Wilmot Woods Subdivision

Functional Servicing Report

Project Location:
New Hamburg

Prepared for:
Wilmot Woods Developments Inc.
310 Fairway Road South
Kitchener, ON N2C 2R6

Prepared by:
MTE Consultants Inc.
520 Bingemans Centre Drive
Kitchener, ON N2B 3X9

April 2022
March 8, 2023
Revised: December 8, 2023

MTE File No.: 35056-104

Engineers, Scientists, Surveyors.

Contents

Figures

Tables

Appendices

Drawings

1.0 Introduction

1.1 Overview

MTE Consultants Inc. (MTE) was retained by Wilmot Woods Developments Inc. to prepare the following Functional Servicing Report (FSR) in support of a Draft Plan of Subdivision application and zoning by-law amendment for a proposed residential subdivision in the Township of Wilmot.

Zoning by-law amendment and plan of subdivision applications were formally submitted to the Township of Wilmot and the Region of Waterloo in April 2022. A revised submission was made to the Township on March 8, 2023. The subdivision application has been assigned Subdivision File 30T-22601. This revised report considers servicing comments received to date through the circulation of the plan of subdivision application.

The Wilmot Woods subdivision, herein referred to as the 'subject lands', are located in the Town of New Hamburg. The lands are generally bounded by Waterloo Street to the north, the Ivan Gingrich Municipal Drain (IGMD) and agricultural lands to the east, the Canadian National (CN) railway corridor to the south, and the Forest Glen residential subdivision to the west. Refer to the Location Plan in **Figure 1.1**.

The subject lands comprise a total area of approximately 37.19ha. Development plans include the construction of street-oriented residential units, multiple residential blocks, a park block, open space block and stormwater management facilities with the required roads and municipal services (storm, sanitary, and water). Portions of the lands are undevelopable, as they are within the floodplain limits of the IGMD. A Draft Plan of Subdivision (dated February 3, 2023) for the proposed development has been prepared by MHBC Planning and forms the basis for this report. The Draft Plan has been included in **Appendix A**.

The purpose of this revised FSR is to prepare a servicing strategy for the proposed subdivision which outlines how the subdivision 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 additional reports/information:

- *Wilmot Woods Subdivision – Preliminary Stormwater Management Report* – MTE Consultants Inc. (March 8, 2023).
- *Wilmot Woods Subdivision - Hydrogeological Assessment Report* – MTE Consultants Inc. (March, 2023).
- *MTE's response letters to agency comments received to date.*

1.2 Background Information

1.2.1 List of Background Studies

- *Wastewater Treatment Master Plan Study - Region of Waterloo (2007)*
- *Baden and New Hamburg Water and Wastewater Master Plan Update – AECOM (2011)*
- *Enhanced Master Drainage Plan (EMDP) - MTE Consultants Inc. (2012)*
- *Wastewater Servicing Study for New Growth Areas – Baden and New Hamburg (WSS) - Conestoga Rovers & Associates (2014)*
- *Baden/New Hamburg Wastewater Servicing Strategy - MTE Consultants Inc. (2019)*

- *Baden and New Hamburg Water & Wastewater System Servicing Review (B/NH-W/WW-SR) – Stantec (2021/2022)*
- *Morningside Trunk Sanitary Sewer Class EA (MT-SS-EA) - GM Blue Plan (2021/2022)*
- *Baden Trunk Sanitary Sewer Schedule B Class EA and Environmental Study Report – MTE Consultants Inc. (2022)*
- *Baden/New Hamburg Sanitary Servicing Analysis – MTE Consultants Inc. (March 2023)*

The preliminary design strategies for sanitary servicing, stormwater management and water distribution have been developed to be in accordance with the recommended within the WSS, MTE's wastewater servicing technical memorandum, EMDP and MTE's preliminary design submissions for the Wilmot Employment Lands (WEL), all of which are described within this FSR.

1.2.2 Wastewater Servicing Study for New Growth Areas – Baden and New Hamburg (WSS)

The *Wastewater Servicing Study for New Growth Areas – Baden and New Hamburg (WSS)* was prepared by Conestoga Rovers & Associates in 2014. This study documented the Township's approved preferred sanitary servicing strategy as Alternative D. The WSS also identifies downstream constraints within the existing sanitary sewer system and recommends proposed upgrades which would alleviate downstream capacity constraints. Alternative D requires the construction of a sanitary sewer crossing of the CN railway which would drain to new gravity sanitary sewers within the WEL which would outlet to the Morningside trunk sanitary sewer on the south side of Highway 7/8. The Morningside trunk sanitary sewer was identified by the WSS to be upsized from a 450mm to a 525mm (or larger) to accommodate flows from growth and development. Flows from the Morningside trunk sewer ultimately drain to the Morningside Wastewater Pumping Station (MWWPS) and is then pumped via a forcemain to New Hamburg Wastewater Treatment Plant (NHWWTP).

Subsequent to the work completed for the WSS, MTE has prepared a technical memorandum entitled *Baden – New Hamburg Wastewater Servicing Strategy*, dated November 22, 2019. This technical memo discusses changes to the servicing strategy from the preferred Alternative D within the WSS, which resulted from consultation with the Township and Region. The changes include redirecting sanitary areas (flows) from future growth areas between three sanitary outlets being; the Forest Glen Wastewater Pumping Station (FGWWPS), the Baden Wastewater Pumping Station (BWWPS), and future sanitary trunk sewers through the WEL.

The WEL are located directly south of the subject lands between the CN railway and Highway 7/8. MTE completed and submitted an FSR and Preliminary Stormwater Management (SWM) Report in support of Two Draft Plan of Subdivision applications for the WEL, dated November 22, 2019. The Draft Plans were approved on March 17, 2021.

Through discussions and correspondence with the Township, the overall sanitary servicing strategy is generally agreed to, however there may be some minor modifications at the servicing limits. The B/NH-W/WW-SR presented 4 alternatives to address key issues identified within the existing sanitary network. The most recent Public Consultation Centre #3 held by the Region indicates that the preferred alternative consists of upgrades to the Baden Wastewater Pumping Station and construction a new forcemain directly to the NHWWTP, bypassing the MWWPS.

1.2.3 Baden Trunk Sanitary Sewer Class EA and Environmental Study Report

The WWS *w*as prepared by CRA in 2014 to assist Township staff and Council in the decision-making process to address existing wastewater servicing constraints and future wastewater servicing needs associated with new growth areas. Furthermore, changes to the Provincial Policy Statement (2020), the Places to Grow Plan (2020), the amended Regional Official Plan (2014) and the Township of Wilmot Official Plan (2019) have prompted the re-evaluation of the preferred wastewater management strategy.

The Township completed a Schedule B Municipal Class Environmental Assessment (Class EA), including an Environmental Study Report (ESR) in 2022 that documents the study process and evaluation of five sanitary trunk alignments, resulting in the selection of the preferred trunk sewer alignment and preliminary design. The alternatives were evaluated in the context of several factors/criteria that were grouped into 5 categories including: natural environment, socio-cultural environment, transportation/municipal services and utilities, financial, and technical. The result of the evaluation confirmed Alternative 5 as the preferred alternative.

1.2.4 Baden/New Hamburg Sanitary Servicing Analysis (MTE 2023)

As part of the preliminary engineering for the Wilmot Woods development and the final engineering for the adjacent WEL development, MTE has been working through the sanitary servicing design for the WEL trunk sanitary sewer and sewer extension across the CN railway corridor and open space to ultimately provide a sanitary outlet for the lands north of the railway corridor. As part of this work, it was identified that the WEL trunk sewer should be constructed as deep as possible to ensure maximum gravity serviceability limits are achieved, as well as potentially keep options open for lands that are located at the top end of the sewershed.

A meeting was held with the Township of Wilmot on December 15, 2022 in regards to the sanitary servicing strategy of the Wilmot Woods development and adjacent upstream lands owned by Cachet Homes. The meeting was largely in regard to the depth and slope of the WEL trunk sewer (i.e., 0.35% slope versus 0.50%slope) required to service the above mentioned properties. Township staff also inquired about the potential of servicing the lands east of Nafziger Road owned by Stremma Developments Inc. (referred to as parcels Q, W, and X) to the west through the Cachet lands and the WEL trunk sewer.

As a result of this meeting, a technical memo was prepared (dated March 8, 2023) outlining four sanitary servicing solutions. This technical memo describes the servicing options, the capacity and sizing of each option, and any restrictions associated with each.

1.2.5 Previous Water Servicing Studies

As part of many servicing studies undertaken for the Baden and New Hamburg areas, watermain and water distribution improvements have been studied to develop an understanding of existing operating conditions between the two pressure zones and forecast necessary upgrades to accommodate growing interest and development plans in these communities.

A transmission watermain project was first identified in the 2011 *Baden and New Hamburg Water and Wastewater Master Plan Update* and further defined in the 2011 *Baden Tank Optimization Study*. The Region has initiated the final design in 2021 with construction work of a 450mm diameter transmission watermain to occur in 2023 to supply additional water from the New Hamburg Water Treatment Plant to the Baden elevated tower and water distribution network.

Water servicing redundancy will help the overall pressure and flow availability throughout the two pressure zones, especially during emergency situations. The proposed water distribution plan discussed herein will involve connections to the existing New Hamburg distribution network and pressure zone.

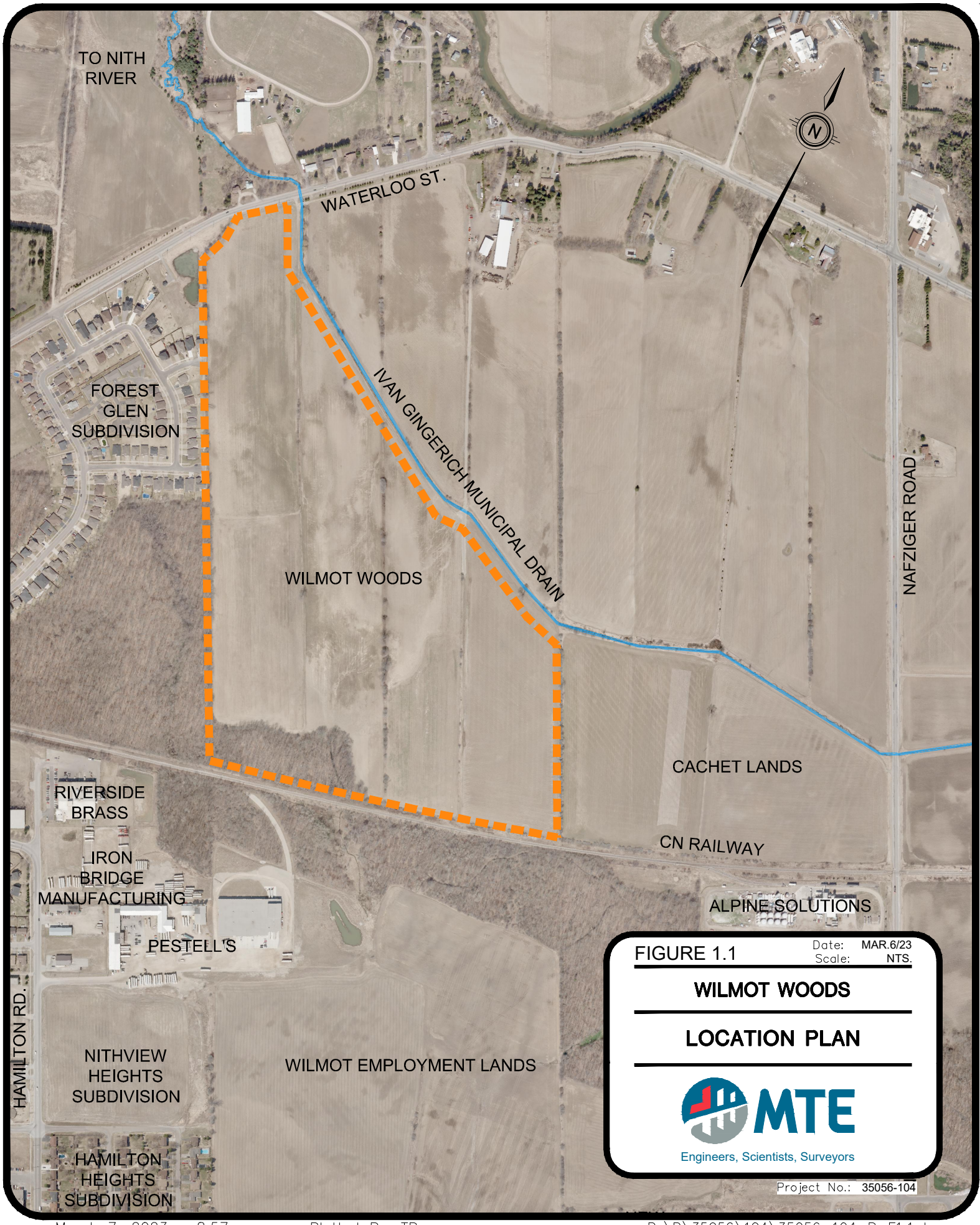


FIGURE 1.1

Date: MAR.6/23
Scale: NTS.

WILMOT WOODS

LOCATION PLAN

MTE
Engineers, Scientists, Surveyors

Project No.: 35056-104

March 7, 2023 — 8:57 a.m. — Plotted By: TBerry

P:\P\35056\104\35056-104-P-F1.1.dwg

2.0 Existing Conditions

2.1 Topographical Information

As previously discussed, the subject lands consist of approximately 37.19ha, of which portions of the lands are undevelopable as they are within the IGMD floodplain. The subject lands are generally bounded by Waterloo Street to the north, the IGMD and agricultural lands to the east, the CN railway corridor to the south, and the Forest Glen residential subdivision to the west. The subject lands are currently used for interim agricultural purposes.

MTE conducted a detailed topographical survey of the subject lands in 2010. This information has been supplemented a few times since 2010 with additional surveys. Existing topographic conditions for the subject lands are illustrated in **MTE Drawing 35056-104-EC1.1**. Under existing conditions, the subject lands are moderately sloped throughout the majority of the site (generally between 1.0% and 6.0%). Existing elevations range between 339.0m near the IGMD floodplain in the north, 340.0m near the wetland feature located in the south, and 347.5m in the southeastern corner of the lands.

2.2 Pre-Development Conditions

There is a subwatershed divide in the central portion of the subject lands. The northern portion of the property drains to the IGMD as illustrated in **MTE Drawing 35056-104-EC1.1**. The IGMD flows northward, through a 1750mm diameter culvert beneath Waterloo Street, and ultimately to the Nith River, located approximately 700m downstream. A small area of this northern portion drains to an existing swale located in the northwest corner of the subject lands. The swale also conveys major storm flows from the existing Forest Glen subdivision SWM Facility, ultimately draining underneath Waterloo Street to the IGMD.

The southern portion of the subject lands primarily drains to an adjacent woodlot and wetland feature along the CN railway, and ultimately to the “Western Tributary” that conveys flows south of Highway 7/8 to the Nith River. This wetland feature has a positive draining surface outlet, through an existing 900mm diameter culvert under the CN railway, and flows south through the remainder of the wetland towards the WEL communal SWMF.

2.3 GRCA Mapping

As illustrated in **Figure 2.1,** the northern portion of the subject lands is within a significant groundwater recharge area (SGRA) as defined by the Source Water Protection Plan Mapping. The SGRA limit corresponds with a surficial sand layer at the north portion of the subject lands. The SGRA has a vulnerability score of 2.0 generally representing a low score of surface groundwater interaction and base flow to the IGMD and the Nith River.

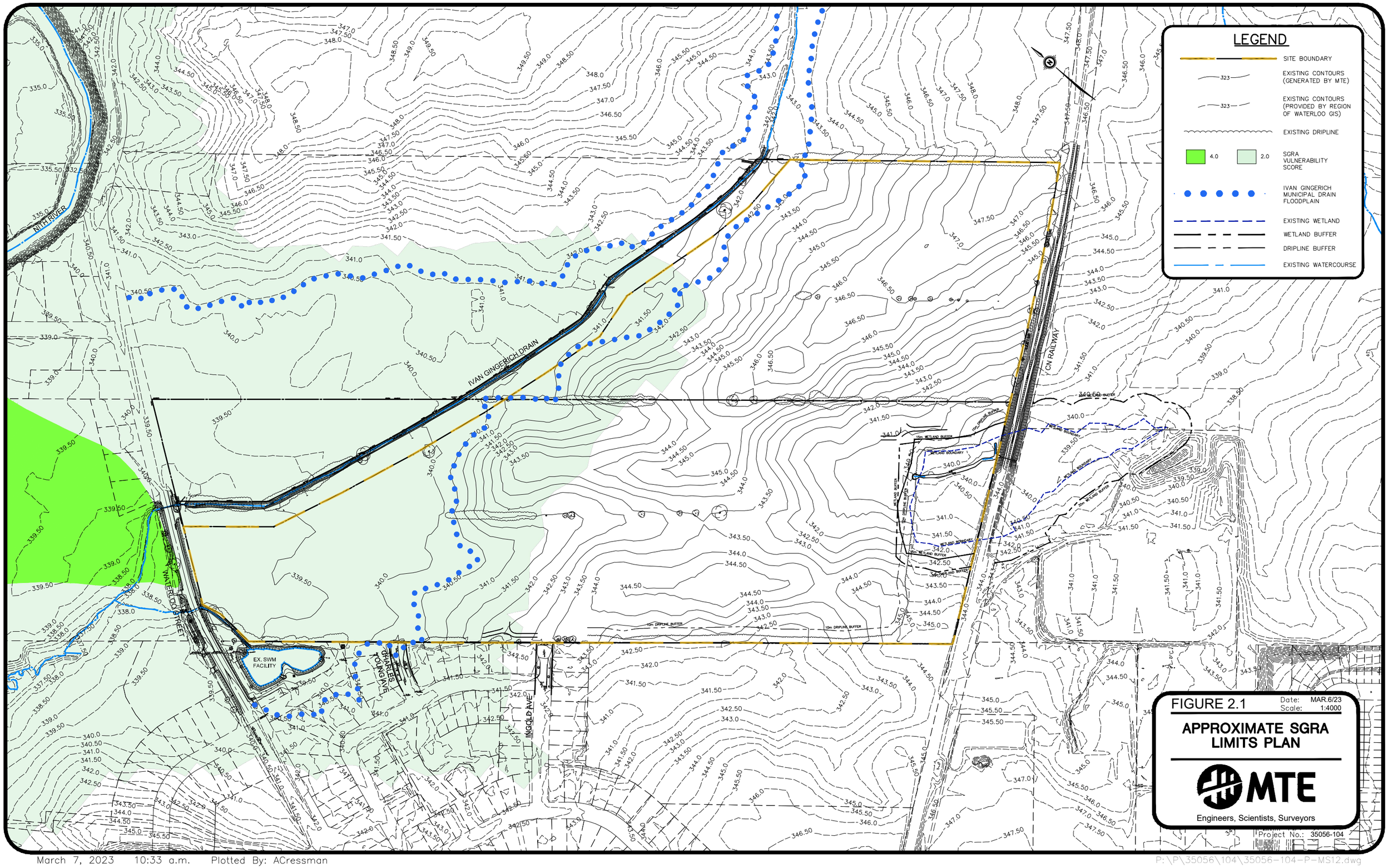


FIGURE 2.1 Date: MAR.6/23 Scale: 1:4000

APPROXIMATE SGRA LIMITS PLAN

MTE
Engineers, Scientists, Surveyors

Project No.: 35056-104

March 7, 2023 10:33 a.m. Plotted By: ACressman

P:\P\35056\104\35056-104-P-MS12.dwg

2.4 Geotechnical and Hydrogeological Information

In February 2022, Peto MacCallum Ltd. (Peto) prepared a geotechnical investigation for the subject lands. The fieldwork was carried out in 2018 included 22 boreholes, 10 of which included monitoring wells, to depths ranging between 6.5m to 12.6m.

In 2021/2022, MTE completed a Hydrogeological Assessment Report (April 2022) for the subject lands. This study summarizes the hydrogeological investigations performed to date for the development study area.

Based on the results of the detailed investigations, the subsurface stratigraphy is generally described as topsoil and localized fill underlain by extensive deposits of clayey silt, locally containing cohesionless silt, sandy silt, silty sand, and sand layers. Wet and saturated conditions are generally encountered throughout the site. Based on hydrostatic groundwater level readings recorded by Peto, groundwater levels generally rise and fall with the topography. Groundwater flow is interpreted to flow northward toward Waterloo Street and south towards the WEL from the topographic high in the central portion of the subject lands, which coincides with the subwatershed boundary. Sandy soils may act as an aquifer, but were only encountered within a few boreholes, which indicate that clayey soils dominate the subject lands. Infiltration is minor and the majority of the development portion of the subject lands are not a significant recharge area.

In March 2021, Peto provided MTE with updated water levels within monitoring wells MW101-MW110. Levels were measured from November 2020 to February 2021 and provided supplemental to the groundwater contours established within the original 2019 hydrogeological report. More recently, MTE has been monitoring water levels within existing wells, as well as within the drilled wells installed in 2021 as part of MTE's *Hydrogeological Assessment Report*. Seasonal high groundwater contours, have been generated for the subject lands based on collected groundwater level monitoring to date.

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

3.0 Proposed Development

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

- Single detached and townhome residential dwellings.
- Multiple residential dwellings.
- A neighbourhood park and open space blocks.
- Walkways and trails.
- A Service Corridor Block.
- Municipal right-of-ways with widths of 20.0m and 23.0m.
- Two Stormwater Management Facilities.

Refer to the Draft Plan of Subdivision prepared by MHBC (dated February 3, 2023) in **Appendix A** for more details.

3.1 Municipal Right-of-Ways

As shown in the Draft Plan of Subdivision, the proposed development will be serviced by collector and local roads. The roadways will be constructed to a full urban cross-section including: asphalt pavement, concrete curb and gutters, concrete sidewalks, roadway illumination, and boulevard landscaping.

Local roads within the subject lands will consist of a 20.0m right-of-way width, and the collector roads (Street Two and Street Eight) will be a modified 23.0m right-of-way width (section determined through discussions with the Township). The 23m right-of-way has been modified to include a 3m multi-use trail on the northern and eastern sides of Streets Two and Eight to allow for increased connectivity to the surrounding trail system, further discussed in Section 3.3. Typical road cross-section of the rights-of-way are included in **Appendix C** for reference.

As previously mentioned, a geotechnical investigation was completed by Peto, dated February 24, 2022. 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)	Collector Roads (mm)
Asphaltic Concrete – HL3	40	50
Asphaltic Concrete – HL4	100	100
Granular ‘A’ Base	200	200
Granular ‘B’ Sub-base	600	600

3.2 Traffic Calming

Designing the road network within the plan of subdivision with traffic calming features at the outset can have significant advantages as these features can be integrated with other design considerations. A proposed traffic calming plan has been prepared by the project team (see Appendix H Figure H1). A number of traffic calming measures have been incorporated into the preliminary design of the Wilmot Woods subdivision including a traffic circle, pedestrian refuge islands and a raised intersection.

A traffic circle is proposed to be constructed at the intersection of Streets Two and Eight. The traffic circle is to be constructed with reduced radii and pedestrian refuge islands to discourage larger truck movements through the development from the future adjacent employment lands to the east, and encourage pedestrian movement. Truck turning movements were confirmed through the traffic circle in the event that emergency vehicles and trucks are required to move through the local roads (i.e., moving trucks, delivery vehicles). Detailed grading within the traffic circle will be finalized through the detailed design phase.

Per comments from the Township, further information displaying the interfacing of Streets Two and Eight with the proposed traffic calming measures and driveways was requested to ensure no conflicts are present. Refer to Figure H3 in Appendix H. Please note that the driveway locations and lot lines are approximate and are to be confirmed during detailed design.

3.3 Multi-Use Trails

There are a number of multi-use trails located within the Wilmot Woods subdivision as illustrated in the *Design Brief* prepared by MHBC Planning. One of the main trails will be a 3.0-metre-wide trail along the east, south and west boundaries of the plan, located within the outermost edge of the buffers associated with natural heritage features. This trail will connect to Waterloo Street in the north, and existing trails in the southeast.

Grading of the trails will follow Township standards and best practices. Typical accessibility best practice recommends that grades should be 5% or less, if possible. Grades up to 10% may be used when required by topography, but level areas should be provided at regular intervals.

Refer **to MTE Drawings 35056-104 MS17.1 to 17.3** for detailed grading of the 3.0m wide Multi-use trail around the perimeter of the property.

3.4 Sight Line Analysis Waterloo Street

Using the Transportation Association of Canada (TAC) *Geometric Design Guide for Canadian Roads* (2017), a sight line analysis was performed for the proposed Street Two and Waterloo Street intersection. Refer to **Figure 3.1** for a plan depicting the required sight distances.

For the westbound traffic on Waterloo Street, with a design speed limit of 70km/h (60km/h posted speed), the minimum stopping sight distance (SSD) is 105m. For the eastbound traffic, with a design speed of 60km/h (50km/h posted speed), the minimum stopping sight distance is 85m. Note there is a speed limit change on Waterloo Street (from 50km/h to 60km/h) in the vicinity of the IGMD crossing.

The intersection sight distance (ISD) represents the sight distance for drivers to make a decision and turn onto a roadway to attain design speed without being overtaken by a vehicle approaching behind them. Utilizing Section 9.9 from the TAC manual, the minimum ISD for a left turn into westbound traffic is 150m, and the minimum ISD for a right turn into eastbound traffic is 110m.

In order to meet the ISD for eastbound traffic, the vegetation south of the intersection of Street Two and Waterloo Street will need to be removed to the extent where safe sight distances can be achieved. The vegetation removal has been illustrated on **Figure 3.1.**

3.5 Waterloo Street Left-In Turn Lanes and Functional Designs

A Transportation Impact Study (TIS) was completed by Paradigm (March, 2022) to assess the impact of the proposed development on the adjacent existing road infrastructure. It was determined that westbound left-turn lanes are required on Waterloo Street at Street Two and Laschinger Boulevard.

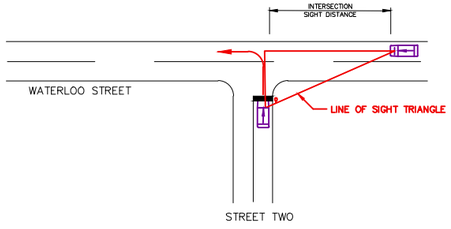
As part of the April 2022 Draft Plan submission to the Region of Waterloo, a functional design of the proposed left-turn lanes were submitted. Comments were received via email by the Region (dated October 20, 2022) and the functional designs were revised accordingly. A response letter from Paradigm was also prepared to confirm that the revised functional design of the turn lanes conformed to the recommendations within the TIS. The revised design, response and associated cost estimate was sent to the Region in December, 2022.

Refer to **MTE Drawings 35056-104-MS18.1 and 18.2** for the functional design of the proposed left-turn lanes from Waterloo Street into Street Two, and Waterloo Street into Laschinger Boulevard.

Detailed design for both intersections introducing left turn lanes will be completed during the final design phase of the subdivision requiring approval by the Township of Wilmot and the Region of Waterloo.

INTERSECTION SIGHT DISTANCE – LEFT TURN FROM STOP (TABLES 9.9.2 / 9.9.4)

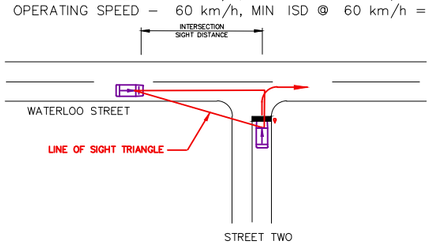
POSTED SPEED LIMIT – 60 km/h, MIN ISD @ 60 km/h = 130 m
DESIGN SPEED – 70 km/h, MIN ISD @ 70 km/h = 150 m
OPERATING SPEED – 70 km/h, MIN ISD @ 70 km/h = 150 m



SCALE: N.T.S

INTERSECTION SIGHT DISTANCE – RIGHT TURN FROM STOP (TABLES 9.9.2 / 9.9.6)

POSTED SPEED LIMIT – 50 km/h, MIN ISD @ 50 km/h = 95 m
DESIGN SPEED – 60 km/h, MIN ISD @ 60 km/h = 110 m
OPERATING SPEED – 60 km/h, MIN ISD @ 60 km/h = 110 m



SCALE: N.T.S

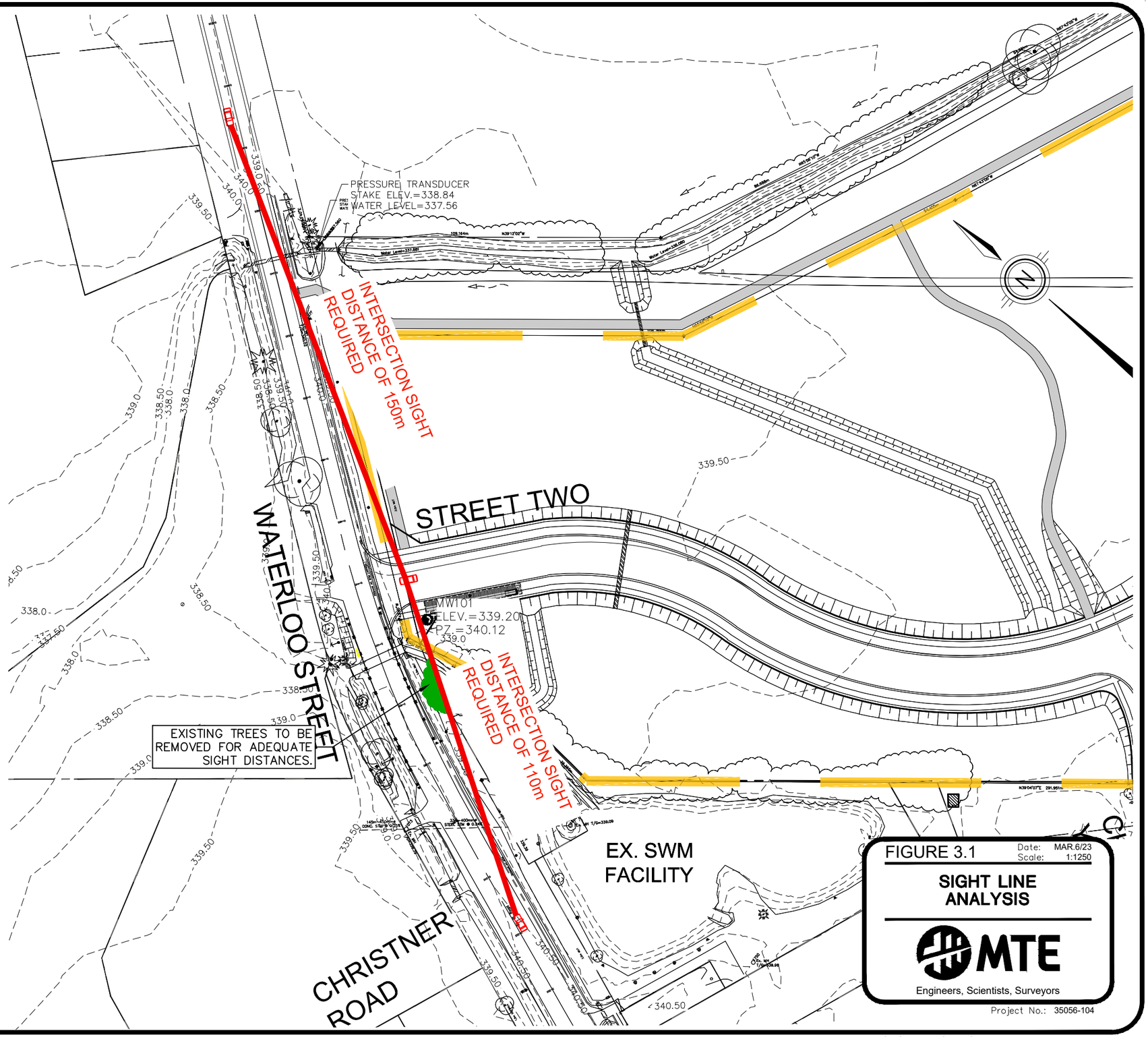


FIGURE 3.1 Date: MAR.6/23 Scale: 1:1250

SIGHT LINE ANALYSIS

MTE
Engineers, Scientists, Surveyors

Project No.: 35056-104

March 7, 2023 10:35 a.m. Plotted By: ACressman

P:\P\35056\104\35056-104-P-MS8.dwg

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 centreline road elevations at existing streets.
- Comply with Township of Wilmot standards for minimum and maximum road grades.
- Match 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 appropriate stormwater management facility.
- Utilize enhanced sump pump systems within areas of soils with low conductivity (10^{-6}m/s).
- Implement a groundwater management system in areas of soils with high conductivity (10^{-4}m/s) and grading is constrained by street connections, floodplain interface and boundary conditions.
- Minimize the cut/fill deficit for the subject lands.

4.2 Roadworks and Lot Grading

Utilizing the proposed road layout, preliminary slopes for centreline of road ranging from 0.5% (minimum) to 5.0% (maximum) were used to complete the preliminary lot grading design. The maximum road grade for the subject lands was designed at 1.5%. Preliminary lot grades range from 2.5% (minimum) to 5.0% (maximum) with a combination of traditional back to front drainage, split drainage, and walk-out type lots. The considerations listed in Section 4.1 were incorporated into the overall preliminary grading design and is illustrated in **MTE Drawing 35056-104-QU1.1**.

The seasonal high groundwater surface was modelled based on MTE's *Hydrogeological Assessment Report* (March 2023). The preliminary house grades and underside of footing elevations were designed to maintain a minimum vertical separation of 0.60m above the seasonal high groundwater elevations where possible. The groundwater separation is illustrated in **MTE Drawing 35056-104-QU2.1.** The seasonal high groundwater throughout the development lands is generally found at an elevation between 338.0m and 343.0m. Grading around buildings generally range from 342.5m to 346.5m. Basement floor elevations were assumed to be generally 2.2m below front of house grade. In the southern portion of the development, the average separation between the underside of footings and seasonal high groundwater is generally more than 0.6m. In the central portion groundwater separation cannot be achieved, however based on the fine-grained nature of this soil (having a K value at 10^{-6}m/sec or less), it is expected that sump pumps will manage the high groundwater levels generally experienced during the spring freshet. In the northern portion, a groundwater management system will be installed. This is further discussed in **Section 5.3.2**.

4.3 CN Railway Corridor

An existing CN railway corridor exists along the southern property line of the subject lands. As such, MTE and the project team, have reviewed the *Guidelines for New Development in Proximity to Railway Operations – May 2013* (the Proximity Guidelines) for compliance.

As required by the Proximity Guidelines, a 30m setback is proposed adjacent to the CN railway and Street Nine. Within the setback and within SWM Facility 2, a standard 2.5m high railway crash berm is proposed adjacent to the rail corridor.

Outlined in **Appendix G** are the relevant sections of the Proximity Guidelines in italics, and a response from MTE as to how the Proposed Development has met the guideline requirements. We note that this report has been prepared to document compliance to the Proximity Guidelines for the Wilmot Woods development. Also included in Appendix G is **MTE Drawing 35056-104-MS11** that is referred to throughout the technical memo, and illustrates the development and various applicable “setback” lines from the CN Principal Main Line.

5.0 Municipal Servicing

5.1 Sanitary Servicing

5.1.1 Sanitary Sewage Collection System

The subject lands are intended to be serviced by a proposed 450mm diameter trunk sanitary sewer that will be extended northerly from the WEL. This trunk sewer is proposed to service the majority of the subject lands by gravity and the adjacent Cachet Lands east of the property, and also include capacity for the lands being conveyed to the FGWWPS located along Waterloo Street. The FGWWPS collects wastewater from neighbouring residential subdivisions, such as the Forest Glen Subdivision and the Sugarlane Ridge Subdivision, and would also collect future sanitary sewage from the east along Waterloo Street.

The subject lands, in addition to the existing and future growth areas serviced by the FGWWPS, are located within the drainage area which ultimately drains to the New Hamburg Wastewater Treatment Plant. It should be noted that the treatment plant has sufficient capacity to accommodate sanitary flows from this area. As discussed earlier, the means for making capacity available within the Morningside trunk sewer is subject to two ongoing studies being *B/NH-W/WW-SR* and the MT-SS-EA.

The development of the subject lands was considered in order to adequately size the sanitary sewers within the sanitary servicing easement and all other proposed downstream sewers as part of the WEL design. The design of the receiving sanitary sewers within the WEL provide for anticipated flows from the subject lands and will accommodate the proposed development size and population densities. Preliminary Sanitary Sewer Design Sheets have been prepared and are included in **Appendix D**. It should be noted that the current preliminary sanitary design utilizes a residential flow rate equivalent to 305 L/c/day (per Township standards), and an industrial flow rate of 0.09L/s/ha (equivalent to 25pp/ha) applied to the southern portion of the Cachet Lands, and downstream WEL.

As part of the current 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 assuming capacity constraints within the Morningside trunk sewer are resolved by the *B/NH-W/WW-SR*.

Figure 5.1 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 trunk sewers located on proposed Street Two and Street Eight will collect and convey sanitary flows from the local streets. The depth of these sewers ranges from approximately 2.8m to 6.7m. The deepest point is located in the Street Six/Eight intersection prior to the stub connection provided for the adjacent Cachet Lands. Sanitary sewers extended through the remaining local roads within the proposed road allowances are at typical depths ranging from 2.8m to 5.0m.

A sanitary sewer plug is provided at the stub of Street Eight to accommodate flows from the adjacent Cachet Lands.

5.1.2 Forest Glen Wastewater Pump Station and Forcemain

In 2019, the Township retained Watson & Associates Economists Ltd. to prepare a *Development Charges (DC) Background Study* to outline the cost associated with the upgrades of water and wastewater infrastructure. The study was updated on July 21, 2021 to reflect amended DC rates to be implemented.

The DC Study includes cost estimates for the Forest Glen Wastewater Pumping Station (FGWWPS), the forcemain within the subject lands, as well as the sanitary sewer crossing of the CN railway to the south of the subject lands. The total gross capital cost estimates for the FGWWPS and forcemain is $1,936,000 and $293,000, respectively.

The existing FGWWPS has a capacity of approximately 20L/s, equivalent to 1675m^3/day. As shown in **Appendix D**, several external catchments and a small portion of the subject lands drain directly to FGWWPS under the ultimate buildout of Baden – New Hamburg.

A small portion of units fronting Ingold Avenue in Block 1-Stage 1 are proposed to be serviced via an extension of the existing sanitary sewer on Ingold Avenue in the adjacent Forest Glen Subdivision. These flows would be directed to the FGWWPS. This results in approximately an additional 0.3 L/s of sanitary flow (equivalent to a population of 14 people) being directed towards the FGWWPS. Under the ultimate buildout scenario, the FGWWPS will be accepting approximately 34.7 L/s from surrounding existing and future development lands. It is proposed that the FGWWPS will ultimately outlet via a forcemain to the new trunk sewer along Street Two, which in turn drains to the trunk sewer system through the WELs.

Analysis has confirmed the entirety of the Wilmot Woods Subdivision can be serviced by gravity and that upgrades to the FGWWPS and forcemain are not required for the subdivision or the adjacent Cachet lands. In the event the forcemain is constructed, it should be funded by development charges and installed concurrently with the construction of Street Two.

5.1.3 CN Railway Crossing to WEL

In order to provide a sanitary servicing outlet for the subject lands, an extension of the WEL trunk sanitary sewer is required from its present terminus within the northern part of the employment lands to the north side of the railway corridor. This would require a trenchless construction technique to install the sanitary trunk as it crosses the CN railway corridor. The trenchless construction limits have been designed to be outside of the buffers associated with the adjacent natural features. Refer to MTE Drawing **35056-104-MS5.1.**

5.2 Water Distribution

The subject lands are located along the boundary between the New Hamburg Pressure Zone and the Baden Pressure Zone. The pressure divide is established by the existing pressure reducing valve (PRV) at the intersection of Snyder's Road West and Nafziger Road, northeast of the subject lands. The current hydraulic grade line (HGL) in the New Hamburg Pressure Zone is approximately 390.8m, whereas the HGL in the Baden Pressure Zone is approximately 400.0m.

Water supply for the subject lands will be provided through the New Hamburg Pressure Zone, through three external connection points to the existing municipal water distribution system, as follows:

- Direct connection to the existing 300mm diameter watermain along Waterloo Street, at the intersection with proposed Street Two.
- Direct connection to the existing 150mm diameter watermain stub along Charles Young Avenue.
- Direct connection to the existing 150mm diameter watermain stubs along Ingold Avenue.

The water distribution network and analysis for the proposed development is presented in the *Wilmot Woods Subdivision – Preliminary Water Distribution Analysis (February 2023)* prepared by MTE (see **Appendix E** for the complete report). The analysis was also used to determine the preliminary pipe sizes for the proposed internal water distribution network, which is generally

'looped' following the proposed road allowances, as shown in **Figure 5.2**. An ultimate development scenario was completed as part of the analysis which included the adjacent Cachet residential and industrial lands to the east. The following summarizes the key points of the report:

- Connections to the existing watermains (listed above) will adequately service the proposed water distribution network for the subject lands.
- Connection to the existing watermain on Waterloo Street to the north by the Cachet lands and looped with the Wilmot Woods Subdivision will adequately service the subject lands and Cachet lands up to a maximum fire flow of 221L/s.
- The proposed water distribution network will adequately provide the required daily water demands and recommended FUS fire flows within the respective pressure guidelines.
- A 300mm watermain stub has been provided on Street Eight at the Cachet lands property line.
- The installation of pressure reducing valves is not required within the subject lands.

LEGEND

- SUBJECT LANDS
- EXISTING SANITARY SEWER
- PROPOSED SANITARY SEWER
- PROPOSED SANITARY FORCEMAIN
- PROPOSED SANITARY TRUNK SEWER
- EXISTING SANITARY PUMPING STATION
- AREA TO BE DIRECTED TO EX. FOREST GLEN WWPS
- F/G=360.35 / SAN OBV.=357.46± / DEPTH=2.90m± — C/L ROAD GRADE / PROPOSED LOCAL SANITARY OBVERT / SANITARY COVER

SAN. PLUG OBV. 339.00±

F/G=345.54 SAN OBV.=338.80± DEPTH=6.74m±

F/G=346.00 SAN OBV.=343.20± DEPTH=2.80m±

F/G=346.30 SAN OBV.=343.31± DEPTH=2.99m±

F/G=345.62 SAN OBV.=342.27± DEPTH=3.35m±

F/G=345.35 SAN OBV.=342.23± DEPTH=3.12m±

F/G=345.34 SAN OBV.=342.50± DEPTH=2.84m±

F/G=345.11 SAN OBV.=338.35± DEPTH=6.76m±

F/G=345.67 SAN OBV.=342.31± DEPTH=3.42m±

F/G=345.02 SAN OBV.=341.87± DEPTH=3.15m±

F/G=344.66 SAN OBV.=341.48± DEPTH=3.18m±

F/G=344.41 SAN OBV.=338.05± DEPTH=6.36m±

F/G=343.68 SAN OBV.=339.21± DEPTH=4.47m±

F/G=344.04 SAN OBV.=338.93± DEPTH=5.11m±

F/G=344.14 SAN OBV.=338.08± DEPTH=6.06m±

F/G=344.00 SAN OBV.=337.75± DEPTH=6.25m±

F/G=344.64 SAN OBV.=338.40± DEPTH=6.24m±

F/G=342.68 SAN OBV.=339.88± DEPTH=2.80m±

F/G=344.90 SAN OBV.=342.10± DEPTH=2.80m±

F/G=345.35 SAN OBV.=342.45± DEPTH=2.90m±

F/G=344.90 SAN OBV.=342.10± DEPTH=2.80m±

F/G=345.73 SAN OBV.=342.90± DEPTH=2.83m±

F/G=344.85 SAN OBV.=341.38± DEPTH=3.40m±

STREET NINE
STREET TEN
STREET EIGHT
STREET SIX
STREET SEVEN
STREET FOUR
STREET FIVE
STREET ONE
STREET TWO
STREET THREE

200mmØ SAN @ 0.60%
200mmØ SAN @ 1.00%
200mmØ SAN @ 1.50%
200mmØ SAN @ 2.00%
200mmØ SAN @ 0.80%
300mmØ SAN @ 0.35%
300mmØ SAN TRUNK @ 0.35%
450mmØ SAN @ 0.35%
450mmØ SAN TRUNK @ 0.35%
250mmØ SAN @ 0.35%
200mmØ SAN @ 1.20%
200mmØ SAN @ 1.70%

Blk. 12 Trail 0.03 ha
Blk. 15 0.3m Reserve 0.001 ha
Blk. 13 Trail
Blk. 9 0.31 ha
Blk. 8 0.27 ha
Blk. 5 0.54 ha
Blk. 7 0.31 ha
Blk. 6 0.31 ha
Blk. 23 Open Space 0.92 ha
Blk. 2 0.52 ha
Blk. 0.56
Blk. 3 0.21 ha
Blk. 22 Park 1.00 ha
Blk. 20 Multiple Residential 0.98 ha
Blk. 4 0.23 ha
Blk. 5 0.18 ha
Blk. 0.56 ha
Blk. 28 SWM Facility 1.82 ha
Blk. 30 0.19 ha
Blk. 29 0.19 ha
Blk. 3 0.32 ha
Blk. 4 0.32 ha
Blk. 6 0.56 ha
Blk. 8 Open Space 2.86 ha
Blk. 21 Multiple Residential 0.82 ha
Blk. 16 0.25 ha
Blk. 3 0.13 ha
Blk. 19 Multiple Residential 1.03 ha
Blk. 12 0.51 ha
Blk. 11 0.51 ha
Blk. 2 0.31 ha
Blk. 17 0.19 ha
Blk. 14 0.51 ha
Blk. 1 0.24 ha
Blk. 27 SWM Facility 1.17 ha
Blk. 18 0.18 ha
Blk. 0.49 ha
Blk. 24 Open Space 3.27 ha
Blk.37 Road Widening 0.03 ha
Blk. 25 Open Space 0.73 ha
Walkway 0.02 ha

CN RAILWAY

10m DRIPLINE BUFFER
30m WETLAND BUFFER
15m WETLAND BUFFER
WETLAND BOUNDARY

PROPOSED FORCEMAIN TO DIRECT FLOWS FROM FOREST GLEN WWPS TO PROPOSED TRUNK SANITARY SEWER

SANITARY SEWER TO CONNECT TO EX. MH6A TO SERVICE BLOCK 1–STAGE 1 UNITS INV=338.37±

FOR SANITARY TRUNK EXTENSION UNDER CN CROSSING, SEE 35056-104-MS5.1

WATERLOO STREET

EX. SWM FACILITY

SAN. FORCEMAIN

FOREST GLEN WWPS

CHARLES YOUNG AVE

INGOLD AVE

EX. 200mmØ SAN

FIGURE 5.1 — SANITARY SERVICING PLAN

Date: DEC.8/23
Scale: 1:3000

MTE
Engineers, Scientists, Surveyors

Project No.: 35056-104

March 7, 2023 — 9:11 a.m. — Plotted By: TBerry

P:\P\35056\104\35056-104-P-F5.1 (SAN).dwg

LEGEND

- SUBJECT LANDS
- Ex. WTM — EXISTING WATERMAIN
- 150mmØ WTM. — PROPOSED 150mmØ WATERMAIN
- 200mmØ WTM. — PROPOSED 200mmØ WATERMAIN
- FUT. 300mmØ WTM. — FUTURE 300mmØ WATERMAIN (BY OTHERS)
- 300mmØ WTM. — PROPOSED 300mmØ WATERMAIN
- PROPOSED HYDRANT
- J_172 — REGION OF WATERLOO PRESSURE NODE
- J-18 — PROPOSED NODE

N

FUT. 300mmØ WTM.

Blk. 6 Trail 0.05 ha
Blk. 14 Trail 0.03 ha
Blk. 15 0.3m Reserve 0.001 ha
Blk. 13 Trail 0.18 ha
Blk. 10 0.09 ha
Blk. 9 0.31 ha
Blk. 8 0.27 ha
Blk. 7 Trail 0.21 ha

300mmØ WTM. STUB

STREET NINE

200mmØ WTM.
150mmØ WTM.
STREET TEN
Blk. 7 0.31 ha
Blk. 6 0.31 ha
Blk. 5 0.35 ha
Blk. 4 0.34 ha

STREET EIGHT
STREET SEVEN
STREET SIX

Blk. 23 Open Space 0.92 ha
Blk. 1 0.49 ha
Blk. 2 0.52 ha
Blk. 3 0.56 ha
Blk. 4 0.46 ha
Blk. 11 0.70 ha
Blk. 22 Park 1.00 ha
Blk. 6 0.13 ha
Blk. 20 Multiple Residential 0.98 ha
Blk. 4 0.29 ha
Blk. 2 0.16 ha
Blk. 5 0.21 ha
Blk. 1 0.34 ha
Blk. 28 SWM Facility 1.82 ha

150mmØ WTM. STUB
STREET TWO
Blk.7 0.19 ha
Blk.8 0.18 ha
300mmØ WTM.

CN RAILWAY

30m WETLAND BUFFER
WETLAND BOUNDARY
15m WETLAND BUFFER

Blk. 19 Multiple Residential 1.03 ha
Blk. 3 0.15 ha
Blk. 16 0.28 ha
Blk. 2 Residential 0.82 ha
Blk. 12 0.51 ha
Blk. 10 0.19 ha
Blk. 9 0.19 ha
Blk. 2 0.14 ha
Blk. 1 0.24 ha
Blk. 13 0.51 ha
Blk. 17 0.19 ha
Blk. 14 0.51 ha
Blk. 11 0.19 ha
Blk. 2 0.31 ha
Blk. 3 0.32 ha
Blk. 4 0.32 ha
Blk. 1 0.19 ha
Blk. 5 0.19 ha
Blk. 6 0.32 ha
Blk. 8 Open Space 2.86 ha

STREET THREE
STREET FOUR
STREET FIVE
STREET ONE

Blk. 24 Open Space 3.27 ha
Blk.37 Road Widening 0.03 ha
Blk. 27 SWM Facility 1.17 ha
Blk. 18 0.18 ha
Blk. 1 0.49 ha
Blk. 25 Open Space 0.73 ha
Blk. 26 Open Space 0.43 ha
Blk. 1 0.56 ha
Blk. 9 Walkway 0.02 ha
Blk. 5 Open Space 2.86 ha

10m DRIPLINE BUFFER

J_172
J_00033

WATERLOO STREET
Ex. 300mmØ WTM.
EX. SWM FACILITY
CHARLES YOUNG AVE
INGOLD AVE
Ex. 150mmØ WTM.

FIGURE 5.2 — WATER DISTRIBUTION PLAN

Date: MAR.6/23
Scale: 1:3000

MTE
Engineers, Scientists, Surveyors

Project No.: 35056-104

March 7, 2023 — 10:38 a.m. — Plotted By: ACressman

P:\P\35056\104\35056-104-P-F5.3 (WTM).dwg

5.3 Storm Drainage

5.3.1 Storm Sewer Network

Storm drainage for the proposed development will be provided through a combination of minor (piped) and major (overland) drainage systems. Based on the existing grading conditions of the subject lands, stormwater runoff drainage patterns can generally be described by two main subcatchment areas. The northern portion drains to the IGMD, and the southern portion drains to the existing wetland and 900mm diameter culvert beneath the CN railway. Under post-development conditions, drainage patterns will mimic existing conditions, with stormwater runoff being conveyed to appropriately sized SWM facilities prior to being discharged to their respective receiving water bodies.

The proposed internal drainage areas, as illustrated in **Appendix F**, generally flow northward to the proposed SWMF1 and ultimately the IGMD, and southward to the proposed SWMF2 and ultimately the existing culvert beneath the CN railway. The following drainage areas are delineated with respective runoff coefficients to determine the preliminary design peak flows.

Figure 5.3 illustrates a schematic of the overall 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 2.0m.

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 F**.

5.3.2 Groundwater Management System

Portions of multi-residential blocks and single family residential lots in the northern limits of the subject lands are within the SGRA limits. Seasonal high groundwater contours in this area vary from 339.0 to 341.0m. Due to the grading constraints present in this area along Ingold Avenue, typical groundwater separation of standard basement depths cannot be met. To accommodate the SGRA and provide adequate groundwater management around proposed basements, two alternative solutions are proposed: a groundwater management system (GWMS) or a soil swap.

The first alternative is the GWMS along Street Two, Street Three and Ingold Avenue. Refer to **Figure 5.4**. The system is directed north through SWMF1 and along Street Two, which ultimately discharges north of Waterloo Street to the IGMD. The GWMS is set at an invert elevation of 339.70m to ensure that no backwater effects occur within the GWMS as a result of the IGMD floodplain downstream of Waterloo Street (Regional flood elevation is 339.62m). Surrounding underside of footing elevations will be designed to a minimum depth of 340.30m to ensure 0.6m of groundwater separation from the building's foundations. Perforated GWMS pipes will be provided within the residential block limits. All GWMS manholes will be equipped with watertight lids to maintain a closed collection system.

The second alternative is to complete a soil swap in areas within the SGRA and observed high groundwater, where sand would be present within the building footprints. This grading operation would subexcavate the sand layers underneath the proposed lots where groundwater separation is not achieved. Silty material from the southern portions of the subject lands would then be placed in these locations, allowing the proposed sump pump systems to operate and draw down the observed high groundwater. This alternative does not require the GWMS system within the SGRA limits.

The preferred alternative will be confirmed with the Township and implemented during final design.

5.3.3 Drainage Area 205 SWM Strategy

As described within the preliminary SWM Report, Drainage Area 205 represents a portion of Street Two that is unable to drain towards SWMF1. This 0.56 ha of right-of-way is proposed to be directed towards an oil-grit separator unit and infiltration gallery treatment train prior to be released into the IGMD. The infiltration gallery is sized to infiltrate the 25mm event. Flows in excess of the 25mm event bypass the infiltration gallery and outlet into the SWMF1 outlet swale, ultimately draining to the IGMD. The location of the gallery and associated storm sewers are shown in **Figure 5.5**. Details regarding the sizing of the infiltration gallery are provided within **Appendix D** of the revised SWM Report.

5.3.4 External Cachet Lands Drainage

Approximately 4.17ha of external drainage adjacent to the CN railway corridor, near the southeastern corner of the subject lands, currently drains towards the existing 900mm diameter culvert. Under existing conditions, this area drains to the ditch within the CN corridor. Under proposed conditions, this external area is to be conveyed through a ditch inlet catchbasin at the low point of the depression, and a 450mm storm sewer system to SWMF2. The ditch inlet catchbasin drains to a storm sewer flowing westerly within the 30m railway setback outletting to SWMF2. The location of this local storm sewer is shown in **Figure 5.3.**

5.4 Stormwater Management

The proposed stormwater management infrastructure on the site will include a storm sewer conveyance network, an OGS and infiltration gallery for a small drainage area at the north end of Street Two, and two end-of-pipe stormwater management facilities. The stormwater management strategy for the proposed development is presented in the *Wilmot Woods Subdivision - Preliminary Stormwater Management Report (February 2023)* prepared by MTE. The following summarizes the key points of the report:

- Water quantity and quality control will be provided within two stormwater management facilities (SWMF). The proposed facilities provide peak flow control of runoff from the contributing drainage area for storm events up to and including the 100-year storm event.
- Enhanced (previously Level 1) water quality control will be provided in the end-of-pipe facilities.
- Analysis of the IGMD floodplain concludes that the introduction of Street Two within the existing floodplain limits has negligible impacts.
- Surface water inputs to the adjacent natural areas will be maintained in the post-development condition by directing adjacent rear yards to the feature.

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 SWMF1 and SWMF2, as shown in **Figure 5.3**. The storm sewers are designed for the 5-year storm event, with overland flow routes generally flowing through the proposed road allowances.

LEGEND

SUBJECT LANDS

PROPOSED STORM SEWER

F/G=314.28 — C/L ROAD GRADE
STM OBV.=312.78± — LOCAL STORM OBVERT
DEPTH=1.50m± — STORM COVER

EXT 4.17ha

F/G=346.94
STM OBV.=345.44±
DEPTH=1.50m±

F/G=345.46
STM OBV.=343.96±
DEPTH=1.50m±

F/G=345.73
STM OBV.=344.23±
DEPTH=1.50m±

F/G=345.78
STM OBV.=344.05±
DEPTH=1.73m±

F/G=346.14
STM OBV.=344.50±
DEPTH=1.64m±

F/G=345.10
STM OBV.=343.50±
DEPTH=1.60m±

F/G=345.50
STM OBV.=343.77±
DEPTH=1.73m±

F/G=344.80
STM OBV.=343.30±
DEPTH=1.50m±

F/G=345.59
STM OBV.=343.82±
DEPTH=1.77m±

F/G=343.30
STM OBV.=342.19±
DEPTH=1.11m±

F/G=343.80
STM OBV.=342.30±
DEPTH=1.50m±

F/G=343.54
STM OBV.=341.90±
DEPTH=1.64m±

F/G=344.12
STM OBV.=342.62±
DEPTH=1.50m±

F/G=344.57
STM OBV.=343.04±
DEPTH=1.53m±

F/G=344.20
STM OBV.=342.70±
DEPTH=1.50m±

F/G=343.95
STM OBV.=342.47±
DEPTH=1.48m±

F/G=342.80
STM OBV.=341.30±
DEPTH=1.50m±

F/G=344.73
STM OBV.=343.23±
DEPTH=1.50m±

F/G=342.50
STM OBV.=341.00±
DEPTH=1.50m±

F/G=343.01
STM OBV.=341.51±
DEPTH=1.50m±

F/G=342.20
STM OBV.=340.70±
DEPTH=1.50m±

F/G=345.32
STM OBV.=343.82±
DEPTH=1.50m±

F/G=344.87
STM OBV.=343.40±
DEPTH=1.50m±

F/G=344.77
STM OBV.=343.03±
DEPTH=1.50m±

F/G=342.59
STM OBV.=341.10±
DEPTH=1.5m±

F/G=345.66
STM OBV.=344.16±
DEPTH=1.50m±

F/G=342.39
STM OBV.=340.97±
DEPTH=1.42m±

STREET NINE
STREET TEN
STREET EIGHT
STREET SIX
STREET SEVEN
STREET TWO
STREET THREE
STREET FOUR
STREET FIVE
STREET ONE
STREET TWO
WATERLOO STREET
CHARLES YOUNG AVE
NGOLD AVE

IVAN GINGERICH MUNICIPAL DRAIN

CN RAILWAY

SWMF2

SWMF

EX. SWM FACILITY

EX. 900mm CULVERT

600x1200mm FLOODPLAIN EQUALIZATION CULVERT INV. = 339.40m

CLOSED STORM SEWER SYSTEM TO SERVICE DRAINAGE AREA 205 (SEE FIGURE 5.5)

1200mmØ STM @ 0.55%

TO NITH RIVER

TO CN CULVERT

WETLAND BOUNDARY
WETLAND BUFFER
15m WETLAND BUFFER
30m WETLAND BUFFER
10m DRIPLINE BUFFER

FIGURE 5.3
Date: MAR.6/23
Scale: 1:3000

STORM SERVICING PLAN

MTE
Engineers, Scientists, Surveyors

Project No.: 35056-104

March 7, 2023 — 9:15 a.m. — Plotted By: TBerry

P:\P\35056\104\35056-104-P-F5.4 (STM).dwg

LEGEND

- SUBJECT LANDS
- PROPOSED GWMS (SOLID)
- LOTS WITH MINIMUM USF=340.30±
- LOTS FOR POTENTIAL SOIL SWAP

F/G=314.28	FG ROAD GRADE
STM OBV.=312.78±	STORM OBVERT
DEPTH=1.50m±	STORM COVER

IVAN GINGERICH MUNICIPAL DRAIN (IGMD)

STREET TWO

STREET THREE

STREET ONE

WATERLOO STREET

OUTLET TO IGMD INV.=337.70±

SWMF1 OUTLET SWALE TO IGMD

300mmØ GWMS @0.25

300mmØ GWMS @ 0.25%

INV.=338.00

F/G=340.20
STM OBV.=338.30±
DEPTH=1.90m±

600X1200mm FLOODPLAIN EQUALIZATION CULVERT INV.=339.40±

F/G=342.30
STM OBV.=339.35±
DEPTH=2.95m±

300mmØ GWMS @ 0.25%

300mmØ GWMS @ 0.35%

INV.=339.05

SWMF1

F/G=342.35
STM OBV.=340.00±
DEPTH=2.35m±

INV.=339.70

300mmØ GWMS @ 0.35%

F/G=343.60
STM OBV.=340.00±
DEPTH=3.60m±

INV.=339.70

300mmØ GWMS

300mmØ GWMS

300mmØ GWMS

FIGURE 5.4

Date: DEC.8/23
Scale: 1:1500

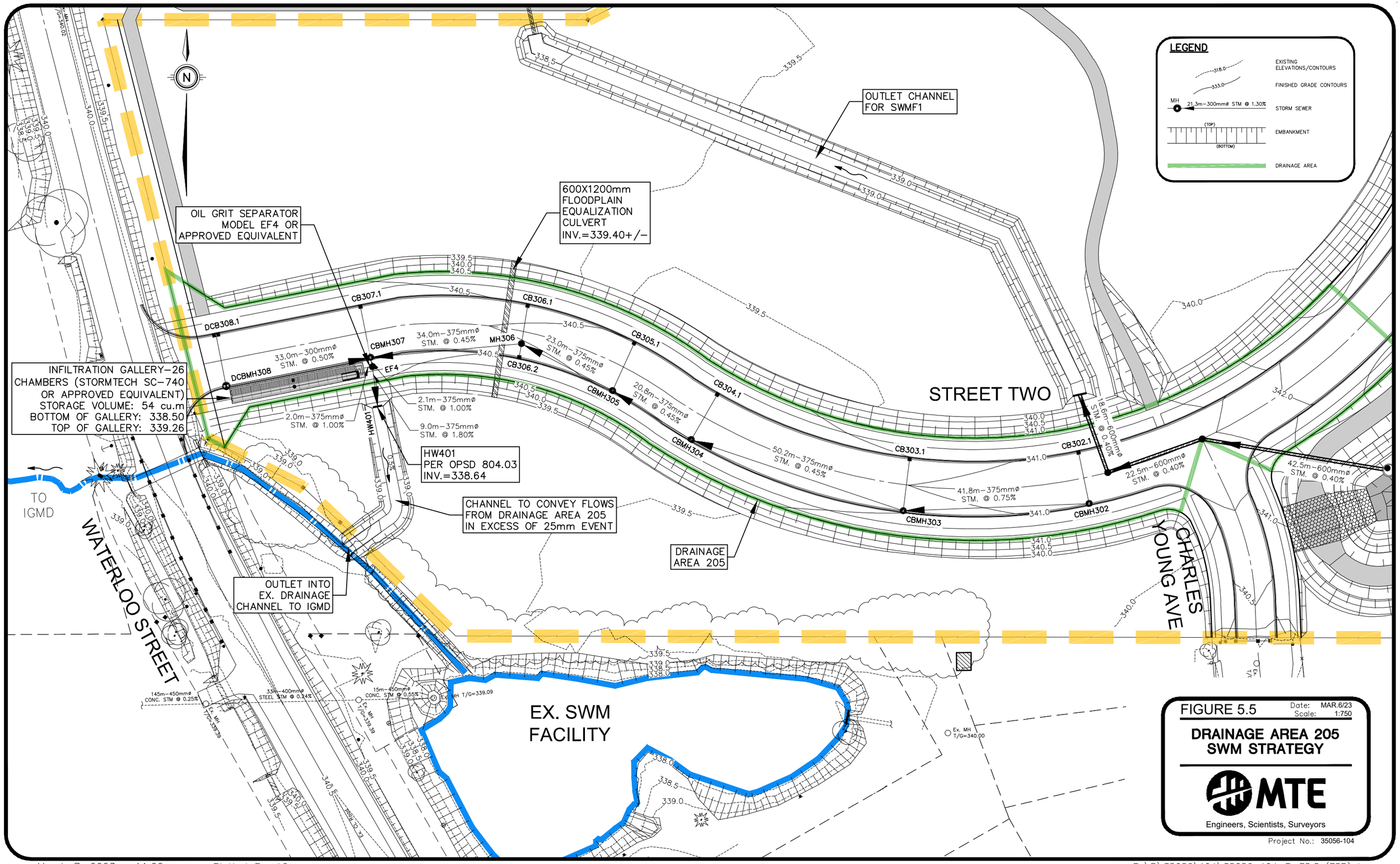
GWMS AND SOIL SWAP PLAN

MTE
Engineers, Scientists, Surveyors

Project No.: 35056-104

November 10, 2023 — 9:00 a.m. — Plotted By: ABarakzay

P:\P\35056\104\35056-104-P-F5.5 (GWMS).dwg



March 7, 2023 — 11:20 a.m. — Plotted By: ACressman

P:\P\35056\104\35056–104–P–F5.5 (FSR).dwg

6.0 Utility Servicing

Utility servicing of the proposed development will be through the connection to and extension of existing services from Waterloo Street and from the existing development to the west.

KW Hydro (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. Proposed lot grading and roadworks within the proposed development can be completed in compliance with the Township of Wilmot'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, avoiding grading into the buffer areas where practical, and minimizing grading within the buffer areas to the maximum practical extent possible where minor intrusions are required.
2. Streets within the subdivisions will be constructed to the Township of Wilmot's 20m right-of-way, and a modified 23m right-of-way determined through Township discussions. The cross-sections are illustrated in **Appendix C**.
3. The sanitary servicing of the subdivision implements the recommendations of MTE's *Sanitary Servicing Analysis* (dated March 2023).
4. The majority of the subject lands will direct sanitary sewage by gravity to the trunk sanitary sewer that flows south through the Wilmot Employment Lands.
5. A portion of units within Block 1-Stage 1 fronting Ingold Avenue will direct sanitary drainage to the existing sanitary sewer on Ingold Avenue towards the Forest Glen Wastewater Pumping Station. A forcemain will ultimately outlet to the proposed trunk sewer along Street Two.
6. The development requires an extension of the Wilmot Employment Lands trunk sanitary sewer across the CN railway corridor/open space.
7. 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 within the New Hamburg Pressure Zone.
8. Storm sewer system for the proposed development can be adequately serviced through the use of existing and proposed outlets within the Ivan Gingerich Municipal Drain and through the development of Wilmot Employment Lands, respectively.
9. Lots within the SGRA limits experiencing groundwater separation issues are able to be accommodated through the use of a groundwater management system (GWMS) or soil swap under the building footprints, to be determined during detailed design.
10. Stormwater management for the development will be directed to and can be accommodated by SWMF 1 and SWMF 2 within the subject lands, as outlined in the *Wilmot Woods Subdivision - Preliminary Stormwater Management Report* (March 8, 2023).

