32
03:00 hrs	1.31	365.32	60.82
04:00 hrs	1.11	363.93	59.43
05:00 hrs	1.10	363.78	59.28
06:00 hrs	1.41	363.91	59.41
07:00 hrs	1.97	363.08	58.58
08:00 hrs	2.01	362.86	58.36
09:00 hrs	2.06	362.97	58.47
10:00 hrs	2.18	362.87	58.37
11:00 hrs	2.25	362.84	58.34
12:00 hrs	2.19	363.01	58.51
13:00 hrs	2.14	363.15	58.65
14:00 hrs	2.04	363.37	58.87
15:00 hrs	2.04	363.48	58.98
16:00 hrs	2.02	363.49	58.99
17:00 hrs	2.00	364.11	59.61
18:00 hrs	2.05	363.81	59.31
19:00 hrs	2.08	363.57	59.07
20:00 hrs	2.03	363.51	59.01
21:00 hrs	1.95	363.72	59.22
22:00 hrs	1.86	363.97	59.47
23:00 hrs	1.62	363.52	59.02
Average Day HGL:		363.58	
Minimum Hour:		365.32	

JCT_39051 Maximum Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	2.39	363.95	59.45
01:00 hrs	2.19	364.41	59.91
02:00 hrs	2.45	363.94	59.44
03:00 hrs	2.78	363.28	58.78
04:00 hrs	2.40	363.50	59.00
05:00 hrs	2.05	363.64	59.14
06:00 hrs	2.92	363.09	58.59
07:00 hrs	3.93	361.56	57.06
08:00 hrs	4.18	362.12	57.62
09:00 hrs	4.16	362.62	58.12
10:00 hrs	3.76	363.06	58.56
11:00 hrs	3.79	363.27	58.77
12:00 hrs	3.80	363.03	58.53
13:00 hrs	3.93	363.22	58.72
14:00 hrs	3.67	363.14	58.64
15:00 hrs	3.46	363.60	59.10
16:00 hrs	3.68	363.11	58.61
17:00 hrs	4.38	361.95	57.45
18:00 hrs	4.35	362.18	57.68
19:00 hrs	4.56	361.41	56.91
20:00 hrs	5.13	360.20	55.70
21:00 hrs	5.39	359.65	55.15
22:00 hrs	4.33	360.72	56.22
23:00 hrs	3.21	362.09	57.59
Maximum Day HGL:		362.61	
Peak Hour:		359.65	

CAM 3 Infowater Location: Blenheim Rd at new connection

Available Flow (L/s)	Residual Pressure (m)
0.0	58.6
10.0	58.0
20.0	57.3
30.0	56.4
40.0	55.4
50.0	54.2
60.0	52.9
70.0	51.5
80.0	49.9
90.0	48.3
100.0	46.4
110.0	44.5
120.0	42.5
130.0	40.3
140.0	38.0
150.0	35.6
160.0	33.0
170.0	30.4
180.0	27.6
190.0	24.7
200.0	21.7
210.0	19.4

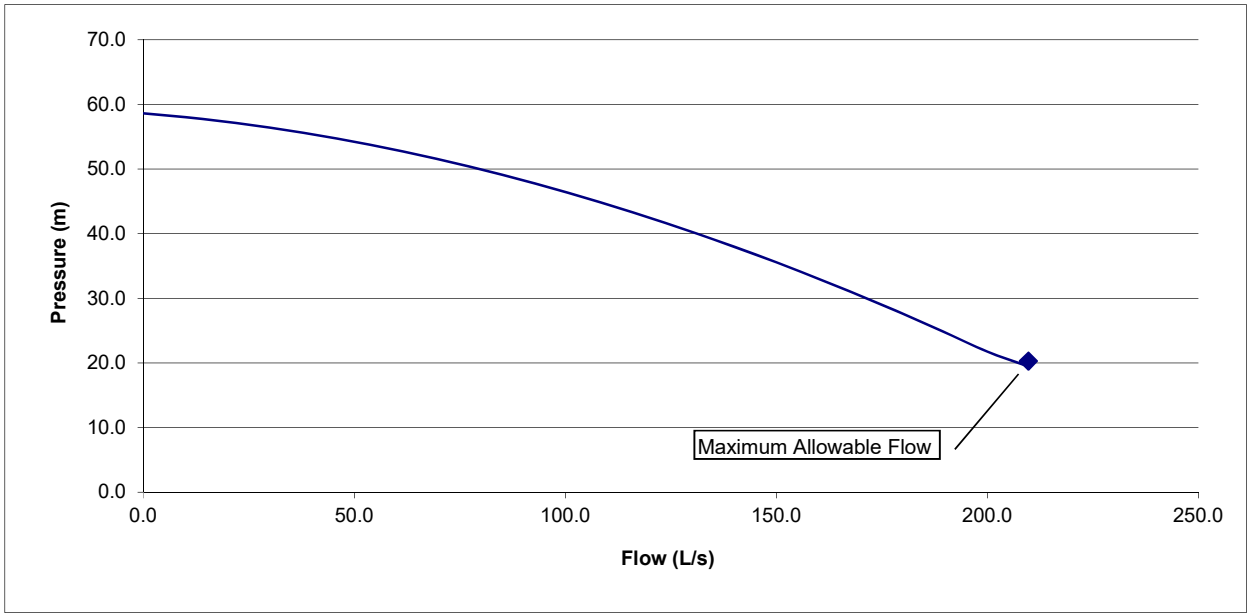
Fire Flow Analysis

Fire Flow Node:	JCT_39051
Design Flow (L/s):	209.7
Design Pressure (m):	20.3

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 3 Infowater Location: Westcliffe Way @ Newman Dr

JCT_12800 Average Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	1.45	363.67	54.67
01:00 hrs	1.20	364.00	55.00
02:00 hrs	1.50	363.82	54.82
03:00 hrs	1.58	365.26	56.26
04:00 hrs	1.45	363.88	54.88
05:00 hrs	1.38	363.71	54.71
06:00 hrs	1.93	363.93	54.93
07:00 hrs	2.78	363.27	54.27
08:00 hrs	3.18	363.15	54.15
09:00 hrs	2.98	363.22	54.22
10:00 hrs	3.08	363.17	54.17
11:00 hrs	3.08	363.17	54.17
12:00 hrs	2.90	363.28	54.28
13:00 hrs	2.80	363.38	54.38
14:00 hrs	2.60	363.54	54.54
15:00 hrs	2.55	363.64	54.64
16:00 hrs	2.73	363.67	54.67
17:00 hrs	2.88	364.35	55.35
18:00 hrs	3.20	364.13	55.13
19:00 hrs	3.43	363.96	54.96
20:00 hrs	3.48	363.89	54.89
21:00 hrs	3.15	363.99	54.99
22:00 hrs	2.73	364.14	55.14
23:00 hrs	2.05	363.54	54.54
Average Day HGL:		363.74	
Minimum Hour:		365.26	

JCT_12800 Maximum Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	2.49	363.94	54.94
01:00 hrs	1.69	364.42	55.42
02:00 hrs	2.14	363.92	54.92
03:00 hrs	2.89	363.22	54.22
04:00 hrs	2.69	363.47	54.47
05:00 hrs	2.89	363.61	54.61
06:00 hrs	4.39	362.93	53.93
07:00 hrs	6.73	361.00	52.00
08:00 hrs	6.83	361.51	52.51
09:00 hrs	5.43	362.22	53.22
10:00 hrs	4.99	362.76	53.76
11:00 hrs	5.08	362.95	53.95
12:00 hrs	4.94	362.73	53.73
13:00 hrs	4.94	362.90	53.90
14:00 hrs	4.54	362.90	53.90
15:00 hrs	4.29	363.40	54.40
16:00 hrs	5.03	362.81	53.81
17:00 hrs	5.68	361.45	52.45
18:00 hrs	6.38	361.61	52.61
19:00 hrs	7.48	360.63	51.63
20:00 hrs	8.37	359.16	50.16
21:00 hrs	8.72	358.48	49.48
22:00 hrs	6.83	360.09	51.09
23:00 hrs	4.19	361.93	52.93
Maximum Day HGL:		362.25	
Peak Hour:		358.48	

CAM 3 Infowater Location: Westcliffe Way @ Newman Dr

Available Flow (L/s)	Residual Pressure (m)
0.0	54.1
10.0	53.3
20.0	52.2
30.0	50.9
40.0	49.3
50.0	47.5
60.0	45.4
70.0	43.1
80.0	40.5
90.0	37.7
100.0	34.7
110.0	31.4
120.0	28.0
130.0	24.3
140.0	20.4
150.0	16.3

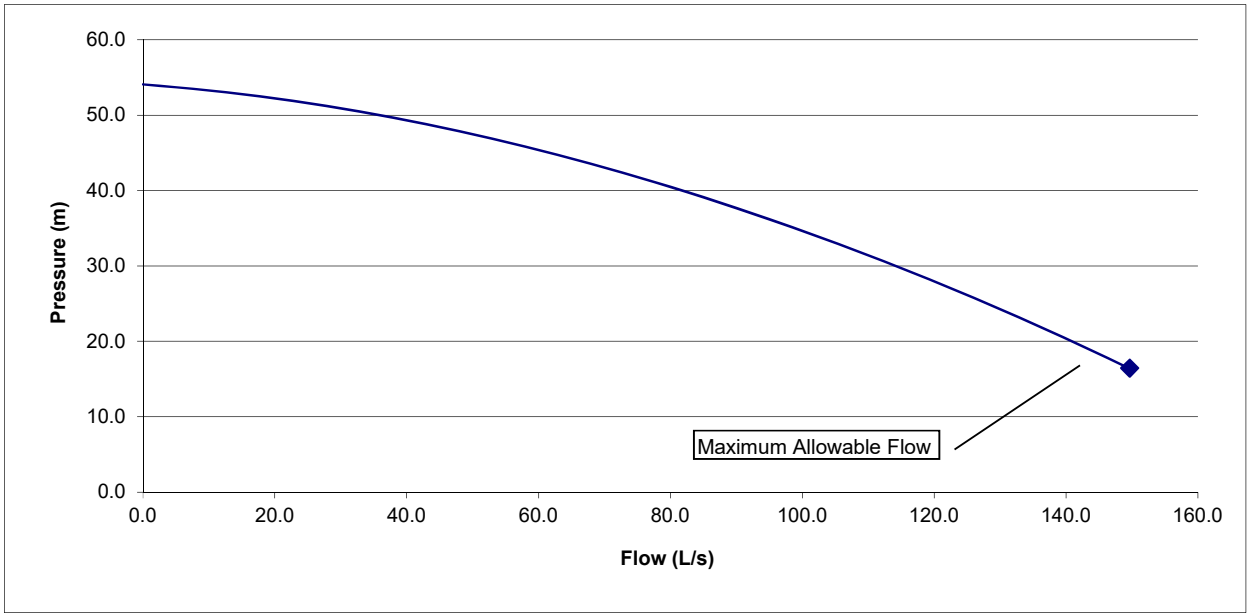
Fire Flow Analysis

Fire Flow Node:	JCT_12800
Design Flow (L/s):	149.7
Design Pressure (m):	16.4

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 3 Infowater Location: Westcliffe Way @ Bismark Dr

JCT_12518 Average Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	0.62	363.67	56.67
01:00 hrs	0.51	364.00	57.00
02:00 hrs	0.64	363.82	56.82
03:00 hrs	0.67	365.27	58.27
04:00 hrs	0.62	363.88	56.88
05:00 hrs	0.59	363.71	56.71
06:00 hrs	0.82	363.93	56.93
07:00 hrs	1.19	363.28	56.28
08:00 hrs	1.36	363.16	56.16
09:00 hrs	1.27	363.23	56.23
10:00 hrs	1.32	363.18	56.18
11:00 hrs	1.32	363.17	56.17
12:00 hrs	1.24	363.29	56.29
13:00 hrs	1.20	363.38	56.38
14:00 hrs	1.11	363.54	56.54
15:00 hrs	1.09	363.64	56.64
16:00 hrs	1.17	363.68	56.68
17:00 hrs	1.23	364.36	57.36
18:00 hrs	1.37	364.14	57.14
19:00 hrs	1.47	363.97	56.97
20:00 hrs	1.49	363.90	56.90
21:00 hrs	1.35	363.99	56.99
22:00 hrs	1.17	364.14	57.14
23:00 hrs	0.88	363.55	56.55
Average Day HGL:		363.75	
Minimum Hour:		365.27	

JCT_12518 Maximum Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	1.06	363.94	56.94
01:00 hrs	0.72	364.42	57.42
02:00 hrs	0.91	363.93	56.93
03:00 hrs	1.23	363.23	56.23
04:00 hrs	1.15	363.48	56.48
05:00 hrs	1.23	363.62	56.62
06:00 hrs	1.87	362.94	55.94
07:00 hrs	2.87	361.03	54.03
08:00 hrs	2.92	361.54	54.54
09:00 hrs	2.32	362.23	55.23
10:00 hrs	2.13	362.77	55.77
11:00 hrs	2.17	362.97	55.97
12:00 hrs	2.11	362.74	55.74
13:00 hrs	2.11	362.92	55.92
14:00 hrs	1.94	362.91	55.91
15:00 hrs	1.83	363.41	56.41
16:00 hrs	2.15	362.82	55.82
17:00 hrs	2.43	361.47	54.47
18:00 hrs	2.72	361.63	54.63
19:00 hrs	3.19	360.66	53.66
20:00 hrs	3.57	359.20	52.20
21:00 hrs	3.72	358.52	51.52
22:00 hrs	2.92	360.12	53.12
23:00 hrs	1.79	361.94	54.94
Maximum Day HGL:		362.27	
Peak Hour:		358.52	

CAM 3 Infowater Location: Westcliffe Way @ Bismark Dr

Available Flow (L/s)	Residual Pressure (m)
0.0	55.9
10.0	55.1
20.0	54.1
30.0	52.9
40.0	51.5
50.0	49.9
60.0	48.1
70.0	46.1
80.0	43.9
90.0	41.5
100.0	39.0
110.0	36.2
120.0	33.4
130.0	30.3
140.0	27.1
150.0	23.7
160.0	20.1

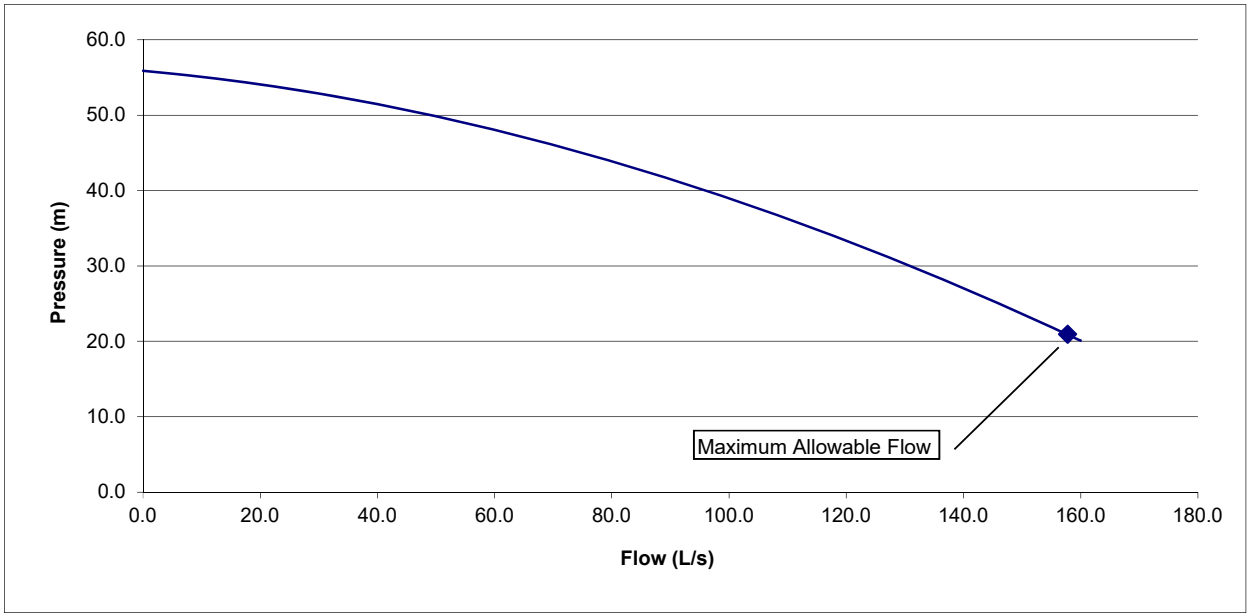
Fire Flow Analysis

Fire Flow Node:	JCT_12518
Design Flow (L/s):	157.8
Design Pressure (m):	20.9

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 3 Infowater Location: Blenheim Rd at new connection

