



WILMOT EMPLOYMENT LANDS INDUSTRIAL SUBDIVISION

Functional Servicing Report

Project Location:

Part of Lot 20, Concession North of Bleams Road and
Part Lot 19, Concession North Bleams Road,
North of Highway 7 & 8
Township of Wilmot
Regional Municipality of Waterloo

Prepared for:

Badenview Developments Inc.
P.O. Box 249
Breslau, ON N0B 1M0
and
New Hamburglrs Inc.
675 Riverbend Drive
Kitchener, ON N2K 3S3

Prepared by:

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

December 17, 2018

**MTE File No.: 34896-104
39219-104**



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1.0 INTRODUCTION

1.1 Overview

MTE Consultants Inc. (MTE) was retained by Badenview Developments Inc. and New Hamburglrs Inc. to prepare the following Functional Servicing Report (FSR) in support of two Draft Plan of Subdivision applications. The Badenview and New Hamburglrs properties are herein referred to as the 'subject lands'. For the purposes of this report the two draft plans will be reviewed as one cohesive development. The subject lands are located within what is commonly referred to as the Wilmot Employment Lands in the Town of New Hamburg, Township of Wilmot.

The Wilmot Employment Lands (WEL) are comprised of 2 parcels of land, formerly known as the Good Lands and the Schneider Lands. The Good Lands is owned by Badenview Developments Inc. (BDI) and the Schneider Lands is owned by New Hamburglrs Inc. (NHI). Refer to **Figure 1.1** for the location of the subject lands. The subject lands comprise a total area of approximately 55.38ha, of which 42.07ha represents the BDI lands, 9.90ha represents the NHI lands, 2.70ha represents additional lands owned by NHI (potential MTO interchange), and 0.71ha of unopened road allowance. It should be noted that approximately 11.50ha of woodlot was recently transferred to the Township of Wilmot. The subject lands are proposed to be developed as an industrial subdivision with approximately 19 industrial blocks, municipal right-of-way's, and a stormwater management block. A Draft Plan of Subdivision for each of the proposed developments has been prepared by MHBC Planning (dated November 22, 2018 – Good Lands and dated November 22, 2018 – Schneider Lands) and forms the basis for the proposed servicing concepts (See **Appendix A**).

The purpose of this report is to prepare a servicing strategy for the subdivision which implements the approved *Wilmot Employment Lands - Enhanced Master Drainage Plan* and outlines how the subdivision can be developed on full municipal services, including sanitary sewage collection, domestic water, storm drainage and utilities.

1.2 Background Information

An *Enhanced Master Drainage Plan* (EMDP) was undertaken for the Wilmot Employment Lands by the Township of Wilmot. The EMDP was completed in May 2012 and approved by the Township of Wilmot, Region of Waterloo, the Grand River Conservation Authority (GRCA) and the Ministry of Transportation of Ontario (MTO). Prior to the EMDP, a holding provision on the zoning was implemented by the Township of Wilmot and the GRCA due to floodplain constraints within the subject lands. The purpose of the EMDP was to release this holding provision and prepare a comprehensive stormwater management (SWM) strategy for the contributing subwatershed. While the EMDP was not completed under an Environmental Assessment (EA) process, one Public Information Centre (PIC) was held to inform the general public of the study.

In 2007 the Region of Waterloo commissioned the completion of a Region wide Wastewater Treatment Master Plan Study, and in 2011 a further Baden and New Hamburg Water and Wastewater Master Plan Update. In 2014 the Township of Wilmot commissioned a study called the *Wastewater Servicing Study for New Growth Areas – Baden and New Hamburg* (WSS) to assist in evaluating sanitary infrastructure needs associated with the recommendations proposed by the Baden and New Hamburg Water and Wastewater Master Plan Update.

The WSS identifies several constraints within the existing sanitary system and proposes a solution which will alleviate existing issues as well as provide capacity for additional development areas. Part of the overall solution as it relates to the WEL is upgrading the trunk sewer from Highway 7&8 to the Morningside Wastewater Pump Station, and the construction of a new gravity sanitary sewer within the WEL (GEXR railway to Highway 7&8) to convey sewage from additional development lands to the north of the GEXR railway.

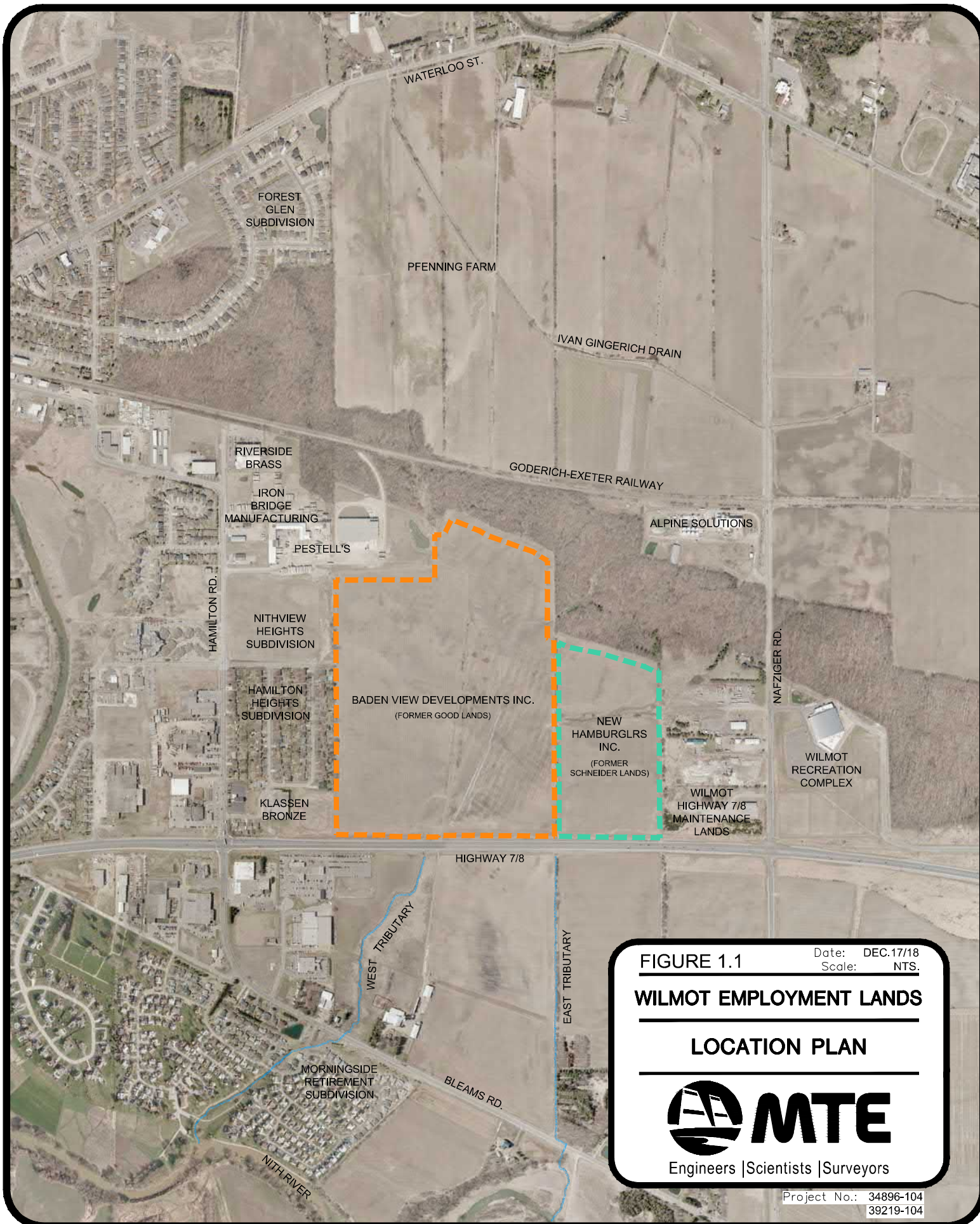



FIGURE 1.1 Date: DEC.17/18
Scale: NTS.

WILMOT EMPLOYMENT LANDS

LOCATION PLAN


MTE

Engineers | Scientists | Surveyors

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39219-104

The preliminary design strategies for stormwater management and sanitary servicing have been developed to be in accordance with the recommended solutions within both the EMDP and the WSS and are described within this Functional Servicing Report (FSR).

2.0 EXISTING CONDITIONS

The subject lands consist of approximately 55.38ha and are generally bounded by existing industrial and residential lands to the west, Highway 7&8 to the south, industrial lands and the Wilmot Recreation Complex facility to the east, and a woodlot / Goderich-Exeter Railway corridor to the north. An unopened road allowance that connects to Nafziger Road bisects the NHI lands. Currently, the majority of the WEL is under interim agricultural use pending development. MTE conducted a detailed topographical survey of the WEL lands in 2018. Existing site conditions and topography for the subject property is shown on **Figure 2.1**, as well as the enclosed MTE Drawing No. **EC1.1**.

The subject lands are moderately sloped, generally ranging from 0.5% to 10%. Existing elevations within the lands range from 332.6m at the south end of the property to approximately 344.0m. There are currently 2 culverts along the southern property line of the WEL that cross Highway 7&8. The western culvert is a 1.5m x 1.5m concrete box which discharges runoff across Highway 7&8 to the West Tributary, and the eastern culvert is a 1.2m x 1.2m concrete box that discharges to the East Tributary. Both of these watercourses are tributary to the Nith River.


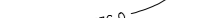



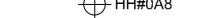








The West Tributary has a total catchment area of approximately 210.18ha, and consists of agricultural, commercial, industrial, residential, and open space land uses. Of this total area approximately 161ha are located upstream (north) of Highway 7&8. There are also three 'watercourses' (inlets) that drain external lands into the subject lands. The first inlet is located at the north side of the BDI lands and conveys storm water runoff from primarily lands north of the subject lands. The second inlet is located at the northeastern border of the BDI and NHI lands, and the third inlet is located at the northeastern property line of the NHI lands. These watercourses are currently connected to an existing field tile network which ultimately outlets to the western culvert (West Tributary). There is also some overland flow from the backyards of the adjacent subdivisions to the west that enters the BDI lands. Additionally, a 600mm diameter storm sewer and easement is located at the southwestern corner of the BDI lands that conveys storm water runoff from the Hamilton Height Subdivision to the western culvert.

The East Tributary consists of approximately 17.8ha of land upstream of Highway 7&8, which consists of the NHI lands as well as approximately 9.3ha of external lands. The external contributing areas drain primarily overland through ditches along Nafziger Road and Highway 7&8.

Located near the western culvert is an existing 450mm diameter sanitary sewer which runs southerly to the Morningside Wastewater Pumping Station (MWPS). Two sanitary easements are currently located within the subject property and connect into the 450mm diameter sanitary sewer. The western easement is located at the southwest corner of the BDI lands providing a sanitary outlet for the adjacent Hamilton Heights Subdivision. The eastern easement bisects the NHI lands before running along the BDI/NHI property line. This easement provides a sanitary outlet for the Wilmot Recreation Complex facility.

An existing 300mm/450mm diameter watermain is located along Nafziger Road, and a 250mm diameter watermain is located along Hamilton Road.

LEGEND

-  PROPERTY BOUNDARY
-  EXISTING CONTOURS
-  EXISTING DRIPLINE
-  EXISTING WATERMAIN
-  EXISTING SANITARY
-  EXISTING STORM
-  HH#0A8 HAND HOLE
-  MW101-10 MONITORING WELL
-  BH 4 BOREHOLE
-  TP 202 TEST PIT
-  EXISTING REGULATORY FLOODPLAIN (GRCA)
-  EXISTING REGULATION LIMIT (GRCA)
-  EXISTING WATERCOURSE (GRCA)
-  EXISTING WETLAND (GRCA)

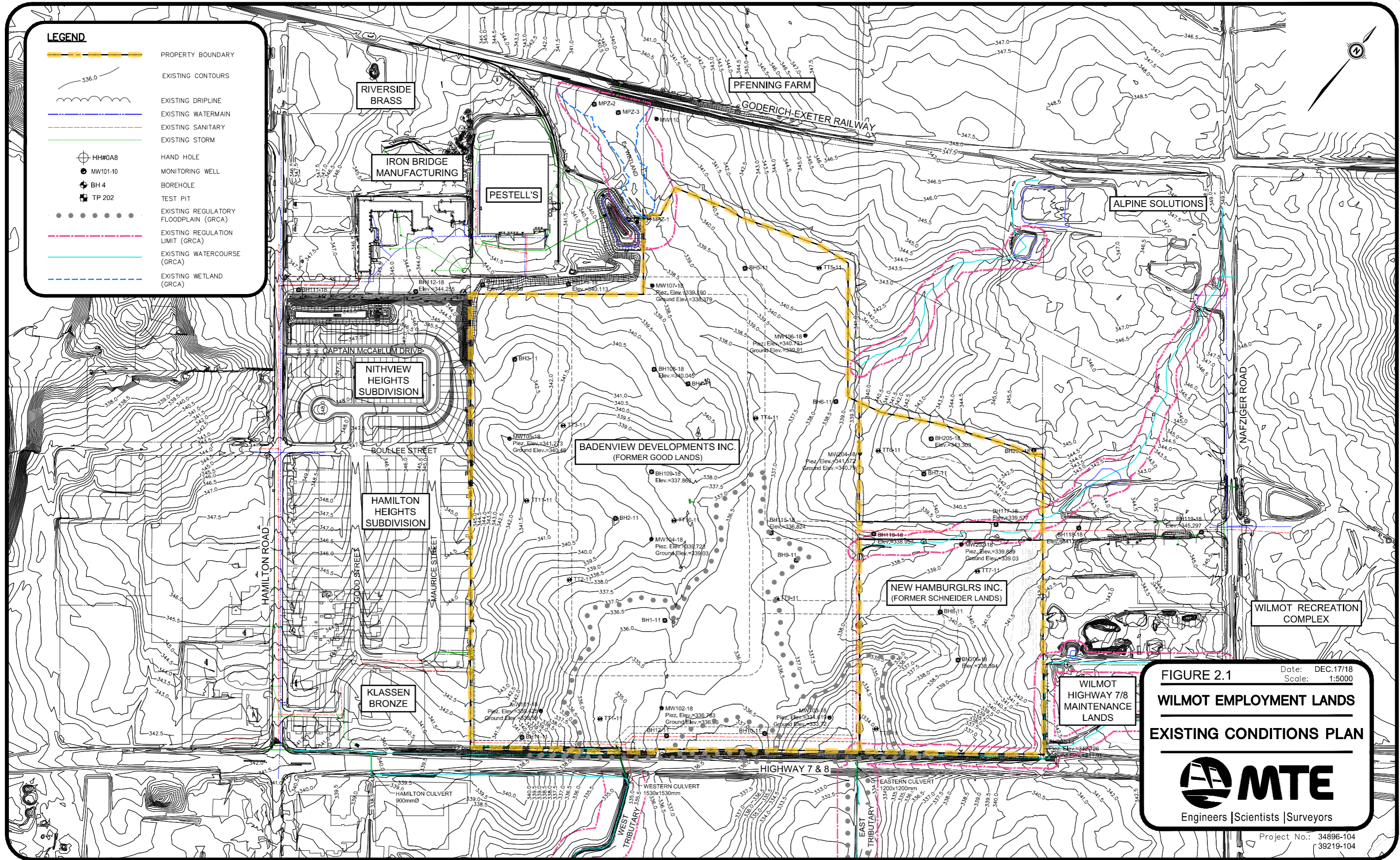


FIGURE 2.1
WILMOT EMPLOYMENT LANDS
EXISTING CONDITIONS PLAN



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3.0 PROPOSED DEVELOPMENT

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

- Industrial blocks.
- Stormwater Management facility.
- Stormwater conveyance channel blocks.
- Future road widening.
- Municipal right-of-ways with widths of 20.0m and 26.0m.

3.1 Municipal Right-of-Ways

As shown on the Draft Plan, the proposed development is serviced by local and collector roads. The roadways will be constructed to an urban cross-section including asphalt pavement, concrete curb and gutters, concrete sidewalks, roadway illumination and boulevard landscaping. It should be noted that the Township of Wilmot requested that the 26.0m collector road should include a 3.0m wide multi-use trail. Roadway classification and right-of-way widths are shown in **TABLE 3.1** below.

Since the Township of Wilmot currently does not have a design standard for an urban cross-section, through discussions and coordination with Township staff a standard urban cross-section was developed for the subject lands. Refer to **Appendix B** for an illustration of the 20.0m and 26.0m right-of-ways.

TABLE 3.1 – ROAD CLASSIFICATIONS

| Road | Classification | Right-of-way width |
|----------|----------------|--------------------|
| Street 1 | Collector | 26m |
| Street 2 | Local | 20m |
| Street 3 | Collector | 26m |
| Street A | Local | 20m |
| Street B | Local | 20m |

Two preliminary geotechnical investigations for the subject lands (BDI and NHI Lands) have been completed by Peto MacCallum Ltd. dated December 18, 2018. The proposed pavement structures outlined in the reports are summarized in **TABLE 3.2** below.

TABLE 3.2 – PROPOSED PAVEMENT STRUCTURE

| Pavement Structure | Local Roads (mm) | Collector Roads (mm) |
|----------------------------|---------------------|-------------------------|
| Asphaltic Concrete-surface | 100 | 100 |
| Granular 'A' Base | 150 | 150 |
| Granular 'B' Sub-base | 600 | 600 |

3.2 Watercourses/Municipal Drains

The subject lands are a confluence of drainage for several upstream properties. There are three separate watercourses that drain external lands into the subject lands along the north and east boundaries. From these locations, minor storm drainage from the watercourses is conveyed through a field tile drainage system to the western culvert under Highway 7&8.

The first watercourse (Inlet #1) conveys runoff from the neighbouring Pestell's lands, woodlot and future development lands to the north of the GEXR railway corridor (which includes the Pfenning Farm), to an existing catchbasin and discharges through a 300mm diameter tile drain.

The second watercourse (Inlet #2) conveys runoff from lands northeast of the subject lands. Inlet #2 collects drainage from the upstream woodlot and a portion of the Alpine Solutions land through an existing catchbasin and discharges through a 200mm diameter tile drain.

The third watercourse (Inlet #3) conveys runoff from lands to the east of the subject lands and includes the Alpine Solutions Lands, additional industrial lands, the Wilmot Recreation Complex facility and additional lands on the east side of Nafziger Road. Inlet #3 is located along the eastern property line of the NHI lands. An existing catchbasin collects this drainage and discharges through a 250mm diameter tile drain.

Currently Alpine Solutions discharges via Inlet #2 and Inlet #3. It should be noted that Alpine has retained R.J. Burnside and Associates Limited to establish Municipal Drains in place of watercourses 2 and 3.

The proposed development will ensure that these inlets/conveyance of drainage is through the subject lands via municipal drainage channels from the respective inlets into the proposed stormwater management facility.

3.3 West and East Tributaries

As mentioned previously, an Enhanced Master Drainage Plan was completed for the WEL by MTE in May 2012. The Township completed the EMDP to meet the needs and requirements of not only the Township of Wilmot, but also the Region of Waterloo, the GRCA and MTO. The plan identified and evaluated existing and future conditions and established a management plan for the area subject to the EMDP. The EMDP involved the detailed review of existing applicable reports and data, extensive field work to document existing conditions, and hydrologic / hydrogeological analysis.

The EMDP also explore various alternatives with the goal of generating a management plan for the catchment area, including a preferred stormwater management strategy and pond location.

The proposed SWM solution will adhere to the criteria/strategy developed in the EMDP. The proposed SWM facility is located along the southern border of the BDI lands and will outlet into the west culvert (1.5mx1.5m box culvert). Refer to the *Preliminary Stormwater Management Report* completed by MTE for further details.