11. 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.

Alex Cressman, P.Eng.
Design Engineer
519-743-6500 ext. 1279
acressman@mte85.com

Garett Korber, P.Eng.
Design Engineer
519-743-6500 ext. 1292
gkorber@mte85.com

M:\35056\104\02 - Reports\MTE Reports\FSR\35056-104_rpt_FSR_2023-12-08.docx

Appendix A

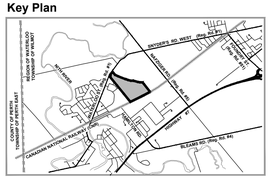
Draft Plan of Subdivision (Reduced)

DRAFT PLAN OF SUBDIVISION

Legal Description

PART OF LOT 20, CONCESSION SOUTH OF SNYDER'S ROAD
TOWNSHIP OF WILMOT
REGIONAL MUNICIPALITY OF WATERLOO

Key Plan



Subject Lands

SCALE: NTS

Source: SLRN, Region of Waterloo

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, STORMWATER MANAGEMENT, PARK, OPEN SPACE		
E. AS SHOWN	F. AS SHOWN	G. AS SHOWN
H. MUNICIPAL WATER SUPPLY	I. SANDY LOAM/CLAY LOAM	J. AS SHOWN
K. ALL SERVICES AS REQUIRED	L. AS SHOWN	

Notes

1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE SHOWN.
2. BOUNDARY INFORMATION AND TOPOGRAPHICAL BASE INFORMATION PROVIDED BY MTE, MAY 31, 2021
3. ADJACENT PARCEL FABRIC IS APPROXIMATE.
4. LOTS/BLOCKS ON THE PLAN ARE RESIDENTIAL UNLESS OTHERWISE LISTED

■ ■ ■ DENOTES STAGE LIMITS

19/25 MINIMUM/MAXIMUM LOT YIELD PER BLOCK

Rev. No.	Date	Issued / Revision	By
2.	Feb.3, 2023	For Resubmission to Township/Region;	DGS
1.	Sept. 30, 2021	For pre-consultation meeting submission;	DGS

Owner's Certificate

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

DATE: January 12, 2022 — Adam Belsky, Adam Belsky, Wilmot Woods Developments Inc.

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: JAN. 14, 2022 — Trevor D.A. McNeil, OLS (MTE OLS LTD.)

Area Schedule

30T-_____

	Stage 1		
Description	Lots/Blocks	Units (min/max)*	Area (ha)
Residential*	1-18	135/196	4.81
Multiple Residential	19-21	186/246	2.83
Park	22		1.00
Open Space	23-26		5.30
Stormwater Management	27,28		2.99
Service Corridor	29		0.22
Walkway	30		0.02
0.3m Reserve	31-36		0.01
Road Widening	37		0.03
Roads			4.27
Total	37	321/442	21.48

*Blks. 2,3,4,5,12,16 [street towns (5.5-7m)]
Blks. 6-11,17 [street towns (6m) and small single detached lots (9m)]
Blk. 1,13,14 [small single detached lots (9-12m)]
Blk. 15,18 [large single detached lots (9-13.76m)]
Blks. 19,20,21 [from Concept Plans (Stacked Towns)]

	Stage 2		
Description	Lots/Blocks	Units (min/max)*	Area (ha)
*Residential	1-5	66/96	2.73
Trail	6		0.05
0.3m Reserve	7		0.001
Roads			1.00
Total	7	66/96	3.78

*Blk. 1 [street towns (6m) and small single detached lots (9m)]
Blks. 2,3,4,5 [small single detached lots (9m-12m)]

	Stage 3		
Description	Lots/Blocks	Units (min/max)*	Area (ha)
*Residential	1-7	56/81	2.48
Open Space	8		2.86
Walkway	9		0.02
Trail			
0.3m Reserve			
Roads			0.84
Total	9	56/81	6.20

*Part of Blk. 6 [street towns (6m) and small single detached lots (9m)]
Blks. 1,2,3,4,5 [small single detached lots (9m-12m)]
Blk. 6,7 [large single detached lots (9-13.76m)]

Stage 4		
Lots/Blocks	Units (min/max)*	Area (ha)
1-11	80/134	3.49
12-14		0.42
15		0.001
		1.82
15	80/134	5.73

*Part of Blk. 1, Blks. 3,4,5,6,7,8 [street towns (6m) and small single detached lots (9m)]
Blks. 2,9,10,11 [small single detached lots (9m-12m)]
Blk. 1 [large single detached lots (9-13.76m)]

Total			
Description	Lots/Blocks	Units (min/max)	Area (ha)
Residential	41	337/507	13.51
Multiple Residential	3	186/246	2.83
Park	1		1.00
Open Space	5		8.16
Stormwater Management	2		2.99
Trail	4		0.47
Walkway	2		0.04
Service Corridor	1		0.22
0.3m Reserve	8		0.01
Road Widening	1		0.03
Roads			7.93
Total	68	523/753	37.19

MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE
200-540 BINGEMANS CENTRE DR. KITCHENER, ON. N2B 3X9 | P: 519.576.3650 F: 519.576.0121 | WWW.MHBCPLAN.COM

Approval Stamp

Date	February 3, 2023
File No.	2123A
Plan Scale	1:2,000 (24x36)
Drawn By	D.G.S.
Checked By	P.B.

Project Wilmot Woods

Applicant

Wilmot Woods Developments Inc.
310 Fairway Rd. S
P.O. Box 45016
Kitchener, ON. N2C 2R6
P: 519.570.2137

File Name DRAFT PLAN

Dwg No. 1 of 1

Scale Bar 0 10 25 50 100m

K:\2123A-NH Properties-New Hamburg\DP\Draft Plan February3 2023.dwg

Appendix B

Geotechnical Investigation

GEOTECHNICAL INVESTIGATION
PROPOSED WILMOT WOODS DEVELOPMENT
NEW HAMBURG, ONTARIO

for

WILMOT WOODS DEVELOPMENT INC.

PETO MacCALLUM LTD.
16 FRANKLIN STREET SOUTH
KITCHENER, ONTARIO
N2C 1R4
PHONE: (519) 893-7500
FAX: (519) 893-0654
EMAIL: kitchener@petomaccallum.com

Distribution:
1 cc: Wilmot Woods Development Inc.
1 cc: MTE Consultants Inc. (+email – jcabral@mte85.com)
1 cc PML Kitchener

PML Ref.: 18KF031
Report: 1
February 24, 2022

Peto MacCallum Ltd.
CONSULTING ENGINEERS

February 24, 2022

PML Ref.: 18KF031
Report: 1

Mr. Adam Belksy
Wilmot Woods Development Inc.
310 Fairway Road South, P.O. Box 45016
Kitchener, Ontario
N2C 2R6

Dear Mr. Belksy

Geotechnical Investigation
Proposed Wilmot Woods Development
New Hamburg, Ontario

Peto MacCallum Ltd. (PML) is pleased to report the results of the geotechnical investigation recently completed at the above noted project site. Authorization to proceed with this assignment was provided by Mr. Galbraith in an email dated July 9, 2018.

In general, the project involves the proposed construction of a residential subdivision on a 37 Ha site located south of Waterloo Street and north or the railway in New Hamburg, Ontario. The proposed development is located on an existing agricultural property. Details of the proposed development have yet to be established, but in general it is understood that approximately 600 residential dwellings will be constructed at the site. It is anticipated that the proposed development will have full municipal servicing including watermain, storm and sanitary sewers, with typical invert depths expected to be to a maximum 3 m depth below existing grade. It is also understood that a trunk sewer will extend southward from the site, under the railway and connect to a proposed trunk sewer on the neighbouring property (the Wilmot Employment Lands). Two storm water ponds also are proposed for the development, one near the northwest corner of the site, and the second at the south side of the site.

16 Franklin Street South, Kitchener, Ontario N2C 1R4
Tel: (519) 893-7500 Fax: (519) 893-0654
E-mail: kitchener@petomaccallum.com
BARRIE, COLLINGWOOD, HAMILTON, KITCHENER, LONDON, TORONTO

The purpose of the current geotechnical investigation was to explore the subsurface soil and ground water conditions at the site and based on this information, to provide geotechnical recommendations for the proposed development. Specific considerations to be addressed in this report include:

- A description of the site and the field investigation procedure;
- A summary of the subsurface soil and ground water conditions encountered;
- Log of borehole sheets, a borehole location plan drawing, and geotechnical laboratory test results;
- Excavation and construction dewatering requirements;
- House foundation design, including bearing resistances, settlement projections and site class for seismic design;
- Slab on grade floors and below grade walls, including compaction requirements and geotechnical suitability of onsite soils for re-use;
- Site servicing (storm, sanitary, water and utilities) including pipe bedding requirements;
- Pavement structure design for new roadways; and,
- Suitability of native soils for infiltration of stormwater.

Recommendations for the proposed trenchless crossing of the railway will be provided under separate cover.

The comments and recommendations provided in this report are based on the site conditions at the time of the investigation, and are for the current project only. Any changes in plans will require review by PML to assess the applicability of the report, and may require modified recommendations, additional analysis and / or investigation. When the project design is complete, the general recommendations given in this report should be reviewed by PML to ensure their applicability.

Investigation Procedure

The field work for this geotechnical investigation was conducted between July 30 and October 15, 2018. The investigation program comprised a total of 22 boreholes (BH1 to BH12 and MW101 to MW110) advanced to between 6.5 and 12.6 m depth, with monitoring wells installed in ten of the boreholes (designated MW101 to MW110). The borehole and monitoring well locations are shown on the appended Borehole Location Plan, Drawing 1.

The borehole locations were established in the field by PML. Borehole locations were surveyed by PML using a Global Navigation Satellite System (GNSS). The survey equipment was provided by SOKKIA Canada, model GCX-2.

The boreholes were advanced using a Diedrich D-50 track mounted drillrig fitted with continuous flight solid and hollow stem augers and automatic hammer, supplied and operated by a specialist drilling contractor. The work was carried out under the full-time supervision of a PML engineering staff member who directed the drilling and sampling operations, documented the soil stratigraphy, monitored ground water conditions and processed the recovered samples.

Representative samples of the overburden were recovered at regular intervals throughout the depths explored. Standard penetration tests (SPT) were carried out during sampling operations in the boreholes using conventional split spoon equipment. Pocket penetrometer testing was carried out on the recovered samples to determine the undrained shear strength of the cohesive soils. Ground water observations were made in the boreholes during and upon completion of drilling. The boreholes were backfilled in accordance with O.Reg.903 upon completion of drilling.

Monitoring wells were installed in ten boreholes to more accurately measure ground water levels. The monitoring wells comprised 50 mm diameter PVC pipe, filter sand, bentonite seals, and protective casings. Subsequent water level measurements from the wells were conducted by PML.

All of the recovered samples were returned to PML's laboratory for detailed visual examination, classification, and routine moisture content determinations. The laboratory testing also included particle size distribution analyses on eleven samples of the major soil types encountered.

Summarized Subsurface Conditions

Reference is made to the appended Log of Borehole sheets for details of the field work including soil descriptions, inferred stratigraphy, standard penetration test (SPT) N values, pocket penetrometer test values, ground water observations and laboratory moisture content determinations.

Due to the soil sampling procedures and the limited size of samples, the depth / elevation demarcations on the borehole logs must be viewed as "transitional" zones, and cannot be construed as exact geologic boundaries between layers.

In general, the soil stratigraphy encountered comprised surficial topsoil and localized fill, underlain by an extensive clayey silt deposit containing localized discontinuous cohesionless silt, sandy silt, silty sand and sand layers.

Surficial topsoil was contacted in all of the boreholes, with the exception of Borehole 104. The topsoil was between 180 and 850 mm thick, with an average of 294 mm.

Surficial fill was encountered locally in Borehole 104, and extended 0.68 m depth.

An extensive clayey silt deposit was encountered below the surficial topsoil and fill deposits, in all of the boreholes, and extended to the 6.5 to 12.6 m borehole termination depths. The cohesive clayey silt deposit was generally firm to very stiff based on SPT N values between 4 and 30 blows per 0.3 m penetration of the split spoon sampler. Pocket penetrometer shear strengths of the clayey silt ranged between 50 and 225 kPa. Moisture content ranged between 8 and 31% indicating drier than plastic limit (DTPL) to wetter than limit (WPL) conditions in the cohesive clayey silt soils.

Reference is given to the appended Figures 1 to 6 for the results of the particle size analyses conducted on samples of the clayey silt.

Discontinuous localized layers of cohesionless silt, sandy silt, silty sand and sand were encountered above, below and within the clayey silt, in Boreholes BH5, BH6, BH9, MW101, MW102. These layers were loose to compact based on SPT N values between 5 to 28 blows per 0.3 m penetration of the split spoon sampler. Moisture contents ranged between 5 and 22% indicating damp to saturated conditions in the cohesionless soils. Reference is given to Figures 6 to 11 for the results of particle size distribution analyses conducted on samples of the silt, sandy silt, silty sand, and sand soils.

Ground Water Conditions

Ground water observations carried out during and upon completion of drilling are presented on the appended Log of Borehole Sheets.

During drilling, wet and saturated conditions were generally encountered in the silt, sandy silt, silty sand and sand layers below 1.0 to 2.9 m depth (Elevation 338.1 to 340.3). Free water was observed upon completion of drilling, in Boreholes 2 and 9, below 2.0 to 2.3 m depth (Elevation 339.4 to 340.9).

On November 26, 2018 water level measurements from the monitoring wells installed in Boreholes 101 to 110 ranged between 0.1 to 5.4 m depth below existing grade (about Elevation 338.1 to 344.1).

The ground water levels at the site are subject to seasonal fluctuations and precipitation patterns. It should be noted that the relatively impermeable nature of the clayey silt deposits could contribute to the development of perched water conditions following short term and seasonal participation events.

Discussion and Recommendations

In general, the project involves the proposed construction of a residential subdivision on a 37 Ha site located south of Waterloo Street and north of the railway in New Hamburg, Ontario. It is anticipated that the proposed development will have full municipal servicing including watermain, storm and sanitary sewers, with typical invert depths expected to be to a maximum 3 m depth below existing grade. It is also understood that a trunk sewer will extend southward from the site, under the railway and connect to a proposed trunk sewer on the neighbouring property (the Wilmot Employment Lands). Two storm water ponds also are proposed for the development.

Foundations and Earthworks Grading

Details of the buildings in the proposed residential subdivision have yet to be established. We have provided the following preliminary foundation design recommendations and earthworks grading recommendations for the development.

The site is generally underlain by firm to very stiff clayey silt. It is feasible to support buildings on conventional spread or strip footings founded in the native firm to very stiff clayey silt. Based on the investigation findings, footings founded a minimum 0.3 m into the firm to very stiff native clayey silt deposits, below any surficial fill and topsoil and local surficial soft or loose zones, may be designed for a net bearing resistance of 150 kPa at the serviceability limit state (SLS) and a factored bearing resistance of 225 kPa at the ultimate limit state (ULS).

Alternatively, in areas where grades are to be raised footings may be placed at higher elevations on engineered structural fill. The existing topsoil and fill must be excavated to the levels of competent native clayey silt deposits in advance of engineered structural fill placement. Engineered structural fill used to establish footing founding subgrade levels should comprise an approved compactable inorganic soil, placed in lifts with a maximum thickness of 300 mm and be compacted to at least 98% standard Proctor maximum dry density (SPMDD). Additional generic recommendations for engineered fill construction are provided in Appendix A. Footings supported on approved engineered structural fill may also be designed using the values for a net factored resistance of 150 at SLS and 225 kPa at ULS. Full time inspection of any structural fill placement by PML personnel is recommended to approve subgrade conditions, fill materials and to verify that the specified compaction levels are being achieved.

The excavated soils likely to be used for site grading will comprise primarily clayey silt soils, in DTPL to WTPL condition, with moisture contents between 8 to 31%. Material described as 'wet' or 'WTPL' on the appended borehole will generally not be compactible to 98% SPMDD and should be segregated and allocated to areas where post construction settlement would not present a concern. The bulk of the clayey silt soil to be excavated would be too wet for immediate reuse given the observed moisture conditions.

Therefore, the excavated soils are considered suitable for reuse only if the work is carried out during the dry summer months and the construction schedule is flexible to permit air drying to reduce the moisture content closer to the optimum value.

It should also be noted that the in-situ clayey silt materials will tend to retain a voided structure when placed as backfill. Sufficient compaction must be applied to breakdown all lumps / clods within the fill matrix to achieve a non-voided condition. Significant post construction settlement could otherwise result.

The maximum total settlement of foundations designed for the net SLS bearing pressures noted above are not expected to exceed 25 mm. Differential settlements of around 50 to 75% of the total settlement should be anticipated.

All founding surfaces should be examined by PML personnel prior to concrete placement, to check that all loose, frozen, organic or otherwise deleterious materials have been satisfactorily removed and the required bearing capacity is available throughout.

All exterior footings and all footings exposed to seasonal freezing conditions must be provided with frost protection. The minimum frost protection should be 1.2 m of earth cover or the thermal insulation equivalent.

Design provisions for earthquake loading should also be applied. For the soil conditions at the site, a Class D site category may be assumed, in accordance with the 2012 Ontario Building Code.

Slab-on-Grade Floors

Preparation of the floor slab subgrade should include stripping of the surficial, topsoil, and other deleterious material, placement and compaction of engineered fill, if necessary, followed by proof rolling of the exposed subgrade with a heavy roller to ensure uniform adequate support. Excessively loose, soft or compressible materials revealed during the proofrolling operations should be subexcavated and replaced with well compacted approved material.

Engineered fill placed under the floor slab to achieve finished subgrade levels or as foundation wall backfill should comprise approved inorganic material having a moisture content within 3% of the optimum value, placed in maximum 200 mm thick lifts, and compacted to at least 95% SPMDD. Reference is given to Appendix A for additional engineered fill construction recommendations.

A minimum 150 mm thick layer of free draining Granular A type material compacted to 98% SPMDD is recommended directly beneath the slab-on-grade. A polyethylene vapour barrier should be placed on the surface of the granular base if a moisture sensitive finish is to be placed on the floor. Joints should be saw cut into concrete floor immediately after initial set of the concrete to control potential cracking of the slab.

Below Grade Walls

Below grade walls and basement walls should be designed as retaining walls to resist the unbalanced horizontal earth pressure imposed by the backfill adjacent to the wall. The unfactored lateral earth pressure, p, may be computed using the following equation, assuming a triangular pressure distribution:

$$p = K(\gamma h + q)$$

where K = lateral earth pressure coefficient
= 0.5 for wall restrained at both top and bottom

γ = unit weight of free-draining granular material
= *21* kN/m^3

h = depth below final grade (m)

q = surcharge load (kPa), if present

The excavation adjacent to the basement walls should be backfilled with free-draining granular material satisfying the OPS Granular B gradation specification and a weeping tile system installed to minimize the build-up of hydrostatic pressure behind the wall.

The weeping tiles should be surrounded by a properly designed graded granular filter or wrapped with approved geotextile to prevent migration of fines into the system. The drainage pipe should be placed on a positive grade and lead to a frost-free sump or outlet.

Excavation and Ground Water Control

It is generally envisaged that excavations for the earthworks and site servicing will extend to a maximum 5 m depth within the proposed development.

Excavations for service installations are expected to extend up to about 3 m depth through topsoil and into the native clayey silt deposits containing localized layers of silt, sandy silt, silty sand and sand, which are classified as Type 3 materials as defined in the OHSA. Subject to inspection and providing adequate ground water control is achieved, excavations within Type 3 soils that are to be entered by workers should be inclined from the base of the excavation at one horizontal to one vertical (1H:1V) or flatter.

It is anticipated that ground water seepage or surface water entering the excavations will be handled readily by conventional sump pumping. The actual dewatering methods should be established at the contractor's discretion within the context of a performance specification for the project. Regardless of the dewatering method chosen, the hydraulic head and ground water inflow must be properly controlled to ensure a stable and safe excavation and to facilitate construction. The design of the dewatering system should be specified to maintain and control ground water at least 0.3 m below the excavation base level, in order to provide a stable excavation base throughout construction.

It should be noted that, under the Ontario Water Resources Act, the Water Taking and Transfer Regulation 387/04, a Permit to Take Water (PTTW) from the Ministry of Environment Conservation and Parks (MECP) is required if the dewatering discharge is greater than 400,000 L/day. In accordance with the above noted regulatory requirements and in compliance with the MECP's PTTW Manual (April 2005), and application should be filed to the MECP for the subject property construction dewatering PTTW, if the dewatering discharge is greater than 400,000 L/day, or about 4.6 L/S. If the dewatering discharge is between 50,000 L/day (or about 0.6 L/S) and 400,000 L/day (or about 4.6 L/S) dewatering activities need to be registered on the Environmental Activity and Sector Registry (EASR). PML would be pleased to assist with this process, if required. The depth of excavations for site grading and site servicing are expected to extend to a maximum 3 m depth into clayey silt deposits with wet to saturated layers of silt, sand, sandy silt, and silty sand and it is generally envisaged that sump pumping from within trenching excavating will have dewatering rates less than 50,000 L/day, and a PTTW or EASR should not be required.

It is recommended that test pits be carried out during the tendering stage of the project in order that prospective contractors may familiarize themselves with soil and ground water conditions to be contacted. Also, as noted above, the dewatering requirements should be established by the contractor in the context of a performance specification.

Pipe Bedding and Cover

It is expected that the proposed water and sewer pipes will be founded on competent native deposits, or engineered fill. Providing adequate ground water control is achieved, bearing problems are not anticipated for conduits founded on the native mineral soils or engineered fill. It may be necessary to increase the bedding thickness if excessively loose, soft or wet conditions are present at the pipe subgrade. The need for this is best determined during construction.

Conventional bedding and cover constructed in accordance with applicable Ontario Provincial Standard Drawings (OPSD) will be suitable. Material containing stones larger than 50 mm size should not be used in the bedding layer. The bedding and cover material should be placed in 150 mm lifts compacted to at least 95% SPMDD. Compaction should be provided beneath the pipe haunches to provide uniform support. Over-compaction should be avoided as damage to the pipe could result.

Trench backfill material should comprise approved material placed in uniform 200 mm thick lifts within 3% of the optimum moisture content and compacted to at least 95% SPMDD.

It is anticipated that the excavated material will primarily comprise clayey silt. The in-situ moisture content of the clayey silt typically ranges from 8 to 31%. Based on our experience with similar types of material, the upper limit of placement moisture content compatible with efficient compaction is expected to be about 15%. Therefore, the excavated clayey silt containing wet and saturated soils are considered suitable for reuse only if the work is carried out during the dry summer months and the construction schedule is flexible to permit air drying to reduce the moisture content closer to the optimum value.

Excavated materials intended for backfilling purposes should not be exposed to the elements for prolonged time periods, as they might be rendered unsuitable for reuse. Organic soil, topsoil, deleterious or excessively wet material should not be used as backfill. Should construction start during the winter season, particular attention must be given to ensure that frozen material is not used as backfill for service trenches. Topsoil may be reused for landscape purposes only.

It should also be noted that the in-situ clayey silt materials will tend to retain a voided structure when placed as backfill. Sufficient compaction must be applied to breakdown all lumps / clods within the fill matrix to achieve a non-voided condition. Significant post construction settlement could otherwise result.

The trenching and backfilling operations should be carried out in a manner which minimizes the length of trench left open yet accommodates efficient pipe laying and compaction activities.

Soil Infiltration

Two storm water management (SWM) ponds are proposed for the site. The first SWM pond will be near Boreholes BH2, MW102 and MW103, while the second will be near MW108 and MW109. Design details of the ponds have yet to be finalized. Typical soils at the pond site comprise clayey silt with occasional to numerous silt layers and deposits of sand and sandy silt. Although the clayey silt is considered to be relatively impermeable, the silt, sandy silt and sand layers which are interlayered with the clayey silt are more permeable. Therefore, it will be necessary to line the base of the ponds to maintain the permanent pool water levels.

The earthen liner should comprise clayey silt soils having a hydraulic conductivity of no more than $1x10^{-6}$ cm/s. The native clayey silt has a permeability less than $1x10^{-6}$ cm/sec, however, inspection and testing during construction will be required to confirm if excavated materials are suitable for reuse as the earth liner.

Fill used for earth liner construction at the pond, should be placed in lifts with a maximum 300 mm thickness, and compacted to at least 95%SPMDD. General recommendations for fill subgrade preparation and engineered fill construction are provided in Appendix A.

Where berms are required, they should be constructed using select soil placed in maximum 300 mm thick lifts compacted to 95% SPMDD. Finished slopes of the ponds should not be steeper than 5H:1V for the interior. Slopes should be provided with vegetation cover or other means for erosion protection.

Full-time inspection should be carried out by PML personnel to examine and approve backfill, fill placement operations, and to check the compaction by in situ density testing using nuclear gauges.

It is understood that onsite storm water infiltration parameters are required. The following table provides hydraulic conductivity and infiltration design parameters for the major onsite soils encountered. An appropriate factor of safety should also be used for design.

SOIL	HYDRAULIC CONDUCTIVITY (cm/s)	INFILTRATION RATE (mm/hr)
Clayey Silt/Silt	Less than $1x10^{-6}$	Less than 0.1
Silt/Sandy Silt/Silty Sand	$1x10^{-4}$ to $1x10^{-5}$	2
Sand	$1x10^{-3}$	40

Cognizant of the low permeability and infiltration rates and considering the limited extent and high groundwater level within the silt/sandy silt/silty sand/sand layers, the amount of onsite infiltration is expected to be negligible.

Pavement Design

Based on the proposed pavement usage, frost susceptibility, and strength of the expected subgrade soils, the following minimum pavement component thicknesses are considered suitable for the proposed residential subdivision roadways.

PAVEMENT COMPONENT	THICKNESS (mm)
Asphalt	80
Granular A Base	150
Granular B Subbase	600

The pavement design considers that construction will be carried out during the drier time of the year and that the subgrade is stable, as determined by proofrolling and inspection by PML personnel. If the subgrade is wet and unstable, subexcavation and placement of additional granular subbase material will be required.

In areas where the subgrade is sensitive to disturbance or construction is to occur outside of the drier time of year, then consideration can be given to thickening the granular subbase or using a geotextile separator between the pavement structure and subbase, in lieu of additional granular subbase. The geotextile separator envisaged should provide reinforcement, filtration and separation of the granular subbase from the anticipated clayey silt / clayey silt fill subgrade soils, and a woven geotextile such Terrafix's 200 W (or equivalent) is envisaged.

The pavement materials should conform to current OPS and municipal specifications. The Granular A base and Granular B subbase courses should be placed in thin lifts and be compacted to a minimum of 100% SPMDD, and asphalt should be placed to a minimum of 92% of the material's maximum relative density (MRD) and reference is made to OPS Specification 310.

During construction, testing should be conducted to confirm the gradation and compactibility characteristics of the granular base materials and the mix design properties of the asphalt.

Proofrolling procedures and the placement and compaction of all the granular materials and asphalt for the pavement construction should be inspected on a continuous basis by PML personnel.

The pavement subgrade materials will lose strength to support traffic loads if allowed to become wet. Moreover, the silty clay subgrade soils are considered frost susceptible and the roadway may heave during freezing and thawing periods. Drainage of the pavement structure is essential to maintain structural integrity and limit frost heave. In this regard, installation of longitudinal subdrains is recommended. The longitudinal subdrains should comprise a minimum 100 mm diameter perforated plastic pipe, set below the subbase level, and outlet to ditching, or catch basins. Subdrain pipes should be surrounded by appropriate filter media such as clear stone wrapped in geotextile, or alternatively the pipes should be wrapped in filter cloth and surrounded by concrete sand.

Geotechnical Review and Construction Inspection and Testing

When development design is complete, it is recommended that the design drawings be submitted to PML for general geotechnical review for compatibility with site conditions and recommendations of this report.

Earthworks operations should be carried out under the supervision of PML to approve subgrade preparation, backfill materials, placement and compaction procedures, and verify the specified degree of compaction is achieved uniformly throughout fill materials.

The comments and recommendations provided in the report are based on the information revealed in the boreholes. Conditions away from and between boreholes may vary, particularly where service trenches exist. Geotechnical review during construction should be on going to confirm the subsurface conditions are substantially similar to those encountered in the boreholes, which may otherwise require modification to the original recommendations.

This report is subject to the Statement of Limitations that is included in Appendix B, which must be read in conjunction with the report

Closure

We trust the information presented in this report is sufficient for your immediate requirements. If you have any questions or require further information, please do not hesitate to contact our office.

Sincerely

Peto MacCallum Ltd.

William Loghrin, P.Eng.
Manager Engineering Services

Gerry Mitchell, MEng, P.Eng.
Senior Consultant

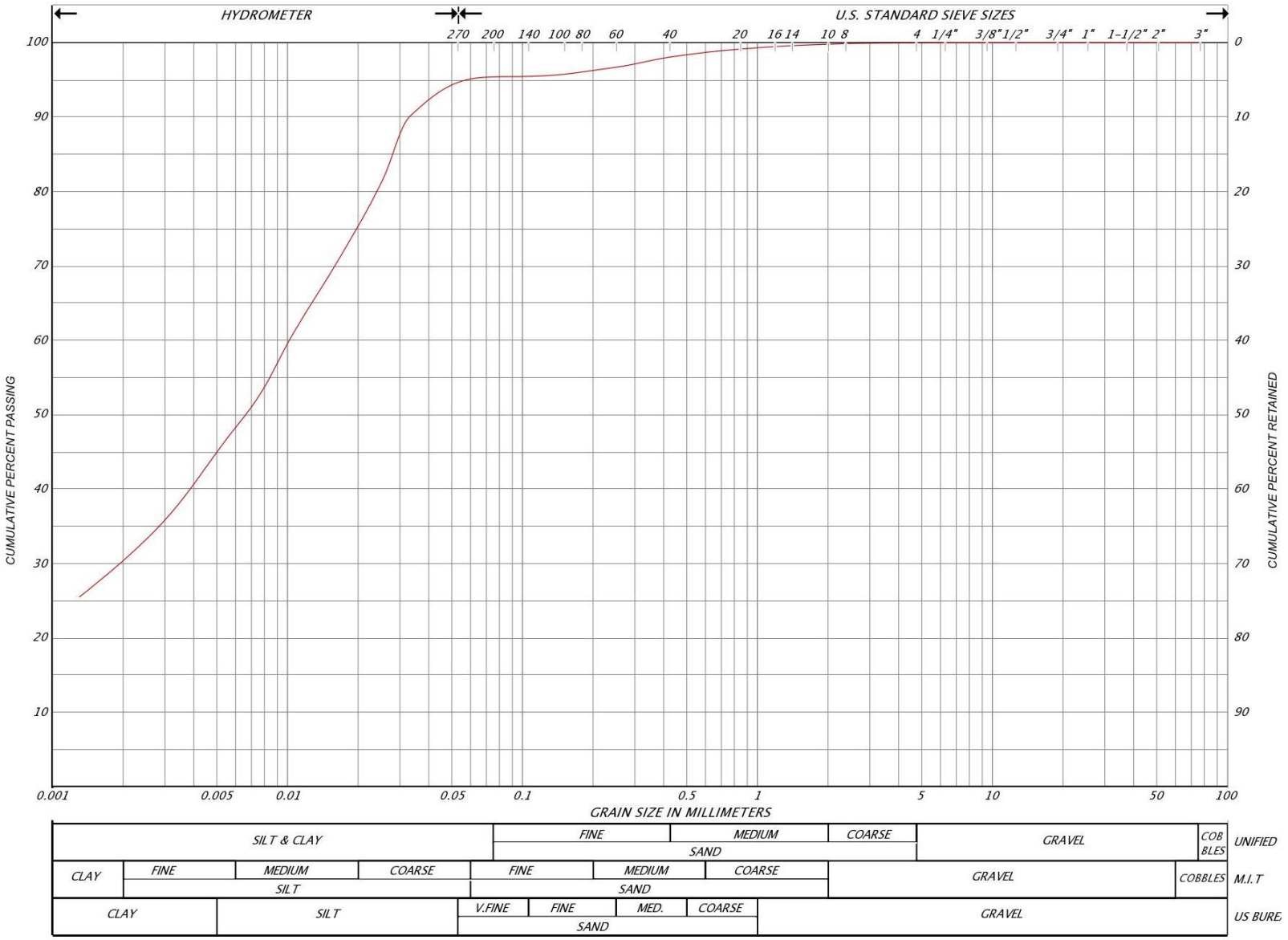
WL/GM:tm

Enclosures:
Figures 1 to 11 - Particle Size Distribution Charts
List of Abbreviations
Log of Boreholes BH1 to BH12 and BH/MW101 to BH/MW110
Drawing 1 - Borehole Location Plan
Appendix A – Engineered Fill
Appendix B – Statement of Limitations

Peto MacCallum Ltd.
CONSULTING ENGINEERS

PARTICLE SIZE DISTRIBUTION CHART

PML REF. 18KF031
FIGURE NO. 1



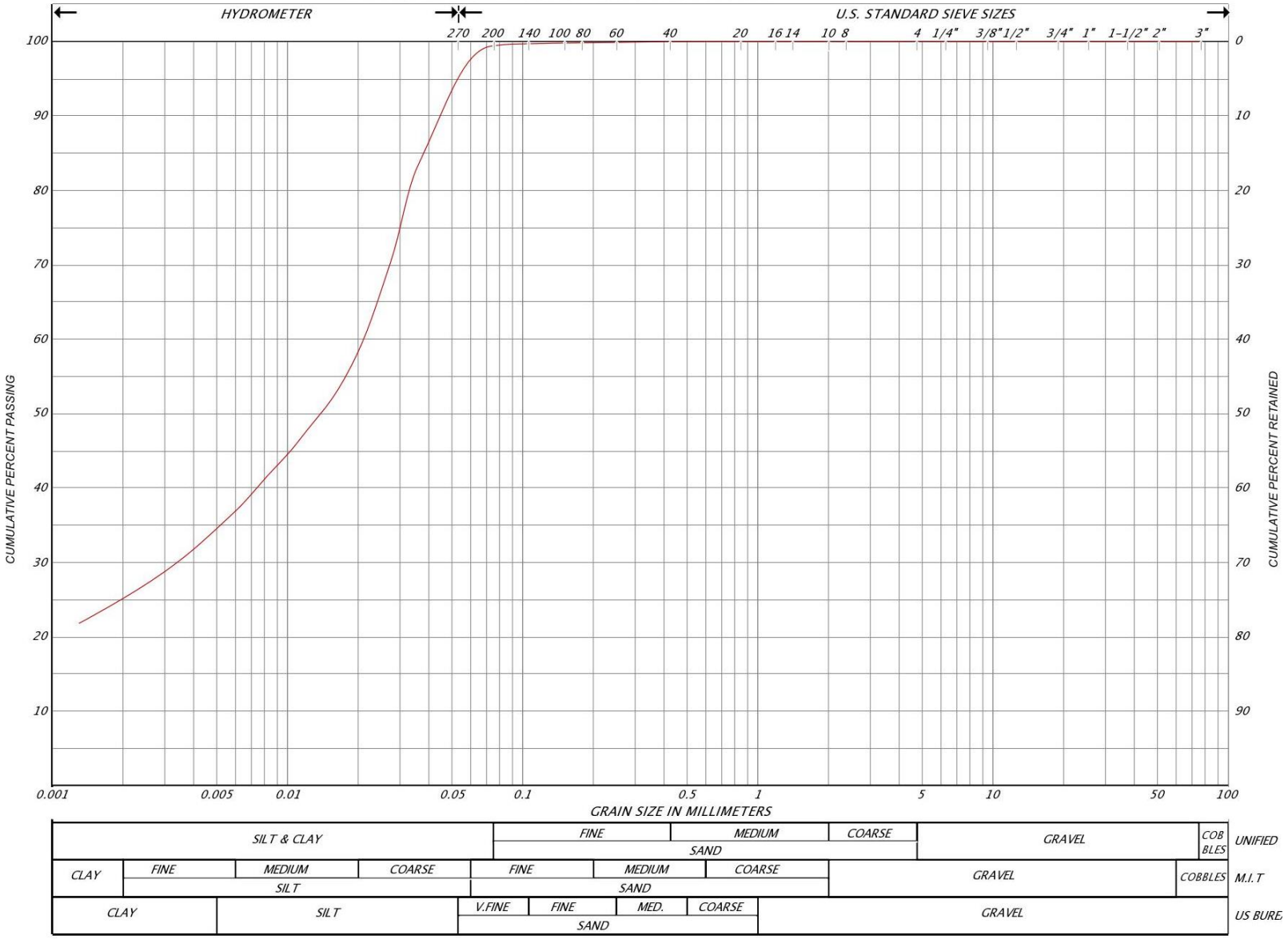
REMARKS Borehole MW101, Sample SS7, Depth 6.1 to 6.5 m

CLAYEY SILT

Peto MacCallum Ltd.
CONSULTING ENGINEERS

PARTICLE SIZE DISTRIBUTION CHART

PML REF. 18KF031
FIGURE NO. 2



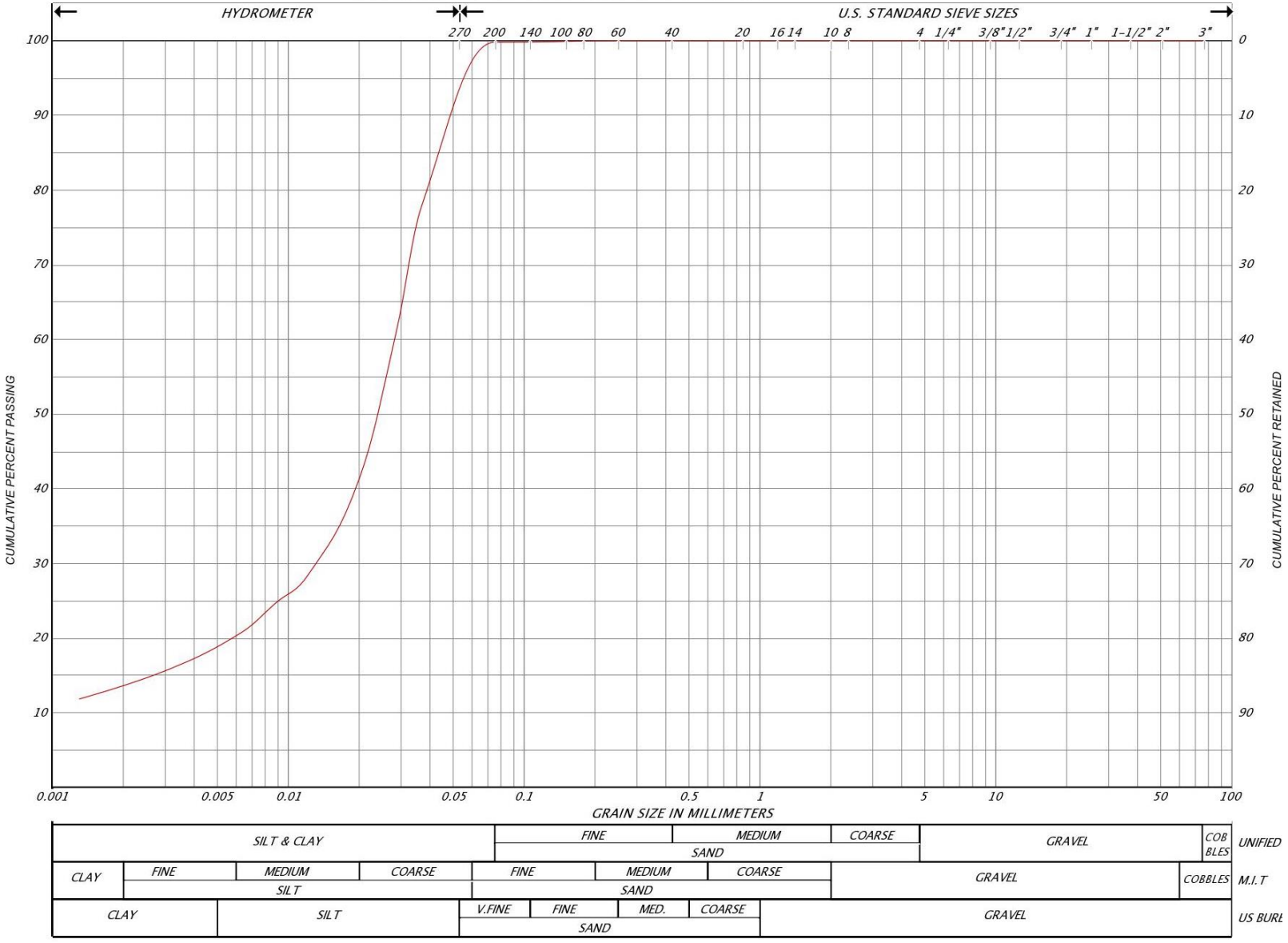
REMARKS Borehole MW104, Sample SS6, Depth 4.6 to 5.0 m

CLAYEY SILT

Peto MacCallum Ltd.
CONSULTING ENGINEERS

PARTICLE SIZE DISTRIBUTION CHART

PML REF. 18KF031
FIGURE NO. 3



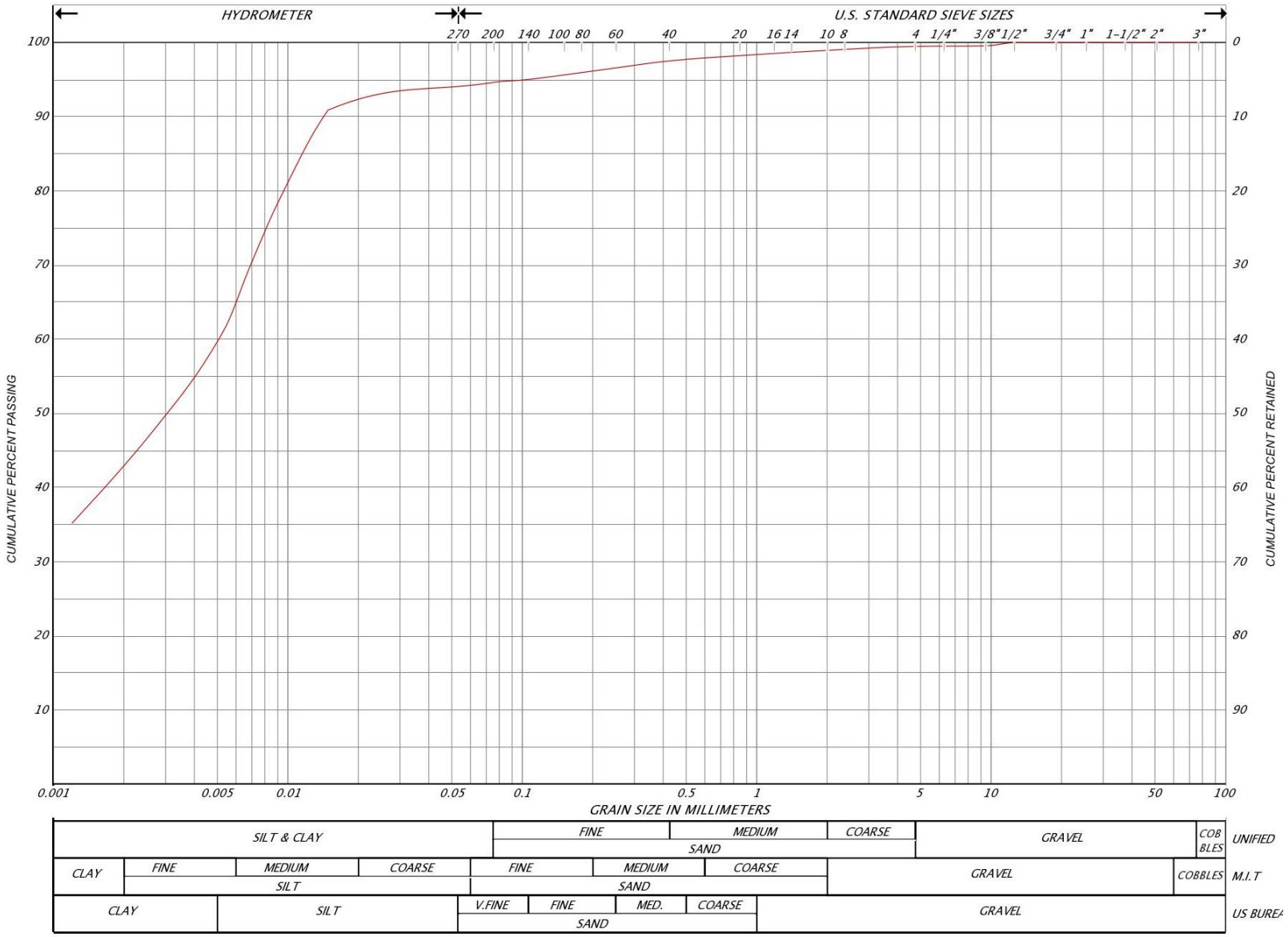
REMARKS Borehole MW105, Sample SS6, Depth 4.5 to 5.0 m

CLAYEY SILT

Peto MacCallum Ltd.
CONSULTING ENGINEERS

PARTICLE SIZE DISTRIBUTION CHART

PML REF. 18KF031
FIGURE NO. 4



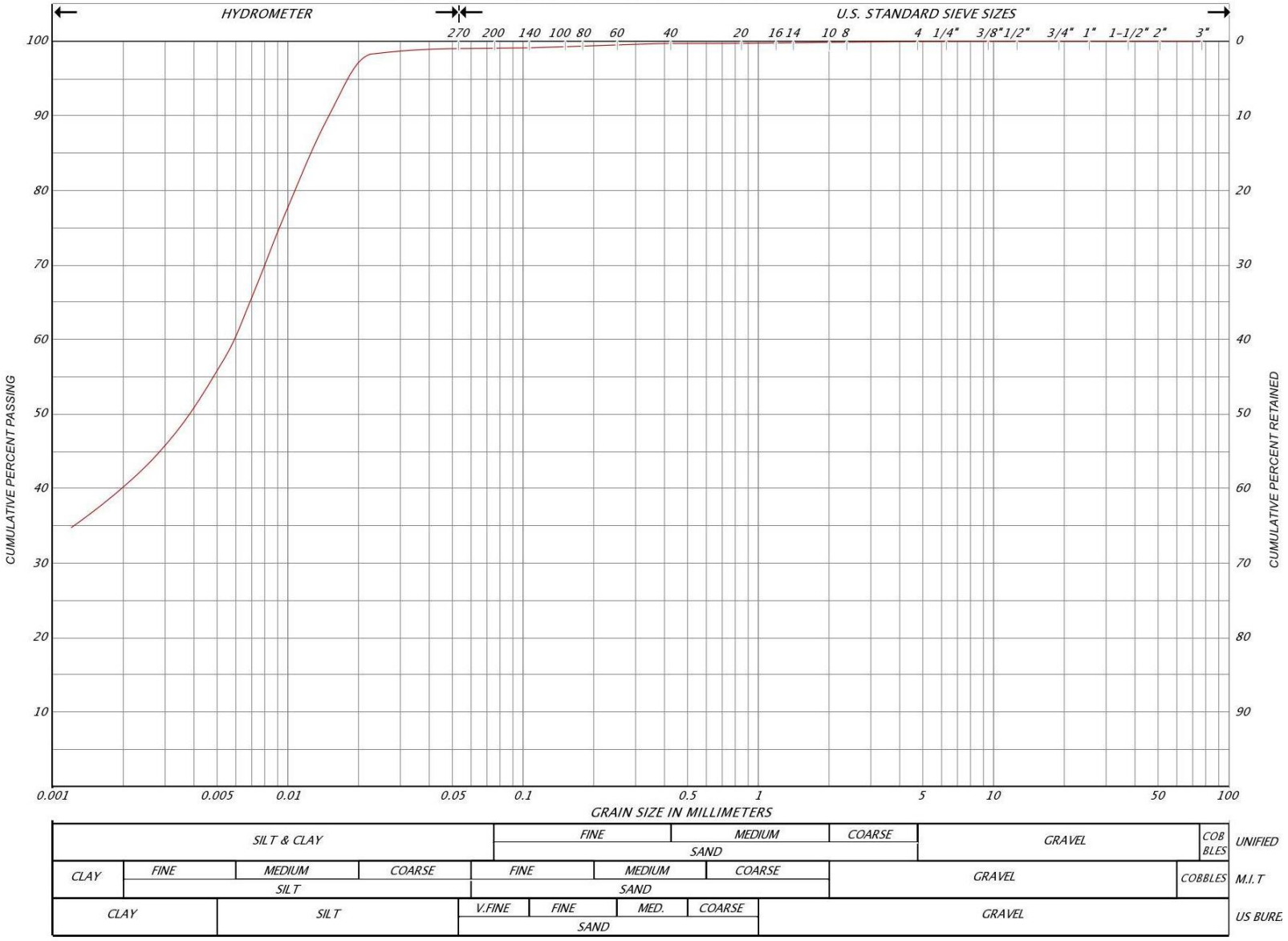
REMARKS Borehole MW107, Sample SS3, Depth 1.5 to 2.0 m

CLAYEY SILT

Peto MacCallum Ltd.
CONSULTING ENGINEERS

PARTICLE SIZE DISTRIBUTION CHART

PML REF. 18KF031
FIGURE NO. 5



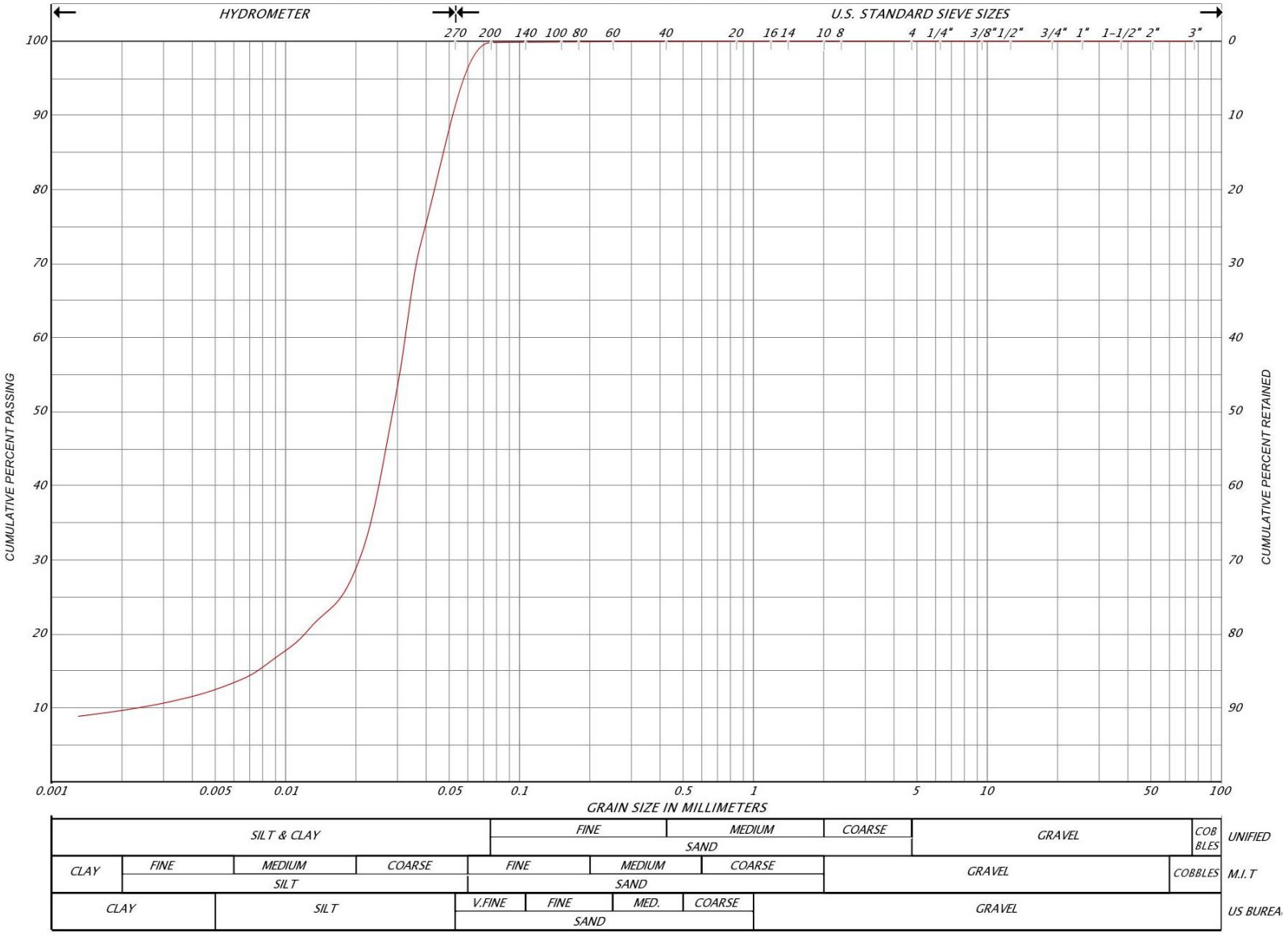
REMARKS Borehole MW107, Sample SS6, Depth 4.6 to 5.0 m

CLAYEY SILT

Peto MacCallum Ltd.
CONSULTING ENGINEERS

PARTICLE SIZE DISTRIBUTION CHART

PML REF. 18KF031
FIGURE NO. 6



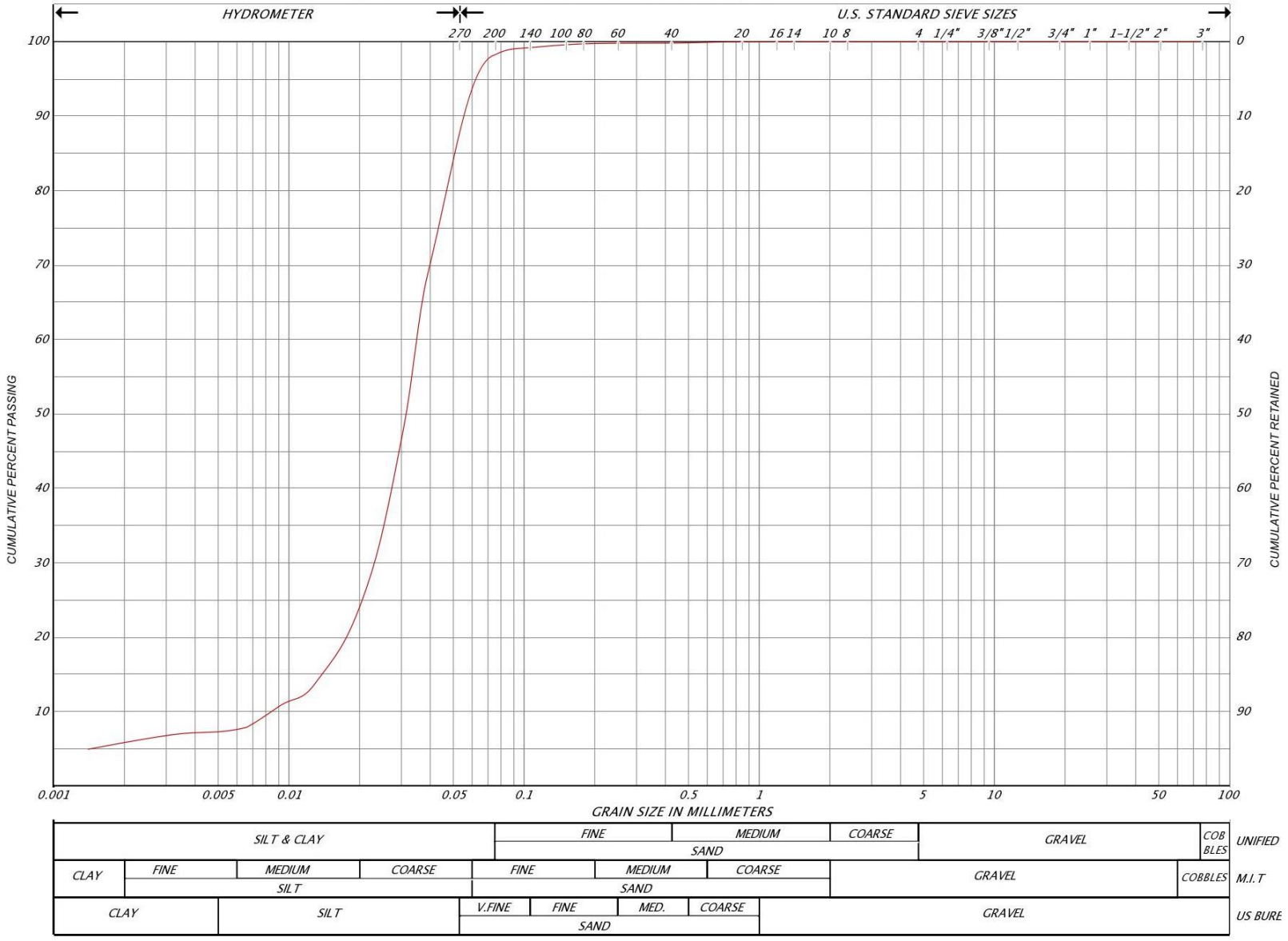
REMARKS Borehole MW109, Sample SS11, Depth 9.1 to 9.6 m

CLAYEY SILT

Peto MacCallum Ltd.
CONSULTING ENGINEERS

PARTICLE SIZE DISTRIBUTION CHART

PML REF. 18KF031
FIGURE NO. 7



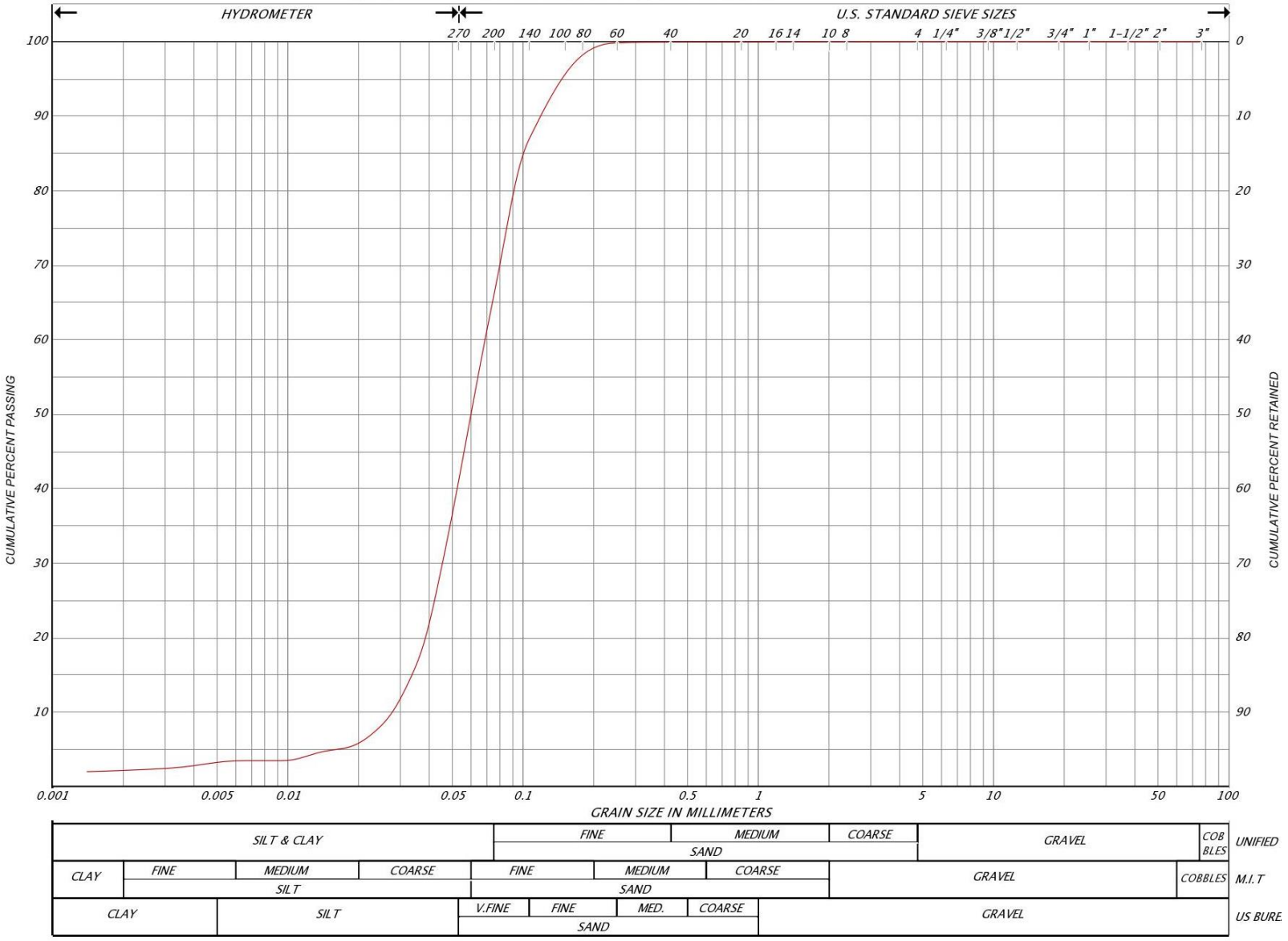
REMARKS Borehole BH9, Sample SS3, Depth 1.5 to 2.0 m

SILT

Peto MacCallum Ltd.
CONSULTING ENGINEERS

PARTICLE SIZE DISTRIBUTION CHART

PML REF. 18KF031
FIGURE NO. 8



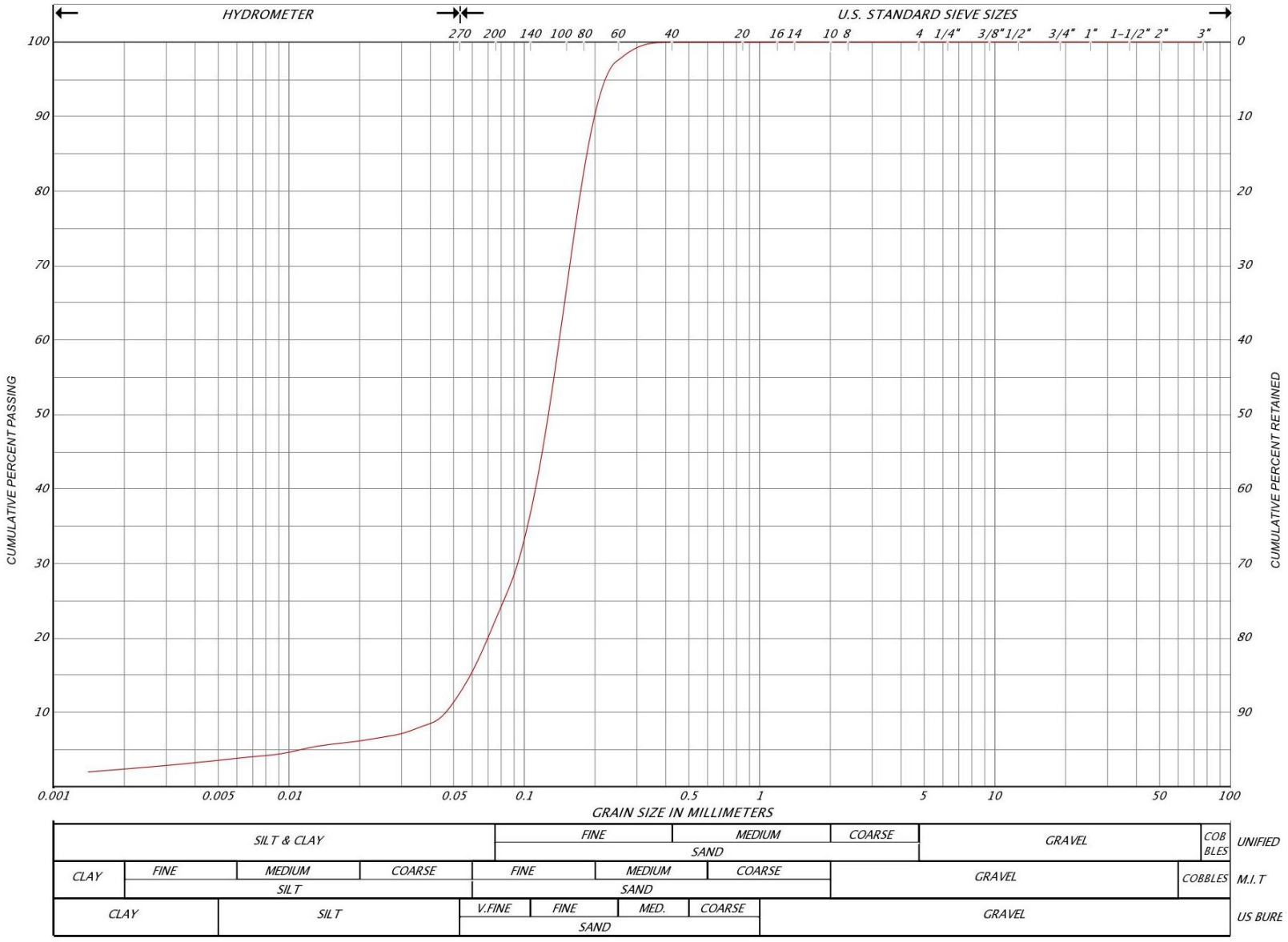
REMARKS Borehole MW102, Sample SS6, Depth 4.6 to 5.0 m

SANDY SILT

Peto MacCallum Ltd.
CONSULTING ENGINEERS

PARTICLE SIZE DISTRIBUTION CHART

PML REF. 18KF031
FIGURE NO. 9



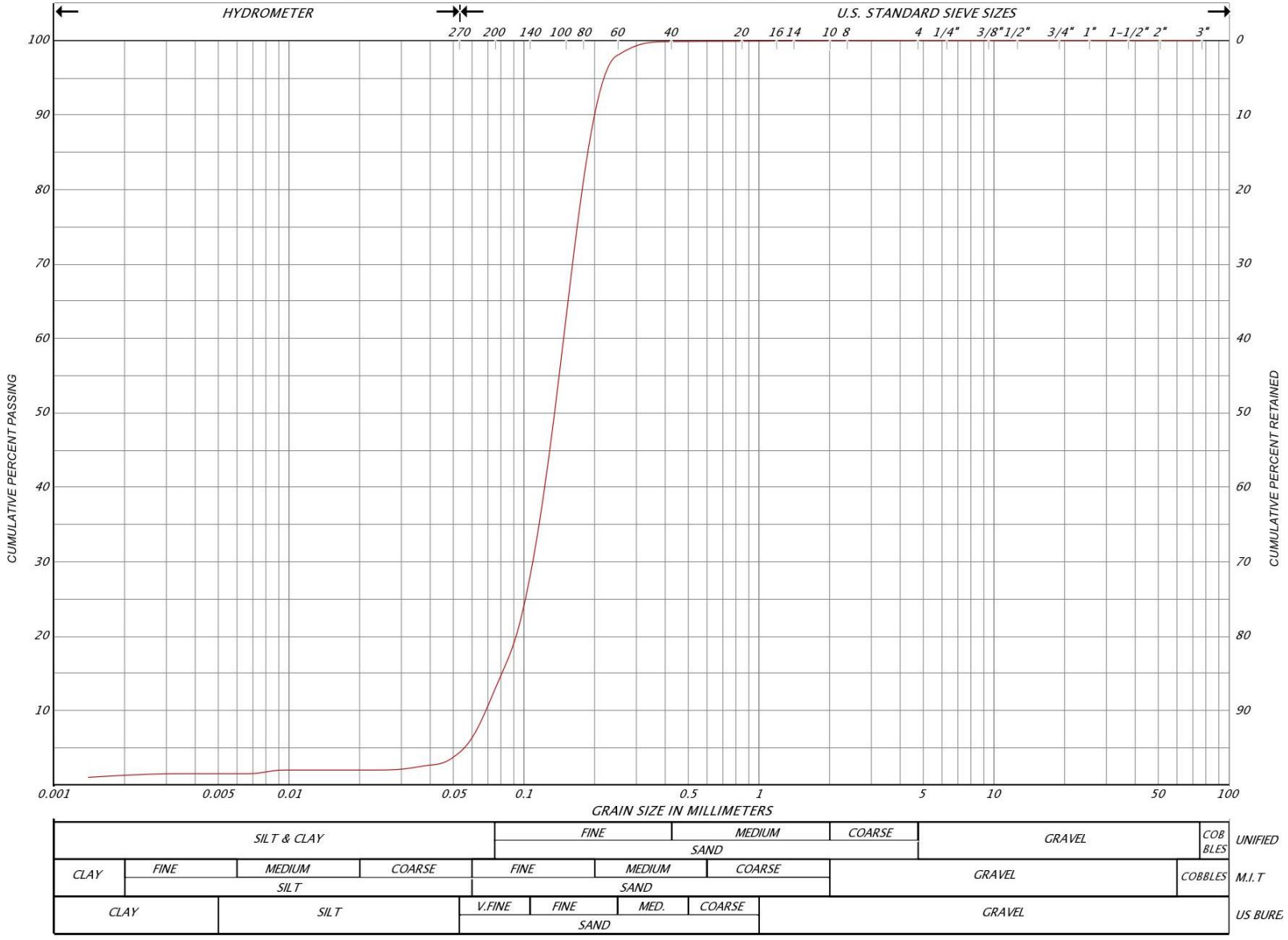
REMARKS Borehole BH9, Sample SS5, Depth 3.1 to 3.5 m

SILTY SAND

Peto MacCallum Ltd.
CONSULTING ENGINEERS

PARTICLE SIZE DISTRIBUTION CHART

PML REF. 18KF031
FIGURE NO. 10



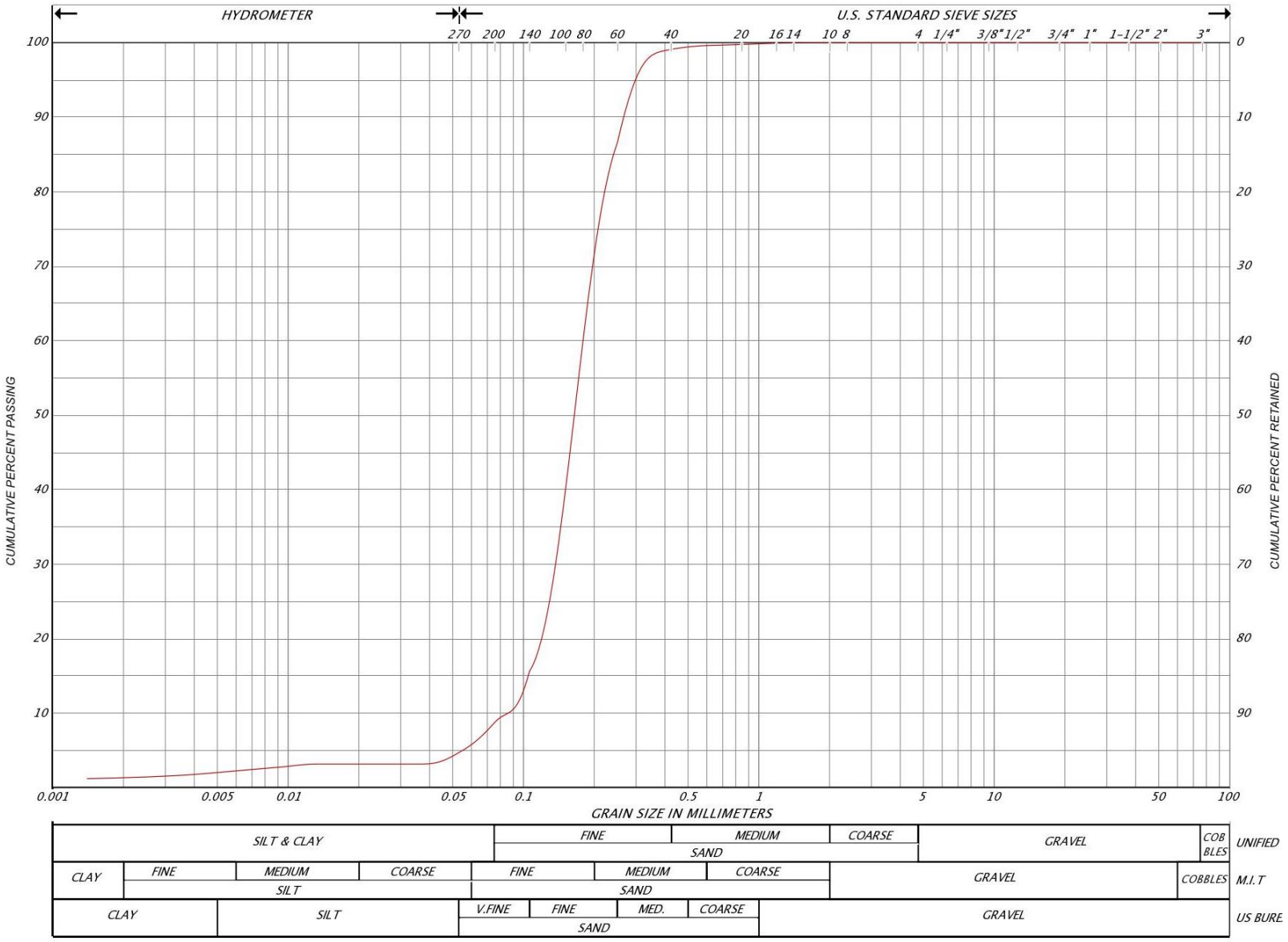
REMARKS Borehole BH6, Sample SS5, Depth 3.1 to 3.5 m

SAND

Peto MacCallum Ltd.
CONSULTING ENGINEERS

PARTICLE SIZE DISTRIBUTION CHART

PML REF. 18KF031
FIGURE NO. 11



REMARKS Borehole MW102, Sample SS4, Depth 2.3 to 2.7 m

SAND

LIST OF ABBREVIATIONS

PENETRATION RESISTANCE

Standard Penetration Resistance N: - The number of blows required to advance a standard split spoon sampler 0.3 m into the subsoil. - Driven by means of a 63.5 kg hammer falling freely a distance of 0.76 m.