JCT_39051 Average Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	1.39	363.65	59.15
01:00 hrs	1.27	363.97	59.47
02:00 hrs	1.38	363.80	59.30
03:00 hrs	1.31	365.25	60.75
04:00 hrs	1.11	363.85	59.35
05:00 hrs	1.10	363.68	59.18
06:00 hrs	1.41	363.92	59.42
07:00 hrs	1.97	363.29	58.79
08:00 hrs	2.01	363.19	58.69
09:00 hrs	2.06	363.25	58.75
10:00 hrs	2.18	363.21	58.71
11:00 hrs	2.25	363.21	58.71
12:00 hrs	2.19	363.31	58.81
13:00 hrs	2.14	363.40	58.90
14:00 hrs	2.04	363.55	59.05
15:00 hrs	2.04	363.65	59.15
16:00 hrs	2.02	363.69	59.19
17:00 hrs	2.00	364.38	59.88
18:00 hrs	2.05	364.17	59.67
19:00 hrs	2.08	364.01	59.51
20:00 hrs	2.03	363.94	59.44
21:00 hrs	1.95	364.02	59.52
22:00 hrs	1.86	364.15	59.65
23:00 hrs	1.62	363.54	59.04
Average Day HGL:		363.75	
Minimum Hour:		365.25	

JCT_39051 Maximum Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	2.39	363.95	59.45
01:00 hrs	2.19	364.40	59.90
02:00 hrs	2.45	363.93	59.43
03:00 hrs	2.78	363.26	58.76
04:00 hrs	2.40	363.49	58.99
05:00 hrs	2.05	363.63	59.13
06:00 hrs	2.92	363.03	58.53
07:00 hrs	3.93	361.36	56.86
08:00 hrs	4.18	361.90	57.40
09:00 hrs	4.16	362.47	57.97
10:00 hrs	3.76	362.95	58.45
11:00 hrs	3.79	363.15	58.65
12:00 hrs	3.80	362.92	58.42
13:00 hrs	3.93	363.10	58.60
14:00 hrs	3.67	363.05	58.55
15:00 hrs	3.46	363.53	59.03
16:00 hrs	3.68	363.00	58.50
17:00 hrs	4.38	361.74	57.24
18:00 hrs	4.35	361.97	57.47
19:00 hrs	4.56	361.13	56.63
20:00 hrs	5.13	359.83	55.33
21:00 hrs	5.39	359.23	54.73
22:00 hrs	4.33	360.49	55.99
23:00 hrs	3.21	362.04	57.54
Maximum Day HGL:		362.48	
Peak Hour:		359.23	

CAM 3 Infowater Location: Blenheim Rd at new connection

JCT_39051	Residual Pressure (m)
0.0	58.6
10.0	58.0
20.0	57.3
30.0	56.4
40.0	55.4
50.0	54.2
60.0	52.9
70.0	51.5
80.0	49.9
90.0	48.3
100.0	46.4
110.0	44.5
120.0	42.5
130.0	40.3
140.0	38.0
150.0	35.6
160.0	33.0
170.0	30.4
180.0	27.6
190.0	24.7

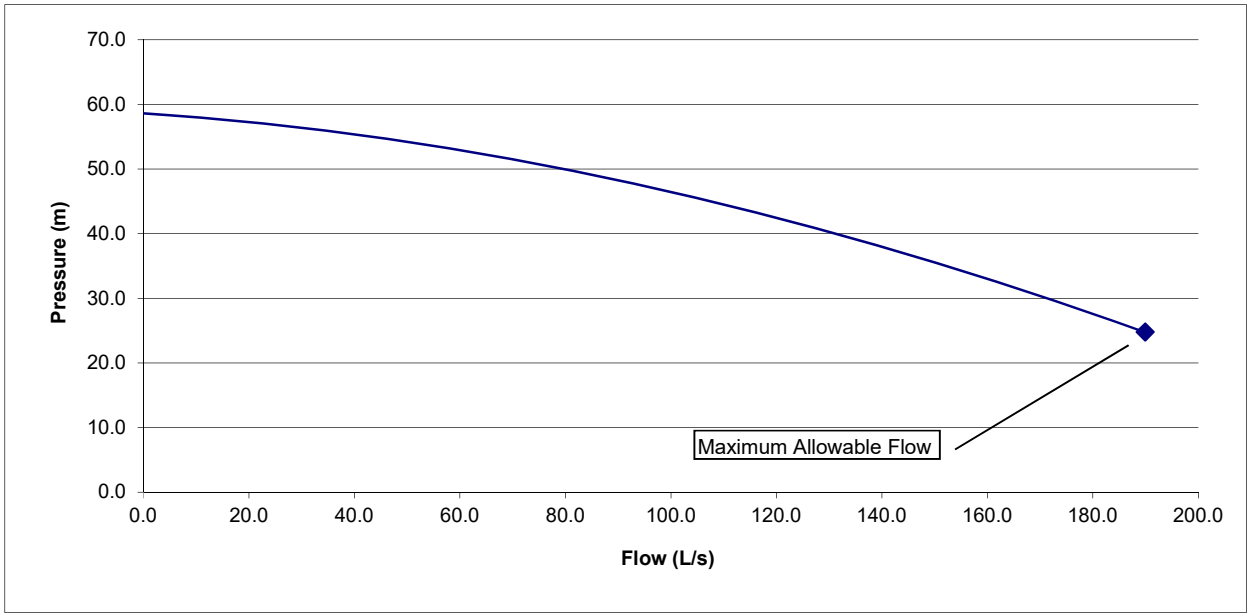
Fire Flow Analysis

Fire Flow Node:	JCT_39051
Design Flow (L/s):	189.9
Design Pressure (m):	24.8

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 3 Infowater Location: Westcliffe Way @ Newman Dr

JCT_12800 Average Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	1.45	363.67	54.67
01:00 hrs	1.20	363.99	54.99
02:00 hrs	1.50	363.82	54.82
03:00 hrs	1.58	365.22	56.22
04:00 hrs	1.45	363.87	54.87
05:00 hrs	1.38	363.70	54.70
06:00 hrs	1.93	363.94	54.94
07:00 hrs	2.78	363.31	54.31
08:00 hrs	3.18	363.21	54.21
09:00 hrs	2.98	363.27	54.27
10:00 hrs	3.08	363.23	54.23
11:00 hrs	3.08	363.23	54.23
12:00 hrs	2.90	363.33	54.33
13:00 hrs	2.80	363.42	54.42
14:00 hrs	2.60	363.57	54.57
15:00 hrs	2.55	363.67	54.67
16:00 hrs	2.73	363.71	54.71
17:00 hrs	2.88	364.38	55.38
18:00 hrs	3.20	364.18	55.18
19:00 hrs	3.43	364.03	55.03
20:00 hrs	3.48	363.96	54.96
21:00 hrs	3.15	364.03	55.03
22:00 hrs	2.73	364.16	55.16
23:00 hrs	2.05	363.55	54.55
Average Day HGL:		363.77	
Minimum Hour:		365.22	

JCT_12800 Maximum Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	2.49	363.96	54.96
01:00 hrs	1.69	364.42	55.42
02:00 hrs	2.14	363.95	54.95
03:00 hrs	2.89	363.28	54.28
04:00 hrs	2.69	363.51	54.51
05:00 hrs	2.89	363.64	54.64
06:00 hrs	4.39	363.08	54.08
07:00 hrs	6.73	361.52	52.52
08:00 hrs	6.83	362.07	53.07
09:00 hrs	5.43	362.60	53.60
10:00 hrs	4.99	363.05	54.05
11:00 hrs	5.08	363.25	54.25
12:00 hrs	4.94	363.02	54.02
13:00 hrs	4.94	363.20	54.20
14:00 hrs	4.54	363.13	54.13
15:00 hrs	4.29	363.59	54.59
16:00 hrs	5.03	363.09	54.09
17:00 hrs	5.68	361.94	52.94
18:00 hrs	6.38	362.14	53.14
19:00 hrs	7.48	361.34	52.34
20:00 hrs	8.37	360.11	51.11
21:00 hrs	8.72	359.55	50.55
22:00 hrs	6.83	360.67	51.67
23:00 hrs	4.19	362.08	53.08
Maximum Day HGL:		362.59	
Peak Hour:		359.55	

CAM 3 Infowater Location: Westcliffe Way @ Newman Dr

Available Flow (L/s)	Residual Pressure (m)
0.0	54.3
10.0	53.7
20.0	52.9
30.0	51.9
40.0	50.8
50.0	49.4
60.0	47.8
70.0	46.1
80.0	44.1
90.0	42.0
100.0	39.7
110.0	37.3
120.0	34.6
130.0	31.8
140.0	28.8
150.0	25.7
160.0	22.4
170.0	18.9
180.0	15.3

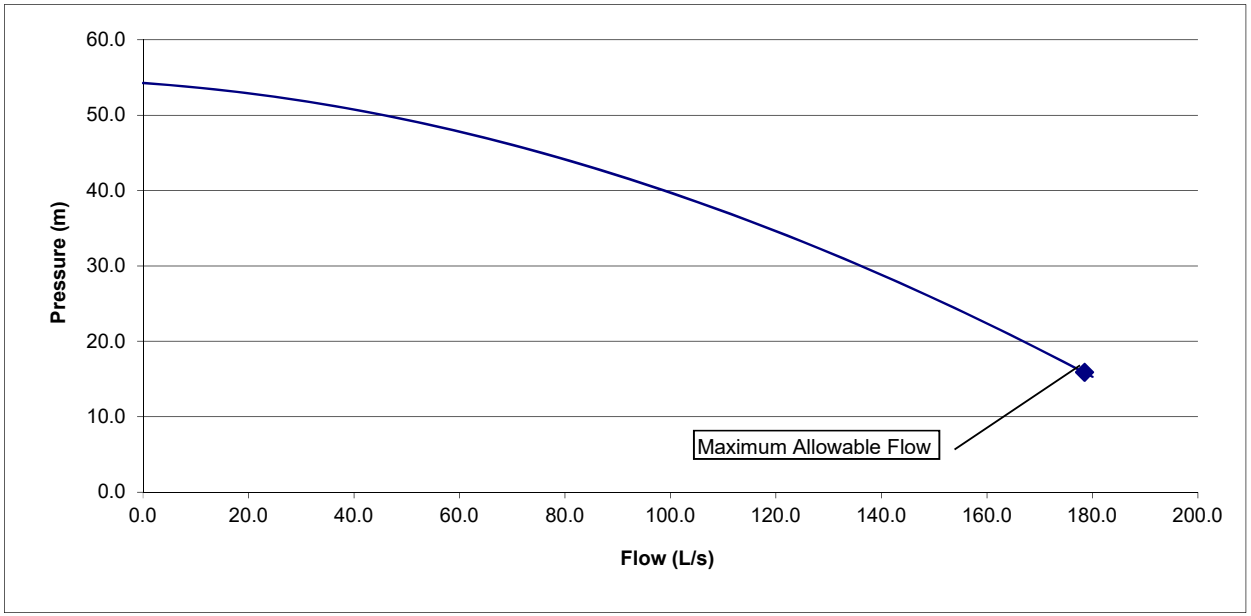
Fire Flow Analysis

Fire Flow Node:	JCT_12800
Design Flow (L/s):	178.6
Design Pressure (m):	15.8

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 3 Infowater Location: Westcliffe Way @ Bismark Dr

JCT_12518 Average Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	0.62	363.67	56.67
01:00 hrs	0.51	363.99	56.99
02:00 hrs	0.64	363.82	56.82
03:00 hrs	0.67	365.23	58.23
04:00 hrs	0.62	363.88	56.88
05:00 hrs	0.59	363.70	56.70
06:00 hrs	0.82	363.94	56.94
07:00 hrs	1.19	363.31	56.31
08:00 hrs	1.36	363.21	56.21
09:00 hrs	1.27	363.28	56.28
10:00 hrs	1.32	363.24	56.24
11:00 hrs	1.32	363.24	56.24
12:00 hrs	1.24	363.34	56.34
13:00 hrs	1.20	363.43	56.43
14:00 hrs	1.11	363.58	56.58
15:00 hrs	1.09	363.68	56.68
16:00 hrs	1.17	363.72	56.72
17:00 hrs	1.23	364.38	57.38
18:00 hrs	1.37	364.18	57.18
19:00 hrs	1.47	364.03	57.03
20:00 hrs	1.49	363.96	56.96
21:00 hrs	1.35	364.04	57.04
22:00 hrs	1.17	364.16	57.16
23:00 hrs	0.88	363.55	56.55
Average Day HGL:		363.77	
Minimum Hour:		365.23	

JCT_12518 Maximum Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	1.06	363.96	56.96
01:00 hrs	0.72	364.43	57.43
02:00 hrs	0.91	363.95	56.95
03:00 hrs	1.23	363.29	56.29
04:00 hrs	1.15	363.51	56.51
05:00 hrs	1.23	363.65	56.65
06:00 hrs	1.87	363.09	56.09
07:00 hrs	2.87	361.55	54.55
08:00 hrs	2.92	362.10	55.10
09:00 hrs	2.32	362.62	55.62
10:00 hrs	2.13	363.06	56.06
11:00 hrs	2.17	363.27	56.27
12:00 hrs	2.11	363.03	56.03
13:00 hrs	2.11	363.22	56.22
14:00 hrs	1.94	363.14	56.14
15:00 hrs	1.83	363.60	56.60
16:00 hrs	2.15	363.10	56.10
17:00 hrs	2.43	361.96	54.96
18:00 hrs	2.72	362.16	55.16
19:00 hrs	3.19	361.38	54.38
20:00 hrs	3.57	360.16	53.16
21:00 hrs	3.72	359.60	52.60
22:00 hrs	2.92	360.70	53.70
23:00 hrs	1.79	362.09	55.09
Maximum Day HGL:		362.61	
Peak Hour:		359.60	

CAM 3 Infowater Location: Westcliffe Way @ Bismark Dr

Available Flow (L/s)	Residual Pressure (m)
0.0	56.1
10.0	55.6
20.0	54.9
30.0	54.0
40.0	53.0
50.0	51.9
60.0	50.6
70.0	49.2
80.0	47.7
90.0	46.0
100.0	44.2
110.0	42.3
120.0	40.3
130.0	38.1
140.0	35.8
150.0	33.4
160.0	30.9
170.0	28.2
180.0	25.4
190.0	22.6
196.0	20.8