3.4 MTO Setback and Future On-ramp

Highway 7&8 runs along the southern border of the subject lands, and as such falls within the MTO permit control area. A 14.0m wide setback runs along the frontage of the subject lands for future highway expansion.

Since 2007 the MTO has conducted a study of Highway 7&8 between Stratford and New Hamburg. Part of the study looked at highway access management measures for the intersection of Highway 7&8 and Nafziger Road. A final Transportation Environmental Study Report has not been completed at this time, however, a preferred option has been developed for this intersection. This option includes a new bridge for Nafziger Road over Highway 7&8 and a westbound on/off ramp to connect from proposed Street 3 to Highway 7&8 within the NHI lands.

4.0 PROPOSED GRADING

4.1 Considerations

While developing the preliminary grading design of the WEL, the following is a list of considerations which influenced and/or governed the conceptual design:


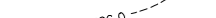





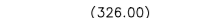


- Match centerline elevations of existing road grades.
- Matching existing and proposed boundary grades around the perimeter of the subdivision lands.
- Maintain existing conveyance of external lands drainage through the subject lands.
- Ensure major storm event overland flows are directed towards the proposed stormwater management facility.
- Comply with municipal standards for minimum and maximum road grades.
- Ensure adequate cover is provided over municipal services.
- Minimize cut/fill deficit for the subject lands.

4.2 Lot Grading

Utilizing the proposed road layout, preliminary slopes for centerline of road ranging from 0.5% (minimum) to 3.0% (maximum) were used to complete the preliminary lot grading design. In addition, the considerations listed above were incorporated into the overall preliminary grading design and is illustrated on **Figure 4.1**.

Preliminary lot grades range from 1.0% (minimum) to 3.0% (maximum) with a combination of traditional back to front drainage, front to back drainage and split drainage. Preliminary finished grades are designed to optimize the earthmoving (cutting and filling) required for road and lot construction. The Preliminary Finished Grade Contours have been shown on the enclosed **MTE Drawing AG1.1**.

LEGEND

-  PROPERTY BOUNDARY
-  EXISTING CONTOURS
-  EXISTING DRIPLINE
-  EXISTING REGULATION LIMIT (GRCA)
-  EXISTING WATERCOURSE (GRCA)
-  EXISTING WETLAND (GRCA)
-  PROPOSED SPOT ELEVATIONS
EX = MAINTAIN EXISTING
HP = HIGH POINT
LP = LOW POINT
-  PROPOSED CONTOURS
-  1.0% → DIRECTION OF DRAINAGE
-  ← MAJOR OVERLAND FLOW ROUTE

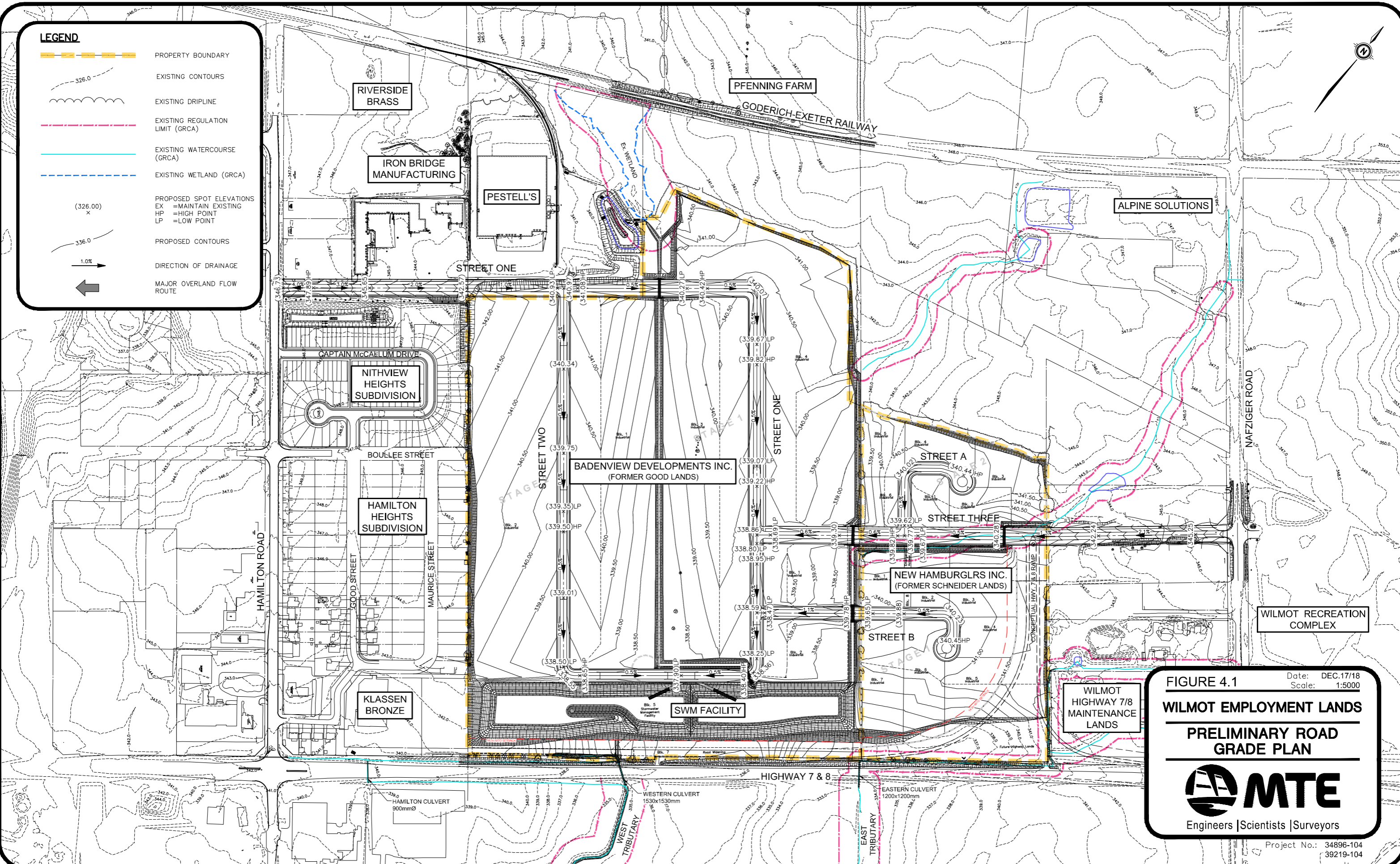


FIGURE 4.1 Date: DEC.17/18
Scale: 1:5000

**WILMOT EMPLOYMENT LANDS
PRELIMINARY ROAD
GRADE PLAN**



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5.0 MUNICIPAL SERVICING

5.1 Sanitary Servicing

The subject lands are intended to be serviced by the existing 450mm diameter trunk sanitary sewer, located at the southern property line of the BDI lands, and crosses underneath Highway 7&8 before ultimately discharging into the MWPS. This outlet currently services the neighbouring Hamilton Heights Subdivision and the Wilmot Recreation Complex. In addition to the subject lands, the sanitary outlet will also service future development lands north of the GEXR railway via the Forest Glen Sanitary Pumping Station.

The sanitary drainage areas are illustrated on **Figure 5.1.1**. A schematic of the proposed sanitary sewer as well as the existing sanitary sewer network, including proposed finished road grades and depths of sewers at key points, are shown on **Figure 5.1.2**. Refer to **Appendix C** for Preliminary Sanitary Sewer Design sheets and correlating drainage areas. The proposed drainage areas are further described below:

5.1.1 Area 1 – Future Lands North of GEXR

As mentioned previously in Section 0, the WSS report analyzed the existing sanitary network and pumping stations for New Hamburg and Baden. Located north of the WEL is the existing Forest Glen Sanitary Pumping Station (FGSPS) which was design and built to service the surrounding Forest Glen Residential Subdivision. In order to allow for approximately 110ha of future development lands, the FGSPS is proposed to be upgraded including a new forcemain alignment through the Pfenning Farm property that will ultimately discharge into the new sanitary trunk sewer that bisects the WEL and connects into the existing 450mm diameter sewer at Highway 7&8.

The proposed forcemain will discharge approximately 73L/s of flow into the proposed 375mm diameter sanitary trunk sewer that will continue through the BDI lands along Street 1 and Street 2 before crossing under the proposed SWM facility and connecting to the existing 375mm diameter sanitary sewer along the southern property line. It should be noted that based on the WSS, the existing 450mm diameter sanitary sewer between Highway 7&8 and the MWPS requires to be upgraded to a 525mm diameter sewer.

In order to provide sufficient depth for the upstream lands, the proposed trunk sewer under Street 2 and Stree1 road allowances is required to be lowered from a typical depth of 2.8m to a depth of 5.0 to 7.0m. Refer to MTE Drawing **SA1.1** and **SA1.2** for plan and profile details of the sanitary trunk sewer.

5.1.2 Area 2 – Existing Eastern Lands

This 14.56ha drainage area consists of the Wilmot Recreation Complex on the east side of Nafziger Road and existing industrial lands located on the west side of Nafziger Road. In 2011 the Recreation Complex was constructed with a dedicated sanitary sewer ranging in size from 250mm diameter to 375mm diameter. The sewer is located under the proposed Street 3 roadway corridor before turning south along the BDI/NHI border and finally west along the southern property line of the BDI lands. This length of sanitary sewer is also known as the 'Rec Centre Sanitary' and was designed to accommodate the recreation facility and eastern industrial lands.

5.1.3 Area 3 – New Hamburglrs Inc. Lands

This drainage area consists of approximately 10.68ha of industrial lands which will outlet through the existing 'Rec Centre Sanitary'. Lands to the north of Street 3 (Area 3a) will be conveyed through a 200mm diameter sanitary sewer located under Street A and will connect to an existing manhole located at the intersection of Street 3 and Street A.

Industrial lands south of Street 3 (Area 3b) will be conveyed through a 200 mm diameter sanitary sewer located under Street B and will connect to a proposed manhole on top of the 'Rec Centre Sanitary' located at the intersection of Street B and the 'Rec Centre Sanitary' easement.

5.1.4 Area 4 – External Industrial Lands to Northwest

The existing Pestell's industrial property, located to the northwest of the BDI lands, currently discharges via an interim pump chamber and forcemain into an existing sanitary sewer located on Hamilton Road. Provisions are required through the development of the subject lands to redirect and receive any sanitary flows from the Pestell's property. The existing pump chamber will be decommissioned and a new 200mm diameter sanitary sewer connection is required at Street 1.

5.1.5 Area 5 – Badenview Development Inc. Lands






This drainage area consists of approximately 35.65ha of industrial lands which outlet into the existing 375mm diameter trunk sewer. This area is divided into two parcels, the west lands and east lands. Discharge from the western lands (Area 5a – 16.20ha) will be conveyed through a 200mm diameter local sanitary sewer located under Street 2, and the eastern lands (19.45ha) will be conveyed to the proposed 375mm diameter trunk sanitary sewer located under Street 1. As mentioned, these areas will discharge through the 375mm diameter trunk under the SWM facility and ultimately through the 450mm diameter outlet under Highway 7&8.


5.1.6 Area 6 – Hamilton Height Subdivision


The Hamilton Heights subdivision (7.69ha) is conveyed through an existing 450mm diameter sanitary sewer located at the southwestern corner of the BDI lands. This sanitary sewer will combine north of Highway 7&8 and be conveyed downstream to the MWPS.

The overall analysis of these drainage areas demonstrates that there is sufficient capacity to convey peak sanitary flows from the proposed drainage areas through the existing sewer network to the 450mm diameter trunk sanitary sewer without surcharging.

LEGEND

-  PROPERTY BOUNDARY
-  EXISTING REGULATION LIMIT (GRCA)
-  EXISTING WATERCOURSE (GRCA)
-  EXISTING WETLAND (GRCA)
-  SANITARY DRAINAGE AREA

 DRAINAGE DIRECTION

 CATCHMENT ID No.
AREA (ha)

NOTE: * DENOTES DRAINAGE AREA TO FOREST GLEN PUMPING STATION TAKEN FROM WASTEWATER SERVICING STUDY FOR NEW GROWTH AREAS BADEN AND NEW HAMBURG

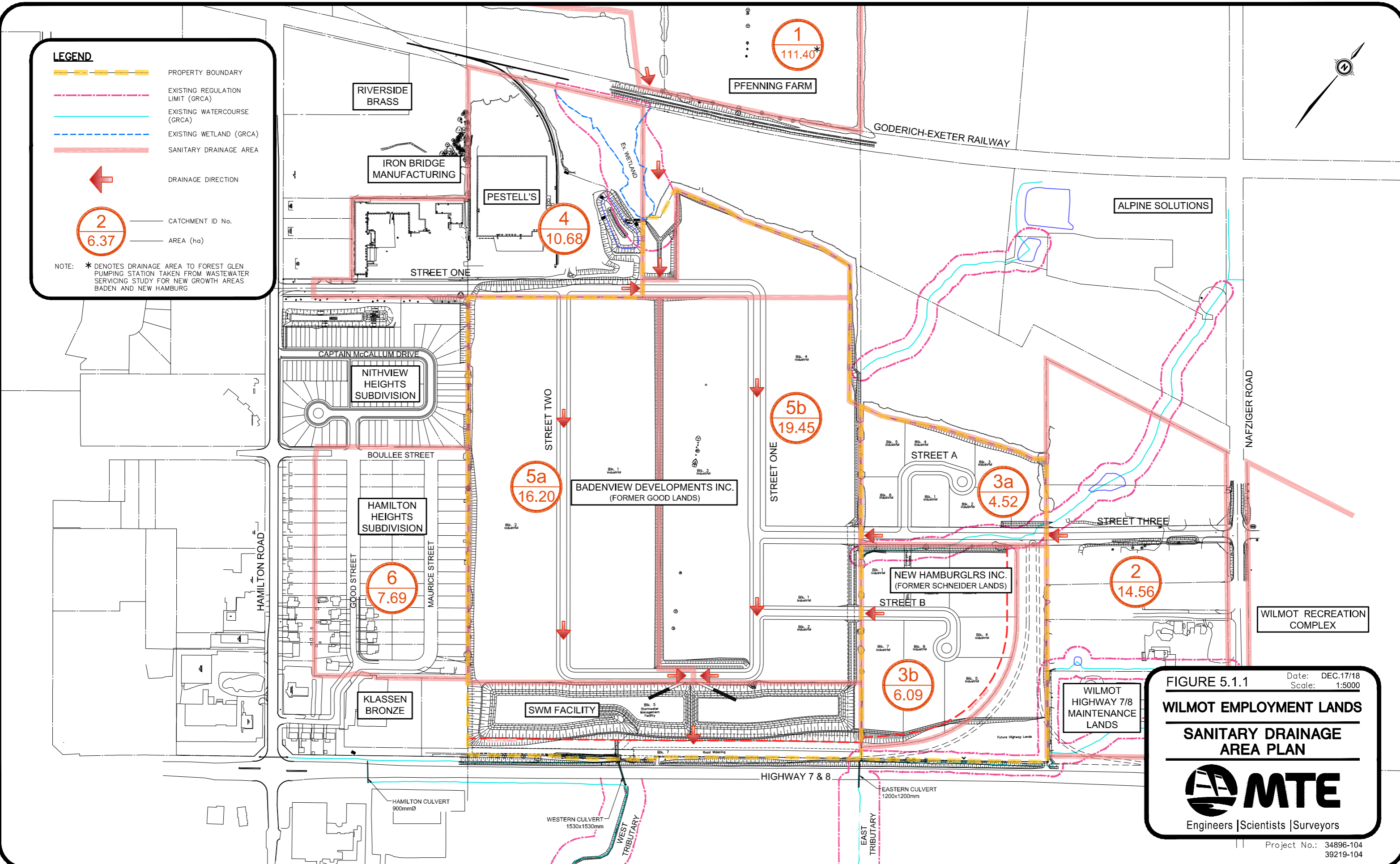








FIGURE 5.1.1 Date: DEC.17/18
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**WILMOT EMPLOYMENT LANDS
SANITARY DRAINAGE
AREA PLAN**



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LEGEND

-  PROPERTY BOUNDARY
 -  EXISTING REGULATION LIMIT (GRCA)
 -  EXISTING WATERCOURSE (GRCA)
 -  EXISTING WETLAND (GRCA)
 -  EXISTING SANITARY SEWER
 -  PROPOSED SANITARY SEWER
- | | |
|------------------|-----------------------|
| F/G=346.00 | C/L ROAD GRADE |
| SAN OBV.=343.80± | LOCAL SANITARY OBVERT |
| DEPTH=2.20m± | SANITARY COVER |

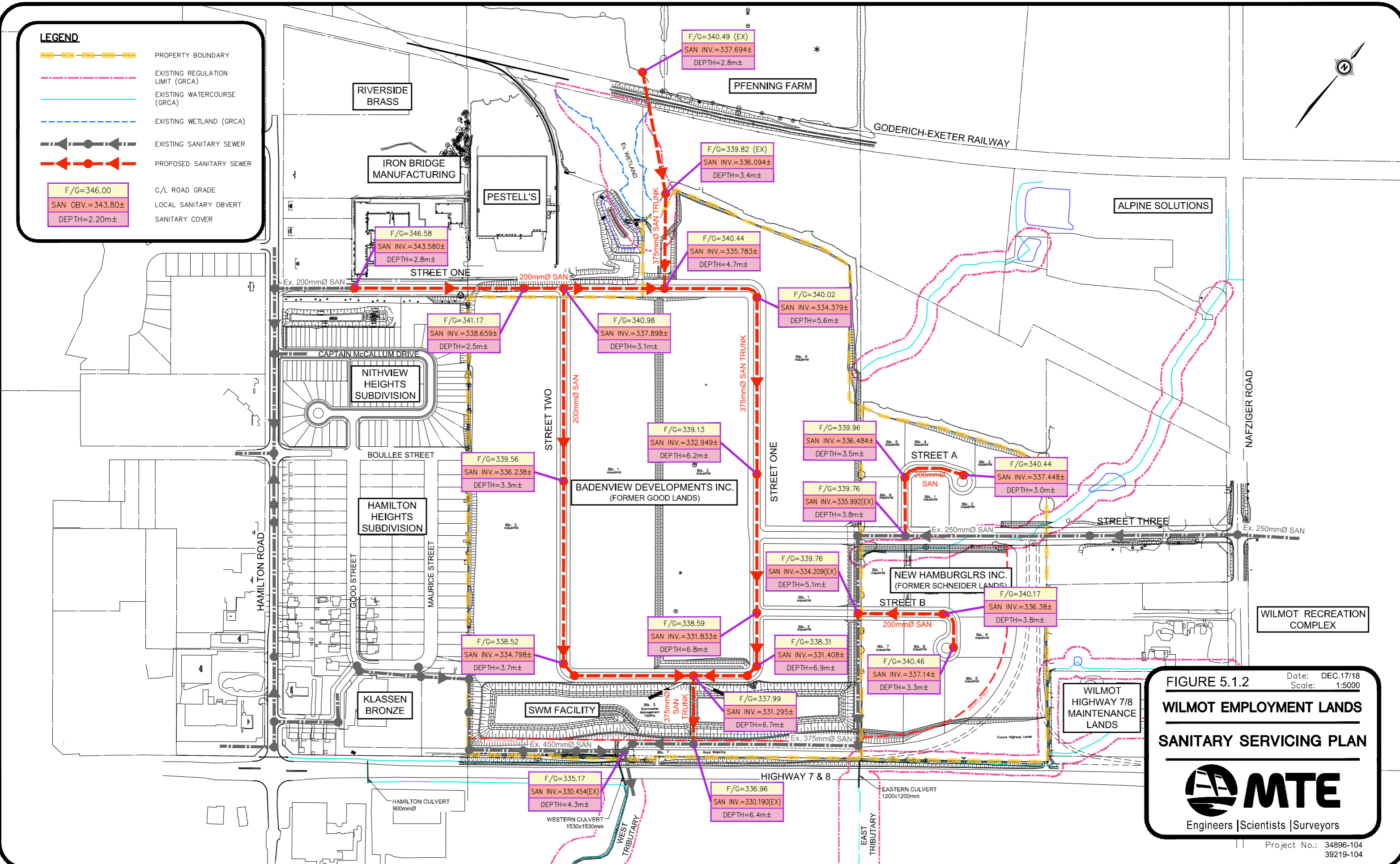


FIGURE 5.1.2 Date: DEC.17/18 Scale: 1:5000

**WILMOT EMPLOYMENT LANDS
SANITARY SERVICING PLAN**



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5.2 Water Distribution

The WEL 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 boundary extends through the northwestern portion of the subject lands so that the majority of the site is located within the Baden Pressure Zone. The current hydraulic grade line (HGL) in the New Hamburg Pressure Zone is approximately 390.0m, whereas the HGL in the Baden Pressure Zone is approximately 397.0m.