Dynamic Penetration Resistance: The number of blows required to advance a 51 mm, 60 degree cone, fitted to the end of drill rods, 0.3 m into the subsoil. The driving energy being 475 J per blow.

DESCRIPTION OF SOIL

The consistency of cohesive soils and the relative density or denseness of cohesionless soils are described in the following terms:

CONSISTENCY	N (blows/0.3 m)	c (kPa)	DENSENESS	N (blows/0.3 m)
Very Soft	0 - 2	0 - 12	Very Loose	0 - 4
Soft	2 - 4	12 - 25	Loose	4 - 10
Firm	4 - 8	25 - 50	Compact	10 - 30
Stiff	8 - 15	50 - 100	Dense	30 - 50
Very Stiff	15 - 30	100 - 200	Very Dense	> 50
Hard	> 30	> 200		

WTPL	Wetter Than Plastic Limit
APL	About Plastic Limit
DTPL	Drier Than Plastic Limit

TYPE OF SAMPLE

SS	Split Spoon	TW	Thinwall Open
WS	Washed Sample	TP	Thinwall Piston
SB	Scraper Bucket Sample	OS	Oesterberg Sample
AS	Auger Sample	FS	Foil Sample
CS	Chunk Sample	RC	Rock Core
ST	Slotted Tube Sample	USS	Undisturbed Shear Strength
PH	Sample Advanced Hydraulically	RSS	Remoulded Shear Strength
PM	Sample Advanced Manually		

SOIL TESTS

Qu	Unconfined Compression	LV	Laboratory Vane
Q	Undrained Triaxial	FV	Field Vane
Qcu	Consolidated Undrained Triaxial	C	Consolidation
Qd	Drained Triaxial		

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 1

17T 523755E 4804492N

PROJECT Wilmot Woods Development — **PML REF.** 18KF031

LOCATION New Hamburg, Ontario — **BORING DATE** September 24, 2018 — **ENGINEER** H. Shinwary

BORING METHOD Continuous Flight Solid Stem Augers — **TECHNICIAN** M. Rapsey

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	ELEVATION SCALE
		SURFACE ELEVATION 339.37					
0.22	339.15	TOPSOIL: Dark brown sandy silt, trace clay, occasional rootlets, moist		1	SS	6	339
		CLAYEY SILT: Soft brown clayey silt, some sand, moist					
1.1				2	SS	3	
1.4	338.0	becoming WTPL becoming firm					338
				3	SS	7	
2.1	337.3	becoming stiff, numerous silt layers					
				4	SS	14	337
				5	SS	12	336
							335
				6	SS	11	
							334
				7	SS	12	
6.6	332.8	BOREHOLE TERMINATED AT 6.55 m					333

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS

GRAIN SIZE DISTRIBUTION (%)
GR SA SI&CL

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 2

17T 523879E 4804339N

PROJECT Wilmot Woods Development — **PML REF.** 18KF031

LOCATION New Hamburg, Ontario — **BORING DATE** September 24, 2018 — **ENGINEER** H. Shinwary

BORING METHOD Continuous Flight Solid Stem Augers — **TECHNICIAN** M. Rapsey

DEPTH (metres)	ELEV	DESCRIPTION	NUMBER	TYPE	"N" VALUES
		SURFACE ELEVATION 341.42			
0.0	341.24	TOPSOIL: Dark brown sandy silt, trace clay, occasional rootlets, damp	1	SS	4
0.70	340.72	SAND: Loose brown sand, some silt, damp			
1.0		SANDY SILT: Loose brown sandy silt, moist	2	SS	6
1.4	340.0	becoming compact, saturated	3	SS	18
2.0			4	SS	17
3.0			5	SS	23
3.9	337.5	SILT: Compact grey silt, trace sand, occasional clayey silt seams, saturated			
4.0			6	SS	17
5.0					
6.0					
6.2	335.2	CLAYEY SILT: Very stiff grey clayey silt, trace sand, WTPL	7	SS	17
6.6	334.8	BOREHOLE TERMINATED AT 6.55 m			
7.0					
8.0					
9.0					
10.0					
11.0					
12.0					
13.0					
14.0					
15.0					

ELEVATION SCALE: 341, 340, 339, 338, 337, 336, 335

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Free water encountered after SS3

Upon completion of augering Wet cave at 2.0 m

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 3

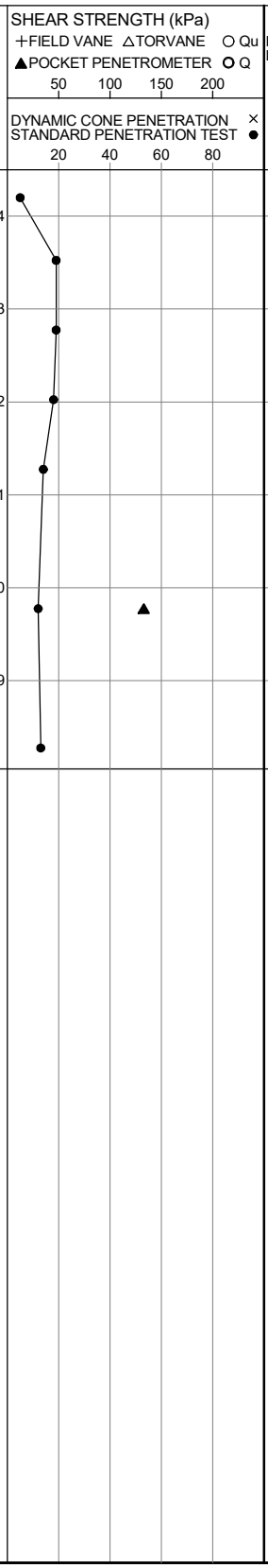
17T 524026E 4804185N

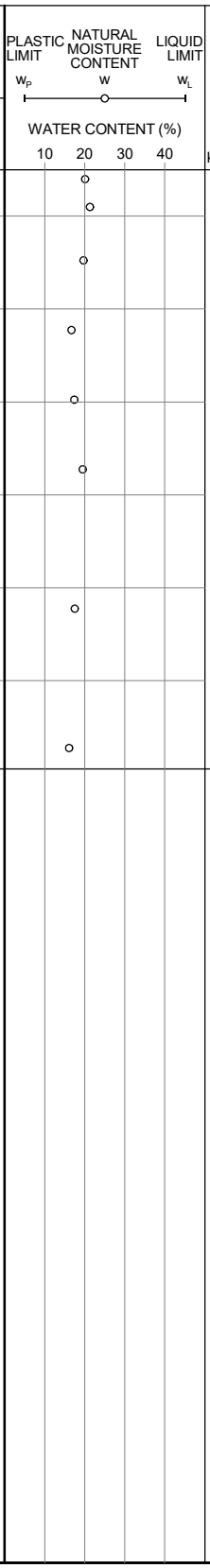
PROJECT Wilmot Woods Development — **PML REF.** 18KF031

LOCATION New Hamburg, Ontario — **BORING DATE** July 31, 2018 — **ENGINEER** H. Shinwary

BORING METHOD Continuous Flight Solid Stem Augers — **TECHNICIAN** K. Pettitt

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	SAMPLE NUMBER	SAMPLE TYPE	"N" VALUES
		SURFACE ELEVATION 344.50				
0.0	344.50					
0.20	344.30	TOPSOIL: Dark brown sandy silt, some clay, occasional rootlets, moist		1A	SS	5
				1B		
		CLAYEY SILT: Very stiff brown clayey silt, some sand, WTPL, numerous silt layers		2	SS	19
1.0						
				3	SS	19
2.0						
				4	SS	18
2.9	341.6	becoming stiff, grey				
3.0				5	SS	14
4.0						
				6	SS	12
5.0						
6.0				7	SS	13
6.5	338.0	BOREHOLE TERMINATED AT 6.5 m				
7.0						
8.0						
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						





UNIT WEIGHT kN/m³	GROUND WATER OBSERVATIONS AND REMARKS	GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL
	Upon completion of augering Open Dry	

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 4

17T 524118E 4804016N

PROJECT Wilmot Woods Development | **PML REF.** 18KF031
LOCATION New Hamburg, Ontario | **BORING DATE** July 30, 2018 | **ENGINEER** H. Shinwary
BORING METHOD Continuous Flight Solid Stem Augers | **TECHNICIAN** K. Pettitt

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	ELEVATION SCALE
0.0		SURFACE ELEVATION 342.61					
0.24	342.37	TOPSOIL: Dark brown sandy silt, some clay, occasional rootlets, moist		1A	SS	7	342
				1B			
		CLAYEY SILT: Firm brown clayey silt, trace sand, DTPL		2	SS	6	
1.0							
				3	SS	6	341
2.1	340.5	becoming stiff, some sand, WTPL, numerous silt layers					
2.0				4	SS	15	340
3.0				5	SS	15	
4.0	338.6	becoming grey					339
				6	SS	11	338
5.0							
5.6	337.0	becoming very stiff					337
6.0				7	SS	16	
6.5	336.1	BOREHOLE TERMINATED AT 6.5 m					
7.0							
8.0							
9.0							
10.0							
11.0							
12.0							
13.0							
14.0							
15.0							

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Upon completion of augering
Open
Dry

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 5

17T 523995E 4804385N

PROJECT Wilmot Woods Development — **PML REF.** 18KF031
LOCATION New Hamburg, Ontario — **BORING DATE** July 31, 2018 — **ENGINEER** H. Shinwary
BORING METHOD Continuous Flight Solid Stem Augers — **TECHNICIAN** K. Pettitt

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	ELEVATION SCALE
		SURFACE ELEVATION 341.78					
0.0		TOPSOIL: Dark brown sandy silt, some clay, occasional rootlets, moist		1A	SS	13	
0.31	341.47			1B			
		CLAYEY SILT: Stiff brown clayey silt, some sand, DTPL		2	SS	11	341
1.0							
1.4	340.4	numerous silt layers		3	SS	13	340
2.0							
2.6	339.2	becoming grey, WTPL		4	SS	14	339
3.0				5	SS	9	
4.0							338
				6	SS	11	337
5.0							
6.0							336
6.5	335.3	BOREHOLE TERMINATED AT 6.5 m		7	SS	13	
7.0							
8.0							
9.0							
10.0							
11.0							
12.0							
13.0							
14.0							
15.0							

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS

GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Upon completion of augering
Open
Dry

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 6

17T 524153E 4804198N

PROJECT Wilmot Woods Development | **PML REF.** 18KF031
LOCATION New Hamburg, Ontario | **BORING DATE** July 31, 2018 | **ENGINEER** H. Shinwary
BORING METHOD Continuous Flight Solid Stem Augers | **TECHNICIAN** K. Pettitt

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES
		SURFACE ELEVATION 343.61				
0.0	343.61					
0.25	343.36	TOPSOIL: Dark brown sandy silt, some clay, occasional rootlets, moist		1A	SS	7
				1B		
		SILTY SAND: Compact brown silty sand, trace gravel, damp				
1.0				2A	SS	17
1.1				2B		
1.4	342.2	SILT: Compact brown silt, trace clay, trace sand, wet				
		SAND: Compact brown sand, some silt, wet		3	SS	20
2.0						
2.1	341.5	becoming saturated		4	SS	19
3.0				5	SS	22
4.0						
				6	SS	28
5.0						
5.5	338.1	CLAYEY SILT: Very stiff grey clayey silt, WTPL, numersous silt layers				
6.0				7	SS	23
6.5	337.1	BOREHOLE TERMINATED AT 6.5 m				
7.0						
8.0						
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						

ELEVATION SCALE: 343, 342, 341, 340, 339, 338

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ● Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Upon completion of augering
Cave at 2.1 m
Dry

NOTES

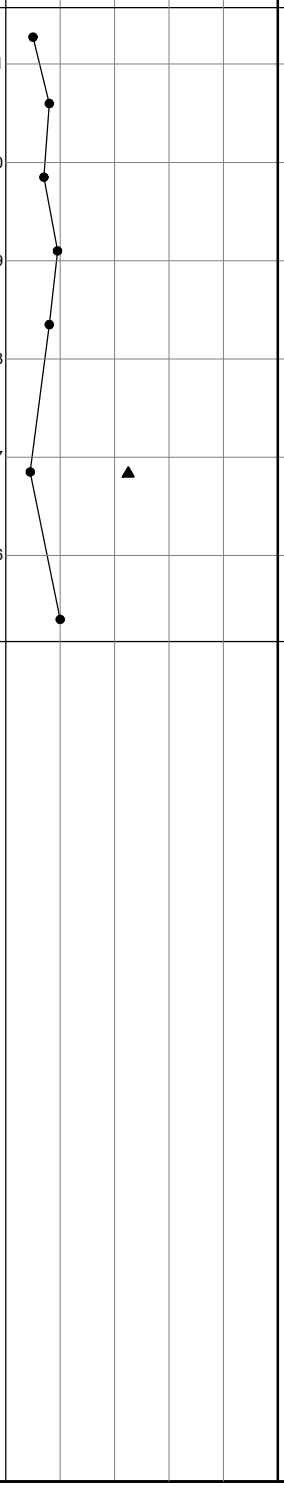
Peto MacCallum Ltd.
CONSULTING ENGINEERS

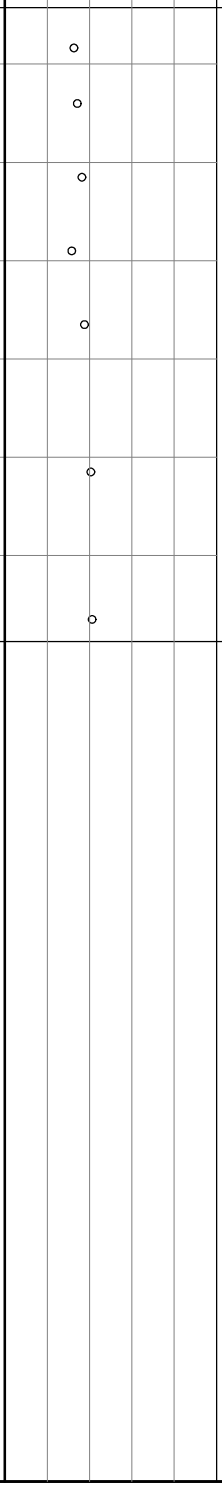
LOG OF BOREHOLE NO. 7

17T 524277E 4804038N

PROJECT Wilmot Woods Development | **PML REF.** 18KF031
LOCATION New Hamburg, Ontario | **BORING DATE** July 30, 2018 | **ENGINEER** H. Shinwary
BORING METHOD Continuous Flight Solid Stem Augers | **TECHNICIAN** K. Pettitt

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES
		SURFACE ELEVATION 341.57				
0.0	341.57					
	0.22	TOPSOIL: Dark brown sandy silt, trace clay, occasional rootlets, moist		1A	SS	10
	341.35			1B		
		CLAYEY SILT: Stiff to very stiff brown clayey silt, some sand, trace gravel, DTPL		2	SS	16
1.0						
	1.4					
	340.2	numerous silt layers		3	SS	14
2.0						
	2.1					
	339.5	becoming grey, WTPL		4	SS	19
3.0						
				5	SS	16
4.0						
				6	SS	9
5.0						
6.0				7	SS	20
	6.5					
	335.1	BOREHOLE TERMINATED AT 6.5 m				
7.0						
8.0						
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						





UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS

GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Upon completion of augering
Open
Dry

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 8

17T 524205E 4804333N

PROJECT Wilmot Woods Development — **PML REF.** 18KF031

LOCATION New Hamburg, Ontario — **BORING DATE** August 1, 2018 — **ENGINEER** H. Shinwary

BORING METHOD Continuous Flight Solid Stem Augers — **TECHNICIAN** K. Pettitt

DEPTH ELEV (metres)	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	ELEVATION SCALE
	SURFACE ELEVATION 343.37					343
0.39 / 342.98	TOPSOIL: Dark brown sandy silt, trace clay, occasional rootlets, moist		1A	SS	5	
	SANDY SILT: Compact brown sandy silt, moist; with topsoil inclusions		1B			
0.95 / 342.42	CLAYEY SILT: Stiff brown clayey silt, some sand, WTPL, numerous silt layers		2A, 2B	SS	11	342
			3	SS	14	
			4	SS	15	341
2.9 / 340.5	becoming grey		5	SS	12	340
			6	SS	15	339
			7	SS	9	338
6.5 / 336.9	BOREHOLE TERMINATED AT 6.5 m					337

SHEAR STRENGTH (kPa)
+ FIELD VANE △ TORVANE ○ Qu
▲ POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS

GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Upon completion of augering
Open
Dry

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 9

17T 524349E 4804152N

PROJECT Wilmot Woods Development | **PML REF.** 18KF031
LOCATION New Hamburg, Ontario | **BORING DATE** August 1, 2018 | **ENGINEER** H. Shinwary
BORING METHOD Continuous Flight Solid Stem Augers | **TECHNICIAN** K. Pettitt

DEPTH ELEV (metres)	DESCRIPTION	NUMBER	TYPE	"N" VALUES
	SURFACE ELEVATION 343.24			
0.27 / 342.97	TOPSOIL: Dark brown sandy silt, some clay, occasional rootlets, moist	1A / 1B	SS	5
0.68 / 342.56	SILTY SAND: Compact brown silty sand, damp			
	SILT: Compact brown silt, trace sand, trace clay, moist to wet	2	SS	16
		3	SS	17
		4	SS	14
2.9 / 340.3	SILTY SAND: Compact brown silty sand, wet	5	SS	22
4.0 / 339.2	becoming saturated	6	SS	16
5.5 / 337.7	SANDY SILT: Compact grey sandy silt, trace clay, saturated	7	SS	26
6.5 / 336.7	BOREHOLE TERMINATED AT 6.5 m			

SHEAR STRENGTH (kPa): + FIELD VANE △ TORVANE ○ Qu ▲ POCKET PENETROMETER ○ Q; DYNAMIC CONE PENETRATION × STANDARD PENETRATION TEST ●

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L — WATER CONTENT (%)

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS

GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Upon completion of augering
Free water at 2.3 m
Cave at 2.4 m

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 10

17T 524328E 4804366N

PROJECT Wilmot Woods Development | **PML REF.** 18KF031

LOCATION New Hamburg, Ontario | **BORING DATE** August 2, 2018 | **ENGINEER** H. Shinwary

BORING METHOD Continuous Flight Solid Stem Augers | **TECHNICIAN** K. Pettitt

DEPTH / ELEV (metres)	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	ELEVATION SCALE
	SURFACE ELEVATION 342.20					
0.27 / 341.93	TOPSOIL: Dark brown sandy silt, trace clay, occasional rootlets, moist		1A	SS	8	342
			1B			
	CLAYEY SILT: Firm brown clayey silt, DTPL, numerous silt layers		2	SS	5	341
1.4 / 340.8	becoming stiff		3	SS	10	
			4	SS	12	340
2.9 / 339.3	becoming grey, WTPL		5	SS	8	339
			6	SS	14	338
			7	SS	10	337
6.5 / 335.7	BOREHOLE TERMINATED AT 6.5 m					336

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Upon completion of augering
Open
Dry

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 11

17T 524447E 4804190N

PROJECT Wilmot Woods Development
PML REF. 18KF031
LOCATION New Hamburg, Ontario
BORING DATE August 2, 2018
ENGINEER H. Shinwary
BORING METHOD Continuous Flight Solid Stem Augers
TECHNICIAN K. Pettitt

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	ELEVATION SCALE
		SURFACE ELEVATION 346.37					
0.0	346.37	TOPSOIL: Dark brown clayey silt, trace sand, occasional rootlets, DTPL		1A	SS	9	346
0.30	346.07			1B			
		CLAYEY SILT: Stiff brown clayey silt, some sand, DTPL		2	SS	14	
1.0							345
				3	SS	9	
2.0							
				4	SS	11	344
3.0							
				5	SS	12	343
4.0	342.4	becoming grey, WTPL					
				6	SS	11	342
5.0							
							341
6.0				7	SS	15	
6.5	339.9	BOREHOLE TERMINATED AT 6.5 m					340
7.0							
8.0							
9.0							
10.0							
11.0							
12.0							
13.0							
14.0							
15.0							

SHEAR STRENGTH (kPa)
+ FIELD VANE △ TORVANE ○ Qu
▲ POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS

GRAIN SIZE DISTRIBUTION (%)
GR SA SI&CL

Upon completion of augering
Open
Dry

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 12

17T 524560E 4804228N

PROJECT Wilmot Woods Development | **PML REF.** 18KF031
LOCATION New Hamburg, Ontario | **BORING DATE** August 2, 2018 | **ENGINEER** H. Shinwary
BORING METHOD Continuous Flight Solid Stem Augers | **TECHNICIAN** K. Pettitt

DEPTH / ELEV (metres)	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	ELEVATION SCALE
	SURFACE ELEVATION 346.22					346
0.25 / 345.97	TOPSOIL: Dark brown clayey silt, some sand, occasional rootlets, DTPL		1A	SS	10	
	CLAYEY SILT: Stiff to very stiff brown clayey silt, some sand, DTPL to APL, numerous silt layers		1B			
			2	SS	14	345
			3	SS	17	
			4	SS	14	344
2.9 / 343.3	becoming grey, WTPL		5	SS	10	343
			6	SS	12	342
			7	SS	8	341
6.5 / 339.7	BOREHOLE TERMINATED AT 6.5 m					340

SHEAR STRENGTH (kPa)
+ FIELD VANE △ TORVANE ○ Qu
▲ POCKET PENETROMETER ● Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Upon completion of augering
Open
Dry

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE/MONITORING WELL NO. 101

17T 523684.7E 4804597N

PROJECT Wilmot Woods Development — **PML REF.** 18KF031

LOCATION New Hamburg, Ontario — **BORING DATE** August 1, 2018 — **ENGINEER** H. Shinwary

BORING METHOD Continuous Flight Hollow Stem Augers — **TECHNICIAN** K. Pettitt

DEPTH (metres)	ELEV	DESCRIPTION	NUMBER	TYPE	"N" VALUES
		SURFACE ELEVATION 339.04			
0.0	339.04	TOPSOIL: Dark brown sandy silt, some clay, occasional rootlets, moist	1A	SS	7
0.38			1B		
0.68		SANDY SILT: Loose brown sandy silt, moist, occasional rootlets	2A	SS	8
0.98		SILT: Loose brown silt, some sand, trace clay, moist	2B		
1.0	338.06	SILTY SAND: Compact brown silty sand, wet	3	SS	11
2.1	336.9	CLAYEY SILT: Stiff to very stiff grey clayey silt, trace sand, WTPL, numerous silt layers	4	SS	17
3.0			5	SS	12
4.0					
5.0			6	SS	16
6.0					
6.5	332.5	BOREHOLE TERMINATED AT 6.5 m	7	SS	16
7.0					
8.0					
9.0					
10.0					
11.0					
12.0					
13.0					
14.0					
15.0					

ELEVATION SCALE: 338, 337, 336, 335, 334, 333

SHEAR STRENGTH (kPa): + FIELD VANE △ TORVANE ○ Qu ▲ POCKET PENETROMETER ○ Q; 50 100 150 200

DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L

WATER CONTENT (%): 10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS

GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Stickup Well Protector Set in Concrete

Bentonite Seal

Filter Sand

Screen

Water Level Readings:

Date	Depth	Elev.
2018-08-01	2.4	336.6
2018-08-03	1.8	337.2
2018-11-07	0.9	338.1
2018-11-26	0.9	338.1

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE/MONITORING WELL NO. 102

17T 523788.7E 4804396N

PROJECT Wilmot Woods Development — **PML REF.** 18KF031

LOCATION New Hamburg, Ontario — **BORING DATE** August 1, 2018 — **ENGINEER** H. Shinwary

BORING METHOD Continuous Flight Hollow Stem Augers — **TECHNICIAN** K. Pettitt

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	SAMPLE NUMBER	SAMPLE TYPE	"N" VALUES
		SURFACE ELEVATION 340.00				
0.0		TOPSOIL: Dark brown sandy silt, some clay, occasional rootlets, moist		1A	SS	8
0.30	339.70			1B		
		CLAYEY SILT: Firm brown clayey silt, trace sand, DTPL, numerous silt layers		2A	SS	6
1.0				2B		
1.1	338.9	SAND: Loose brown sand, trace silt, wet to saturated				
1.4	338.6	becoming compact		3	SS	14
2.0				4	SS	17
3.0				5	SS	15
4.0	336.0	SANDY SILT: Compact grey sandy silt, trace clay, saturated		6	SS	20
5.0						
6.0				7	SS	21
6.5	333.5	BOREHOLE TERMINATED AT 6.5 m				
7.0						
8.0						
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						

ELEVATION SCALE: 339, 338, 337, 336, 335, 334

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Stickup Well Protector Set in Concrete
Bentonite Seal
Filter Sand
Screen

Water Level Readings:

Date	Depth	Elev.
2018-08-01	1.7	338.3
2018-08-03	1.7	338.3
2018-11-07	1.4	338.6
2018-11-26	1.2	338.8

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE/MONITORING WELL NO. 103

17T 523910.3E 4804249N

PROJECT Wilmot Woods Development — **PML REF.** 18KF031

LOCATION New Hamburg, Ontario — **BORING DATE** August 1, 2018 — **ENGINEER** H. Shinwary

BORING METHOD Continuous Flight Solid Stem Augers — **TECHNICIAN** K. Pettitt

DEPTH (metres)	ELEV	DESCRIPTION	NUMBER	TYPE	"N" VALUES
		SURFACE ELEVATION 343.23			
0.0	343.23				
	0.21	TOPSOIL: Dark brown sandy silt topsoil,	1A	SS	8
	343.02	some clay, occasional rootlets, moist	1B		
		CLAYEY SILT: Stiff brown clayey silt, trace sand, DTPL, numerous silt layers			
1.0			2	SS	10
			3	SS	13
2.0	2.1				
	341.1	becoming WTPL	4	SS	14
3.0			5	SS	18
4.0	4.0				
	339.2	becoming grey			
			6	SS	17
5.0					
6.0			7	SS	21
	6.5				
	336.7	BOREHOLE TERMINATED AT 6.5 m			
7.0					
8.0					
9.0					
10.0					
11.0					
12.0					
13.0					
14.0					
15.0					

SHEAR STRENGTH (kPa): + FIELD VANE △ TORVANE ○ Qu ▲ POCKET PENETROMETER O Q; DYNAMIC CONE PENETRATION × STANDARD PENETRATION TEST ●

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L

WATER CONTENT (%)

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS

GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Stickup Well Protector Set in Concrete

Bentonite Seal

Filter Sand

Screen

Water Level Readings:

Date	Depth	Elev.
2018-08-01	4.0	339.2
2018-08-03	2.8	340.4
2018-11-07	2.3	340.9
2018-11-26	1.9	341.3

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE/MONITORING WELL NO. 104

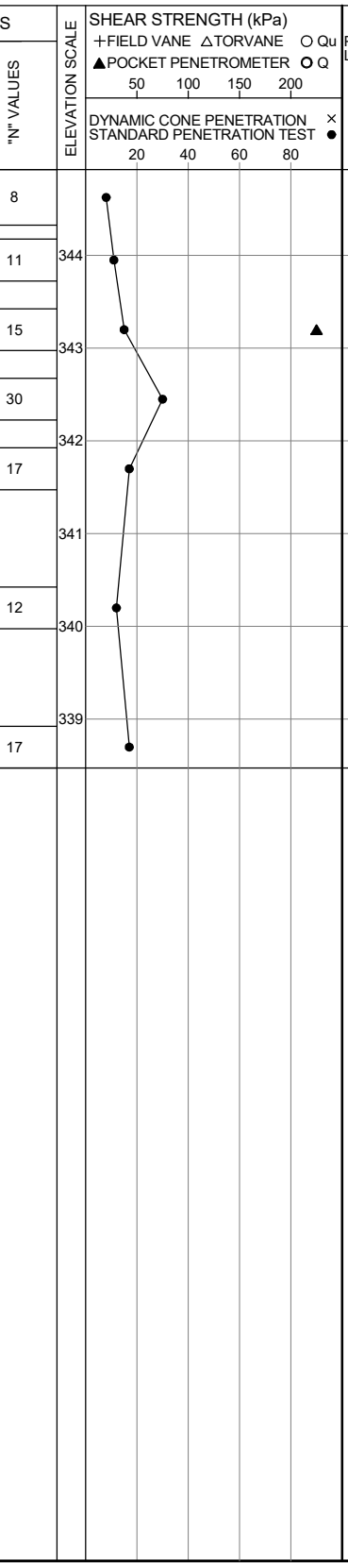
17T 524180E 4803929N

PROJECT Wilmot Woods Development — **PML REF.** 18KF031

LOCATION New Hamburg, Ontario — **BORING DATE** July 30, 2018 — **ENGINEER** H. Shinwary

BORING METHOD Continuous Flight Solid Stem Augers — **TECHNICIAN** K. Pettitt

DEPTH ELEV (metres)	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES
	SURFACE ELEVATION 344.92				
0.18 / 344.74	FILL: Dark brown clayey silt, some sand, occasional rootlets, APL, occasional wood fragments		1A		
			1B	SS	8
0.68 / 344.24	FILL: Firm brown silty clay , some sand, WTPL, occasional wood fragments		2	SS	11
	CLAYEY SILT: Stiff to very stiff brown clayey silt, trace sand, DTPL, numerous silt layers		3	SS	15
2.1 / 342.8	becoming grey, WTPL		4	SS	30
			5	SS	17
			6	SS	12
			7	SS	17
6.5 / 338.4	BOREHOLE TERMINATED AT 6.5 m				



SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Water Level Readings:

Date	Depth	Elev.
2018-07-31	DRY	----
2018-08-03	3.3	341.6
2018-11-07	1.4	343.5
2018-11-26	0.8	344.1

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE/MONITORING WELL NO. 105

17T 524125.6E 4804437N

PROJECT Wilmot Woods Development — **PML REF.** 18KF031

LOCATION New Hamburg, Ontario — **BORING DATE** August 1, 2018 — **ENGINEER** H. Shinwary

BORING METHOD Continuous Flight Solid Stem Augers — **TECHNICIAN** K. Pettitt

DEPTH (metres)	ELEV	DESCRIPTION	NUMBER	TYPE	"N" VALUES
	341.05	SURFACE ELEVATION 341.05			
0.0	341.05	TOPSOIL: Dark brown sandy silt, trace clay, occasional rootlets, moist	1A	SS	9
0.46	340.59	CLAYEY SILT: Firm brown clayey silt, trace sand, DTPL, numerous silt layers	1B		
			2	SS	7
1.4	339.6	becoming stiff			
			3	SS	10
2.1	338.9	becoming WTPL			
			4	SS	9
			5	SS	9
			6	SS	13
5.6	335.4	becoming very stiff			
			7	SS	17
6.5	334.5	BOREHOLE TERMINATED AT 6.5 m			

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Stickup Well Protector Set in Concrete
Bentonite Seal
Filter Sand
Screen

Water Level Readings:

Date	Depth	Elev.
2018-08-01	DRY	----
2018-08-03	1.4	339.6
2018-11-07	1.0	340.0
2018-11-26	0.8	340.2

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE/MONITORING WELL NO. 106

17T 524544.9E 4804378N

PROJECT Wilmot Woods Development — **PML REF.** 18KF031

LOCATION New Hamburg, Ontario — **BORING DATE** August 2, 2018 — **ENGINEER** H. Shinwary

BORING METHOD Continuous Flight Solid Stem Augers — **TECHNICIAN** K. Pettitt

DEPTH ELEV (metres)	DESCRIPTION	NUMBER	TYPE	"N" VALUES
	SURFACE ELEVATION 342.98			
0.20 / 342.78	TOPSOIL: Dark brown clayey silt, some sand, occasional rootlets, DTPL	1A	SS	11
	CLAYEY SILT: Stiff brown clayey silt, trace sand, DTPL, numerous silt layers	1B		
		2	SS	15
		3	SS	16
2.1 / 340.9	becoming firm, grey, WTPL	4	SS	7
		5	SS	8
4.0 / 339.0	becoming stiff to very stiff	6	SS	13
		7	SS	25
6.5 / 336.5	BOREHOLE TERMINATED AT 6.5 m			

SHEAR STRENGTH (kPa): + FIELD VANE △ TORVANE ○ Qu ▲ POCKET PENETROMETER ○ Q; DYNAMIC CONE PENETRATION × STANDARD PENETRATION TEST ●

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L; WATER CONTENT (%)

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS

GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Stickup Well Protector Set in Concrete

Bentonite Seal

Filter Sand

Screen

Water Level Readings:

Date	Depth	Elev.
2018-08-02	4.3	338.7
2018-08-03	2.7	340.3
2018-11-07	1.5	341.5
2018-11-24	1.2	341.8

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE/MONITORING WELL NO. 107

17T 524733E 4804139N

PROJECT Wilmot Woods Development — **PML REF.** 18KF031
LOCATION New Hamburg, Ontario — **BORING DATE** August 2, 2018 — **ENGINEER** H. Shinwary
BORING METHOD Continuous Flight Solid Stem Augers — **TECHNICIAN** K. Pettitt

DEPTH (metres) / ELEV	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	TYPE	"N" VALUES
	SURFACE ELEVATION 346.96				
0.20 / 346.76	TOPSOIL: Dark brown clayey silt, some sand, occasional rootlets, DTPL		1A	SS	12
	CLAYEY SILT: Stiff brown clayey silt, trace sand, DTPL, numerous silt layers		1B		
			2	SS	11
			3	SS	12
			4	SS	12
2.9 / 344.1	becoming firm to stiff, grey, WTPL		5	SS	7
			6	SS	9
			7	SS	10
6.5 / 340.5	BOREHOLE TERMINATED AT 6.5 m				

SHEAR STRENGTH (kPa): +FIELD VANE △TORVANE ○ Qu; ▲POCKET PENETROMETER ○ Q; DYNAMIC CONE PENETRATION ×; STANDARD PENETRATION TEST ●

PLASTIC LIMIT (w_P) — NATURAL MOISTURE CONTENT (w) — LIQUID LIMIT (w_L); WATER CONTENT (%)

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS; GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Stickup Well Protector Set in Concrete
Bentonite Seal
Filter Sand
Screen

Water Level Readings:

Date	Depth	Elev.
2018-08-02	DRY	----
2018-08-03	DRY	----
2018-11-07	2.5	344.5
2018-11-26	2.3	344.7

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE/MONITORING WELL NO. 108

17T 524541.1E 4804122N

PROJECT Wilmot Woods Development — **PML REF.** 18KF031

LOCATION New Hamburg, Ontario — **BORING DATE** August 2, 2018 — **ENGINEER** H. Shinwary

BORING METHOD Continuous Flight Solid Stem Augers — **TECHNICIAN** K. Pettitt

DEPTH ELEV (metres)	DESCRIPTION	NUMBER	TYPE	"N" VALUES
	SURFACE ELEVATION 345.32			
0.22 / 345.10	TOPSOIL: Dark brown sandy silt, trace clay, occasional rootlets, moist	1A / 1B	SS	9
	CLAYEY SILT: Stiff brown clayey silt, trace sand, DTPL, numerous silt layers	2	SS	17
		3	SS	12
		4	SS	14
		5	SS	12
4.0 / 341.3	becoming WTPL			
		6	SS	15
		7	SS	13
6.5 / 338.8	BOREHOLE TERMINATED AT 6.5 m			

SHEAR STRENGTH (kPa): + FIELD VANE △ TORVANE ○ Qu ▲ POCKET PENETROMETER ● Q; DYNAMIC CONE PENETRATION × STANDARD PENETRATION TEST ●

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L; WATER CONTENT (%)

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS

GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Stickup Well Protector Set in Concrete

Bentonite Seal

Filter Sand

Screen

Water Level Readings:

Date	Depth	Elev.
2018-08-02	DRY	----
2018-08-03	DRY	----
2018-11-07	5.9	339.4
2018-11-26	5.4	339.9

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE/MONITORING WELL NO. 109

17T 524441.1E 4803985N

PROJECT Wilmot Woods Development | **PML REF.** 18KF031
LOCATION New Hamburg, Ontario | **BORING DATE** August 2, 2018 | **ENGINEER** H. Shinwary
BORING METHOD Continuous Flight Solid Stem Augers | **TECHNICIAN** K. Pettitt

DEPTH (metres)	ELEV	DESCRIPTION	NUMBER	TYPE	"N" VALUES
		SURFACE ELEVATION 339.93			
0.0		TOPSOIL: Dark brown clayey silt, some sand, occasional rootlets, APL to WTPL	1	SS	5
0.85	339.08	CLAYEY SILT: Soft to firm brown clayey silt, trace sand, DTPL, numerous silt layers, occasional cobbles	2A 2B	SS	3
			3	SS	7
2.1	337.8	becoming stiff	4	SS	11
2.9	337.0	becoming WTPL	5	SS	15
			6	SS	13
			7	SS	9
			8	SS	14
			9	SS	10
			10	SS	10
			11	SS	12
10.1	329.8	becoming very stiff	12	SS	16
			13	SS	15
12.5	327.4	BOREHOLE TERMINATED AT 12.5 m			

SHEAR STRENGTH (kPa): + FIELD VANE △ TORVANE ○ Qu ▲ POCKET PENETROMETER ○ Q; 50 100 150 200
DYNAMIC CONE PENETRATION × STANDARD PENETRATION TEST ●; 20 40 60 80
PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%): 10 20 30 40
UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Stickup Well Protector Set in Concrete
Bentonite Seal
Filter Sand
Screen

Water Level Readings:

Date	Depth	Elev.
2018-08-03	3.7	336.2
2018-11-07	0.1	339.8
2018-11-26	0.1	339.8

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE/MONITORING WELL NO. 110

17T 524499.6E 4803961N

PROJECT Wilmot Woods Development — **PML REF.** 18KF031

LOCATION New Hamburg, Ontario — **BORING DATE** October 15, 2018 — **ENGINEER** H. Shinwary

BORING METHOD Continuous Flight Hollow Stem Augers — **TECHNICIAN** K. Pettitt

DEPTH (metres)	ELEV	DESCRIPTION	NUMBER	TYPE	"N" VALUES
		SURFACE ELEVATION 339.98			
0.0		TOPSOIL: Dark brown silt, trace sand, occasional rootlets, moist to wet	1	SS	3
0.36	339.62	CLAYEY SILT: Stiff brown clayey silt, some sand, DTPL, numerous silt layers			
0.70	339.28	becoming firm to stiff, occasional cobbles, WTPL	2	SS	10
1.0					
			3	SS	12
2.0					
			4	SS	16
2.9	337.1	becoming firm to stiff grey, trace sand, WTPL			
3.0			5	SS	8
4.0			6	SS	7
			7	SS	9
5.0					
			8	SS	9
6.0					
			9	SS	9
7.0	333.0	becoming very stiff, occasional silt layers			
			10	SS	18
8.0					
8.5	331.5	becoming stiff, numerous silt layers			
9.0					
			11	SS	12
10.0					
			12	SS	10
11.0					
			13	SS	13
12.0					
12.6	327.4	BOREHOLE TERMINATED AT 12.6 m			
13.0					
14.0					
15.0					

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ● Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

ELEVATION SCALE: 339, 338, 337, 336, 335, 334, 333, 332, 331, 330, 329, 328

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

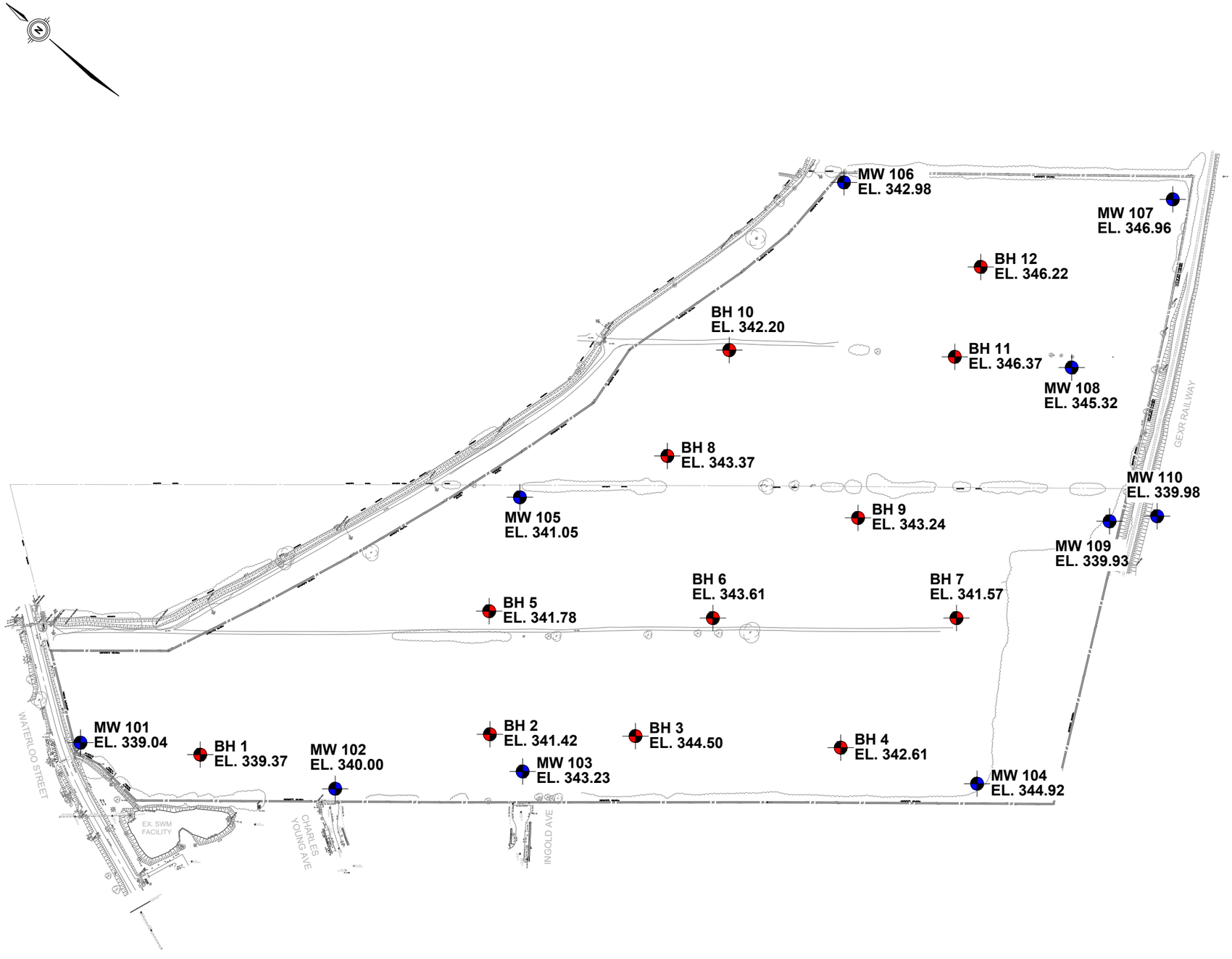
GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Stickup Well Protector Set in Concrete
50 mm pipe
Bentonite Seal
Filter Sand
Screen

Water Level Readings:

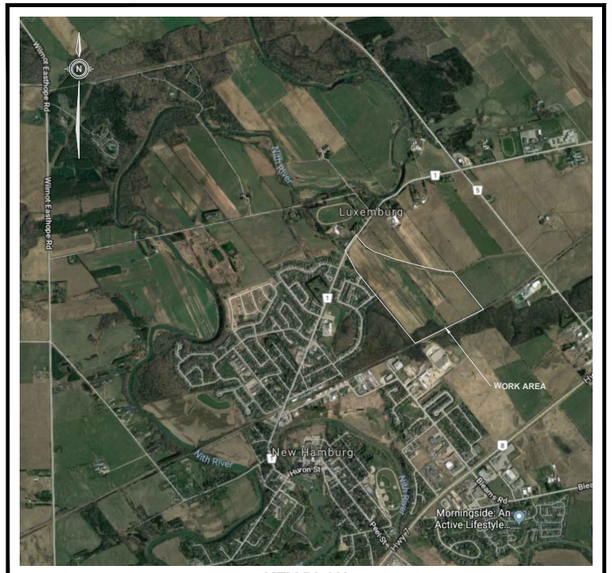
Date	Depth	Elev.
2018-10-15	DRY	----
2018-11-07	0.5	339.5
2018-11-26	0.2	339.8

NOTES



SCALE

0 m 100 m 200 m 300 m 400 m 500 m



KEY PLAN

LEGEND:

- BOREHOLE LOCATION
- MONITORING WELL LOCATION

REFERENCE:

BOREHOLE LOCATION PLAN REPRODUCED FROM DRAWING SUPPLIED BY CLIENT.

NOTE:

THE INFERRED STRATIGRAPHY REFERRED TO IN THE REPORT IS BASED ON THE DATA FROM THESE BOREHOLES SUPPLEMENTED BY GEOLOGICAL EVIDENCE. THE ACTUAL STRATIGRAPHY BETWEEN THE BOREHOLES MAY VARY.

WILMOT WOODS DEVELOPMENT INC.

PROPOSED WILMOT WOODS DEVELOPMENT

NEW HAMBURG

NEW HAMBURG, ONTARIO

BOREHOLE LOCATION PLAN

Peto MacCallum Ltd.
CONSULTING ENGINEERS

DRAWN	D. BRICE	*DATE*	*SCALE*	*PML REF.*	*DWG. NO.*
CHECKED	W. LOGHRIN	FEBRUARY 2022	AS SHOWN	18KF031	1
APPROVED	G. MITCHELL				

APPENDIX A

ENGINEERED FILL

ENGINEERED FILL

The information presented in this appendix is intended for general guidance only. Site specific conditions and prevailing weather may require modification of compaction standards, backfill type or procedures. Each site must be discussed, and procedures agreed with Peto MacCallum Ltd. prior to the start of the earthworks and must be subject to ongoing review during construction. This appendix is not intended to apply to embankments. Steeply sloping ravine residential lots require special consideration.

For fill to be classified as engineered fill suitable for supporting structural loads, a number of conditions must be satisfied, including but not necessarily limited to the following:

1. Purpose

The site specific purpose of the engineered fill must be recognized. In advance of construction, all parties should discuss the project and its requirements and agree on an appropriate set of standards and procedures.

2. Minimum Extent

The engineered fill envelope must extend beyond the footprint of the structure to be supported. The minimum extent of the envelope should be defined from a geotechnical perspective by:

- at founding level, extend a minimum 1.0 m beyond the outer edge of the foundations, greater if adequate layout has not yet been completed as noted below; and
- extend downward and outward at a slope no greater than 45° to meet the subgrade

All fill within the envelope established above must meet the requirements of engineered fill in order to support the structure safely. Other considerations such as survey control, or construction methods may require an envelope that is larger, as noted in the following sections.

Once the minimum envelope has been established, structures must not be moved or extended without consultation with Peto MacCallum Ltd. Similarly, Peto MacCallum Ltd. should be consulted prior to any excavation within the minimum envelope.

3. Survey Control

Accurate survey control is essential to the success of an engineered fill project. The boundaries of the engineered fill must be laid out by a surveyor in consultation with engineering staff from Peto MacCallum Ltd. Careful consideration of the maximum building envelope is required.

During construction it is necessary to have a qualified surveyor provide total station control on the three dimensional extent of filling.

4. Subsurface Preparation

Prior to placement of fill, the subgrade must be prepared to the satisfaction of Peto MacCallum Ltd. All deleterious material must be removed and in some cases, excavation of native mineral soils may be required.

Particular attention must be paid to wet subgrades and possible additional measures required to achieve sufficient compaction. Where fill is placed against a slope, benching may be necessary and natural drainage paths must not be blocked.

5. Suitable Fill Materials

All material to be used as fill must be approved by Peto MacCallum Ltd. Such approval will be influenced by many factors and must be site and project specific. External fill sources must be sampled, tested and approved prior to material being hauled to site.

6. Test Section

In advance of the start of construction of the engineered fill pad, the Contractor should conduct a test section. The compaction criterion will be assessed in consultation with Peto MacCallum Ltd. for the various fill material types using different lift thicknesses and number of passes for the compaction equipment proposed by the Contractor.

Additional test sections may be required throughout the course of the project to reflect changes in fill sources, natural moisture content of the material and weather conditions.

The Contractor should be particularly aware of changes in the moisture content of fill material. Site review by Peto MacCallum Ltd. is required to ensure the desired lift thickness is maintained and that each lift is systematically compacted, tested and approved before a subsequent lift is commenced.

7. Inspection and Testing

Uniform, thorough compaction is crucial to the performance of the engineered fill and the supported structure. Hence, all subgrade preparation, filling and compacting must be carried out under the full time inspection by Peto MacCallum Ltd.

All founding surfaces for all buildings and residential dwellings or any part thereof (including but not limited to footings and floor slabs) on structural fill or native soils must be inspected and approved by PML engineering personnel prior to placement of the base/subbase granular material and/or concrete. The purpose of the inspection is to ensure the subgrade soils are capable of supporting the building/house foundation and floor slab loads and to confirm the building/house envelope does not extend beyond the limits of any structural fill pads.

8. Protection of Fill

Fill is generally more susceptible to the effects of weather than natural soil. Fill placed and approved to the level at which structural support is required must be protected from excessive wetting, drying, erosion or freezing. Where adequate protection has not been provided, it may be necessary to provide deeper footings or to strip and recompact some of the fill.

9. Construction Delay Time Considerations

The integrity of the fill pad can deteriorate due to the harsh effects of our Canadian weather. Hence, particular care must be taken if the fill pad is constructed over a long time period.

It is necessary therefore, that all fill sources are tested to ensure the material compactability prior to the soil arriving at site. When there has been a lengthy delay between construction periods of the fill pad, it is necessary to conduct subgrade proof rolling, test pits or boreholes to verify the adequacy of the exposed subgrade to accept new fill material.

When the fill pad will be constructed over a lengthy period of time, a field survey should be completed at the end of each construction season to verify the areal extent and the level at which the compacted fill has been brought up to, tested and approved.

In the following spring, subexcavation may be necessary if the fill pad has been softened attributable to ponded surface water or freeze/thaw cycles.

A new survey is required at the beginning of the next construction season to verify that random dumping and/or spreading of fill has not been carried out at the site.

10. Approved Fill Pad Surveillance

It should be appreciated that once the fill pad has been brought to final grade and documented by field survey, there must be ongoing surveillance to ensure that the integrity of the fill pad is not threatened.

Grading operations adjacent to fill pads can often take place several months or years after completion of the fill pad.

It is imperative that all site management and supervision staff, the staff of Contractors and earthwork operators be fully aware of the boundaries of all approved engineered fill pads.

Excavation into an approved engineered fill pad should never be contemplated without the full knowledge, approval and documentation by the geotechnical consultant.

If the fill pad is knowingly built several years in advance of ultimate construction, the areal limits of the fill pad should be substantially overbuilt laterally to allow for changes in possible structure location and elevation and other earthwork operations and competing interests on the site. The overbuilt distance required is project and/or site specified.

Iron bars should be placed at the corner/intermediate points of the fill pad as a permanent record of the approved limits of the work for record keeping purposes.

11. Unusual Working Conditions

Construction of fill pads may at times take place at night and/or during periods of freezing weather conditions because of the requirements of the project schedule. It should be appreciated therefore, that both situations present more difficult working conditions. The Owner, Contractor, Design Consultant and Geotechnical Engineer must be willing to work together to revise site construction procedures, enhance field testing and surveillance, and incorporate design modifications as necessary to suit site conditions.

When working at night there must be sufficient artificial light to properly illuminate the fill pad and borrow areas.

Placement of material to form an engineered fill pad during winter and freezing temperatures has its own special conditions that must be addressed. It is imperative that each day prior to placement of new fill, the exposed subgrade must be inspected and any overnight snow or frozen material removed. Particular attention should be given to the borrow source inspection to ensure only nonfrozen fill is brought to the site.

The Contractor must continually assess the work program and have the necessary spreading and compacting equipment to ensure that densification of the fill material takes place in a minimum amount of time. Changes may be required to the spreading methods, lift thickness, and compaction techniques to ensure the desired compaction is achieved uniformly throughout each fill lift.

The Contractor should adequately protect the subgrade at the end of each shift to minimize frost penetration overnight. Since water cannot be added to the fill material to facilitate compaction, it is imperative that densification of the fill be achieved by additional compaction effort and an appropriate reduced lift thickness. Once the fill pad has been completed, it must be properly protected from freezing temperatures and ponding of water during the spring thaw period.

If the pad is unusually thick or if the fill thickness varies dramatically across the width or length of the fill pad, Peto MacCallum Ltd. should be consulted for additional recommendations. In this case, alternative special provisions may be recommended, such as providing a surcharge preload for a limited time or increase the degree of compaction of the fill.

APPENDIX B

STATEMENT OF LIMITATIONS

STATEMENT OF LIMITATIONS

This report is prepared for and made available for the sole use of the client named. Peto MacCallum Ltd. (PML) hereby disclaims any liability or responsibility to any person or entity, other than those for whom this report is specifically issued, for any loss, damage, expenses, or penalties that may arise or result from the use of any information or recommendations contained in this report. The contents of this report may not be used or relied upon by any other person without the express written consent and authorization of PML.

This report shall not be relied upon for any purpose other than as agreed with the client named without the written consent of PML. It shall not be used to express or imply warranty as to the fitness of the property for a particular purpose. A portion of this report may not be used as a separate entity: that is to say the report is to be read in its entirety at all times.

The report is based solely on the scope of services which are specifically referred to in this report. No physical or intrusive testing has been performed, except as specifically referenced in this report. This report is not a certification of compliance with past or present regulations, codes, guidelines and policies.

The scope of services carried out by PML is based on details of the proposed development and land use to address certain issues, purposes and objectives with respect to the specific site as identified by the client. Services not expressly set forth in writing are expressly excluded from the services provided by PML. In other words, PML has not performed any observations, investigations, study analysis, engineering evaluation or testing that is not specifically listed in the scope of services in this report. PML assumes no responsibility or duty to the client for any such services and shall not be liable for failing to discover any condition, whose discovery would require the performance of services not specifically referred to in this report.

The findings an comments made by PML in this report are based on the conditions observed at the time of PML's site reconnaissance. No assurances can be made and no assurances are given with respect to any potential changes in site conditions following the time of completion of PML's field work. Furthermore, regulations, codes and guidelines may change at any time subsequent to the date of this report and these changes may effect the validity of the findings and recommendations given in this report.

STATEMENT OF LIMITATIONS

The results and conclusions with respect to site conditions are therefore in no way intended to be taken as a guarantee or representation, expressed or implied, that the site is free from any contaminants from past or current land use activities or that the conditions in all areas of the site and beneath or within structures are the same as those areas specifically sampled.

Any investigation, examination, measurements or sampling explorations at a particular location may not be representative of conditions between sampled locations. Soil, ground water, surface water, or building material conditions between and beyond the sampled locations may differ from those encountered at the sampling locations and conditions may become apparent during construction which could not be detected or anticipated at the time of the intrusive sampling investigation.

Budget estimates contained in this report are to be viewed as an engineering estimate of probable costs and provided solely for the purposes of assisting the client in its budgeting process. It is understood and agreed that PML will not in any way be held liable as a result of any budget figures provided by it.

The Client expressly waives its right to withhold PML's fees, either in whole or in part, or to make any claim or commence any action or bring any other proceedings, whether in contract, tort, or otherwise against PML in anyway connected with advice or information given by PML relating to the cost estimate or Environmental Remediation/Cleanup and Restoration or Soil and Ground Water Management Plan Cost Estimate.

GEOTECHNICAL INVESTIGATION
PROPOSED WILMOT WOODS DEVELOPMENT
CN RAILWAY CROSSING
NEW HAMBURG, ONTARIO

for

WILMOT WOODS DEVELOPMENT INC.

PETO MacCALLUM LTD.
16 FRANKLIN STREET SOUTH
KITCHENER, ONTARIO
N2C 1R4
PHONE: (519) 893-7500
FAX: (519) 893-0654
EMAIL: kitchener@petomaccallum.com

Distribution:
1 cc: Wilmot Woods Development Inc.
1 cc: MTE Consultants Inc. (+email – jcabral@mte85.com)
1 cc: PML Kitchener

PML Ref.: 18KF031
Report: 2
February 24, 2022

Peto MacCallum Ltd.
CONSULTING ENGINEERS

February 24, 2022

PML Ref.: 18KF031
Report: 2

Mr. Adam Belksy
Wilmot Woods Development Inc.
310 Fairway Road South, P.O. Box 45016
Kitchener, Ontario
N2C 2R6

Dear Mr.Belksy

Geotechnical Investigation
Proposed Wilmot Woods Development
CN Railway Crossing
New Hamburg, Ontario

Peto MacCallum Ltd. (PML) is pleased to report the results of the geotechnical investigation recently completed at the above noted project site. Authorization to proceed with this assignment was provided by Mr. Galbraith in email dated July 9, 2018.

In general, the project involves the proposed installation of a proposed trunk sanitary sewer extending from the proposed Pfenning Farm development southward under the railway, and will connect to a proposed trunk sewer on the neighboring property (the Wilmot employment Lands). The railway which runs along the south side of the Pfenning Farm development site is located on top of an embankment at about Elevation 345. It is understood that a trenchless installation using jack and bore or pipe ramming methods is being considered for the railway crossing. Detailed design of the crossing has not been provided. However, in general, sewer crossing under the railway will comprise a 400 mm dimeter pipe with inverts at about Elevation 335.7, about 9 m below the railway and 4 to 5 m depth below existing grade beyond the railway.

The purpose of this geotechnical report is to assess the existing subsurface soil and ground water information, and provide preliminary geotechnical engineering recommendations for the proposed trenchless installation of the trunk sanitary sewer under the railway.

Recommendations for the proposed construction of a residential subdivision are provided under separate cover, PML Ref. 18KF031, Report 1.