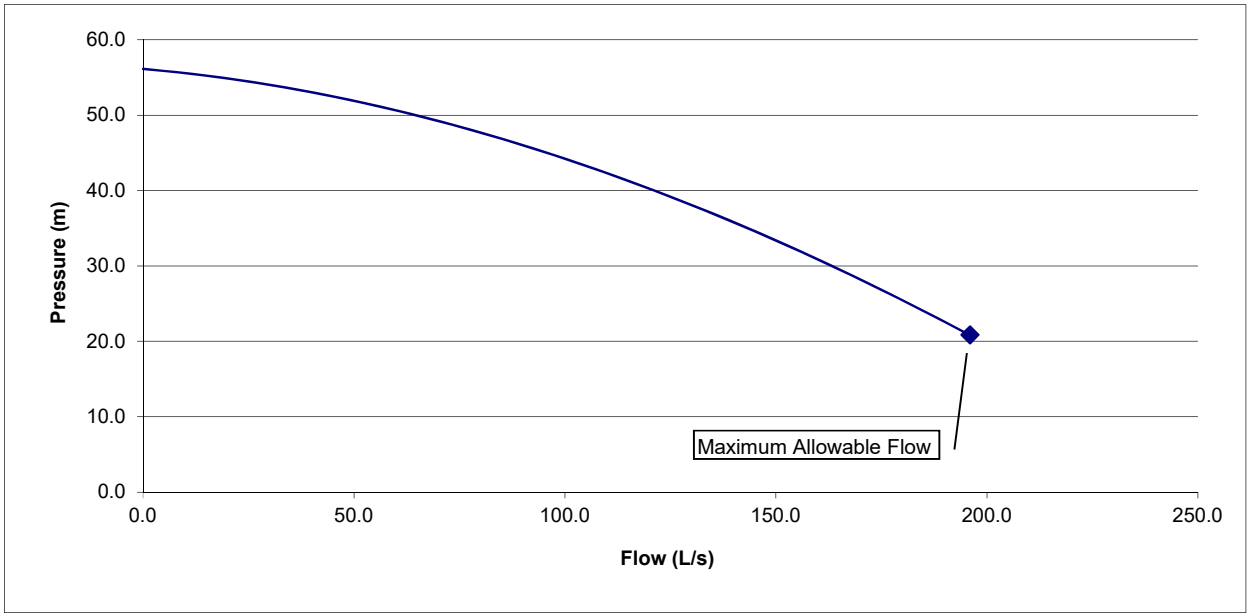
Fire Flow Analysis

Fire Flow Node:	JCT_12518
Design Flow (L/s):	196.0
Design Pressure (m):	20.8

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 3 Infowater Location: End of Freure Dr

JCT_12240 Average Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	0.65	363.65	43.65
01:00 hrs	0.54	363.96	43.96
02:00 hrs	0.67	363.80	43.80
03:00 hrs	0.70	365.20	45.20
04:00 hrs	0.65	363.85	43.85
05:00 hrs	0.62	363.67	43.67
06:00 hrs	0.86	363.93	43.93
07:00 hrs	1.24	363.32	43.32
08:00 hrs	1.42	363.23	43.23
09:00 hrs	1.33	363.29	43.29
10:00 hrs	1.38	363.26	43.26
11:00 hrs	1.38	363.26	43.26
12:00 hrs	1.30	363.35	43.35
13:00 hrs	1.25	363.44	43.44
14:00 hrs	1.16	363.58	43.58
15:00 hrs	1.14	363.68	43.68
16:00 hrs	1.22	363.72	43.72
17:00 hrs	1.29	364.39	44.39
18:00 hrs	1.43	364.20	44.20
19:00 hrs	1.53	364.06	44.06
20:00 hrs	1.56	363.99	43.99
21:00 hrs	1.41	364.05	44.05
22:00 hrs	1.22	364.17	44.17
23:00 hrs	0.92	363.54	43.54
Average Day HGL:		363.77	
Minimum Hour:		365.20	

JCT_12240 Maximum Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	0.81	363.96	43.96
01:00 hrs	0.55	364.41	44.41
02:00 hrs	0.70	363.95	43.95
03:00 hrs	0.94	363.31	43.31
04:00 hrs	0.88	363.52	43.52
05:00 hrs	0.94	363.65	43.65
06:00 hrs	1.43	363.17	43.17
07:00 hrs	2.19	361.81	41.81
08:00 hrs	2.22	362.39	42.39
09:00 hrs	1.77	362.81	42.81
10:00 hrs	1.62	363.21	43.21
11:00 hrs	1.65	363.42	43.42
12:00 hrs	1.60	363.17	43.17
13:00 hrs	1.60	363.37	43.37
14:00 hrs	1.48	363.26	43.26
15:00 hrs	1.39	363.70	43.70
16:00 hrs	1.64	363.25	43.25
17:00 hrs	1.85	362.19	42.19
18:00 hrs	2.07	362.44	42.44
19:00 hrs	2.43	361.76	41.76
20:00 hrs	2.72	360.67	40.67
21:00 hrs	2.84	360.17	40.17
22:00 hrs	2.22	361.00	41.00
23:00 hrs	1.36	362.17	42.17
Maximum Day HGL:		362.78	
Peak Hour:		360.17	

CAM 3 Infowater Location: End of Freure Dr

Available Flow (L/s)	Residual Pressure (m)
0.0	43.2
10.0	42.8
20.0	42.3
30.0	41.7
40.0	41.0
50.0	40.2
60.0	39.3
70.0	38.4
80.0	37.3
90.0	36.2
100.0	35.0
110.0	33.7
120.0	32.3
130.0	30.8
140.0	29.2
150.0	27.6
160.0	25.9
170.0	24.1
180.0	22.3
190.0	20.3
200.0	18.3
210.0	16.2
220.0	14.0

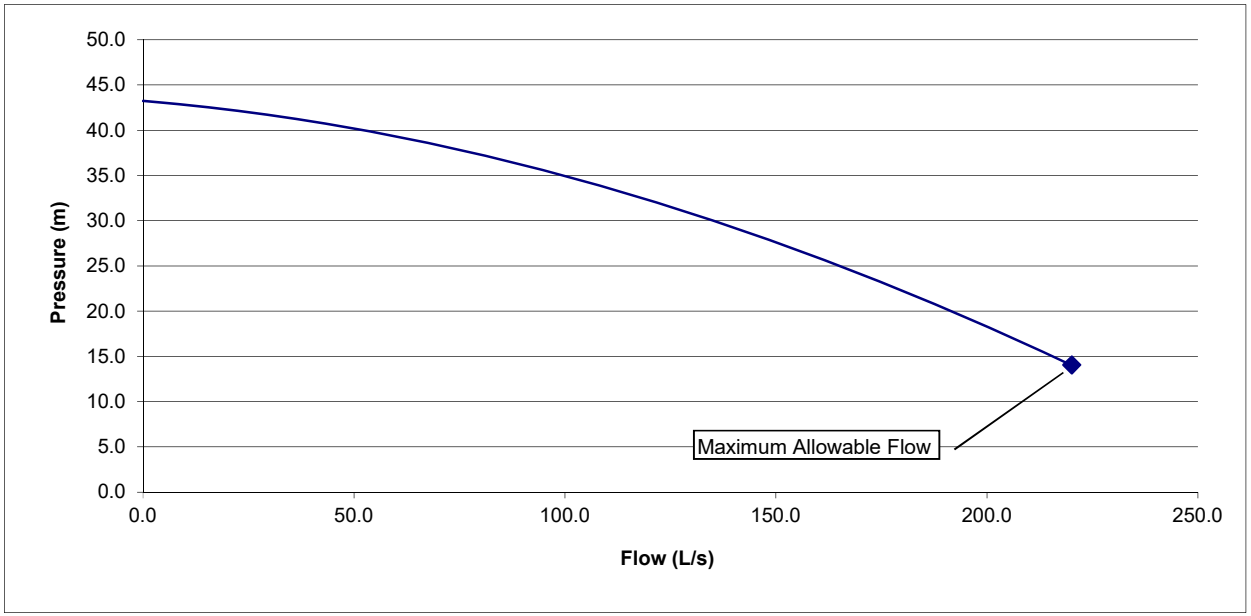
Fire Flow Analysis

Fire Flow Node:	JCT_12240
Design Flow (L/s):	220.2
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 3 Infowater Location: Blenheim Rd at new connection

JCT_39051 Average Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	1.39	363.65	59.15
01:00 hrs	1.27	363.96	59.46
02:00 hrs	1.38	363.80	59.30
03:00 hrs	1.31	365.21	60.71
04:00 hrs	1.11	363.85	59.35
05:00 hrs	1.10	363.67	59.17
06:00 hrs	1.41	363.93	59.43
07:00 hrs	1.97	363.32	58.82
08:00 hrs	2.01	363.23	58.73
09:00 hrs	2.06	363.29	58.79
10:00 hrs	2.18	363.26	58.76
11:00 hrs	2.25	363.25	58.75
12:00 hrs	2.19	363.35	58.85
13:00 hrs	2.14	363.44	58.94
14:00 hrs	2.04	363.58	59.08
15:00 hrs	2.04	363.68	59.18
16:00 hrs	2.02	363.72	59.22
17:00 hrs	2.00	364.39	59.89
18:00 hrs	2.05	364.20	59.70
19:00 hrs	2.08	364.06	59.56
20:00 hrs	2.03	363.99	59.49
21:00 hrs	1.95	364.05	59.55
22:00 hrs	1.86	364.17	59.67
23:00 hrs	1.62	363.54	59.04
Average Day HGL:		363.77	
Minimum Hour:		365.21	

JCT_39051 Maximum Day 24 Hour Simulation

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	2.39	363.96	59.46
01:00 hrs	2.19	364.41	59.91
02:00 hrs	2.45	363.94	59.44
03:00 hrs	2.78	363.31	58.81
04:00 hrs	2.40	363.52	59.02
05:00 hrs	2.05	363.65	59.15
06:00 hrs	2.92	363.15	58.65
07:00 hrs	3.93	361.75	57.25
08:00 hrs	4.18	362.33	57.83
09:00 hrs	4.16	362.76	58.26
10:00 hrs	3.76	363.17	58.67
11:00 hrs	3.79	363.38	58.88
12:00 hrs	3.80	363.14	58.64
13:00 hrs	3.93	363.33	58.83
14:00 hrs	3.67	363.23	58.73
15:00 hrs	3.46	363.67	59.17
16:00 hrs	3.68	363.21	58.71
17:00 hrs	4.38	362.13	57.63
18:00 hrs	4.35	362.37	57.87
19:00 hrs	4.56	361.67	57.17
20:00 hrs	5.13	360.55	56.05
21:00 hrs	5.39	360.04	55.54
22:00 hrs	4.33	360.93	56.43
23:00 hrs	3.21	362.15	57.65
Maximum Day HGL:		362.74	
Peak Hour:		360.04	

CAM 3 Infowater Location: Blenheim Rd at new connection

JCT_39051	Residual Pressure (m)
0.0	58.8
10.0	58.4
20.0	57.8
30.0	57.2
40.0	56.5
50.0	55.6
60.0	54.7
70.0	53.7
80.0	52.6
90.0	51.4
100.0	50.0
110.0	48.7
120.0	47.2
130.0	45.6
140.0	43.9
150.0	42.2
160.0	40.3
170.0	38.4
180.0	36.4
190.0	34.3
200.0	32.1
210.0	29.8
220.0	27.5

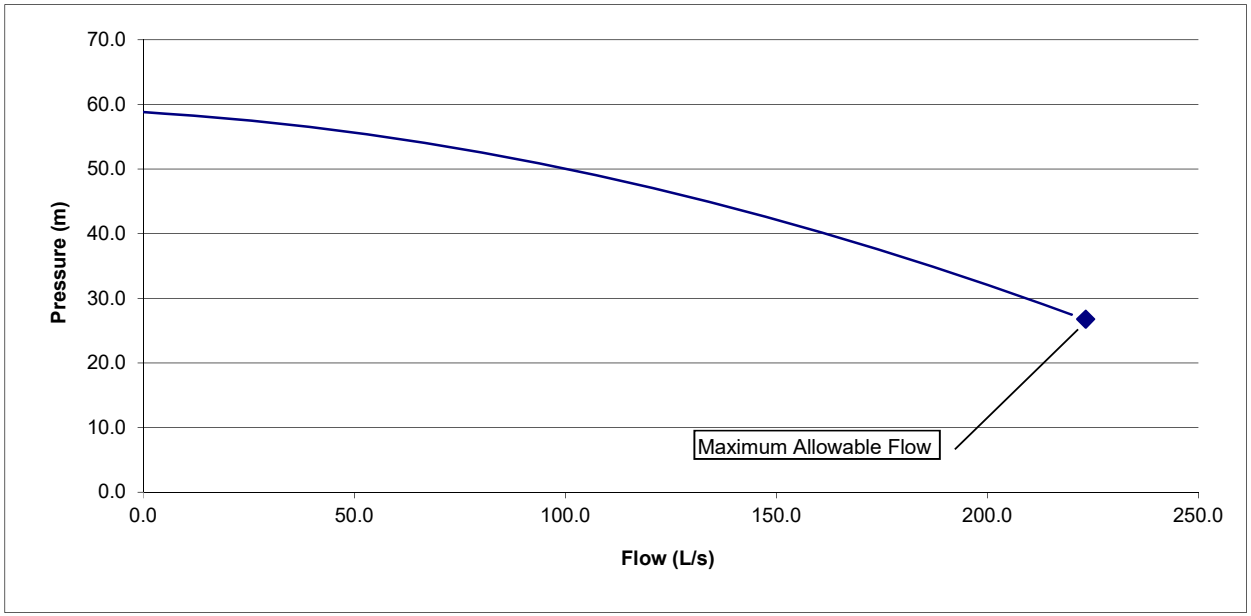
Fire Flow Analysis

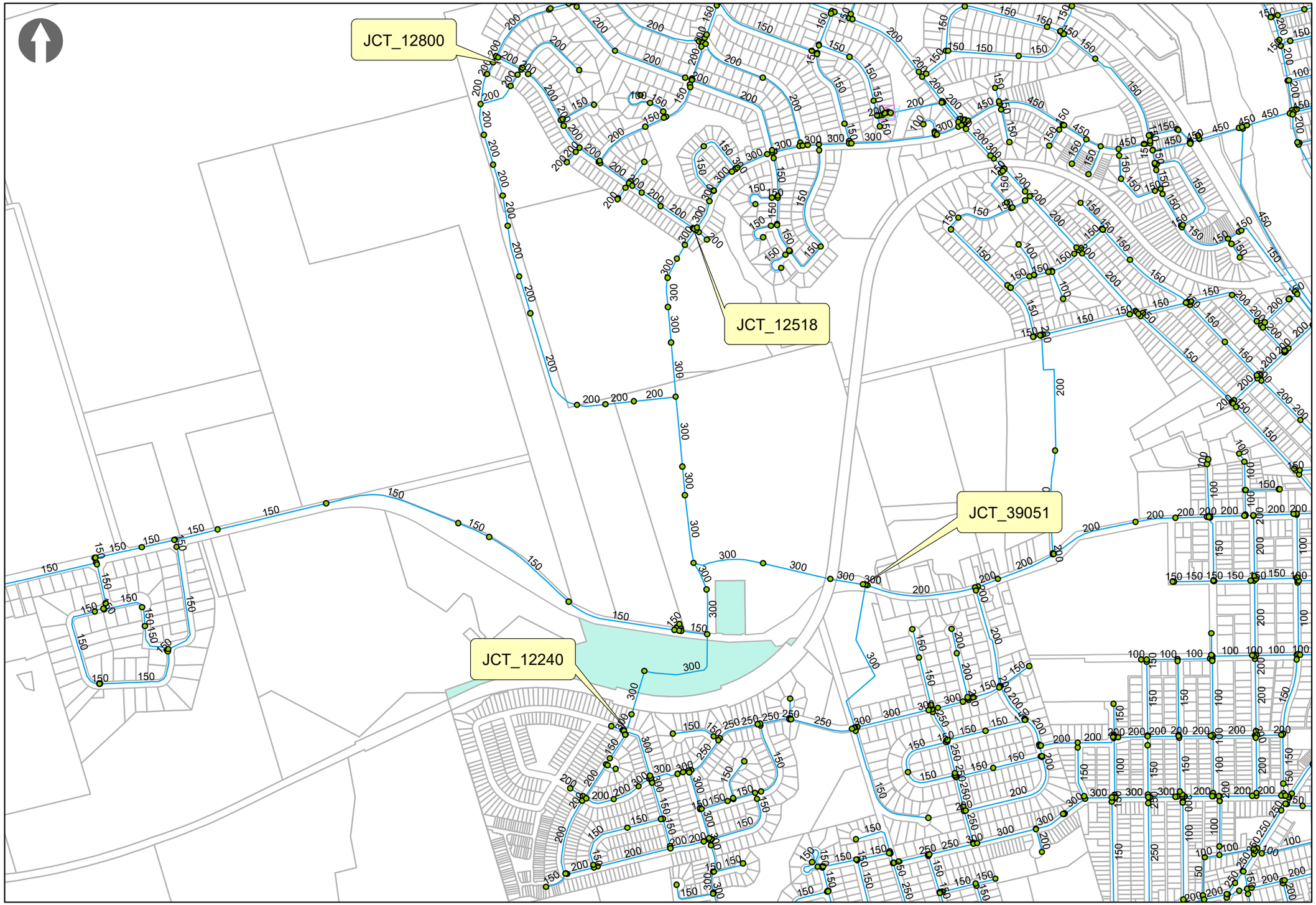
Fire Flow Node:	JCT_39051
Design Flow (L/s):	223.4
Design Pressure (m):	26.7