Water supply for the WEL will be provided by two connection points to the existing/future municipal water distribution system, as follows:

Baden Pressure Zone Connection:

- Direct connection of the future proposed 450mm diameter transmission watermain to the existing 300mm/450mm diameter watermain connection along Nafziger Road, at the intersection to the entrance to 1282 Nafziger Road.











Two Internal Connections:

- Direct connections to the future 450mm diameter transmission watermain at each end of the proposed development; Street One near Hamilton Road and Street Three near Nafziger Road.

The water distribution system and analysis for the proposed development is presented in the *Preliminary Water Distribution Analysis – Wilmot Employment Lands (December 17, 2018)* prepared by MTE (see **Appendix D** 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 on **Figure 5.2.1**. The following summarizes the key points of the report:

- Connections to the existing/future watermains (listed above) will adequately service the proposed water distribution network for the BDI and NHI lands.
- The proposed water distribution network will generally provide system pressures within the respective pressure guidelines.
- Pressure reducing valves (PRVs) will be required near centreline of road grades below 341.0m.
- Under the proposed development conditions, the recommended Fire Underwriters Survey (FUS) fire flows are satisfied at the minimum Ministry of the Environment, Conservation and Parks (MECP) pressure requirement of 140kPa.

LEGEND

-  PROPERTY BOUNDARY
-  EXISTING CONTOURS
-  EXISTING REGULATION LIMIT (GRCA)
-  EXISTING WATERCOURSE (GRCA)
-  EXISTING WETLAND (GRCA)
-  DEMAND JUNCTION
-  JUNCTION CONTRIBUTING AREA
-  250mmØ EXISTING WATERMAIN
-  250mmØ 250mm PIPE DIAMETER
-  450mmØ 450mm PIPE DIAMETER

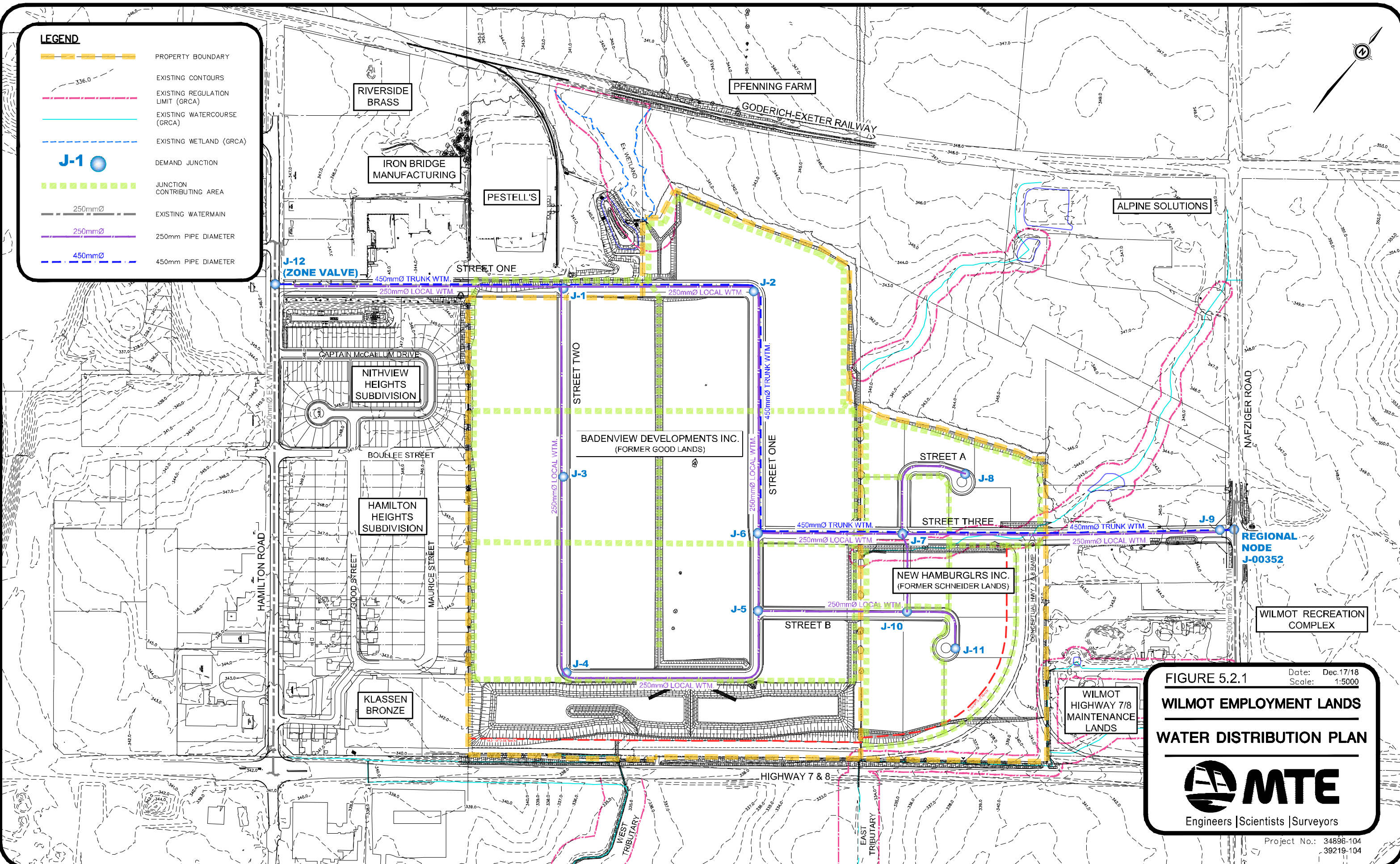



FIGURE 5.2.1 Date: Dec.17/18
 Scale: 1:5000
WILMOT EMPLOYMENT LANDS
WATER DISTRIBUTION PLAN

 Engineers | Scientists | Surveyors

Project No.: 34896-104
39219-104

5.3 Storm Drainage

Storm drainage for the proposed development will be provided through a combination of minor (piped), major (overland), and combined minor & major (drainage channels) drainage systems. There are several storm drainage subcatchment areas within the subject lands, in addition to approximately 91.83ha of upstream external lands, conveyed to the proposed SWM facility. This conveyance will outlet into the proposed SWM facility at five separate locations. The SWM facility will outlet into the West Tributary via a 1.5mx1.5m concrete box culvert under Highway 7&8.

As previously mentioned there are three inlets conveying runoff from upstream lands into the subject lands. These external inlets will be conveyed through the subjected lands via constructed municipal channels designed to maintain flows up to and including the regional storm event. Some minor on-site flows will be conveyed overland to these channels as well. These channels will outlet into the proposed SWM facility at two locations.

The majority of the on-site conveyance will be collected via a storm sewer network, ranging in size from 450mm diameter to 1350mm diameter, and will outlet into the proposed SWM facility at two locations. Some portions of the storm sewer network will outlet into the proposed municipal channels.

The storm drainage areas are illustrated on **Figure 5.3.1**. A schematic of the proposed storm sewer network, including proposed finished road grades and depths of sewers at key points, are shown on **Figure 5.3.2**. Refer to **Appendix E** for preliminary storm sewer design sheets and correlating drainage areas. The proposed development is divided into six major drainage areas. Areas 1 through Area 5 are conveyed to the West Tributary, and Area 6 is conveyed to the East Tributary. The following is a detailed description of these proposed drainage areas:

5.3.1 Area 1 – Lands to Municipal Channel #1

Runoff generated by the major and minor storm events from Inlet #1 will be conveyed through a municipal channel located at the approximate center of the BDI Lands at the rear of Block 1 and Block 3. This channel has been designed to convey a total drainage area of 52.20ha, consisting of 41.07ha of external lands as well as 11.13ha of internally drained lands.

Municipal Channel #1 will be constructed with a 4.0m wide bottom at a slope of 0.25% with 3:1 side slopes to a minimum height of 1.2m. Two 900mmx1800mm concrete box culverts are required underneath Street 1 and two 1500x2400mm concrete box culverts are required underneath Street 2. This channel will outlet into the proposed SWM facility at the southeastern corner of Street 2.

5.3.2 Area 2 – Lands to Municipal Channel #2

Runoff generated by the major and minor storm events from Inlet #2 will be conveyed through a municipal channel located at the eastern property line of the BDI Lands at the rear of Block 4. This Channel will bisect Street 3, before combining with Municipal Channel #3, and bisecting Street B and ultimately outlet into the proposed SWM facility. This channel has been designed to convey a total drainage area of 20.32ha, consisting of 15.15ha of external lands as well as 5.17ha of internally drained lands.

North of Street 3, Municipal Channel #2 will be constructed with a 2.0m wide bottom at a slope of 0.50% with 3:1 side slopes to a minimum height of 1.2m. Two 900mmx1800mm concrete box culverts are required underneath Street 3. Additionally a 3.20ha drainage area (**Area 2b**) will be collected via storm sewer network, ranging in size from 525mm diameter to 825mm diameter, and outlet into these box culverts.

As mentioned previously, Channel #2 and Channel #3 confluence south of Street 3 and as such the remainder of the Channel will be constructed with a 4.0m wide bottom at a slope of 0.25% with 3:1 side slopes to a minimum height of 1.2m. Two 1500mmx2400mm concrete box culverts are required underneath Street B. Additionally a 3.96ha drainage area will be collected via storm sewer network, ranging in size from 525mm diameter to 750mm diameter, and outlet into these box culverts.

5.3.3 Area 3 – Lands to Municipal Channel #3

Runoff generated by the major and minor storm events from External Inlet #3 will be conveyed through a municipal channel located primarily south of Street 3 within the NHI Lands at the rear of Blocks 1 to 3. This channel has been designed to convey a total drainage area of 32.10ha (Area 3a), consisting of 30.25ha of external lands as well as 1.85ha of internally drained lands.

Municipal Channel #3 will be constructed with a 2.0m wide bottom at a slope of 0.25% with 3:1 side slopes to a minimum height of 1.2m. Two 900mmx1800mm concrete box culverts are required underneath Street 3. Additionally a 5.77ha drainage area (Area 3b) will be collected via storm sewer network, ranging in size from 450mm diameter to 825mm diameter, and outlet into these box culverts. This Channel will confluence with Channel #2 at the border of the BDI and NHI properties and ultimately outlet into the proposed SWM facility.

5.3.4 Area 4 – Lands to SWMP Inlet #3

This 17.76ha drainage area consists of existing industrial areas and the proposed western portion of the BDI Lands. Storm runoff will be conveyed via a storm sewer network, ranging in size from 525mm diameter to 1350mm diameter, and roadway network to the proposed SWM facility.

The Iron Bridge Manufacturing property, located north of the subject lands, will be redeveloped to include a 525mm diameter storm sewer to convey up to and including the 100 year storm event. This flow was taken into account for the storm sewer design, as well as provisions for industrial lands located along Hamilton Road and north of Street 1.

In order to provide sufficient cover over top of the storm sewer the 1350mm diameter storm sewer will be constructed as a 1095x1730mm elliptical pipe.











5.3.5 Area 5 – Lands to SWMP Inlet #4

This 10.30ha drainage area consists the proposed eastern portion of the BDI Lands. Storm runoff will be conveyed via a storm sewer network, ranging in size from 525mm diameter to 1200mm diameter, and roadway network to the proposed SWM facility.

5.3.6 Area 6 – Lands to SWMP Inlet #5

Runoff generated by the major and minor storm events from Area 6 will be conveyed through a drainage swale located at the southern development limit within the NHI Lands at the rear of Blocks 5 through 7. This channel has been designed to convey a total drainage area of 1.94ha directly into the southeastern corner of the SWM facility.

LEGEND

-  PROPERTY BOUNDARY
-  EXISTING REGULATION LIMIT (GRCA)
-  EXISTING WATERCOURSE (GRCA)
-  EXISTING WETLAND (GRCA)
-  STORM DRAINAGE AREA
-  STORMWATER FLOW DIRECTION
-  CATCHMENT ID No.
AREA (ha)
-  AREA TO MUNICIPAL CHANNEL #1
-  AREA TO MUNICIPAL CHANNEL #2
-  AREA TO MUNICIPAL CHANNEL #3

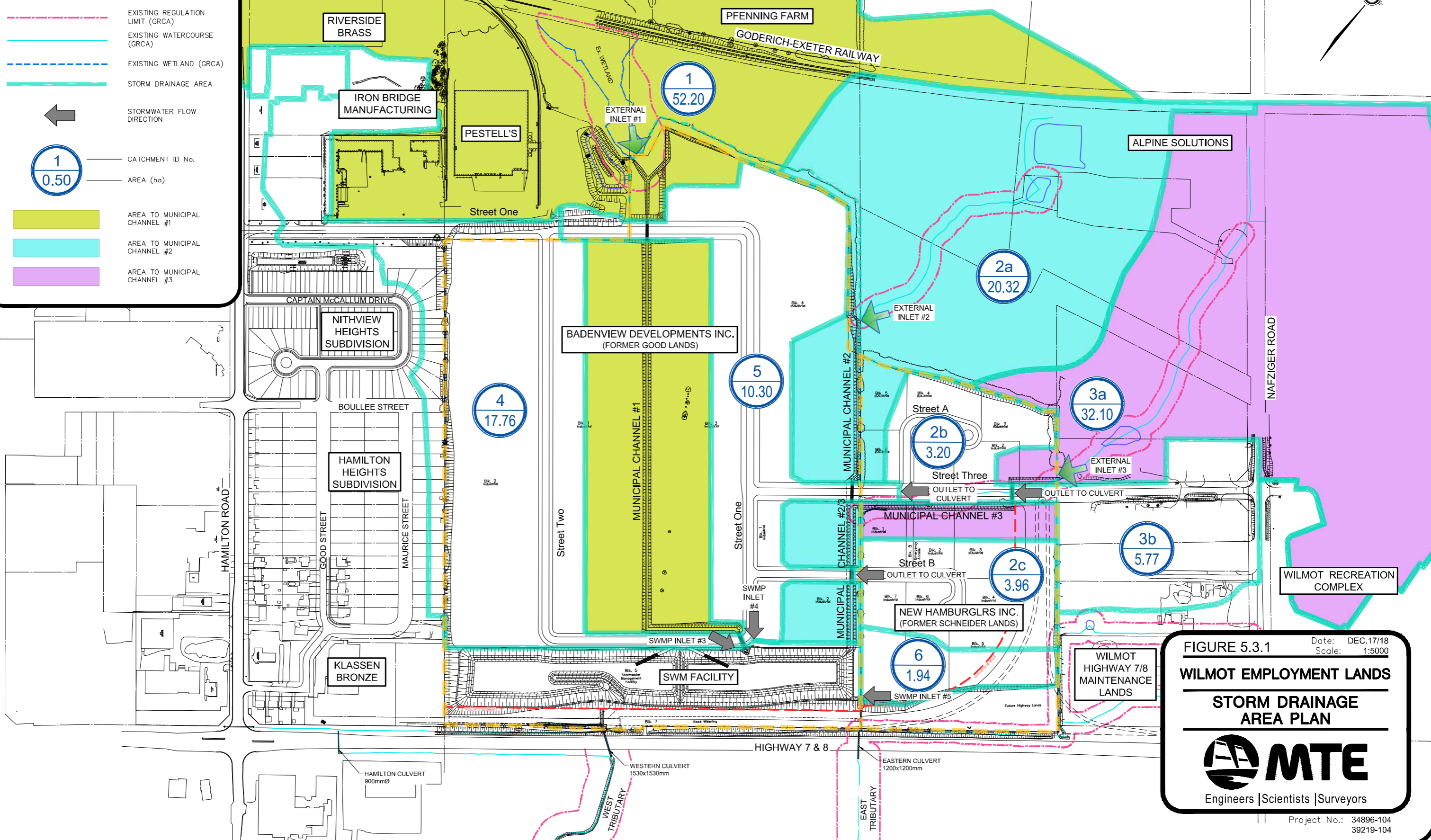
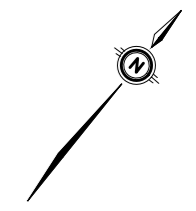








FIGURE 5.3.1 Date: DEC.17/18
Scale: 1:5000

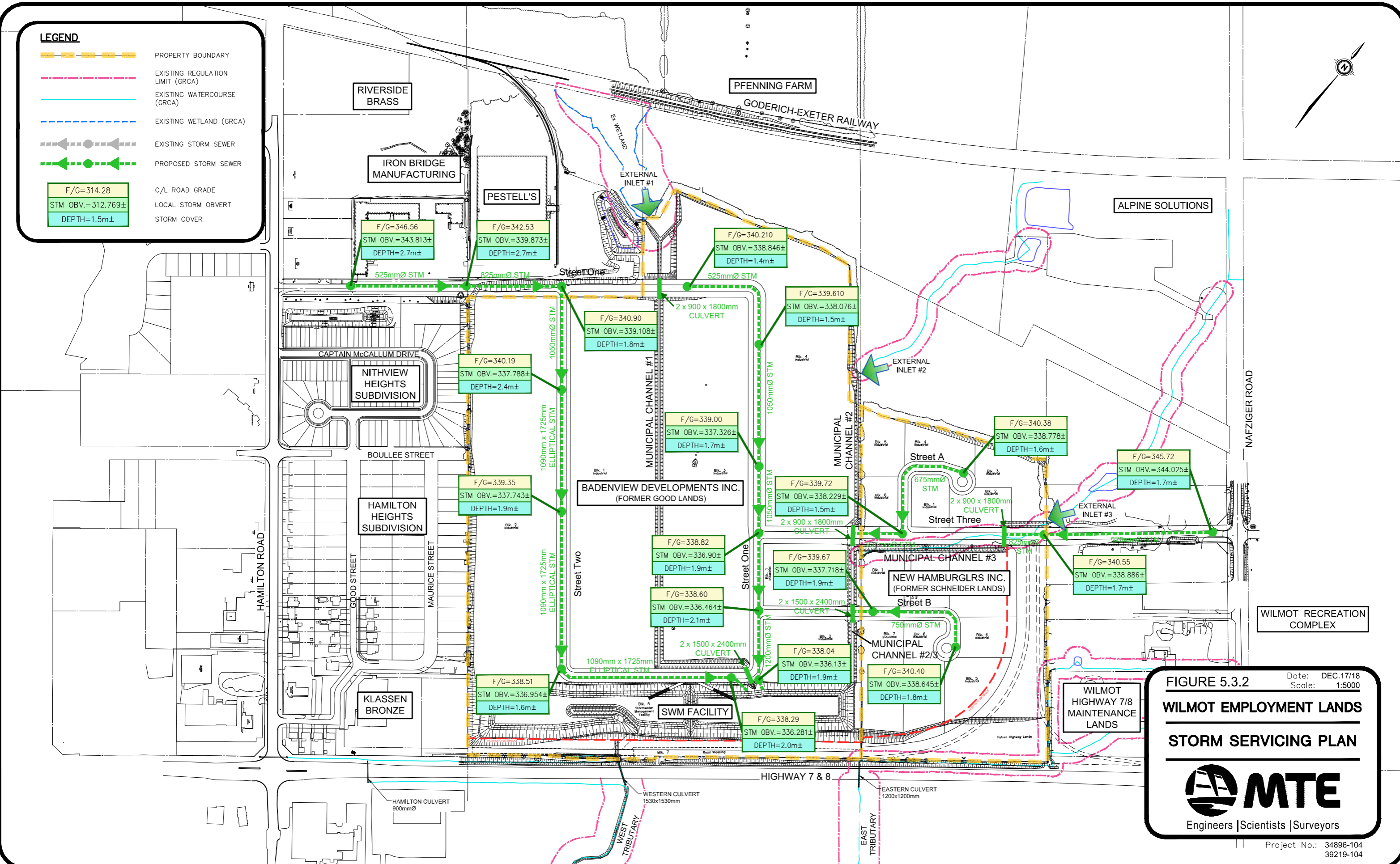
**WILMOT EMPLOYMENT LANDS
STORM DRAINAGE
AREA PLAN**



Project No.: 34896-104
39219-104

LEGEND

-  PROPERTY BOUNDARY
 -  EXISTING REGULATION LIMIT (GRCA)
 -  EXISTING WATERCOURSE (GRCA)
 -  EXISTING WETLAND (GRCA)
 -  EXISTING STORM SEWER
 -  PROPOSED STORM SEWER
- | | |
|-------------------|--------------------|
| F/G=314.28 | C/L ROAD GRADE |
| STM OBV.=312.769± | LOCAL STORM OBVERT |
| DEPTH=1.5m± | STORM COVER |



**WILMOT EMPLOYMENT LANDS
STORM SERVICING PLAN**



Project No.: 34896-104
39219-104

6.0 STORMWATER MANAGEMENT

The proposed stormwater management strategy includes water quality, quantity and erosion control within a proposed stormwater management facility located along the south property line of the BDI lands adjacent to Highway 7&8. The stormwater management strategy for the proposed development is presented in the *Preliminary Stormwater Management Report – Wilmot Employment Lands (December 17, 2018)* prepared by MTE. The following summarizes the key points of the report:

- Water quality and quantity control will be provided within one stormwater management facility (SWMF). The proposed facility will provide peak flow control of runoff from the contributing drainage area for storm events up to and including the Regional storm event.
- Enhanced (previously Level 1) water quality control will be provided in the proposed SWMF.
- The Regulatory Floodplain will be contained within the proposed Stormwater Management block.
- Post-development erosion targets will be met.
- Surface water inputs to the existing Tributaries will be maintained in the post-development condition.