The comments and recommendations provided in this report are based on the site conditions at the time of the investigation, and are for the current project only. Any changes in plans will require review by PML to assess the applicability of the report, and may require modified recommendations, additional analysis and / or investigation. When the project design is complete, the general recommendations given in this report should be reviewed by PML to ensure their applicability.

16 Franklin Street South, Kitchener, Ontario N2C 1R4
Tel: (519) 893-7500 Fax: (519) 893-0654
E-mail: kitchener@petomaccallum.com
BARRIE, COLLINGWOOD, HAMILTON, KITCHENER, LONDON, TORONTO

Investigation

The field work for this geotechnical investigation was conducted on August 2, 2018 and October 15, 2018 as part of the investigation for the entire development. The investigation program for the railway crossing comprised two boreholes (MW109 and MW110) advanced to between 12.5 and 12.6 m depth, with monitoring wells installed in both of the boreholes, at the locations shown on the appended Drawing 1. Details of the geotechnical investigation are presented under separate cover in our previous report PML Ref 18KF031 Report 1. Reference is given to Appendix A for the Log of Borehole Sheets, and particle size analyses applicable to the current Railway crossing.

The borehole locations were established in the field by PML. Borehole locations were surveyed by PML using Global Navigation Satellite System (GNSS). The survey equipment was provided by SOKKIA Canada, model GCX-2.

The boreholes were advanced using a Diedrich D-50 track mounted drillrig fitted with continuous flight solid and hollow stem augers and automatic hammer, supplied and operated by a specialist drilling contractor. The work was carried out under the full-time supervision of a PML engineering staff member who directed the drilling and sampling operations, documented the soil stratigraphy, monitored ground water conditions and processed the recovered samples.

Representative samples of the overburden were recovered at regular intervals throughout the depths explored. Standard penetration tests (SPT) were carried out during sampling operations of the boreholes using conventional split spoon equipment. Pocket penetrometer testing was carried out on the recovered samples to determine the undrained shear strength of the cohesive soils. Ground water observations were made in the boreholes during and upon completion of drilling. The boreholes were backfilled and compacted in accordance with O.Reg.903 upon completion of drilling.

Monitoring wells were installed in Boreholes MW109 and MW110 to more accurately measure ground water levels. The monitoring wells comprised 50 mm diameter PVC pipe, filter sand,

All of the recovered samples were returned to PML's laboratory for detailed visual examination, classification, and routine moisture content determinations. The laboratory testing also included particle size distribution analyses on samples of the major soil type encountered.

Summarized Subsurface Conditions

Reference is made to the appended Log of Borehole sheets for details of the field work including soil descriptions, inferred stratigraphy, standard penetration test (SPT) N values, dynamic cone penetration test values, ground water observations and laboratory moisture content determinations.

Due to the soil sampling procedures and the limited size of samples, the depth / elevation demarcations on the borehole logs must be viewed as "transitional" zones, and cannot be construed as exact geologic boundaries between layers.

In general, the soil stratigraphy encountered comprised surficial topsoil, underlain by an extensive clayey silt deposit containing numerous cohesionless silt layers.

Surficial topsoil was contacted in both boreholes and was between 850 mm and 360 mm thick in Boreholes MW109 and MW110, respectively.

An extensive clayey silt deposit was encountered below the surficial topsoil, in both boreholes, and extended to the 12.5 to 12.6 m borehole termination depths. The cohesive clayey silt deposit was generally firm to very stiff based on standard penetration N values between 7 and 18 blows per 0.3 m penetration of the split spoon sampler. Pocket penetrometer shear strengths of the clayey silt ranged between 75 and 125 kPa. Moisture content ranged between 18 and 28% indicating drier than plastic limit (DTPL) to wetter than limit (WTPL) conditions in the cohesive clayey silt soils. Occasional cobbles and boulders are present in the clayey silt deposit.

Ground Water Conditions

Ground water observations carried out during and upon completion of drilling are presented on the appended Log of Borehole Sheets.

During drilling, WTPL conditions were generally encountered in the clayey below 2.9 m depth (Elevation 337.0 and 337.1).

On November 26, 2018 water level measurements from the monitoring wells installed in Boreholes 109 and 110 ranged between 0.1 to 0.2 m depth below existing grade (about Elevation 339.8).

The ground water levels at the site are subject to seasonal fluctuations and precipitation patterns. It should be noted that the relatively impermeable nature of the clayey silt deposits could contribute to the development of perched water conditions following short term and seasonal participation events.

Discussion and Recommendations

As noted previously, the project involves the proposed installation of a trunk sewer below the railway tracks which will extend southward from the Pfenning Farm to the Wilmot employment Lands. The crossing will house a 400 mm diameter pipe inside a steel casing with proposed inverts about Elevations 335.7. The sewer pipe and casing invert will be about 9 m below the railway tracks and 4 to 5 m below the existing grades on each side of the railway. For discussion purposes a maximum 900 mm diameter steel casing is envisioned. Therefore, the top of the steel pipe crossing will be about 4 m below ground on the lands beside the railway, and about 8 m below the railway tracks.

In general, the soil stratigraphy encountered comprised surficial topsoil, underlain by an extensive clayey silt deposit containing numerous cohesionless silt layers and occasional cobbles. The cohesive clayey silt deposit was generally firm to very stiff. The ground water level is at about Elevation 339.8, and above the proposed trunk sewer depth. Considering the subsurface conditions encountered and details proposed for the crossing, both jack and bore and pipe ramming methods were evaluated, and further details on both methods are provided in the sections below.

Regardless of the method used, it is recommended that the contractor prepare a plan in advance of construction outlining the details of the installation to provide instructions for the construction crews and provide a possible contingency action plan should difficulties occur during the tunnelling operations. The plan should also be reviewed by the project proponent and the railway authorities prior to construction. Upon request, PML can assist in reviewing the plan to check that assumptions regarding soil and ground water conditions are appropriate.

Reference is also given to Ontario Provincial Standard Specifications (OPSS) 415, Construction Specifications for Pipeline and Utility Installation by Tunnelling.

Jack and Bore

Jack and bore (or cased auger boring) typically involves the simultaneous advancement of a continuous flight auger and conduit pipe. The auger is used to excavate soil in advance of the casing and transport cuttings back to the receiving pit where they are removed. Rotary power to auger and pushing force is provided by a drill rig located within a jacking pit. Jack and bore is a common method of trenchless installation and in appropriate site and soil conditions may be preferable from a cost perspective.

Jack and bore installation(s) should be conducted in accordance with OPSS 416, Construction Specifications for Pipeline and Utility Installation by Jacking and Boring.

A jack and bore installation is technically feasible for the installations provided the work is carried out by contractors experienced with tunneling in clayey silt with layered silt conditions, and provided adequate measures are used to prevent loss of ground.

The sanitary sewer installation will be below the ground water level in the clayey silt, and ground water conditions could hinder or prevent a jack and bore installation. In wet soils there is potential for ground surface subsidence due to wet soil flowing into the bore, which could result in voids. Dewatering the clayey silt with numerous silt layers is not likely to be effective, therefore the risk of ravelling soil cannot be entirely eliminated.

The jacking forces should be estimated to select the suitable jacks. Suitable jacking head and suitable bracing between jacks and jacking head should be used to assure that pressure will be applied to the pipe uniformly around the ring of the pipe. Utilizing an effective lubrication system may minimize pipe friction during advance. A suitable face pressure or soil plug should be maintained to minimize loss of ground during advance. Any over-cut during augering and pipe advance which potentially create soil disturbance, space or voids outside the pipe should be grouted or filled to avoid potential ground movements.

The proposed crossing may encounter cobbles and boulders during installation. Contractors working on this assignment should provide measures to break up or remove cobbles and boulders if they are encountered during the jack and bore installation.

Pipe Ramming

Pipe ramming installation is analogous to driving an open-ended tube pile horizontally. Impact forces from a percussive hammer (mole) are used to advance a conduit pipe from an entry pit to a receiving pit. During the advance, most of the soil being penetrated fills the conduit rather than being excavated. The rammed conduit is terminated in a receiving pit at which point the soil contained in the pipe is removed.

When the driving has been completed, soil within the pipe can be removed via augering or a pipe shovel. Augering is expected to be the preferred method, however if soil within the pipe cannot be augered, use of a pipe shovel will be necessary. A pipe shovel is essentially a special scoop made from a pipe which fits inside the liner. Excavation via pipe shovel involves advancing the shovel into the soil plug using impact hammer (mole), then pulling the shovel and its contents out with a chain or cable, the process is repeated as required.

Reference is given to the following section for recommendations pertaining to the construction of entry and receiving pits. Dewatering measures will be required at the entry and receiving pits. Ideally, dewatering measures for the staging works should be established to such that the zone of influence includes as much of the tunnel area as possible as this will generally reduce potential ground water seepage through the tunnel during construction.

A pipe ramming installation is technically feasible for the sanitary sewer installation provided the work is carried out by contractors experienced with tunneling in clayey silt conditions, and adequate ground water control is achieved.

It is noted that grade adjustments cannot be completed once pipe ramming has started. It will be necessary to increase the slope of the crossing due to the potential for uncontrolled deflection during pipe ramming installation.

The proposed crossing may encounter cobbles and boulders during installation. Contractors working on this assignment should provide measures to break up cobbles and boulders if they are encountered during the pipe ramming installation.

The effects of the percussive forces on the railway must also be considered and assessed.

In summary, jack and bore is technically feasible for the proposed crossings, however pipe ramming is generally recommended as an alternative given the ground water conditions within the proposed tunneling depths.

Entry and Receiving Pit Excavation and Ground Water Control

Provided adequate ground water control is achieved, the subsurface soils encountered at the borehole locations are classified as Type 3 soils as defined in the Occupational Health and Safety Act (OHSA). For temporary unsupported excavations within Type 3 soils that are to be entered by workers, the excavation side slopes should be maintained no steeper than 1 horizontal to 1 vertical (1H:1V) from the base of shallow excavations. Workers should not enter an unprotected excavation if there is evidence of ongoing seepage in the banks or base of the excavation. An adequate temporary support system (i.e., trench boxes) should be provided at all locations where space limitations prevent construction of sufficiently shallow slopes.

It will also be important to ensure that the excavations do not undermine possible existing in-ground structures, roads and or other services in their proximity. The need for underpinning and utility support can be established according to criteria illustrated on the appended Figure 1. It should be noted that a trench liner box may not be relied on for bracing purposes.

The envisaged excavations for the sending and receiving pits of the sanitary sewer crossing will extend about 6.5 m into clayey silt with numerous wet silt seams. Excavations are anticipated to require dewatering to control of ground water seepage or surface water entering the excavation, and sump pumps along with a more sophisticated dewatering system such as well points, or eductor wells, or water tight sheet pile or secant caisson cut-off may be required.

Regardless of the dewatering method chosen, the hydraulic head and ground water inflow must be properly controlled to ensure stable and safe excavation and to facilitate construction. 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 ground water at least 0.30 m below the excavation base level, in order to provide a stable excavation base throughout construction.

It should be noted that, under the Ontario Water Resources Act, the Water Taking and Transfer Regulation 387/04, a Permit to Take Water (PTTW) from the Ministry of Environment Conservation and Parks (MECP) is required if the dewatering discharge is greater than 50,000 L/day. In accordance with the above noted regulatory requirements and in compliance with the MECP's PTTW Manual (April 2005), and application should be filed to the MECP for the subject property construction dewatering PTTW, if the dewatering discharge is greater than 400,000 L/day, or about 4.6 L/S. If the dewatering discharge is between 50,000 L/day (or about 0.6 L/S) and 400,000 L/day (or about 4.6 L/S) dewatering activities need to be registered on the Environmental Activity and Sector Registry (EASR). PML would be happy to assist with this process, if required.

The depth of excavations for trunk sewer installation are expected to extend to a maximum 6.5 m depth into clayey silt deposits with wet to saturated layers of silt. Due to the presence of numerous water bearing silt layers in the native deposits, excavations for the sending and receiving pits might have pumping rates that exceed 50,000 L/day, and a PTTW or EASR may be required, along with a hydrogeological investigation in support of the application. The estimated construction dewatering volumes should be reassessed once more detailed design information has been established. Upon request, PML would be please to provide further recommendations in this regard.

It is recommended that test pits be carried out during the tendering stage of the project in order that prospective contractors may familiarize themselves with soil and ground water conditions to be expected. Also, the dewatering requirements should be established by the contractor in the context of a performance specification.

Braced Excavations

If space is not available for an enlarged unsupported open cut excavation then consideration should be given to using an engineered system (timber lagging, sheet piling or caisson wall) to support the excavation walls. The soil parameters presented in the following table may be used for the design of braced excavation systems. The parameters are based on the Rankin method of analysis which ignores wall friction.

SOIL TYPE	**CLAYEY SILT**
Coefficient of Active Earth Pressure K_a	0.33
Coefficient of Passive Earth Pressure K_p	3.00
Angle of Internal Friction Ø	30
Cohesive Strength c_u	50 kPa
Unit Weight γ (kN/m^3)	21

For the soil stratigraphy encountered, the bracing system may be designed as a multi-braced system using a rectangular stress distribution in accordance with methods outlined in the latest Canadian Foundation Engineering Manual (CFEM) and summarized on the appended Figure 2, or as a singly-braced system using a triangular stress distribution and summarized on the appended Figure 3. The system design should also consider load effects from ground water, the adjacent embankments, structures and construction equipment.

The ground surface adjacent to a braced excavation is expected to experience some inward movement and vertical settlement. The magnitude of movements adjacent to a braced cut can be limited by proper selection of the lateral earth pressure coefficient, provided good quality workmanship and construction practices are employed.

The maximum allowable movements of braced excavations must be established in a performance specification, and should be determined through agreement with the railway authority.

Backfill

In general, conventional bedding and cover will be suitable for sewer installation and backfilling of the sending and receiving pits. Material containing stones larger than 50 mm size should not be used in the bedding or cover layers. The bedding should be constructed in accordance with applicable Ontario Provincial Standard Drawings (OPSD) and / or local standards. The bedding and cover material should be placed in 150 mm lifts and compacted to at least 95% standard Proctor maximum dry density (SPMDD).

Backfill materials should comprise approved imported granular soil. The backfill materials should be placed in 300 mm maximum lifts and compacted to a minimum of 95% SPMDD.

Should construction extend to the winter months, care must be taken to ensure that frozen material is not used as backfill.

Excavated materials intended for backfilling purposes should not be exposed to the elements for prolonged time periods, as they might be rendered unsuitable for reuse.

Monitoring

The ground surface over the tunnel route may become distorted and distressed by tunnelling. The most common type of distress is settlement caused by loss of ground around the tunnel. Heave of the ground surface is also possible depending on the type of installation. Monitoring of lateral movement of ground near excavations may also be necessary. Mitigation of the distress or distortion on the railway would be a major inconvenience and possibly a safety issue.

Distress at the ground surface is generally prevented or minimized by good construction practices and proper planning. In this regard, preparation of an installation plan as noted above is recommended.

It is also recommended that the project proponent implement a monitoring program to check the condition of the ground over the tunnel before, during and upon completion of construction. The monitoring program should be carried out by a qualified geotechnical consulting firm that is familiar with the proposed work and subsurface conditions. The monitoring period should begin prior to tunnelling, extend throughout the duration and continue at least 2 weeks after completion of tunnelling. More specific monitoring procedures may also be required by the railway authorities.

Monitoring points should be marked using a method approved by the railway authority. Monitoring points should also be functional throughout the monitoring period and should not deteriorate because of traffic, maintenance activities, and weather conditions.

If distress is observed during construction, the contractor should be informed and corrective action should be undertaken immediately. Specific corrective action will be dependent on the nature of the distress and type of installation. Regardless, the process should be outlined in the monitoring program and be part of the contingency actions in the contractor's installation plan.

In general, settlement or heave of the railway from a properly constructed jack and bore or pipe ramming installation carried out in accordance with the recommendations noted in this report, should be less than 10 mm. If settlement or heave of the ground surface exceeds 10 mm, the construction process should be reviewed and adjusted to mitigate further disturbances for the remainder of the tunnelling work.

If total settlement or heave exceeds 15 mm, tunnelling operations should be terminated, the site secured against further deterioration and mitigative action should be undertaken immediately to reinstate the railway and existing utilities

All actions to prevent, secure, or mitigate destruction or damage to the highway and associated features should be done in accordance with, and approved by the railway authorities.

Geotechnical Review and Construction Inspection and Testing

When development design is complete, it is recommended that the design drawings be submitted to PML for general geotechnical review for compatibility with site conditions and recommendations of this report.

Earthworks operations should be carried out under the supervision of PML to approve subgrade preparation, backfill materials, placement and compaction procedures, and verify the specified degree of compaction is achieved uniformly throughout fill materials.

The comments and recommendations provided in the report are based on the information revealed in the boreholes. Conditions away from and between boreholes may vary, particularly where service trenches exist. Geotechnical review during construction should be on going to confirm the subsurface conditions are substantially similar to those encountered in the boreholes, which may otherwise require modification to the original recommendations.

This report is subject to the Statement of Limitations that is included in Appendix B, which must be read in conjunction with the report.

Closure

We trust the information presented in this report is sufficient for your immediate requirements. If you have any questions or require further information, please do not hesitate to contact our office.

Sincerely

Peto MacCallum Ltd.

William Loghrin, P.Eng.
Manager Engineering Service

Gerry Mitchell, MEng, P.Eng.
Senior Consultant

WL/GM:tm

Enclosures:
Figure 1 – General Recommendations Regarding Underpinning
Figure 2 – Lateral Earth Pressure Distribution Multi-Braced Cuts in Cohesionless Soils
Figure 3 – Lateral Earth Pressure Distribution Singly-Braced Cuts in Cohesionless Soils
Drawing 1 - Borehole Location Plan
Appendix A – Figure 6 and Borehole Logs BH/MW109 and BH/MW110
Appendix B – Statement of Limitations

Closure

We trust the information presented in this report is sufficient for your immediate requirements. If you have any questions or require further information, please do not hesitate to contact our office.

Sincerely

Peto MacCallum Ltd.

William Loghrin, P.Eng.
Manager Engineering Service

Gerry Mitchell, MEng, P.Eng.
Senior Consultant

WL/GM:tm

Enclosures:
Figure 1 – General Recommendations Regarding Underpinning
Figure 2 – Lateral Earth Pressure Distribution Multi-Braced Cuts in Cohesionless Soils
Figure 3 – Lateral Earth Pressure Distribution Singly-Braced Cuts in Cohesionless Soils
Drawing 1 - Borehole Location Plan
Appendix A – Figure 6 and Borehole Logs BH/MW109 and BH/MW110
Appendix B – Statement of Limitations

NOTES

1. The need to underpin existing footings/utilities is dependent upon soil type, proximity of the existing facility to the face of the excavation, loads imposed on the foundation and permissible movements.

   ZONE A:
   Foundations of relatively heavy and/or settlement sensitive structures/ utilities located in Zone A generally require underpinning.

   ZONE B:
   Foundations of structures located within Zone B generally do not require underpinning. Consideration should be given to underpinning of settlement sensitive utilities or heavy foundation units located in this zone.

   ZONE C:

   Utilities and foundations located within Zone C do not normally require underpinning.

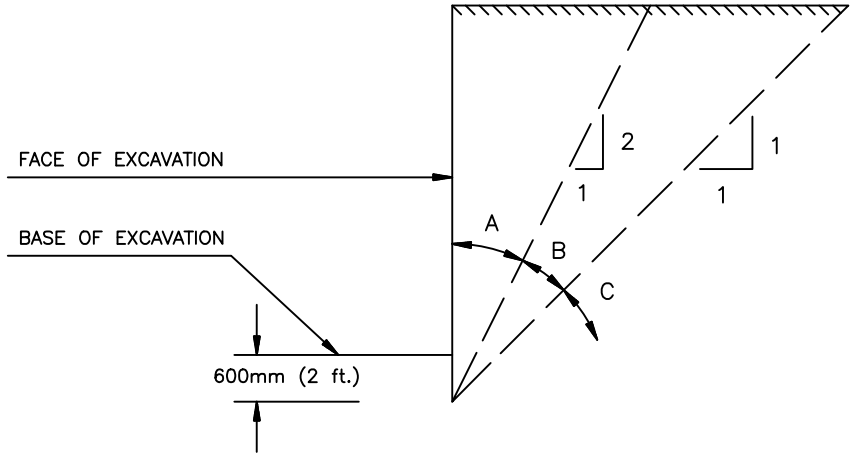
   Underpinning of foundations located in Zones A and B should extend at least into Zone C.

2. As an alternative to underpinning, it may be possible to control movement of existing utilities and foundations by supporting the face of the excavation with bracing/tiebacks or a rigid (caisson) wall. Horizontal and vertical earth pressures imposed on the excavation wall by non–underpinned foundations must be considered in the design of the support system.

3. A condition survey should be conducted prior to construction and appropriate monitoring (surface and insitu) carried out during construction to monitor any movement which may occur.

4. All work should be carried out in accordance with the Occupational Health and Safety Act and local regulations. Good quality workmanship and construction practices are to be employed.

5. This sheet is to be read in conjunction with text of report for this project. Additional comments and recommendations concerning these general guidelines will be provided if required.



Peto MacCallum Ltd. CONSULTING ENGINEERS

STANDARD DRAWING

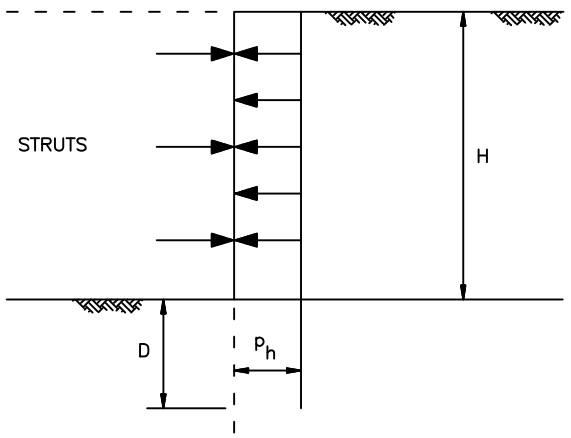
GENERAL RECOMMENDATIONS REGARDING UNDERPINNING OF FOUNDATIONS/UTILITIES LOCATED CLOSE TO EXCAVATION

DATE	JOB NUMBER	FIGURE NO.
FEB 2022	18KF031	1

NOTES

1. The actual magnitude and distribution of the horizontal earth pressures which will act on the bracing system are dependent upon the permissible lateral/vertical movements adjacent to the excavation, the soil type, groundwater conditions, drainage provisions, temporary/permanent surcharge loads, the type of bracing system adopted, weather conditions, quality of workmanship and length of time the excavation will be supported. Hence, the recommended pressure diagram and design parameters should be reviewed when construction details, schedule and type of support system are established.
2. Stability of base of excavation must be confirmed when bracing system design, excavation geometry and surcharge loads are established. If groundwater table is well above base of excavation and/or artesian conditions exist, local lowering of the groundwater level will be necessary to prevent bottom heave/piping of the base of the excavation.
3. Earth pressure diagram is applicable to maximum depth of cut of 12m (40 ft.).
4. Structural components of bracing system should be confirmed adequate for each level of excavation.
5. If sheeting will not permit drainage, bracing system must be designed to resist water pressure.
6. Surcharge loads such as street/construction traffic, supported utilities, adjacent foundations, temporary stockpiles and other loads carried by bracing system are not included in earth pressure diagram.
7. Temporary surcharge loading should not be closer to the face of the excavation than half the depth of excavation unless accounted for in bracing design.
8. If settlement sensitive structures are located near the excavation, special measures should be undertaken to control settlements. A condition survey should be conducted prior to construction and appppropriate monitoring (surface and insitu) carried out during construction.
9. Earth pressure diagram is applicable for relatively short construction periods. If excavation is to be open for long periods, monitoring of deformation is essential, earth pressure diagram must be reviewed, and remedial works may be required.
10. Earth pressure diagram does not account for extended periods of exposure of the excavation to freezing temperatures.
11. Bracing system should be regularly examined for signs of distress.
12. All work should be carried out in accordance with the Occupational Health and Safety Act and local regulations. Good quality workmanship and construction practices are to be employed.
13. This sheet should be read in conjunction with text of report for this project. Additional comments and recommendations concerning these general guidelines will be provided if required.

EARTH PRESSURE DIAGRAM



p_h = design lateral earth pressure
= 0.65 $K\gamma H$

K = lateral earth pressure coefficient

γ = unit weight of soil

H = depth of excavation

D = depth of embedment of soldier piles (if used).

RECOMMENDED DESIGN PARAMETERS

γ = 21.0 kN/m^3

K = 0.33 (movement of retained soil acceptable)
0.50 (movement of adjacent structures/facilities unacceptable)

Peto MacCallum Ltd
CONSULTING ENGINEERS

LATERAL EARTH PRESSURE DISTRIBUTION

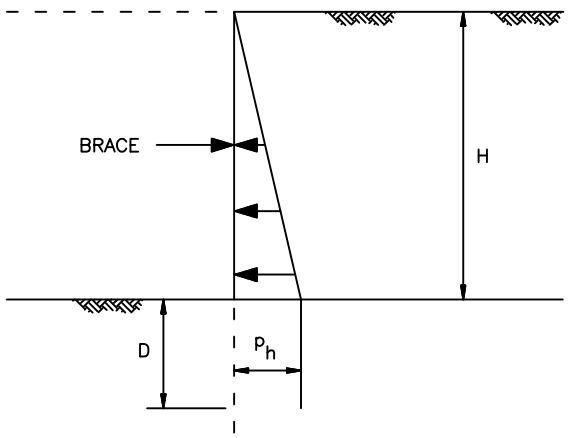
MULTI–BRACED CUTS IN COHESIONLESS SOILS

DATE	JOB NUMBER	FIGURE NO.
FEB 2022	18KF031	2

NOTES

1. The actual magnitude and distribution of the horizontal earth pressures which will act on the bracing system are dependent upon the permissible lateral/vertical movements adjacent to the excavation, the soil type, groundwater conditions, drainage provisions, temporary/permanent surcharge loads, the type of bracing system adopted, weather conditions, quality of workmanship and length of time the excavation will be supported. Hence, the recommended pressure diagram and design parameters should be reviewed when construction details, schedule and type of support system are established.
2. Stability of base of excavation must be confirmed when bracing system design, excavation geometry and surcharge loads are established. If groundwater table is well above base of excavation and/or artesian conditions exist, local lowering of the groundwater level will be necessary to prevent bottom heave/piping of the base of the excavation.
3. Earth pressure diagram is applicable to maximum depth of cut of 12m (40 ft.).
4. Structural components of bracing system should be confirmed adequate for each level of excavation.
5. If sheeting will not permit drainage, bracing system must be designed to resist water pressure.
6. Surcharge loads such as street/construction traffic, supported utilities, adjacent foundations, temporary stockpiles and other loads carried by bracing system are not included in earth pressure diagram.
7. Temporary surcharge loading should not be closer to the face of the excavation than half the depth of excavation unless accounted for in bracing design.
8. If settlement sensitive structures are located near the excavation, special measures should be undertaken to control settlements. A condition survey should be conducted prior to construction and apppropriate monitoring (surface and insitu) carried out during construction.
9. Earth pressure diagram is applicable for relatively short construction periods. If excavation is to be open for long periods, monitoring of deformation is essential, the earth pressure diagram must be reviewed, and remedial works may be required.
10. Earth pressure diagram does not account for extended periods of exposure of the excavation to freezing temperatures.
11. Bracing system should be regularly examined for signs of distress.
12. All work should be carried out in accordance with the Occupational Health and Safety Act and local regulations. Good quality workmanship and construction practices are to be employed.
13. This sheet should be read in conjunction with text of report for this project. Additional comments and recommendations concerning these general guidelines will be provided if required.

EARTH PRESSURE DIAGRAM



p_h = design lateral earth pressure
= $K\gamma H$

K = lateral earth pressure coefficient

γ = unit weight of soil

H = depth of excavation

D = depth of embedment of soldier piles (if used).

RECOMMENDED DESIGN PARAMETERS

γ = 21.0 kN/m^3

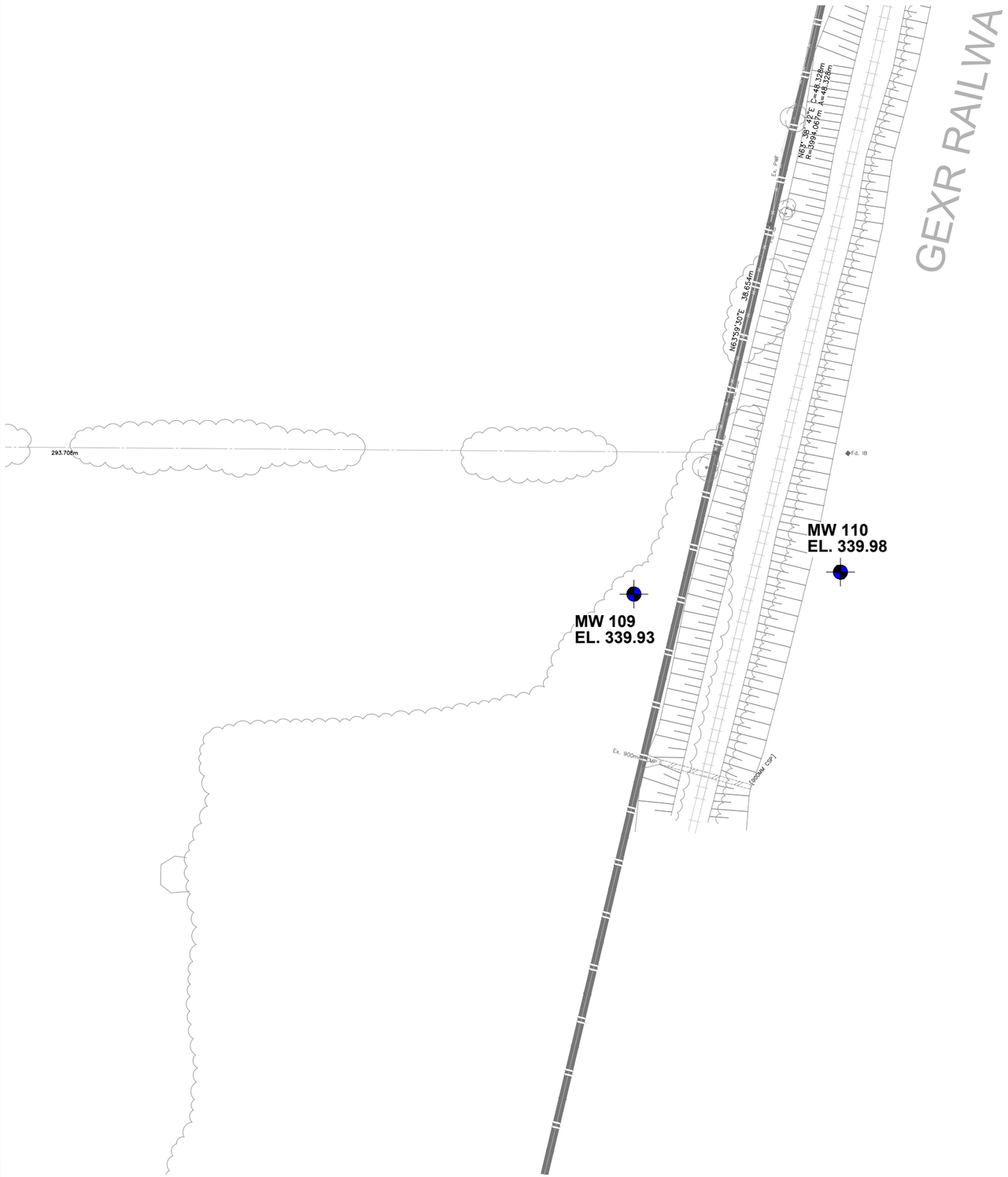
K = 0.33 (movement of retained soil acceptable)
0.50 (movement of adjacent structures/facilities unacceptable)

Peto MacCallum Ltd
CONSULTING ENGINEERS

LATERAL EARTH PRESSURE DISTRIBUTION

SINGLY–BRACED CUTS IN COHESIONLESS SOILS

DATE	JOB NUMBER	FIGURE NO.
FEB 2022	18KF031	3



KEY PLAN

LEGEND:

- BOREHOLE LOCATION
- MONITORING WELL LOCATION

REFERENCE:

BOREHOLE LOCATION PLAN REPRODUCED FROM DRAWING SUPPLIED BY CLIENT.

NOTE:

THE INFERRED STRATIGRAPHY REFERRED TO IN THE REPORT IS BASED ON THE DATA FROM THESE BOREHOLES SUPPLEMENTED BY GEOLOGICAL EVIDENCE. THE ACTUAL STRATIGRAPHY BETWEEN THE BOREHOLES MAY VARY.

WILMOT WOODS DEVELOPMENT INC.

PROPOSED WILMOT WOODS DEVELOPMENT

NEW HAMBURG

NEW HAMBURG, ONTARIO

BOREHOLE LOCATION PLAN

PML Peto MacCallum Ltd.
CONSULTING ENGINEERS

DRAWN	D. BRICE	*DATE*	*SCALE*	*PML REF.*	*DWG. NO.*
CHECKED	W. LOGHRIN	FEBRUARY 2022	AS SHOWN	18KF031	1
APPROVED	G. MITCHELL				

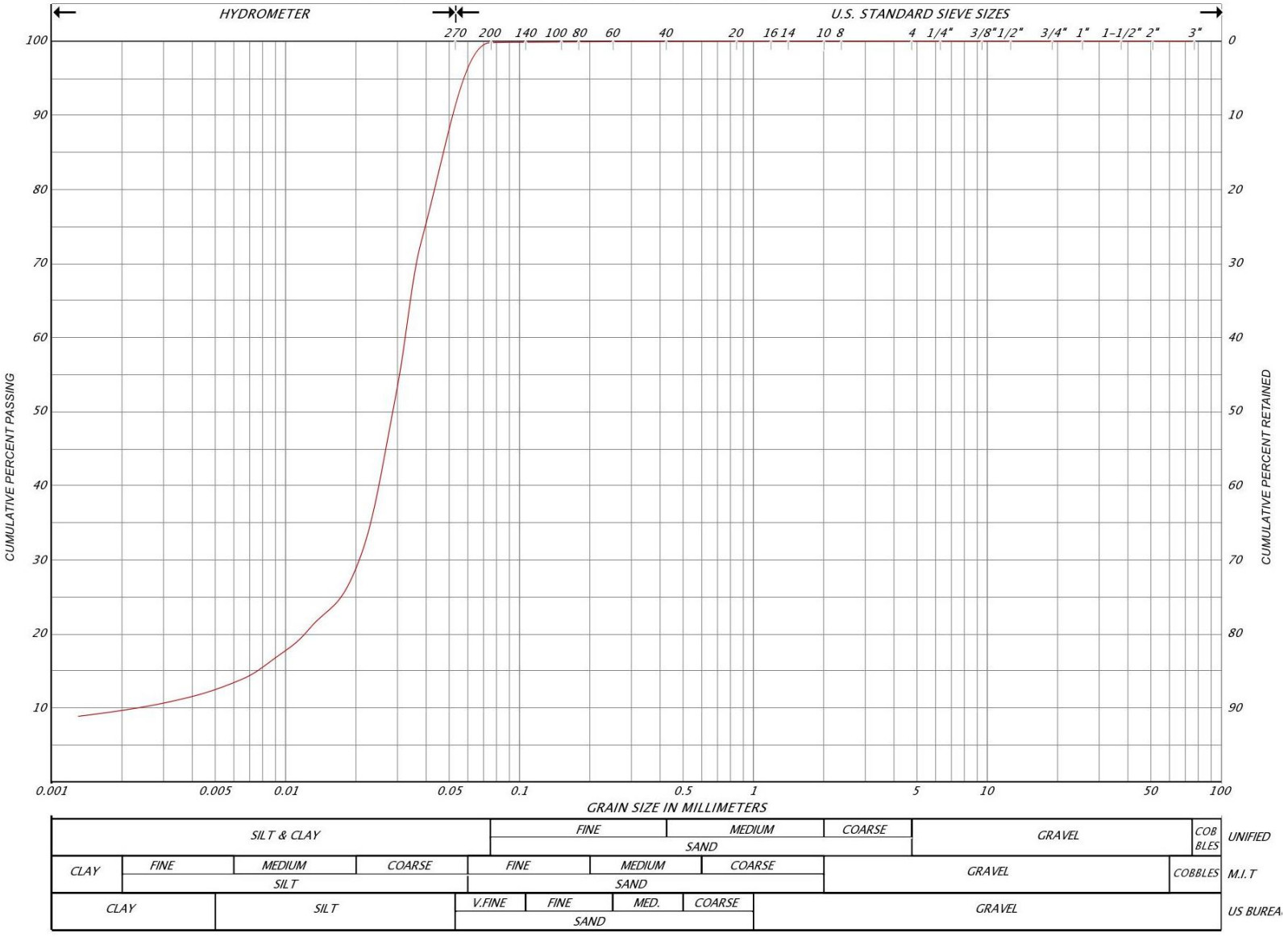
APPENDIX A

FIGURE 6 AND BOREHOLE LOGS 109 AND 110
FROM PREVIOUS REPORT

Peto MacCallum Ltd.
CONSULTING ENGINEERS

PARTICLE SIZE DISTRIBUTION CHART

PML REF. 18KF031
FIGURE NO. 6



REMARKS Borehole MW109, Sample SS11, Depth 9.1 to 9.6 m

CLAYEY SILT

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE/MONITORING WELL NO. 109

17T 524441.1E 4803985N

PROJECT Wilmot Woods Development
PML REF. 18KF031
LOCATION New Hamburg, Ontario
BORING DATE August 2, 2018
ENGINEER H. Shinwary
BORING METHOD Continuous Flight Solid Stem Augers
TECHNICIAN K. Pettitt

DEPTH (metres)	ELEV	DESCRIPTION	NUMBER	TYPE	"N" VALUES
		SURFACE ELEVATION 339.93			
0.0		TOPSOIL: Dark brown clayey silt, some sand, occasional rootlets, APL to WTPL	1	SS	5
0.85	339.08	CLAYEY SILT: Soft to firm brown clayey silt, trace sand, DTPL, numerous silt layers, occasional cobbles	2A 2B	SS	3
			3	SS	7
2.1	337.8	becoming stiff	4	SS	11
2.9	337.0	becoming WTPL	5	SS	15
			6	SS	13
			7	SS	9
			8	SS	14
			9	SS	10
			10	SS	10
			11	SS	12
10.1	329.8	becoming very stiff	12	SS	16
			13	SS	15
12.5	327.4	BOREHOLE TERMINATED AT 12.5 m			

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Stickup Well Protector Set in Concrete
Bentonite Seal
Filter Sand
Screen

Water Level Readings:

Date	Depth	Elev.
2018-08-03	3.7	336.2
2018-11-07	0.1	339.8
2018-11-26	0.1	339.8

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE/MONITORING WELL NO. 110

17T 524499.6E 4803961N

PROJECT Wilmot Woods Development — **PML REF.** 18KF031

LOCATION New Hamburg, Ontario — **BORING DATE** October 15, 2018 — **ENGINEER** H. Shinwary

BORING METHOD Continuous Flight Hollow Stem Augers — **TECHNICIAN** K. Pettitt

DEPTH (metres)	ELEV	DESCRIPTION	NUMBER	TYPE	"N" VALUES
		SURFACE ELEVATION 339.98			
0.0		TOPSOIL: Dark brown silt, trace sand, occasional rootlets, moist to wet	1	SS	3
0.36	339.62	CLAYEY SILT: Stiff brown clayey silt, some sand, DTPL, numerous silt layers			
0.70	339.28	becoming firm to stiff, occasional cobbles, WTPL	2	SS	10
1.0					
			3	SS	12
2.0					
			4	SS	16
2.9	337.1	becoming firm to stiff grey, trace sand, WTPL			
3.0			5	SS	8
4.0			6	SS	7
			7	SS	9
5.0					
			8	SS	9
6.0					
			9	SS	9
7.0	333.0	becoming very stiff, occasional silt layers			
			10	SS	18
8.0					
8.5	331.5	becoming stiff, numerous silt layers			
9.0					
			11	SS	12
10.0					
			12	SS	10
11.0					
			13	SS	13
12.0					
12.6	327.4	BOREHOLE TERMINATED AT 12.6 m			
13.0					
14.0					
15.0					

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ● Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

ELEVATION SCALE: 339, 338, 337, 336, 335, 334, 333, 332, 331, 330, 329, 328

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Stickup Well Protector Set in Concrete
50 mm pipe
Bentonite Seal
Filter Sand
Screen

Water Level Readings:

Date	Depth	Elev.
2018-10-15	DRY	----
2018-11-07	0.5	339.5
2018-11-26	0.2	339.8

NOTES

APPENDIX B

STATEMENT OF LIMITATIONS

STATEMENT OF LIMITATIONS

This report is prepared for and made available for the sole use of the client named. Peto MacCallum Ltd. (PML) hereby disclaims any liability or responsibility to any person or entity, other than those for whom this report is specifically issued, for any loss, damage, expenses, or penalties that may arise or result from the use of any information or recommendations contained in this report. The contents of this report may not be used or relied upon by any other person without the express written consent and authorization of PML.

This report shall not be relied upon for any purpose other than as agreed with the client named without the written consent of PML. It shall not be used to express or imply warranty as to the fitness of the property for a particular purpose. A portion of this report may not be used as a separate entity: that is to say the report is to be read in its entirety at all times.

The report is based solely on the scope of services which are specifically referred to in this report. No physical or intrusive testing has been performed, except as specifically referenced in this report. This report is not a certification of compliance with past or present regulations, codes, guidelines and policies.

The scope of services carried out by PML is based on details of the proposed development and land use to address certain issues, purposes and objectives with respect to the specific site as identified by the client. Services not expressly set forth in writing are expressly excluded from the services provided by PML. In other words, PML has not performed any observations, investigations, study analysis, engineering evaluation or testing that is not specifically listed in the scope of services in this report. PML assumes no responsibility or duty to the client for any such services and shall not be liable for failing to discover any condition, whose discovery would require the performance of services not specifically referred to in this report.

The findings an comments made by PML in this report are based on the conditions observed at the time of PML's site reconnaissance. No assurances can be made and no assurances are given with respect to any potential changes in site conditions following the time of completion of PML's field work. Furthermore, regulations, codes and guidelines may change at any time subsequent to the date of this report and these changes may effect the validity of the findings and recommendations given in this report.

STATEMENT OF LIMITATIONS

The results and conclusions with respect to site conditions are therefore in no way intended to be taken as a guarantee or representation, expressed or implied, that the site is free from any contaminants from past or current land use activities or that the conditions in all areas of the site and beneath or within structures are the same as those areas specifically sampled.

Any investigation, examination, measurements or sampling explorations at a particular location may not be representative of conditions between sampled locations. Soil, ground water, surface water, or building material conditions between and beyond the sampled locations may differ from those encountered at the sampling locations and conditions may become apparent during construction which could not be detected or anticipated at the time of the intrusive sampling investigation.

Budget estimates contained in this report are to be viewed as an engineering estimate of probable costs and provided solely for the purposes of assisting the client in its budgeting process. It is understood and agreed that PML will not in any way be held liable as a result of any budget figures provided by it.

The Client expressly waives its right to withhold PML's fees, either in whole or in part, or to make any claim or commence any action or bring any other proceedings, whether in contract, tort, or otherwise against PML in anyway connected with advice or information given by PML relating to the cost estimate or Environmental Remediation/Cleanup and Restoration or Soil and Ground Water Management Plan Cost Estimate.

Peto MacCallum Ltd.
CONSULTING ENGINEERS

February 24, 2022

PML Ref.: 18KF031
Report: 3 Revised

Mr. Adam Belksy
Wilmot Woods Development Inc.
310 Fairway Road South, P.O. Box 45016
Kitchener, Ontario
N2C 2R6

Dear Mr. Belksy

Monitoring Well Water Level Reading
Proposed Wilmot Woods Development
New Hamburg, Ontario

Peto MacCallum Ltd. is pleased to submit our report regarding the ground water monitoring program of Proposed Wilmot Woods Development, New Hamburg, Ontario.

A record of water monitoring completed since September 2018 to February 2021 is presented in Table 1, attached.

We trust that this report has been completed within our terms of reference, and is sufficient for your immediate requirements. If you have any questions, or require further information, please do not hesitate to contact our office

Sincerely

Peto MacCallum Ltd.

William Loghrin, P.Eng.
Manager, Engineering Services

WL:tm

Enclosure:
Table 1: Ground Water Level Readings in Monitoring Wells

Distribution:
1 cc: Wilmot Woods Development Inc.
1 cc: MTE Consultants Inc. (+ email – jcabral@mte85.com).
1 cc: PML Kitchener

16 Franklin Street South, Kitchener, Ontario N2C 1R4
Tel: (519) 893-7500 Fax: (519) 893-0654
E-mail: kitchener@petomaccallum.com
BARRIE, COLLINGWOOD, HAMILTON, KITCHENER, LONDON, TORONTO

TABLE 1

GROUND WATER LEVEL READINGS IN MONITORING WELLS

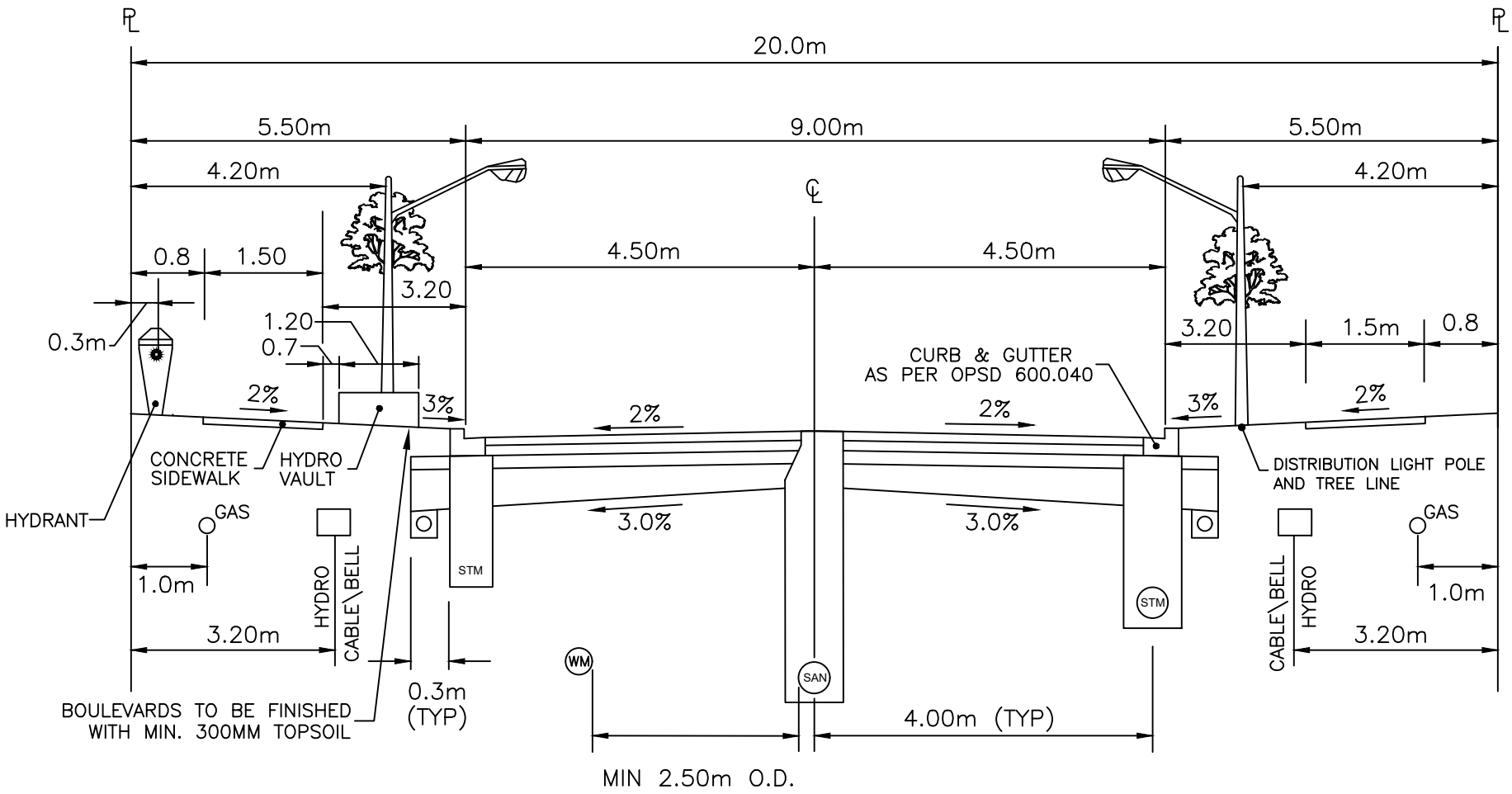
MONITORING WELL No.	GROUND SURFACE ELEVATION[1]	MID-SCREEN ELEVATION[2] (DEPH, m)	HYDROSTATIC GROUND WATER LEVEL ELEVATION (DEPTH, m) [2]								
			SEPTEMBER 19, 2018	OCTOBER 10, 2018	NOVEMBER 7, 2018	NOVEMBER 26, 2018	FEBRUARY 8, 2019	NOVEMBER 19, 2020	DECEMBER 18, 2020	JANUARY 30, 2021	FEBRUARY 26, 2021
101	339.0	333.8 (5.2)	337.2 (1.80)	337.7 (1.34)	338.2 (0.85)	337.8 (1.24)	338.1 (0.96)	337.572 (1.46)	337.832 (1.20)	337.172 (1.86)	337.152 (1.88)
102	340.0	334.8 (5.2)	338.3 (1.71)	338.5 (1.48)	338.8 (1.23)	338.8 (1.24)	338.6 (1.41)	338.404 (1.69)	338.594 (1.50)	338.484 (1.61)	338.794 (1.30)
103	343.2	338.0 (5.2)	340.0 (3.22)	340.6 (2.66)	340.9 (2.33)	341.3 (1.91)	341.5 (1.70)	340.326 (3.00)	340.666 (2.66)	341.466 (1.86)	340.746 (2.58)
104	344.9	339.7 (5.2)	341.8 (3.17)	342.5 (2.45)	343.5 (1.41)	344.1 (0.83)	343.9 (1.03)	341.708 (3.23)	343.168 (1.77)	343.678 (1.26)	343.358 (1.58)
105	341.1	335.9 (5.2)	339.7 (1.31)	340.0 (1.08)	340.1 (0.91)	340.3 (0.77)	340.2 (0.84)	339.874 (1.26)	340.024 (1.11)	340.554 (0.58)	339.284 (1.85)
106	343.0	337.8 (5.2)	340.9 (2.13)	341.7 (1.25)	341.7 (1.31)	341.8 (1.15)	341.3 (1.65)	339.523 (3.47)	341.303 (1.69)	341.753 (1.24)	342.283 (0.71)
107	347.0	341.8 (5.2)	343.9 (3.07)	-	344.7 (2.30)	344.6 (2.33)	344.8 (2.20)	341.475 (5.52)	343.175 (3.82)	346.415 (0.58)	346.245 (0.75)
108	345.3	340.1 (5.2)	339.4 (5.94)	-	339.6 (5.68)	339.9 (5.40)	339.7 (5.63)	339.387 (6.00)	Dry	344.877 (0.51)	344.647 (0.74)
109	339.9	330.8 (9.1)	339.4 (0.53)	339.4 (0.53)	339.7 (0.19)	339.9 (0.04)	339.7 (0.20)	327.355 (0.48)	327.495 (0.34)	327.185 (0.65)	327.375 (0.46)
110	340.0	328.4 (11.6)	-	-	339.8 (0.43)	339.8 (0.17)	339.7 (0.26)	332.442 (0.84)	332.282 (1.00)	332.652 (0.63)	332.782 (0.50)

Notes:

(1) Ground surface elevations at the monitoring well locations were surveyed by PML and are geodetic.
(2) Water levels measured using a Solinst flat tape water level reader.

Appendix C

Typical ROW Cross-Sections



NOTES:

1. ALL DIMENSION IN METERS.(UNLESS NOTED)
2. SUBDRAIN SHALL BE 150mm PERFORATED PIPE c/w SOCK AND MASONARY SAND (TYP.)
3. MINIMUM DEPTH OF COVER

STORM SEWER	1.50m
SANITARY SEWER	2.80m
WATERMAIN	2.00m
GAS MAIN	0.75m IN BLVD.
HYDRO/BELL/CABLE	1.00m IN BLVD.

4. CURB STOP VALVES AT PROPERTY LINE (PREFERRED LOCATION OUT OF DRIVEWAY)
5. HYDRANT VALVES LOCATED 0.50m BEHIND CURB
6. MINIMUM DEPTH OF COVER FOR SERVICE LATERALS AT PROPERTY LINE.

STORM SERVICE	1.30m
SANITARY SERVICE	2.50m
WATER SERVICE	1.80m

7. THE FOLLOWING IS A MINIMUM ROAD BASE AND WILL REQUIRE A SOILS REPORT VERIFICATIONS TO DERMINE IF ADDITIONAL THICKNESS IS REQUIRED.
   - 40mm HL3
   - 100mm HL4
   - 200mm GRANULAR 'A'
   - 600mm GRANULAR 'B'

20.0m LOCAL ROAD ROW

TOWNSHIP OF WILMOT
PUBLIC WORKS AND ENGINEERING DEPARTMENT

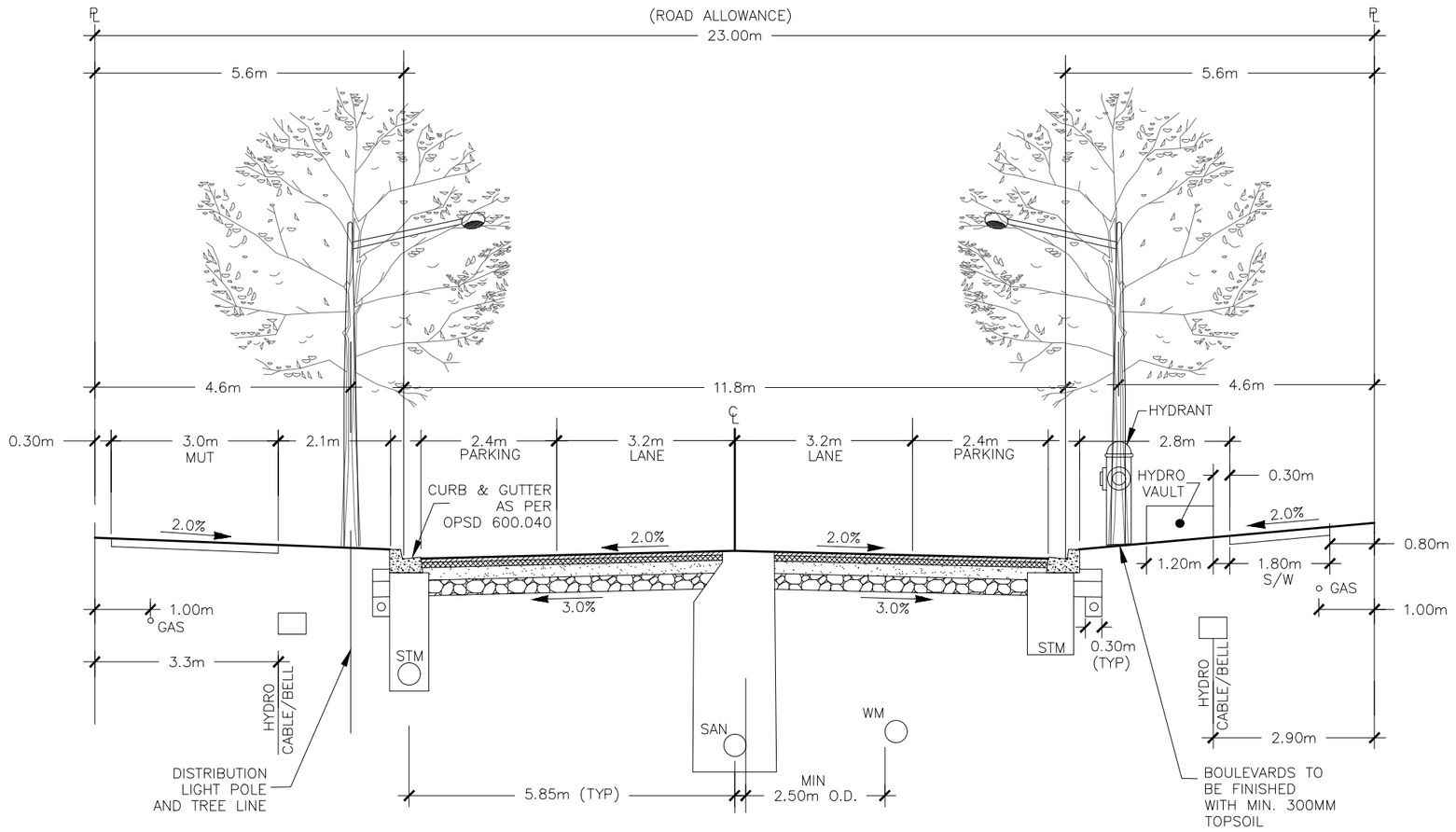
DATE: FEBRUARY 2022

SCALE: N.T.S.