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.*





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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

TYPE
- Active
- Domain

TYPE
- Active
- Domain

TYPE
- Active
- Domain

TYPE
- Active
- Domain

TYPE
- Active
- Domain

TYPE
- Active
- Domain
- Assessment Parcels (MPAC)
- Subject Site

Cambridge West
Sawmill Alignment

Appendix C

Usage Rates, Water Demands, and Design Values

Westwood Village Phase 2
City of Cambridge
Project No: 02534-800
Date: April 2, 2026
By: CJC

J100's = Cachet Management (Cam West) Inc.
J200's = Hallman Construction Ltd.
J300's = Huron Creek Development
J500's = Westwood Village Phase 2

Demand Calculations

Node No.	Residential					Commercial		Institutional		Final Demand[3]					Road Elevation (m)	Regional Node Demand
	Medium Density - Single Family[1]															
	# SF Units (3.25 per unit)	# TH/B_B Units (2.44 per unit)	# Apartments (1.77 per unit)	# Persons	Demand[2] (l/s)	Area (ha)	Demand[2] (l/s)	Area (ha)	Demand[2] (l/s)	Avg Day Demand Q_{avg} (l/s)	Max Day Demand $Q_{max.day}$ (l/s)	Min Hour Demand $Q_{min.hr}$ (l/s)	Peak Hour Demand Q_{peak} (l/s)	Max Day + Fire Flow Demand[4] $Q_{max.d+fire}$ (l/s)		
J-200	16	10		76	0.201		0.000		0.000	0.201	0.403	0.101	0.604	133.403	314.47	
J-201	30	6		112	0.296		0.000		0.000	0.296	0.591	0.148	0.887	133.591	313.81	
J-300	21			68	0.180		0.000		0.000	0.180	0.360	0.090	0.540	100.360	311.10	**RoW**
J-301	39			127	0.334		0.000		0.000	0.334	0.668	0.167	1.002	100.668	313.05	**Node**
J-302	19	16		101	0.266		0.000		0.000	0.266	0.531	0.133	0.797	133.531	313.70	**12800**
J-303	3	61		159	0.418		0.000		0.000	0.418	0.836	0.209	1.254	133.836	314.55	
Subtotal	**208**	**143**		**1025**	**2.701**	**0.000**	**0.000**	**0.000**	**0.000**	**2.701**	**5.402**	**1.351**	**8.103**	**133.836**	**-**	
J-500	12	5		51	0.135		0.000		0.000	0.135	0.270	0.067	0.405	150.270	315.34	
J-501		43		105	0.277		0.000		0.000	0.277	0.553	0.138	0.830	150.553	314.59	
J-502		52		127	0.334		0.000		0.000	0.334	0.669	0.167	1.003	150.669	315.67	
J-503	2	33		87	0.229		0.000		0.000	0.229	0.459	0.115	0.688	150.459	315.06	
J-504	10	5		45	0.118		0.000		0.000	0.118	0.236	0.059	0.353	150.236	314.85	
J-505	11	11		63	0.165		0.000		0.000	0.165	0.330	0.082	0.495	150.330	315.62	
J-506	14	16		85	0.223		0.000		0.000	0.223	0.446	0.111	0.668	150.446	314.98	
J-507		52		127	0.334		0.000		0.000	0.334	0.669	0.167	1.003	150.669	315.93	
J-508	8	24		85	0.223		0.000		0.000	0.223	0.446	0.111	0.669	150.446	315.52	
J-509	25			81	0.214		0.000		0.000	0.214	0.428	0.107	0.642	100.428	317.21	
J-510	20	8		85	0.223		0.000		0.000	0.223	0.445	0.111	0.668	150.445	316.38	**MTE**
J-511	12	16		78	0.206		0.000		0.000	0.206	0.411	0.103	0.617	150.411	315.98	**Node**
J-512	8	12		55	0.146		0.000		0.000	0.146	0.291	0.073	0.437	150.291	315.40	**J519**
J-513	16	14		86	0.227		0.000		0.000	0.227	0.454	0.114	0.681	150.454	316.37	
J-514	9	12		59	0.154		0.000		0.000	0.154	0.309	0.077	0.463	150.309	315.92	
J-515	24			78	0.206		0.000		0.000	0.206	0.411	0.103	0.617	100.411	315.40	
J-516	12	9		61	0.161		0.000		0.000	0.161	0.321	0.080	0.482	150.321	316.85	
J-517	11	18		80	0.210		0.000		0.000	0.210	0.420	0.105	0.630	150.420	316.51	
J-518	20			65	0.171		0.000		0.000	0.171	0.343	0.086	0.514	100.343	317.30	
J-519	19			62	0.163		0.000		0.000	0.163	0.325	0.081	0.488	100.325	314.70	
J-520			240	425	1.120		0.000		0.000	1.120	2.239	0.560	3.359	200.000	315.81	
J-521				0	0.000		0.000		0.000	0.000	0.000	0.000	0.000	100.000	314.25	
Subtotal	**233**	**330**	**240**	**1987**	**5.237**	**0.000**	**0.000**	**0.000**	**0.000**	**5.237**	**10.474**	**2.619**	**15.712**	**200.000**	**-**	
Totals	**663**	**1551**	**240**	**6364**	**16.772**	**1.975**	**10.140**	**2.850**	**2.850**	**29.762**	**59.524**	**14.881**	**89.285**	**754.240**	**-**	**-**
				Total Units =	**2,454**	**Total Flow ICI Avg. Day =**			**12.990**							
				Total Population =	**6,364**	**Total Flow ICI Max. Day =**			**25.980**							

1. Unit Count

Unit Type	Persons per Unit
Single Family (SF)	3.25
Townhouse (TH/B_B)	2.44
Apartment (APT)	1.77

Reference: Persons per unit from *Water and Wastewater Monitoring Report (Region of Waterloo, 2020), Section 2.4*
Unit count based on MHBC Documents: Cambridge West Draft Plan (May 23, 2018) and Lotting Plan (June 24, 2020), Westwood Phase 2 Draft Plan (September 11, 2020)

2. Water Demand

Development Type	Design Flow	
Residential	227.7	l/d/person
	0.0026	l/s/person
Commercial	28.00	m^3/ha/day
	0.324	l/s/ha
School	1.00	l/s/ha

Reference: *Residential Demands - Tri-City Distribution System Study (AECOM, May 2009)*
Reference: *Commercial and Industrial Demands - Design Guidelines for Drinking Water Systems (MOE, 2008). Section 3.4.3 - Commercial and Institutional Water Demands*
Reference: City-Wide Sanitary Sewer System Capacity Study, City of Kitchener (AECOM, 2011), p.69

3. Peaking Factors

Demand Scenario	Factor
Average Day	1.0
Maximum Day	2.0
Minimum Hour	0.5
Peak Hour	3.0

Reference: *Design Guidelines for Drinking Water Systems (MOE, 2008). Table 3.1: Peaking Factors - Population 3,001 - 10,000*

4. Fire Flow

Development Type	Fire Flow
Townhomes (continuous)	9,000 l/min
Townhomes - Minimum Required Fire Flow	133 l/s
Townhomes - Design Fire Flow	150 l/s
Apartments (Max. 4 storeys, standard construction)	15,000 l/min
	200 l/s
Single Family <3m separation	6,000 l/min
	100 l/s
Commercial (<5,000 sq.m).	12,000 l/min
	200 l/s
Institutional - School (< 3 storey)	15,000 l/min
	250 l/s

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

WESTWOOD VILLAGE COMMUNITY - WATER SERVICING ANALYSIS

CITY OF CAMBRIDGE - PRESSURE ZONE 3

Pump Curve Design Sheet - Scenario 1

Project No.: 44719-114
Date: 2-Jul-21
Design By: CJC
File: Q:\44719\114\Water Distribution\July 2021\44719-114_Region Pressures & Pump Curves.xlsx
Note: System pressure information is from correspondence to Charles Carré from Kevin Dolishny at the Region of Waterloo on December 18, 2019.

Node 12240 End of Freure Dr
Elevation = *320.00* m

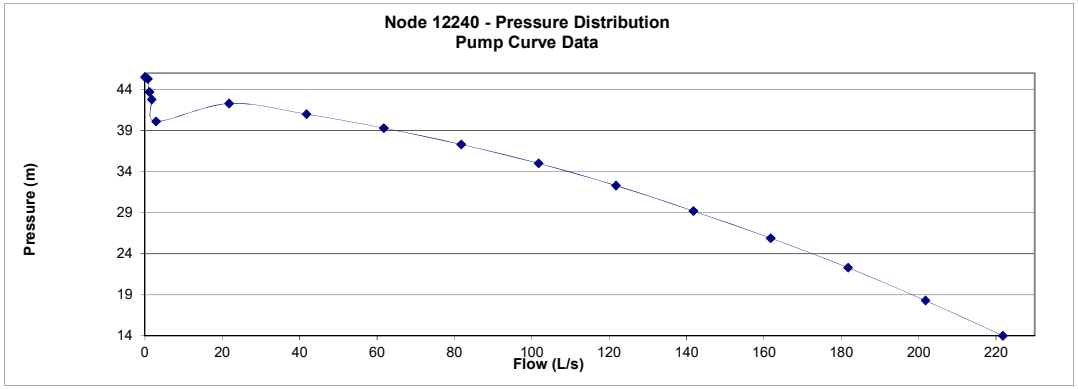
Average Day				
Time	Flow (L/s)	Head (m)	Residual Pressure (m)	
00:00 hrs	0.65	363.63	43.63	
01:00 hrs	0.54	363.94	43.94	
02:00 hrs	0.67	363.78	43.78	
03:00 hrs	**0.70**	**365.28**	**45.28**	**Min Hr**
04:00 hrs	0.65	363.83	43.83	
05:00 hrs	0.62	363.66	43.66	
06:00 hrs	0.86	363.91	43.91	
07:00 hrs	1.24	363.33	43.33	
08:00 hrs	1.42	363.25	43.25	
09:00 hrs	1.33	363.31	43.31	
10:00 hrs	1.38	363.28	43.28	
11:00 hrs	1.38	363.29	43.29	
12:00 hrs	1.30	363.38	43.38	
13:00 hrs	1.25	363.46	43.46	
14:00 hrs	1.16	363.59	43.59	
15:00 hrs	**1.14**	**363.69**	**43.69**	**Avg Day**
16:00 hrs	1.22	363.74	43.74	
17:00 hrs	1.29	364.41	44.41	
18:00 hrs	1.43	364.23	44.23	
19:00 hrs	1.53	364.10	44.10	
20:00 hrs	1.56	364.03	44.03	
21:00 hrs	1.41	364.08	44.08	
22:00 hrs	1.22	364.18	44.18	
23:00 hrs	0.92	363.55	43.55	
Average =	**1.12**	363.79	43.79	
Minimum =	**0.54**	365.28	45.28	

Maximum Day				
Time	Flow (L/s)	Head (m)	Residual Pressure (m)	
00:00 hrs	0.81	363.96	43.96	
01:00 hrs	0.55	364.41	44.41	
02:00 hrs	0.70	363.94	43.94	
03:00 hrs	0.94	363.31	43.31	
04:00 hrs	0.88	363.52	43.52	
05:00 hrs	0.94	363.65	43.65	
06:00 hrs	1.43	363.16	43.16	
07:00 hrs	2.19	361.77	41.77	
08:00 hrs	2.22	362.35	42.35	
09:00 hrs	**1.77**	**362.79**	**42.79**	**Max Day**
10:00 hrs	1.62	363.19	43.19	
11:00 hrs	1.65	363.40	43.40	
12:00 hrs	1.60	363.15	43.15	
13:00 hrs	1.60	363.35	43.35	
14:00 hrs	1.48	363.24	43.24	
15:00 hrs	1.39	363.68	43.68	
16:00 hrs	1.64	363.23	43.23	
17:00 hrs	1.85	362.14	42.14	
18:00 hrs	2.07	362.40	42.40	
19:00 hrs	2.43	361.71	41.71	
20:00 hrs	2.72	360.61	40.61	
21:00 hrs	**2.84**	**360.10**	**40.10**	**Peak Hr**
22:00 hrs	2.22	360.96	40.96	
23:00 hrs	1.36	362.16	42.16	
Max Day =	**1.62**	362.76	42.76	
Peak Hour =	**2.84**	360.10	40.10	

Fire Flow Analysis		
Available Flow (L/s)	Head (m)	Residual Pressure (m)
0.0	363.20	43.20
10.0	362.80	42.80
20.0	362.30	42.30
30.0	361.70	41.70
40.0	361.00	41.00
50.0	360.20	40.20
60.0	359.30	39.30
70.0	358.40	38.40
80.0	357.30	37.30
90.0	356.20	36.20
100.0	355.00	35.00
110.0	353.70	33.70
120.0	352.30	32.30
130.0	350.80	30.80
140.0	349.20	29.20
150.0	347.60	27.60
160.0	345.90	25.90
170.0	344.10	24.10
180.0	342.30	22.30
190.0	340.30	20.30
200.0	338.30	18.30
210.0	336.20	16.20
220.0	334.00	14.00

Fire Flow Analysis Adjusted for Maximum Day Flows		
Available Flow (L/s)	Head (m)	Residual Pressure (m)
1.8	363.20	43.20
11.8	362.80	42.80
21.8	362.30	42.30
31.8	361.70	41.70
41.8	361.00	41.00
51.8	360.20	40.20
61.8	359.30	39.30
71.8	358.40	38.40
81.8	357.30	37.30
91.8	356.20	36.20
101.8	355.00	35.00
111.8	353.70	33.70
121.8	352.30	32.30
131.8	350.80	30.80
141.8	349.20	29.20
151.8	347.60	27.60
161.8	345.90	25.90
171.8	344.10	24.10
181.8	342.30	22.30
191.8	340.30	20.30
201.8	338.30	18.30
211.8	336.20	16.20
221.8	334.00	14.00

Node 12240 - Pump Curve Pressure Distribution			
Demand Scenario	Discharge (L/s)	HGL (m)	Head (m)
0 (Est.)	0.00	365.50	45.50
Minimum Hour	0.70	365.28	45.28
Average Day	1.14	363.69	43.69
Maximum Day	1.77	362.79	42.79
Peak Hour	2.84	360.10	40.10
Max Day + 20 L/s Fire Flow	21.77	362.30	42.30
Max Day + 40 L/s Fire Flow	41.77	361.00	41.00
Max Day + 60 L/s Fire Flow	61.77	359.30	39.30
Max Day + 80 L/s Fire Flow	81.77	357.30	37.30
Max Day + 100 L/s Fire Flow	101.77	355.00	35.00
Max Day + 120 L/s Fire Flow	121.77	352.30	32.30
Max Day + 140 L/s Fire Flow	141.77	349.20	29.20
Max Day + 160 L/s Fire Flow	161.77	345.90	25.90
Max Day + 180 L/s Fire Flow	181.77	342.30	22.30
Max Day + 200 L/s Fire Flow	201.77	338.30	18.30
Max Day + 220 L/s Fire Flow	221.77	334.00	14.00



WESTWOOD VILLAGE COMMUNITY - WATER SERVICING ANALYSIS

CITY OF CAMBRIDGE - PRESSURE ZONE 3

Pump Curve Design Sheet - Scenario 1

Project No.: 44719-114
Date: 2-Jul-21
Design By: CJC
File: Q:\44719\114\Water Distribution\July 2021\44719-114_Region Pressures & Pump Curves.xlsx
Note: System pressure information is from correspondence to Garett Korber from Kevin Dolishny at the Region of Waterloo on June 25, 2021.