Storm drainage for the proposed development will be provided through a combination of minor (piped), major (overland), and combined minor & major (drainage channels) drainage systems. The storm sewers will be designed for the 1:5 year storm event with major overland flow routes generally flowing through the proposed road allowances, and drainage channels.

7.0 UTILITY SERVICING

Utility servicing of the proposed development will be through the connection to and extension of existing services from Hamilton Road and Nafziger Road.

Hydro electrical (Kitchener-Wilmot Hydro), telephone (Bell Canada), natural gas (Union Gas), and cable (Rogers Cable) will be confirmed that the proposed development can be adequately serviced.

8.0 SUMMARY

The main findings of the functional servicing report for the proposed Badenview Developments and New Hamburg Industrial Subdivisions are:

1. The subdivisions have been designed to implement the *Wilmot Employment Lands - Enhanced Master Drainage Plan (May 2012)*.
2. Proposed Grading - The roadworks and lot grading within the proposed development can be completed in compliance with Township of Wilmot's Design Standards while maintaining the minimum required cover over the proposed sewers.
3. Streets within the subdivisions will be constructed to the Design Standards including an 20.0m and 26.0m urban right-of-way.
4. Sanitary/Storm sewage collection - The proposed development can be adequately serviced through the extension of the existing gravity sewers to the north.
5. There is adequate capacity in the Morningside Wastewater Treatment Plant to accommodate the proposed subdivisions.
6. Water Distribution – Water supply for the proposed development can satisfactorily meet the pressure and flow demands through connections to the existing water municipal distribution system.
7. Stormwater Management for the development can be accommodated by directing the maximum allowable drainage areas to the proposed SWM facility as outlined in the *Preliminary Stormwater Management Report, dated December 17, 2018*.
8. The proposed development can be adequately serviced through the extension of existing utilities including hydro, gas, cable TV and telephone.

All of which is respectfully submitted,

MTE CONSULTANTS INC.



Nicholas Da Maren, C.E.T.
Designer



Garett Korber, P.Eng.
Design Engineer



APPENDIX A

**DRAFT PLAN OF SUBDIVISIONS
(REDUCED)**


Notes
 1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE SHOWN.
 2. SITE BOUNDARY AND TOPOGRAPHIC BASE PLAN PREPARED BY MTE AUGUST 25, 2017 AND UPDATED JUNE 2018.
 3. BOUNDARY INFORMATION ALSO TAKEN FROM PLAN 58R-20194. ADJACENT PARCEL FABRIC IS APPROXIMATE.
 - - - - - STAGE LINE

DRAFT PLAN OF SUBDIVISION

Legal Description
 PART OF LOT 20, NORTH OF BLEAMS ROAD
 PART OF LOT 20, SOUTH OF SNYDERS ROAD
 TOWNSHIP OF WILMOT
 REGIONAL MUNICIPALITY OF WATERLOO

Owner's Certificate
 I HEREBY AUTHORIZE MACNAUGHTON HERMSEN BRITTON CLARKSON PLANNING LIMITED TO SUBMIT THIS PLAN FOR APPROVAL.
 DATE: December 4, 2018 *Patrick Hegele*
 BADENVIEW DEVELOPMENTS INC. (OWNER)

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: NOV. 22, 2018 *Trevor D.A. McNeil*
 TREVOR D.A. MCNEIL, OLS
 (MTE OLS LTD.)

Key Plan

 Subject Lands
 SCALE: NTS
 Source: Region of Waterloo SLRN

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. INDUSTRIAL STORMWATER MANAGEMENT | | |
| E. AS SHOWN | F. AS SHOWN | |
| G. AS SHOWN | H. MUNICIPAL WATER SUPPLY | L. SILTY CLAY LOAM |
| J. AS SHOWN | K. ALL SERVICES AS REQUIRED | L. AS SHOWN |

Area Schedule **30T**

| Description | Stage 1 | | Stage 2 | |
|--------------------------------|-----------|---------------|----------|---------------|
| | Blocks | Area (ha) | Blocks | Area (ha) |
| Industrial | 1-4 | 16.822 | 1,2 | 14.650 |
| Stormwater Management Facility | 5 | 5.797 | | |
| Road Widening | 6 | 0.631 | | |
| Future Development | 7,8 | 0.349 | | |
| 0.3m Reserve | 9-12 | 0.007 | | |
| Roads | | 2.501 | | 1.317 |
| Sub-Total | 12 | 26.107 | 2 | 15.967 |

| Description | Total | |
|--------------------------------|-----------|---------------|
| | Blocks | Area (ha) |
| Industrial | 6 | 31.472 |
| Stormwater Management Facility | 1 | 5.797 |
| Road Widening | 1 | 0.631 |
| Future Development | 2 | 0.349 |
| 0.3m Reserve | 4 | 0.007 |
| Roads | | 3.818 |
| Total | 14 | 42.074 |

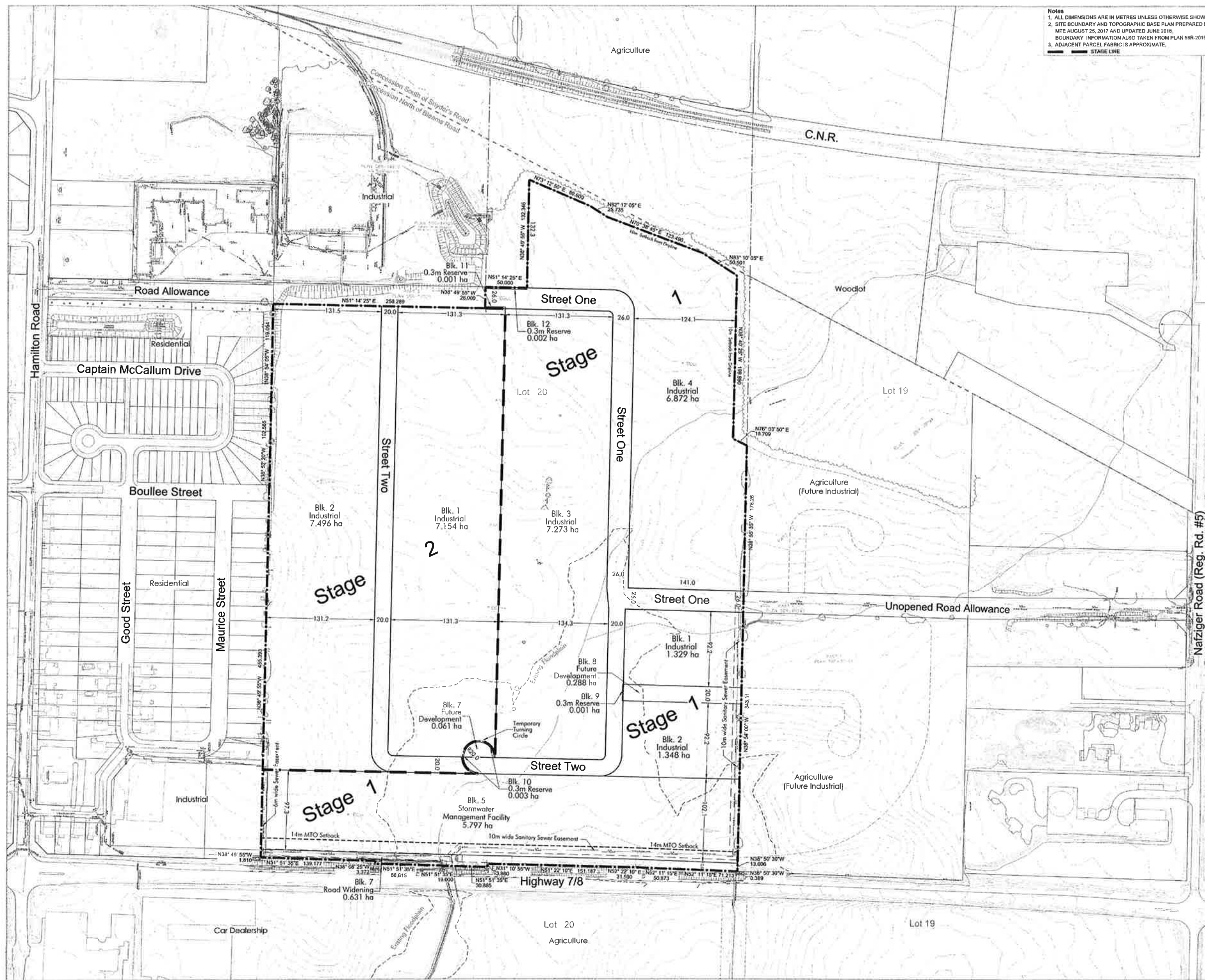
| | | | |
|--------------|---------------|------------------------------------|-----|
| 2. | Nov. 22, 2018 | For submission to Region; | DGS |
| 1. | Nov. 5, 2018 | For review by surveyor and client; | DGS |
| Revision No. | Date | Issued / Revision | By |

MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE
 200-42 BIRCHMOUNT CENTRE DR. COCHRAM, ONT. N0C 1B0 P: 519.572.2600 F: 519.572.2111 WWW.MHBCA.COM

| | | | |
|-----------------------|-------------------------|-------------------|------|
| Approval Stamp | Date | November 22, 2018 | |
| | File No. | 1159A | |
| | Plan Scale | 1:2,000 (24x36) | |
| | Drawn By | D.G.S. | |
| Project | Wilmot Employment Lands | Checked By | P.C. |

Applicant
 Badenview Developments Inc.
 P.O. Box 249 Breslau, ON
 N0B 1M0
 P: 519.648.2285

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



DRAFT PLAN OF SUBDIVISION

Legal Description
 PART OF LOT 19, NORTH OF BLEAMS ROAD
 TOWNSHIP OF WILMOT
 REGIONAL MUNICIPALITY OF WATERLOO

Owner's Certificate
 I HEREBY AUTHORIZE MACNAUGHTON HERMSEN BRITTON CLARKSON PLANNING LIMITED TO SUBMIT THIS PLAN FOR APPROVAL.
 DATE: Nov 23/18
 NEW HAMBURGERS INC. (OWNER)

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: Nov 22, 2018
 TREVOR D.A. McNEIL, OLS (MTE OLS LTD.)

Key Plan

Subject Lands
 Additional Lands Owned by Applicant

SCALE: NTS

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. INDUSTRIAL | F. AS SHOWN | E. AS SHOWN |
| G. AS SHOWN | H. MUNICIPAL WATER SUPPLY | I. SILTY CLAY LOAM |
| J. AS SHOWN | K. ALL SERVICES AS REQUIRED | L. AS SHOWN |

Area Schedule 30T

| Description | Stage 1 | | Stage 2 | |
|------------------|----------|--------------|----------|--------------|
| | Blocks | Area (ha) | Blocks | Area (ha) |
| Industrial | 1-7 | 5.546 | 1-6 | 3.373 |
| Emergency Access | 8 | 0.092 | | |
| Roads | | 0.456 | | 0.432 |
| Sub-Total | 8 | 6.094 | 6 | 3.805 |

| Description | Total | |
|------------------|-----------|--------------|
| | Blocks | Area (ha) |
| Industrial | 13 | 8.919 |
| Emergency Access | 1 | 0.092 |
| Roads | | 0.888 |
| Total | 14 | 9.899 |

Notes

- ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE SHOWN.
- SITE BOUNDARY AND TOPOGRAPHIC BASE PLAN PREPARED BY MTE, AUGUST 26, 2017 AND UPDATED JUNE 2018. BOUNDARY INFORMATION ALSO TAKEN FROM PLAN 58R-20194.
- ADJACENT PARCEL FABRIC IS APPROXIMATE.

| | | | |
|--------------|---------------|------------------------------------|-----|
| 2. | Nov. 22, 2018 | For submission to Region: | DGS |
| 1. | Nov. 5, 2018 | For review by surveyor and client: | DGS |
| Revision No. | Date | Issued / Revision | By |

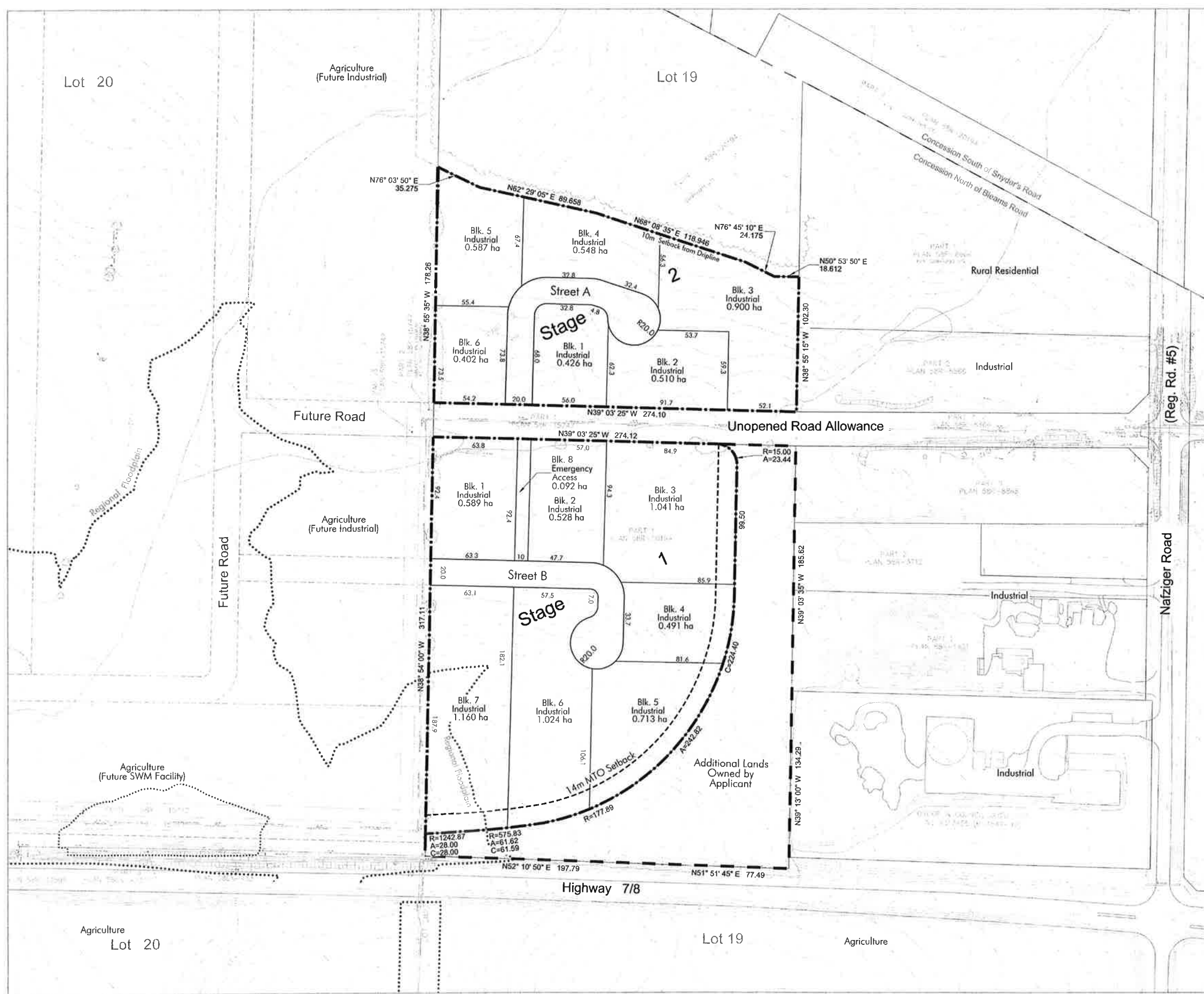
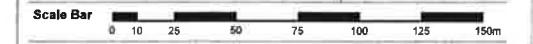
2164 BRIMHAM DRIVE, SUITE 104, KITCHENER, ON N2K 3S3 P: 519 571 3600 F: 519 571 5521 WWW.MHBCANCA.COM

| | | |
|-----------------------|------------|-------------------|
| Approval Stamp | Date | November 22, 2018 |
| | File No. | 18157A |
| | Plan Scale | 1:1,250 (24x36) |
| | Drawn By | D.G.S. |
| | Checked By | P.C. |

Project: Highway 7 and Nafziger Road

Applicant: New Hamburgers Inc.
 675 Riverbend Dr. Kitchener, ON N2K 3S3
 P: 519.571.8800

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



Lot 20

Agriculture (Future Industrial)

Lot 19

Rural Residential

Industrial

Future Road

Unopened Road Allowance

Agriculture (Future Industrial)

Industrial

Agriculture (Future SWM Facility)