DWG No.: WIL-DET-22-34 | REV: 0

NORTH/EAST

SOUTH/WEST



23.0m URBAN R.O.W. CROSS-SECTION

TOWNSHIP OF WILMOT

UTILITY	MIN. COVER
SANITARY	2.8m
STORM	1.5m
WATER	2.0m

UTILITY	MIN. COVER
HYDRO	0.9m
BELL	0.75m
CABLE	0.75m
GAS	0.6m

ROAD STRUCTURE SHALL BE:	
HL3 SURFACE ASPHALT	50mm
HL4 BINDER ASPHALT	100mm
GRAN 'A' BASE COURSE	200mm
GRAN 'B' SUBBASE COURSE	600mm

C-2

Date: DEC.8/23
Scale: 1:100

23.0m URBAN COLLECTOR ROAD R.O.W. CROSS SECTION

MTE
Engineers, Scientists, Surveyors

Project No.: 35056-104

Appendix D

Proposed Sanitary Sewer Analysis

WILMOT WOODS

TOWNSHIP OF WILMOT, Ontario

ULTIMATE BUILD OUT SANITARY SEWER DESIGN SHEET

ENGINEERING AND PUBLIC WORKS

Project Number: 35056-104
Date: March 6, 2023
Design By: AJC
Checked By: GMK
File: Q:\35056\104\SAN\35056-104-Sanitary Sewer Design Sheet Revised Submission.xls

Drainage Area Plan No: PRELIM-SA1.1

Design Parameters

Average Daily Flow
Residential 0.00353 L/s/c (305 l/c/d)
Commercial 0.95 L/s/ha
Industrial 0.09 L/s/ha (25 pp/ha equivalent)
Inst. / School 0.25 L/s/ha

Mannings "*n*" 0.0130
Min. Velocity 0.6 m/sec
Max. Velocity 3.0 m/sec
Residential Harmon Peaking Factor (F)
Residential Areas Infiltration 0.25 L/s/ha

LOCATION				RESIDENTIAL AREAS and POPULATION					SCHOOL, INSTITUTIONAL			COMMERCIAL			INDUSTRIAL				INFILTRATION			DESIGN					
STREET	AREA NO.	MANHOLE LOCATION FROM MH	MANHOLE LOCATION TO MH	HECTARES OF EACH DENSITY 100	HECTARES OF EACH DENSITY 60	POPUL.	CUMUL POPUL.	PEAK FACTOR "F"	PEAK RES. FLOW	HECTARES AND FLOW OF EACH ZONING 0.25 L/s/ha AREA	CUMUL AREA	PEAK FLOW	0.95 L/s/ha AREA	CUMUL AREA	PEAK FLOW	0.09 L/s/ha 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
				ha	*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*	*m*	*%*	*mm*	*L/sec*	*m/s*
LANDS TO FOREST GLEN WWPS																											
Existing (Fig 2-14B from CRA Report)							*0.431*	*4.01*	*7.0000*	*(equivalent population based on existing flow rate)*													*7.0000*				
Northern Cachet Lands	*M & L*			*19.29*		*1.157*	*1.157*	*3.76*	*15.3549*	*0.00*			*0.00*			*0.00*			*0.0000*	*19.29*	*19.29*	*4.8225*	*20.1774*					
Pfenning Farm	*G1*			*10.20*		*0.612*	*0.612*	*3.93*	*8.4849*	*0.00*			*0.00*			*0.00*			*0.0000*	*10.20*	*10.20*	*2.5500*	*11.0349*					
Block 1 on Ingold Avenue				0.24		0.014	0.014	4.40	0.2236	0.00			0.00			0.00			0.0000	0.24	0.24	0.0600	0.2836					
TOTAL TO FOREST GLEN WWPS							*2.215*	*3.55*	*27.7662*												*29.73*	*7.4325*	*35.1987*					
35056-104 - WILMOT WOODS																											
STREET ONE	1	1	2		0.47	0.028	0.028	4.36	0.4339	0.00	0.0000		0.00	0.0000		0.00	0.0000		0.0000	0.47	0.470	0.1175	0.5514	60.0	1.70	200	42.7422	1.361
STREET ONE	2	2	3		0.66	0.040	0.068	4.29	1.0258	0.00	0.0000		0.00	0.0000		0.00	0.0000		0.0000	0.66	1.130	0.2825	1.3083	80.0	1.70	200	42.7422	1.361
STREET ONE	3	3	4		0.47	0.028	0.096	4.25	1.4397	0.00	0.0000		0.00	0.0000		0.00	0.0000		0.0000	0.47	1.600	0.4000	1.8397	70.0	0.60	200	25.3927	0.809
INGOLD AVENUE	4	4	9		0.58	0.035	0.131	4.21	1.9438	0.00	0.0000		0.00	0.0000		0.00	0.0000		0.0000	0.58	2.180	0.5450	2.4888	84.0	0.35	200	19.3940	0.618
STREET THREE	5	5	6		0.59	0.035	0.035	4.34	0.5427	0.00	0.0000		0.00	0.0000		0.00	0.0000		0.0000	0.59	0.590	0.1475	0.6902	63.0	1.20	200	35.9106	1.144
STREET THREE	6	6	7		0.59	0.035	0.071	4.28	1.0701	0.00	0.0000		0.00	0.0000		0.00	0.0000		0.0000	0.59	1.180	0.2950	1.3651	71.0	1.20	200	35.9106	1.144
STREET THREE	7	7	9		0.23	0.014	0.085	4.26	1.2731	0.00	0.0000		0.00	0.0000		0.00	0.0000		0.0000	0.23	1.410	0.3525	1.6256	60.0	1.00	200	32.7818	1.044
BLOCK 19	8	8	9	1.03		0.103	0.103	4.24	1.5417	0.00	0.0000		0.00	0.0000		0.00	0.0000		0.0000	1.03	1.030	0.2575	1.7992	15.0	1.00	200	32.7818	1.044
INGOLD AVENUE	9	9	11		0.57	0.034	0.353	4.05	5.0381	0.00	0.0000		0.00	0.0000		0.00	0.0000		0.0000	0.57	5.190	1.2975	6.3356	101.0	0.35	200	19.3940	0.618
STREET TWO (+FOREST GLEN WWPS)	10	10	11		0.43	0.026	2.241	3.55	28.0579	0.00	0.0000		0.00	0.0000		0.00	0.0000		0.0000	0.43	30.160	7.5400	35.5979	55.0	0.35	300	57.1799	0.809
STREET TWO	11	11	14		0.43	0.026	2.619	3.49	32.2866	0.00	0.0000		0.00	0.0000		0.00	0.0000		0.0000	0.43	35.780	8.9450	41.2316	90.0	0.35	300	57.1799	0.809
BLOCK 20	12	12	14	0.98		0.098	0.098	4.25	1.4689	0.00	0.0000		0.00	0.0000		0.00	0.0000		0.0000	0.98	0.980	0.2450	1.7139	15.0	1.00	200	32.7818	1.044
BLOCK 21	13	13	14	0.82		0.082	0.082	4.27	1.2349	0.00	0.0000		0.00	0.0000		0.00	0.0000		0.0000	0.82	0.820	0.2050	1.4399	15.0	1.00	200	32.7818	1.044
STREET TWO	14	14	23			0.000	2.799	3.47	34.2680	0.00	0.0000		0.00	0.0000		0.00	0.0000		0.0000	0.00	37.58	9.3950	43.6630	120.0	0.35	300	57.1799	0.809
STREET FOUR	15	15	16		0.37	0.022	0.022	4.37	0.3428	0.00	0.0000		0.00	0.0000		0.00	0.0000		0.0000	0.37	0.37	0.0925	0.4353	56.0	1.00	200	32.7818	1.044
STREET FOUR	16	16	23		0.30	0.018	0.040	4.33	0.6149	0.00	0.0000		0.00	0.0000		0.00	0.0000		0.0000	0.30	0.67	0.1675	0.7824	81.0	0.60	200	25.3927	0.809
STREET SIX	17	17	18		0.33	0.020	0.020	4.38	0.3062	0.00	0.0000		0.00	0.0000		0.00	0.0000		0.0000	0.33	0.33	0.0825	0.3887	56.0	1.00	200	32.7818	1.044
STREET SIX	18	18	19		0.27	0.016	0.036	4.34	0.5517	0.00	0.0000		0.00	0.0000		0.00	0.0000		0.0000	0.27	0.60	0.1500	0.7017	53.0	0.60	200	25.3927	0.809
STREET SIX	19	19	20		0.23	0.014	0.050	4.32	0.7586	0.00	0.0000		0.00	0.0000		0.00	0.0000		0.0000	0.23	0.83	0.2075	0.9661	48.0	0.60	200	25.3927	0.809
STREET SIX	20	20	21		0.40	0.024	0.074	4.28	1.1144	0.00	0.0000		0.00	0.0000		0.00	0.0000		0.0000	0.40	1.23	0.3075	1.4219	53.0	0.60	200	25.3927	0.809
STREET SIX	21	21	22		0.47	0.028	0.102	4.24	1.5271	0.00	0.0000		0.00	0.0000		0.00	0.0000		0.0000	0.47	1.70	0.4250	1.9521	60.0	0.60	200	25.3927	0.809
STREET SIX	22	22	23		0.61	0.037	0.139	4.20	2.0559	0.00	0.0000		0.00	0.0000		0.00	0.0000		0.0000	0.61	2.31	0.5775	2.6334	90.0	0.60	200	25.3927	0.809
STREET TWO	23	23	29		0.54	0.032	3.011	3.44	36.5700	0.00	0.0000		0.00	0.0000		0.00	0.0000		0.0000	0.54	41.10	10.2750	46.8450	84.0	0.35	300	57.1799	0.809
STREET FIVE	24	24	25		0.50	0.030	0.030	4.35	0.4612	0.00	0.0000		0.00	0.0000		0.00	0.0000		0.0000	0.50	0.50	0.1250	0.5862	48.0	1.00	200	32.7818	1.044
STREET FIVE	25	25	29		0.50	0.030	0.060	4.30	0.9103	0.00	0.0000		0.00	0.0000		0.00	0.0000		0.0000	0.50	1.00	0.2500	1.1603	90.0	0.80	200	29.3209	0.934
STREET SEVEN	26	26	27		0.51	0.031	0.031	4.35	0.4703	0.00	0.0000		0.00	0.0000		0.00	0.0000		0.0000	0.51	0.51	0.1275	0.5978	74.0	1.00	200	32.7818	1.044
STREET SEVEN	27	27	28		0.74	0.044	0.075	4.28	1.1320	0.00	0.0000		0.00	0.0000		0.00	0.0000		0.0000	0.74	1.25	0.3125	1.4445	90.0	0.80	200	29.3209	0.934
STREET SEVEN	28	28	29		0.50	0.030	0.105	4.24	1.5708	0.00	0.0000		0.00	0.0000		0.00	0.0000		0.0000	0.50	1.75	0.4375	2.0083	90.0	0.80	200	29.3209	0.934
STREET TWO	29	29	52		0.54	0.032	3.208	3.42	38.7007	0.00	0.0000		0.00	0.0000		0.00	0.0000		0.0000	0.54	44.39	11.0975	49.7982	84.0	0.35	300	57.1799	0.809

STREET ONE	30	30	31		0.61	0.037	0.037	4.34	0.5608		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.61	0.61	0.1525	0.7133	84.0	1.00	200	32.7818	1.044
STREET ONE	31	31	32		0.53	0.032	0.068	4.29	1.0347		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.53	1.14	0.2850	1.3197	76.0	0.60	200	25.3927	0.809
STREET ONE	32	32	33		0.27	0.016	0.085	4.26	1.2731		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.27	1.41	0.3525	1.6256	12.0	0.60	200	25.3927	0.809
STREET ONE	33	33	34		0.55	0.033	0.118	4.22	1.7534		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.55	1.96	0.4900	2.2434	85.0	0.60	200	25.3927	0.809
STREET ONE	34	34	52		0.62	0.037	0.155	4.19	2.2878		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.62	2.58	0.6450	2.9328	90.0	0.60	200	25.3927	0.809
STREET SIX	35	35	38		0.22	0.013	0.013	4.40	0.2051		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.22	0.22	0.0550	0.2601	37.0	2.00	200	46.3604	1.476
STREET NINE	36	36	37		0.25	0.015	0.015	4.40	0.2328		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.25	0.25	0.0625	0.2953	52.0	1.00	200	32.7818	1.044
STREET NINE	37	37	38		0.42	0.025	0.040	4.33	0.6149		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.42	0.67	0.1675	0.7824	84.0	0.60	200	25.3927	0.809
CACHET LANDS (TRUNK)	*EXT*	*CACHET*	*38*		*25.98*	*1.559*	*1.559*	*3.67*	*20.1807*		*0.00*	*0.0000*		*0.00*	*0.0000*	*14.62*	*14.62*	*1.2902*	*1.2902*	*40.60*	*40.60*	*10.1500*	*31.6210*	*100.0*	*0.35*	*250*	*35.1636*	*0.717*
STREET EIGHT (TRUNK)	**38**	**38**	**39**		**0.41**	**0.025**	**1.637**	**3.65**	**21.1005**		**0.00**	**0.0000**		**0.00**	**0.0000**		**14.62**	**1.2902**	**1.2902**	**0.41**	**41.90**	**10.4750**	**32.8657**	**60.0**	**0.35**	**300**	**57.1799**	**0.809**
STREET EIGHT (TRUNK)	**39**	**39**	**50**		**0.48**	**0.029**	**1.666**	**3.65**	**21.4387**		**0.00**	**0.0000**		**0.00**	**0.0000**		**14.62**	**1.2902**	**1.2902**	**0.48**	**42.38**	**10.5950**	**33.3239**	**60.0**	**0.35**	**300**	**57.1799**	**0.809**
STREET NINE	40	41	42		0.30	0.018	0.018	4.39	0.2787		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.30	0.30	0.0750	0.3537	39.0	1.00	200	32.7818	1.044
STREET NINE		42	43			0.000	0.018	4.39	0.2787		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.00	0.30	0.0750	0.3537	16.0	0.60	200	25.3927	0.809
STREET NINE	41	43	44		0.28	0.017	0.035	4.34	0.5337		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.28	0.58	0.1450	0.6787	50.0	0.60	200	25.3927	0.809
STREET NINE	42	44	45		0.27	0.016	0.051	4.31	0.7765		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.27	0.85	0.2125	0.9890	54.0	0.60	200	25.3927	0.809
STREET NINE		45	46			0.000	0.051	4.31	0.7765		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.00	0.85	0.2125	0.9890	14.0	0.60	200	25.3927	0.809
STREET NINE	43	46	49		0.41	0.025	0.076	4.27	1.1409		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.41	1.26	0.3150	1.4559	74.0	0.60	200	25.3927	0.809
STREET TEN	44	47	48		0.44	0.026	0.026	4.36	0.4066		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.44	0.44	0.1100	0.5166	60.0	1.50	200	40.1493	1.279
STREET TEN	45	48	49		0.44	0.026	0.053	4.31	0.8033		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.44	0.88	0.2200	1.0233	60.0	1.00	200	32.7818	1.044
STREET NINE	46	49	50		0.29	0.017	0.146	4.20	2.1591		0.00	0.0000		0.00	0.0000		0.00	0.0000	0.0000	0.29	2.43	0.6075	2.7666	84.0	0.60	200	25.3927	0.809
STREET EIGHT (TRUNK)	**47**	**50**	**51**		**0.62**	**0.037**	**1.849**	**3.61**	**23.5717**		**0.00**	**0.0000**		**0.00**	**0.0000**		**14.62**	**1.2902**	**1.2902**	**0.62**	**45.43**	**11.3575**	**36.2194**	**82.0**	**0.35**	**300**	**57.1799**	**0.809**
STREET EIGHT (TRUNK)	**48**	**51**	**52**		**0.53**	**0.032**	**1.880**	**3.61**	**23.9396**		**0.00**	**0.0000**		**0.00**	**0.0000**		**14.62**	**1.2902**	**1.2902**	**0.53**	**45.96**	**11.4900**	**36.7198**	**81.0**	**0.35**	**300**	**57.1799**	**0.809**
OUTLET TO WEL		**52**				**0.000**	**5.243**	**3.23**	**59.7058**		**0.00**	**0.0000**		**0.00**	**0.0000**		**14.62**	**1.2902**	**1.2902**	**0.00**	**92.93**	**23.2325**	**84.2285**	**81.0**	**0.35**	**450**	**168.5854**	**1.061**
WEL - EXISTING AND PROPOSED EASTERN REACH SANITARY SEWER																										
Nafziger Road	*1*	*MH50A*	*Ex. MH16A*		*0.000*	*0.000*	*4.50*	*0.0000*		*0.00*	*0.0000*		*0.00*	*0.0000*	*9.40*	*9.40*	*0.8296*	*0.8296*	*9.40*	*9.40*	*2.3500*	*3.1796*	*360.0*	*0.60*	*200*	*25.3927*	*0.809*
Nafziger Road	*2*	*MURF*	*Ex. MH16A*		*0.000*	*0.000*	*4.50*	*0.0000*	*17.72*	*17.72*	*4.4300*		*0.00*	*0.0000*		*0.00*	*0.0000*	*4.4300*	*17.72*	*17.72*	*4.4300*	*8.8600*				*0.0000*	*0.000*
Howie Meeker Boulevard		*Ex. MH16A*	*Ex. MH15A*		*0.000*	*0.000*	*4.50*	*0.0000*		*17.72*	*4.4300*		*0.00*	*0.0000*		*9.40*	*0.8296*	*5.2596*		*27.12*	*6.7800*	*12.0396*	*40.5*	*1.50*	*250*	*72.7956*	*1.484*
Howie Meeker Boulevard	*4*	*FUT. INDUS.*	*Ex. MH15A*	**Future Contigency*	*0.000*	*0.000*	*4.50*	*0.0000*		*0.00*	*0.0000*		*0.00*	*0.0000*	*4.79*	*4.79*	*0.4227*	*0.4227*	*4.79*	*4.79*	*1.1975*	*1.6202*				*0.0000*	*0.000*
Howie Meeker Boulevard	*5*	*EX. INDUS.*	*Ex. MH15A*	**Future Contigency*	*0.000*	*0.000*	*4.50*	*0.0000*		*0.00*	*0.0000*		*0.00*	*0.0000*	*8.50*	*8.50*	*0.7501*	*0.7501*	*8.50*	*8.50*	*2.1250*	*2.8751*				*0.0000*	*0.000*
Howie Meeker Boulevard	*3*	*Ex. MH15A*	*Ex. MH14A*		*0.000*	*0.000*	*4.50*	*0.0000*		*17.72*	*4.4300*		*0.00*	*0.0000*		*22.69*	*2.0024*	*6.4324*	*0.09*	*40.50*	*10.1240*	*16.5564*	*89.0*	*1.72*	*250*	*77.9513*	*1.589*
Howie Meeker Boulevard	*6*	*Ex. MH14A*	*Ex. MH13A*		*0.000*	*0.000*	*4.50*	*0.0000*		*17.72*	*4.4300*		*0.00*	*0.0000*		*22.69*	*2.0024*	*6.4324*	*0.23*	*40.73*	*10.1823*	*16.6146*	*88.8*	*1.55*	*250*	*73.9989*	*1.508*
Howie Meeker Boulevard	*7*	*Ex. MH13A*	*Ex. MH12A*		*0.000*	*0.000*	*4.50*	*0.0000*		*17.72*	*4.4300*		*0.00*	*0.0000*		*22.69*	*2.0024*	*6.4324*	*0.23*	*40.96*	*10.2403*	*16.6726*	*91.0*	*1.18*	*250*	*64.5655*	*1.316*
Howie Meeker Boulevard	*8*	*Ex. MH12A*	*Ex. MH11A*		*0.000*	*0.000*	*4.50*	*0.0000*		*17.72*	*4.4300*		*0.00*	*0.0000*		*22.69*	*2.0024*	*6.4324*	*0.24*	*41.20*	*10.2995*	*16.7319*	*92.7*	*0.98*	*250*	*58.8400*	*1.199*
Howie Meeker Boulevard	*9*	*Ex. MH11A*	*Ex. MH10A*		*0.000*	*0.000*	*4.50*	*0.0000*		*17.72*	*4.4300*		*0.00*	*0.0000*		*22.69*	*2.0024*	*6.4324*	*0.24*	*41.44*	*10.3598*	*16.7921*	*89.0*	*1.07*	*250*	*61.4824*	*1.253*
Kay Hall Place	*11*	*BLOCK 2*	*MH37A*		*0.000*	*0.000*	*4.50*	*0.0000*		*0.00*	*0.0000*		*0.00*	*0.0000*	*0.49*	*0.49*	*0.0434*	*0.0434*	*0.49*	*0.49*	*0.1230*	*0.1664*	*28.2*	*1.00*	*200*	*32.7818*	*1.044*
Kay Hall Place	*12*	*BLOCK 3*	*MH37A*		*0.000*	*0.000*	*4.50*	*0.0000*		*0.00*	*0.0000*		*0.00*	*0.0000*	*0.84*	*0.84*	*0.0737*	*0.0737*	*0.84*	*0.84*	*0.2088*	*0.2824*	*21.7*	*1.00*	*200*	*32.7818*	*1.044*
Kay Hall Place		*MH37A*	*MH38A*		*0.000*	*0.000*	*4.50*	*0.0000*		*0.00*	*0.0000*		*0.00*	*0.0000*		*1.33*	*0.1171*	*0.1171*		*1.33*	*0.3318*	*0.4489*	*34.3*	*1.00*	*200*	*32.7818*	*1.044*
Kay Hall Place	*13*	*MH38A*	*MH39A*		*0.000*	*0.000*	*4.50*	*0.0000*		*0.00*	*0.0000*		*0.00*	*0.0000*		*1.33*	*0.1171*	*0.1171*	*0.17*	*1.49*	*0.3733*	*0.4904*	*40.2*	*0.60*	*200*	*25.3927*	*0.809*
Kay Hall Place	*15*	*BLOCK 4*	*MH39A*		*0.000*	*0.000*	*4.50*	*0.000*		*0.00*	*0.0000*		*0.00*	*0.0000*	*0.51*	*0.51*	*0.0449*	*0.0449*	*0.51*	*0.51*	*0.1273*	*0.1722*	*11.2*	*2.00*	*200*	*46.3604*	*1.476*
Kay Hall Place	*14*	*MH39A*	*MH40A*		*0.000*	*0.000*	*4.50*	*0.0000*		*0.00*	*0.0000*		*0.00*	*0.0000*		*1.84*	*0.1620*	*0.1620*	*0.08*	*2.08*	*0.5205*	*0.6825*	*18.6*	*0.60*	*200*	*25.3927*	*0.809*
Kay Hall Place	*17*	*BLOCK 5*	*MH40A*		*0.000*	*0.000*	*4.50*	*0.000*		*0.00*	*0.0000*		*0.00*	*0.0000*	*0.59*	*0.59*	*0.0518*	*0.0518*	*0.59*	*0.59*	*0.1468*	*0.1986*	*10.2*	*2.00*	*200*	*46.3604*	*1.476*
Kay Hall Place	*16*	*MH40A*	*MH41A*		*0.000*	*0.000*	*4.50*	*0.0000*		*0.00*	*0.0000*		*0.00*	*0.0000*		*2.42*	*0.2138*	*0.2138*	*0.04*	*2.71*	*0.6765*	*0.8903*	*44.7*	*0.60*	*200*	*25.3927*	*0.809*
Kay Hall Place	*19*	*BLOCK 1*	*MH41A*		*0.000*	*0.000*	*4.50*	*0.000*		*0.00*	*0.0000*		*0.00*	*0.0000*	*0.43*	*0.43*	*0.0375*	*0.0375*	*0.43*	*0.43*	*0.1063*	*0.1438*	*11.5*	*2.00*	*200*	*46.3604*	*1.476*
Kay Hall Place	*20*	*BLOCK 6*	*MH41A*		*0.000*	*0.000*	*4.50*	*0.000*		*0.00*	*0.0000*		*0.00*	*0.0000*	*0.40*	*0.40*	*0.0354*	*0.0354*	*0.40*	*0.40*	*0.1003*	*0.1356*	*11.5*	*1.00*	*200*	*32.7818*	*1.044*
Kay Hall Place	*18*	*MH41A*	*Ex. MH10A*		*0.000*	*0.000*	*4.50*	*0.0000*		*0.00*	*0.0000*		*0.00*	*0.0000*		*3.25*	*0.2867*	*0.2867*	*0.09*	*3.62*	*0.9053*	*1.1920*	*43.5*	*0.60*	*200*	*25.3927*	*0.809*
Howie Meeker Boulevard	*10, 21*	*Ex. MH10A*	*Ex. MH9A*		*0.000*	*0.000*	*4.50*	*0.0000*		*17.72*	*4.4300*		*0.00*	*0.0000*		*25.94*	*2.2891*	*6.7191*	*0.30*	*45.36*	*11.3403*	*18.0594*	*70.7*	*1.12*	*250*	*62.9026*	*1.282*
Howie Meeker Boulevard	*22*	*Ex. MH9A*	*MH16A*		*0.000*	*0.000*	*4.50*	*0.0000*		*17.72*	*4.4300*		*0.00*	*0.0000*		*25.94*	*2.2891*	*6.7191*	*0.18*	*45.54*	*11.3845*	*18.1036*	*120.7*	*0.60*	*300*	*74.8660*	*1.060*
Hahn Brass Way	*24*	*BLOCK 5*	*MH42A*		*0.000*	*0.000*	*4.50*	*0.0000*		*0.00*	*0.0000*		*0.00*	*0.0000*	*0.71*	*0.71*	*0.0629*	*0.0629*	*0.71*	*0.71*	*0.1783*	*0.2412*	*25.9*	*2.00*	*200*	*46.3604*	*1.476*
Hahn Brass Way		*MH42A*	*MH43A*		*0.000*	*0.000*	*4.50*	*0.0000*		*0.00*	*0.0000*		*0.00*	*0.0000*		*0.71*	*0.0629*	*0.0629*		*0.71*	*0.1783*	*0.2412*	*33.6*	*1.00*	*200*	*32.7818*	*1.044*

Hahn Brass Way	26	BLOCK 4	MH43A		0.000	0.000	4.50	0.0000	0.00	0.0000	0.00	0.0000	0.49	0.49	0.0433	0.0433	0.49	0.49	0.1228	0.1661	10.9	2.00	200	46.3604	1.476
Hahn Brass Way	25	MH43A	MH44A		0.000	0.000	4.50	0.0000	0.00	0.0000	0.00	0.0000		1.20	0.1063	0.1063	0.17	1.38	0.3445	0.4508	15.3	0.60	200	25.3927	0.809
Hahn Brass Way	28	BLOCK 3	MH44A		0.000	0.000	4.50	0.0000	0.00	0.0000	0.00	0.0000	0.91	0.91	0.0803	0.0803	0.91	0.91	0.2275	0.3078	11.0	2.00	200	46.3604	1.476
Hahn Brass Way	27	MH44A	MH45A		0.000	0.000	4.50	0.0000	0.00	0.0000	0.00	0.0000		2.11	0.1866	0.1866	0.03	2.32	0.5795	0.7661	22.4	0.60	200	25.3927	0.809
Hahn Brass Way	30	BLOCK 2	MH45A		0.000	0.000	4.50	0.0000	0.00	0.0000	0.00	0.0000	0.45	0.45	0.0398	0.0398	0.45	0.45	0.1128	0.1526	11.5	2.00	200	46.3604	1.476
Hahn Brass Way	31	BLOCK 6	MH45A		0.000	0.000	4.50	0.0000	0.00	0.0000	0.00	0.0000	1.02	1.02	0.0903	0.0903	1.02	1.02	0.2558	0.3460	11.5	2.00	200	46.3604	1.476
Hahn Brass Way	29	MH45A	MH46A		0.000	0.000	4.50	0.0000	0.00	0.0000	0.00	0.0000		3.59	0.3166	0.3166	0.04	3.84	0.9590	1.2756	77.6	0.60	200	25.3927	0.809
Hahn Brass Way	33	BLOCK 1	MH46A		0.000	0.000	4.50	0.0000	0.00	0.0000	0.00	0.0000	0.51	0.51	0.0446	0.0446	0.51	0.51	0.1263	0.1708	11.5	2.00	200	46.3604	1.476
Hahn Brass Way	34	BLOCK 7	MH46A		0.000	0.000	4.50	0.0000	0.00	0.0000	0.00	0.0000	1.16	1.16	0.1023	0.1023	1.16	1.16	0.2898	0.3920	11.5	2.00	200	46.3604	1.476
Hahn Brass Way	32	MH46A	MH47A		0.000	0.000	4.50	0.0000	0.00	0.0000	0.00	0.0000		5.25	0.4635	0.4635	0.16	5.66	1.4138	1.8772	90.0	0.60	200	25.3927	0.809
Hahn Brass Way	35	MH47A	MH19A		0.000	0.000	4.50	0.0000	0.00	0.0000	0.00	0.0000		5.25	0.4635	0.4635	0.18	5.84	1.4588	1.9222	90.0	0.60	200	25.3927	0.809
WEL - NORTHERN REACH SANITARY SEWER																										
Howie Meeker Boulevard	37	Ex. PESTELL	Ex. MH19A		0.000	0.000	4.50	0.0000	0.00	0.0000	0.00	0.0000	2.05	2.05	0.1808	0.1808	2.05	2.05	0.5123	0.6931	14.6	1.03	200	33.2699	1.060
Howie Meeker Boulevard		Ex. MH19A	MH1A		0.000	0.000	4.50	0.0000	0.00	0.0000	0.00	0.0000		2.05	0.1808	0.1808		2.05	0.5123	0.6931	80.3	2.30	200	49.7160	1.583
Howie Meeker Boulevard	38	MH1A	MH2A		0.000	0.000	4.50	0.0000	0.00	0.0000	0.00	0.0000		2.05	0.1808	0.1808	0.21	2.26	0.5645	0.7453	80.0	2.30	200	49.7160	1.583
Howie Meeker Boulevard	39	MH2A	MH3A		0.000	0.000	4.50	0.0000	0.00	0.0000	0.00	0.0000		2.05	0.1808	0.1808	0.21	2.47	0.6165	0.7973	90.0	0.80	200	29.3209	0.934
Howie Meeker Boulevard	41	Ex. PESTELL	MH3A		0.000	0.000	4.50	0.0000	0.00	0.0000	0.00	0.0000	4.05	4.05	0.3573	0.3573	4.05	4.05	1.0123	1.3696	13.2	0.50	150	10.7634	0.609
Howie Meeker Boulevard	40	MH3A	MH4A		0.000	0.000	4.50	0.0000	0.00	0.0000	0.00	0.0000		6.10	0.5381	0.5381	0.23	6.75	1.6873	2.2254	38.7	0.80	200	29.3209	0.934
Howie Meeker Boulevard	42	MH4A	MH5A		0.000	0.000	4.50	0.0000	0.00	0.0000	0.00	0.0000		6.10	0.5381	0.5381	0.10	6.84	1.7110	2.2491	90.0	0.80	200	29.3209	0.934
Howie Meeker Boulevard	44	PESTELL	MH5A	*Future Contigency	0.000	0.000	4.50	0.0000	0.00	0.0000	0.00	0.0000	3.32	3.32	0.2933	0.2933	3.32	3.32	0.8310	1.1243				0.0000	0.000
Howie Meeker Boulevard	43	MH5A	MH6A		0.000	0.000	4.50	0.0000	0.00	0.0000	0.00	0.0000	0.68	10.10	0.8911	0.8911	0.68	10.84	2.7108	3.6018	82.9	0.80	200	29.3209	0.934
WEL - WESTERN REACH SANITARY SEWER																										
Vernon Erb Drive		MH4A	MH23A		0.000	0.000	4.50	0.0000	0.00	0.0000	0.00	0.0000		0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	40.8	1.00	200	32.7818	1.044
Vernon Erb Drive	45	MH23A	MH24A		0.000	0.000	4.50	0.0000	0.00	0.0000	0.00	0.0000	0.85	0.85	0.0750	0.0750	0.85	0.85	0.2125	0.2875	40.5	1.00	200	32.7818	1.044
Vernon Erb Drive	46	MH24A	MH25A		0.000	0.000	4.50	0.0000	0.00	0.0000	0.00	0.0000	0.49	1.34	0.1185	0.1185	0.49	1.34	0.3358	0.4543	37.4	0.60	200	25.3927	0.809
Vernon Erb Drive	47	MH25A	MH26A		0.000	0.000	4.50	0.0000	0.00	0.0000	0.00	0.0000	0.49	1.83	0.1615	0.1615	0.49	1.83	0.4575	0.6190	25.8	0.60	200	25.3927	0.809
Vernon Erb Drive	48	MH26A	MH27A		0.000	0.000	4.50	0.0000	0.00	0.0000	0.00	0.0000	0.91	2.74	0.2418	0.2418	0.91	2.74	0.6850	0.9268	48.3	0.60	200	25.3927	0.809
Vernon Erb Drive	49	MH27A	MH28A		0.000	0.000	4.50	0.0000	0.00	0.0000	0.00	0.0000	0.95	3.69	0.3258	0.3258	0.95	3.69	0.9230	1.2488	73.0	0.60	200	25.3927	0.809
Vernon Erb Drive	50	MH28A	MH29A		0.000	0.000	4.50	0.0000	0.00	0.0000	0.00	0.0000	1.40	5.10	0.4497	0.4497	1.40	5.10	1.2740	1.7237	72.6	0.60	200	25.3927	0.809
Vernon Erb Drive	51	MH29A	MH30A		0.000	0.000	4.50	0.0000	0.00	0.0000	0.00	0.0000	1.40	6.50	0.5734	0.5734	1.40	6.50	1.6243	2.1976	43.3	0.60	200	25.3927	0.809
Vernon Erb Drive	52	MH30A	MH31A		0.000	0.000	4.50	0.0000	0.00	0.0000	0.00	0.0000	1.35	7.84	0.6921	0.6921	1.35	7.84	1.9605	2.6526	81.1	0.60	200	25.3927	0.809
Vernon Erb Drive	53	MH31A	MH32A		0.000	0.000	4.50	0.0000	0.00	0.0000	0.00	0.0000	1.36	9.20	0.8116	0.8116	1.36	9.20	2.2993	3.1109	78.2	0.60	200	25.3927	0.809
Vernon Erb Drive	54	MH32A	MH33A		0.000	0.000	4.50	0.0000	0.00	0.0000	0.00	0.0000	0.98	10.17	0.8979	0.8979	0.98	10.17	2.5435	3.4414	22.6	0.60	200	25.3927	0.809
Vernon Erb Drive	55	MH33A	MH34A		0.000	0.000	4.50	0.0000	0.00	0.0000	0.00	0.0000		10.17	0.8979	0.8979	0.05	10.22	2.5548	3.4526	26.9	0.60	200	25.3927	0.809
Vernon Erb Drive	56	MH34A	MH35A		0.000	0.000	4.50	0.0000	0.00	0.0000	0.00	0.0000	0.41	10.58	0.9338	0.9338	0.41	10.63	2.6565	3.5903	87.2	0.60	200	25.3927	0.809
Vernon Erb Drive	57	MH35A	MH36A		0.000	0.000	4.50	0.0000	0.00	0.0000	0.00	0.0000	0.62	11.20	0.9885	0.9885	0.62	11.25	2.8115	3.8000	90.0	0.60	200	25.3927	0.809
WEL SANITARY TRUNK																										
Howie Meeker Boulevard (WEL TRUNK)	**59**	**MH6A**	**MH7A**		**0.000**	**5.243**	**3.23**	**59.7058**	**0.00**	**0.0000**	**0.00**	**0.0000**	**0.62**	**25.34**	**2.2363**	**2.2363**	**0.62**	**104.40**	**26.0993**	**88.0414**	**47.2**	**0.35**	**450**	**168.5854**	**1.061**
Howie Meeker Boulevard (WEL TRUNK)	**60**	**MH7A**	**MH8A**		**0.000**	**5.243**	**3.23**	**59.7058**	**0.00**	**0.0000**	**0.00**	**0.0000**		**25.34**	**2.2363**	**2.2363**	**0.12**	**104.52**	**26.1300**	**88.0722**	**34.8**	**0.35**	**450**	**168.5854**	**1.061**
Howie Meeker Boulevard (WEL TRUNK)	**61**	**MH8A**	**MH9A**		**0.000**	**5.243**	**3.23**	**59.7058**	**0.00**	**0.0000**	**0.00**	**0.0000**	**1.91**	**27.25**	**2.4045**	**2.4045**	**1.91**	**106.43**	**26.6063**	**88.7165**	**34.3**	**0.35**	**450**	**168.5854**	**1.061**
Howie Meeker Boulevard (WEL TRUNK)	**62**	**MH9A**	**MH10A**		**0.000**	**5.243**	**3.23**	**59.7058**	**0.00**	**0.0000**	**0.00**	**0.0000**		**27.25**	**2.4045**	**2.4045**	**0.09**	**106.51**	**26.6283**	**88.7385**	**46.4**	**0.35**	**450**	**168.5854**	**1.061**
Howie Meeker Boulevard (WEL TRUNK)	**63**	**MH10A**	**MH11A**		**0.000**	**5.243**	**3.23**	**59.7058**	**0.00**	**0.0000**	**0.00**	**0.0000**	**0.52**	**27.77**	**2.4505**	**2.4505**	**0.52**	**107.04**	**26.7588**	**88.9151**	**31.0**	**0.35**	**450**	**168.5854**	**1.061**
Howie Meeker Boulevard (WEL TRUNK)	**64**	**MH11A**	**MH12A**		**0.000**	**5.243**	**3.23**	**59.7058**	**0.00**	**0.0000**	**0.00**	**0.0000**	**1.90**	**29.67**	**2.6185**	**2.6185**	**1.90**	**108.94**	**27.2345**	**89.5588**	**90.0**	**0.35**	**450**	**168.5854**	**1.061**
Howie Meeker Boulevard (WEL TRUNK)	**65**	**MH12A**	**MH13A**		**0.000**	**5.243**	**3.23**	**59.7058**	**0.00**	**0.0000**	**0.00**	**0.0000**	**3.47**	**33.14**	**2.9246**	**2.9246**	**3.47**	**112.41**	**28.1018**	**90.7322**	**90.0**	**0.35**	**450**	**168.5854**	**1.061**
Howie Meeker Boulevard (WEL TRUNK)	**66**	**MH13A**	**MH14A**		**0.000**	**5.243**	**3.23**	**59.7058**	**0.00**	**0.0000**	**0.00**	**0.0000**	**3.57**	**36.71**	**3.2394**	**3.2394**	**3.57**	**115.97**	**28.9935**	**91.9387**	**26.0**	**0.35**	**450**	**168.5854**	**1.061**
Howie Meeker Boulevard (WEL TRUNK)	**67**	**MH14A**	**MH15A**		**0.000**	**5.243**	**3.23**	**59.7058**	**0.00**	**0.0000**	**0.00**	**0.0000**		**36.71**	**3.2394**	**3.2394**	**0.07**	**116.04**	**29.0103**	**91.9555**	**37.0**	**0.35**	**450**	**168.5854**	**1.061**
Howie Meeker Boulevard (WEL TRUNK)	**68**	**MH15A**	**MH16A**		**0.000**	**5.243**	**3.23**	**59.7058**	**0.00**	**0.0000**	**0.00**	**0.0000**		**36.71**	**3.2394**	**3.2394**	**0.10**	**116.14**	**29.0340**	**91.9792**	**19.6**	**0.35**	**450**	**168.5854**	**1.061**
Vernon Erb Drive (WEL TRUNK)	**23, 69**	**MH16A**	**MH17A**		**0.000**	**5.243**	**3.23**	**59.7058**	**17.72**	**4.4300**	**0.00**	**0.0000**	**2.02**	**64.66**	**5.7065**	**10.1365**	**2.33**	**164.00**	**41.0000**	**110.8423**	**36.4**	**0.35**	**450**	**168.5854**	**1.061**
Vernon Erb Drive (WEL TRUNK)	**70**	**MH17A**	**MH18A**		**0.000**	**5.243**	**3.23**	**59.7058**	**17.72**	**4.4300**	**0.00**	**0.0000**		**64.66**	**5.7065**	**10.1365**	**0.06**	**164.06**	**41.0160**	**110.8583**	**22.4**	**0.35**	**450**	**168.5854**	**1.061**
Vernon Erb Drive (WEL TRUNK)	**71**	**MH18A**	**MH19A**		**0.000**	**5.243**	**3.23**	**59.7058**	**17.72**	**4.4300**	**0.00**	**0.0000**	**1.21**	**65.87**	**5.8133**	**10.2433**	**1.21**	**165.27**	**41.3185**	**111.2676**	**84.3**	**0.35**	**450**	**168.5854**	**1.061**
Vernon Erb Drive (WEL TRUNK)	**36, 72**	**MH19A**	**MH20A**		**0.000**	**5.243**	**3.23**	**59.7058**	**17.72**	**4.4300**	**0.00**	**0.0000**	**3.23**	**74.36**	**6.5618**	**10.9918**	**3.40**	**174.51**	**43.6273**	**114.3249**	**58.8**	**0.35**	**450**	**168.5854**	**1.061**
Vernon Erb Drive (WEL TRUNK)	**73**	**MH20A**	**MH21A**		**0.000**	**5.243**	**3.23**	**59.7058**	**17.72**	**4.4300**	**0.00**	**0.0000**	**1.00**	**75.36**	**6.6502**	**11.0802**	**1.00**	**175.51**	**43.8775**	**114.6635**	**29.6**	**0.35**	**450**	**168.5854**	**1.061**
Vernon Erb Drive (WEL TRUNK)	**74**	**MH21A**	**MH22A**		**0.000**	**5.243**	**3.23**	**59.7058**	**17.72**	**4.4300**	**0.00**	**0.0000**		**75.36**	**6.6502**	**11.0802**	**0.06**	**175.57**	**43.8923**	**114.6783**	**13.0**	**0.35**	**450**	**168.5854**	**1.061**
Vernon Erb Drive (WEL TRUNK)	**75**	**MH22A**	**MH36A**		**0.000**	**5.243**	**3.23**	**59.7058**	**17.72**	**4.4300**	**0.00**	**0.0000**	**0.52**	**75.88**	**6.6962**	**11.1262**	**0.52**	**176.09**	**44.0228**	**114.8548**	**69.0**	**0.35**	**450**	**168.5854**	**1.061**
Prop. SWMF Easement (WEL TRUNK)	**58, 76**	**MH36A**	**Ex. MH2A**		**0.000**	**5.243**	**3.23**	**59.7058**	**17.72**	**4.4300**	**0.00**	**0.0000**	**0.59**	**87.67**	**7.7366**	**12.1666**	**0.73**	**188.07**	**47.0163**	**118.8887**	**101.0**	**0.35**	**450**	**168.5854**	**1.061**

3) COMBINE NORTHERN & EASTERN REACHES AND CONTINUE DOWNSTREAM																							
Ex. East Easement		**Ex MH2A**	**Ex MH1A**		**0.000**	**5.243**	**3.23**	**59.7058**	**17.72**	**4.4300**	**0.00**	**0.0000**	**87.67**	**7.7366**	**12.1666**	**0.00**	**188.07**	**47.0163**	**118.8887**	**91.3**	**0.35**	**375**	**103.6740**	**0.939**
Ex. East Easement		**Ex MH1A**	**Ex MH-7A**		**0.000**	**5.243**	**3.23**	**59.7058**	**17.72**	**4.4300**	**0.00**	**0.0000**	**87.67**	**7.7366**	**12.1666**	**0.00**	**188.07**	**47.0163**	**118.8887**	**16.5**	**0.36**	**375**	**105.1447**	**0.952**
4) EXISTING WESTERN REACH SANITARY SEWER																							
Ex. West Easement	*77*	*Ex. MH-0A*	*Ex. MH-1A*	*7.69*	*0.461*	*0.461*	*3.99*	*6.5020*	*0.00*	*0.0000*	*0.00*	*0.0000*	*0.00*	*0.0000*	*0.0000*	*7.69*	*7.69*	*1.9225*	*8.4245*	*91.0*	*0.75*	*200*	*28.3899*	*0.904*
Ex. West Easement		*Ex. MH-1A*	*Ex. MH-2A*		*0.000*	*0.461*	*3.99*	*6.5020*	*0.00*	*0.0000*	*0.00*	*0.0000*	*0.00*	*0.0000*	*0.0000*	*0.00*	*7.69*	*1.9225*	*8.4245*	*71.4*	*0.78*	*200*	*28.9521*	*0.922*
Ex. West Easement		*Ex. MH-2A*	*Ex. MH-3A*		*0.000*	*0.461*	*3.99*	*6.5020*	*0.00*	*0.0000*	*0.00*	*0.0000*	*0.00*	*0.0000*	*0.0000*	*0.00*	*7.69*	*1.9225*	*8.4245*	*49.0*	*0.96*	*200*	*32.1195*	*1.023*
Ex. West Easement		*Ex. MH-3A*	*Ex. MH-4A*		*0.000*	*0.461*	*3.99*	*6.5020*	*0.00*	*0.0000*	*0.00*	*0.0000*	*0.00*	*0.0000*	*0.0000*	*0.00*	*7.69*	*1.9225*	*8.4245*	*55.7*	*0.68*	*200*	*27.0325*	*0.861*
Ex. West Easement		*Ex. MH-4A*	*Ex. MH-5A*		*0.000*	*0.461*	*3.99*	*6.5020*	*0.00*	*0.0000*	*0.00*	*0.0000*	*0.00*	*0.0000*	*0.0000*	*0.00*	*7.69*	*1.9225*	*8.4245*	*79.6*	*2.22*	*200*	*48.8438*	*1.556*
Ex. West Easement		*Ex. MH-5A*	*Ex. MH-6A*		*0.000*	*0.461*	*3.99*	*6.5020*	*0.00*	*0.0000*	*0.00*	*0.0000*	*0.00*	*0.0000*	*0.0000*	*0.00*	*7.69*	*1.9225*	*8.4245*	*78.6*	*2.00*	*200*	*46.3604*	*1.476*
Ex. West Easement		*Ex. MH-6A*	*Ex. MH-7A*		*0.000*	*0.461*	*3.99*	*6.5020*	*0.00*	*0.0000*	*0.00*	*0.0000*	*0.00*	*0.0000*	*0.0000*	*0.00*	*7.69*	*1.9225*	*8.4245*	*71.1*	*3.90*	*200*	*64.7388*	*2.062*
5) COMBINE 3 & 4 AND CONTINUE DOWNSTREAM																							
Hwy 7/8 Crossing		**Ex. MH-7A**	**Ex. MH17**		**0.000**	**5.705**	**3.19**	**64.2680**	**17.72**	**4.4300**	**0.00**	**0.0000**	**87.67**	**7.7366**	**12.1666**	**0.00**	**195.76**	**48.9388**	**125.3734**	**13.1**	**0.88**	**375**	**164.3907**	**1.489**
		Ex. MH17	**Ex. MH16**		**0.000**	**5.705**	**3.19**	**64.2680**	**17.72**	**4.4300**	**0.00**	**0.0000**	**87.67**	**7.7366**	**12.1666**	**0.00**	**195.76**	**48.9388**	**125.3734**	**50.0**	**0.54**	**375**	**128.7754**	**1.167**
7) COMBINE 5 & 6 AND CONTINUE DOWNSTREAM TO MORNINGSIDE WWPS																							
Existing Sanitary Trunk		*Ex. MH16*	*Ex. MH15*		*0.000*	*5.705*	*3.19*	*64.2680*	*17.72*	*4.4300*	*0.00*	*0.0000*	*87.67*	*7.7366*	*12.1666*	*0.00*	*195.76*	*48.9388*	*125.3734*	*98.3*	*0.34*	*450*	*166.1596*	*1.045*
		Ex. MH15	*Ex. MH14*		*0.000*	*5.705*	*3.19*	*64.2680*	*17.72*	*4.4300*	*0.00*	*0.0000*	*87.67*	*7.7366*	*12.1666*	*0.00*	*195.76*	*48.9388*	*125.3734*	*118.6*	*0.30*	*450*	*156.0798*	*0.982*
		Ex. MH14	*Ex. MH13*		*0.000*	*5.705*	*3.19*	*64.2680*	*17.72*	*4.4300*	*0.00*	*0.0000*	*87.67*	*7.7366*	*12.1666*	*0.00*	*195.76*	*48.9388*	*125.3734*	*102.5*	*0.31*	*450*	*158.6598*	*0.998*
		Ex. MH13	*Ex. MH12*		*0.000*	*5.705*	*3.19*	*64.2680*	*17.72*	*4.4300*	*0.00*	*0.0000*	*87.67*	*7.7366*	*12.1666*	*0.00*	*195.76*	*48.9388*	*125.3734*	*106.1*	*0.36*	*450*	*170.9768*	*1.076*
		Ex. MH12	*Ex. MH11*		*0.000*	*5.705*	*3.19*	*64.2680*	*17.72*	*4.4300*	*0.00*	*0.0000*	*87.67*	*7.7366*	*12.1666*	*0.00*	*195.76*	*48.9388*	*125.3734*	*65.7*	*0.42*	*450*	*184.6761*	*1.162*
		Ex. MH11	*Ex. MH10*		*0.000*	*5.705*	*3.19*	*64.2680*	*17.72*	*4.4300*	*0.00*	*0.0000*	*87.67*	*7.7366*	*12.1666*	*0.00*	*195.76*	*48.9388*	*125.3734*	*68.1*	*0.33*	*450*	*163.6979*	*1.030*
		Ex. MH10	*Ex. MH9*		*0.000*	*5.705*	*3.19*	*64.2680*	*17.72*	*4.4300*	*0.00*	*0.0000*	*87.67*	*7.7366*	*12.1666*	*0.00*	*195.76*	*48.9388*	*125.3734*	*55.3*	*0.33*	*450*	*163.6979*	*1.030*
		Ex. MH9	*Ex. MH8*		*0.000*	*5.705*	*3.19*	*64.2680*	*17.72*	*4.4300*	*0.00*	*0.0000*	*87.67*	*7.7366*	*12.1666*	*0.00*	*195.76*	*48.9388*	*125.3734*	*36.6*	*0.38*	*450*	*175.6620*	*1.105*
		Ex. MH8	*Ex. MH7*		*0.000*	*5.705*	*3.19*	*64.2680*	*17.72*	*4.4300*	*0.00*	*0.0000*	*87.67*	*7.7366*	*12.1666*	*0.00*	*195.76*	*48.9388*	*125.3734*	*52.3*	*0.46*	*450*	*193.2702*	*1.216*
		Ex. MH7	*Ex. MH6*		*0.000*	*5.705*	*3.19*	*64.2680*	*17.72*	*4.4300*	*0.00*	*0.0000*	*87.67*	*7.7366*	*12.1666*	*0.00*	*195.76*	*48.9388*	*125.3734*	*38.9*	*0.37*	*450*	*173.3353*	*1.090*
		Ex. MH6	*Ex. MH5*		*0.000*	*5.705*	*3.19*	*64.2680*	*17.72*	*4.4300*	*0.00*	*0.0000*	*87.67*	*7.7366*	*12.1666*	*0.00*	*195.76*	*48.9388*	*125.3734*	*32.5*	*0.71*	*450*	*240.1127*	*1.510*
		Ex. MH5	*Ex. MH4*		*0.000*	*5.705*	*3.19*	*64.2680*	*17.72*	*4.4300*	*0.00*	*0.0000*	*87.67*	*7.7366*	*12.1666*	*0.00*	*195.76*	*48.9388*	*125.3734*	*74.9*	*0.47*	*450*	*195.3597*	*1.229*
		Ex. MH4	*Ex. MH3*		*0.000*	*5.705*	*3.19*	*64.2680*	*17.72*	*4.4300*	*0.00*	*0.0000*	*87.67*	*7.7366*	*12.1666*	*0.00*	*195.76*	*48.9388*	*125.3734*	*54.0*	*0.48*	*450*	*197.4270*	*1.242*
		Ex. MH3	*Ex. MH2*		*0.000*	*5.705*	*3.19*	*64.2680*	*17.72*	*4.4300*	*0.00*	*0.0000*	*87.67*	*7.7366*	*12.1666*	*0.00*	*195.76*	*48.9388*	*125.3734*	*111.0*	*0.41*	*450*	*182.4643*	*1.148*
		Ex. MH2	*Ex. Stub*		*0.000*	*5.705*	*3.19*	*64.2680*	*17.72*	*4.4300*	*0.00*	*0.0000*	*87.67*	*7.7366*	*12.1666*	*0.00*	*195.76*	*48.9388*	*125.3734*	*41.0*	*0.34*	*450*	*166.1596*	*1.045*
		Ex. Stub	*Ex. MH1B*		*0.000*	*5.705*	*3.19*	*64.2680*	*17.72*	*4.4300*	*0.00*	*0.0000*	*87.67*	*7.7366*	*12.1666*	*0.00*	*195.76*	*48.9388*	*125.3734*	*21.4*	*0.40*	*450*	*180.2254*	*1.134*
		Ex. MH1B	*Ex. MH1C*		*0.000*	*5.705*	*3.19*	*64.2680*	*17.72*	*4.4300*	*0.00*	*0.0000*	*87.67*	*7.7366*	*12.1666*	*0.00*	*195.76*	*48.9388*	*125.3734*	*24.8*	*0.48*	*450*	*197.4270*	*1.242*

Lot 19 Concession South of Snyder's Road

Lot 20 Concession South of Snyder's Road

IVAN GINGERICH DRAIN
Ivan Gingerich Drain

CN RAILWAY

Canadian National Railway (CNR)

MTE

PROJ. NO.	35056-104
DATE	Feb.07/23
SCALE	1:1250
BY	Alex Cressman
CAD FILE	P:\P\35056\104\TEMP DWGS\AJC\ 35056-104-STM+SAN_DESIGN_2ND SUB.DWG

MW103-21
ELEV.=342.96
PZ.=344.13

MW103-22
ELEV.=345.36
PZ.=345.42

MW103-23
ELEV.=341.08
PZ.=342.16

MW203B-23
ELEV.=344.77
PZ.=345.72

MW203-23
ELEV.=345.73
PZ.=345.70

MW201-21
ELEV.=343.52
PZ.=344.38

MW102
ELEV.=340.15

MW110
ELEV.=340.04
PZ.=340.75

MW109
ELEV.=340.06
PZ.=340.92

MW104
ELEV.=344.95
PZ.=345.88

MPDT-22
ELEV.=340.97
PZ.=342.22

BH 1 ELEV.=342.20
BH 2 ELEV.=344.50
BH 3 ELEV.=344.50
BH 4 ELEV.=342.61
BH 5 ELEV.=341.78
BH 6 ELEV.=343.61
BH 7 ELEV.=341.57
BH 8 ELEV.=343.37
BH 9 ELEV.=343.24
BH 10 ELEV.=342.20
BH 11 ELEV.=346.37
BH 12 ELEV.=346.22

WETLAND BOUNDARY
15m WETLAND BUFFER
10m DRIPLINE BUFFER

Concession South of Snyder's Road
Concession North of Blearns Road

CHARLES YOUNG AVE

Appendix E

Proposed Water Distribution Analysis

Wilmot Woods Subdivision

Preliminary Water Distribution Report

Project Location:
New Hamburg

Prepared for:
Wilmot Woods Developments Inc.
310 Fairway Road South
Kitchener ON N2C 2R6

Prepared by:
MTE Consultants Inc.
520 Bingemans Centre Drive
Kitchener, ON N2B 3X9

April 2022
Revised: March 8, 2023

MTE File No.: 35056-104

Engineers, Scientists, Surveyors.

Contents

Figures

Tables

Appendices

1.0 Introduction

1.1 Overview

MTE Consultants Inc. (MTE) was retained by Wilmot Woods Developments Inc. to prepare the following Water Distribution Analysis in support of a Draft Plan of Subdivision application and zoning by-law amendment for a proposed residential subdivision in the Township of Wilmot.

Zoning by-law amendment and Plan of Subdivision applications were formally submitted to the Township of Wilmot and the Region of Waterloo in April 2022. The subdivision application has been assigned Subdivision File 30T-22601. This report addresses comments received to date from all agencies in response to the April 2022 application.

The Wilmot Woods subdivision, herein referred to as the 'subject lands', are located in the Town of New Hamburg. The lands are generally bounded by Waterloo Street to the north, the Ivan Gingrich Municipal Drain (IGMD) and agricultural lands to the east, the Canadian National (CN) railway corridor to the south, and the existing Forest Glen residential subdivision to the west. Refer to the Location Plan in **Figure 1.1**.

The subject lands comprise a total area of approximately 37.19ha. Development plans include the construction of street-oriented residential units, multiple residential blocks, a park block, open space block, and stormwater management facilities with the required roads and municipal services (storm, sanitary, and water). Portions of the lands are undevelopable, as they are within the floodplain limits of the IGMD. A Draft Plan of Subdivision (dated February 3, 2023) for the proposed development has been prepared by MHBC Planning and forms the basis of this report.

The purpose of this Preliminary Water Distribution Analysis is to confirm that adequate pressure and water supply is available to support the proposed development through connections to the existing water distribution network. This analysis will 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), the Township of Wilmot (Township), and the Region of Waterloo (Region).

As requested by the Township, this preliminary water distribution analysis includes a supplemental ultimate development scenario where the future Cachet residential and industrial lands, east of the subject lands, are modelled in addition to the proposed development. This analysis was performed to confirm whether the current New Hamburg water supply system has sufficient capacity and pressure to adequately service the proposed and future developments.

1.2 Background Information

The subject site lies along the boundary of the New Hamburg Pressure Zone and the Baden Pressure Zone. The current New Hamburg/Baden Pressure Zone interface is defined by a pressure reducing valve (PRV) at Snyder's Road West and Nafziger Road. The current hydraulic grade line (HGL) of the New Hamburg Pressure Zone is approximately 390.80m, with a serviceability range of approximately 334.80m to 354.80m.

The New Hamburg system is fed from the reservoir located at the New Hamburg Water Treatment Plant (NHWTP), located on the south side of Fairview Street - approximately 0.2km south of the intersection of Bleams Road and Fairview Street.

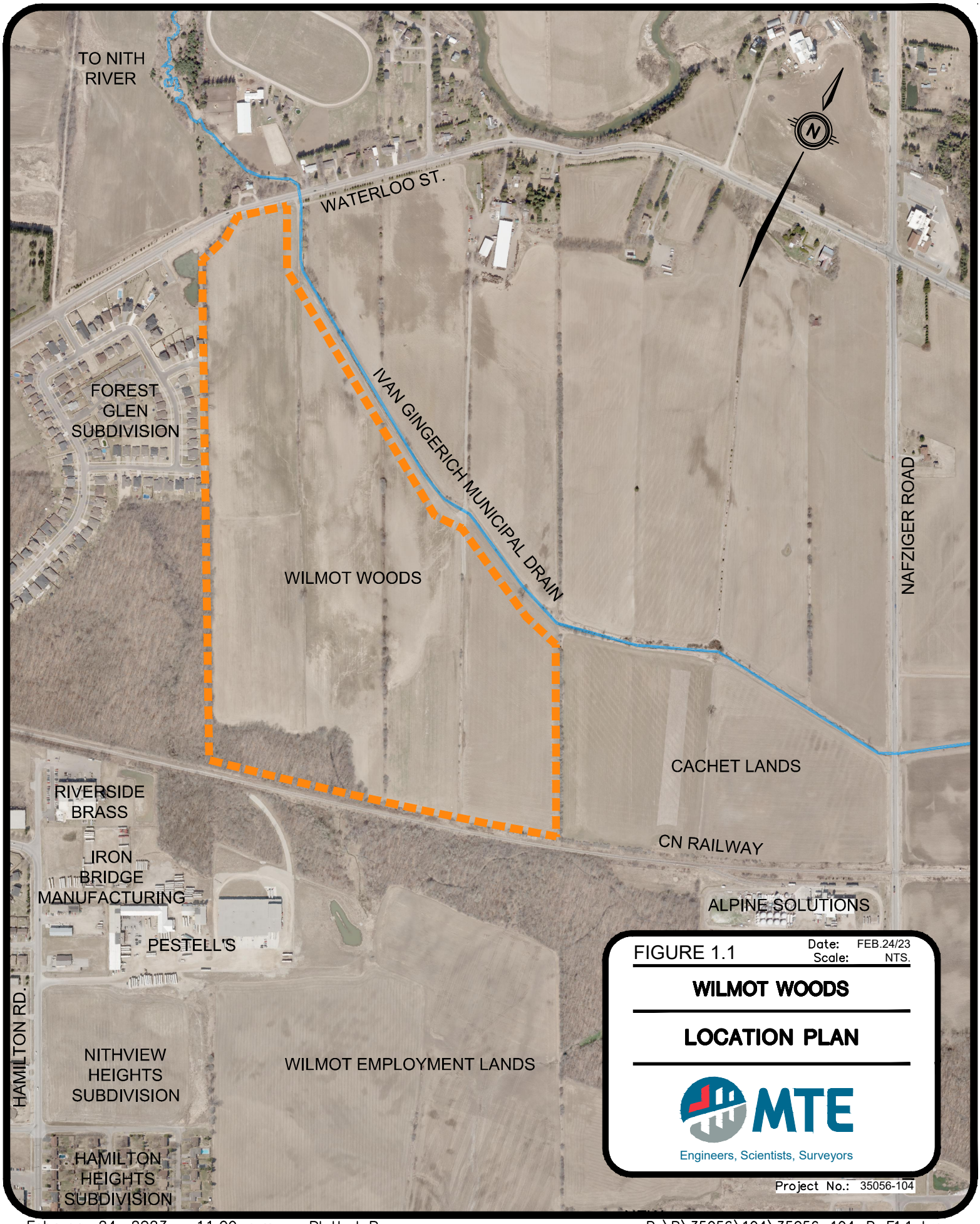


FIGURE 1.1

Date: FEB.24/23
Scale: NTS.

WILMOT WOODS

LOCATION PLAN

MTE
Engineers, Scientists, Surveyors

Project No.: 35056-104

February 24, 2023 — 11:09 a.m. — Plotted By: acressman

P:\P\35056\104\35056-104-P-F1.1.dwg

The HGL information has specified that any proposed centreline of road elevation below 334.80m within the New Hamburg Pressure Zone may require services to be connected to individual pressure reducing valves (PRVs), as specified in section B.2.4.7 of the *Region of Waterloo and Area Municipalities Design Guidelines and Supplemental Specifications for Municipal Services (DGSSMS) (RMOW, 2022)*. The proposed centreline of road grades range from approximately 342.00m to 347.00m, so no individual PRVs are anticipated.

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 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 Wilmot Woods development and the future adjacent Cachet lands. The study area consists of single-family residential blocks, street-fronting townhome blocks, multiple residential blocks, and industrial blocks.

Demands for the subject lands are based on a proposed Draft Plan provided by MHBC (dated February 3, 2023), which includes a maximum of 507 street-fronting townhomes and single-family dwellings, and 246 multiple residential units. Demands for the future Cachet development east of the subject lands are based on conceptual development plans which show approximately 11.75ha and 26.52ha of industrial and residential development lands, respectively. The Cachet lands residential populations are based on 60 people per hectare.

Two development scenarios were developed for this analysis:

- Interim Scenario: Wilmot Woods development
- Ultimate Scenario: Wilmot Woods development + Future Cachet development

Refer to **Figures 2.1 and 2.2** for the proposed water distribution network under the interim and ultimate scenarios, respectively.

2.1.1 Network Connections

Water supply for the proposed Wilmot Woods Subdivision has been modelled with three external connection points to the existing municipal water distribution system:

- 300mm diameter – Street Two and Waterloo Street
- 150mm diameter – Charles Young Avenue
- 150mm diameter – Ingold Avenue

The Cachet lands are conceptually proposed to connect to the subject lands' Street Eight 300mm diameter watermain stub and be lopped internally back to the existing 300mm diameter watermain on Waterloo Street to the north.

2.1.2 System Pressure

The system pressure information for this analysis is based on the Region's nodal information provided by Mr. Kevin Dolishny on April 23, 2021 (**Appendix A**). The nodes used in the Region's model are described below:

- J172 – Waterloo Street and Site Boundary (Street Two)
- JCT_00033 – Ingold Avenue and Site Boundary

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. **Tables 2.1 and 2.2** provide a summary of the hydraulic grade lines used for the nodes in the analysis.

LEGEND

- SUBJECT LANDS
- Ex. WTM — EXISTING WATERMAIN
- 150mmØ WTM. — PROPOSED 150mmØ WATERMAIN
- 200mmØ WTM. — PROPOSED 200mmØ WATERMAIN
- FUT. 300mmØ WTM. — FUTURE 300mmØ WATERMAIN (BY OTHERS)
- 300mmØ WTM. — PROPOSED 300mmØ WATERMAIN
- WATERMAIN CONTRIBUTING AREA
- J_172 — REGION OF WATERLOO PRESSURE NODE
- J-18 — PROPOSED NODE

N

FUT. 300mmØ WTM.

300mmØ WTM. STUB

STREET NINE

J-1 J-2 J-3 J-4 J-5 J-6 J-7 J-8 J-9 J-10 J-11 J-12 J-13 J-14 J-15 J-16 J-17 J-18 J-19 J-20 J-201 J-202 J-203

200mmØ WTM.

150mmØ WTM.

STREET EIGHT

STREET TEN

STREET SIX

STREET SEVEN

300mmØ WTM.

150mmØ WTM. STUB

STREET TWO

STREET THREE

STREET FOUR

STREET FIVE

STREET ONE

Blk. 6 Trail 0.05 ha
Blk. 15 0.3m Reserve 0.001 ha
Blk. 13 Trail 0.18 ha
Blk. 10 0.09 ha
Blk. 9 0.31 ha
Blk. 8 0.27 ha
Blk. 7 0.31 ha
Blk. 5 0.35 ha
Blk. 4 0.34 ha
Blk. 23 Open Space 0.92 ha
Blk. 22 Park 1.00 ha
Blk. 20 Multiple Residential 0.98 ha
Blk. 21 Multiple Residential 0.82 ha
Blk. 2 0.52 ha
Blk. 3 0.56 ha
Blk. 4 0.66 ha
Blk. 11 0.70 ha
Blk. 2 0.16 ha
Blk. 3 0.21 ha
Blk. 28 SWM Facility 1.82 ha
Blk. 4 0.29 ha
Blk. 6 0.13 ha
Blk. 7 0.19 ha
Blk. 8 0.19 ha
Blk. 16 0.25 ha
Blk. 12 0.51 ha
Blk. 10 0.19 ha
Blk. 9 0.19 ha
Blk. 3 0.13 ha
Blk. 2 0.14 ha
Blk. 13 0.51 ha
Blk. 11 0.31 ha
Blk. 17 0.19 ha
Blk. 14 0.51 ha
Blk. 1 0.19 ha
Blk. 3 0.32 ha
Blk. 4 0.32 ha
Blk. 5 0.19 ha
Blk. 1 0.24 ha
Blk. 27 SWM Facility 1.17 ha
Blk. 18 0.18 ha
Blk. 19 0.49 ha
Blk. 17 Walkway 0.02 ha
Blk. 8 Open Space 2.86 ha
Blk. 9 Walkway 0.02 ha
Blk. 24 Open Space 3.27 ha
Blk.37 Road Widening 0.03 ha
Blk. 25 Open Space 0.73 ha

CN RAILWAY

30m WETLAND BUFFER
WETLAND BOUNDARY
15m WETLAND BUFFER
10m DRIPLINE BUFFER

WATERLOO STREET

172

J_00033

EX. SWM FACILITY

CHARLES YOUNG AVE

INGOLD AVE

Ex. 300mmØ WTM.
Ex. 150mmØ WTM.

FIGURE 2.1 — WATER DISTRIBUTION PLAN (INTERIM)

Date: JAN.28/23
Scale: 1:3000

MTE
Engineers, Scientists, Surveyors

Project No.: 35056-104

March 2, 2023 — 1:22 p.m. — Plotted By: ABarakzay

P:\P\35056\104\35056-104-P-F5.3 (WTM).dwg

LEGEND

- SUBJECT LANDS
- Ex. WTM — EXISTING WATERMAIN
- 150mmØ WTM. — PROPOSED 150mmø WATERMAIN
- 200mmØ WTM. — PROPOSED 200mmø WATERMAIN
- 300mmØ WTM. — PROPOSED 300mmø WATERMAIN
- FUT. 300mmØ WTM. — FUTURE 300mmø WATERMAIN (BY OTHERS)
- WATERMAIN CONTRIBUTING AREA
- PROPOSED HYDRANT
- J_172 — REGION OF WATERLOO PRESSURE NODE
- J-18 — PROPOSED NODE
- J-11 — FUTURE NODE

FUTURE CACHET RESIDENTIAL LANDS (26.52ha @ 60PPH)

FUTURE CACHET INDUSTRIAL LANDS (11.75ha)

J-24 — FUT. 300mmØ WTM. — J-23 — FUT. 300mmØ WTM. — FUT. 300mmØ WTM. — J-22

FUT. 300mmØ WTM.

Ex. 300mmØ WTM

300mmØ WTM. STUB

STREET NINE

J-2 — 200mmØ WTM. — J-3

J-1 — J-4

J-5 — J-6 — J-7 — J-8

STREET SIX — STREET SEVEN — STREET EIGHT — STREET TEN

150mmØ WTM. — 200mmØ WTM. — 300mmØ WTM.

J-201 — J-10 STREET TWO — J-12 — J-13

J-9 — J-202 — J-11

J-203 — J-14 — J-15 — J-16 — J-17

STREET THREE — STREET FOUR — STREET FIVE — STREET ONE

J-18 — J-19 — J-20

STREET ONE

J_172 — WATERLOO STREET — 300mmØ WTM — J_00033

EX. SWM FACILITY

CHARLES STONE AVE

INGOLD AVE

Ex. 150mmØ WTM

CN RAILWAY

30m WETLAND BUFFER

WETLAND BOUNDARY

FIGURE 2.2 — Date: JAN.27/22 — Scale: 1:5000

WATER DISTRIBUTION PLAN (ULTIMATE)

MTE

Engineers, Scientists, Surveyors

Project No.: 35056-104

March 3, 2023 — 11:50 a.m. — Plotted By: ACressman

P:\P\35056\104\35056-104-P-F2.2 (ULTIMATE WTM).dwg

Table 2.1 – System Pressures for J172

Demand Scenario	Discharge (L/s)	HGL (m)	Head (m)
Initial	0.00	390.50	51.50
Minimum Hour	0.00	390.47	51.47
Average Day	0.00	390.21	51.21
Maximum Day	0.00	389.76	50.76
Peak Hour	0.00	386.33	47.33
Max Day + 20.0L/s Fire Flow	20.00	389.60	50.60
Max Day + 60.0L/s Fire Flow	60.00	387.60	48.60
Max Day + 100.0L/s Fire Flow	100.00	383.50	44.50
Max Day + 140.0L/s Fire Flow	140.00	377.90	38.90
Max Day + 180.0L/s Fire Flow	180.00	371.30	32.30
Max Day + 220.0L/s Fire Flow	220.00	363.50	24.50
Max Day + 222.9L/s Fire Flow	222.90	362.90	23.90

Table 2.2 – System Pressures for JCT_00033

Demand Scenario	Discharge (L/s)	HGL (m)	Head (m)
Initial	0.0	390.50	47.50
Minimum Hour	0.01	390.47	47.47
Average Day	0.01	390.21	47.21
Maximum Day	0.01	389.76	46.76
Peak Hour	0.01	386.32	43.32
Max Day + 20.0L/s Fire Flow	20.01	389.50	46.50
Max Day + 60.0L/s Fire Flow	60.01	387.50	44.50
Max Day + 100.0L/s Fire Flow	100.01	383.30	40.30
Max Day + 140.0L/s Fire Flow	140.01	377.50	34.50
Max Day + 180.0L/s Fire Flow	180.01	370.60	27.60
Max Day + 220.0L/s Fire Flow	220.01	362.60	19.60
Max Day + 221.4L/s Fire Flow	221.41	362.30	19.30

2.2 Design Criteria

The water network for the analysis was developed by assigning physical parameters to each node and pipe within the proposed interim and 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) and 2.44 persons per unit (high density), as specified in the Region's *2022 Water and Wastewater Monitoring Report* (Region, 2022). These densities are listed below in **Table 2.3**.

Table 2.3 – Population Densities

Structure Type	PPU
Single, detached	3.25
Townhouse	2.44

The Draft Plan of Subdivision for the subject lands, was used to determine the number of residential and multi-residential units corresponding to each node in the model. The maximum unit counts were used to show a worst-case scenario.

The total unit count and appropriate densities listed above were used to estimate a combined maximum population of 2,063 people under the interim scenario. Based on the 60 people per hectare for the Cachet residential lands, the additional population is estimated to be 1,591; for a total ultimate scenario population of 3,654 people. Refer to the Demand Calculations in **Appendix B** for more details regarding the unit counts and population estimate.

2.2.2 System Demands

System demands for the proposed residential development were based on a water usage rate 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 future Cachet lands, the same residential water usage rate was used, and the total residential demand was represented by one node. System demands for the industrial lands were determined using the average water usage rate per the *Design Guidelines for Drinking-Water Systems (MOE, 2008)*. The total industrial development area was multiplied by $45m^3/d/ha$, then converted to L/s, and applied at one node. The usage rates and demand calculations for each node are provided in **Appendix B.**

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 2,001-3,000 for the interim scenario and 3,001-10,000 for the ultimate scenario. **Table 2.4** summarizes the peaking factors used based on the population estimates from the combined development plans.

Table 2.4 – Peaking Factors

Demand Scenario	2,001-3,000	3,001-10,000
Average Day	1.0	1.0
Maximum Day	2.25	2.00
Peak Hour	3.38	3.00
Minimum Hour	0.45	0.50

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)

Specific details are not currently available for the proposed multi-residential blocks within the subject lands. As such, the fire flow values should be confirmed when the information becomes available. At this time, a fire flow value of 133L/s was used for the multi-residential blocks.

Specific details are not available for the adjacent Cachet lands. For the purpose of this analysis, a fire flow value of 133L/s was used for the residential lands and 200L/s was used for the industrial lands. It should be noted that fire flow demand can vary significantly depending on the proposed industrial use. As such, these fire flow value should be confirmed when information becomes 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 2.5**. A value of 150 for the PVC pipes was used in this analysis. A value of 130 was used for the existing ductile iron watermain on Waterloo Street under the ultimate scenario.

Table 2.5 – 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 the purpose of this preliminary analysis, a conservative K-value of 1.0 was used for all proposed pipes. Minor losses were calculated for the two existing watermains on Waterloo Street and Laschinger Boulevard. Refer to **Appendix B** for the minor loss calculations.

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 2.6**.