Node 12518 Westcliffe Way @ Proposed Bismark Drive
Elevation = *307.00* m

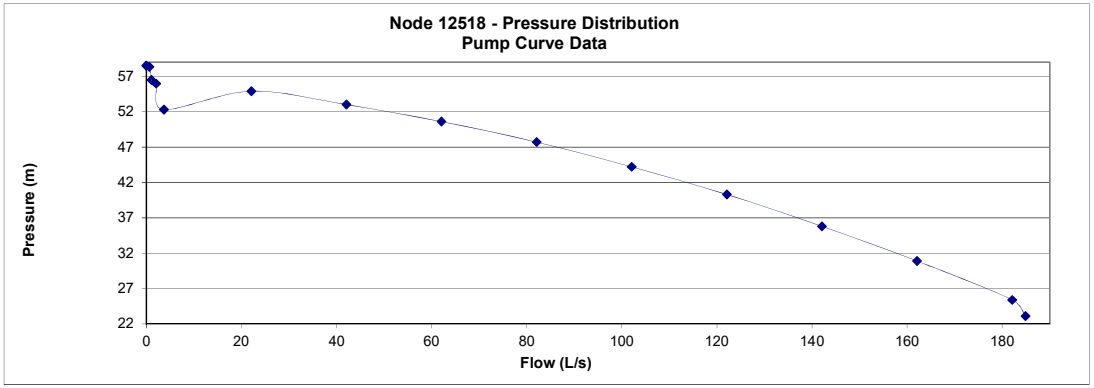
Average Day				
Time	Flow (L/s)	Head (m)	Residual Pressure (m)	
00:00 hrs	0.62	363.70	56.70	
01:00 hrs	0.51	364.09	57.09	
02:00 hrs	0.64	363.85	56.85	
03:00 hrs	**0.67**	**365.34**	**58.34**	**Min Hr**
04:00 hrs	0.62	363.96	56.96	
05:00 hrs	0.59	363.81	56.81	
06:00 hrs	0.82	363.92	56.92	
07:00 hrs	1.19	363.08	56.08	
08:00 hrs	1.36	362.86	55.86	
09:00 hrs	1.27	362.97	55.97	
10:00 hrs	1.32	362.86	55.86	
11:00 hrs	1.32	362.84	55.84	
12:00 hrs	1.24	363.02	56.02	
13:00 hrs	1.20	363.15	56.15	
14:00 hrs	1.11	363.37	56.37	
15:00 hrs	**1.09**	**363.48**	**56.48**	**Avg Day**
16:00 hrs	1.17	363.49	56.49	
17:00 hrs	1.23	364.12	57.12	
18:00 hrs	1.37	363.80	56.80	
19:00 hrs	1.47	363.56	56.56	
20:00 hrs	1.49	363.50	56.50	
21:00 hrs	1.35	363.71	56.71	
22:00 hrs	1.17	363.97	56.97	
23:00 hrs	0.88	363.53	56.53	
Average =	**1.07**	363.58	56.58	
Minimum =	**0.51**	365.34	58.34	

Maximum Day				
Time	Flow (L/s)	Head (m)	Residual Pressure (m)	
00:00 hrs	1.06	363.96	56.96	
01:00 hrs	0.72	364.42	57.42	
02:00 hrs	0.91	363.94	56.94	
03:00 hrs	1.23	363.27	56.27	
04:00 hrs	1.15	363.50	56.50	
05:00 hrs	1.23	363.64	56.64	
06:00 hrs	1.87	363.05	56.05	
07:00 hrs	2.87	361.40	54.40	
08:00 hrs	2.92	361.94	54.94	
09:00 hrs	2.32	362.50	55.50	
10:00 hrs	2.13	362.98	55.98	
11:00 hrs	2.17	363.18	56.18	
12:00 hrs	**2.11**	**362.95**	**55.95**	**Max Day**
13:00 hrs	2.11	363.13	56.13	
14:00 hrs	1.94	363.07	56.07	
15:00 hrs	1.83	363.54	56.54	
16:00 hrs	2.15	363.02	56.02	
17:00 hrs	2.43	361.82	54.82	
18:00 hrs	2.72	362.01	55.01	
19:00 hrs	3.19	361.17	54.17	
20:00 hrs	3.57	359.88	52.88	
21:00 hrs	**3.72**	**359.29**	**52.29**	**Peak Hr**
22:00 hrs	2.92	360.53	53.53	
23:00 hrs	1.79	362.05	55.05	
Max Day =	**2.13**	362.51	55.51	
Peak Hour =	**3.72**	359.29	52.29	

Fire Flow Analysis		
Available Flow (L/s)	Head (m)	Residual Pressure (m)
0.0	363.10	56.10
10.0	362.60	55.60
20.0	361.90	54.90
30.0	361.00	54.00
40.0	360.00	53.00
50.0	358.90	51.90
60.0	357.60	50.60
70.0	356.20	49.20
80.0	354.70	47.70
90.0	353.00	46.00
100.0	351.20	44.20
110.0	349.30	42.30
120.0	347.30	40.30
130.0	345.10	38.10
140.0	342.80	35.80
150.0	340.40	33.40
160.0	337.90	30.90
170.0	335.20	28.20
180.0	332.40	25.40
182.8	330.10	23.10

Fire Flow Analysis Adjusted for Maximum Day Flows		
Available Flow (L/s)	Head (m)	Residual Pressure (m)
2.1	363.10	56.10
12.1	362.60	55.60
22.1	361.90	54.90
32.1	361.00	54.00
42.1	360.00	53.00
52.1	358.90	51.90
62.1	357.60	50.60
72.1	356.20	49.20
82.1	354.70	47.70
92.1	353.00	46.00
102.1	351.20	44.20
112.1	349.30	42.30
122.1	347.30	40.30
132.1	345.10	38.10
142.1	342.80	35.80
152.1	340.40	33.40
162.1	337.90	30.90
172.1	335.20	28.20
182.1	332.40	25.40
184.9	330.10	23.10

Node 12518 - Pump Curve Pressure Distribution			
Demand Scenario	Discharge (L/s)	HGL (m)	Head (m)
0 (Est.)	0.00	365.50	58.50
Minimum Hour	0.67	365.34	58.34
Average Day	1.09	363.48	56.48
Maximum Day	2.11	362.95	55.95
Peak Hour	3.72	359.29	52.29
Max Day + 20 L/s Fire Flow	22.11	361.90	54.90
Max Day + 40 L/s Fire Flow	42.11	360.00	53.00
Max Day + 60 L/s Fire Flow	62.11	357.60	50.60
Max Day + 80 L/s Fire Flow	82.11	354.70	47.70
Max Day + 100 L/s Fire Flow	102.11	351.20	44.20
Max Day + 120 L/s Fire Flow	122.11	347.30	40.30
Max Day + 140 L/s Fire Flow	142.11	342.80	35.80
Max Day + 160 L/s Fire Flow	162.11	337.90	30.90
Max Day + 180 L/s Fire Flow	182.11	332.40	25.40
Max Day + 182.8 L/s Fire Flow	184.91	330.10	23.10



WESTWOOD VILLAGE COMMUNITY - WATER SERVICING ANALYSIS

CITY OF CAMBRIDGE - PRESSURE ZONE 3

Pump Curve Design Sheet - Scenario 1

Project No.: 44719-114
Date: 2-Jul-21
Design By: CJC
File: Q:\44719\114\Water Distribution\July 2021\44719-114_Region Pressures & Pump Curves.xlsx
Note: System pressure information is from correspondence to Charles Carré from Kevin Dolishny at the Region of Waterloo on December 18, 2019.

Node 12800 Westcliffe Way @ Proposed Newman Drive
Elevation = *309.00* m

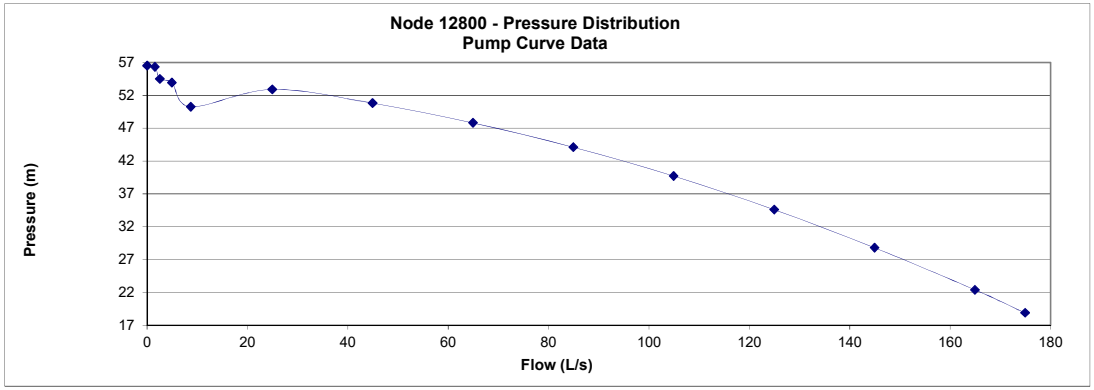
Average Day				
Time	Flow (L/s)	Head (m)	Residual Pressure (m)	
00:00 hrs	1.45	363.70	54.70	
01:00 hrs	1.20	364.09	55.09	
02:00 hrs	1.50	363.84	54.84	
03:00 hrs	**1.58**	**365.33**	**56.33**	**Min Hr**
04:00 hrs	1.45	363.96	54.96	
05:00 hrs	1.38	363.80	54.80	
06:00 hrs	1.93	363.92	54.92	
07:00 hrs	2.78	363.07	54.07	
08:00 hrs	3.18	362.85	53.85	
09:00 hrs	2.98	362.97	53.97	
10:00 hrs	3.08	362.86	53.86	
11:00 hrs	3.08	362.83	53.83	
12:00 hrs	2.90	363.01	54.01	
13:00 hrs	2.80	363.14	54.14	
14:00 hrs	2.60	363.37	54.37	
15:00 hrs	**2.55**	**363.48**	**54.48**	**Avg Day**
16:00 hrs	2.73	363.49	54.49	
17:00 hrs	2.88	364.11	55.11	
18:00 hrs	3.20	363.80	54.80	
19:00 hrs	3.43	363.56	54.56	
20:00 hrs	3.48	363.49	54.49	
21:00 hrs	3.15	363.71	54.71	
22:00 hrs	2.73	363.96	54.96	
23:00 hrs	2.05	363.53	54.53	
Average =	**2.50**	363.58	54.58	
Minimum =	**1.20**	365.33	56.33	

Maximum Day				
Time	Flow (L/s)	Head (m)	Residual Pressure (m)	
00:00 hrs	2.49	363.95	54.95	
01:00 hrs	1.69	364.42	55.42	
02:00 hrs	2.14	363.94	54.94	
03:00 hrs	2.89	363.27	54.27	
04:00 hrs	2.69	363.50	54.50	
05:00 hrs	2.89	363.63	54.63	
06:00 hrs	4.39	363.04	54.04	
07:00 hrs	6.73	361.37	52.37	
08:00 hrs	6.83	361.91	52.91	
09:00 hrs	5.43	362.49	53.49	
10:00 hrs	4.99	362.96	53.96	
11:00 hrs	5.08	363.16	54.16	
12:00 hrs	**4.94**	**362.93**	**53.93**	**Max Day**
13:00 hrs	4.94	363.12	54.12	
14:00 hrs	4.54	363.06	54.06	
15:00 hrs	4.29	363.53	54.53	
16:00 hrs	5.03	363.01	54.01	
17:00 hrs	5.68	361.80	52.80	
18:00 hrs	6.38	361.99	52.99	
19:00 hrs	7.48	361.14	52.14	
20:00 hrs	8.37	359.84	50.84	
21:00 hrs	**8.72**	**359.24**	**50.24**	**Peak Hr**
22:00 hrs	6.83	360.50	51.50	
23:00 hrs	4.19	362.04	53.04	
Max Day =	**4.98**	362.49	53.49	
Peak Hour =	**8.72**	359.24	50.24	

Fire Flow Analysis		
Available Flow (L/s)	Head (m)	Residual Pressure (m)
0.0	363.30	54.30
10.0	362.70	53.70
20.0	361.90	52.90
30.0	360.90	51.90
40.0	359.80	50.80
50.0	358.40	49.40
60.0	356.80	47.80
70.0	355.10	46.10
80.0	353.10	44.10
90.0	351.00	42.00
100.0	348.70	39.70
110.0	346.30	37.30
120.0	343.60	34.60
130.0	340.80	31.80
140.0	337.80	28.80
150.0	334.70	25.70
160.0	331.40	22.40
170.0	327.90	18.90

Fire Flow Analysis Adjusted for Maximum Day Flows		
Available Flow (L/s)	Head (m)	Residual Pressure (m)
4.9	363.30	54.30
14.9	362.70	53.70
24.9	361.90	52.90
34.9	360.90	51.90
44.9	359.80	50.80
54.9	358.40	49.40
64.9	356.80	47.80
74.9	355.10	46.10
84.9	353.10	44.10
94.9	351.00	42.00
104.9	348.70	39.70
114.9	346.30	37.30
124.9	343.60	34.60
134.9	340.80	31.80
144.9	337.80	28.80
154.9	334.70	25.70
164.9	331.40	22.40
174.9	327.90	18.90

Node 12800 - Pump Curve Pressure Distribution			
Demand Scenario	Discharge (L/s)	HGL (m)	Head (m)
0 (Est.)	0.00	365.50	56.50
Minimum Hour	1.58	365.33	56.33
Average Day	2.55	363.48	54.48
Maximum Day	4.94	362.93	53.93
Peak Hour	8.72	359.24	50.24
Max Day + 20 L/s Fire Flow	24.94	361.90	52.90
Max Day + 40 L/s Fire Flow	44.94	359.80	50.80
Max Day + 60 L/s Fire Flow	64.94	356.80	47.80
Max Day + 80 L/s Fire Flow	84.94	353.10	44.10
Max Day + 100 L/s Fire Flow	104.94	348.70	39.70
Max Day + 120 L/s Fire Flow	124.94	343.60	34.60
Max Day + 140 L/s Fire Flow	144.94	337.80	28.80
Max Day + 160 L/s Fire Flow	164.94	331.40	22.40
Max Day + 170 L/s Fire Flow	174.94	327.90	18.90



WESTWOOD VILLAGE COMMUNITY - WATER SERVICING ANALYSIS

CITY OF CAMBRIDGE - PRESSURE ZONE 3

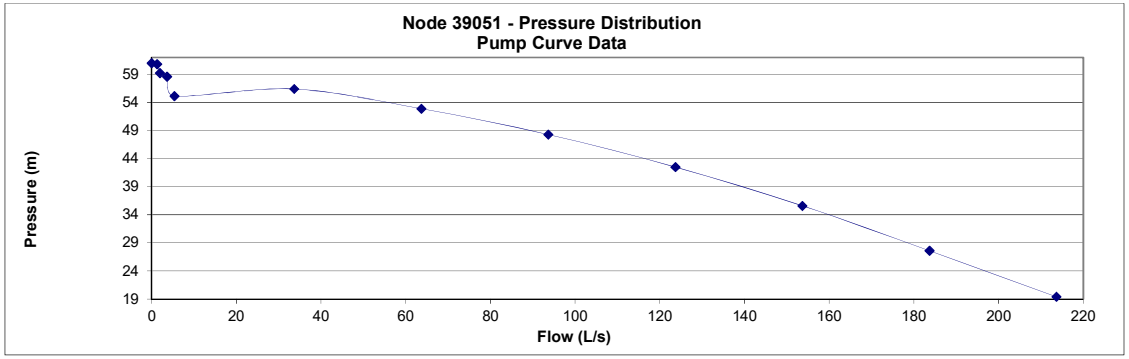
Pump Curve Design Sheet - Scenario 1

Project No.: 44719-114
Date: 2-Jul-21
Design By: CJC
File: Q:\44719\114\Water Distribution\July 2021\44719-114_Region Pressures & Pump Curves.xlsx
Note: System pressure information is from correspondence to Charles Carré from Kevin Dolishny at the Region of Waterloo on December 18, 2019.