Additional Lands Owned by Applicant

Agriculture Lot 20

Lot 19

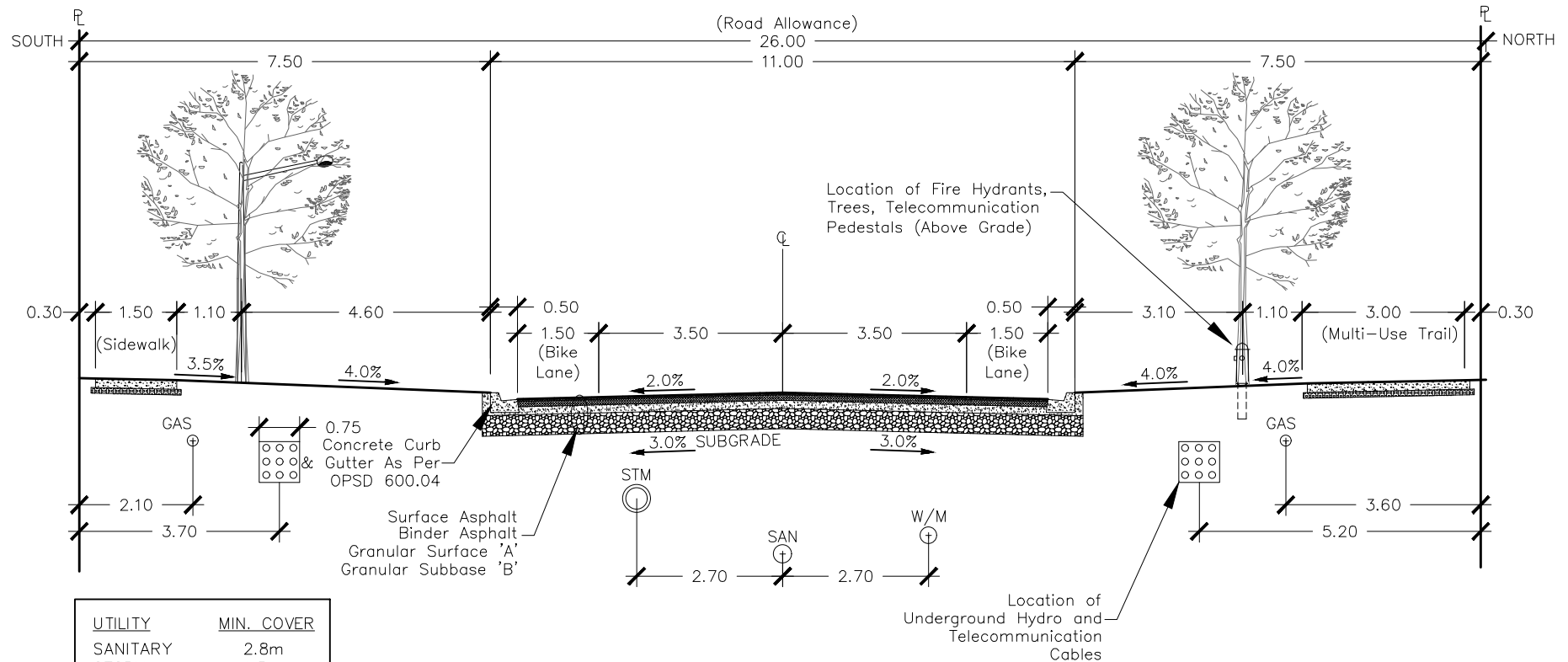
Agriculture

Highway 7/8

Nafziger Road (Reg. Rd. #5)



20.0m AND 26.0m URBAN RIGHT-OF-WAY




| UTILITY | MIN. COVER |
|----------|------------|
| SANITARY | 2.8m |
| STORM | 1.5m |
| WATER | 2.0m |
| HYDRO | 0.9m |
| BELL | 0.75m |
| CABLE | 0.75m |
| GAS | 0.6m |

| ROAD STRUCTURE SHALL BE: | |
|--------------------------|-------|
| HL3 SURFACE ASPHALT | 40mm |
| HL4 BINDER ASPHALT | 60mm |
| GRAN 'A' BASE COURSE | 150mm |
| GRAN 'B' SUBBASE COURSE | 600mm |

APPENDIX B.1 Date: Dec.17/18
 Scale: NTS

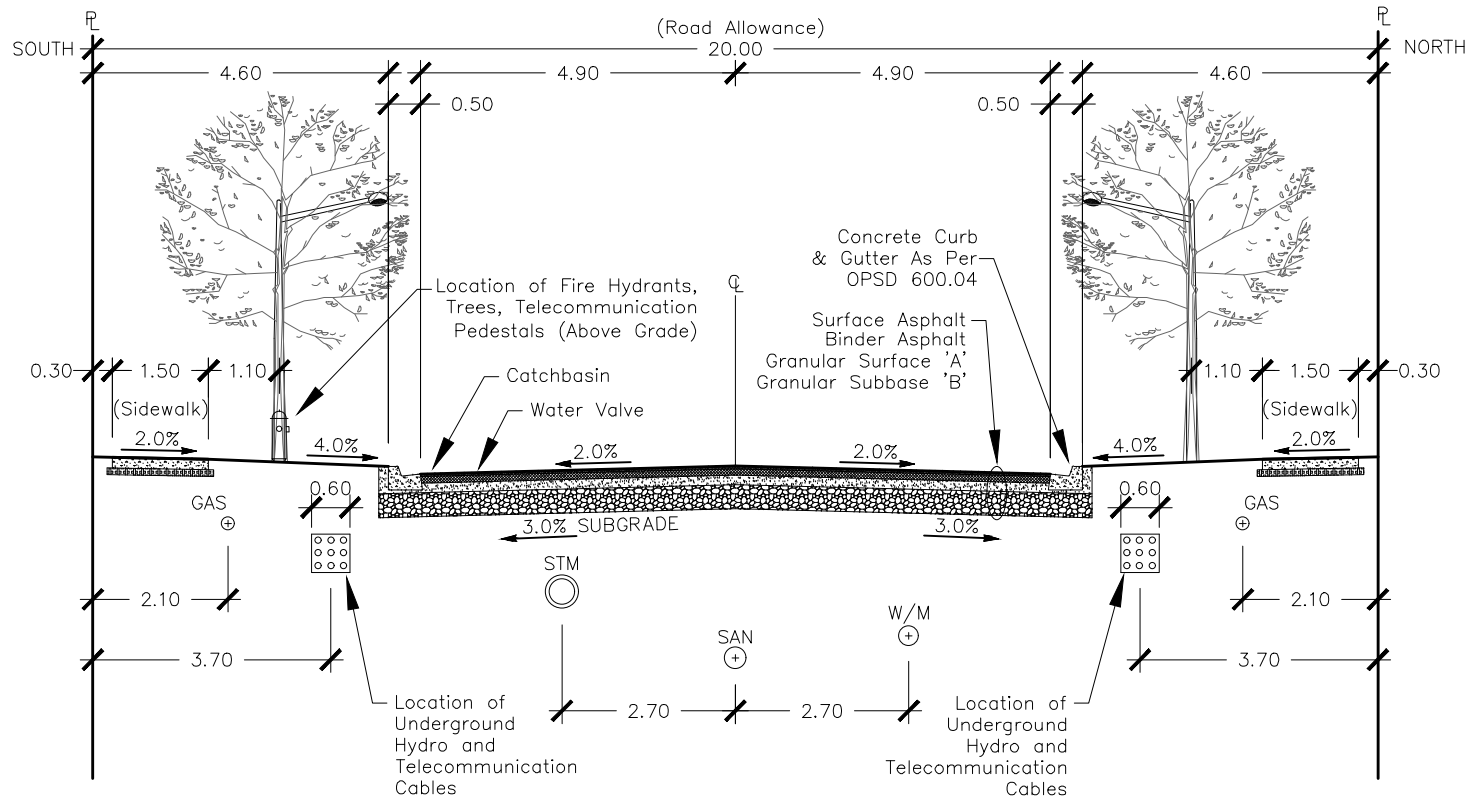
WILMOT EMPLOYMENT LANDS

ROAD SECTION
URBAN 26.0m RIGHT-OF-WAY



Engineers | Scientists | Surveyors

Project No.: 34896-104
 39219-104



| UTILITY | MIN. COVER |
|----------|------------|
| SANITARY | 2.8m |
| STORM | 1.5m |
| WATER | 2.0m |
| HYDRO | 0.9m |
| BELL | 0.75m |
| CABLE | 0.75m |
| GAS | 0.6m |

| ROAD STRUCTURE SHALL BE: | |
|--------------------------|-------|
| HL3 SURFACE ASPHALT | 40mm |
| HL4 BINDER ASPHALT | 60mm |
| GRAN 'A' BASE COURSE | 150mm |
| GRAN 'B' SUBBASE COURSE | 600mm |

APPENDIX B.2 Date: Dec.17/18
Scale: NTS

WILMOT EMPLOYMENT LANDS

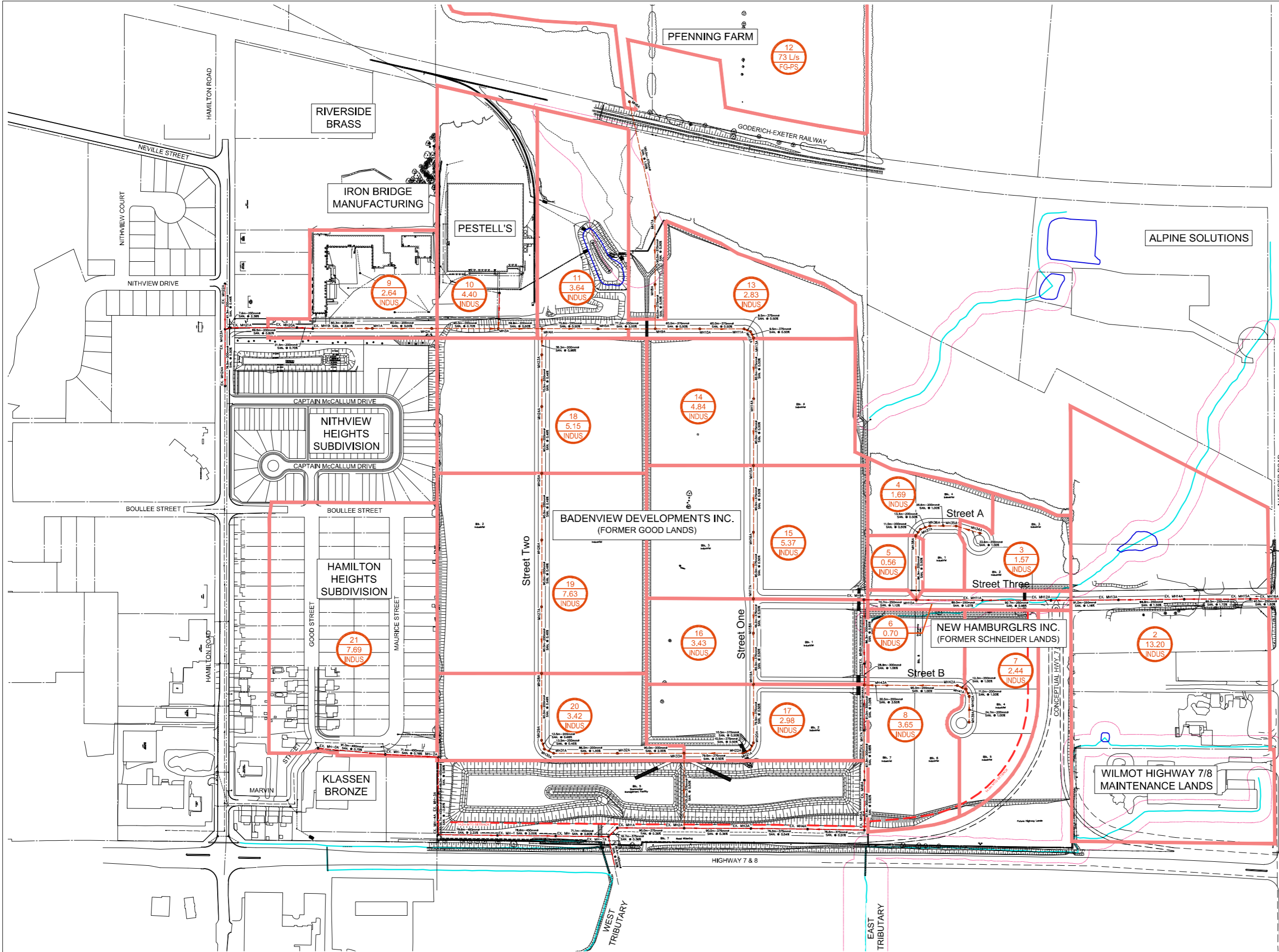
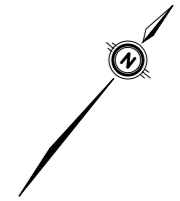
ROAD SECTION
URBAN 20.0m RIGHT-OF-WAY