Table 2.6 – DGSSMS Pressure Guidelines

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

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 for the interim and ultimate build-out. **Appendix C** provides the proposed network and a series of tables summarizing the output results of the WaterCAD analysis for both build-out scenarios. **Table 3.1** and **Table 3.2** provide a summary of the model results for the scenarios analyzed, identifying the system pressures for each demand scenario, as well as the maximum pipe velocities for the fire flow scenarios.

3.1 Daily Demand Scenarios

As shown in **Table 3.1** and **Table 3.2**, the proposed water distribution system will be able to adequately provide the required daily water demands within the *DGSSMS* recommended minimum and maximum pressure range guidelines of 350kPa to 550kPa for the average and maximum day demand scenarios, and 275kPa to 700kPa for the minimum and peak hour demand scenarios.

Based on these results, the implementation of pressure reducing valves (PRVs) is not required within the subject lands.

Watermains were sized to be 150mm, 200mm, and 300mm 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 mostly found in the service stubs used to model flow into the multiple residential blocks. 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.

3.2 Fire Flow Limitations (Cachet Industrial Lands)

Specific details for the adjacent Cachet industrial lands are not available, thus detailed *FUS* fire flow calculations to confirm the assumed 200L/s cannot be performed. It should be noted that the modelled nodes provided by the Region only provide fire flows up to approximately 221L/s. Therefore, the existing water distribution system can only provide flows up to this limit for the Cachet industrial lands. Should the Cachet demands exceed the capacity of the New Hamburg Pressure Zone, the option to service the industrial lands through the Baden Pressure Zone (existing 300mm diameter watermain along Nafziger Road) should be explored. Based on correspondence with thew Region, the Baden system can provide flows upwards of 475L/s along Nafziger Road.

Table 3.1 – Modelling Results - Interim Scenario

Node	Elevation (m)	Pressure (kPa)				Maximum Day + Fire Flow				
		Average Day	Maximum Day	Minimum Hour	Peak Hour	Fire Flow Required (L/s)	Available Fire Flow (L/s)	Residual Pressure (kPa)	Velocity of Max Pipe (m/s)	Pipe with Max Velocity
J-1	346.30	424.0	423.5	424.1	422.9	100.00	193.69	140.1	4.94	P-1
J-2	345.50	431.8	431.4	431.9	430.7	133.00	221.40	178.0	4.19	P-29
J-3	346.00	426.9	426.5	427.0	425.8	133.00	215.39	140.0	4.08	P-29
J-4	346.00	426.9	426.5	427.0	425.8	133.00	198.50	140.0	3.78	P-29
J-5	345.50	431.8	431.4	431.9	430.7	133.00	164.04	140.0	4.82	P-10
J-6	345.00	436.7	436.3	436.8	435.6	100.00	170.58	140.0	4.90	P-11
J-7	344.80	438.6	438.2	438.8	437.5	133.00	221.40	185.6	4.19	P-29
J-8	345.00	436.7	436.3	436.8	435.6	133.00	220.12	140.0	4.24	P-9
J-9	343.70	449.4	449.0	449.5	448.4	133.00	221.40	264.3	3.95	P-29
J-10	344.00	446.5	446.1	446.6	445.5	133.00	221.40	252.3	4.04	P-29
J-11	344.75	439.1	438.7	439.2	438.1	133.00	221.40	234.3	4.16	P-29
J-12	344.25	444.0	443.6	444.1	443.0	133.00	221.40	222.8	4.19	P-29
J-13	344.00	446.5	446.1	446.6	445.4	133.00	221.40	211.3	4.19	P-29
J-14	343.10	455.3	454.9	455.4	454.3	133.00	221.40	186.0	4.86	P-23
J-15	345.10	435.7	435.3	435.8	434.7	133.00	221.40	151.6	4.75	P-19
J-16	344.50	441.6	441.2	441.7	440.5	100.00	190.72	140.0	***6.05***	P-20
J-17	344.50	441.6	441.2	441.7	440.5	100.00	180.04	140.0	***6.11***	P-21
J-18	342.70	459.2	458.9	459.3	458.3	133.00	221.40	239.2	***6.21***	P-29
J-19	345.75	429.4	428.9	429.5	428.3	100.00	219.68	140.0	4.62	P-29
J-20	345.30	433.8	433.3	433.9	432.7	100.00	206.97	140.1	4.98	P-27
J-21	341.50	471.0	470.7	471.1	470.2	100.00	221.40	297.2	3.34	P-29
J-201	345.00	436.7	436.3	436.8	435.7	133.00	169.92	140.0	***9.62***	P-201
J-202	345.00	436.7	436.3	436.8	435.6	133.00	160.32	140.0	***9.07***	P-202
J-203	344.30	443.5	443.1	443.6	442.5	133.00	147.73	140.0	***8.36***	P-203

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

Table 3.2 – Modelling Results - Ultimate Scenario

Node	Elevation (m)	Pressure (kPa)				Maximum Day + Fire Flow				
		Average Day	Maximum Day	Minimum Hour	Peak Hour	Fire Flow Required (L/s)	Available Fire Flow (L/s)	Residual Pressure (kPa)	Velocity of Max Pipe (m/s)	Pipe with Max Velocity
J-1	346.30	423.1	420.5	423.9	416.5	100.00	200.73	140.0	***5.25***	P-1
J-2	345.50	430.9	428.3	431.7	424.1	133.00	221.40	190.3	3.91	P-29
J-3	346.00	426.0	423.4	426.8	419.2	133.00	221.40	171.9	4.22	P-2
J-4	346.00	426.0	423.4	426.8	419.3	133.00	213.95	140.0	3.80	P-29
J-5	345.50	431.0	428.4	431.7	424.5	133.00	165.74	140.0	4.84	P-10
J-6	345.00	435.9	433.3	436.6	429.3	100.00	173.55	140.0	4.97	P-11
J-7	344.80	437.8	435.2	438.5	431.1	133.00	221.40	194.6	3.93	P-29
J-8	345.00	435.8	433.2	436.6	429.1	133.00	221.40	181.6	4.23	P-9
J-9	343.70	448.7	446.4	449.3	442.8	133.00	221.40	219.8	3.89	P-29
J-10	344.00	445.7	443.4	446.4	439.7	133.00	221.40	215.9	3.94	P-29
J-11	344.75	438.4	435.9	439.0	432.1	133.00	221.40	210.0	3.99	P-29
J-12	344.25	443.2	440.7	443.9	436.8	133.00	221.40	206.1	3.99	P-29
J-13	344.00	445.7	443.1	446.4	439.2	133.00	221.40	202.7	3.97	P-29
J-14	343.10	454.6	452.3	455.2	448.8	133.00	221.40	183.8	4.87	P-23
J-15	345.10	435.0	432.6	435.6	428.9	133.00	221.40	156.4	4.82	P-19
J-16	344.50	440.8	438.3	441.5	434.4	100.00	194.10	140.0	***6.18***	P-20
J-17	344.50	440.8	438.2	441.5	434.3	100.00	183.32	140.0	***6.26***	P-21
J-18	342.70	458.6	456.7	459.1	453.7	133.00	221.40	235.2	***6.16***	P-29
J-19	345.75	428.6	426.2	429.3	422.5	100.00	221.40	140.9	4.64	P-24
J-20	345.30	433.0	430.5	433.7	426.6	100.00	210.86	140.0	4.98	P-27
J-21	341.50	470.3	468.2	470.9	465.1	100.00	221.40	229.6	3.52	P-29
J-201	345.00	436.0	433.6	436.6	430.1	133.00	167.91	140.0	***9.50***	P-201
J-202	345.00	435.9	433.6	436.6	429.9	133.00	159.23	140.0	***9.01***	P-202
J-203	344.30	442.8	440.5	443.5	437.0	133.00	146.11	140.0	***8.27***	P-203
J-22	348.50	401.5	398.7	402.3	394.4	200.00	221.40	191.3	3.65	P-29
J-23	352.00	367.3	364.5	368.1	360.2	133.00	221.40	151.3	3.58	P-29
J-24	342.00	423.1	420.5	423.9	416.5	100.00	200.73	140.0	***5.25***	P-1

**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 connections to the existing 300mm diameter watermain along Waterloo Street, existing 150mm diameter watermain along Charles Young Avenue, and the existing 150mm diameter watermain along Ingold Avenue will adequately service the proposed water distribution network for the Wilmot Woods Subdivision.
- An additional 300mm diameter looped connection between the existing 300mm diameter watermain on Waterloo Street and the proposed 300mm diameter watermain along Street Eight will adequately provide capacity for the future Cachet lands and the Wilmot Woods Subdivision up to a maximum available flow of approximately 221L/s.
- 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.
- The installation of pressure reducing valves is not required within the subject lands.
- The pipe sizing for the development is to be 150mm, 200mm, and 300mm diameter. Pipe velocities were less than the DGSSMS maximum recommended 5.0m/s for most pipes under the fire flow conditions. However, where velocities did exceed the recommendation, 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 MOE pressure of 140kPa within the subject lands.

All of which is respectfully submitted,

MTE Consultants Inc.

Alex Cressman, P.Eng.
Design Engineer
519-743-6500 ext. 1279
acressman@mte85.com

Garett Korber, P.Eng.
Design Engineer
519-743-6500 ext. 1292
gkorber@mte85.com

AJC:GMK:sgd

\\mte85.local\mte\Proj_Mgmt\35056\104\02 - Reports\MTE Reports\Water Distribution\2023-03\35056-104_rpt_Water Distribution_2023-03_08.docx

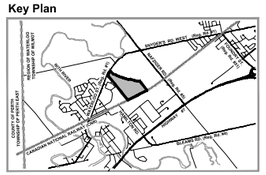
Appendix A

Draft Plan of Subdivision (Reduced)

DRAFT PLAN OF SUBDIVISION

Legal Description
PART OF LOT 20, CONCESSION SOUTH OF SNYDER'S ROAD
TOWNSHIP OF WILMOT
REGIONAL MUNICIPALITY OF WATERLOO

Key Plan



Subject Lands

SCALE: NTS
Source: SLRN, Region of Waterloo

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

DATE: January 12, 2022 — Adam Belsky
Adam Belsky, Wilmot Woods Developments Inc.

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: JAN. 14, 2022
Trevor D.A. McNeil, OLS (MTE OLS LTD.)

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, STORMWATER MANAGEMENT, PARK, OPEN SPACE
E. AS SHOWN — F. AS SHOWN — G. AS SHOWN
H. MUNICIPAL WATER SUPPLY — I. SANDY LOAM/CLAY LOAM — J. AS SHOWN
K. ALL SERVICES AS REQUIRED — L. AS SHOWN

Notes
1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE SHOWN.
2. BOUNDARY INFORMATION AND TOPOGRAPHICAL BASE INFORMATION PROVIDED BY MTE, MAY 31, 2021
3. ADJACENT PARCEL FABRIC IS APPROXIMATE.
4. LOTS/BLOCKS ON THE PLAN ARE RESIDENTIAL UNLESS OTHERWISE LISTED

■ ■ ■ DENOTES STAGE LIMITS
19/25 MINIMUM/MAXIMUM LOT YIELD PER BLOCK

Rev. No.	Date	Issued / Revision	By
2.	Feb.3, 2023	For Resubmission to Township/Region;	DGS
1.	Sept. 30, 2021	For pre-consultation meeting submission;	DGS

Area Schedule — 30T-_____

	Stage 1		
Description	Lots/Blocks	Units (min/max)*	Area (ha)
Residential*	1-18	135/196	4.81
Multiple Residential	19-21	186/246	2.83
Park	22		1.00
Open Space	23-26		5.30
Stormwater Management	27,28		2.99
Service Corridor	29		0.22
Walkway	30		0.02
0.3m Reserve	31-36		0.01
Road Widening	37		0.03
Roads			4.27
Total	37	321/442	21.48

*Blks. 2,3,4,5,12,16 [street towns (5.5-7m)]
Blks. 6-11,17 [street towns (6m) and small single detached lots (9m)]
Blk. 1,13,14 [small single detached lots (9-12m)]
Blk. 15,18 [large single detached lots (9-13.76m)]
Blks. 19,20,21 [from Concept Plans (Stacked Towns)]

	Stage 2		
Description	Lots/Blocks	Units (min/max)*	Area (ha)
*Residential	1-5	66/96	2.73
Trail	6		0.05
0.3m Reserve	7		0.001
Roads			1.00
Total	7	66/96	3.78

*Blk. 1 [street towns (6m) and small single detached lots (9m)]
Blks. 2,3,4,5 [small single detached lots (9m-12m)]

	Stage 3		
Description	Lots/Blocks	Units (min/max)*	Area (ha)
*Residential	1-7	56/81	2.48
Open Space	8		2.86
Walkway	9		0.02
Trail			
0.3m Reserve			
Roads			0.84
Total	9	56/81	6.20

*Part of Blk. 6 [street towns (6m) and small single detached lots (9m)]
Blks. 1,2,3,4,5 [small single detached lots (9m-12m)]
Blk. 6,7 [large single detached lots (9-13.76m)]

	Stage 4		
Lots/Blocks	Units (min/max)*	Area (ha)	
1-11	80/134	3.49	
12-14		0.42	
15		0.001	
		1.82	
15	80/134	5.73	

*Part of Blk. 1, Blks. 3,4,5,6,7,8 [street towns (6m) and small single detached lots (9m)]
Blks. 2,9,10,11 [small single detached lots (9m-12m)]
Blk. 1 [large single detached lots (9-13.76m)]

	Total		
Description	Lots/Blocks	Units (min/max)	Area (ha)
Residential	41	337/507	13.51
Multiple Residential	3	186/246	2.83
Park	1		1.00
Open Space	5		8.16
Stormwater Management	2		2.99
Trail	4		0.47
Walkway	2		0.04
Service Corridor	1		0.22
0.3m Reserve	8		0.01
Road Widening	1		0.03
Roads			7.93
Total	68	523/753	37.19

MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE
200-540 BINGEMANS CENTRE DR. KITCHENER, ON. N2B 3X9 | P: 519.576.3650 F: 519.576.0121 | WWW.MHBCPLAN.COM

Approval Stamp

Date: February 3, 2023
File No.: 2123A
Plan Scale: 1:2,000 (24x36)
Drawn By: D.G.S.
Checked By: P.B.

Project: Wilmot Woods

Applicant
Wilmot Woods Developments Inc.
310 Fairway Rd. S
P.O. Box 45016
Kitchener, ON. N2C 2R6
P: 519.570.2137

north

File Name: DRAFT PLAN
Dwg No.: 1 of 1

Scale Bar
0 10 25 50 100m

K:\2123A-NH Properties-New Hamburg\DP\Draft Plan February3 2023.dwg

Appendix B

Region of Waterloo Modelling Simulation Results

Region of Waterloo

TRANSPORTATION AND
ENVIRONMENTAL SERVICES
Water Services

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

Charles Carre, P. Eng.
MTE Consultants Inc.
520 Bingemans Center Drive
Kitchener, ON N2B 3X9
t. 519-743-6500 x1232
e. CCarre@mte85.com

Date: April 23, 2021
File #: E18-10/KI

Dear: Charles

Re: Pfenning Farm Water Modelling Request

Please find the results of the modeling simulations for boundary conditions requested on March 1, 2021. The results include a figure showing the location of the nodes from the Region's model.

As requested, the Region completed two modelling scenarios using average day and maximum day demands of 3.7 and 9.3 L/s, respectively, applied to the internal junction J174. Table 1 below summarized the model junction information and fire flow analysis results.

Table 1 – Model Junction Information and Results

Scenario	Pressure Zone	Node	Elevation	Location	Fire Flow Results	
					Design Flow (L/s)	Design Flow (L/s)
1	New Hamburg	J172	339.0	Waterloo St & Site Boundary	222.9	23.9
		JCT_00033	343.0	Ingold Ave & Site Boundary	221.4	19.3
2	Baden	J176	340.6	Internal Network	318.1	14.0

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.

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

If you have any questions, please contact me.

Kevin Dolishny P.Eng.
Senior Engineer, Water Services
c. 226.751.4551
kdolishny@regionofwaterloo.ca

cc Cody Scott, RMOW

J172 **Average Day 24 Hour Simulation**

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	0.00	387.32	48.32
01:00 hrs	0.00	387.24	48.24
02:00 hrs	0.00	387.22	48.22
03:00 hrs	0.00	387.22	48.22
04:00 hrs	0.00	387.04	48.04
05:00 hrs	0.00	390.47	51.47
06:00 hrs	0.00	390.28	51.28
07:00 hrs	0.00	390.29	51.29
08:00 hrs	0.00	390.33	51.33
09:00 hrs	0.00	390.37	51.37
10:00 hrs	0.00	390.42	51.42
11:00 hrs	0.00	390.46	51.46
12:00 hrs	0.00	390.38	51.38
13:00 hrs	0.00	390.46	51.46
14:00 hrs	0.00	390.46	51.46
15:00 hrs	0.00	390.46	51.46
16:00 hrs	0.00	390.39	51.39
17:00 hrs	0.00	390.30	51.30
18:00 hrs	0.00	390.22	51.22
19:00 hrs	0.00	390.21	51.21
20:00 hrs	0.00	390.34	51.34
21:00 hrs	0.00	390.47	51.47
22:00 hrs	0.00	387.01	48.01
23:00 hrs	0.00	387.25	48.25

Average Day HGL:	389.44
Minimum Hour:	390.47

J172 **Maximum Day 24 Hour Simulation**

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	0.00	387.11	48.11
01:00 hrs	0.00	386.91	47.91
02:00 hrs	0.00	386.85	47.85
03:00 hrs	0.00	386.87	47.87
04:00 hrs	0.00	386.38	47.38
05:00 hrs	0.00	389.90	50.90
06:00 hrs	0.00	389.81	50.81
07:00 hrs	0.00	389.82	50.82
08:00 hrs	0.00	389.85	50.85
09:00 hrs	0.00	389.87	50.87
10:00 hrs	0.00	389.89	50.89
11:00 hrs	0.00	389.90	50.90
12:00 hrs	0.00	389.87	50.87
13:00 hrs	0.00	389.90	50.90
14:00 hrs	0.00	389.90	50.90
15:00 hrs	0.00	389.90	50.90
16:00 hrs	0.00	389.88	50.88
17:00 hrs	0.00	389.83	50.83
18:00 hrs	0.00	389.76	50.76
19:00 hrs	0.00	389.76	50.76
20:00 hrs	0.00	389.85	50.85
21:00 hrs	0.00	389.90	50.90
22:00 hrs	0.00	386.33	47.33
23:00 hrs	0.00	386.92	47.92

Maximum Day HGL:	388.96
Peak Hour:	386.33

Available Flow (L/s)	Residual Pressure (m)
0.0	50.9
20.0	50.6
40.0	49.9
60.0	48.6
80.0	46.8
100.0	44.5
120.0	41.9
140.0	38.9
160.0	35.7
180.0	32.3
200.0	28.5
220.0	24.5
222.9	23.9

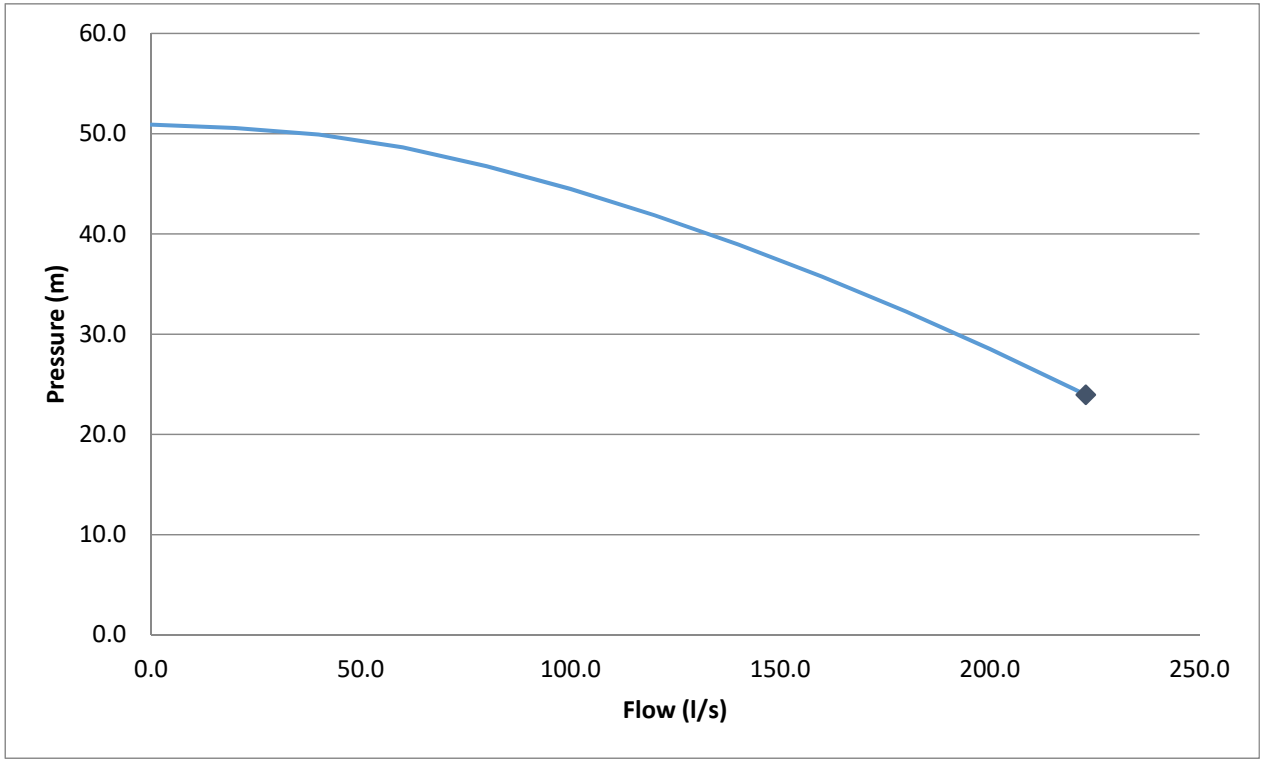
Fire Flow Analysis

Fire Flow Node:	J172
Design Flow (L/s):	222.9
Design Pressure (m):	23.9

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.*



JCT_00033 **Average Day 24 Hour Simulation**

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	0.00	387.32	44.32
01:00 hrs	0.00	387.24	44.24
02:00 hrs	0.00	387.22	44.22
03:00 hrs	0.00	387.22	44.22
04:00 hrs	0.01	387.04	44.04
05:00 hrs	0.01	390.47	47.47
06:00 hrs	0.01	390.28	47.28
07:00 hrs	0.01	390.29	47.29
08:00 hrs	0.01	390.33	47.33
09:00 hrs	0.01	390.37	47.37
10:00 hrs	0.01	390.42	47.42
11:00 hrs	0.01	390.46	47.46
12:00 hrs	0.01	390.38	47.38
13:00 hrs	0.01	390.46	47.46
14:00 hrs	0.01	390.46	47.46
15:00 hrs	0.01	390.46	47.46
16:00 hrs	0.01	390.39	47.39
17:00 hrs	0.01	390.30	47.30
18:00 hrs	0.01	390.22	47.22
19:00 hrs	0.01	390.21	47.21
20:00 hrs	0.01	390.34	47.34
21:00 hrs	0.01	390.47	47.47
22:00 hrs	0.01	387.01	44.01
23:00 hrs	0.00	387.24	44.24

Average Day HGL:	389.44
Minimum Hour:	390.47

JCT_00033 **Maximum Day 24 Hour Simulation**

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	0.01	387.11	44.11
01:00 hrs	0.01	386.90	43.90
02:00 hrs	0.01	386.85	43.85
03:00 hrs	0.01	386.87	43.87
04:00 hrs	0.01	386.38	43.38
05:00 hrs	0.01	389.90	46.90
06:00 hrs	0.02	389.81	46.81
07:00 hrs	0.01	389.82	46.82
08:00 hrs	0.01	389.85	46.85
09:00 hrs	0.01	389.86	46.86
10:00 hrs	0.01	389.89	46.89
11:00 hrs	0.01	389.90	46.90
12:00 hrs	0.01	389.87	46.87
13:00 hrs	0.01	389.90	46.90
14:00 hrs	0.01	389.90	46.90
15:00 hrs	0.01	389.90	46.90
16:00 hrs	0.01	389.88	46.88
17:00 hrs	0.01	389.82	46.82
18:00 hrs	0.02	389.76	46.76
19:00 hrs	0.02	389.76	46.76
20:00 hrs	0.01	389.85	46.85
21:00 hrs	0.01	389.90	46.90
22:00 hrs	0.01	386.32	43.32
23:00 hrs	0.01	386.92	43.92

Maximum Day HGL:	388.95
Peak Hour:	386.32

Available Flow (L/s)	Residual Pressure (m)
0.0	46.9
20.0	46.5
40.0	45.9
60.0	44.5
80.0	42.6
100.0	40.3
120.0	37.6
140.0	34.5
160.0	31.2
180.0	27.6
200.0	23.7
220.0	19.6
221.4	19.3

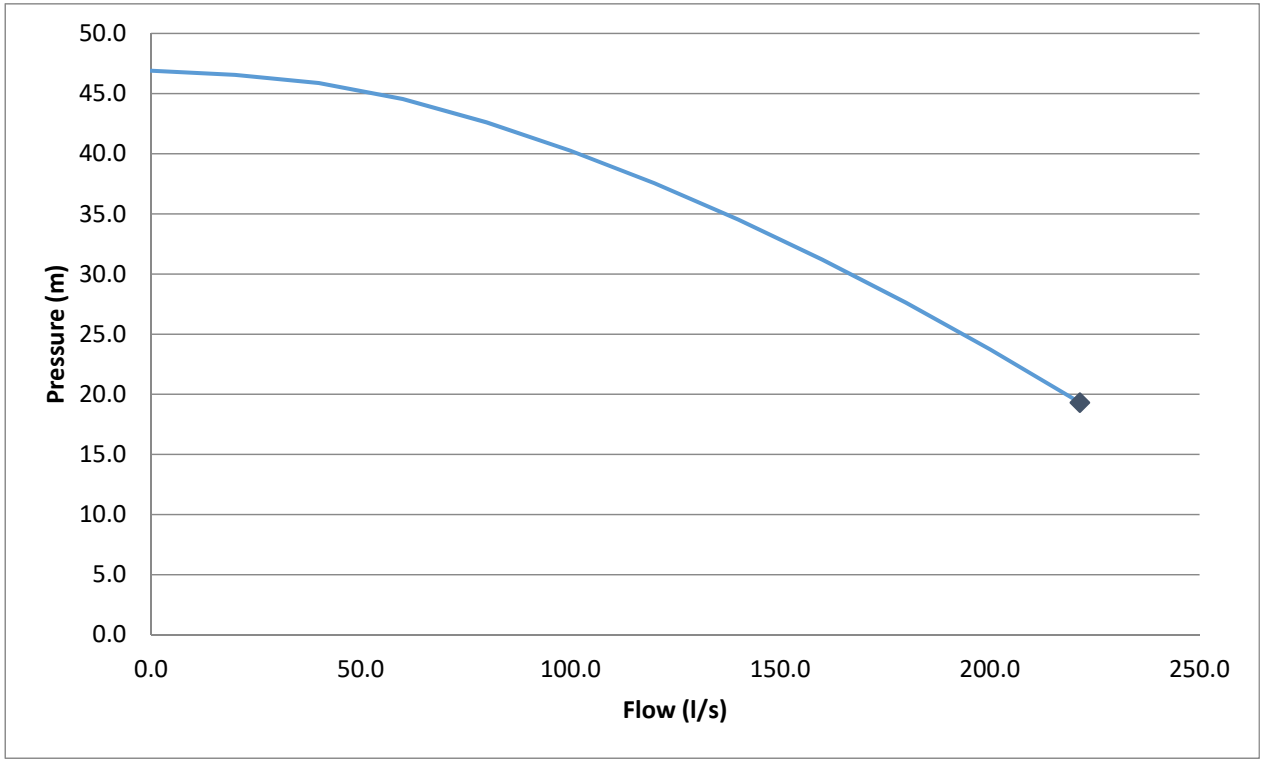
Fire Flow Analysis

Fire Flow Node:	JCT_00033
Design Flow (L/s):	221.4
Design Pressure (m):	19.3

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.*



J176 **Average Day 24 Hour Simulation**

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	0.00	398.50	57.90
01:00 hrs	0.00	398.38	57.78
02:00 hrs	0.00	398.25	57.65
03:00 hrs	0.00	398.11	57.51
04:00 hrs	0.00	397.96	57.36
05:00 hrs	0.00	398.13	57.53
06:00 hrs	0.00	398.27	57.67
07:00 hrs	0.00	398.42	57.82
08:00 hrs	0.00	398.56	57.96
09:00 hrs	0.00	398.70	58.10
10:00 hrs	0.00	398.84	58.24
11:00 hrs	0.00	399.00	58.40
12:00 hrs	0.00	399.04	58.44
13:00 hrs	0.00	398.91	58.31
14:00 hrs	0.00	398.77	58.17
15:00 hrs	0.00	398.64	58.04
16:00 hrs	0.00	398.51	57.91
17:00 hrs	0.00	398.38	57.78
18:00 hrs	0.00	398.23	57.63
19:00 hrs	0.00	398.06	57.46
20:00 hrs	0.00	398.04	57.44
21:00 hrs	0.00	398.17	57.57
22:00 hrs	0.00	398.33	57.73
23:00 hrs	0.00	398.45	57.85
Average Day HGL:		398.44	
Minimum Hour:		399.04	

J176 **Maximum Day 24 Hour Simulation**

Time	Demand (L/s)	Head (m)	Pressure (m)
00:00 hrs	0.00	398.60	58.00
01:00 hrs	0.00	398.71	58.11
02:00 hrs	0.00	398.80	58.20
03:00 hrs	0.00	398.87	58.27
04:00 hrs	0.00	398.94	58.34
05:00 hrs	0.00	398.94	58.34
06:00 hrs	0.00	399.01	58.41
07:00 hrs	0.00	398.81	58.21
08:00 hrs	0.00	398.53	57.93
09:00 hrs	0.00	398.27	57.67
10:00 hrs	0.00	398.01	57.41
11:00 hrs	0.00	397.96	57.36
12:00 hrs	0.00	398.03	57.43
13:00 hrs	0.00	398.08	57.48
14:00 hrs	0.00	398.14	57.54
15:00 hrs	0.00	398.22	57.62
16:00 hrs	0.00	398.29	57.69
17:00 hrs	0.00	398.34	57.74
18:00 hrs	0.00	398.35	57.75
19:00 hrs	0.00	398.34	57.74
20:00 hrs	0.00	398.33	57.73
21:00 hrs	0.00	398.36	57.76
22:00 hrs	0.00	398.42	57.82
23:00 hrs	0.00	398.40	57.80
Maximum Day HGL:		398.45	
Peak Hour:		397.96	

Available Flow (L/s)	Residual Pressure (m)
0.0	57.4
20.0	57.0
40.0	56.2
60.0	55.0
80.0	53.6
100.0	51.8
120.0	49.7
140.0	47.3
160.0	44.6
180.0	41.6
200.0	38.4
220.0	34.8
240.0	31.0
260.0	27.1
280.0	23.0
300.0	18.4
318.1	14.0

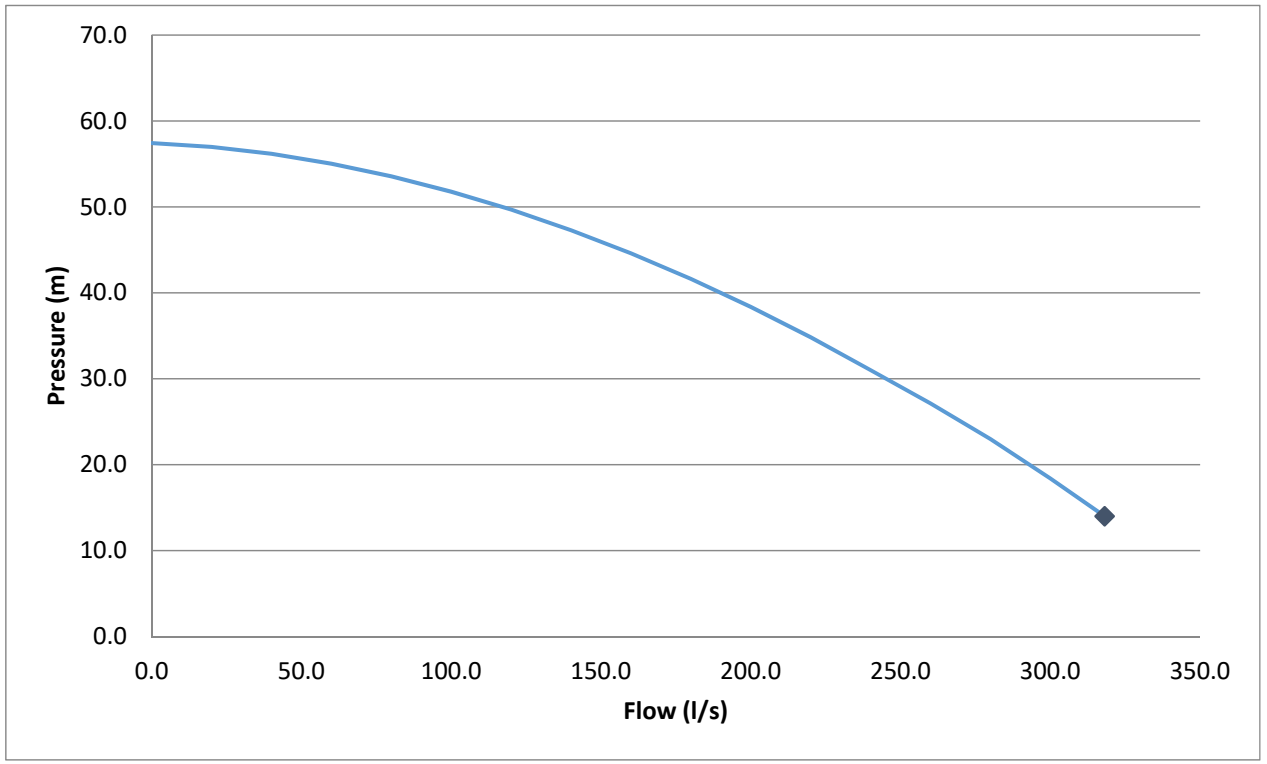
Fire Flow Analysis

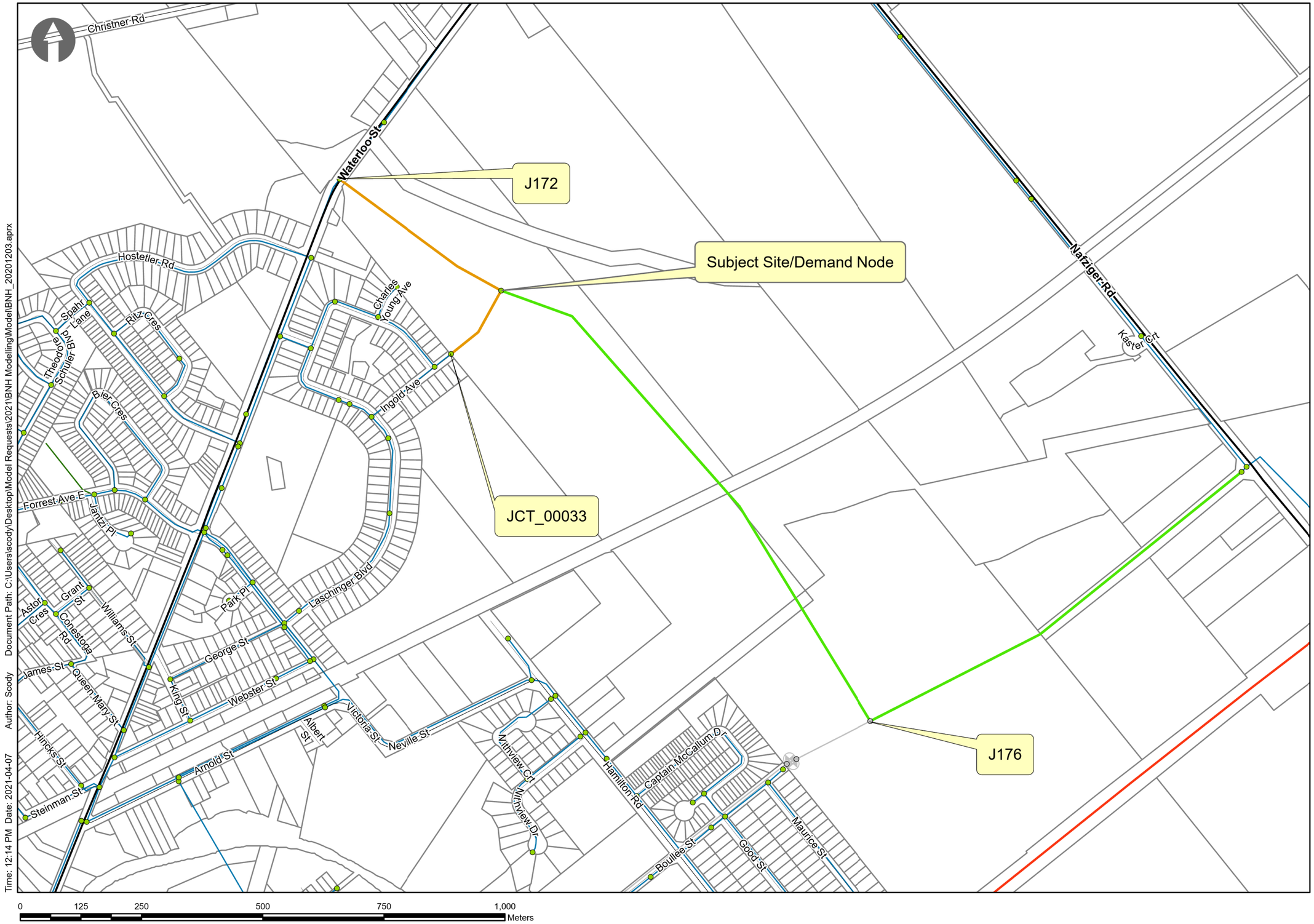
Fire Flow Node:	J176
Design Flow (L/s):	318.1
Design Pressure (m):	14.0

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.*





Time: 12:14 PM Date: 2021-04-07 Author: Scody Document Path: C:\Users\scody\Desktop\Model Requests\2021\BNH Modelling\Model\BNH_20201203.aprx

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

Junction
- Active
- Inactive

Pipe
- Active
- Inactive

Assessment Parcels (MPAC)

Scenario Pipes
- Baden Scenario Pipes
- New Hamburg Scenario Pipes

Pfenning Farms Site

Appendix C

Usage Rates, Water Demands, and Design Values

WILMOT WOODS
Community of New Hamburg - New Hamburg Pressure Zone
Pump Curve Design Sheet

Project No.: 35056-104
Date: 23-Feb-23
Design By: AJC
File: Q:\35056\104\Water Distribution\2023-02\35056-104_Region Pressures & Pump Curves.xlsx
Note: System pressure information is from correspondence to Charles Carré from Kevin Dolishny at the Region of Waterloo on April 23, 2021.

Node J172 ***Waterloo Street at Site Boundary***
Elevation = ***339.00*** **m**

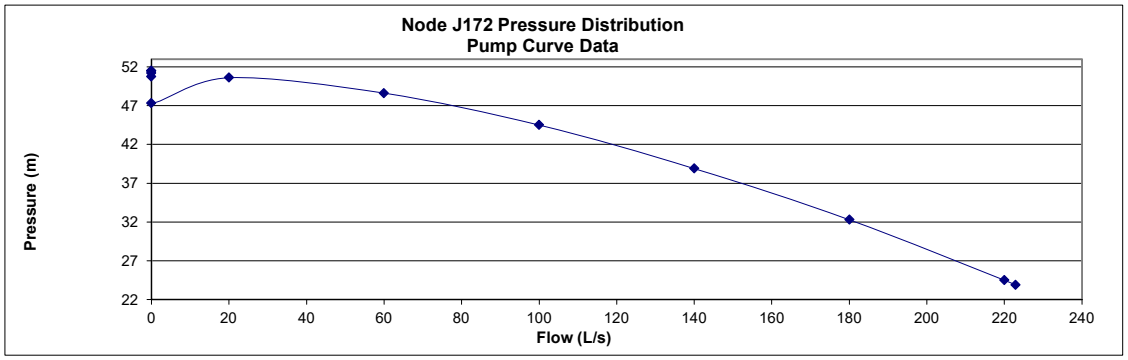
Average Day				
Time	Flow (L/s)	Head (m)	Residual Pressure (m)	
00:00 hrs	0.00	387.32	48.32	
01:00 hrs	0.00	387.24	48.24	
02:00 hrs	0.00	387.22	48.22	
03:00 hrs	0.00	387.22	48.22	
04:00 hrs	0.00	387.04	48.04	
05:00 hrs	**0.00**	**390.47**	**51.47**	**Min Hr**
06:00 hrs	0.00	390.28	51.28	
07:00 hrs	0.00	390.29	51.29	
08:00 hrs	0.00	390.33	51.33	
09:00 hrs	0.00	390.37	51.37	
10:00 hrs	0.00	390.42	51.42	
11:00 hrs	0.00	390.46	51.46	
12:00 hrs	0.00	390.38	51.38	
13:00 hrs	0.00	390.46	51.46	
14:00 hrs	0.00	390.46	51.46	
15:00 hrs	0.00	390.46	51.46	
16:00 hrs	0.00	390.39	51.39	
17:00 hrs	0.00	390.30	51.30	
18:00 hrs	0.00	390.22	51.22	
19:00 hrs	**0.00**	**390.21**	**51.21**	**Avg Day**
20:00 hrs	0.00	390.34	51.34	
21:00 hrs	0.00	390.47	51.47	
22:00 hrs	0.00	387.01	48.01	
23:00 hrs	0.00	387.25	48.25	
Average =	**0.00**	389.44	50.44	
Minimum =	**0.00**	390.47	51.47	

Maximum Day				
Time	Flow (L/s)	Head (m)	Residual Pressure (m)	
00:00 hrs	0.00	387.11	48.11	
01:00 hrs	0.00	386.91	47.91	
02:00 hrs	0.00	386.85	47.85	
03:00 hrs	0.00	386.87	47.87	
04:00 hrs	0.00	386.38	47.38	
05:00 hrs	0.00	389.90	50.90	
06:00 hrs	0.00	389.81	50.81	
07:00 hrs	0.00	389.82	50.82	
08:00 hrs	0.00	389.85	50.85	
09:00 hrs	0.00	389.87	50.87	
10:00 hrs	0.00	389.89	50.89	
11:00 hrs	0.00	389.90	50.90	
12:00 hrs	0.00	389.87	50.87	
13:00 hrs	0.00	389.90	50.90	
14:00 hrs	0.00	389.90	50.90	
15:00 hrs	0.00	389.90	50.90	
16:00 hrs	0.00	389.88	50.88	
17:00 hrs	0.00	389.83	50.83	
18:00 hrs	**0.00**	**389.76**	**50.76**	**Max Day**
19:00 hrs	0.00	389.76	50.76	
20:00 hrs	0.00	389.85	50.85	
21:00 hrs	0.00	389.90	50.90	
22:00 hrs	**0.00**	**386.33**	**47.33**	**Peak Hr**
23:00 hrs	0.00	386.92	47.92	
Max Day =	**0.00**	388.96	49.96	
Peak Hour =	**0.00**	386.33	47.33	

Fire Flow Analysis		
Available Flow (L/s)	Head (m)	Residual Pressure (m)
0.0	389.90	50.90
20.0	389.60	50.60
40.0	388.90	49.90
60.0	387.60	48.60
80.0	385.80	46.80
100.0	383.50	44.50
120.0	380.90	41.90
140.0	377.90	38.90
160.0	374.70	35.70
180.0	371.30	32.30
200.0	367.50	28.50
220.0	363.50	24.50
222.9	362.90	23.90

Fire Flow Analysis Adjusted for Maximum Day Flows		
Available Flow (L/s)	Head (m)	Residual Pressure (m)
0.0	389.90	50.90
20.0	389.60	50.60
40.0	388.90	49.90
60.0	387.60	48.60
80.0	385.80	46.80
100.0	383.50	44.50
120.0	380.90	41.90
140.0	377.90	38.90
160.0	374.70	35.70
180.0	371.30	32.30
200.0	367.50	28.50
220.0	363.50	24.50
222.9	362.90	23.90

Node J172 - Pump Curve Pressure Distribution			
Demand Scenario	Discharge (L/s)	HGL (m)	Head (m)
0 (Est.)	0.00	390.50	51.50
Minimum Hour	0.00	390.47	51.47
Average Day	0.00	390.21	51.21
Maximum Day	0.00	389.76	50.76
Peak Hour	0.00	386.33	47.33
Max Day + 20 L/s Fire Flow	20.00	389.60	50.60
Max Day + 60 L/s Fire Flow	60.00	387.60	48.60
Max Day + 100 L/s Fire Flow	100.00	383.50	44.50
Max Day + 140 L/s Fire Flow	140.00	377.90	38.90
Max Day + 180 L/s Fire Flow	180.00	371.30	32.30
Max Day + 220 L/s Fire Flow	220.00	363.50	24.50
Max Day + 223 L/s Fire Flow	222.90	362.90	23.90



WILMOT WOODS

Community of New Hamburg - New Hamburg Pressure Zone

Pump Curve Design Sheet

Project No.: 35056-104
Date: 23-Feb-23
Design By: AJC
File: Q:\35056\104\Water Distribution\2023-02\35056-104_Region Pressures & Pump Curves.xlsx
Note: System pressure information is from correspondence to Charles Carré from Kevin Dolishny at the Region of Waterloo on April 23, 2021.

Node 00033 ***Ingold Avenue at Site Boundary***
Elevation = ***343.00*** **m**

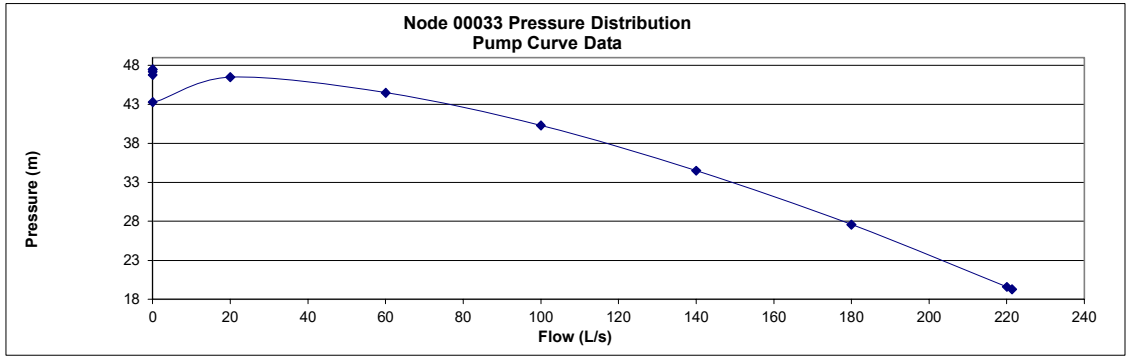
Average Day				
Time	Flow (L/s)	Head (m)	Residual Pressure (m)	
00:00 hrs	0.00	387.32	44.32	
01:00 hrs	0.00	387.24	44.24	
02:00 hrs	0.00	387.22	44.22	
03:00 hrs	0.00	387.22	44.22	
04:00 hrs	0.01	387.04	44.04	
05:00 hrs	**0.01**	**390.47**	**47.47**	**Min Hr**
06:00 hrs	0.01	390.28	47.28	
07:00 hrs	0.01	390.29	47.29	
08:00 hrs	0.01	390.33	47.33	
09:00 hrs	0.01	390.37	47.37	
10:00 hrs	0.01	390.42	47.42	
11:00 hrs	0.01	390.46	47.46	
12:00 hrs	0.01	390.38	47.38	
13:00 hrs	0.01	390.46	47.46	
14:00 hrs	0.01	390.46	47.46	
15:00 hrs	0.01	390.46	47.46	
16:00 hrs	0.01	390.39	47.39	
17:00 hrs	0.01	390.30	47.30	
18:00 hrs	0.01	390.22	47.22	
19:00 hrs	**0.01**	**390.21**	**47.21**	**Avg Day**
20:00 hrs	0.01	390.34	47.34	
21:00 hrs	0.01	390.47	47.47	
22:00 hrs	0.01	387.01	44.01	
23:00 hrs	0.00	387.24	44.24	
Average =	**0.01**	389.44	46.44	
Minimum =	**0.00**	390.47	47.47	

Maximum Day				
Time	Flow (L/s)	Head (m)	Residual Pressure (m)	
00:00 hrs	0.01	387.11	44.11	
01:00 hrs	0.01	386.90	43.90	
02:00 hrs	0.01	386.85	43.85	
03:00 hrs	0.01	386.87	43.87	
04:00 hrs	0.01	386.38	43.38	
05:00 hrs	0.01	389.90	46.90	
06:00 hrs	0.02	389.81	46.81	
07:00 hrs	0.01	389.82	46.82	
08:00 hrs	0.01	389.85	46.85	
09:00 hrs	0.01	389.86	46.86	
10:00 hrs	0.01	389.89	46.89	
11:00 hrs	0.01	389.90	46.90	
12:00 hrs	0.01	389.87	46.87	
13:00 hrs	0.01	389.90	46.90	
14:00 hrs	0.01	389.90	46.90	
15:00 hrs	0.01	389.90	46.90	
16:00 hrs	0.01	389.88	46.88	
17:00 hrs	0.01	389.82	46.82	
18:00 hrs	**0.02**	**389.76**	**46.76**	**Max Day**
19:00 hrs	0.02	389.76	46.76	
20:00 hrs	0.01	389.85	46.85	
21:00 hrs	0.01	389.90	46.90	
22:00 hrs	**0.01**	**386.32**	**43.32**	**Peak Hr**
23:00 hrs	0.01	386.92	43.92	
Max Day =	**0.01**	388.96	45.96	
Peak Hour =	**0.02**	386.32	43.32	

Fire Flow Analysis		
Available Flow (L/s)	Head (m)	Residual Pressure (m)
0.0	389.90	46.90
20.0	389.50	46.50
40.0	388.90	45.90
60.0	387.50	44.50
80.0	385.60	42.60
100.0	383.30	40.30
120.0	380.60	37.60
140.0	377.50	34.50
160.0	374.20	31.20
180.0	370.60	27.60
200.0	366.70	23.70
220.0	362.60	19.60
221.4	362.30	19.30

Fire Flow Analysis Adjusted for Maximum Day Flows		
Available Flow (L/s)	Head (m)	Residual Pressure (m)
0.0	389.90	46.90
20.0	389.50	46.50
40.0	388.90	45.90
60.0	387.50	44.50
80.0	385.60	42.60
100.0	383.30	40.30
120.0	380.60	37.60
140.0	377.50	34.50
160.0	374.20	31.20
180.0	370.60	27.60
200.0	366.70	23.70
220.0	362.60	19.60
221.4	362.30	19.30

Node 00033 - Pump Curve Pressure Distribution			
Demand Scenario	Discharge (L/s)	HGL (m)	Head (m)
0 (Est.)	0.00	390.50	47.50
Minimum Hour	0.01	390.47	47.47
Average Day	0.01	390.21	47.21
Maximum Day	0.01	389.76	46.76
Peak Hour	0.01	386.32	43.32
Max Day + 20 L/s Fire Flow	20.01	389.50	46.50
Max Day + 60 L/s Fire Flow	60.01	387.50	44.50
Max Day + 100 L/s Fire Flow	100.01	383.30	40.30
Max Day + 140 L/s Fire Flow	140.01	377.50	34.50
Max Day + 180 L/s Fire Flow	180.01	370.60	27.60
Max Day + 220 L/s Fire Flow	220.01	362.60	19.60
Max Day + 221 L/s Fire Flow	221.41	362.30	19.30



WILMOT WOODS

Community of New Hamburg

Project No: 35056-104
Date: February 23, 2023
By: MXF/CJC

Water Demand Calculations - Interim Scenario

Location	Node No.	Residential											Industrial		Final Demand[4] (l/s)					Road Elevation (m)
		Medium Density (Single Family)			Medium Density (Block)				Street Townhomes											
		# units[1]	#persons[2] (3.25/unit)	Demand[3] (l/s)	Area (ha)	# units[1] (avg 100/ha)	#persons[2] (2.44/unit)	Demand[3] (l/s)	# units[1]	#persons[2] (2.44/unit)	Demand[3] (l/s)		Area (ha)	Demand[3] (l/s)	Avgerage Day Qavg	Maximum Day Qmax.day	Minimum Hour Qmin.hr	Peak Hour Qpeak	Max Day + Fire Flow[5] Qmax.d+fire	
Street Six @ Street Seven	J-1	22	72	0.188											0.188	0.424	0.085	0.637	100.424	346.30
Street Six/Nine @ Street Eight	J-2	10	33	0.086					7	17	0.045				0.131	0.294	0.059	0.442	133.627	345.50
Street Nine @ Street Ten	J-3	7	23	0.060					17	41	0.109				0.169	0.381	0.076	0.572	133.714	346.00
Street Nine	J-4								28	68	0.180				0.180	0.405	0.081	0.609	133.738	346.00
Street Six	J-5	16	52	0.137					15	37	0.096				0.233	0.525	0.105	0.789	133.859	345.50
Street Seven	J-6	32	104	0.274											0.274	0.617	0.123	0.926	100.617	345.00
Street Eight @ Street Nine	J-7	18	59	0.154					7	17	0.045				0.199	0.448	0.090	0.673	133.781	344.80
Street Nine @ Street Ten	J-8	7	23	0.060					17	41	0.109				0.169	0.381	0.076	0.572	133.714	345.00
Street Two @ Ingold Avenue	J-9								21	51	0.135				0.135	0.304	0.061	0.456	133.637	343.70
Street Two	J-10								5	12	0.032				0.032	0.072	0.014	0.109	133.406	344.00
Street Two @ Street Four/Six	J-11	5	16	0.043					19	46	0.122				0.165	0.371	0.074	0.558	133.705	344.75
Street Two @ Street Five/Seven	J-12								16	39	0.103				0.103	0.231	0.046	0.348	133.565	344.25
Street Two @ Street One/Eight	J-13	18	59	0.154					7	17	0.045				0.199	0.448	0.090	0.673	133.781	344.00
Ingold Avenue @ Street Three	J-14	8	26	0.069					37	90	0.238				0.306	0.690	0.138	1.036	134.023	343.10
Street Four @ Street Three	J-15	9	29	0.077					29	71	0.186				0.264	0.593	0.119	0.891	133.926	345.10
Street Five	J-16	22	72	0.188											0.188	0.424	0.085	0.637	100.424	344.50
Street One	J-17	22	72	0.188											0.188	0.424	0.085	0.637	100.424	344.50
Ingold Avenue @ Street One	J-18	28	91	0.240					4	10	0.026				0.266	0.597	0.119	0.898	133.931	342.70
Street One @ Street Four	J-19	26	85	0.223											0.223	0.501	0.100	0.753	100.501	345.75
Street One @ Street Five	J-20	28	91	0.240											0.240	0.540	0.108	0.811	100.540	345.30
Street Two @ Charles Young Avenue	J-21														0.000	0.000	0.000	0.000	100.000	341.50
Multi-Block 20	J-201				0.98	78	190	0.502							0.502	1.129	0.226	1.695	134.462	345.00
Multi-Block 21	J-202				0.87	82	200	0.527							0.527	1.186	0.237	1.782	134.520	345.00
Multi-Block 19	J-203				1.13	86	210	0.553							0.553	1.244	0.249	1.869	134.578	344.30
Total		**278**	**904**	**2.381**	**2.980**	**246**	**600**	**1.582**	**229**	**559**	**1.473**		**0.000**	**0.000**	**5.436**	**12.230**	**2.446**	**18.372**	**134.578**	
						Interim Total Population			**2063**											
						Interim Total Units			**753**											

Water Demand Calculations - Ultimate Scenario

Location	Node No.	Residential											Industrial		Final Demand[4] (l/s)					Road Elevation (m)
		Medium Density (Single Family)			Medium Density (Block)				Street Townhomes											
		# units[1]	#persons[2] (3.25/unit)	Demand[3] (l/s)	Area (ha)	# units[1] (avg 100/ha)	#persons[2] (2.44/unit)	Demand[3] (l/s)	# units[1]	#persons[2] (2.44/unit)	Demand[3] (l/s)		Area (ha)	Demand[3] (l/s)	Avgerage Day Qavg	Maximum Day Qmax.day	Minimum Hour Qmin.hr	Peak Hour Qpeak	Max Day + Fire Flow[5] Qmax.d+fire	
Street Six @ Street Seven	J-1	22	72	0.188											0.188	0.377	0.094	0.565	100.377	346.30
Street Six/Nine @ Street Eight	J-2	10	33	0.086					7	17	0.045				0.131	0.261	0.065	0.392	133.595	345.50
Street Nine @ Street Ten	J-3	7	23	0.060					17	41	0.109				0.169	0.339	0.085	0.508	133.672	346.00
Street Nine	J-4								28	68	0.180				0.180	0.360	0.090	0.540	133.693	346.00
Street Six	J-5	16	52	0.137					15	37	0.096				0.233	0.467	0.117	0.700	133.800	345.50
Street Seven	J-6	32	104	0.274											0.274	0.548	0.137	0.822	100.548	345.00
Street Eight @ Street Nine	J-7	18	59	0.154					7	17	0.045				0.199	0.398	0.100	0.598	133.732	344.80
Street Nine @ Street Ten	J-8	7	23	0.060					17	41	0.109				0.169	0.339	0.085	0.508	133.672	345.00
Street Two @ Ingold Avenue	J-9								21	51	0.135				0.135	0.270	0.068	0.405	133.603	343.70
Street Two	J-10								5	12	0.032				0.032	0.064	0.016	0.096	133.398	344.00
Street Two @ Street Four/Six	J-11	5	16	0.043					19	46	0.122				0.165	0.330	0.083	0.495	133.663	344.75
Street Two @ Street Five/Seven	J-12								16	39	0.103				0.103	0.206	0.051	0.309	133.539	344.25
Street Two @ Street One/Eight	J-13	18	59	0.154					7	17	0.045				0.199	0.398	0.100	0.598	133.732	344.00
Ingold Avenue @ Street Three	J-14	8	26	0.069					37	90	0.238				0.306	0.613	0.153	0.919	133.946	343.10
Street Four @ Street Three	J-15	9	29	0.077					29	71	0.186				0.264	0.527	0.132	0.791	133.860	345.10
Street Five	J-16	22	72	0.188											0.188	0.377	0.094	0.565	100.377	344.50
Street One	J-17	22	72	0.188											0.188	0.377	0.094	0.565	100.377	344.50
Ingold Avenue @ Street One	J-18	28	91	0.240					4	10	0.026				0.266	0.531	0.133	0.797	133.864	342.70
Street One @ Street Four	J-19	26	85	0.223											0.223	0.445	0.111	0.668	100.445	345.75
Street One @ Street Five	J-20	28	91	0.240											0.240	0.480	0.120	0.719	100.480	345.30
Street Two @ Charles Young Avenue	J-21														0.000	0.000	0.000	0.000	100.000	341.50
Multi-Block 20	J-201				0.98	78	190	0.502							0.502	1.003	0.251	1.505	134.336	345.00
Multi-Block 21	J-202				0.87	82	200	0.527							0.527	1.055	0.264	1.582	134.388	345.00
Multi-Block 19	J-203				1.13	86	210	0.553							0.553	1.106	0.277	1.659	134.439	344.30
Cachet Lands - Industrial	J-22												11.75	6.120	6.120	12.240	3.060	18.359	212.240	348.50
Cachet Lands - Residential	J-23	26.52	1591	4.193											4.193	8.387	2.097	12.580	141.720	352.00
		*60 pph																		-
Cachet Lands @ Waterloo Street	J-24														0.000	0.000	0.000	0.000	0.000	342.00
Total			**2495**	**6.575**	**2.980**	**246**	**600**	**1.582**	**229**	**559**	**1.473**		**11.75**	**6.120**	**15.749**	**31.498**	**7.874**	**47.246**	**212.240**	
						Ultimate Total Population			**3654**											

Table Notes:

1. Unit counts are based on the Draft Plan (with maximum unit yield) by MHBC, dated February 3, 2023.

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

Reference: Region of Waterloo 2022 Water and Wastewater Monitoring Report (Region of Waterloo, September 2022)

3. Water Demand	
Residential	227.7 l/d/person 0.0026 l/s/person
ICI	45 m^3/d/ha 0.5208 l/s/ha
Institutional	1.000 l/s/ha

Reference: Water demand per capita from the *Tri-City Water Distribution Master Plan Final Report* , (AECOM, May 2009):
- Average ICI Demand & Peaking Factor: *Design Guidelines for Drinking-Water Systems* , (MOE, 2008) - Section 3.4.4: Industrial Water Demands

4. Peaking Factors	2,001-3,000	3,001-10,000
Average Day	1.00	1.00
Maximum Day	2.25	2.00
Minimum Hour	0.45	0.50
Peak Hour	3.38	3.00

Reference: *Design Guidelines for Drinking-Water Systems,* (MOE, 2008) - Table 3.1: Peaking Factors

5. Fire Flow	
High Density	12,000 l/min 200 l/s
Townhomes (contiguous)	8,000 l/min 133 l/s
Single Family <3m separation	6,000 l/min 100 l/s
Institutional (School)	10,000 l/min 167 l/s
Commercial	12,000 l/min 200 l/s
Industrial	12,000 l/min 200 l/s

Reference: *Water Supply for Public Fire Protection* (FUS, 2020) - F=220C(A)^1/2

Wilmot Woods

Community of New Hamburg

Project No: 35056-104

Date: February 23, 2023

By: MXF

Minor Losses Pipes

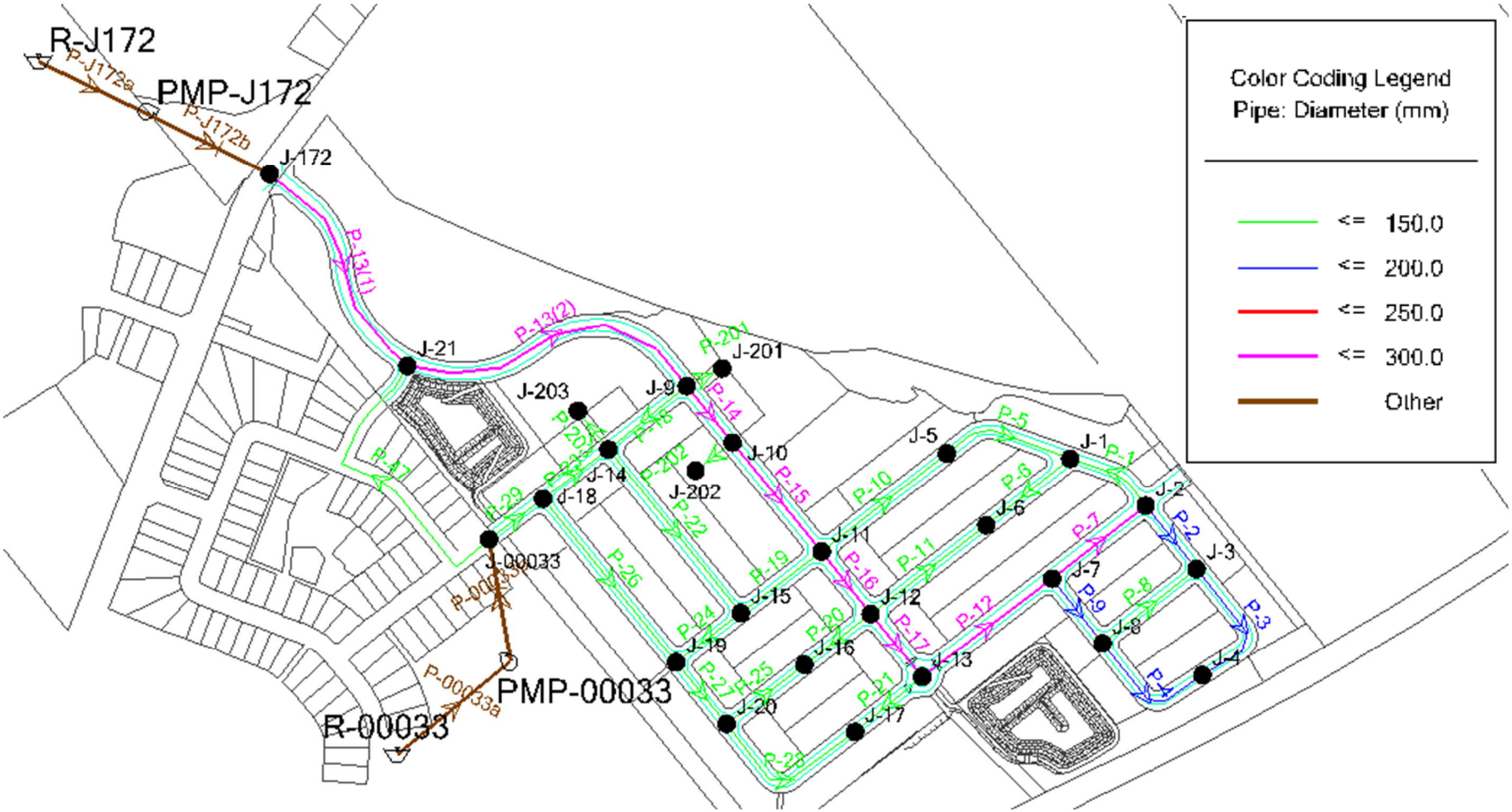
Rep-TEE branch with change in size

Pipe No.	Diameter (mm)	Diameter (in)	ft factor	"k" Factor	No. Gate Valves	"k" Factor	No. 11.25° bends	"k" Factor	No. 22.5° bends	"k" Factor	No. 45° bends	"k" Factor	No. 90° bends	"k" Factor	No. Tee (thru)	"k" Factor	No. Tee (branch)	"k" Factor	WMC, DCV, Reducer, or HYD	"k" Factor per Pipe
Minor Losses K-Values				8 f_T		4 f_T		6 f_T		16 f_T		30 f_T		20 f_T		60 f_T				
P-47	150	6	0.015	0.12	5	0.06	2	0.09	1	0.24		0.45		0.3	3	0.9	2			3.51
P-52	300	12	0.013	0.104	2	0.052		0.078	1	0.208		0.39		0.26	2	0.78				0.81
			Total =		**7**		**2**		**2**		**0**		**0**		**5**		**2**		**Average =**	**1.44**