Node 39051 Blenheim Road - West of Railway @ Sawmill Easement
Elevation = *304.50* m

Average Day					Maximum Day					Fire Flow Analysis			Fire Flow Analysis Adjusted for Maximum Day Flows		
Time	Flow (L/s)	Head (m)	Residual Pressure (m)		Time	Flow (L/s)	Head (m)	Residual Pressure (m)		Available Flow (L/s)	Head (m)	Residual Pressure (m)	Available Flow (L/s)	Head (m)	Residual Pressure (m)
00:00 hrs	1.39	363.68	59.18		00:00 hrs	2.39	363.95	59.45		0.0	363.10	58.60	3.7	363.10	58.60
01:00 hrs	1.27	364.06	59.56		01:00 hrs	2.19	364.41	59.91		10.0	362.50	58.00	13.7	362.50	58.00
02:00 hrs	1.38	363.82	59.32		02:00 hrs	2.45	363.94	59.44		20.0	361.80	57.30	23.7	361.80	57.30
03:00 hrs	**1.31**	**365.32**	**60.82**	**Min Hr**	03:00 hrs	2.78	363.28	58.78		30.0	360.90	56.40	33.7	360.90	56.40
04:00 hrs	1.11	363.93	59.43		04:00 hrs	2.40	363.50	59.00		40.0	359.90	55.40	43.7	359.90	55.40
05:00 hrs	1.10	363.78	59.28		05:00 hrs	2.05	363.64	59.14		50.0	358.70	54.20	53.7	358.70	54.20
06:00 hrs	1.41	363.91	59.41		06:00 hrs	2.92	363.09	58.59		60.0	357.40	52.90	63.7	357.40	52.90
07:00 hrs	1.97	363.08	58.58		07:00 hrs	3.93	361.56	57.06		70.0	356.00	51.50	73.7	356.00	51.50
08:00 hrs	2.01	362.86	58.36		08:00 hrs	4.18	362.12	57.62		80.0	354.40	49.90	83.7	354.40	49.90
09:00 hrs	2.06	362.97	58.47		09:00 hrs	4.16	362.62	58.12		90.0	352.80	48.30	93.7	352.80	48.30
10:00 hrs	2.18	362.87	58.37		10:00 hrs	3.76	363.06	58.56		100.0	350.90	46.40	103.7	350.90	46.40
11:00 hrs	2.25	362.84	58.34		11:00 hrs	3.79	363.27	58.77		110.0	349.00	44.50	113.7	349.00	44.50
12:00 hrs	2.19	363.01	58.51		12:00 hrs	3.80	363.03	58.53		120.0	347.00	42.50	123.7	347.00	42.50
13:00 hrs	2.14	363.15	58.65		13:00 hrs	3.93	363.22	58.72		130.0	344.80	40.30	133.7	344.80	40.30
14:00 hrs	2.04	363.37	58.87		14:00 hrs	3.67	363.14	58.64		140.0	342.50	38.00	143.7	342.50	38.00
15:00 hrs	2.04	363.48	58.98		15:00 hrs	3.46	363.60	59.10		150.0	340.10	35.60	153.7	340.10	35.60
16:00 hrs	2.02	363.49	58.99		**16:00 hrs**	**3.68**	**363.11**	**58.61**	**Max Day**	160.0	337.50	33.00	163.7	337.50	33.00
17:00 hrs	2.00	364.11	59.61		17:00 hrs	4.38	361.95	57.45		170.0	334.90	30.40	173.7	334.90	30.40
18:00 hrs	2.05	363.81	59.31		18:00 hrs	4.35	362.18	57.68		180.0	332.10	27.60	183.7	332.10	27.60
19:00 hrs	2.08	363.57	59.07		19:00 hrs	4.56	361.41	56.91		190.0	329.20	24.70	193.7	329.20	24.70
20:00 hrs	2.03	363.51	59.01		20:00 hrs	5.13	360.20	55.70		200.0	326.20	21.70	203.7	326.20	21.70
21:00 hrs	**1.95**	**363.72**	**59.22**	**Avg Day**	**21:00 hrs**	**5.39**	**359.65**	**55.15**	**Peak Hr**	210.0	323.90	19.40	213.7	323.90	19.40
22:00 hrs	1.86	363.97	59.47		22:00 hrs	4.33	360.72	56.22							
23:00 hrs	1.62	363.52	59.02		23:00 hrs	3.21	362.09	57.59							
Average =	**1.81**	363.58	59.08		**Max Day =**	**3.62**	362.61	58.11							
Minimum =	**1.10**	365.32	60.82		**Peak Hour =**	**5.39**	359.65	55.15							

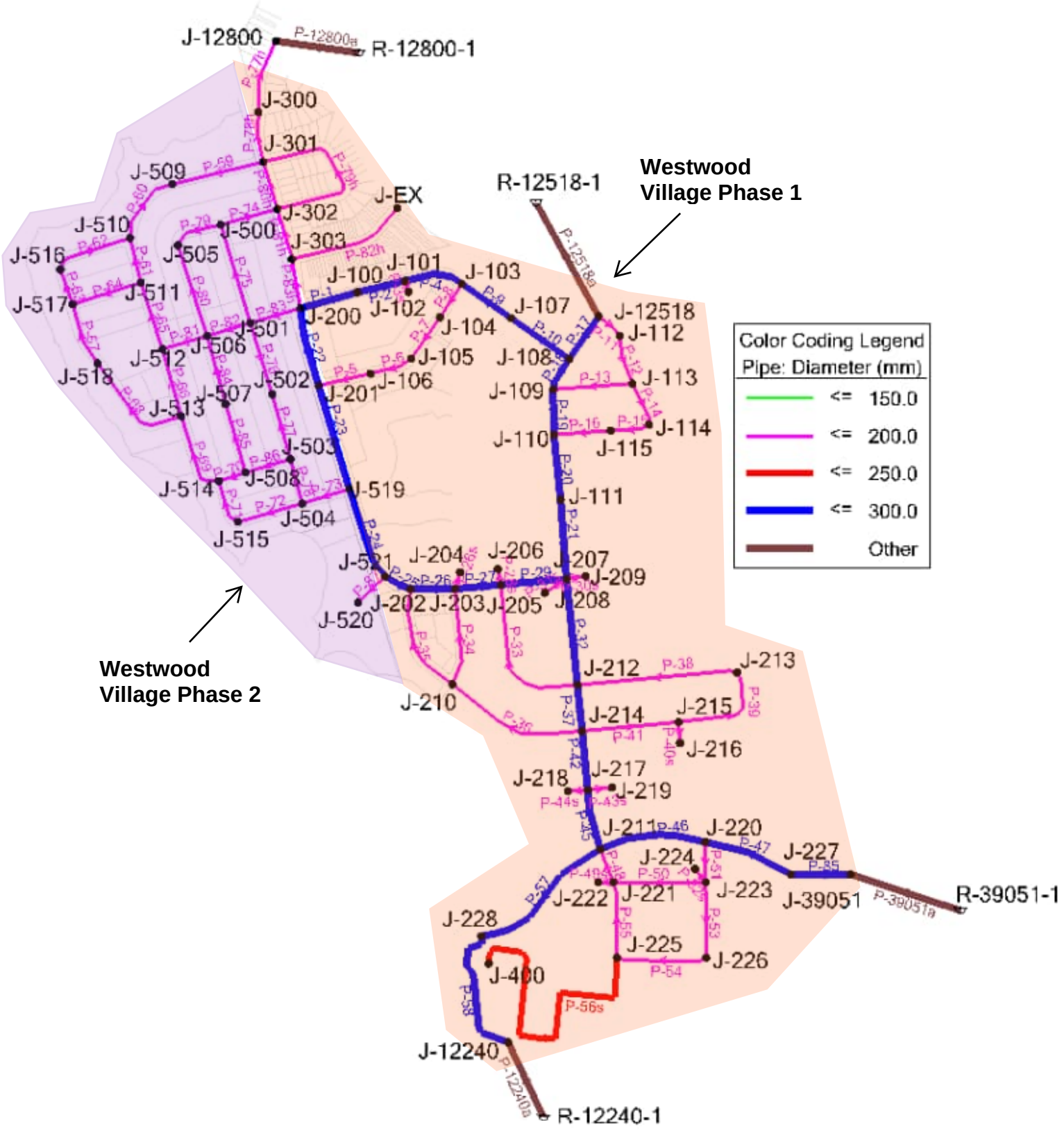
Node 39051- Pump Curve Pressure Distribution			
Demand Scenario	**Discharge (L/s)**	**HGL (m)**	**Head (m)**
0 (Est.)	0.00	365.50	61.00
Minimum Hour	1.31	365.32	60.82
Average Day	1.95	363.72	59.22
Maximum Day	3.68	363.11	58.61
Peak Hour	5.39	359.65	55.15
Max Day + 30 L/s Fire Flow	33.68	360.90	56.40
Max Day + 60 L/s Fire Flow	63.68	357.40	52.90
Max Day + 90 L/s Fire Flow	93.68	352.80	48.30
Max Day + 120 L/s Fire Flow	123.68	347.00	42.50
Max Day + 150 L/s Fire Flow	153.68	340.10	35.60
Max Day + 180 L/s Fire Flow	183.68	332.10	27.60
Max Day + 210 L/s Fire Flow	213.68	323.90	19.40



Appendix D

WaterCAD Output Files

Water Distribution Network



Westwood Village - Water Distribution Analysis

Active Scenario: Max Day + Fire

Label	Elevation (m)	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-200	314.47	True	133.000	133.403	217.403	440.2	418.8	1.67	P-77h
J-201	313.81	True	100.000	100.394	217.394	443.8	418.8	1.65	P-17
J-300	311.10	True	100.000	100.360	217.360	439.0	418.6	3.79	P-77h
J-301	313.05	True	100.000	100.668	217.668	429.1	398.7	2.64	P-77h
J-302	313.70	True	133.000	133.531	217.531	423.8	406.5	2.27	P-77h
J-303	314.55	True	133.000	133.785	217.785	397.1	414.9	3.73	P-83h
J-500	315.34	True	150.000	150.270	217.270	389.6	398.5	2.95	P-74
J-501	314.59	True	150.000	150.553	217.553	416.3	404.3	2.80	P-83
J-502	315.67	True	150.000	150.669	217.669	354.1	401.3	3.56	P-76
J-503	315.06	True	150.000	150.459	217.459	390.5	401.2	2.82	P-73
J-504	314.85	True	150.000	150.236	217.236	401.6	405.1	3.47	P-73
J-505	315.62	True	150.000	150.330	217.330	353.5	402.4	3.80	P-79
J-506	314.98	True	150.000	150.446	217.446	402.2	394.2	2.53	P-82
J-507	315.93	True	150.000	150.669	217.669	345.9	393.5	3.56	P-84
J-508	315.52	True	150.000	150.446	217.446	384.2	395.3	2.64	P-73
J-509	317.21	True	100.000	100.428	217.428	317.3	371.7	3.84	P-59
J-510	316.38	True	150.000	150.445	217.445	334.1	344.1	2.73	P-59
J-511	315.98	True	150.000	150.411	217.411	343.3	349.7	3.08	P-65
J-512	315.40	True	150.000	150.291	217.291	374.8	372.8	3.36	P-81
J-513	316.37	True	150.000	150.454	217.454	352.5	361.2	2.86	P-69
J-514	315.92	True	150.000	150.309	217.309	377.0	392.2	2.95	P-70
J-515	315.40	True	100.000	100.411	217.411	357.5	392.5	3.54	P-71
J-516	316.85	True	150.000	150.321	217.321	295.1	335.4	3.77	P-63
J-517	316.51	True	150.000	150.420	217.420	320.7	328.9	2.67	P-81
J-518	317.30	True	100.000	100.343	217.343	285.5	347.3	3.58	P-67
J-519	314.70	True	100.000	100.325	217.325	436.2	418.8	1.62	P-17
J-520	315.81	True	200.000	201.539	218.539	306.2	418.8	6.96	P-87
J-521	314.25	True	100.000	100.000	217.000	440.1	418.8	1.70	P-25

Westwood Village - Water Distribution Analysis

Active Scenario: Average Day

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (kPa)
J-200	314.47	0.201	362.94	474.4
J-201	313.81	0.197	362.94	480.8
J-300	311.10	0.180	362.93	507.3
J-301	313.05	0.334	362.93	488.2
J-302	313.70	0.266	362.94	481.9
J-303	314.55	0.392	362.94	473.6
J-500	315.34	0.135	362.94	465.8
J-501	314.59	0.277	362.94	473.1
J-502	315.67	0.334	362.94	462.6
J-503	315.06	0.229	362.94	468.5
J-504	314.85	0.118	362.94	470.6
J-505	315.62	0.165	362.94	463.0
J-506	314.98	0.223	362.94	469.3
J-507	315.93	0.334	362.94	460.0
J-508	315.52	0.223	362.94	464.1
J-509	317.21	0.214	362.93	447.5
J-510	316.38	0.223	362.93	455.6
J-511	315.98	0.206	362.93	459.5
J-512	315.40	0.146	362.94	465.2
J-513	316.37	0.227	362.94	455.7
J-514	315.92	0.154	362.94	460.1
J-515	315.40	0.206	362.94	465.2
J-516	316.85	0.161	362.93	451.0
J-517	316.51	0.210	362.93	454.4
J-518	317.30	0.171	362.94	446.6
J-519	314.70	0.163	362.94	472.1
J-520	315.81	0.770	362.94	461.3
J-521	314.25	0.000	362.94	476.5

Westwood Village - Water Distribution Analysis

Active Scenario: Max Day

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (kPa)
J-200	314.47	0.403	362.89	473.8
J-201	313.81	0.394	362.89	480.3
J-300	311.10	0.360	362.90	507.0
J-301	313.05	0.668	362.89	487.8
J-302	313.70	0.531	362.89	481.4
J-303	314.55	0.785	362.89	473.1
J-500	315.34	0.270	362.88	465.3
J-501	314.59	0.553	362.88	472.6
J-502	315.67	0.669	362.88	462.1
J-503	315.06	0.459	362.88	468.0
J-504	314.85	0.236	362.88	470.1
J-505	315.62	0.330	362.88	462.5
J-506	314.98	0.446	362.88	468.8
J-507	315.93	0.669	362.88	459.5
J-508	315.52	0.446	362.88	463.5
J-509	317.21	0.428	362.88	447.0
J-510	316.38	0.445	362.88	455.1
J-511	315.98	0.411	362.88	459.0
J-512	315.40	0.291	362.88	464.7
J-513	316.37	0.454	362.88	455.2
J-514	315.92	0.309	362.88	459.6
J-515	315.40	0.411	362.88	464.7
J-516	316.85	0.321	362.88	450.5
J-517	316.51	0.420	362.88	453.9
J-518	317.30	0.343	362.88	446.1
J-519	314.70	0.325	362.88	471.5
J-520	315.81	1.539	362.88	460.7
J-521	314.25	0.000	362.88	475.9