Engineers | Scientists | Surveyors



Project No.: 34896-104
39219-104



EXISTING SANITARY SEWER ANALYSIS



LEGEND

-  SANITARY DRAINAGE AREA
-  CATCHMENT ID No.
AREA (ha)
POPULATION DENSITY

1
12.00
INST

2
13.20
INDUS

3
1.57
INDUS

4
1.69
INDUS

5
0.56
INDUS

6
0.70
INDUS

7
2.44
INDUS

8
3.65
INDUS

12
73 L/s
FG-PS

13
2.83
INDUS

14
4.84
INDUS

15
5.37
INDUS

16
3.43
INDUS

17
2.98
INDUS

11
3.64
INDUS

18
5.15
INDUS

19
7.63
INDUS

20
3.42
INDUS

9
2.64
INDUS

21
7.89
INDUS

10
4.40
INDUS

**PRELIM-SA1.1
SANITARY DRAINAGE
AREA PLAN**



| WILMOT EMPLOYMENT LANDS | | | | ULTIMATE BUILD OUT SANITARY SEWER DESIGN SHEET | | | | | | | | | | Design Parameters | | | | | | | | | | | | | | | | | | | | |
|--|----------|------------------|----------|---|-----|-------|-----|-----|-------|-------|-------------|--------|---------------|---|----------------|----------------------------------|------------|-------|-------------|------------|-------|---------|--------------|---------|------------------|--------|------------|------------|-------------------|--------|-------|-----------|----------|--------------------|
| TOWNSHIP OF WILMOT, Ontario | | | | ENGINEERING AND PUBLIC WORKS | | | | | | | | | | Average Daily Flow Residential 0.00353 L/s/c Commercial 0.95 L/s/ha Industrial 0.40 L/s/ha Inst. / School 0.25 L/s/ha Mannings "n" 0.0130 Min. Velocity 0.8 m/sec Max. Velocity 3.0 m/sec Residential Harmon Peaking Factor (F) Residential Areas Infiltration 0.25 L/s/ha | | | | | | | | | | | | | | | | | | | | |
| Project Number: 34896-104 Date: December 17, 2018 Design By: NED Checked By: MSB File: Q:\34896\104\Sanitary\34896-104-Sanitary Sewer Design Sheet.xls | | | | Drainage Area Plan No: PRELIM-SA1.1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LOCATION | | | | RESIDENTIAL AREAS and POPULATION | | | | | | | | | | SCHOOL, INSTITUTIONAL | | | COMMERCIAL | | | INDUSTRIAL | | | INFILTRATION | | | DESIGN | | | | | | | | |
| STREET | AREA NO. | MANHOLE LOCATION | | HECTARES OF EACH DENSITY | | | | | | | | POPUL. | CUMUL. POPUL. | PEAK FACTOR "F" | PEAK RES. FLOW | HECTARES AND FLOW OF EACH ZONING | | | | | | | | | TOTALS- C-1 FLOW | AREA | CUMUL AREA | INFIL FLOW | TOTAL VOLUME FLOW | LENGTH | SLOPE | PIPE SIZE | CAPACITY | FULL FLOW VELOCITY |
| | | FROM MH | TO MH | R2 | R3 | R4/R5 | R6 | R7 | R8 | R9 | 0.25 L/s/ha | | | | | 0.95 L/s/ha | | | 0.40 L/s/ha | | | | | | | | | | | | | | | |
| | | 36 | 72 | 143 | 196 | 312 | 387 | 775 | 1000s | 1000s | L/sec | | | | | ha | ha | L/sec | ha | ha | L/sec | ha | ha | L/sec | | | | | | | | | | |
| 1) EASTERN REACH SANITARY SEWER | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| STREET 3 | 1 | Ex MH16A | Ex MH15A | | | | | | | | 0.000 | 0.000 | 4.5 | 0.0000 | 12.00 | 12.00 | 3.0000 | | 0.00 | 0.0000 | | | | 3.0000 | 12.00 | 12.00 | 3.0000 | 6.0000 | 40.5 | 1.50 | 250 | 72.7956 | 1.484 | |
| STREET 3 | 2 | Ex MH15A | Ex MH14A | | | | | | | | 0.000 | 0.000 | 4.5 | 0.0000 | 12.00 | 12.00 | 3.0000 | | 0.00 | 0.0000 | 13.20 | 13.20 | 5.2800 | 8.2800 | 13.20 | 25.20 | 6.3000 | 14.5800 | 89.0 | 1.72 | 250 | 77.9513 | 1.589 | |
| STREET 3 | | Ex MH14A | Ex MH13A | | | | | | | | 0.000 | 0.000 | 4.5 | 0.0000 | 12.00 | 12.00 | 3.0000 | | 0.00 | 0.0000 | | 13.20 | 13.20 | 5.2800 | 8.2800 | 0.00 | 25.20 | 6.3000 | 14.5800 | 88.8 | 1.55 | 250 | 73.9989 | 1.508 |
| STREET 3 | | Ex MH13A | Ex MH12A | | | | | | | | 0.000 | 0.000 | 4.5 | 0.0000 | 12.00 | 12.00 | 3.0000 | | 0.00 | 0.0000 | | 13.20 | 13.20 | 5.2800 | 8.2800 | 0.00 | 25.20 | 6.3000 | 14.5800 | 91.0 | 1.18 | 250 | 64.5655 | 1.316 |
| STREET 3 | 6 | Ex MH12A | Ex MH11A | | | | | | | | 0.000 | 0.000 | 4.5 | 0.0000 | 12.00 | 12.00 | 3.0000 | | 0.00 | 0.0000 | 0.70 | 13.90 | 5.5600 | 8.5600 | 0.70 | 25.90 | 6.4750 | 15.0350 | 92.7 | 0.98 | 250 | 58.8400 | 1.199 | |
| STREET 3 | | Ex MH11A | Ex MH10A | | | | | | | | 0.000 | 0.000 | 4.5 | 0.0000 | 12.00 | 12.00 | 3.0000 | | 0.00 | 0.0000 | | 13.90 | 5.5600 | 8.5600 | 0.00 | 25.90 | 6.4750 | 15.0350 | 89.0 | 1.07 | 250 | 61.4824 | 1.253 | |
| STREET A | 3 | MH34A | MH35A | | | | | | | | 0.000 | 0.000 | 4.5 | 0.0000 | | 0.00 | 0.0000 | | 0.00 | 0.0000 | | 1.57 | 1.57 | 0.6280 | 0.6280 | 1.57 | 1.57 | 0.3925 | 1.0205 | 40.0 | 1.00 | 200 | 32.7818 | 1.044 |
| STREET A | 4 | MH35A | MH38A | | | | | | | | 0.000 | 0.000 | 4.5 | 0.0000 | | 0.00 | 0.0000 | | 0.00 | 0.0000 | | 1.69 | 3.26 | 1.3040 | 1.3040 | 1.69 | 3.26 | 0.8150 | 2.1190 | 64.0 | 0.50 | 200 | 23.1802 | 0.738 |
| STREET A | 5 | MH38A | Ex MH10A | | | | | | | | 0.000 | 0.000 | 4.5 | 0.0000 | | 0.00 | 0.0000 | | 0.00 | 0.0000 | | 0.56 | 3.82 | 1.5280 | 1.5280 | 0.56 | 3.82 | 0.9550 | 2.4830 | 86.3 | 0.50 | 200 | 23.1802 | 0.738 |
| STREET 3 | | Ex MH10A | Ex MH9A | | | | | | | | 0.000 | 0.000 | 4.5 | 0.0000 | 12.00 | 3.0000 | | 0.00 | 0.0000 | | 17.72 | 7.0880 | 10.0880 | 10.0880 | 0.00 | 29.72 | 7.4300 | 17.5180 | 70.7 | 1.12 | 250 | 62.9026 | 1.282 | |
| Ex. East Easement | | Ex MH9A | Ex MH8A | | | | | | | | 0.000 | 0.000 | 4.5 | 0.0000 | 12.00 | 3.0000 | | 0.00 | 0.0000 | | 17.72 | 7.0880 | 10.0880 | 10.0880 | 0.00 | 29.72 | 7.4300 | 17.5180 | 86.3 | 0.95 | 300 | 94.2044 | 1.333 | |
| Ex. East Easement | | Ex MH8A | MH44A | | | | | | | | 0.000 | 0.000 | 4.5 | 0.0000 | 12.00 | 3.0000 | | 0.00 | 0.0000 | | 17.72 | 7.0880 | 10.0880 | 10.0880 | 0.00 | 29.72 | 7.4300 | 17.5180 | 28.9 | 1.06 | 300 | 99.5090 | 1.408 | |
| STREET B | 7 | MH39A | MH41A | | | | | | | | 0.000 | 0.000 | 4.5 | 0.0000 | | 0.00 | 0.0000 | | 0.00 | 0.0000 | | 2.44 | 2.44 | 0.9760 | 0.9760 | 2.44 | 2.44 | 0.6100 | 1.5860 | 45.7 | 1.00 | 200 | 32.7818 | 1.044 |
| STREET B | 8 | MH41A | MH44A | | | | | | | | 0.000 | 0.000 | 4.5 | 0.0000 | | 0.00 | 0.0000 | | 0.00 | 0.0000 | | 3.65 | 6.09 | 2.4360 | 2.4360 | 3.65 | 6.09 | 1.5225 | 3.9585 | 137.8 | 1.00 | 200 | 32.7818 | 1.044 |
| Ex. East Easement | | MH44A | Ex MH7A | | | | | | | | 0.000 | 0.000 | 4.5 | 0.0000 | 12.00 | 3.0000 | | 0.00 | 0.0000 | | 23.81 | 9.5240 | 12.5240 | 12.5240 | 0.00 | 35.81 | 8.9525 | 21.4765 | 61.0 | 1.06 | 300 | 99.5090 | 1.408 | |
| Ex. East Easement | | Ex MH7A | Ex MH6A | | | | | | | | 0.000 | 0.000 | 4.5 | 0.0000 | 12.00 | 3.0000 | | 0.00 | 0.0000 | | 23.81 | 9.5240 | 12.5240 | 12.5240 | 0.00 | 35.81 | 8.9525 | 21.4765 | 67.3 | 0.98 | 300 | 95.6803 | 1.354 | |
| Ex. East Easement | | Ex MH6A | Ex MH5A | | | | | | | | 0.000 | 0.000 | 4.5 | 0.0000 | 12.00 | 3.0000 | | 0.00 | 0.0000 | | 23.81 | 9.5240 | 12.5240 | 12.5240 | 0.00 | 35.81 | 8.9525 | 21.4765 | 67.4 | 0.92 | 300 | 92.7050 | 1.312 | |
| Ex. East Easement | | Ex MH5A | Ex MH4A | | | | | | | | 0.000 | 0.000 | 4.5 | 0.0000 | 12.00 | 3.0000 | | 0.00 | 0.0000 | | 23.81 | 9.5240 | 12.5240 | 12.5240 | 0.00 | 35.81 | 8.9525 | 21.4765 | 76.6 | 0.51 | 375 | 125.1472 | 1.134 | |
| Ex. East Easement | | Ex MH4A | Ex MH3A | | | | | | | | 0.000 | 0.000 | 4.5 | 0.0000 | 12.00 | 3.0000 | | 0.00 | 0.0000 | | 23.81 | 9.5240 | 12.5240 | 12.5240 | 0.00 | 35.81 | 8.9525 | 21.4765 | 76.5 | 0.54 | 375 | 128.7754 | 1.167 | |
| Ex. East Easement | | Ex MH3A | Ex MH2A | | | | | | | | 0.000 | 0.000 | 4.5 | 0.0000 | 12.00 | 3.0000 | | 0.00 | 0.0000 | | 23.81 | 9.5240 | 12.5240 | 12.5240 | 0.00 | 35.81 | 8.9525 | 21.4765 | 90.0 | 0.36 | 375 | 105.1447 | 0.952 | |
| 2) NORTHERN REACH SANITARY SEWER | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| STREET 1 | 9 | Ex. MH19A | MH1A | | | | | | | | 0.000 | 0.000 | 4.5 | 0.0000 | | 0.00 | 0.0000 | | 0.00 | 0.0000 | 2.64 | 2.64 | 1.0560 | 1.0560 | 2.64 | 2.64 | 0.6600 | 1.7160 | 160.3 | 3.00 | 200 | 56.7797 | 1.808 | |
| STREET 1 | 10 | MH11A | MH3A | | | | | | | | 0.000 | 0.000 | 4.5 | 0.0000 | | 0.00 | 0.0000 | | 0.00 | 0.0000 | 4.40 | 7.04 | 2.8160 | 2.8160 | 4.40 | 7.04 | 1.7600 | 4.5760 | 90.0 | 0.50 | 200 | 23.1802 | 0.738 | |
| STREET 1 | 11 | MH3A | MH9A | | | | | | | | 0.000 | 0.000 | 4.5 | 0.0000 | | 0.00 | 0.0000 | | 0.00 | 0.0000 | 3.64 | 10.68 | 4.2720 | 4.2720 | 3.64 | 10.68 | 2.6700 | 6.9420 | 211.6 | 0.50 | 200 | 23.1802 | 0.738 | |
| Prop. North Easement | 12 | MH6A | MH9A | | | | | | | | 0.000 | 0.000 | 4.5 | 73.0000 | | 0.00 | 0.0000 | | 0.00 | 0.0000 | | 0.00 | 0.0000 | 0.0000 | 0.00 | 0.00 | 0.0000 | 73.0000 | 150.0 | 0.50 | 375 | 123.9142 | 1.123 | |
| STREET 1 | 13 | MH9A | MH13A | | | | | | | | 0.000 | 0.000 | 4.5 | 73.0000 | | 0.00 | 0.0000 | | 0.00 | 0.0000 | 2.83 | 13.51 | 5.4040 | 5.4040 | 2.83 | 13.51 | 3.3775 | 81.7815 | 79.0 | 0.50 | 375 | 123.9142 | 1.123 | |
| STREET 1 | 14 | MH13A | MH15A | | | | | | | | 0.000 | 0.000 | 4.5 | 73.0000 | | 0.00 | 0.0000 | | 0.00 | 0.0000 | 4.84 | 18.35 | 7.3400 | 7.3400 | 4.84 | 18.35 | 4.5875 | 84.9275 | 172.0 | 0.50 | 375 | 123.9142 | 1.123 | |
| STREET 1 | 15 | MH15A | MH17A | | | | | | | | 0.000 | 0.000 | 4.5 | 73.0000 | | 0.00 | 0.0000 | | 0.00 | 0.0000 | 5.37 | 23.72 | 9.4880 | 9.4880 | 5.37 | 23.72 | 5.9300 | 88.4180 | 180.0 | 0.50 | 375 | 123.9142 | 1.123 | |
| STREET 1 | 16 | MH17A | MH19A | | | | | | | | 0.000 | 0.000 | 4.5 | 73.0000 | | 0.00 | 0.0000 | | 0.00 | 0.0000 | 3.43 | 27.15 | 10.8600 | 10.8600 | 3.43 | 27.15 | 6.7875 | 90.6475 | 69.0 | 0.50 | 375 | 123.9142 | 1.123 | |
| STREET 2 | 17 | MH19A | MH33A | | | | | | | | 0.000 | 0.000 | 4.5 | 73.0000 | | 0.00 | 0.0000 | | 0.00 | 0.0000 | 2.98 | 30.13 | 12.0520 | 12.0520 | 2.98 | 30.13 | 7.5325 | 92.5845 | 179.5 | 0.50 | 375 | 123.9142 | 1.123 | |
| STREET 2 | 18 | MH23A | MH25A | | | | | | | | 0.000 | 0.000 | 4.5 | 0.0000 | | 0.00 | 0.0000 | | 0.00 | 0.0000 | 5.15 | 5.15 | 2.0600 | 2.0600 | 5.15 | 5.15 | 1.2875 | 3.3475 | 195.3 | 0.50 | 200 | 23.1802 | 0.738 | |
| STREET 2 | 19 | MH25A | MH28A | | | | | | | | 0.000 | 0.000 | 4.5 | 0.0000 | | 0.00 | 0.0000 | | 0.00 | 0.0000 | 7.63 | 12.78 | 5.1120 | 5.1120 | 7.63 | 12.78 | 3.1950 | 8.3070 | 270.0 | 0.50 | 200 | 23.1802 | 0.738 | |
| STREET 2 | 20 | MH28A | MH33A | | | | | | | | 0.000 | 0.000 | 4.5 | 0.0000 | | 0.00 | 0.0000 | | 0.00 | 0.0000 | 3.42 | 16.20 | 6.4800 | 6.4800 | 3.42 | 16.20 | 4.0500 | 10.5300 | 292.0 | 2.00 | 200 | 46.3604 | 1.476 | |
| Prop. SWMP Easement | | MH33A | Ex MH2A | | | | | | | | 0.000 | 0.000 | 4.5 | 73.0000 | | 0.00 | 0.0000 | | 0.00 | 0.0000 | | 46.33 | 18.5320 | 18.5320 | 0.00 | 46.33 | 11.5825 | 103.1145 | 101.0 | 0.50 | 375 | 123.9142 | 1.123 | |
| 3) COMBINE NORTHERN & EASTERN REACHES AND CONTINUE DOWNSTREAM | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ex. East Easement | | Ex MH2A | Ex MH1A | | | | | | | | 0.000 | 0.000 | 4.5 | 73.0000 | 12.00 | 3.0000 | | 0.00 | 0.0000 | | 70.14 | 28.0560 | 31.0560 | 31.0560 | 0.00 | 82.14 | 20.5350 | 124.5910 | 90.0 | 0.36 | 375 | 105.1447 | 0.952 | |
| Ex. East Easement | | Ex MH1A | Ex MH-7A | | | | | | | | 0.000 | 0.000 | 4.5 | 73.0000 | 12.00 | 3.0000 | | 0.00 | 0.0000 | | 70.14 | 28.0560 | 31.0560 | 31.0560 | 0.00 | 82.14 | 20.5350 | 124.5910 | 16.7 | 0.36 | 375 | 105.1447 | | |



**PRELIMINARY WATER DISTRIBUTION
ANALYSIS**



WILMOT EMPLOYMENT LANDS INDUSTRIAL SUBDIVISION

Preliminary Water Distribution Analysis

Project Location:

Part of Lot 20, Concession North of Bleams Road and
Part Lot 19, Concession North Bleams Road,
North of Highway 7 & 8
Township of Wilmot
Regional Municipality of Waterloo

Prepared for:

Badenview Developments Inc.
P.O. Box 249
Bresau, ON N0B 1M0
and
New Hamburglrs Inc.
675 Riverbend Drive
Kitchener, ON N2K 3S3

Prepared by:

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

December 17, 2018

**MTE File No.: 34896-104
39219-104**



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1.0 INTRODUCTION

1.1 Overview

MTE Consultants Inc. (MTE) was retained by Badenview Developments Inc. and New Hamburglrs Inc. to complete a Preliminary Water Distribution Analysis in support of two Draft Plan of Subdivision applications. The Badenview and New Hamburglrs properties are herein referred to as the 'subject lands'. For the purposes of this report the two draft plans will be reviewed as one cohesive development. The subject lands are located within what is herein referred to as the Wilmot Employment Lands in the Town of New Hamburg, Township of Wilmot.

The Wilmot Employment Lands (WEL) are comprised of 2 parcels of land, formerly known as the Good Lands and the Schneider Lands. The Good Lands are owned by Badenview Developments Inc. (BDI) and the Schneider Lands are owned by New Hamburglrs Inc. (NHI). Refer to **Figure 1.1** for more details.

The subject lands comprise a total area of approximately 55.38ha, of which 42.07ha represents the BDI lands, 9.90ha represents the NHI lands, 2.70ha represents additional lands owned by NHI (potential MTO interchange), and 0.71ha of unopened road allowance. It should be noted that approximately 11.50ha of woodlot was recently transferred to the Township of Wilmot. The subject lands are proposed to be developed as an industrial subdivision with approximately 19 industrial blocks, municipal right-of-ways, and a stormwater management block. A Draft Plan of Subdivision for each of the proposed developments has been prepared by MHBC Planning (dated November 22, 2018 – Good Lands and dated November 22, 2018 – Schneider Lands) and forms the basis for the proposed servicing concepts. Refer to **Appendix A** for more details.

The purpose of the 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/future water distribution network. The preliminary analysis is also used to determine the pipe sizes for the proposed internal water distribution network and whether the pressures within the development under various demand scenarios, including fire flow, are within the guidelines set out by the Ministry of the Environment, Conservation and Parks (MECP, formally MOECC), the Region of Waterloo (Region), and the Township of Wilmot (Wilmot).

1.2 Background Information

Development plans for the subject site include the construction of 19 industrial blocks, a stormwater management facility block, open space blocks, a dedicated MTO block, and municipal right-of-ways (including storm, sanitary, and water).

The subject site lies along the boundary of the New Hamburg Pressure Zone and the Baden Pressure Zone. The current hydraulic grade line (HGL) of the New Hamburg Pressure Zone is approximately 390.00m, with a serviceability range of approximately 334.00m to 354.00m. The HGL of the Baden Pressure Zone is approximately 397.00m, with a serviceability range of approximately 341.00m to 361.00m.

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. The Baden system is fed from the elevated storage tank located on Snyder's Road West in Baden. The supply for both of these systems comes from the New Hamburg wellfield and the Wilmot Centre Wellfield.

Due to proposed site elevations, the HGL information has specified that any centerline of road elevation below 334.00m within the New Hamburg Pressure Zone and below 341.00m within the Baden 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, 2018)*. The proposed ground contours of the site range from approximately 338.55m to 340.97m. Therefore, it is anticipated that some of the connections may require the implementation of individual PRVs.

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 delineation of the pressure boundary transects the northern portion of the subject lands so that the majority of the site is located within the Baden Pressure Zone.

2.0 METHODOLOGY

2.1 Model Development

The Bentley water distribution system analysis program (WaterCAD Connect Edition) was utilized for the analysis of this study. The model utilizes demands for the fully-developed proposed subdivision. While the Region of Waterloo H2OMap water distribution model was developed for trunk supply and distribution of water, MTE's WaterCAD model includes the proposed subdivision road fabric and watermain connectivity to size the internal watermains, and account for looping and head losses in the local system.

2.1.1 Model Scenarios

One servicing scenario was modelled for the proposed Wilmot Employment Lands industrial subdivision development. Due to restrictive flow and pressure capabilities of the NHWTP and the New Hamburg water distribution system, the modelling scenario incorporated the entire subject lands into the Baden Pressure Zone. In order to do so, the proposed future 450mm diameter transmission watermain that is intended to be installed through the subject lands was incorporated into the design. The modelled water supply was fed through this main and the proposed local watermains for the subject lands were connected to the trunk watermain to provide water to the various industrial blocks.

2.1.2 Network Connections

Water supply for the proposed development was modelled with two internal connection points to the existing/future municipal water distribution system as follows:

Baden Pressure Zone Connection:

- Direct connection of the future proposed 450mm diameter transmission watermain to the existing 300mm/450mm diameter watermain connection along Nafziger Road, at the intersection to the entrance to 1282 Nafziger Road.

Two Internal Connections:

- Direct connections to the future proposed 450mm diameter transmission watermain at each end of the proposed development; Street One near Hamilton Road and Street Three near Nafziger Road.

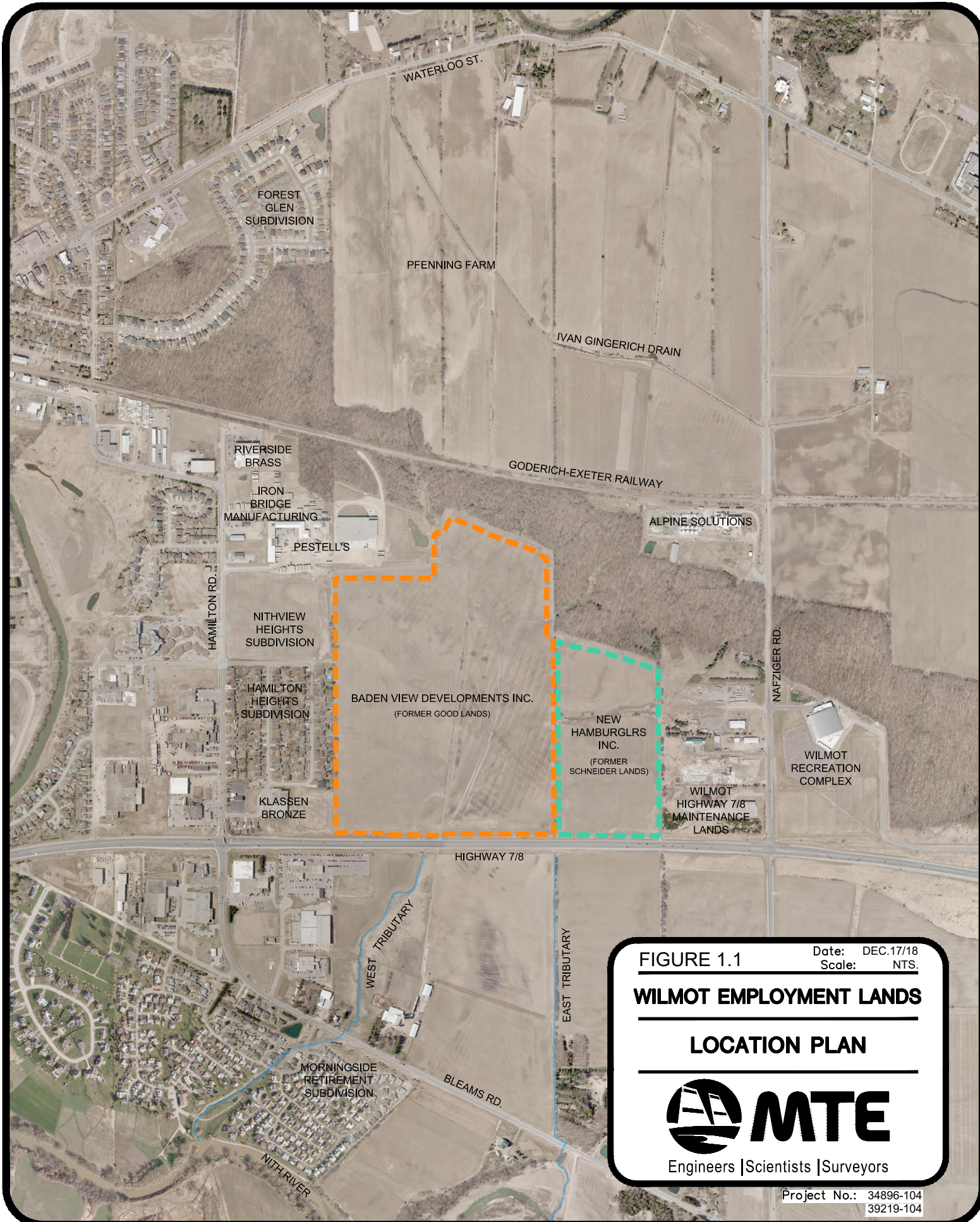



FIGURE 1.1 Date: DEC.17/18
Scale: NTS.