Appendix D

WaterCAD Output Files

WATER DISTRIBUTION NETWORK - INTERIM SCENARIO



Interim Scenario

Active Scenario: New Hamburg - Max Day + Fire

Label	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (L/s)	Flow (Total Available) (L/s)	Pressure (Calculated Residual) (kPa)	Pressure (Calculated System Lower Limit) (kPa)	Velocity of Maximum Pipe (m/s)	Pipe w/ Maximum Velocity
J-1	True	100.00	193.69	140.1	207.3	4.94	P-1
J-2	True	133.00	221.40	178.8	178.0	4.19	P-29
J-3	True	133.00	215.39	140.0	155.8	4.08	P-29
J-4	True	133.00	198.50	140.0	193.9	3.78	P-29
J-5	True	133.00	164.04	140.0	267.1	4.82	P-10
J-6	True	100.00	170.58	140.0	249.5	4.90	P-11
J-7	True	133.00	221.40	197.0	185.6	4.19	P-29
J-8	True	133.00	220.12	140.0	144.5	4.24	P-9
J-9	True	133.00	221.40	288.1	264.3	3.95	P-29
J-10	True	133.00	221.40	273.2	252.3	4.04	P-29
J-11	True	133.00	221.40	249.3	234.3	4.16	P-29
J-12	True	133.00	221.40	241.1	222.8	4.19	P-29
J-13	True	133.00	221.40	230.2	211.3	4.19	P-29
J-14	True	133.00	221.40	197.7	186.0	4.86	P-23
J-15	True	133.00	221.40	151.6	226.7	4.75	P-19
J-16	True	100.00	190.72	140.0	244.1	6.05	P-20
J-17	True	100.00	180.04	140.0	273.6	6.11	P-21
J-18	True	133.00	221.40	239.2	281.8	6.21	P-29
J-19	True	100.00	219.68	140.0	216.6	4.62	P-29
J-20	True	100.00	206.97	140.1	217.1	4.98	P-27
J-21	True	100.00	221.40	338.9	297.2	3.34	P-29
J-00033	True	133.00	221.40	337.2	354.7	2.74	P-29
J-172	True	133.00	221.40	375.2	315.8	3.06	P-29
J-201	True	133.00	169.92	140.0	324.3	9.62	P-201
J-202	True	133.00	160.32	140.0	327.5	9.07	P-202
J-203	True	133.00	147.73	140.0	331.4	8.36	P-203

Interim Scenario

Active Scenario: New Hamburg - Avg Day

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (kPa)
J-1	346.30	0.19	389.62	424.0
J-2	345.50	0.13	389.62	431.8
J-3	346.00	0.17	389.62	426.9
J-4	346.00	0.18	389.62	426.9
J-5	345.50	0.23	389.62	431.8
J-6	345.00	0.27	389.62	436.7
J-7	344.80	0.20	389.62	438.6
J-8	345.00	0.17	389.62	436.7
J-9	343.70	0.13	389.62	449.4
J-10	344.00	0.03	389.62	446.5
J-11	344.75	0.16	389.62	439.1
J-12	344.25	0.10	389.62	444.0
J-13	344.00	0.20	389.62	446.5
J-14	343.10	0.31	389.62	455.3
J-15	345.10	0.26	389.62	435.7
J-16	344.50	0.19	389.62	441.6
J-17	344.50	0.19	389.62	441.6
J-18	342.70	0.27	389.62	459.2
J-19	345.75	0.22	389.62	429.4
J-20	345.30	0.24	389.62	433.8
J-21	341.50	0.00	389.63	471.0
J-00033	343.00	0.00	389.63	456.3
J-172	339.00	0.00	389.63	495.5
J-201	345.00	0.50	389.62	436.7
J-202	345.00	0.53	389.62	436.7
J-203	344.30	0.55	389.62	443.5

Interim Scenario

Active Scenario: New Hamburg - Max Day

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (kPa)
J-1	346.30	0.38	389.58	423.5
J-2	345.50	0.26	389.58	431.4
J-3	346.00	0.34	389.58	426.5
J-4	346.00	0.36	389.58	426.5
J-5	345.50	0.47	389.58	431.4
J-6	345.00	0.55	389.58	436.3
J-7	344.80	0.40	389.58	438.2
J-8	345.00	0.34	389.58	436.3
J-9	343.70	0.27	389.58	449.0
J-10	344.00	0.06	389.58	446.1
J-11	344.75	0.33	389.58	438.7
J-12	344.25	0.21	389.58	443.6
J-13	344.00	0.40	389.58	446.1
J-14	343.10	0.61	389.58	454.9
J-15	345.10	0.53	389.58	435.3
J-16	344.50	0.38	389.58	441.2
J-17	344.50	0.38	389.58	441.2
J-18	342.70	0.53	389.59	458.9
J-19	345.75	0.45	389.58	428.9
J-20	345.30	0.48	389.58	433.3
J-21	341.50	0.00	389.60	470.7
J-00033	343.00	0.00	389.61	456.2
J-172	339.00	0.00	389.60	495.2
J-201	345.00	1.00	389.58	436.3
J-202	345.00	1.06	389.58	436.3
J-203	344.30	1.11	389.58	443.1

Interim Scenario

Active Scenario: New Hamburg - Min Hour

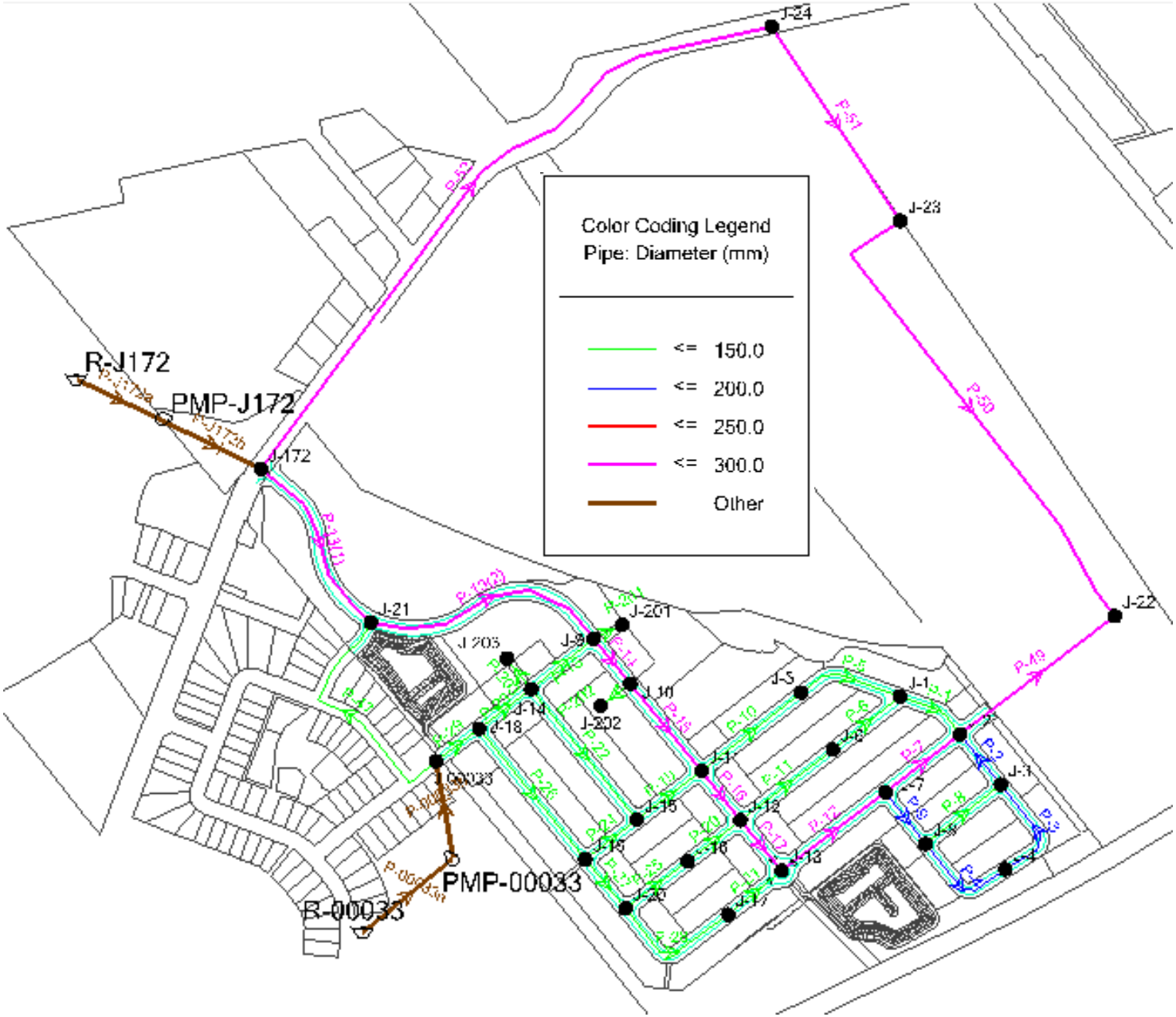
Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (kPa)
J-1	346.30	0.09	389.63	424.1
J-2	345.50	0.06	389.63	431.9
J-3	346.00	0.09	389.63	427.0
J-4	346.00	0.09	389.63	427.0
J-5	345.50	0.12	389.63	431.9
J-6	345.00	0.14	389.63	436.8
J-7	344.80	0.10	389.63	438.8
J-8	345.00	0.09	389.63	436.8
J-9	343.70	0.07	389.63	449.5
J-10	344.00	0.02	389.63	446.6
J-11	344.75	0.08	389.63	439.2
J-12	344.25	0.05	389.63	444.1
J-13	344.00	0.10	389.63	446.6
J-14	343.10	0.15	389.63	455.4
J-15	345.10	0.13	389.63	435.8
J-16	344.50	0.09	389.63	441.7
J-17	344.50	0.09	389.63	441.7
J-18	342.70	0.13	389.63	459.3
J-19	345.75	0.11	389.63	429.5
J-20	345.30	0.12	389.63	433.9
J-21	341.50	0.00	389.63	471.1
J-00033	343.00	0.00	389.63	456.4
J-172	339.00	0.00	389.63	495.5
J-201	345.00	0.25	389.63	436.8
J-202	345.00	0.26	389.63	436.8
J-203	344.30	0.28	389.63	443.6

Interim Scenario

Active Scenario: New Hamburg - Peak Hour

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (kPa)
J-1	346.30	0.57	389.51	422.9
J-2	345.50	0.39	389.51	430.7
J-3	346.00	0.51	389.51	425.8
J-4	346.00	0.54	389.51	425.8
J-5	345.50	0.70	389.51	430.7
J-6	345.00	0.82	389.51	435.6
J-7	344.80	0.60	389.51	437.5
J-8	345.00	0.51	389.51	435.6
J-9	343.70	0.40	389.52	448.4
J-10	344.00	0.10	389.52	445.5
J-11	344.75	0.50	389.51	438.1
J-12	344.25	0.31	389.51	443.0
J-13	344.00	0.60	389.51	445.4
J-14	343.10	0.92	389.52	454.3
J-15	345.10	0.79	389.51	434.7
J-16	344.50	0.57	389.51	440.5
J-17	344.50	0.57	389.51	440.5
J-18	342.70	0.80	389.53	458.3
J-19	345.75	0.67	389.51	428.3
J-20	345.30	0.72	389.51	432.7
J-21	341.50	0.00	389.55	470.2
J-00033	343.00	0.00	389.58	455.9
J-172	339.00	0.00	389.56	494.9
J-201	345.00	1.51	389.52	435.7
J-202	345.00	1.58	389.51	435.6
J-203	344.30	1.66	389.51	442.5

WATER DISTRIBUTION NETWORK - ULTIMATE SCENARIO



Ultimate Scenario

Active Scenario: Max Day + Fire

Label	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (L/s)	Flow (Total Available) (L/s)	Pressure (Calculated Residual) (kPa)	Pressure (Calculated System Lower Limit) (kPa)	Velocity of Maximum Pipe (m/s)	Pipe w/ Maximum Velocity
J-1	True	100.00	200.73	140.0	209.3	5.25	P-1
J-2	True	133.00	221.40	230.2	190.3	3.91	P-29
J-3	True	133.00	221.40	171.9	187.8	4.22	P-2
J-4	True	133.00	213.95	140.0	202.0	3.80	P-29
J-5	True	133.00	165.74	140.0	266.1	4.84	P-10
J-6	True	100.00	173.55	140.0	254.2	4.97	P-11
J-7	True	133.00	221.40	240.0	194.6	3.93	P-29
J-8	True	133.00	221.40	181.6	186.5	4.23	P-9
J-9	True	133.00	221.40	284.7	219.8	3.89	P-29
J-10	True	133.00	221.40	275.7	215.9	3.94	P-29
J-11	True	133.00	221.40	262.3	210.0	3.99	P-29
J-12	True	133.00	221.40	260.9	206.1	3.99	P-29
J-13	True	133.00	221.40	257.2	202.7	3.97	P-29
J-14	True	133.00	221.40	195.5	183.8	4.87	P-23
J-15	True	133.00	221.40	156.4	221.2	4.82	P-19
J-16	True	100.00	194.10	140.0	240.1	6.18	P-20
J-17	True	100.00	183.32	140.0	249.5	6.26	P-21
J-18	True	133.00	221.40	235.2	252.7	6.16	P-29
J-19	True	100.00	221.40	140.9	221.2	4.64	P-24
J-20	True	100.00	210.86	140.0	221.0	4.98	P-27
J-21	True	100.00	221.40	321.5	229.6	3.52	P-29
J-22	True	200.00	221.40	203.6	191.3	3.65	P-29
J-23	True	133.00	221.40	151.3	222.0	3.58	P-29
J-24	True	0.00	221.40	240.0	155.0	3.64	P-29
J-00033	True	133.00	221.40	330.2	291.1	2.61	P-29
J-172	True	133.00	221.40	357.6	231.3	3.43	P-29
J-201	True	133.00	167.91	140.0	272.4	9.50	P-201
J-202	True	133.00	159.23	140.0	277.8	9.01	P-202
J-203	True	133.00	146.11	140.0	297.1	8.27	P-203

Ultimate Scenario

Active Scenario: Avg Day

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (kPa)
J-1	346.30	0.19	389.53	423.1
J-2	345.50	0.13	389.53	430.9
J-3	346.00	0.17	389.53	426.0
J-4	346.00	0.18	389.53	426.0
J-5	345.50	0.23	389.54	431.0
J-6	345.00	0.27	389.54	435.9
J-7	344.80	0.20	389.53	437.8
J-8	345.00	0.17	389.53	435.8
J-9	343.70	0.13	389.55	448.7
J-10	344.00	0.03	389.54	445.7
J-11	344.75	0.16	389.54	438.4
J-12	344.25	0.10	389.54	443.2
J-13	344.00	0.20	389.54	445.7
J-14	343.10	0.31	389.55	454.6
J-15	345.10	0.26	389.54	435.0
J-16	344.50	0.19	389.54	440.8
J-17	344.50	0.19	389.54	440.8
J-18	342.70	0.27	389.56	458.6
J-19	345.75	0.22	389.54	428.6
J-20	345.30	0.24	389.54	433.0
J-21	341.50	0.00	389.56	470.3
J-22	348.50	6.12	389.53	401.5
J-23	352.00	4.19	389.53	367.3
J-24	342.00	0.00	389.53	465.2
J-00033	343.00	0.00	389.59	456.0
J-172	339.00	0.00	389.56	494.8
J-201	345.00	0.50	389.55	436.0
J-202	345.00	0.53	389.54	435.9
J-203	344.30	0.55	389.55	442.8

Ultimate Scenario

Active Scenario: Max Day

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (kPa)
J-1	346.30	0.38	389.27	420.5
J-2	345.50	0.26	389.26	428.3
J-3	346.00	0.34	389.26	423.4
J-4	346.00	0.36	389.26	423.4
J-5	345.50	0.47	389.27	428.4
J-6	345.00	0.55	389.27	433.3
J-7	344.80	0.40	389.26	435.2
J-8	345.00	0.34	389.26	433.2
J-9	343.70	0.27	389.31	446.4
J-10	344.00	0.06	389.30	443.4
J-11	344.75	0.33	389.29	435.9
J-12	344.25	0.21	389.28	440.7
J-13	344.00	0.40	389.28	443.1
J-14	343.10	0.61	389.32	452.3
J-15	345.10	0.53	389.30	432.6
J-16	344.50	0.38	389.28	438.3
J-17	344.50	0.38	389.28	438.2
J-18	342.70	0.53	389.36	456.7
J-19	345.75	0.45	389.30	426.2
J-20	345.30	0.48	389.28	430.5
J-21	341.50	0.00	389.34	468.2
J-22	348.50	12.24	389.24	398.7
J-23	352.00	8.39	389.24	364.5
J-24	342.00	0.00	389.27	462.6
J-00033	343.00	0.00	389.48	454.9
J-172	339.00	0.00	389.36	492.8
J-201	345.00	1.00	389.31	433.6
J-202	345.00	1.06	389.30	433.6
J-203	344.30	1.11	389.31	440.5

Ultimate Scenario

Active Scenario: Min Hour

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (kPa)
J-1	346.30	0.09	389.61	423.9
J-2	345.50	0.06	389.61	431.7
J-3	346.00	0.09	389.61	426.8
J-4	346.00	0.09	389.61	426.8
J-5	345.50	0.12	389.61	431.7
J-6	345.00	0.14	389.61	436.6
J-7	344.80	0.10	389.61	438.5
J-8	345.00	0.09	389.61	436.6
J-9	343.70	0.07	389.61	449.3
J-10	344.00	0.02	389.61	446.4
J-11	344.75	0.08	389.61	439.0
J-12	344.25	0.05	389.61	443.9
J-13	344.00	0.10	389.61	446.4
J-14	343.10	0.15	389.61	455.2
J-15	345.10	0.13	389.61	435.6
J-16	344.50	0.09	389.61	441.5
J-17	344.50	0.09	389.61	441.5
J-18	342.70	0.13	389.61	459.1
J-19	345.75	0.11	389.61	429.3
J-20	345.30	0.12	389.61	433.7
J-21	341.50	0.00	389.61	470.9
J-22	348.50	3.06	389.61	402.3
J-23	352.00	2.10	389.61	368.1
J-24	342.00	0.00	389.61	465.9
J-00033	343.00	0.00	389.62	456.3
J-172	339.00	0.00	389.62	495.4
J-201	345.00	0.25	389.61	436.6
J-202	345.00	0.26	389.61	436.6
J-203	344.30	0.28	389.61	443.5

Ultimate Scenario

Active Scenario: Peak Hour

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (kPa)
J-1	346.30	0.57	388.86	416.5
J-2	345.50	0.39	388.84	424.1
J-3	346.00	0.51	388.84	419.2
J-4	346.00	0.54	388.84	419.3
J-5	345.50	0.70	388.87	424.5
J-6	345.00	0.82	388.86	429.3
J-7	344.80	0.60	388.85	431.1
J-8	345.00	0.51	388.84	429.1
J-9	343.70	0.40	388.95	442.8
J-10	344.00	0.10	388.93	439.7
J-11	344.75	0.50	388.90	432.1
J-12	344.25	0.31	388.89	436.8
J-13	344.00	0.60	388.87	439.2
J-14	343.10	0.92	388.96	448.8
J-15	345.10	0.79	388.92	428.9
J-16	344.50	0.57	388.89	434.4
J-17	344.50	0.57	388.88	434.3
J-18	342.70	0.80	389.06	453.7
J-19	345.75	0.67	388.92	422.5
J-20	345.30	0.72	388.89	426.6
J-21	341.50	0.00	389.02	465.1
J-22	348.50	18.36	388.80	394.4
J-23	352.00	12.58	388.80	360.2
J-24	342.00	0.00	388.85	458.5
J-00033	343.00	0.00	389.31	453.3
J-172	339.00	0.00	389.04	489.8
J-201	345.00	1.51	388.95	430.1
J-202	345.00	1.58	388.93	429.9
J-203	344.30	1.66	388.95	437.0

Appendix F

Proposed Storm Sewer Analysis

WILMOT WOODS

TOWNSHIP OF
WILMOT, Ontario

STORM SEWER DESIGN SHEET

ENGINEERING AND PUBLIC WORKS

Project Number: 35056-104
Date: Jan. 25/2023
Design By: AJC
Checked By:
File: Q:\35056\104\STM\35056-104-Storm Sewer Design Sheet Revised Submission.xlsx

Drainage Area Plan No: PRELIM-ST1.1

Design Parameters

5 YEAR STORM

Q=kAIR, k=0.00278
Intensity (I) = $a/(tc+b)^c$
a = 1593
b = 11
c = 0.8789

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

MTE

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/s*	*mm*	*m*	*%*	*L/s*	*m/s*	*%*
Area to South SWMF																	
STREET FOUR	1			0.19	0.80	0.1520	0.1520	10.0000	0.3202	109.67742	46.34529	300	26.0	1.00	96.70076	1.3680	47.93
STREET FOUR	2			0.28	0.80	0.2240	0.3760	10.3202	0.6284	108.22826	113.12883	375	50.0	0.55	130.02831	1.1773	87.00
STREET FOUR	3			0.20	0.80	0.1600	0.5360	10.9486	0.5946	105.50006	157.20353	450	50.0	0.50	201.60049	1.2676	77.98
STREET FOUR				0.00	0.00	0.0000	0.5360	11.5433	0.1672	103.05032	153.55323	450	14.0	0.50	201.60049	1.2676	76.17
								11.7105									
STREET SIX	4			0.11	0.80	0.0880	0.0880	10.0000	0.4986	109.67742	26.83148	300	35.0	1.00	96.70076	1.3680	27.75
STREET SIX	5			0.13	0.80	0.1040	0.1920	10.4986	0.7999	107.43866	57.34646	300	52.0	0.50	68.37776	0.9673	83.87
STREET SIX	6			0.15	0.80	0.1200	0.3120	11.2985	0.7079	104.04390	90.24352	375	52.0	0.50	123.97713	1.1225	72.79
STREET SIX				0.00	0.80	0.0000	0.3120	12.0064	0.1917	101.22499	87.79851	375	14.0	0.50	123.97713	1.1225	70.82
STREET SIX	7			0.44	0.80	0.3520	0.6640	12.1980	0.7398	100.48958	185.49573	525	60.0	0.40	271.99526	1.2565	68.20
STREET SIX	8			0.40	0.80	0.3200	0.9840	12.9378	0.6754	97.75488	267.41042	600	60.0	0.40	388.33500	1.3735	68.86
STREET SIX	9			0.38	0.80	0.3040	1.2880	13.6132	0.6454	95.39333	341.56916	600	60.0	0.40	388.33500	1.3735	87.96
STREET SIX				0.00	0.80	0.0000	1.2880	14.2586	0.2159	93.24778	333.88672	600	20.0	0.40	388.33500	1.3735	85.98
								14.4744									
STREET TWO	10			0.54	0.80	0.4320	2.2560	14.4744	0.6440	92.55296	580.46257	750	65.0	0.35	658.62356	1.4908	88.13
STREET TWO				0.00	0.80	0.0000	2.2560	15.1184	0.1888	90.54438	567.86538	750	19.0	0.35	658.62356	1.4908	86.22
								15.3072									
STREET FIVE	11			0.47	0.80	0.3760	0.3760	10.0000	0.4433	109.67742	114.64362	375	45.0	1.00	175.33014	1.5875	65.39
STREET FIVE	12			0.51	0.80	0.4080	0.7840	10.4433	0.8098	107.68224	234.69559	525	81.0	0.60	333.12480	1.5389	70.45
STREET FIVE				0.00	0.80	0.0000	0.7840	11.2531	0.1659	104.23052	227.17250	525	14.0	0.40	271.99526	1.2565	83.52
								11.4190									
STREET SEVEN	13			0.48	0.80	0.3840	0.3840	10.0000	0.5882	109.67742	117.08284	375	60.0	1.00	175.33014	1.5875	66.78
STREET SEVEN	14			0.39	0.80	0.3120	0.6960	10.5882	0.4737	107.04657	207.12226	450	48.0	0.70	238.53691	1.4998	86.83
STREET SEVEN	15			0.51	0.80	0.4080	1.1040	11.0619	0.5533	105.02387	322.33085	600	60.0	0.60	475.61130	1.6821	67.77
STREET SEVEN	16			0.35	0.80	0.2800	1.3840	11.6152	0.6247	102.76206	395.37906	675	61.0	0.40	531.63462	1.4856	74.37
STREET SEVEN				0.00	0.80	0.0000	1.3840	12.2399	0.1852	100.33033	386.02297	675	18.0	0.40	531.63462	1.4856	72.61
								12.4251									
STREET TWO	17			0.55	0.80	0.4400	4.8640	15.3072	0.5077	89.97289	1216.60616	975	65.0	0.40	1417.36653	1.8984	85.84
STREET TWO				0.00	0.80	0.0000	4.8640	15.8149	0.1644	88.47398	1196.33807	975	21.0	0.40	1417.36653	1.8984	84.41
								15.9794									
STREET ONE	18			0.42	0.80	0.3360	0.3360	10.0000	0.6873	109.67742	102.44749	375	68.0	1.00	175.33014	1.5875	58.43

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/s*	*mm*	*m*	*%*	*L/s*	*m/s*	*%*
STREET ONE	19			0.39	0.80	0.3120	0.6480	10.6873	1.1014	106.61646	192.06316	525	90.0	0.40	271.99526	1.2565	70.61
STREET ONE				0.00	0.80	0.0000	0.6480	11.7888	0.2223	102.07394	183.88009	525	18.0	0.40	271.99526	1.2565	67.60
STREET ONE	20			0.29	0.80	0.2320	0.8800	12.0111	0.5674	101.20657	247.59175	525	51.0	0.45	288.49454	1.3327	85.82
STREET ONE	21			0.34	0.80	0.2720	1.1520	12.5786	0.5986	99.06274	317.25438	600	55.0	0.40	388.33500	1.3735	81.70
STREET ONE	22			0.29	0.80	0.2320	1.3840	13.1772	0.5701	96.90384	372.83946	675	55.0	0.40	531.63462	1.4856	70.13
STREET ONE				0.00	0.80	0.0000	1.3840	13.7473	0.1353	94.93900	365.27970	675	13.0	0.40	531.63462	1.4856	68.71
								13.8826									
STREET SIX	23			0.12	0.80	0.0960	0.0960	10.0000	0.5437	109.67742	29.27071	300	43.0	1.30	110.25583	1.5598	26.55
STREET SIX				0.00	0.80	0.0000	0.0960	10.5437	0.2417	107.24109	28.62050	300	19.0	1.30	110.25583	1.5598	25.96
								10.7854									
STREET NINE	24			0.16	0.80	0.1280	0.1280	10.0000	0.4635	109.67742	39.02761	300	36.0	1.00	96.70076	1.3680	40.36
STREET NINE	25			0.45	0.80	0.3600	0.4880	10.4635	1.0137	107.59309	145.96510	450	84.0	0.50	201.60049	1.2676	72.40
STREET NINE				0.00	0.80	0.0000	0.4880	11.4772	0.1704	103.31653	140.16333	450	14.0	0.50	201.60049	1.2676	69.53
								11.6476									
STREET EIGHT	26			0.26	0.70	0.1820	0.1820	10.0000	0.1178	109.67742	55.49239	300	10.0	1.00	96.70076	1.3680	57.39
								10.1178									
STREET EIGHT	27			0.47	0.80	0.3760	1.1420	11.6476	0.5439	102.63298	325.83509	600	55.0	0.50	434.17173	1.5356	75.05
STREET EIGHT	28			0.44	0.80	0.3520	1.4940	12.1915	0.5654	100.51436	417.46832	675	61.0	0.50	594.38558	1.6610	70.24
STREET EIGHT				0.00	0.80	0.0000	1.4940	12.7569	0.1769	98.40891	408.72371	675	19.0	0.50	594.38558	1.6610	68.76
								12.9338									
STREET NINE	29			0.16	0.80	0.1280	0.1280	10.0000	0.4249	109.67742	39.02761	300	33.0	1.00	96.70076	1.3680	40.36
STREET NINE	30			0.34	0.60	0.2040	0.3320	10.4249	0.2979	107.76355	99.46145	375	24.0	0.60	135.81014	1.2296	73.24
STREET NINE	31			0.39	0.60	0.2340	0.5660	10.7227	0.5456	106.46369	167.51849	450	50.0	0.60	220.84227	1.3886	75.85
STREET NINE	32			0.29	0.60	0.1740	0.7400	11.2684	0.6017	104.16749	214.29335	525	59.0	0.60	333.12480	1.5389	64.33
STREET NINE				0.00	0.80	0.0000	0.7400	11.8701	0.1640	101.75478	209.32994	525	16.0	0.60	333.12480	1.5389	62.84
STREET NINE	33			0.27	0.80	0.2160	0.9560	12.0341	0.8771	101.11765	268.73836	600	78.0	0.40	388.33500	1.3735	69.20
								12.9112									
STREET TEN	34			0.89	0.80	0.7120	0.7120	10.0000	0.7319	109.67742	217.09110	450	90.0	1.10	299.02184	1.8801	72.60
STREET TEN				0.00	0.80	0.0000	0.7120	10.7319	0.2198	106.42446	210.65231	525	20.0	0.50	304.09995	1.4048	69.27
								10.9517									
STREET NINE	35			0.22	0.80	0.1760	1.8440	12.9112	0.6500	97.85039	501.61241	750	64.0	0.35	658.62356	1.4908	76.16
STREET NINE				0.00	0.80	0.0000	1.8440	13.5613	0.1429	95.57063	489.92565	750	14.0	0.35	658.62356	1.4908	74.39
								13.7041									
STREET EIGHT	36			0.46	0.80	0.3680	3.7060	13.7041	0.6100	95.08470	979.62721	900	74.0	0.40	1144.94130	1.7997	85.56
STREET EIGHT	37			0.40	0.80	0.3200	4.0260	14.3141	0.6019	93.06804	1041.64354	975	71.0	0.35	1325.82498	1.7758	78.57
STREET EIGHT				0.00	0.80	0.0000	4.0260	14.9160	0.1617	91.16570	1020.35199	975	19.0	0.35	1325.82498	1.7758	76.96
								15.0777									
			SWMF	0.00	0.00	0.0000	10.2740	15.9794	0.3357	87.99984	2513.42679	1200	58.0	0.55	2891.37576	2.5565	86.93
Area to North SWMF																	
STREET TWO	38			0.35	0.80	0.2800	0.2800	10.0000	0.3022	109.67742	85.37291	300	28.0	1.00	96.70076	1.3680	88.29

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/s*	*mm*	*m*	*%*	*L/s*	*m/s*	*%*
								10.3022									
	39			0.73	0.80	0.5840	0.5840	10.0000	0.1322	109.67742	178.06349	450	15.0	1.00	285.10614	1.7926	62.46
								10.1322									
STREET TWO	40			0.37	0.80	0.2960	1.1600	10.3022	0.5271	108.30864	349.27370	600	54.0	0.50	434.17173	1.5356	80.45
								10.8293									
	41			0.55	0.80	0.4400	0.4400	10.0000	0.1430	109.67742	134.15742	375	15.0	1.00	175.33014	1.5875	76.52
								10.1430									
STREET TWO	42			0.27	0.80	0.2160	0.2160	10.0000	0.5437	109.67742	65.85910	300	48.0	1.00	96.70076	1.3680	68.11
								10.5437									
INGOLD AVENUE	43			0.63	0.80	0.5040	2.3200	10.8293	0.6728	106.00686	683.70183	750	81.0	0.50	787.20572	1.7819	86.85
INGOLD AVENUE				0.00	0.80	0.0000	2.3200	11.5021	0.1251	103.21605	665.70222	750	15.0	0.50	787.20572	1.7819	84.57
								11.6272									
STREET THREE	44			0.82	0.80	0.6560	0.6560	10.0000	0.7116	109.67742	200.01652	450	86.0	1.10	299.02184	1.8801	66.89
STREET THREE	45			0.60	0.80	0.4800	1.1360	10.7116	0.6568	106.51174	336.37259	525	90.0	1.10	451.05312	2.0836	74.57
STREET THREE				0.00	0.80	0.0000	1.1360	11.3684	0.1877	103.75808	327.67632	600	19.0	0.50	434.17173	1.5356	75.47
								11.5561									
	46			0.79	0.80	0.6320	0.6320	10.0000	0.1299	109.67742	192.69885	450	15.0	1.00	285.10614	1.7926	67.59
								10.1299									
INGOLD AVENUE	47			0.51	0.80	0.4080	4.4960	11.6272	0.5233	102.71431	1283.81381	975	71.0	0.45	1503.34422	2.0135	85.40
INGOLD AVENUE				0.00	0.80	0.0000	4.4960	12.1504	0.1477	100.67107	1258.27556	975	19.0	0.40	1417.36653	1.8984	88.78
								12.2981									
STREET ONE	48			0.49	0.80	0.3920	0.3920	10.0000	0.6959	109.67742	119.52207	375	74.0	1.10	183.88780	1.6649	65.00
STREET ONE	49			0.37	0.80	0.2960	0.6880	10.6959	0.4077	106.57923	203.84770	375	60.0	1.90	241.67592	2.1882	84.35
STREET ONE	50			0.24	0.80	0.1920	0.8800	11.1036	0.3967	104.84966	256.50421	450	60.0	1.70	371.73293	2.3373	69.00
STREET ONE				0.00	0.80	0.0000	0.8800	11.5003	0.2016	103.22317	252.52517	525	19.0	0.50	304.09995	1.4048	83.04
								11.7019									
SWMF	51			0.35	0.70	0.2450	5.6210	12.2981	0.4611	100.10999	1564.35678	1200	53.0	0.25	1949.36514	1.7236	80.25
BYPASS FOREBAY				0.64	0.60	0.3840	0.3840		0.0000	193.61355	206.68634	450		1.00	285.10614	1.7926	72.49

Lot 19 Concession South of Snyder's Road
Lot 20 Concession South of Snyder's Road

IVAN GINGERICH DRAIN
Ivan Gingerich Drain

CN RAILWAY

Canadian National Railway (CNR)

Concession South of Snyder's Road

Concession North of Bleams Road

Lot 20 Concession South of Snyder's Road
Lot 21 Concession South of Snyder's Road

RLES YOUNG AVE

MTE

PROJ. NO.	35056-104
DATE	Feb.07/23
SCALE	1:1250
BY	Alex Cressman
CAD FILE	P:\P\35056\104\TEMP DWGS\AJC\ 35056-104-STM+SAN_DESIGN_2ND SUB.DWG

BH 1 ELEV.=342.20
BH 2 ELEV.=341.78
BH 3 ELEV.=344.50
BH 4 ELEV.=342.61
BH 5 ELEV.=341.78
BH 6 ELEV.=343.61
BH 7 ELEV.=341.5
BH 8 ELEV.=343.37
BH 9 ELEV.=343.24
BH 10 ELEV.=342.20
BH 11 ELEV.=346.37
BH 12 ELEV.=346.22

MW102 ELEV.=341.08 PZ.=342.16
MW103 ELEV.=342.96 PZ.=344.13
MW104 ELEV.=346.95 PZ.=345.88
MW105B ELEV.=345.36 PZ.=345.42
MW109 ELEV.=340.06 PZ.=340.92
MW110 ELEV.=340.04 PZ.=340.75
MW201-21 ELEV.=342.08 PZ.=343.13
MW201-21 ELEV.=343.52
MW203B-21 ELEV.=344.77 PZ.=345.72
MW203D-21 ELEV.=345.73 PZ.=345.70
MP01-22 ELEV.=340.97 PZ.=342.22

WETLAND BOUNDARY
WETLAND BUFFER
10m DRIPLINE BUFFER
15m WETLAND BUFFER

Appendix G

Railway Compliance Guidelines Memo

Technical Memorandum

Project Name: Wilmot Woods Subdivision

MTE File No.: 35056-104

To: Adam Belskey, Capital Homes

Date: August 23, 2022

cc: Paul Britton, MHBC

From: Jeff Martens, P.Eng.
Alex Cressman, P.Eng.

RE: Wilmot Woods Subdivision
Screening of Compliance with Railway Proximity Guidelines
Township of Wilmot

MTE has been retained by Wilmot Woods Developments Inc. to confirm the development proposed by the Plan of Subdivision (the Proposed Development) complies with the Proximity Guidelines. Outlined in this technical memorandum are the relevant sections of the Proximity Guidelines in italics, and a response from MTE as to the means by which the Proposed Development has met the guideline requirements. Attached is **MTE Drawing 35056-104-MS11** referred to throughout this letter report, which illustrates the development and various applicable "setback" lines from the CN Principal Main Line.

3.3 BUILDING SETBACKS FOR NEW DEVELOPMENTS

3.3.1 Guidelines

The standard recommended building setbacks for new residential development in proximity to railway operations are as follows:

- *Freight Rail Yard: 300 metres*
- *Principal Main Line: 30 metres*
- *Secondary Main Line: 30 metres*
- *Principal Branch Line: 15 metres*
- *Secondary Branch Line: 15 metres*
- *Spur Line: 15 metres*

Setback distances must be measured from the mutual property line to the building face. This will ensure that the entire railway right-of-way is protected for potential rail expansion in the future.

Policy Recommendation

Municipalities should establish minimum setback requirements through a zoning bylaw amendment.

MTE Response

The CN rail line in the vicinity of the Proposed Development is a Principal Main Line. Attached is MTE Drawing 35056-104-MS11 illustrating the 30m setbacks from the mutual property line. No new residential house construction is being proposed within 30m of the mutual property line of the CN Principal Main Line as illustrated on the attached plan. Generally open space abuts the CP right-of-way. Accordingly, the Proposed Development complies with the building setback guidelines in section 3.3 of the Proximity Guidelines.

3.4 NOISE MITIGATION
3.4.1 Guidelines

Since rail noise is site-specific in nature, the level and impact of noise on a given site should be accurately assessed by a qualified acoustic consultant through the preparation of a noise impact study. The objective of the noise impact study is to assess the impact of all noise sources affecting the subject lands and to determine the appropriate layout, design, and required control measures. Noise studies should be undertaken by the proponent early in the development process, and should be submitted with the initial proposal.

MTE Response

Reference document – Environmental Noise and Vibration Feasibility Assessment – Proposed Residential Development - Wilmot Woods Development Community, Township of Wilmot (February 2022) prepared by RJ Burnside & Associates Limited (Feasibility Assessment).

The Proximity Guidelines recommend that a minimum noise influence area of 300 metres measured from a Principal Main Line be used in undertaking noise studies. Noise and Vibration Procedures and Criteria are contained in Appendix C of the Proximity Guidelines, which provide procedures and criteria to be applied in undertaking noise assessments, including the development of noise mitigation measures. The Noise Assessment assessed the impact of railway noise based on railway traffic volumes provided by CP, using a 2.5% growth rate, as required by the Proximity Guidelines. We confirm that the Noise Assessment complies with all of the recommended procedures and criteria set out in the Proximity Guidelines, including those in Appendix C. The Noise Assessment also complies with *NPC-300: Environmental Noise Guideline: Stationary and Transportation Sources – Approval and Planning (MOE, 2013)* in accordance with Regional requirements.

The Noise Assessment recommends that for development within certain setback limits, specified noise mitigation measures be applied to address potential noise impacts from the CP railway line, to ensure compliance with the criteria in the Proximity Guidelines and NPC 300, including the following:

- a noise attenuation barrier.
- noise warning clauses of varying types for certain lots/blocks as described in the Noise Assessment.
- forced air heating and provision for the future installation of central air conditioning on certain lots/blocks.
- brick veneer or masonry equivalent construction on exterior walls for buildings on certain lots/block.

Based on the above, the Proposed Development fully complies with the noise mitigation guidelines set out in the Proximity Guidelines.

3.4.1.1 Avoiding Adverse Noise Impacts through Good Design

Many of the adverse impacts of railway noise can be avoided or minimized through good design practices. Careful consideration of the location and orientation of buildings, as well as their internal layout can minimize the exposure of sensitive spaces to railway noise. Site design should take into consideration the location of the rail corridor, existing sound levels, topography, and nearby buildings. Noise barriers, acoustic shielding from other structures, and the use of appropriate windows, doors, ventilation, and façade materials can all minimize the acoustic impacts of railway operations.

MTE Response

The subdivision was designed having regard for the CN rail line. *The Environmental Noise and Vibration Feasibility Assessment* completed to support the Draft Plan of Subdivision application assessed the noise exposure of sensitive land uses to the rail line based on railway location, topography, and existing features. This Feasibility Assessment guided the design of the subdivision and also made recommendations to mitigate impacts. To this end, residential lots and blocks are well separated from the CN rail line by environmental features, related setbacks, roads and other infrastructure including a planned stormwater management facility directly adjacent to the CN rail line. As such, this guideline has been satisfied.

3.4.1.2 Noise Barriers

A noise barrier can effectively reduce outdoor rail noise by between 5dBA and 15dBA, although the largest noise reductions are difficult to achieve without very high barriers. Noise barriers provide significant noise reductions only when they block the line of sight between the noise source and the receiver. Minimum noise barrier heights vary by the classification of the neighbouring rail line.

MTE Response

The Feasibility Assessment established a setback distance between the rail line and a point of assessment at a noise sensitive receiver that would require a noise barrier to meet outdoor noise limits. This setback limit Stage 5 Block 2 (S5B2) is illustrated within the Feasibility Assessment. The development proposes to construct a berm and barrier such that noise levels meet the requirements of NPC-300.

3.4.1.4 Podiums

Outdoor rail noise can be substantially reduced by building residential apartments on top of a podium or commercial building space. If the residential tower is set back, then the podium acts to provide increased distance from the railway corridor, thus reducing the noise from the corridor and providing extra shielding to the lower apartments.

MTE Response

The proposed development does not include high rise style buildings. As such, this guideline is not relevant.

3.4.1.5 Balconies

Providing enclosed balconies can be an effective means of reducing the noise entering a building. Where enclosed balconies are used, acoustic louvres and possibly a fan to move air into and out of the balcony space may be installed to address ventilation requirements.

MTE Response

The proposed development does not include high rise style buildings. As such, this guideline is not relevant.

3.4.1.6 Vegetation

While vegetation such as trees and shrubs does not actually limit the intrusion of noise, it has been shown to create the perception of reduced noise levels. Vegetation is also valuable for improving the aesthetics of noise barriers and for reducing the potential for visual intrusion from railway operations.

MTE Response

Generally, there is an existing woodlot and wetland, a proposed SWM facility, and a proposed crash berm, along the southern property line between the CN corridor and the proposed residential lots. Although not all of it is planned vegetation, the desired outcome is the same in that the existing woodlot and proposed facilities provide a visual screen of the rail line/trains. As such, the intent of this guideline is meet.

3.4.1.7 to 3.4.1.9 Walls, Windows and Doors

MTE Response

Reference document – Environmental Noise and Vibration Feasibility Assessment – Proposed Residential Development - Wilmot Woods Development Community, Township of Wilmot (February 2022) prepared by RJ Burnside & Associates Limited.

The Feasibility Assessment established that EW5 brick veneer is required for the exterior walls of the first row of dwellings adjacent to the rail line if they are within 100m of the rail line. Special Building Component analysis is not required for the balance of the subject lands.

3.5 VIBRATION MITIGATION

3.5.1 Guidelines

• Since vibration is site-specific in nature, the level and impact of vibration on a given site can only be accurately assessed by a qualified acoustic or vibration consultant through the preparation of a vibration impact study. It is highly recommended that an acoustic or vibration consultant be obtained by the proponent early in the design process, as mitigation can be difficult. It is recommended that the consultant be used to determine whether vibration mitigation measures are necessary and what options are available given the particular conditions of the development site in question. The consultant will employ measurements to characterize the vibration affecting the site in question. In the absence of a future rail corridor not yet operating,
estimates based on soil vibration testing are required, although such sites are quite rare.

• The recommended minimum vibration influence area to be considered is 75 metres from a railway corridor or rail yard.

• See AC.2.5 for recommended procedures for the preparation of vibration impact studies. These should be observed.

MTE Response

Reference document – Environmental Noise and Vibration Feasibility Assessment – Proposed Residential Development - Wilmot Woods Development Community, Township of Wilmot (February 2022) prepared by RJ Burnside & Associates Limited.

The Feasibility Assessment considered the potential impact of vibration from railway operations within 140m of the railway right-of-way. The Assessment concluded that standard and custom vibration mitigation measures are required for dwellings within the defined setback lines. As the exact location of the dwelling footprints are not known at this time, mitigation measures will have to be determined during detailed design of the subject lands.

3.6 SAFETY BARRIERS

3.6.1 Guidelines

3.6.1.1 Berms

• Where full setbacks are provided, safety barriers are constructed as berms, which are simple earthen mounds compacted to 95% modified proctor. Setbacks and berms should typically be provided together in order to afford a maximum level of mitigation. Berms are to be constructed adjoining and parallel to the railway right-of-way with returns at the ends and to the following specifications:

Principal Main Line:	*2.5 metres above grade with side slopes not steeper than 2.5 to 1*
Secondary Main Line:	*2.0 metres above grade with side slopes not steeper than 2.5 to 1*
Principal Branch Line:	*2.0 metres above grade with side slopes not steeper than 2.5 to 1*
Secondary Branch Line:	*2.0 metres above grade with side slopes not steeper than 2.5 to 1*
Spur Line:	*no requirement*

N.B. Berms built to the above specifications will have a full width of as many as 15 metres.

• Berm height is to be measured from grade at the property line. Reduced berm heights are possible where larger setbacks are proposed.
• Steeper slopes may be possible in tight situations, and should be negotiated with the affected railway.
• Where the railway line is in a cut of equivalent depth, no berm is required.
• There is no requirement for the proponent to drop back to grade on the side of the berm facing the subject development property. The entire grade of the development could be raised to the required height, or could be sloped more gradually. This may be desirable to avoid creating unusable backyard space, due to the otherwise steep slope of the berm.
• Marginal reductions in the recommended setback of up to 5 metres may be achieved through a reciprocal increase in the height of the berm.
• If applicable to the site conditions, in lieu of the recommended berm, a ditch or valley between the railway and the subject new development property that is generally equivalent to or greater than the inverse of the berm could be considered (e.g. a ditch that is 2.5 metres deep and approximately 14 metres wide in the case of a property adjacent to a Principal Main Line).
• Where the standard berm and setback are not technically or practically feasible, due for example, to site conditions or constraints, then a Development Viability Assessment should be undertaken by the proponent to evaluate the conditions specific to the site, determine its suitability for development, and suggest alternative safety measures such as crash walls or crash berms.

MTE Response

Reference document - MTE Drawing 35056-104-MS11

The Proximity Guidelines require that due to the elevated nature of the CN corridor relative to the subject lands, a 2.5 m high berm with slopes not steeper than 2.5:1 be constructed adjacent to the CN corridor. Refer to MTE Drawing 35056-104-MS11 for a depiction of the crash berm.

3.7 SECURITY FENCING

Trespassing onto a railway corridor can have dangerous consequences given the speed and frequency of trains, and their extremely large stopping distances, and every effort should be made to discourage it. This will save lives, reduce emergency whistling, and minimize disruptions to rail service.

3.7.1 GUIDELINES

• At a minimum, all new residential developments in proximity to railway corridors must include a 1.83 metre high chain link fence along the entire mutual property line, to be constructed by the owner entirely on private property. Other materials may also be considered, in consultation with the relevant railway and the municipality. Noise barriers and crash walls are generally acceptable substitutes for standard fencing, although additional standard fencing may be required in any location with direct exposure to the rail corridor in order to ensure there is a continuous barrier to trespassing.

MTE Response

Reference document - MTE Drawing 35056-104-MS11

MTE Drawing 35056-104-MS11 illustrates a 1.83m high chain link fence along the perimeter of the Proposed Development. It should be noted that along much of the railway corridor, the Plan of Subdivision is separated from the corridor by open space lands that are owned by the Township. The Proposed Development will comply with guideline 3.7.1 regarding security fencing.

3.8 STORMWATER MANAGEMENT AND DRAINAGE

3.8.1 GUIDELINES

- *The proponent should consult with the affected railway regarding any proposed development that may have impacts on existing drainage patterns. Railway corridors/properties with their relative flat profile are not typically designed to handle additional flows from neighbouring properties, and so development should not discharge or direct stormwater, roof water, or floodwater onto a railway corridor.*
- *Any proposed alterations to existing rail corridor drainage patterns must be substantiated by a suitable drainage report, as appropriate.*
- *Any development-related changes to drainage must be addressed using infrastructure and/or other means located entirely within the confines of the subject development site.*
- *Stormwater or floodwater flows should be designed to:*
  - *» maintain the structural integrity of the railway corridor infrastructure;*
  - *» avoid scour or deposition; and*
  - *» prevent obstruction of the railway corridor as a result of stormwater or flood debris.*
- *Drainage systems should be designed so that stormwater is captured on site for reuse or diverted away from the rail corridor to a drainage system, ensuring that existing drainage is not overloaded.*
- *Building design should ensure that gutters and balcony overflows do not discharge into rail infrastructure. Where drainage into the railway corridor is unavoidable due to site characteristics, discussion should be held early on with the railway. If upgrades are required to the drainage system solely due to nearby development, the costs involved should reasonably be met by the proponent. All disturbed surfaces must be stabilized.*
- *Similarly, railways should consult with municipalities where facility expansions or changes may impact drainage patterns.*

MTE Response

Reference document – Wilmot Woods Subdivision – Preliminary Stormwater Management Report (April 2022)

Refer to the Preliminary Stormwater Management for an analysis of the SWM and drainage towards the existing CN corridor and associated culvert.

Storm water runoff from the development lands are directed to stormwater management facilities which outlet to drainage features that are outside of the railway corridor. The southern SWM facility (referred to as SWMF2) outlets towards the existing wetland and ditch adjacent to the CN corridor, and ultimately under the corridor via an existing 900mm culvert. Under post-development conditions, peak flows are reduced, and the Proposed Development complies with the requirements of guideline 3.8.1 regarding stormwater management and drainage.

3.9 WARNING CLAUSES AND OTHER LEGAL AGREEMENTS

3.9.1 GUIDELINES

- *Municipalities are encouraged to promote the use of appropriate specific rail operations warning clauses, if feasible, in consultation with the appropriate railway, to ensure that those who may acquire an interest in a subject property are notified of the existence and nature of the rail operations, the potential for increased rail activities, the potential for annoyance or disruptions, and that complaints should not be directed to the railways. Such warning clauses should be registered on title if possible and be inserted into all agreements of purchase and sale or lease for the affected lots/units.*
- *Municipalities are encouraged to pursue the minimum influence areas outlined in the report when using warning clauses or other notification mechanisms.*
- *Appropriate legal agreements and restrictive covenants registered on title are also recommended to be used, if feasible, to secure the construction and maintenance of any required mitigation measures, as well as the use of warning clauses and any other notification requirements.*
- *Municipalities are encouraged to require appropriate signage/documentation at development marketing and sales centres that:*
    - *identifies the lots or blocks that have been identified by any noise and vibration studies and which may experience noise and vibration impacts;*
    - *identifies the type and location of sound barriers and security fencing;*
    - *identifies any required warning clause(s); and*
    - *contains a statement that railways can operate on a 24 hour a day basis, 7 days a week.*

- *Additionally, studies undertaken to assess and mitigate noise, vibration, and other emissions should be released to potential purchasers for review in order to enhance their understanding of the site constraints and to help minimize future conflict.*
- *Where title agreements, restrictive covenants, and/or warning clauses are not currently permitted, appropriate legislative amendments are recommended. This may require coordination at the provincial level to provide appropriate and/or improved direction to stakeholders.*
- *Warnings and easements provide notice to purchasers, but are not to be used as a complete alternative to the installation of mitigation measures.*

MTE Response

Reference document – Environmental Noise and Vibration Feasibility Assessment – Proposed Residential Development - Wilmot Woods Development Community, Township of Wilmot (February 2022) prepared by RJ Burnside & Associates Limited.

The noise warning clauses in the Feasibility Assessment include the appropriate warning clauses as outlined in Section 3.9.1.

3.10 CONSTRUCTION ISSUES

Planning for construction of new developments in proximity to railway corridors requires unique considerations that should aim to maintain safety while avoiding disruptions to rail service. The efficiency of the operation of railway services should be maintained and no adverse impacts on the corridor or railway operations should occur during the design and construction of a new development located in proximity to a railway corridor.

3.10.1 GUIDELINES

• Prior to the start of construction of a new development, rail corridor-related infrastructure must be identified and plans adjusted as required to ensure that these features are not adversely affected by the proposed construction. Rail corridor-related infrastructure may include, but is not limited to:

- *trackage;*
- *fibre optic cables;*
- *retaining walls;*
- *bridge abutments; and,*
- *signal bridge footings.*

• No entry upon, below, or above the rail corridor shall be permitted without prior consent from the railway.
• Appropriate permits and flagging are required for work immediately adjacent to railway corridors. The proponent is responsible for any related costs.
• Temporary fencing / hoarding is required, as appropriate, to discourage unauthorized access to the rail corridor. Plans illustrating proposed fencing / hoarding locations as well as any other construction related infrastructure, should be submitted to the approval authority and the relevant railway.
• Cranes, concrete pumps, and other equipment capable of moving into or across the airspace above railway corridors may cause safety and other issues if their operation is not strictly managed. This type of equipment must not be used in airspace over the rail corridor without prior approval from the railway.
• Existing services and utilities under a rail corridor must be protected from increased loads during the construction and operation of the development.
• Construction must not obstruct emergency access to the railway corridor.

MTE Response

Construction will comply with the requirements of 3.10.1. Crossing-related work within the corridor will be undertaken in accordance with plans approved by CN in accordance with an agreement with CN.

Overall Conclusion

Based on the above analysis for the Hallman development plans, MTE concludes that these development plans are in compliance with the *Guidelines for New Development in Proximity to Railway Operations (May 2013)*.

MTE FILE PATH: P:\P\35056\104\35056-104-P-MS11.DWG

March 2, 2023 - 11:16:42 AM - Plotted By: Alex Cressman

IVAN GINGERICH DRAIN

WATERLOO STREET

CHARLES YOUNG AVE

INGOLD AVE

CN RAILWAY

300m RAILWAY OFFSET

100m RAILWAY OFFSET

30m RAILWAY OFFSET

STREET SIX

STREET SEVEN

STREET EIGHT

STREET NINE

STREET TEN

Blk. 1 0.19 ha
Blk. 2 0.52 ha
Blk. 3 0.13 ha
Blk. 4 1.66 ha
Blk. 5 0.18 ha
Blk. 6 0.13 ha
Blk. 7 0.31 ha
Blk. 8 0.18 ha
Blk. 9 0.31 ha
Blk. 10 0.19 ha
Blk. 11 0.31 ha
Blk. 12 0.51 ha
Blk. 13 0.51 ha
Blk. 14 0.51 ha
Blk. 15 0.3m Reserve 0.001 ha
Blk. 16 0.25 ha
Blk. 17 0.19 ha
Blk. 18 0.18 ha
Blk. 19 Multiple Residential 1.03 ha
Blk. 20 Multiple Residential 0.98 ha
Blk. 21 Multiple Residential 0.82 ha
Blk. 22 Park 1.00 ha
Blk. 23 Open Space 0.92 ha
Blk. 24 Open Space 3.27 ha
Blk. 25 Open Space 0.73 ha
Blk. 26 SWM Facility 1.82 ha
Blk. 27 SWM Facility 1.17 ha
Blk. 28 0.48 ha
Blk. 29 0.56 ha
Blk. 30 0.21 ha
Blk. 31 0.34 ha
Blk. 32 0.32 ha
Blk. 33 0.32 ha
Blk. 34 0.19 ha
Blk. 35 0.19 ha
Blk. 36 0.24 ha
Blk. 37 Road Widening 0.03 ha
Blk. 8 Open Space 2.86 ha
Walkway 0.07 ha
Walkway 0.04 ha

PROP 1.83m HIGH CHAIN LINK FENCE

PROP 1.83m HIGH CHAIN LINK FENCE ADJACENT TO WOODED AREA

PROP 1.83m HIGH CHAIN LINK FENCE ADJACENT TO WOODED AREA

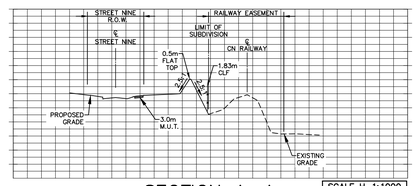
EX. SWM FACILITY

10m DRIPLINE BUFFER

30m WETLAND BUFFER

WETLAND BOUNDARY

SECTION A–A



SCALE H-1:1000 V-1:200

LEGEND

- SITE BOUNDARY
- EXISTING CONTOURS (326.0)
- EXISTING EMBANKMENT (SLOPE AS NOTED) (TOP) (BOTTOM)
- EXISTING DRIPLINE
- DRIPLINE BUFFER
- WETLAND BUFFER
- EXISTING WETLAND
- PROPOSED CONTOURS (336.0)
- EXISTING CN RAILWAY
- 30m RAILWAY OFFSET
- 100m RAILWAY OFFSET
- 300m RAILWAY OFFSET
- 1.8m VINYL CLF

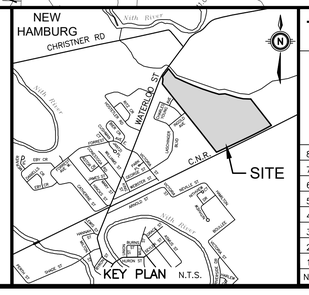
NOTE TO CONTRACTOR :

DO NOT SCALE DRAWINGS.

CONTRACTORS MUST CHECK AND VERIFY ALL DIMENSIONS AND REPORT ANY DISCREPANCIES TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.

ALL DRAWINGS REMAIN THE PROPERTY OF THE ENGINEER AND SHALL NOT BE REPRODUCED OR REUSED WITHOUT THE ENGINEER'S WRITTEN PERMISSION.

THE OWNER/ARCHITECT/CONTRACTOR IS ADVISED THAT M.T.E. CONSULTANTS INC. CANNOT CERTIFY ANY COMPONENT OF THE SITE WORKS NOT INSPECTED DURING CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO NOTIFY M.T.E. CONSULTANTS INC. PRIOR TO COMMENCEMENT OF CONSTRUCTION TO ARRANGE FOR INSPECTION.



TOWNSHIP OF WILMOT

No.	REVISION	BY	DATE
8.			
7.			
6.			
5.			
4.			
3.			
2.			
1.			

GEODETIC BM ELEV. = 342.487m
TABLET IS SET HORIZONTALLY IN SOUTH FACE OF CONCRETE FOUNDATION, BEING 62m NORTH OF CENTRELINE OF HIGHWAY; 2.26m EAST OF SOUTHWEST CORNER AND 24cm BELOW THE FIRST COURSE OF BRICKWORK.

SITE BENCHMARK ELEV. = 339.773m
CUT CROSS SOUTHWEST CORNER CONCRETE BOX CULVERT ON SOUTH SIDE OF WATERLOO STREET PNO 9059

OWNER
WILMOT WOODS DEVELOPMENTS INC.
310 FAIRWAY ROAD SOUTH KITCHENER

PROJECT
WILMOT WOODS
NEW HAMBURG

DRAWING
CN RAIL PROXIMITY GUIDELINES PLAN

MTE
Engineers, Scientists, Surveyors
(519) 743-6500 www.mte85.com

Project Manager J.CABRAL	Project No. 35056-104
Design By AJC	Checked By VAL
Drawn By AXH	Checked By AJC
Surveyed By RLK/KPW	Drawing No. MS11
Date JAN.31/18	
Scale 1:1500	Sheet of

Appendix H

Traffic Calming

LEGEND

- LIMIT OF SUBDIVISION
- EXISTING EMBANKMENT (TOP) / (BOTTOM)
- PROPOSED EMBANKMENT (TOP) / (BOTTOM)
- EXISTING WATERCOURSE
- PEDESTRIAN PROTECTION (REFUGE ISLAND PER RMW DRAWING 217)
- TURNING CIRCLE
- INTERSECTION TREATMENT (RAISED INTERSECTION)

N

APPROXIMATE LOT LINES (TO BE CONFIRMED IN FINAL DESIGN)

IVAN GINGERICH DRAIN

CN RAILWAY

STREET NINE

STREET TEN

STREET EIGHT

STREET SEVEN

STREET SIX

STREET FIVE

STREET FOUR

STREET THREE

STREET TWO

STREET ONE

WATERLOO STREET

CHARLES YOUNG AVE

INGOLD AVE

SWMF 1

SWMF 2

EX. SWM FACILITY

Blk. 6 Trail 0.05 ha
Blk. 12 Trail 0.03 ha
Blk. 15 0.3m Reserve 0.001 ha
Blk. 13 Trail 0.18 ha
Blk. 14 0.09 ha
Blk. 9 0.31 ha
Blk. 8 0.27 ha
Blk. 14 Trail 0.21 ha
Blk. 5 0.54 ha
Blk. 6 0.31 ha
Blk. 7 0.31 ha
Blk. 5 0.35 ha
Blk. 4 0.34 ha
Blk. 4 0.66 ha
Blk. 11 0.70 ha
Blk. 23 Open Space 0.92 ha
Blk. 1 0.45 ha
Blk. 2 0.52 ha
Blk. 3 0.56 ha
Blk. 2 0.16 ha
Blk. 3 0.21 ha
Blk. 22 Park 1.00 ha
Blk. 20 Multiple Residential 0.98 ha
Blk. 4 0.29 ha
Blk. 5 0.18 ha
Blk. 6 0.13 ha
Blk. 7 0.19 ha
Blk. 8 0.18 ha
Blk. 21 Multiple Residential 0.82 ha
Blk. 16 0.25 ha
Blk. 12 0.51 ha
Blk. 10 0.19 ha
Blk. 9 0.19 ha
Blk. 19 Multiple Residential 1.03 ha
Blk. 3 0.13 ha
Blk. 2 0.14 ha
Blk. 1 0.24 ha
Blk. 2 0.31 ha
Blk. 11 0.31 ha
Blk. 4 0.32 ha
Blk. 3 0.32 ha
Blk. 17 0.19 ha
Blk. 13 0.51 ha
Blk. 14 0.51 ha
Blk. 1 0.19 ha
Blk. 5 0.19 ha
Blk. 8 Open Space 2.86 ha
Blk. 6 0.59 ha
Blk. 24 Open Space 3.27 ha
Blk.37 Road Widening 0.03 ha
Blk. 25 Open Space 0.73 ha
Blk. 18 0.18 ha
Blk. 15 0.49 ha
Blk. 15 Walkway 0.02 ha
Blk. 7 0.56 ha
Blk. 9 Walkway 0.02 ha
Blk. 26 Open Space 0.38 ha
Blk. 8 Open Space 2.86 ha

APPENDIX H1 Date: DEC.8/23 Scale: 1:3000

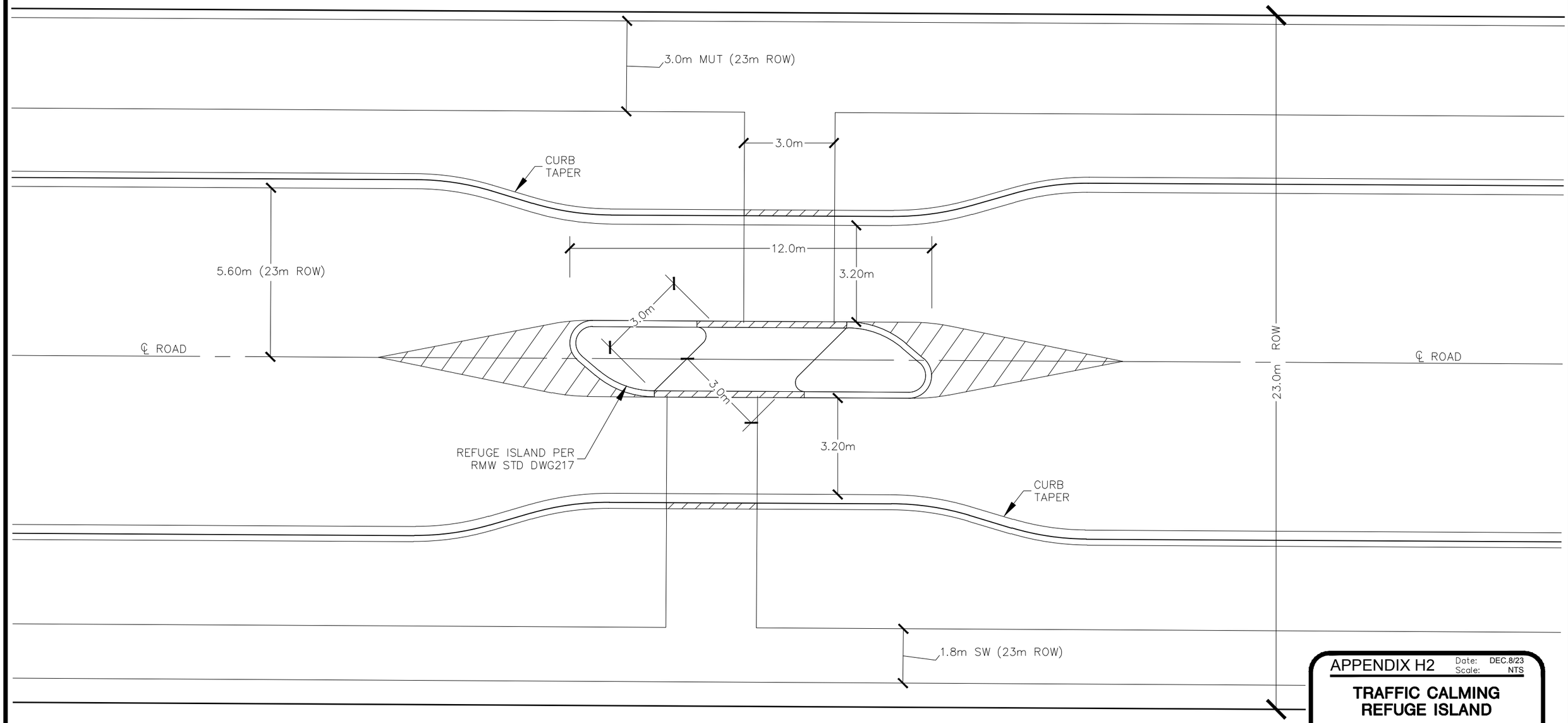
TRAFFIC CALMING LOCATIONS

MTE Engineers, Scientists, Surveyors

Project No.: 35056-104

December 6, 2023 8:51 a.m. Plotted By: ABarakzay

P:\P\35056\104\35056-104-P-MS16.1 (APPENDIX H1).dwg



APPENDIX H2 Date: DEC.8/23 Scale: NTS

TRAFFIC CALMING REFUGE ISLAND

MTE

Engineers, Scientists, Surveyors

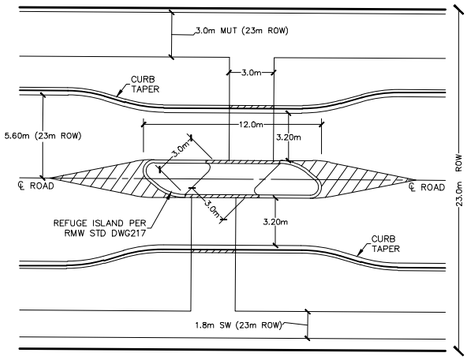
Project No.: 35056-104

December 5, 2023 4:39 p.m. Plotted By: ABarakzay

P:\P\35056\104\35056-104-P-MS9.1(APPENDIX H2).dwg

LEGEND

- LIMIT OF SUBDIVISION
- EXISTING EMBANKMENT (TOP / BOTTOM)
- EXISTING WATERCOURSE
- PROPOSED EMBANKMENT (TOP / BOTTOM)
- PROPOSED DRIVEWAY (APPROXIMATE) — CURB & GUTTER
- PROPOSED APPROXIMATE PROPERTY/LOT LINE



PEDESTRIAN REFUGE ISLAND DETAIL
SCALE: N.T.S.