Westwood Village - Water Distribution Analysis

Active Scenario: Min Hour

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (kPa)
J-200	314.47	0.101	363.01	475.0
J-201	313.81	0.098	363.01	481.5
J-300	311.10	0.090	363.00	508.0
J-301	313.05	0.167	363.00	488.9
J-302	313.70	0.133	363.00	482.5
J-303	314.55	0.196	363.01	474.2
J-500	315.34	0.067	363.00	466.5
J-501	314.59	0.138	363.00	473.8
J-502	315.67	0.167	363.00	463.3
J-503	315.06	0.115	363.01	469.2
J-504	314.85	0.059	363.01	471.3
J-505	315.62	0.082	363.00	463.7
J-506	314.98	0.111	363.00	470.0
J-507	315.93	0.167	363.00	460.7
J-508	315.52	0.111	363.00	464.7
J-509	317.21	0.107	363.00	448.2
J-510	316.38	0.111	363.00	456.3
J-511	315.98	0.103	363.00	460.2
J-512	315.40	0.073	363.00	465.9
J-513	316.37	0.114	363.00	456.4
J-514	315.92	0.077	363.00	460.8
J-515	315.40	0.103	363.01	465.9
J-516	316.85	0.080	363.00	451.7
J-517	316.51	0.105	363.00	455.1
J-518	317.30	0.086	363.00	447.3
J-519	314.70	0.081	363.01	472.8
J-520	315.81	0.385	363.01	461.9
J-521	314.25	0.000	363.01	477.2

Westwood Village - Water Distribution Analysis

Active Scenario: Peak Hour

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (kPa)
J-200	314.47	0.604	362.79	472.9
J-201	313.81	0.591	362.79	479.3
J-300	311.10	0.540	362.85	506.5
J-301	313.05	1.002	362.80	486.9
J-302	313.70	0.797	362.79	480.5
J-303	314.55	1.177	362.79	472.1
J-500	315.34	0.405	362.79	464.3
J-501	314.59	0.830	362.78	471.7
J-502	315.67	1.003	362.78	461.1
J-503	315.06	0.688	362.78	467.0
J-504	314.85	0.353	362.78	469.1
J-505	315.62	0.495	362.78	461.5
J-506	314.98	0.668	362.78	467.8
J-507	315.93	1.003	362.78	458.5
J-508	315.52	0.669	362.78	462.5
J-509	317.21	0.642	362.79	446.1
J-510	316.38	0.668	362.78	454.1
J-511	315.98	0.617	362.78	458.0
J-512	315.40	0.437	362.78	463.7
J-513	316.37	0.681	362.78	454.2
J-514	315.92	0.463	362.78	458.6
J-515	315.40	0.617	362.78	463.7
J-516	316.85	0.482	362.78	449.5
J-517	316.51	0.630	362.78	452.9
J-518	317.30	0.514	362.78	445.1
J-519	314.70	0.488	362.78	470.5
J-520	315.81	2.309	362.77	459.6
J-521	314.25	0.000	362.77	474.9

Appendix E

Proposed Storm Sewer Analysis

PROJECT NAME
CITY OF CAMBRIDGE

STORM SEWER DESIGN SHEET

ENGINEERING AND PUBLIC WORKS

Project Number: 0000-000
Date: April 2, 2026
Design By: TRN
Checked By: GMK
File: Q:\02534\800\STM\bds-02534-800 Storm Sewer Design Sheet 2026-03-27.xlsx

Drainage Area Plan No: ST1.1

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*	*%*
To Blacklock Stub	1	CBMH1	CBMH11	0.640	0.60	0.3840	0.3840	*10.0000* *11.9757*	1.9757	101.5582	108.4155	375	150.0	0.50	123.97713	1.1225	87.45
	2	CBMH7	CBMH11	0.480	0.60	0.2880	0.2880	*10.0000* *11.6149*	1.6149	101.5582	81.3116	375	116.0	0.50	123.97713	1.1225	65.59
	3	CBMH11	CBMH21	0.270	0.60	0.1620	0.8340	*11.9757* *12.7344*	0.7588	94.1519	218.2931	600	70.0	0.50	434.17173	1.5356	50.28
	4	CBMH7	CBMH18	0.280	0.60	0.1680	0.1680	*10.0000* *11.1170*	1.1170	101.5582	47.4318	300	70.0	0.50	68.37776	0.9673	69.37
	5	CBMH15	CBMH18	0.500	0.40	0.2000	0.2000	*10.0000* *11.2163*	1.2163	101.5582	56.4664	375	80.0	0.50	123.97713	1.1225	45.55
	6	CBMH18	CBMH21	0.790	0.60	0.4740	0.8420	*11.2163* *12.4070*	1.1907	96.8533	226.7103	525	110.0	0.50	304.09995	1.4048	74.55
	7	CBMH21	CBMH32	1.170	0.40	0.4680	2.1440	*12.7344* *13.8345*	1.1001	91.6141	546.0491	750	110.0	0.35	658.62356	1.4908	82.91
	8	CBMH29	CBMH32	0.940	0.60	0.5640	0.5640	*10.0000* *11.4236*	1.4236	101.5582	159.2352	450	120.0	0.50	201.60049	1.2676	78.99
	9	CBMH32	MH41	0.180	0.60	0.1080	2.8160	*13.8345* *14.5241*	0.6896	88.1916	690.4060	975	70.0	0.30	1227.47542	1.6440	56.25
	10	CBMH34	MH41	0.500	0.60	0.3000	0.3000	*10.0000* *11.5176*	1.5176	101.5582	84.6996	375	110.0	0.50	123.97713	1.1225	68.32
	11	CBMH36	MH41	1.610	0.60	0.9660	0.9660	*10.0000* *12.2456*	2.2456	101.5582	272.7326	600	190.0	0.35	363.25413	1.2847	75.08
	12	MH41	MH48	0.180	0.60	0.1080	4.1900	*14.5241* *15.1604*	0.6363	86.1866	1003.9188	975	70.0	0.30	1227.47542	1.6440	81.79
	13	CBMH36	CBMH45	0.100	0.60	0.0600	0.0600	*10.0000* *11.4592*	1.4592	101.5582	16.9399	300	90.0	1.00	96.70076	1.3680	17.52
	14	CBMH44	CBMH45	0.100	0.60	0.0600	0.0600	*10.0000* *10.2918*	0.2918	101.5582	16.9399	300	18.0	1.00	96.70076	1.3680	17.52
	15	CBMH45	MH48	1.440	0.60	0.8640	0.9840	*11.4592* *11.4649*	0.0057	95.9705	262.5292	600	0.5	0.40	388.33500	1.3735	67.60
	16	CBMH42	MH48	0.530	0.60	0.3180	0.3180	*10.0000* *12.3546*	2.3546	101.5582	89.7816	375	170.0	0.48	121.47228	1.0998	73.91

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*	*%*
To Wildlife Crossing Stub	17	MH48	MH258	0.160	0.60	0.0960	5.5880	*15.1604* *15.6746*	0.5142	84.4237	1311.4923	975	70.0	0.45	1503.34422	2.0135	87.24
	19	CBMH15	CBMH29	0.770	0.60	0.4620	0.4620	*10.0000*	2.4731	101.5582	130.4374	450	200.0	0.50	201.60049	1.2676	64.70
	20	CBMH29	CBMH52	0.080	0.60	0.0480	0.5100	12.4731	0.1976	92.4708	131.1051	450	16.0	0.50	201.60049	1.2676	65.03
	21	CBMH52	CBMH53	0.310	0.60	0.1860	0.6960	12.6707	0.5447	91.8213	177.6631	600	39.4	0.30	336.30797	1.1894	52.83
	22	CBMH53	CBMH55	0.130	0.60	0.0780	0.7740	13.2154	0.5333	90.0820	193.8313	600	39.4	0.30	336.30797	1.1894	57.64
	23	CBMH55	MH60	0.230	0.60	0.1380	0.9120	13.7487 *14.2644*	0.5157	88.4483	224.2483	600	39.4	0.30	336.30797	1.1894	66.68
	24	CBMH34	MH60	1.180	0.60	0.7080	0.7080	*10.0000* *10.4381*	0.4381	101.5582	199.8910	525	39.4	0.50	304.09995	1.4048	65.73
	25	MH60	MH64	0.360	0.60	0.2160	1.8360	*14.2644* *14.6825*	0.4181	86.9297	443.6960	675	39.4	0.35	497.29865	1.3897	89.22
	26	CBMH42	MH64	1.190	0.60	0.7140	0.7140	*10.0000* *10.3007*	0.3007	101.5582	201.5850	450	39.4	1.35	331.26340	2.0829	60.85
	27	MH64	MH70	0.260	0.60	0.1560	2.7060	*14.6825* *15.0826*	0.4001	85.7402	644.9958	825	39.4	0.30	786.22049	1.4708	82.04
	18	CBMH55	CBMH67	0.240	0.60	0.1440	0.1440	*10.0000*	0.5018	101.5582	40.6558	300	39.4	1.00	96.70076	1.3680	42.04
	28	CBMH67	MH70	0.660	0.60	0.3960	0.5400	*10.0000* *10.4713*	0.4713	101.5582	152.4592	450	39.4	0.50	201.60049	1.2676	75.62
	29	MH70	MH263	0.200	0.60	0.1200	3.3660	*15.0826* *15.4258*	0.3431	84.6349	791.9695	825	39.4	0.40	907.84922	1.6983	87.24
To Newman Drive	EXT. 1	-	-	0.460	0.60	0.2760	0.2760										
	EXT. 2	CBMH44	MH27	0.580	0.60	0.3480	0.3480	*10.0000* *10.8957*	0.8957	101.5582	98.2515	375	66.9	0.50	123.97713	1.1225	79.25
	EXT. 3	CBMH1	EX. MH14	0.710	0.60	0.4260	0.4260	*10.0000* *11.1223*	1.1223	101.5582	120.2734	375	150.0	2.00	247.95426	2.2450	48.51

STORM SEWER CATCHMENT AREAS

MTE Engineers, Scientists, Surveyors

ST1.1

PROJ. NO.	02534-800
DATE	Apr.02/26
SCALE	1:1000
BY	Milan Filipovic
CAD FILE	P:\P\02534\800\TEMP DWGS\TRN\ 02534-800-P-ST1.1-LATEST.DWG

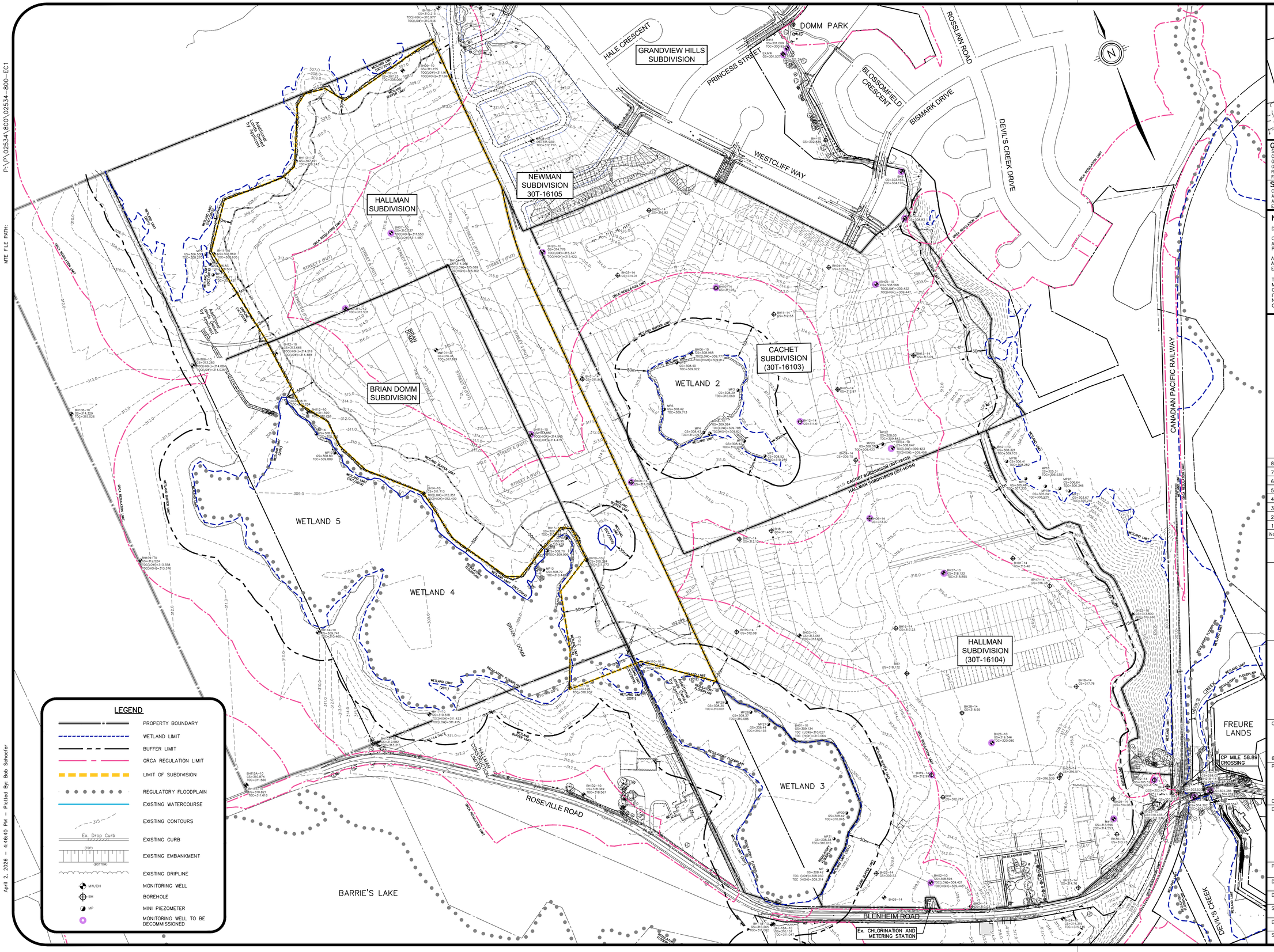
February 1, 2021 7:42 p.m. Plotted By: CCarre

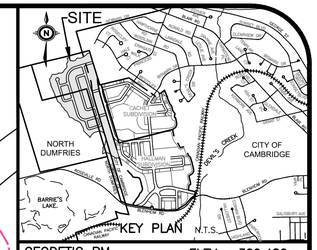
Drawings

P:\P\02534\800\02534-800-EC1

MTE FILE PATH:

April 2, 2026 – 4:46:40 PM – Plotted By: Bob Schaefer





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.