WILMOT EMPLOYMENT LANDS

LOCATION PLAN



MTE
Engineers | Scientists | Surveyors

Project No.: 34896-104
39219-104

The nearest existing Region of Waterloo Water Distribution Model node is Junction_00352. Node 00352 is located at the intersection of Nafziger Road and the entrance to 1282 Nafziger Road, at an elevation of 346.00m. Refer to **Figure 2.1** for more details regarding the location of the nodes, network connections, and water demand contributing areas.

2.2 Design Criteria

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


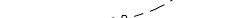








2.2.1 System Pressure

System pressure information for the Baden Pressure Zone was based on the Region's H2OMap model results provided by Kevin Dolishny on December 18, 2018 for node 00352, located as previously noted. The system pressures were determined for the Average day, Maximum day, Minimum hour, Peak hour and Maximum Day + Fire Flow scenarios. **Tables 2.1** provides a summary of the system pressures used in the analysis at the Regional node. **Appendix B** contains the system pressure data correspondence with the Region.

TABLE 2.1 – REGIONAL SYSTEM PRESSURES FOR NODE 00352

| Demand Scenario | Node 00352 | | |
|---------------------|----------------------|---------|-----------------------|
| | Available Flow (L/s) | HGL (m) | Residual Pressure (m) |
| Initial (Estimated) | 0.00 | 397.00 | 51.00 |
| Minimum Hour | 0.13 | 396.92 | 50.92 |
| Average Day | 0.51 | 396.62 | 50.62 |
| Maximum Day | 0.72 | 398.61 | 52.61 |
| Peak Hour | 1.27 | 397.47 | 51.47 |
| Max Day + 50L/s | 50.91 | 398.40 | 52.40 |
| Max Day + 100L/s | 100.91 | 396.80 | 50.80 |
| Max Day + 150L/s | 150.91 | 394.40 | 48.40 |
| Max Day + 200L/s | 200.91 | 391.20 | 45.20 |
| Max Day + 250L/s | 250.91 | 387.30 | 41.30 |
| Max Day + 300L/s | 300.91 | 382.60 | 36.60 |
| Max Day + 350L/s | 350.91 | 377.20 | 31.20 |
| Max Day + 400L/s | 400.91 | 371.10 | 25.10 |
| Max Day + 450L/s | 450.91 | 364.30 | 18.30 |
| Max Day + 475L/s | 475.91 | 360.70 | 14.70 |

LEGEND

-  PROPERTY BOUNDARY
-  EXISTING CONTOURS
-  EXISTING REGULATION LIMIT (GRCA)
-  EXISTING WATERCOURSE (GRCA)
-  EXISTING WETLAND (GRCA)
-  DEMAND JUNCTION
-  JUNCTION CONTRIBUTING AREA
-  250mmØ EXISTING WATERMAIN
-  250mmØ 250mm PIPE DIAMETER
-  450mmØ 450mm PIPE DIAMETER

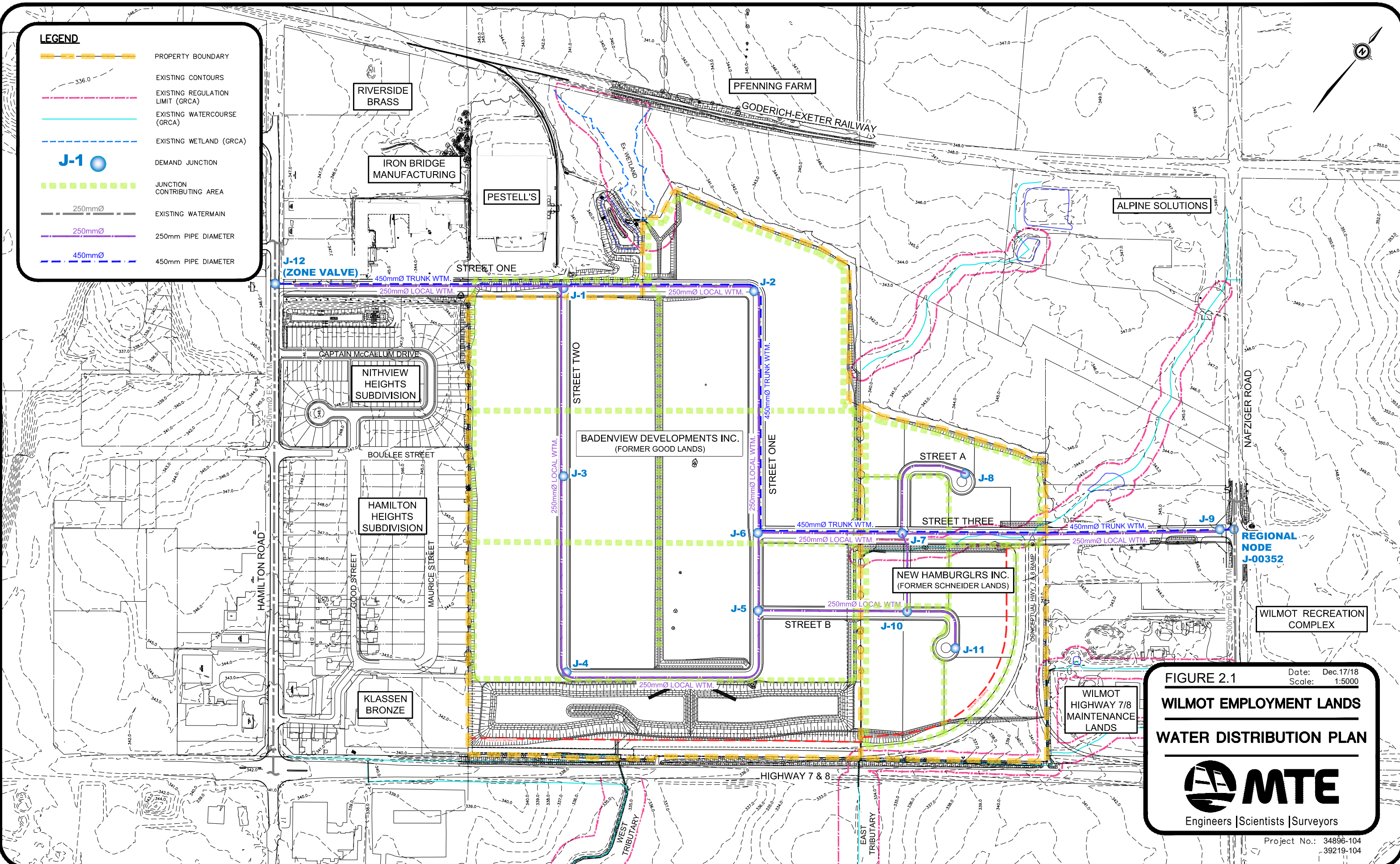


FIGURE 2.1 Date: Dec.17/18
Scale: 1:5000

**WILMOT EMPLOYMENT LANDS
WATER DISTRIBUTION PLAN**



Project No.: 34896-104
39219-104

2.2.2 System Demands

The system demands for the subdivision were determined using the proposed industrial block areas and specific water usage rates for industrial developments per the *Design Guidelines for Drinking-Water Systems (MOE, 2008)*. Industrial demands were derived for representative areas contributing to each node in the model, multiplied by 45m³/d/ha (refer to Note 3 in **Appendix C – Water Demand Calculations**), and then converted to L/s. The model node contributing areas, average usage rates, and demand calculations for each node are provided in **Appendix C**.

2.2.3 Peaking Factors

The peaking factors are based on the population of the development (500-1,000) as outlined in Chapter 3 of the *Design Guidelines for Drinking-Water Systems (MOE, 2008)*. **Table 2.2** summarizes the peaking factors used in the analysis based on the population assumptions calculated in **Appendix C**.

TABLE 2.2 – PEAKING FACTORS

| Demand Scenario | Factor |
|-----------------|--------|
| Average Day | 1.00 |
| Maximum Day | 2.75 |
| Peak Hour | 4.13 |
| Minimum Hour | 0.40 |

2.2.4 Pressure Requirements

As outlined in Section B.2.4 of the *DGSSMS*, the pressure guidelines used for all demand scenarios are shown in **Table 2.3**.

TABLE 2.3 – 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 under any scenario.

2.2.5 Fire Flow Requirements

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

Commercial/Industrial:

- *Industrial Block – 12,000L/min (200L/s).

*At this time, specific details have not been provided for the proposed industrial blocks. Thus, the required fire flow demand for these blocks is based on *FUS* guidelines. These results are to be confirmed once more accurate site plan information becomes available.

2.2.6 Velocity Requirements

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

2.2.7 Friction Factors

The *DGSSMS* recommends that the Hazen-Williams “C” values outlined in **Table 2.4** be used to estimate frictional losses through the system, regardless of size. The friction factors, as specified in Section B.2.3.1, include an allowance for age.

TABLE 2.4 – HAZEN-WILLIAMS C-FACTORS

| Material | C-Factor |
|-----------------|-----------------|
| PVC/PCVO | 150 |
| DI | 130 |
| CPP | 140 |
| HDPE | 140 |
| Unknown | 130 |

2.2.8 Minor Losses

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

3.0 RESULTS

The model was run to analyze the pipe sizes according to the aforementioned design criteria, under the various demand scenarios. **Appendix D** provides the proposed network and a series of tables summarizing the output results of the WaterCAD analysis. **Table 3.1** demonstrates that the water distribution system will adequately service the development, while providing flows generally within the recommended pressures for the Average Day, Maximum Day, Peak Hour, and Minimum Hour, and the recommended *FUS* fire flows at the minimum MECP pressure of 140kPa.

As shown in **Table 3.1**, where the centerline of road elevation is above 341.00m, the proposed water distribution system will adequately be able to provide the required daily water demands within the *DGSSMS* recommended minimum and maximum pressure range guidelines of 350kPa to 550kPa for the Average and Maximum Day demand scenarios, and 275kPa to 700kPa for the Minimum and Peak Hour demand scenarios.

However, **Table 3.1** indicates that where the centerline of road elevation is below 341.00m, which is throughout most of the subdivision, the resulting pressures for the Average and Maximum Day demand scenarios are above the recommended *DGSSMS* minimum pressure guideline of 550kPa. The highest modelled pressure is 579.7kPa (84psi) at node J-4, which represents the lowest junction elevation in this zone of the subdivision at 338.55m. As such, individual pressure reducing valves, or one larger subdivision pressure reducing valve, may be required to reduce the incoming elevated water pressure.

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

TABLE 3.1 – MODELLING RESULTS

| Node | Elevation (m) | Pressure (kPa) | | | | Maximum Day + Fire Flow | | | | |
|------|---------------|----------------|-------------|--------------|-----------|--------------------------|---------------------------|-------------------------|----------------------------|-------------------------|
| | | Average Day | Maximum Day | Minimum Hour | Peak Hour | Fire Flow Required (L/s) | Fire Flow Available (L/s) | Residual Pressure (kPa) | Velocity of Max Pipe (m/s) | Pipe with Max. Velocity |
| J-1 | 340.97 | 556.1 | 546.1 | 557.5 | 532.3 | 200.00 | 256.87 | 241.1 | 3.30 | P-17 |
| J-2 | 340.07 | 564.9 | 554.4 | 566.3 | 540.0 | 200.00 | 259.34 | 201.7 | 3.16 | P-5 |
| J-3 | 339.55 | 570.0 | 559.5 | 571.4 | 545.0 | 200.00 | 256.86 | 185.2 | 3.24 | P-14 |
| J-4 | 338.55 | 579.7 | 569.2 | 581.2 | 554.6 | 200.00 | 257.25 | 184.7 | 3.19 | P-5 |
| J-5 | 338.59 | 579.4 | 568.9 | 580.8 | 554.4 | 200.00 | 257.30 | 247.9 | 3.37 | P-5 |
| J-6 | 338.86 | 576.7 | 566.3 | 578.2 | 551.9 | 200.00 | 257.46 | 251.5 | 3.37 | P-5 |
| J-7 | 339.77 | 567.9 | 557.8 | 569.3 | 543.9 | 200.00 | 252.79 | 251.1 | 3.53 | P-5 |
| J-8 | 340.44 | 561.3 | 551.2 | 562.7 | 537.3 | 200.00 | 246.07 | 140.1 | 5.01 | P-6 |
| J-9 | 345.25 | 515.2 | 510.1 | 515.8 | 502.9 | 200.00 | 250.00 | 342.6 | 1.94 | P-3 |
| J-10 | 339.88 | 566.8 | 556.4 | 568.2 | 542.1 | 200.00 | 253.13 | 220.1 | 3.48 | P-5 |
| J-11 | 340.45 | 561.2 | 550.8 | 562.6 | 536.5 | 200.00 | 251.14 | 140.1 | 5.12 | P-8 |
| J-12 | 346.59 | 501.9 | 495.9 | 502.7 | 487.5 | 200.00 | 250.00 | 290.4 | 1.94 | P-3 |

**Cells highlighted in yellow identify nodes in the model where the pressure is higher than the recommended Region of Waterloo maximum pressure guideline of 550kPa for the average and maximum day demand scenarios; requiring a PRV. 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, the following conclusions are provided:

1. Two direct connections to the future proposed 450mm diameter transmission watermain along the proposed Street One (near the intersection with Hamilton Road) and Street Three (near the intersection with Nafziger Road) will adequately service the proposed Wilmot Employment Lands subdivision.
2. The proposed Wilmot Employment Lands subdivision water distribution system will adequately provide the required daily water demands above the *DGSSMS* recommended minimum pressure guideline of 350kPa for both the Average and Maximum Day demand scenarios, and between the minimum and maximum pressure range guidelines of 275kPa to 700kPa for the Minimum and Peak Hour demand scenarios.
3. All blocks located where the centerline of road elevation is below approximately 341.00m, which represents most of the subdivision, may require the installation of individual pressure reducing valves (PRVs), or one larger subdivision pressure reducing valve, in order to reduce the incoming water pressure to below the *DGSSMS* recommended maximum value of 550kPa under the Average and Maximum Day demand scenarios.
4. Water model results indicate that the proposed water distribution system will adequately provide the recommended *FUS* fire flows at the minimum MECP pressure of 140kPa.
5. Pipe velocities were less than the *DGSSMS* recommended 5.0m/s for most of the pipes under fire flow conditions. However, the pipe sizes were not increased for the sole purpose of reducing the maximum velocity experienced under the rare fire flow condition, as this may create an environment for stagnant water conditions to arise under normal daily demands.

It is recommended that:

1. The water distribution analysis be updated during Final Design of the Wilmot Employment Lands subdivision.

All of which is respectfully submitted;

MTE CONSULTANTS INC.



Charles Carré, E.I.T.
Designer

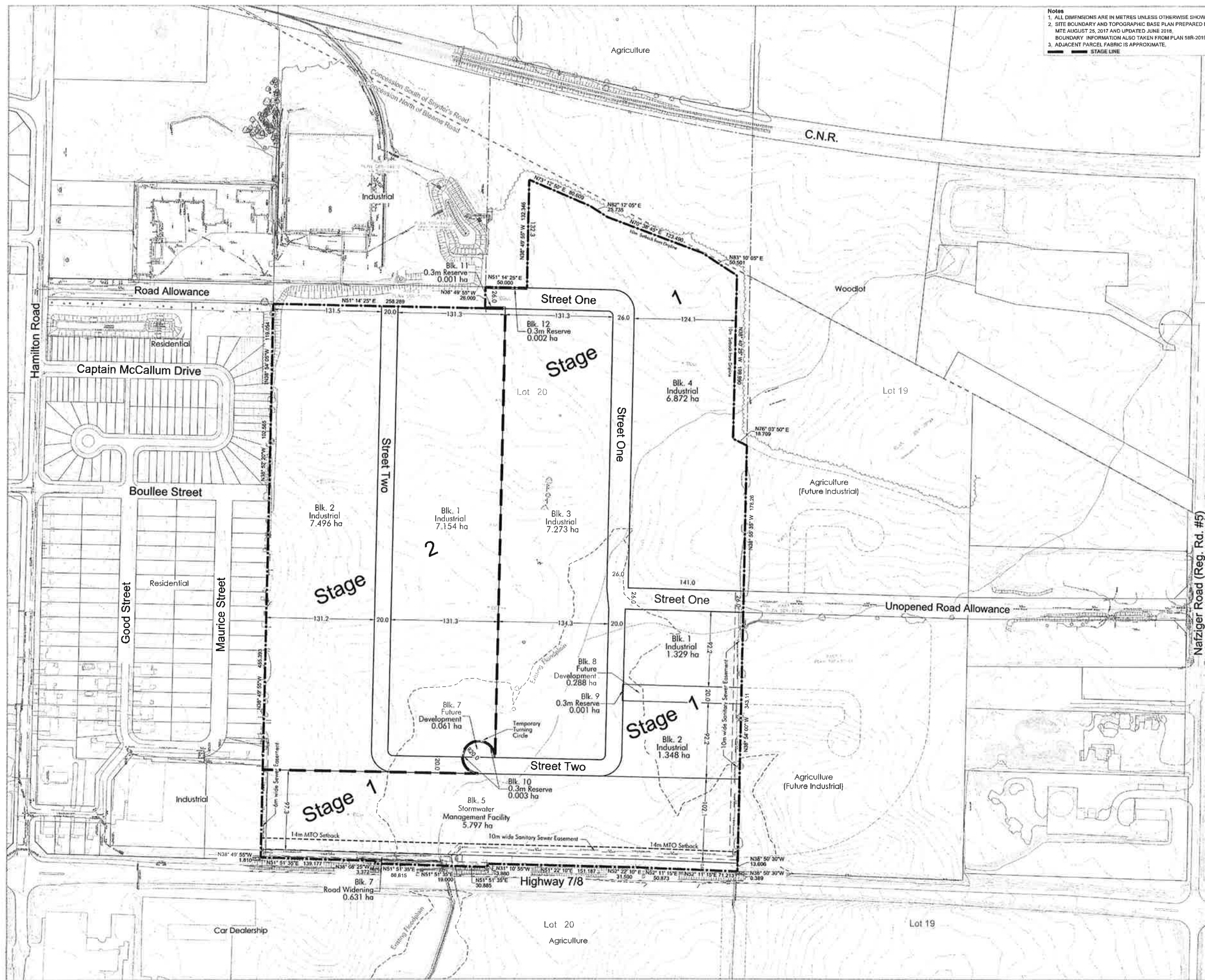


Garett Korber, P.Eng.
Design Engineer



APPENDIX A

DRAFT PLANS (11x17 REDUCED)



Notes
 1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE SHOWN.
 2. SITE BOUNDARY AND TOPOGRAPHIC BASE PLAN PREPARED BY MTE AUGUST 25, 2017 AND UPDATED JUNE 2018.
 3. BOUNDARY INFORMATION ALSO TAKEN FROM PLAN 58R-20194. ADJACENT PARCEL FABRIC IS APPROXIMATE.
 - - - - - STAGE LINE

DRAFT PLAN OF SUBDIVISION

Legal Description
 PART OF LOT 20, NORTH OF BLEAMS ROAD
 PART OF LOT 20, SOUTH OF SNYDERS ROAD
 TOWNSHIP OF WILMOT
 REGIONAL MUNICIPALITY OF WATERLOO

Owner's Certificate
 I HEREBY AUTHORIZE MACNAUGHTON HERMSEN BRITTON CLARKSON PLANNING LIMITED TO SUBMIT THIS PLAN FOR APPROVAL.
 DATE: *December 4, 2018* *Patrick Hegele*
 BADENVIEW DEVELOPMENTS INC. (OWNER)

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: *Nov. 22, 2018* *Trevor D.A. McNeil*
 TREVOR D.A. MCNEIL, OLS
 (MTE OLS LTD.)