N

IVAN GINGERICH DRAIN

Blk. 10 0.09 ha

PEDESTRIAN REFUGE ISLAND AND CURB TAPER (SEE DETAIL)

Blk. 9 0.31 ha

Blk. 8 0.27 ha

STREET NINE

Blk. 5 0.54 ha

Blk. 7 0.31 ha

Blk. 6 0.31 ha

STREET TEN

Blk. 5 0.35 ha

Blk. 4 0.34 ha

STREET NINE

Stage 4

APPROXIMATE LOT LINES (TO BE CONFIRMED IN FINAL DESIGN)

STREET EIGHT

STREET SIX

Blk. 23 Open Space 0.92 ha

Blk. 1 0.45 ha

Blk. 2 0.52 ha

Blk. 3 0.56 ha

Blk. 4 0.66 ha

Blk. 11 0.70 ha

STREET SEVEN

Stage 2

Blk. 2 0.16 ha

Blk. 3 0.21 ha

SWMF 2

Blk. 1 0.44 ha

Blk. 28 SWM Facility 1.82 ha

Blk. 22 Park 1.00 ha

Stage 1

Blk. 20 Multiple Residential 0.98 ha

Blk. 4 0.29 ha

Blk. 5 0.18 ha

PEDESTRIAN REFUGE ISLAND AND CURB TAPER (SEE DETAIL)

STREET TWO

Blk. 6 0.13 ha

Blk. 7 0.19 ha

Blk. 8 0.18 ha

PROPOSED TRAFFIC CIRCLE

Stage 1

Blk. 21 Multiple Residential 0.82 ha

Blk. 10 0.19 ha

Blk. 9 0.19 ha

APPENDIX H3 Date: DEC.8/23 Scale: 1:1500

STREET TWO/EIGHT DRIVEWAY LOCATION PLAN

MTE
Engineers, Scientists, Surveyors

Project No.: 35056-104

December 6, 2023 — 8:49 a.m. — Plotted By: ABarakzay

P:\P\35056\104\35056-104-P-MS24.dwg

Drawings

MTE FILE PATH: P:\P\35056\104\35056-104-P-EC1.DWG

March 7, 2023 - 10:47:19 AM - Plotted By: Alex Cressman

LEGEND

- PROPERTY BOUNDARY
- LIMIT OF SUBDIVISION
- EXISTING DIRECTION OF DRAINAGE/SWALE
- EXISTING CONTOURS (GENERATED BY MTE)
- EXISTING CONTOURS (PROVIDED BY REGION OF WATERLOO GIS)
- EXISTING SANITARY SEWER (Ex. 300mmø SAN, Ex. SAN MH)
- EXISTING STORM SEWER (Ex. 600mmø STM, Ex. STM MH)
- EXISTING WATERMAIN (Ex. 200mmø WTM, Ex. HYD, SCV)
- EXISTING DRIPLINE
- IVAN GINGERICH MUNICIPAL DRAIN FLOODPLAIN
- EXISTING WETLAND
- WETLAND BUFFER
- DRIPLINE BUFFER
- PROPOSED RIGHT OF WAY
- EXISTING WATERCOURSE
- EXISTING RAILWAY
- EXISTING BOREHOLE (Ex. BH10, Elev=311.64)
- EXISTING MONITORING WELL (BH/MW302-D, Ground Elev=313.50, Top of Casing=314.45)

IVAN GINGERICH DRAIN

CN RAILWAY

WATERLOO STREET

CHARLES YOUNG AVE

INGOLD AVE

EX. 1750mm CSP
SE. INV.=337.54
NW. INV.=337.48

EX. 2.4m x 1.2m
BOX CULVERT
SE. INV.=338.09
NW. INV.=338.04

EX. 900mmø
CULVERT
N. INV.=339.503
S. INV.=339.304

EX. SWM FACILITY

MW101 ELEV.=339.20 PZ.=340.12
MW102 ELEV.=340.15 PZ.=341.11
MW103 ELEV.=341.08 PZ.=342.16
MW104 ELEV.=344.95 PZ.=345.88
MW105 ELEV.=342.96 PZ.=344.13
MW106 ELEV.=345.30 PZ.=346.42
MW107 ELEV.=347.01 PZ.=348.06
MW108 ELEV.=340.04 PZ.=340.75
MW109 ELEV.=340.06 PZ.=340.92
MP01-22 ELEV.=340.97 PZ.=342.22
MW201-21 ELEV.=343.52 PZ.=344.38
MW202-21 ELEV.=342.08 PZ.=343.13
MW203A-21 ELEV.=344.73 PZ.=345.70
MW203B-21 ELEV.=344.77 PZ.=345.72

BH 1 ELEV.=339.37
BH 2 ELEV.=341.42
BH 3 ELEV.=344.50
BH 4 ELEV.=342.61
BH 5 ELEV.=341.78
BH 6 ELEV.=343.61
BH 7 ELEV.=341.57
BH 8 ELEV.=343.37
BH 9 ELEV.=343.24
BH 10 ELEV.=342.20
BH 11 ELEV.=346.37
BH 12 ELEV.=346.22

10m DRIPLINE BUFFER
15m WETLAND BUFFER
30m WETLAND BUFFER
WETLAND BOUNDARY

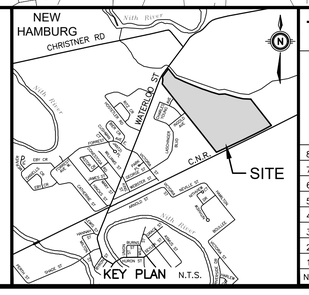
NOTE TO CONTRACTOR :

DO NOT SCALE DRAWINGS.

CONTRACTORS MUST CHECK AND VERIFY ALL DIMENSIONS AND REPORT ANY DISCREPANCIES TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.

ALL DRAWINGS REMAIN THE PROPERTY OF THE ENGINEER AND SHALL NOT BE REPRODUCED OR REUSED WITHOUT THE ENGINEER'S WRITTEN PERMISSION.

THE OWNER/ARCHITECT/CONTRACTOR IS ADVISED THAT M.T.E. CONSULTANTS INC. CANNOT CERTIFY ANY COMPONENT OF THE SITE WORKS NOT INSPECTED DURING CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO NOTIFY M.T.E. CONSULTANTS INC. PRIOR TO COMMENCEMENT OF CONSTRUCTION TO ARRANGE FOR INSPECTION.



TOWNSHIP OF WILMOT

No.	REVISION	BY	DATE
8.			
7.			
6.			
5.			
4.			
3.			
2.			
1.	REVISED DRAFT PLAN SUBMISSION	JJC	MAR.6/23

GEODETIC BM ELEV. = 342.487m
TABLET IS SET HORIZONTALLY IN SOUTH FACE OF CONCRETE FOUNDATION, BEING 62m NORTH OF CENTRELINE OF HIGHWAY; 2.26m EAST OF SOUTHWEST CORNER AND 24cm BELOW THE FIRST COURSE OF BRICKWORK.

SITE BENCHMARK ELEV. = 339.773m
CUT CROSS SOUTHWEST CORNER CONCRETE BOX CULVERT ON SOUTH SIDE OF WATERLOO STREET PNO 9059

OWNER
WILMOT WOODS DEVELOPMENTS INC.
310 FAIRWAY ROAD SOUTH KITCHENER

PROJECT
WILMOT WOODS
NEW HAMBURG

DRAWING
EXISTING CONDITIONS PLAN

MTE
Engineers, Scientists, Surveyors
(519) 743-6500 www.mte85.com

Project Manager J.CABRAL	Project No. 35056-104
Design By AJC	Checked By GMK
Drawn By RXB	Checked By AJC
Surveyed By RLK/KPW	Drawing No. EC1.1
Date JAN.31/18	
Scale 1:1500	Sheet of

LEGEND

- SITE BOUNDARY
- EXISTING EMBANKMENT (SLOPE AS NOTED)
- EXISTING CONTOURS
- EXISTING DRIPLINE
- EXISTING WETLAND
- EXISTING WATERCOURSE (GRCA)
- PROPOSED CONTOURS
- SANITARY TRUNK
- PROPOSED EMBANKMENT (SLOPE AS NOTED)

WILMOT WOODS SUBDIVISION

SWMF 2
SWM Facility
1.43 ha

Service Corridor
0.24 ha

CN RAILWAY

WILMOT EMPLOYMENT LANDS

RECEIVING PIT (6.0mx3.0m)

SENDING PIT (6.0mx3.0m)

FUTURE 4.0m MAINTENANCE ACCESS ROAD

PROPOSED 450mmØ SANITARY TRUNK

45.0m–450mmø FUTURE SAN. @ 1.00%

54.7m–450mmø FUTURE SAN. @ 0.35%

90.0m–450mmø FUTURE SAN. @ 0.35%

61.9m–450mmø FUTURE SAN. @ 0.35%

77.2m–450mmø FUTURE SAN. @ 0.35%

47.2m–450mmø SAN. @ 0.35%

82.9m–200mmø SAN. @ 0.80%

10.0m DRIPLINE SETBACK LIMIT

30.0m WETLAND SETBACK LIMIT

15.0m WETLAND SETBACK LIMIT

EX. DRIPLINE

SURVEYED EX. WETLAND BOUNDARY

EXISTING 900mmØ CULVERT

EX. WATERCOURSE

PROPOSED CONVEYANCE CHANNEL

EXISTING SWM FACILITY

HOWIE MEEKER BOULEVARD

CHAINAGE 1+600 1+625 1+650 1+675 1+700 1+725 1+750 1+775 1+800 1+825 1+850 1+875 1+900 1+925 1+950 1+975 2+000

345 344 343 342 341 340 339 338 337 336 335 334 333

CN RAILWAY

PROPOSED GRADE

LIMIT OF SUBDIVISION/ RAILWAY CORRIDOR ELEV= 340.982

LIMIT OF RAILWAY CORRIDOR ELEV= 340.784

EXISTING GRADE

RECEIVING PIT (6.0mx3.0m)

SENDING PIT (6.0mx3.0m)

45m TRENCHLESS CONSTRUCTION

900mmø STEEL CASING REQUIRED WITHIN LIMITS OF CN RIGHT–OF–WAY

STOP CASING HERE

PROPOSED GRADE

℄ HOWIE MEEKER BLVD.
PM STA= 1+895.98
ELEV= 340.567

SAN. SEWER INVERT

77.2m–450mmø SAN. @ 0.35%
NW336.427
EX336.397

61.9m–450mmø SAN. @ 0.35%
NW336.180
SE336.150

45.0m–450mmø SAN. @ 1.00%
NW335.700
SE335.670

54.7m–450mmø SAN. @ 0.35%
NW335.478
SE335.448

90.0m–450mmø SAN. @ 0.35%

NW335.153
SE335.123

90.0m–450mmø SAN. @ 0.35%

21.75m–450mmø SAN. @ 0.35%
NW334.788
SE334.758

NW334.682
NE334.622

SW336.475
SE334.445

MS5.1

Date: DEC.8/23
Scale: H1:500, V1:50

SANITARY TRUNK EXTENSION - CN CROSSING

MTE
Engineers, Scientists, Surveyors

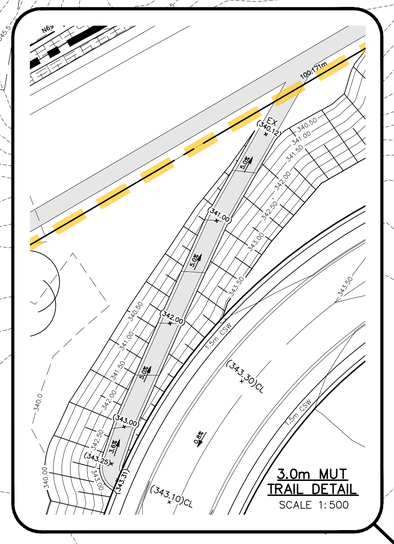
Project No.: 35056-104

August 21, 2023 2:57 p.m. Plotted By: ABarakzay

P:\P\35056\104\35056-104-P-MS5.dwg

MTE FILE PATH: P:\P\35056\104\35056-104-P-MS16.DWG

March 7, 2023 - 10:58:08 AM - Plotted By: Tyler Berry



IVAN GINGERICH DRAIN

STREET NINE

STREET TEN

STREET EIGHT

STREET SEVEN

STREET SIX

STREET TWO

STREET THREE

STREET FOUR

STREET FIVE

STREET ONE

STREET TWO

SWMF 2

SWMF

EX. SWM FACILITY

CN RAILWAY

WATERLOO STREET

CHARLES YOUNG AVE

INGOLD AVE

MODIFIED 20m CROSS SECTION ON PORTION OF STREET NINE, TRAIL TO REPLACE SIDEWALK

APPROXIMATE LOCATION OF CONNECTION TO EXISTING TRAIL IN WOODLOT

WETLAND BOUNDARY

30m WETLAND BUFFER

10m ORDLINE BUFFER

LEGEND

- PROPERTY BOUNDARY
- LIMIT OF SUBDIVISION
- EXISTING CONTOURS
- PROPOSED CONTOURS
- EXISTING EMBANKMENT
- PROPOSED EMBANKMENT
- PROPOSED SPOT ELEVATION
- PROPOSED 4.5m MAINTENANCE ACCESS/TRAIL
- PROPOSED 3.0m MULTI-USE TRAIL
- PROPOSED 1.8m HIGH CHAIN LINK FENCE (OFFSET 0.15m ON PUBLIC PROPERTY)
- PROPOSED GRADE
- EXISTING WATERCOURSE
- PEDESTRIAN PROTECTION (REFUGE ISLAND PER RMW DRAWING 217)

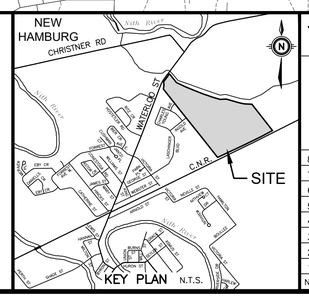
NOTE TO CONTRACTOR :

DO NOT SCALE DRAWINGS.

CONTRACTORS MUST CHECK AND VERIFY ALL DIMENSIONS AND REPORT ANY DISCREPANCIES TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.

ALL DRAWINGS REMAIN THE PROPERTY OF THE ENGINEER AND SHALL NOT BE REPRODUCED OR REUSED WITHOUT THE ENGINEER'S WRITTEN PERMISSION.

THE OWNER/ARCHITECT/CONTRACTOR IS ADVISED THAT M.T.E. CONSULTANTS INC. CANNOT CERTIFY ANY COMPONENT OF THE SITE WORKS NOT INSPECTED DURING CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO NOTIFY M.T.E. CONSULTANTS INC. PRIOR TO COMMENCEMENT OF CONSTRUCTION TO ARRANGE FOR INSPECTION.



TOWNSHIP OF WILMOT

No.	REVISION	BY	DATE
8.			
7.			
6.			
5.			
4.			
3.			
2.			
1.	REVISED DRAFT PLAN SUBMISSION	JJC	MAR.6/23

GEODETIC BM ELEV. = 342.487m
TABLET IS SET HORIZONTALLY IN SOUTH FACE OF CONCRETE FOUNDATION, BEING 62m NORTH OF CENTRELINE OF HIGHWAY; 2.26m EAST OF SOUTHWEST CORNER AND 24cm BELOW THE FIRST COURSE OF BRICKWORK.

SITE BENCHMARK ELEV. = 339.773m
CUT CROSS SOUTHWEST CORNER CONCRETE BOX CULVERT ON SOUTH SIDE OF WATERLOO STREET PNO 9059

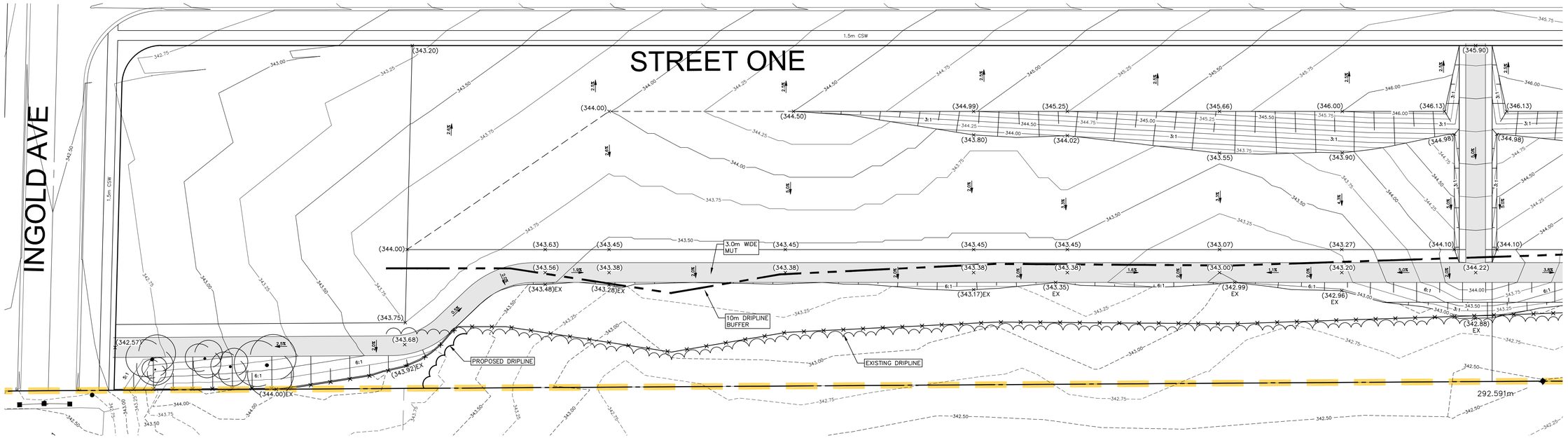
OWNER
WILMOT WOODS DEVELOPMENTS INC.
310 FAIRWAY ROAD SOUTH KITCHENER

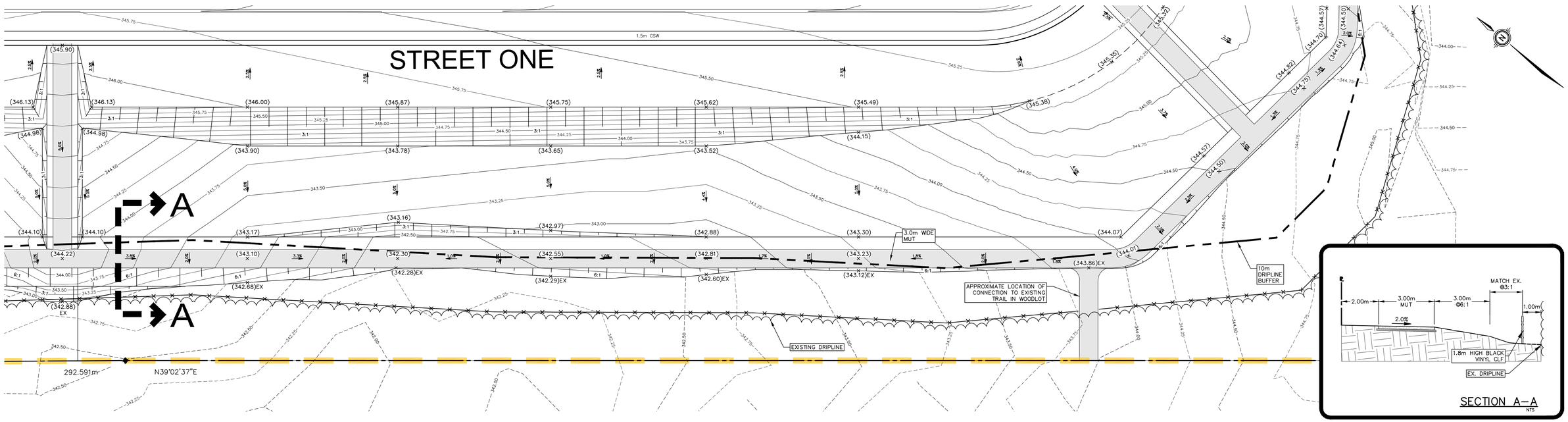
PROJECT
WILMOT WOODS
NEW HAMBURG

DRAWING
TRAIL AND FENCE PLAN

MTE
Engineers, Scientists, Surveyors
(519) 743-6500 www.mte85.com

Project Manager J.CABRAL	Project No. 35056-104
Design By AJC	Checked By GMK
Drawn By RXB	Checked By AJC
Surveyed By RLK/KPW	Drawing No. MS16.1
Date JAN.31/18	
Scale 1:1500	Sheet of





LEGEND

- SITE BOUNDARY
- EXISTING CONTOURS (326.0)
- PROPOSED CONTOURS (336.0)
- EXISTING EMBANKMENT (SLOPE AS NOTED) (TOP) (BOTTOM)
- EXISTING DRIPLINE
- PROPOSED 3.0m MULTI-USE TRAIL
- PROPOSED 1.8m HIGH CHAIN LINK FENCE (OFFSET 0.15m ON PUBLIC PROPERTY)
- PROPOSED DRAINAGE SPLIT
- PROPOSED EMBANKMENT (SLOPE AS NOTED) (TOP) (BOTTOM)
- PROPOSED ELEVATION (391.00)
- PROPOSED GRADE 3.6%

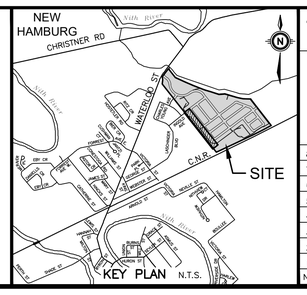
NOTE TO CONTRACTOR :

DO NOT SCALE DRAWINGS.

CONTRACTORS MUST CHECK AND VERIFY ALL DIMENSIONS AND REPORT ANY DISCREPANCIES TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.

ALL DRAWINGS REMAIN THE PROPERTY OF THE ENGINEER AND SHALL NOT BE REPRODUCED OR REUSED WITHOUT THE ENGINEER'S WRITTEN PERMISSION.

THE OWNER/ARCHITECT/CONTRACTOR IS ADVISED THAT M.T.E. CONSULTANTS INC. CANNOT CERTIFY ANY COMPONENT OF THE SITE WORKS NOT INSPECTED DURING CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO NOTIFY M.T.E. CONSULTANTS INC. PRIOR TO COMMENCEMENT OF CONSTRUCTION TO ARRANGE FOR INSPECTION.



TOWNSHIP OF WILMOT

No.	REVISION	BY	DATE
8.			
7.			
6.			
5.			
4.			
3.			
2.			
1.	REVISED DRAFT PLAN SUBMISSION	JJC	MAR.6/23

GEODETIC BM ELEV. = 342.487m
TABLET IS SET HORIZONTALLY IN SOUTH FACE OF CONCRETE FOUNDATION, BEING 62m NORTH OF CENTRELINE OF HIGHWAY; 2.26m EAST OF SOUTHWEST CORNER AND 24cm BELOW THE FIRST COURSE OF BRICKWORK.

SITE BENCHMARK ELEV. = 339.773m
CUT CROSS SOUTHWEST CORNER CONCRETE BOX CULVERT ON SOUTH SIDE OF WATERLOO STREET PNO 9059

OWNER
WILMOT WOODS DEVELOPMENTS INC.
310 FAIRWAY ROAD SOUTH KITCHENER

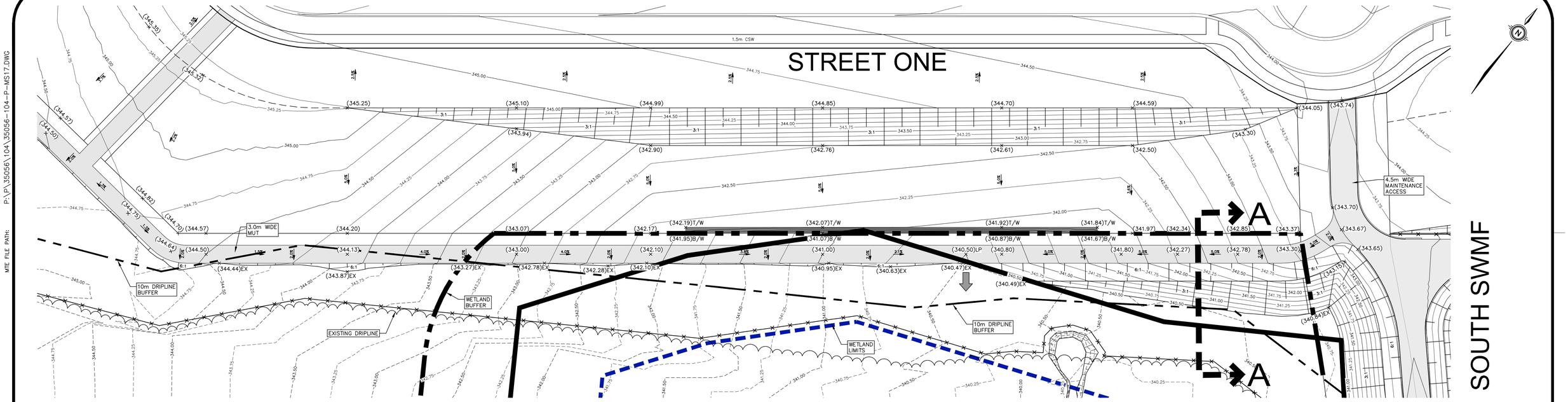
PROJECT
WILMOT WOODS
NEW HAMBURG

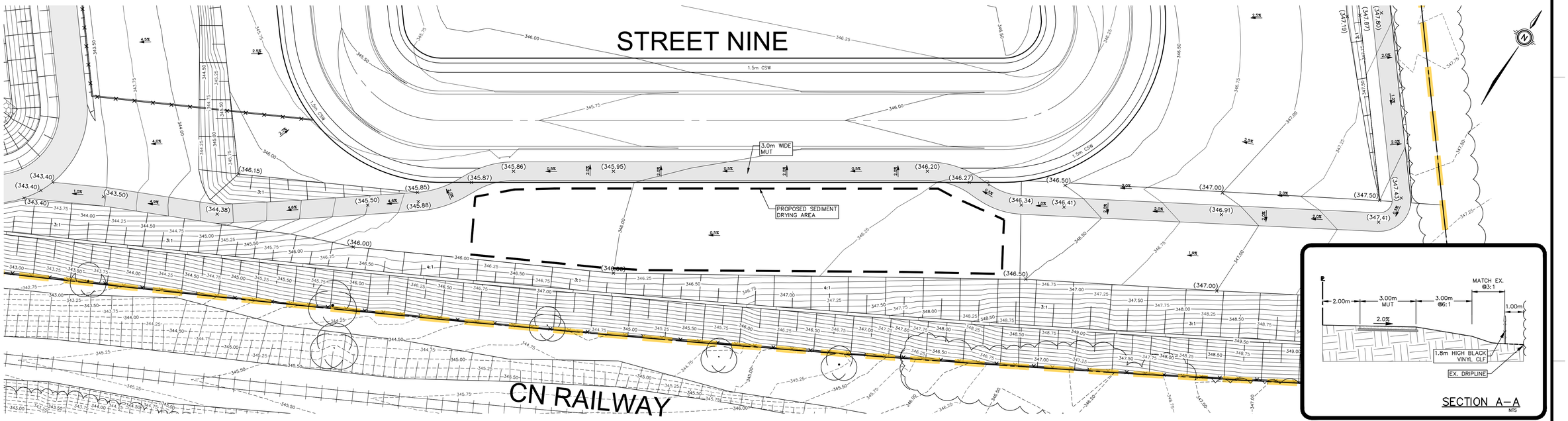
DRAWING
TRAIL GRADING PLAN No.1

MTE
Engineers, Scientists, Surveyors
(519) 743-6500 www.mte85.com

Project Manager: J.CABRAL	Project No.: 35056-104
Design By: AJC	Checked By: GMK
Drawn By: RXB	Checked By: AJC
Surveyed By: RLK/KPW	Drawing No.: MS17.1
Date: JAN.31/18	
Scale: 1:300	Sheet of

MTE FILE PATH: P:\P\35056\104\35056-104-P-MS17.DWG
March 7, 2023 – 11:04:29 AM – Plotted By: Alex Cressman





LEGEND

- SITE BOUNDARY
- EXISTING CONTOURS (328.0)
- PROPOSED CONTOURS (336.0)
- EXISTING EMBANKMENT (SLOPE AS NOTED) (TOP) (BOTTOM)
- EXISTING DRIPLINE
- PROPOSED RETAINING WALL
- PROPOSED 3.0m MULTI-USE TRAIL
- PROPOSED 1.8m HIGH CHAIN LINK FENCE (OFFSET 0.15m ON PUBLIC PROPERTY)
- PROPOSED DRAINAGE SPLIT
- PROPOSED EMBANKMENT (SLOPE AS NOTED) (TOP) (BOTTOM)
- PROPOSED ELEVATION (391.00)
- PROPOSED GRADE 3.6%

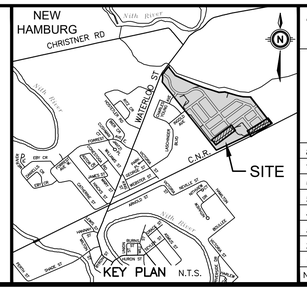
NOTE TO CONTRACTOR :

DO NOT SCALE DRAWINGS.

CONTRACTORS MUST CHECK AND VERIFY ALL DIMENSIONS AND REPORT ANY DISCREPANCIES TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.

ALL DRAWINGS REMAIN THE PROPERTY OF THE ENGINEER AND SHALL NOT BE REPRODUCED OR REUSED WITHOUT THE ENGINEER'S WRITTEN PERMISSION.

THE OWNER/ARCHITECT/CONTRACTOR IS ADVISED THAT M.T.E. CONSULTANTS INC. CANNOT CERTIFY ANY COMPONENT OF THE SITE WORKS NOT INSPECTED DURING CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO NOTIFY M.T.E. CONSULTANTS INC. PRIOR TO COMMENCEMENT OF CONSTRUCTION TO ARRANGE FOR INSPECTION.



No.	REVISION	BY	DATE
8.			
7.			
6.			
5.			
4.			
3.			
2.			
1.	REVISED DRAFT PLAN SUBMISSION	JJC	MAR.6/23

TOWNSHIP OF WILMOT

GEODETIC BM ELEV. = 342.487m
TABLET IS SET HORIZONTALLY IN SOUTH FACE OF CONCRETE FOUNDATION, BEING 62m NORTH OF CENTRELINE OF HIGHWAY; 2.26m EAST OF SOUTHWEST CORNER AND 24cm BELOW THE FIRST COURSE OF BRICKWORK.

SITE BENCHMARK ELEV. = 339.773m
CUT CROSS SOUTHWEST CORNER CONCRETE BOX CULVERT ON SOUTH SIDE OF WATERLOO STREET PNO 9059

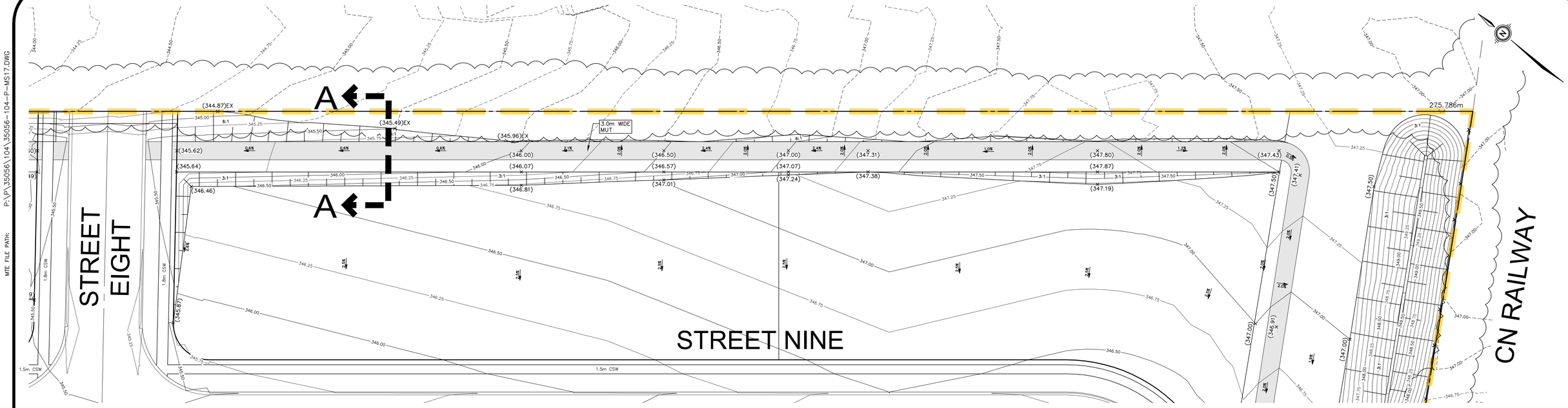
OWNER
WILMOT WOODS DEVELOPMENTS INC.
310 FAIRWAY ROAD SOUTH KITCHENER

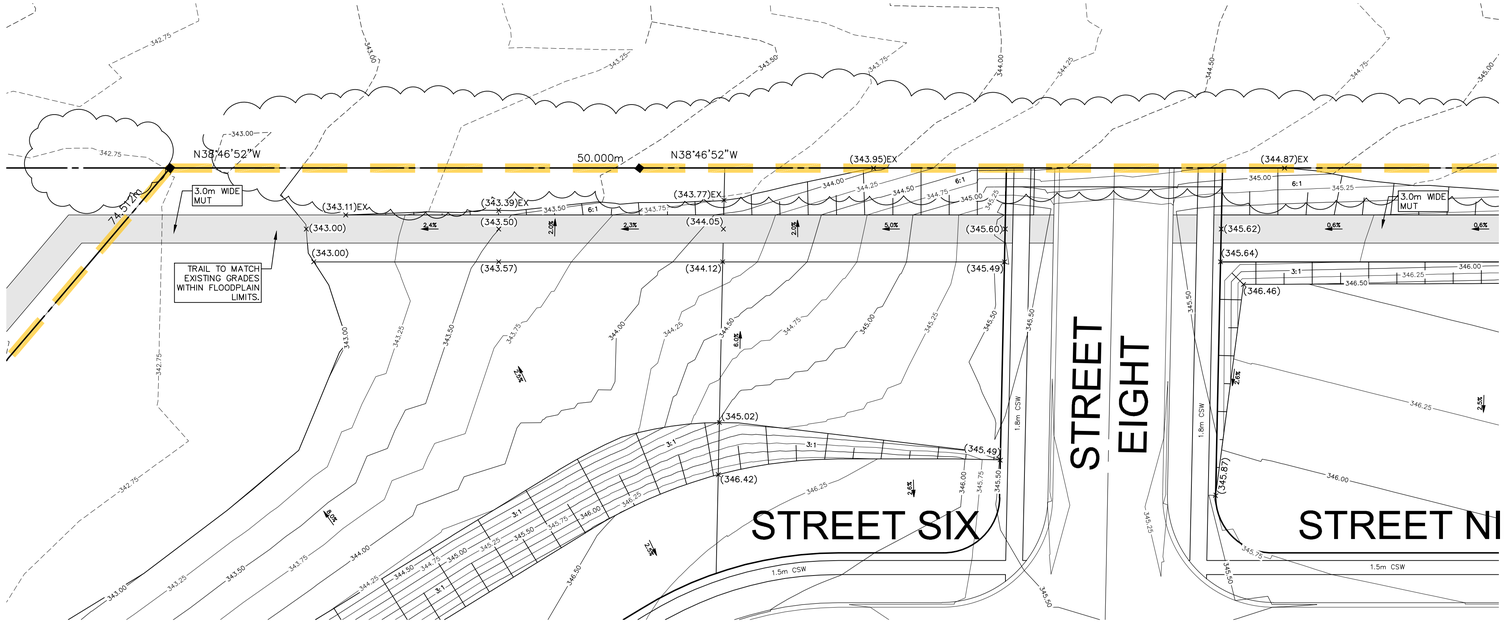
PROJECT
WILMOT WOODS
NEW HAMBURG

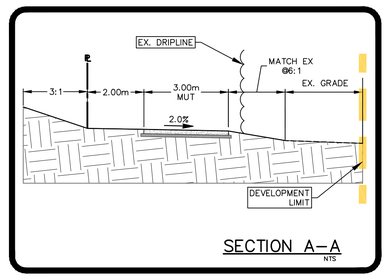
DRAWING
TRAIL GRADING PLAN No.2

MTE
Engineers, Scientists, Surveyors
(519) 743-6500 www.mte85.com

Project Manager J.CABRAL	Project No. 35056-104
Design By AJC	Checked By GMK
Drawn By RXB	Checked By AJC
Surveyed By RLK/KPW	Drawing No. MS17.2
Date JAN.31/18	
Scale 1:300	Sheet of







SECTION A–A
NTS

LEGEND

- SITE BOUNDARY
- EXISTING CONTOURS (326.0 / 336.0)
- PROPOSED CONTOURS
- EXISTING EMBANKMENT (SLOPE AS NOTED) (TOP) (BOTTOM)
- EXISTING DRIPLINE
- PROPOSED 3.0m MULTI-USE TRAIL
- PROPOSED 1.8m HIGH CHAIN LINK FENCE (OFFSET 0.15m ON PUBLIC PROPERTY)
- PROPOSED DRAINAGE SPLIT
- PROPOSED EMBANKMENT (SLOPE AS NOTED) (TOP) (BOTTOM)
- (391.00) PROPOSED ELEVATION
- 3.6% PROPOSED GRADE

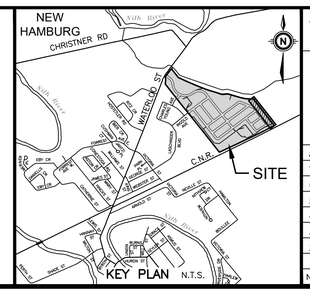
NOTE TO CONTRACTOR :

DO NOT SCALE DRAWINGS.

CONTRACTORS MUST CHECK AND VERIFY ALL DIMENSIONS AND REPORT ANY DISCREPANCIES TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.

ALL DRAWINGS REMAIN THE PROPERTY OF THE ENGINEER AND SHALL NOT BE REPRODUCED OR REUSED WITHOUT THE ENGINEER'S WRITTEN PERMISSION.

THE OWNER/ARCHITECT/CONTRACTOR IS ADVISED THAT M.T.E. CONSULTANTS INC. CANNOT CERTIFY ANY COMPONENT OF THE SITE WORKS NOT INSPECTED DURING CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO NOTIFY M.T.E. CONSULTANTS INC. PRIOR TO COMMENCEMENT OF CONSTRUCTION TO ARRANGE FOR INSPECTION.



TOWNSHIP OF WILMOT

No.	REVISION	BY	DATE
8.			
7.			
6.			
5.			
4.			
3.			
2.			
1.	REVISED DRAFT PLAN SUBMISSION	JJC	MAR.6/23

GEODETIC BM ELEV. = 342.487m
TABLET IS SET HORIZONTALLY IN SOUTH FACE OF CONCRETE FOUNDATION, BEING 62m NORTH OF CENTRELINE OF HIGHWAY, 2.26m EAST OF SOUTHWEST CORNER AND 24cm BELOW THE FIRST COURSE OF BRICKWORK.

SITE BENCHMARK ELEV. = 339.773m
CUT CROSS SOUTHWEST CORNER CONCRETE BOX CULVERT ON SOUTH SIDE OF WATERLOO STREET PNO 9059

OWNER
WILMOT WOODS DEVELOPMENTS INC.
310 FAIRWAY ROAD SOUTH KITCHENER

PROJECT
WILMOT WOODS
NEW HAMBURG

DRAWING
TRAIL GRADING PLAN No.3

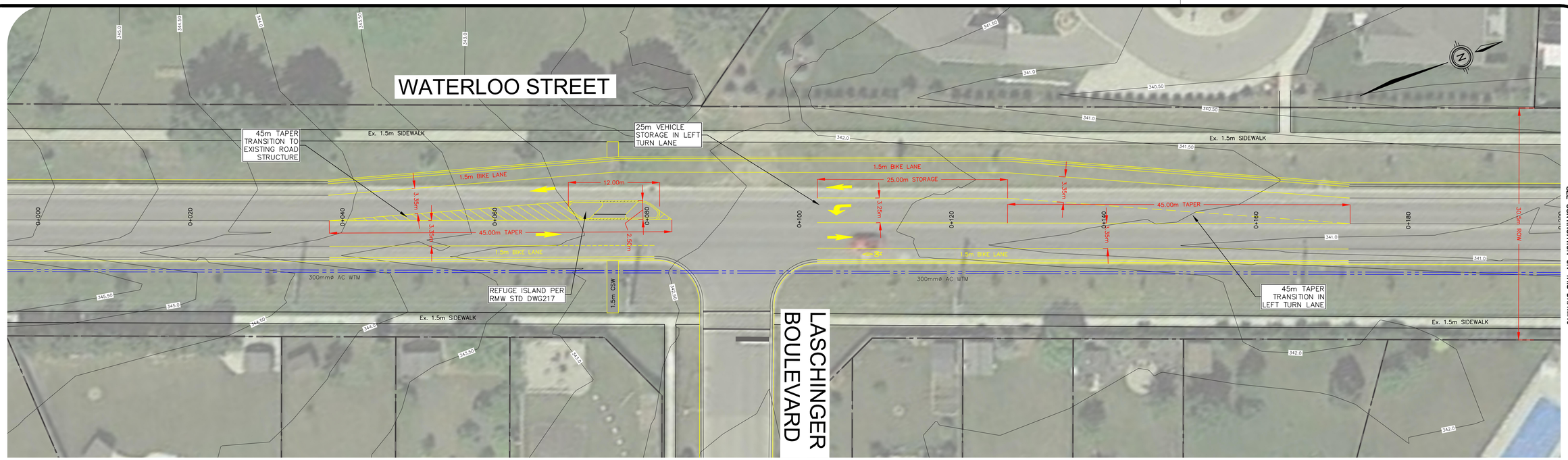
MTE
Engineers, Scientists, Surveyors
(519) 743-6500 www.mte85.com

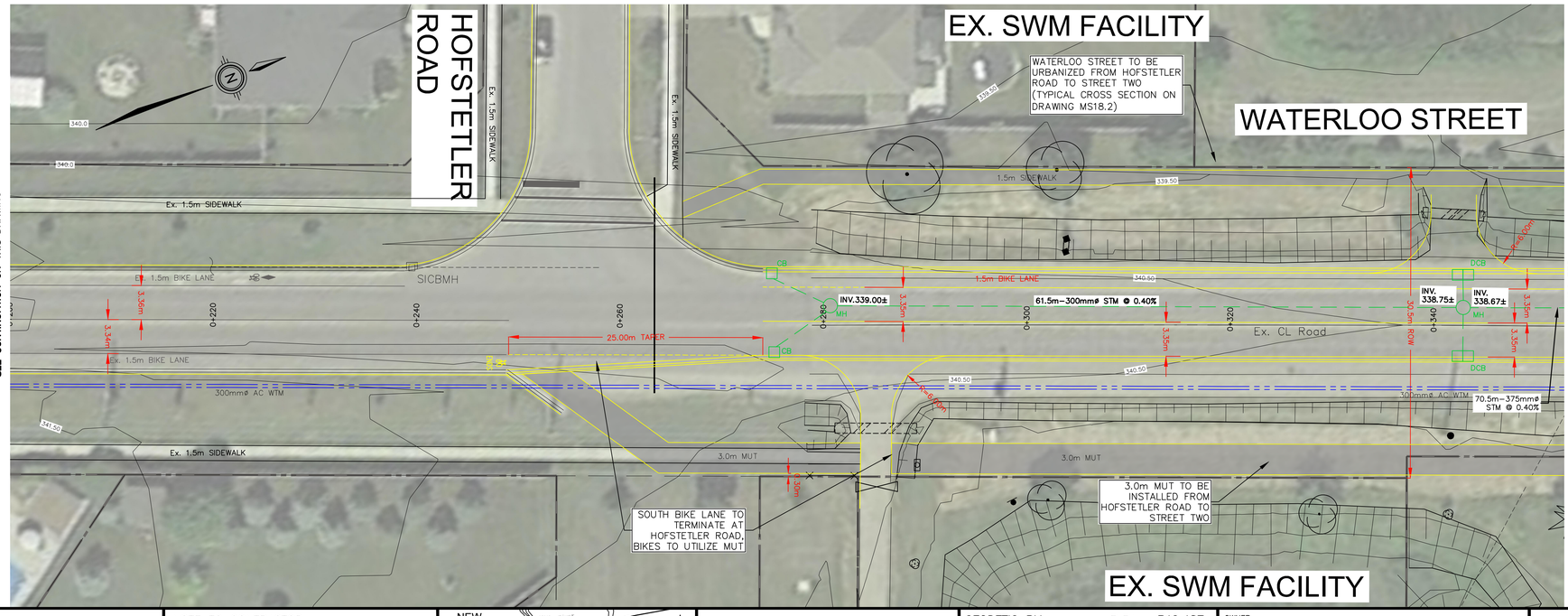
Project Manager: J.CABRAL	Project No.: 35056-104
Design By: AJC	Checked By: GMK
Drawn By: RXB	Checked By: AJC
Surveyed By: RLK/KPW	Drawing No.: MS17.3
Date: JAN.31/18	
Scale: 1:300	Sheet of

MTE FILE PATH: P:\P\35056\104\35056-104-P-MS17.DWG
March 7, 2023 - 11:05:47 AM - Plotted By: Alex Cressman

MTE FILE PATH: P:\P\35056\104\35056-104-P-MS18.DWG

March 7, 2023 - 10:47:42 AM - Plotted By: Tyler Berry





LEGEND

- PROPERTY BOUNDARY
- PROPOSED LANEWAY/LINE PAINTING
- EXISTING LANEWAY/LINE PAINTING
- 3.0m MUT — PROPOSED MUT
- 1.5m SIDEWALK — PROPOSED SIDEWALK
- PROPOSED CURB
- 326.0 — EXISTING CONTOURS
- EX. WATERMAIN
- CB — PROPOSED CATCH BASIN
- MH — PROPOSED MANHOLE
- PROPOSED STORM SEWER

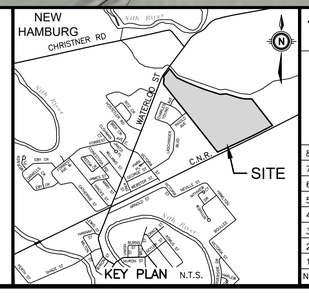
NOTE TO CONTRACTOR :

DO NOT SCALE DRAWINGS.

CONTRACTORS MUST CHECK AND VERIFY ALL DIMENSIONS AND REPORT ANY DISCREPANCIES TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.

ALL DRAWINGS REMAIN THE PROPERTY OF THE ENGINEER AND SHALL NOT BE REPRODUCED OR REUSED WITHOUT THE ENGINEER'S WRITTEN PERMISSION.

THE OWNER/ARCHITECT/CONTRACTOR IS ADVISED THAT M.T.E. CONSULTANTS INC. CANNOT CERTIFY ANY COMPONENT OF THE SITE WORKS NOT INSPECTED DURING CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO NOTIFY M.T.E. CONSULTANTS INC. PRIOR TO COMMENCEMENT OF CONSTRUCTION TO ARRANGE FOR INSPECTION.



TOWNSHIP OF WILMOT

No.	REVISION	BY	DATE
8.			
7.			
6.			
5.			
4.			
3.			
2.			
1.	REVISED DRAFT PLAN SUBMISSION	JJC	MAR.6/23

GEODETIC BM ELEV. = 342.487m
TABLET IS SET HORIZONTALLY IN SOUTH FACE OF CONCRETE FOUNDATION, BEING 62m NORTH OF CENTRELINE OF HIGHWAY; 2.26m EAST OF SOUTHWEST CORNER AND 24cm BELOW THE FIRST COURSE OF BRICKWORK.

SITE BENCHMARK ELEV. = 339.773m
CUT CROSS SOUTHWEST CORNER CONCRETE BOX CULVERT ON SOUTH SIDE OF WATERLOO STREET PNO 9059

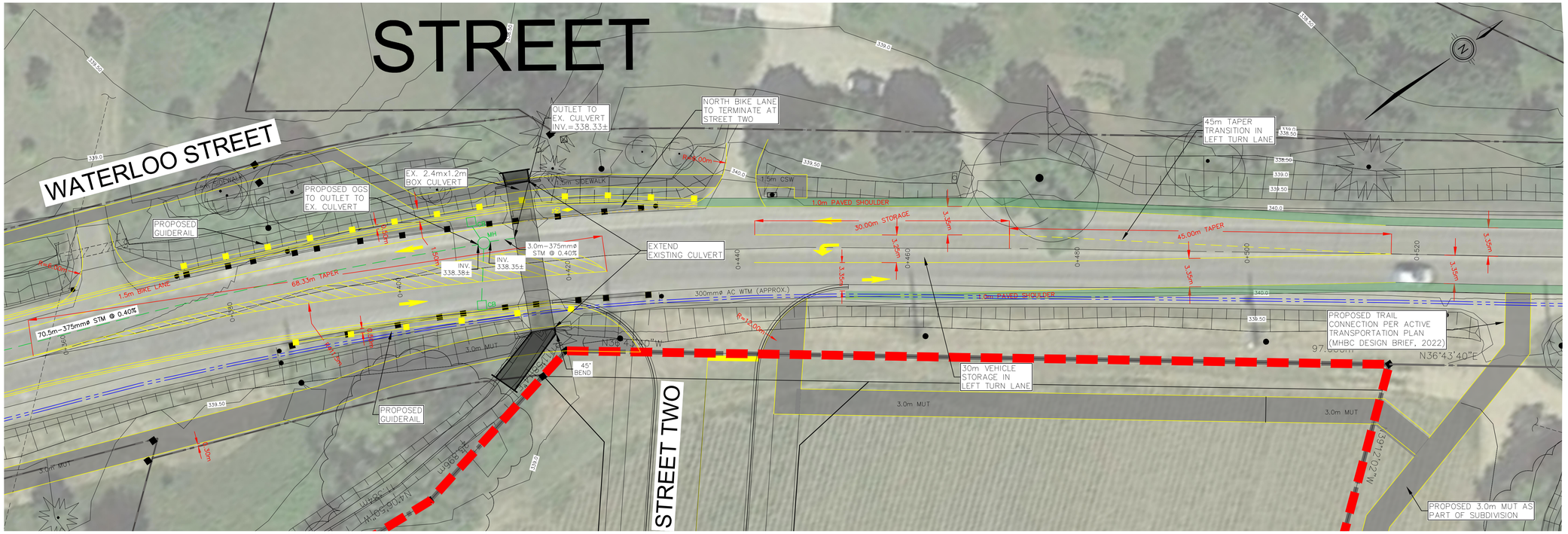
OWNER
WILMOT WOODS DEVELOPMENTS INC.
310 FAIRWAY ROAD SOUTH KITCHENER

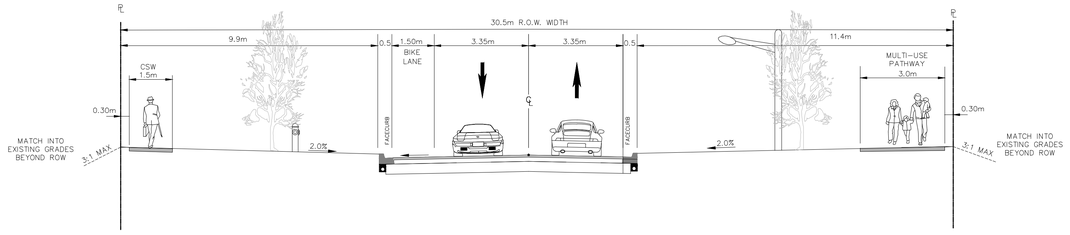
PROJECT
WILMOT WOODS
NEW HAMBURG

DRAWING
WATERLOO STREET FUNCTIONAL DESIGN (LASCHINGER TO HOFSTETLER)

MTE
Engineers, Scientists, Surveyors
(519) 743-6500 www.mte85.com

Project Manager J.CABRAL	Project No. 35056-104
Design By AJC	Checked By GMK
Drawn By AXH/AXB	Checked By AJC
Surveyed By RLK/KPW	Drawing No. MS18.1
Date JAN.31/18	
Scale 1:250	Sheet of





WATERLOO STREET (HOFSTETLER ROAD TO STREET TWO)

PROPOSED 2 LANE CROSS–SECTION

N.T.S.

LEGEND

- PROPERTY BOUNDARY
- PROPOSED LANEWAY/LINE PAINTING
- EXISTING LANEWAY/LINE PAINTING
- 3.0m MUT — PROPOSED MUT
- 1.5m SIDEWALK — PROPOSED SIDEWALK
- PROPOSED CURB
- 326.0 — EXISTING CONTOURS
- EX. WATERMAIN
- CB — PROPOSED CATCH BASIN
- MH — PROPOSED MANHOLE
- PROPOSED STORM SEWER
- PROPOSED GUIDERAIL

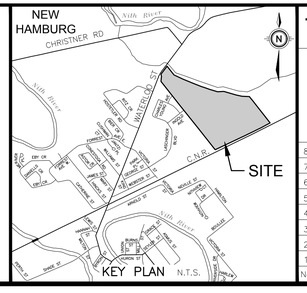
NOTE TO CONTRACTOR :

DO NOT SCALE DRAWINGS.

CONTRACTORS MUST CHECK AND VERIFY ALL DIMENSIONS AND REPORT ANY DISCREPANCIES TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.

ALL DRAWINGS REMAIN THE PROPERTY OF THE ENGINEER AND SHALL NOT BE REPRODUCED OR REUSED WITHOUT THE ENGINEER'S WRITTEN PERMISSION.

THE OWNER/ARCHITECT/CONTRACTOR IS ADVISED THAT M.T.E. CONSULTANTS INC. CANNOT CERTIFY ANY COMPONENT OF THE SITE WORKS NOT INSPECTED DURING CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO NOTIFY M.T.E. CONSULTANTS INC. PRIOR TO COMMENCEMENT OF CONSTRUCTION TO ARRANGE FOR INSPECTION.



TOWNSHIP OF WILMOT

No.	REVISION	BY	DATE
8.			
7.			
6.			
5.			
4.			
3.			
2.	REVISED DRAFT PLAN SUBMISSION	JJC	DEC.8/23
1.	REVISED DRAFT PLAN SUBMISSION	JJC	MAR.6/23

GEODETIC BM ELEV. = 342.487m
TABLET IS SET HORIZONTALLY IN SOUTH FACE OF CONCRETE FOUNDATION, BEING 62m NORTH OF CENTRELINE OF HIGHWAY; 2.26m EAST OF SOUTHWEST CORNER AND 24cm BELOW THE FIRST COURSE OF BRICKWORK.

SITE BENCHMARK ELEV. = 339.773m
CUT CROSS SOUTHWEST CORNER CONCRETE BOX CULVERT ON SOUTH SIDE OF WATERLOO STREET PNO 9059

OWNER
WILMOT WOODS DEVELOPMENTS INC.
310 FAIRWAY ROAD SOUTH KITCHENER

PROJECT
WILMOT WOODS
NEW HAMBURG

DRAWING
WATERLOO STREET LEFT TURN LANE FUNCTIONAL DESIGN (HOFSTETLER ROAD TO STREET TWO)

MTE
Engineers, Scientists, Surveyors
(519) 743-6500 www.mte85.com

Project Manager J.CABRAL	Project No. 35056-104
Design By AJC	Checked By GMK
Drawn By AXH/AXB	Checked By AJC
Surveyed By RLK/KPW	Drawing No. MS18.2
Date JAN.31/18	
Scale 1:250	Sheet of

MTE FILE PATH: P:\P\35056\104\35056-104-P-QU1.DWG

March 7, 2023 - 11:06:52 AM - Plotted By: Alex Cressman

IVAN GINGERICH DRAIN

STREET ONE

STREET TWO

STREET THREE

STREET FOUR

STREET FIVE

STREET SIX

STREET SEVEN

STREET EIGHT

STREET NINE

STREET TEN

WATERLOO STREET

CHARLES YOUNG AVE

INGOLD AVE

CN RAILWAY

SWMF 1

SWMF 2

EX. SWM FACILITY

EX. 900mmø CULVERT

WETLAND BOUNDARY

30m WETLAND BUFFER

10m DRIPLINE BUFFER

LEGEND

- PROPERTY BOUNDARY
- LIMIT OF SUBDIVISION
- EXISTING CONTOURS
- EXISTING EMBANKMENT
- EXISTING DRIPLINE
- DRIPLINE BUFFER
- WETLAND BUFFER
- EXISTING WETLAND
- IVAN GINGERICH MUNICIPAL DRAIN FLOODPLAIN
- PROPOSED SPOT ELEVATION
- PROPOSED CONTOURS
- PROPOSED EMBANKMENT
- MAJOR OVERLAND FLOW ROUTE
- EXISTING WATERCOURSE

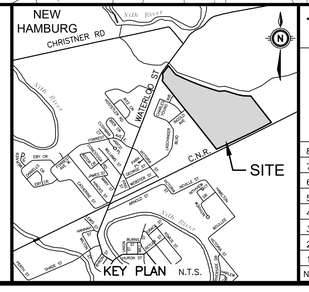
NOTE TO CONTRACTOR :

DO NOT SCALE DRAWINGS.

CONTRACTORS MUST CHECK AND VERIFY ALL DIMENSIONS AND REPORT ANY DISCREPANCIES TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.

ALL DRAWINGS REMAIN THE PROPERTY OF THE ENGINEER AND SHALL NOT BE REPRODUCED OR REUSED WITHOUT THE ENGINEER'S WRITTEN PERMISSION.

THE OWNER/ARCHITECT/CONTRACTOR IS ADVISED THAT M.T.E. CONSULTANTS INC. CANNOT CERTIFY ANY COMPONENT OF THE SITE WORKS NOT INSPECTED DURING CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO NOTIFY M.T.E. CONSULTANTS INC. PRIOR TO COMMENCEMENT OF CONSTRUCTION TO ARRANGE FOR INSPECTION.



TOWNSHIP OF WILMOT

No.	REVISION	BY	DATE
8.			
7.			
6.			
5.			
4.			
3.			
2.			
1.	REVISED DRAFT PLAN SUBMISSION	JJC	MAR.6/23

GEODETIC BM ELEV. = 342.487m
TABLET IS SET HORIZONTALLY IN SOUTH FACE OF CONCRETE FOUNDATION, BEING 62m NORTH OF CENTRELINE OF HIGHWAY; 2.26m EAST OF SOUTHWEST CORNER AND 24cm BELOW THE FIRST COURSE OF BRICKWORK.

SITE BENCHMARK ELEV. = 339.773m
CUT CROSS SOUTHWEST CORNER CONCRETE BOX CULVERT ON SOUTH SIDE OF WATERLOO STREET PNO 9059

OWNER
WILMOT WOODS DEVELOPMENTS INC.
310 FAIRWAY ROAD SOUTH KITCHENER

PROJECT
WILMOT WOODS
NEW HAMBURG

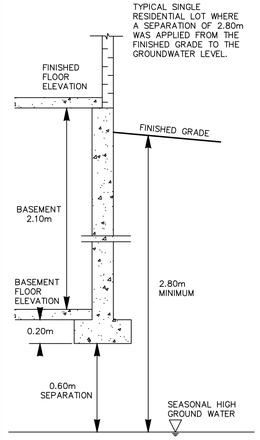
DRAWING
FINISHED GRADE CONTOUR PLAN

MTE
Engineers, Scientists, Surveyors
(519) 743-6500 www.mte85.com

Project Manager J.CABRAL	Project No. 35056-104
Design By AJC	Checked By GMK
Drawn By RXB	Checked By AJC
Surveyed By RLK/KPW	Drawing No. QU1.1
Date JAN.31/18	
Scale 1:1500	Sheet of

NOTE:

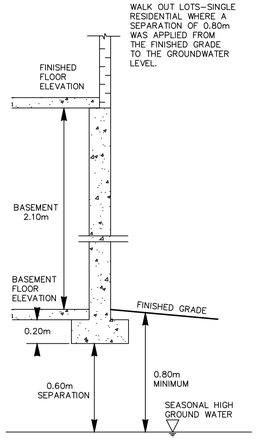
1. NOT APPLICABLE ON; STREETS, PARK BLOCKS, SWM BLOCK.



DETAIL 'A'
TYPICAL SINGLE RESIDENTIAL LOT
N.T.S.

NOTE:

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



DETAIL 'B'
WALK OUT-SINGLE RESIDENTIAL LOT
N.T.S.

LEGEND

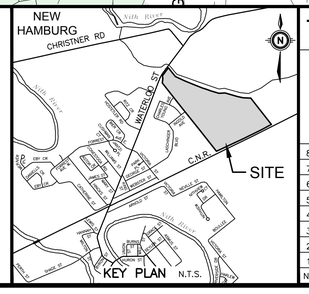
- SITE BOUNDARY
- EXISTING DIRECTION OF DRAINAGE/SWALE
- EXISTING CONTOURS
- HIGH GROUNDWATER CONTOURS
- EXISTING DRIPLINE
- EXISTING BOREHOLE (Ex. BH10 Elev=311.64)
- EXISTING MONITORING WELL (MW8 Ground Elev=313.50 Top of Casing=314.45)
- EXISTING TEST PIT (Test Pit#19 Elev=314.728)
- EXISTING BOREHOLE/ MONITORING WELL (BH/MW302-D Ground Elev=313.50 Top of Casing=314.45)
- GROUNDWATER SEPARATION CONTOUR, RED TICKS REPRESENT AREAS WHERE SEPARATION REQUIREMENT IS NOT MET (0.03)
- GROUNDWATER SEPARATION CONTOUR, GREEN TICKS REPRESENT AREAS WHERE SEPARATION REQUIREMENT IS MET (0.09)
- GROUNDWATER SEPARATION CONTOUR, CYAN TICKS REPRESENT AREAS WHERE SEPARATION FROM USF IS EXACTLY 0.60m (0.00)
- IVAN GINGERICH MUNICIPAL DRAIN FLOODPLAIN
- EXISTING WETLAND
- WETLAND BUFFER
- DRIPLINE BUFFER
- SGRA VULNERABILITY SCORE (2.0, 4.0)

NOTE TO CONTRACTOR :

DO NOT SCALE DRAWINGS.

CONTRACTORS MUST CHECK AND VERIFY ALL DIMENSIONS AND REPORT ANY DISCREPANCIES TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.

THE OWNER/ARCHITECT/CONTRACTOR IS ADVISED THAT M.T.E. CONSULTANTS INC. CANNOT CERTIFY ANY COMPONENT OF THE SITE WORKS NOT INSPECTED DURING CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO NOTIFY M.T.E. CONSULTANTS INC. PRIOR TO COMMENCEMENT OF CONSTRUCTION TO ARRANGE FOR INSPECTION.



TOWNSHIP OF WILMOT

No.	REVISION	BY	DATE
8.			
7.			
6.			
5.			
4.			
3.			
2.			
1.	REVISED DRAFT PLAN SUBMISSION	JJC	MAR.6/23

GEODETIC BM ELEV. = 342.487m
TABLET IS SET HORIZONTALLY IN SOUTH FACE OF CONCRETE FOUNDATION, BEING 62m NORTH OF CENTRELINE OF HIGHWAY; 2.26m EAST OF SOUTHWEST CORNER AND 24cm BELOW THE FIRST COURSE OF BRICKWORK.

SITE BENCHMARK ELEV. = 339.773m
CUT CROSS SOUTHWEST CORNER CONCRETE BOX CULVERT ON SOUTH SIDE OF WATERLOO STREET PNO 9059

OWNER
WILMOT WOODS DEVELOPMENTS INC.
310 FAIRWAY ROAD SOUTH KITCHENER

PROJECT
WILMOT WOODS
NEW HAMBURG

DRAWING
GROUNDWATER SEPARATION CONTOUR PLAN

MTE
Engineers, Scientists, Surveyors
(519) 743-6500 www.mte85.com

Project Manager J.CABRAL	Project No. 35056-104
Design By AJC	Checked By VAL
Drawn By AXH	Checked By AJC
Surveyed By RLK/KPW	Drawing No. QU2.1
Date JAN.31/18	
Scale 1:1500	Sheet of