NOTE TO CONTRACTOR :

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No.	REVISION	BY	YYYY-MM-DD
8.			
7.			
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3.			
2.	ISSUED FOR DRAFT PLAN APPROVAL – PHASE 2	GMK	2026-04-02
1.	ISSUED FOR DRAFT PLAN APPROVAL	GMK	2021-04-19

TOWNSHIP of NORTH DUMFRIES

MTE
Engineers, Scientists, Surveyors
519-743-6500

OWNER
HALLMAN CONSTRUCTION LIMITED
675 RIVERBEND DRIVE KITCHENER

PROJECT
WESTWOOD VILLAGE PHASE 2
Cambridge Ontario

DRAWING
EXISTING CONDITIONS PLAN (OVERALL)

Project Manager	G.KORBER	Project No.	02534-800
Design By	CJC	Checked By	
Drawn By	KAT	Checked By	CJC
Surveyed By	MTE	Drawing No.	EC1.1
Date	Dec.02/20		
Scale	1:2500	Sheet	of

LEGEND

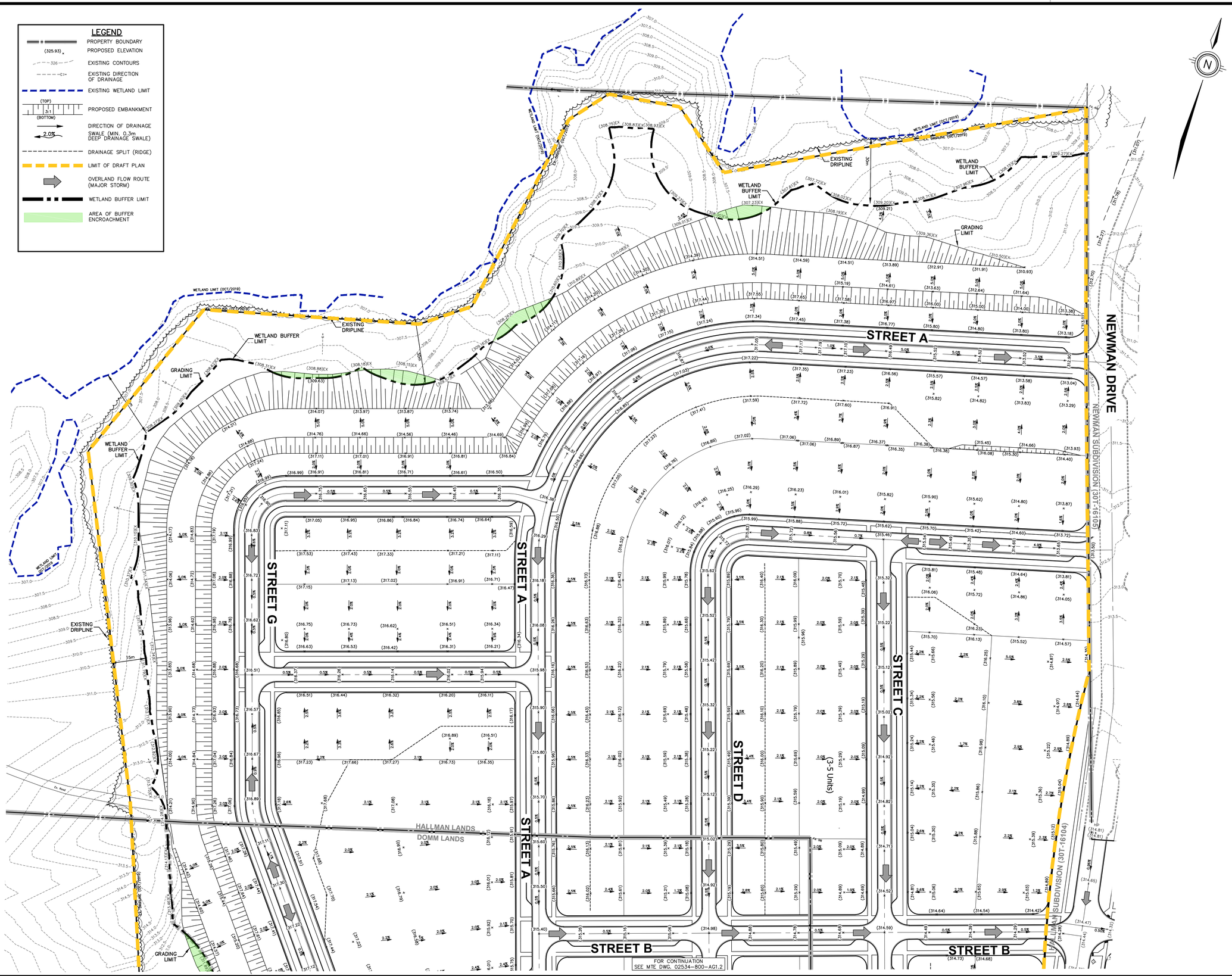
- PROPERTY BOUNDARY
- WETLAND LIMIT
- BUFFER LIMIT
- GRCA REGULATION LIMIT
- LIMIT OF SUBDIVISION
- REGULATORY FLOODPLAIN
- EXISTING WATERCOURSE
- EXISTING CONTOURS
- EXISTING CURB (Ex. Drop Curb)
- EXISTING EMBANKMENT (TOP / BOTTOM)
- EXISTING DRIPLINE
- MONITORING WELL (MW/BH)
- BOREHOLE (BH)
- MINI PIEZOMETER (MP)
- MONITORING WELL TO BE DECOMMISSIONED

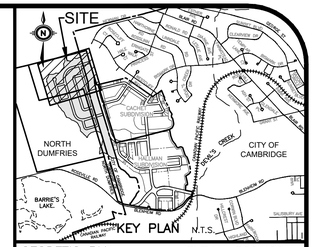
P:\P\02534\800\02534-800-AG1

MTE FILE PATH:

LEGEND

- PROPERTY BOUNDARY
- (325.93) PROPOSED ELEVATION
- 326 EXISTING CONTOURS
- EXISTING DIRECTION OF DRAINAGE
- EXISTING WETLAND LIMIT
- (TOP) 3:1 (BOTTOM) PROPOSED EMBANKMENT
- DIRECTION OF DRAINAGE
- 2.0% SWALE (MIN. 0.3m DEEP DRAINAGE SWALE)
- DRAINAGE SPLIT (RIDGE)
- LIMIT OF DRAFT PLAN
- OVERLAND FLOW ROUTE (MAJOR STORM)
- WETLAND BUFFER LIMIT
- AREA OF BUFFER ENCROACHMENT





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.

NOTE TO CONTRACTOR :

DO NOT SCALE DRAWINGS.

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No.	REVISION	BY	YYYY-MM-DD
8.			
7.			
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2.	ISSUED FOR DRAFT PLAN APPROVAL – PHASE 2	GMK	2026-04-02
1.	ISSUED FOR APPROVAL	GMK	2021-04-02

TOWNSHIP of NORTH DUMFRIES

MTE
Engineers, Scientists, Surveyors
519-743-6500

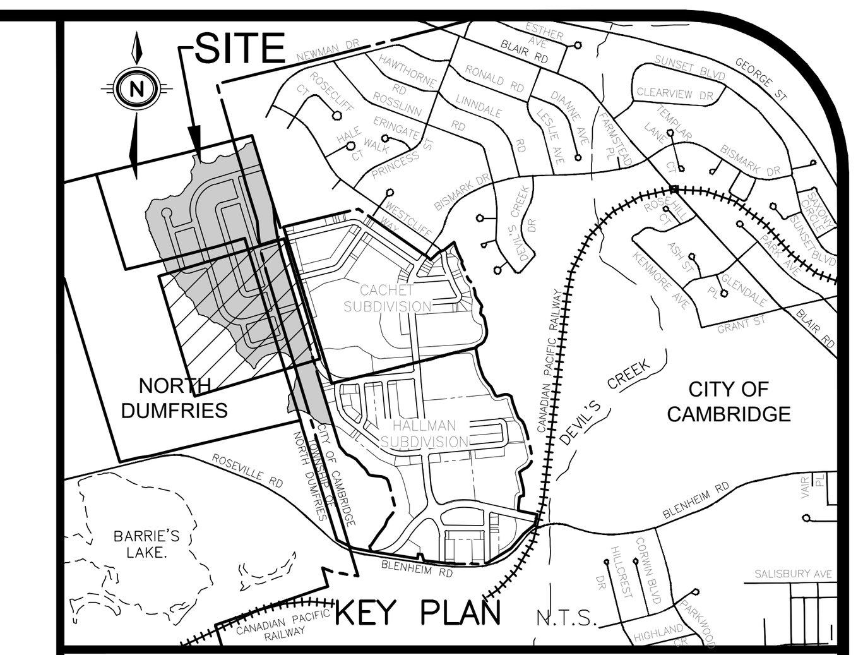
OWNER
HALLMAN CONSTRUCTION LIMITED
675 RIVERBEND DRIVE KITCHENER

PROJECT
WESTWOOD VILLAGE PHASE 2
Cambridge Ontario

DRAWING
AREA GRADING PLAN No. 1

Project Manager	G.KORBER	Project No.	02534-800
Design By	CJC	Checked By	GMK
Drawn By	KAT/AXH	Checked By	GMK
Surveyed By	MTE	Drawing No.	AG1.1
Date	Dec.09/20		
Scale	1:750	Sheet	of

April 2, 2026 – 5:05:01 PM – Plotted By: Bob Schaefer



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STATION 00119663308
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2.	ISSUED FOR DRAFT PLAN APPROVAL – PHASE 2	GMK	2026-04-02
1.	ISSUED FOR APPROVAL	GMK	2021-04-19

TOWNSHIP of NORTH DUMFRIES

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519-743-6500

OWNER
HALLMAN CONSTRUCTION LIMITED
675 RIVERBEND DRIVE KITCHENER

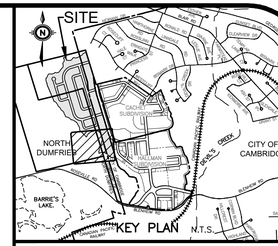
PROJECT
WESTWOOD VILLAGE PHASE 2
Cambridge Ontario

DRAWING
AREA GRADING PLAN No. 2

Project Manager: G.KORBER	Project No.: **02534-800**
Design By: CJC	Checked By: GMK
Drawn By: KAT/AXH	Checked By: GMK
Surveyed By: MTE	Drawing No.: **AG1.2**
Date: Dec.09/20	
Scale: 1:750	Sheet of

LEGEND

- PROPERTY BOUNDARY
- (325.93) PROPOSED ELEVATION
- 326 EXISTING CONTOURS
- EXISTING DIRECTION OF DRAINAGE
- EXISTING WETLAND LIMIT
- (TOP) 3:1 (BOTTOM) PROPOSED EMBANKMENT
- DIRECTION OF DRAINAGE
- 2.0% SWALE (MIN. 0.3m DEEP DRAINAGE SWALE)
- DRAINAGE SPLIT (RIDGE)
- LIMIT OF DRAFT PLAN
- OVERLAND FLOW ROUTE (MAJOR STORM)
- WETLAND BUFFER LIMIT
- AREA OF BUFFER ENCROACHMENT



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. 14.2m SOUTH EAST ALONG WESTCLIFF WAY CENTRELINE FROM INTERSECTION AND 8.4m NORTH EAST ALONG BISMARK DRIVE CENTRELINE FROM INTERSECTION.

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No.	REVISION	BY	YYYY-MM-DD
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2.	ISSUED FOR DRAFT PLAN APPROVAL – PHASE 2	GMK	2026-04-02
1.	ISSUED FOR APPROVAL	GMK	2021-04-19

TOWNSHIP of NORTH DUMFRIES

MTE
Engineers, Scientists, Surveyors
519-743-6500

OWNER
HALLMAN CONSTRUCTION LIMITED
675 RIVERBEND DRIVE KITCHENER

PROJECT
WESTWOOD VILLAGE PHASE 2
Cambridge Ontario

DRAWING
AREA GRADING PLAN No. 3

Project Manager G.KORBER	Project No. 02534-800
Design By CJC	Checked By GMK
Drawn By KAT/AXH	Checked By GMK
Surveyed By MTE	Drawing No. AG1.3
Date Dec.09/20	
Scale 1:500	Sheet of

P:\P\02534\800\02534-800-GP1

MTE FILE PATH:

NEWMAN SUBDIVISION (30T-16105)

CACHET SUBDIVISION (30T-16103)

WETLAND 2

NEWMAN DRIVE

STREET A

STREET B

STREET C

STREET D

STREET E

STREET F

STREET G

BRIAN DOMM SUBDIVISION

HALLMAN SUBDIVISION

Blk. 1 Residential 1.686 ha

Blk. 2 Residential 1.369 ha

Blk. 3 Residential 0.321 ha

Blk. 4 Residential 0.320 ha

Blk. 5 Residential 0.320 ha

Blk. 22 Park 0.339 ha

Blk. 18 Park 0.662 ha

Blk. 6 Residential 1.247 ha

Blk. 7 Residential 1.078 ha

Blk. 8 Residential 0.377 ha

Blk. 9 Residential 0.373 ha

Blk. 10 Residential 0.242 ha

Blk. 11 Residential 0.425 ha

Blk. 12 Residential 0.464 ha

Blk. 13 Residential 0.900 ha

Blk. 14 Residential 0.892 ha

Blk. 15 Residential 0.113 ha

Blk. 16 Residential 0.277 ha

Blk. 17 Residential 0.074 ha

Blk. 18 Residential 0.074 ha

Blk. 19 Consolidation Block Residential 0.558 ha

Blk. 20 Consolidation Block Residential 0.086 ha (3-5 Units)

Blk. 15 Consolidation Block Residential 0.015 ha

Blk. 16 Consolidation Block Residential 0.106 ha

Blk. 1 Residential 0.102 ha

Blk. 2 Residential 0.663 ha

Blk. 29 0.3m Reserve 0.001 ha

Blk. 28 0.3m Reserve 0.001 ha

Blk. 27 0.3m Reserve 0.001 ha

Blk. 30 0.3m Reserve 0.001 ha

Blk. 31 0.3m Reserve 0.001 ha

Blk. 32 0.3m Reserve 0.001 ha

Blk. 14 Residential 0.103 ha

Blk. 13 Residential 0.104 ha

Blk. 12 Residential 0.663 ha

Blk. 11 Residential 0.662 ha

Blk. 9 Residential 0.181 ha

Blk. 8 Residential 0.169 ha

Blk. 10 Residential 0.157 ha

Blk. 6 Residential 0.350 ha

Blk. 7 Residential 0.945 ha

Blk. 4 Residential 0.253 ha

Blk. 3 Residential 0.253 ha

Blk. 5 Residential 0.731 ha (16-19 Units)

Blk. 19 Open Space 2.541 ha

Blk. 23 Open Space 1.465 ha

Blk. 26 Wildlife Corridor 0.245 ha

Blk. 24 Open Space 0.402 ha

20.0m Wetland Setback

50.0m Wetland Setback

LEGEND

- SITE BOUNDARY
- EXISTING SANITARY SEWER (Ex. 300mmø SAN., Ex. MH)
- EXISTING WATERMAIN (Ex. 200mmø WTM., Ex. HYD. SET)
- EXISTING STORM SEWER (Ex. 375mmø STM., Ex. MH)
- SANITARY SEWER (MH, 14.6m–200mmø SAN @ 1.50%)
- STORM SEWER (MH, 21.3m–300mmø STM @ 1.30%)
- WATERMAIN (200mmø WTM, HYD. SET, TEE)
- ROOFWATER COLLECTION SYSTEM (21.3m–300mmø RWCS @ 0.50%)

SITE

NORTH DUMFRIES

CITY OF CAMBRIDGE

KEY PLAN N.T.S.

GEODETIC BM ELEV. =300.480m

STATION 00119663306

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

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2.	ISSUED FOR DRAFT PLAN APPROVAL – PHASE 2	GMK	2026-04-02
1.	ISSUED FOR APPROVAL	GMK	2021-04-19

TOWNSHIP of NORTH DUMFRIES

MTE
Engineers, Scientists, Surveyors
519-743-6500

OWNER

HALLMAN CONSTRUCTION LIMITED
675 RIVERBEND DRIVE KITCHENER

PROJECT

WESTWOOD VILLAGE PHASE 2
Cambridge Ontario

DRAWING

PLAN OF GENERAL SERVICES

Project Manager G.KORBER	Project No. 02534-800
Design By CJC	Checked By GMK
Drawn By AXH	Checked By CJC
Surveyed By MTE	Drawing No. GP1.1
Date Dec.02/20	
Scale 1:1000	Sheet of

April 2, 2026 - 5:27:46 PM - Plotted By: Bob Schaefer