Key Plan

 Subject Lands
 SCALE: NTS
 Source: Region of Waterloo SLRN

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. INDUSTRIAL STORMWATER MANAGEMENT | | |
| E. AS SHOWN | F. AS SHOWN | |
| G. AS SHOWN | H. MUNICIPAL WATER SUPPLY | I. SILTY CLAY LOAM |
| J. AS SHOWN | K. ALL SERVICES AS REQUIRED | L. AS SHOWN |

Area Schedule **30T**

| Description | Stage 1 | | Stage 2 | |
|--------------------------------|-----------|---------------|----------|---------------|
| | Blocks | Area (ha) | Blocks | Area (ha) |
| Industrial | 1-4 | 16.822 | 1,2 | 14.650 |
| Stormwater Management Facility | 5 | 5.797 | | |
| Road Widening | 6 | 0.631 | | |
| Future Development | 7,8 | 0.349 | | |
| 0.3m Reserve | 9-12 | 0.007 | | |
| Roads | | 2.501 | | 1.317 |
| Sub-Total | 12 | 26.107 | 2 | 15.967 |

| Description | Total | |
|--------------------------------|-----------|---------------|
| | Blocks | Area (ha) |
| Industrial | 6 | 31.472 |
| Stormwater Management Facility | 1 | 5.797 |
| Road Widening | 1 | 0.631 |
| Future Development | 2 | 0.349 |
| 0.3m Reserve | 4 | 0.007 |
| Roads | | 3.818 |
| Total | 14 | 42.074 |

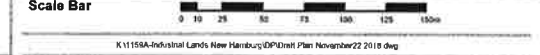
| | | | |
|---------------------|---------------|------------------------------------|-----------|
| 2. | Nov. 22, 2018 | For submission to Region; | DGS |
| 1. | Nov. 5, 2018 | For review by surveyor and client; | DGS |
| Revision No. | Date | Issued / Revision | By |

MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE
 200-42 BIRCHMOUNT CENTRE DR. COCHRAMER ON N2E 3B9 | P: 519-524-2600 | F: 519-524-2111 | WWW.MHBCA.COM

| | | | |
|-----------------------|-------------------------|-------------------|------|
| Approval Stamp | Date | November 22, 2018 | |
| | File No. | 1159A | |
| | Plan Scale | 1:2,000 (24x36) | |
| | Drawn By | D.G.S. | |
| Project | Wilmot Employment Lands | Checked By | P.C. |

Applicant
 Badenview Developments Inc.
 P.O. Box 249 Breslau, ON
 N0B 1M0
 P: 519.648.2285

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



DRAFT PLAN OF SUBDIVISION

Legal Description
 PART OF LOT 19, NORTH OF BLEAMS ROAD
 TOWNSHIP OF WILMOT
 REGIONAL MUNICIPALITY OF WATERLOO

Owner's Certificate
 I HEREBY AUTHORIZE MACNAUGHTON HERMSEN BRITTON CLARKSON PLANNING LIMITED TO SUBMIT THIS PLAN FOR APPROVAL.
 DATE: Nov 23/18
 NEW HAMBURGERS INC. (OWNER)

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: Nov 22, 2018
 TREVOR D.A. McNEIL, OLS (MTE OLS LTD.)

Key Plan

Subject Lands
 Additional Lands Owned by Applicant

SCALE: NTS

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. INDUSTRIAL | F. AS SHOWN | E. AS SHOWN |
| G. AS SHOWN | H. MUNICIPAL WATER SUPPLY | I. SILTY CLAY LOAM |
| J. AS SHOWN | K. ALL SERVICES AS REQUIRED | L. AS SHOWN |

Area Schedule 30T

| Description | Stage 1 | | Stage 2 | |
|------------------|----------|--------------|----------|--------------|
| | Blocks | Area (ha) | Blocks | Area (ha) |
| Industrial | 1-7 | 5.546 | 1-6 | 3.373 |
| Emergency Access | 8 | 0.092 | | |
| Roads | | 0.456 | | 0.432 |
| Sub-Total | 8 | 6.094 | 6 | 3.805 |

| Description | Total | |
|------------------|-----------|--------------|
| | Blocks | Area (ha) |
| Industrial | 13 | 8.919 |
| Emergency Access | 1 | 0.092 |
| Roads | | 0.888 |
| Total | 14 | 9.899 |

Notes

- ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE SHOWN.
- SITE BOUNDARY AND TOPOGRAPHIC BASE PLAN PREPARED BY MTE, AUGUST 26, 2017 AND UPDATED JUNE 2018. BOUNDARY INFORMATION ALSO TAKEN FROM PLAN 58R-20194.
- ADJACENT PARCEL FABRIC IS APPROXIMATE.

| | | | |
|--------------|---------------|------------------------------------|-----|
| 2. | Nov. 22, 2018 | For submission to Region: | DGS |
| 1. | Nov. 5, 2018 | For review by surveyor and client: | DGS |
| Revision No. | Date | Issued / Revision | By |

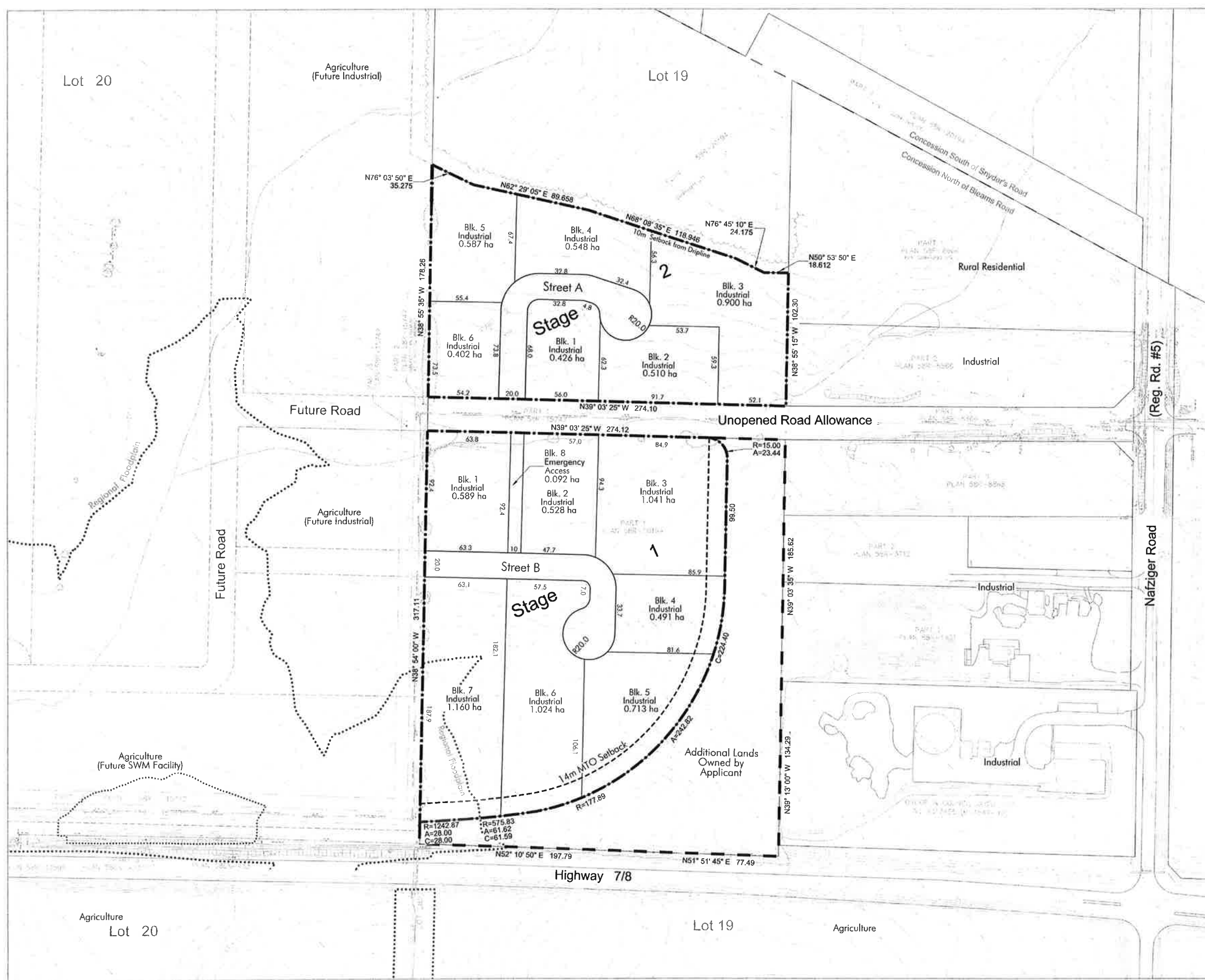
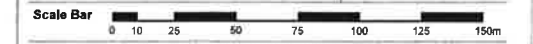
2164 BRIMHAM DRIVE, SUITE 104, KITCHENER, ON N2K 3S3 P: 519 571 8800 WWW.MHBCANCA.COM

| | | |
|-----------------------|------------|-------------------|
| Approval Stamp | Date | November 22, 2018 |
| | File No. | 18157A |
| | Plan Scale | 1:1,250 (24x36) |
| | Drawn By | D.G.S. |
| | Checked By | P.C. |

Project: Highway 7 and Nafziger Road

Applicant: New Hamburgers Inc.
 675 Riverbend Dr. Kitchener, ON N2K 3S3
 P: 519.571.8800

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



Lot 20

Agriculture (Future Industrial)

Lot 19

Rural Residential

Industrial

Future Road

Unopened Road Allowance

Agriculture (Future Industrial)

Industrial

Agriculture (Future SWM Facility)

Additional Lands Owned by Applicant

Industrial

Agriculture Lot 20

Lot 19

Agriculture

Highway 7/8

Nafziger Road (Reg. Rd. #5)



APPENDIX B

PRESSURE INFORMATION (REGION OF WATERLOO)



Date: November 30, 2018
File #: E18-10/WI

Charles Carre
Designer
MTE Consultants Inc.
520 Bingemans Centre Drive
Kitchener, ON N2B 3X9
t. 519.743.6500x1285
e. CCarre@mte85.com

Dear: Charles

Re: Wilmot Employment Lands, New Hamburg

Please find the results of the modeling simulations for boundary conditions originally requested on May 10, 2018 and updated with proposed grading information on September 25, 2018.

The results included a figure showing the locations of the nodes from the Region's model. Attached are a series of spreadsheets containing results for Average Day, Maximum Day demands and available fire flows for Node JCT_00215 located at the intersection of Hamilton Rd and Boulee St, New Hamburg.

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.

Due to the unknown nature of commercial demands, the suggested demands were deemed excessively large for the system. As such, just the existing demands were applied in the return of this modeling request.

| Node | Elevation (mASL) | Demand | | Fire Flow Results | |
|-----------|---------------------|------------------|------------------|----------------------|------------------------|
| | | Ave Day (L/s) | Max Day (L/s) | Design Flow (L/s) | Design Pressure (m) |
| JCT_00215 | 347.0 | 0.0 | 0.0 | 158.4 | 15.0 |

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 Project Engineer, Servicing and Development Planning

t. 519.575.4757 x 3862

e-mail: kdolishny@regionofwaterloo.ca

cc Dave Hicks, MTE Consulting
John Holowackj, Region of Waterloo

JCT_00215 Average Day 24 Hour Simulation

| Time | Demand (L/s) | Head (m) | Pressure (m) |
|-----------|--------------|----------|--------------|
| 00:00 hrs | 0.02 | 389.98 | 42.98 |
| 01:00 hrs | 0.02 | 389.99 | 42.99 |
| 02:00 hrs | 0.02 | 389.98 | 42.98 |
| 03:00 hrs | 0.02 | 389.97 | 42.97 |
| 04:00 hrs | 0.02 | 389.98 | 42.98 |
| 05:00 hrs | 0.02 | 389.97 | 42.97 |
| 06:00 hrs | 0.04 | 389.88 | 42.88 |
| 07:00 hrs | 0.08 | 389.67 | 42.67 |
| 08:00 hrs | 0.10 | 389.69 | 42.69 |
| 09:00 hrs | 0.11 | 389.62 | 42.62 |
| 10:00 hrs | 0.10 | 389.72 | 42.72 |
| 11:00 hrs | 0.10 | 389.75 | 42.75 |
| 12:00 hrs | 0.10 | 389.79 | 42.79 |
| 13:00 hrs | 0.10 | 389.78 | 42.78 |
| 14:00 hrs | 0.10 | 389.79 | 42.79 |
| 15:00 hrs | 0.09 | 389.80 | 42.80 |
| 16:00 hrs | 0.09 | 389.82 | 42.82 |
| 17:00 hrs | 0.09 | 389.80 | 42.80 |
| 18:00 hrs | 0.10 | 389.78 | 42.78 |
| 19:00 hrs | 0.10 | 389.77 | 42.77 |
| 20:00 hrs | 0.09 | 389.81 | 42.81 |
| 21:00 hrs | 0.09 | 389.85 | 42.85 |
| 22:00 hrs | 0.08 | 389.89 | 42.89 |
| 23:00 hrs | 0.05 | 389.94 | 42.94 |

Average Day HGL:

389.83

Minimum Hour:

389.99

JCT_00215 Maximum Day 24 Hour Simulation

| Time | Demand (L/s) | Head (m) | Pressure (m) |
|-----------|--------------|----------|--------------|
| 00:00 hrs | 0.03 | 389.97 | 42.97 |
| 01:00 hrs | 0.02 | 389.97 | 42.97 |
| 02:00 hrs | 0.03 | 389.96 | 42.96 |
| 03:00 hrs | 0.03 | 389.95 | 42.95 |
| 04:00 hrs | 0.03 | 389.95 | 42.95 |
| 05:00 hrs | 0.03 | 389.93 | 42.93 |
| 06:00 hrs | 0.05 | 389.77 | 42.77 |
| 07:00 hrs | 0.12 | 389.36 | 42.36 |
| 08:00 hrs | 0.15 | 389.39 | 42.39 |
| 09:00 hrs | 0.16 | 389.26 | 42.26 |
| 10:00 hrs | 0.14 | 389.46 | 42.46 |
| 11:00 hrs | 0.14 | 389.52 | 42.52 |
| 12:00 hrs | 0.14 | 389.58 | 42.58 |
| 13:00 hrs | 0.14 | 389.58 | 42.58 |
| 14:00 hrs | 0.14 | 389.58 | 42.58 |
| 15:00 hrs | 0.13 | 389.60 | 42.60 |
| 16:00 hrs | 0.13 | 389.65 | 42.65 |
| 17:00 hrs | 0.13 | 389.62 | 42.62 |
| 18:00 hrs | 0.14 | 389.57 | 42.57 |
| 19:00 hrs | 0.14 | 389.55 | 42.55 |
| 20:00 hrs | 0.13 | 389.63 | 42.63 |
| 21:00 hrs | 0.13 | 389.71 | 42.71 |
| 22:00 hrs | 0.12 | 389.79 | 42.79 |
| 23:00 hrs | 0.07 | 389.88 | 42.88 |

Maximum Day HGL:

389.68

Peak Hour:

389.26

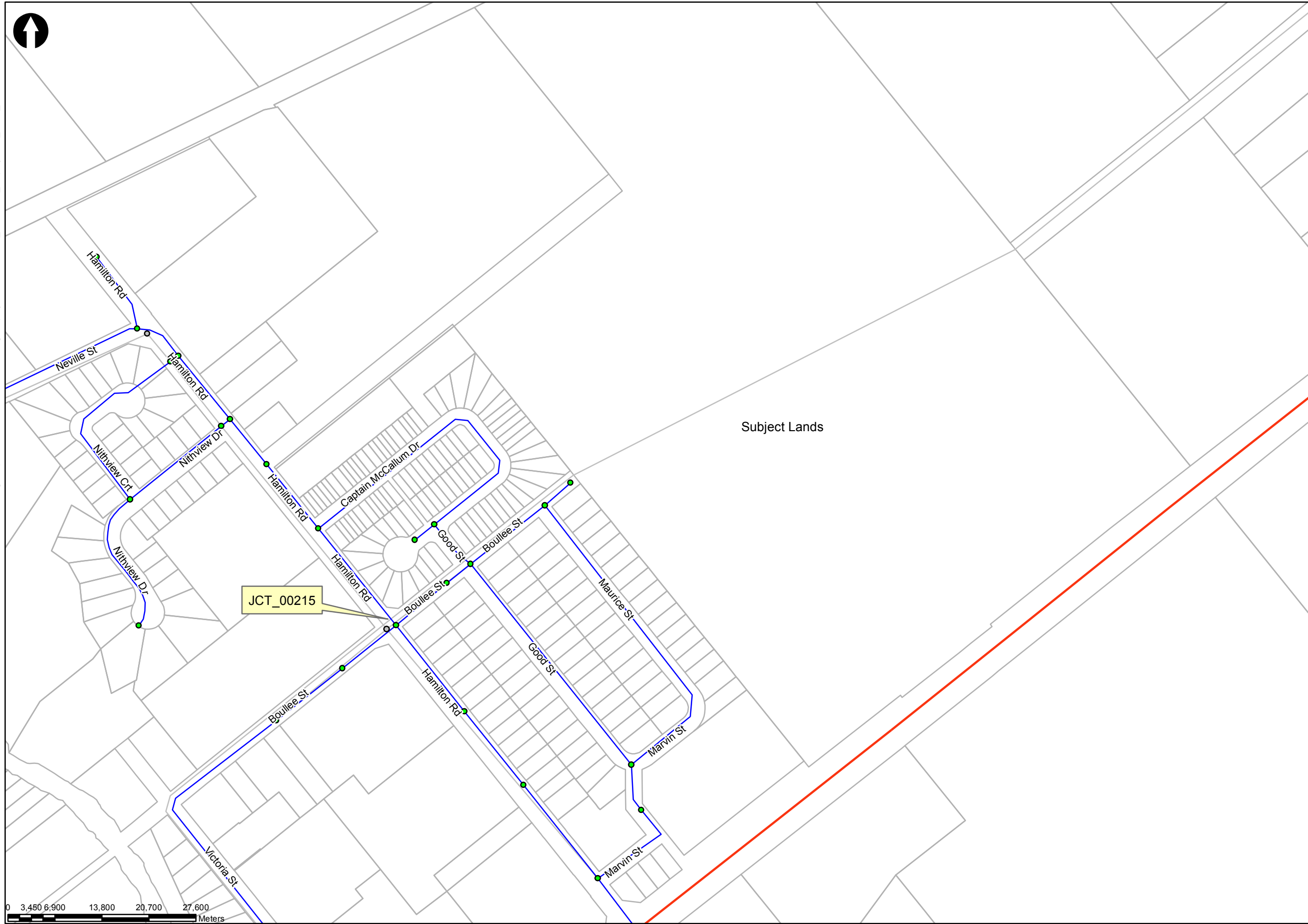


Document Path: I:\InfoWater\Modelling Requests\2018\MTE\New Hamburg Employment lands\BNH_20181128_employment_lands_kd.mxd

Author: dolkevin

Date: 30/11/2018

Time: 11:31:43 AM
0 3,450 6,900 13,800 20,700 27,600 Meters



Region of Waterloo
TRANSPORTATION AND ENVIRONMENTAL SERVICES

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

Legend

Junction

- <all other values>

TYPE

- Active
- Domain
- Inactive

Pipe

- <all other values>

TYPE

- Active
- Domain
- Inactive
- Assessment Parcels (MPAC)

Wilmot Employment Lands

Charles Carre

From: Kevin Dolishny <KDolishny@regionofwaterloo.ca>
Sent: Tuesday, December 18, 2018 5:00 PM
To: Charles Carre
Cc: Dave F. Hicks; John Holowackyj
Subject: RE: New Hamburg Water Modelling Request
Attachments: avemax.pdf; fire.pdf

Hi Charles,

Further to our discussion today I quickly ran the model on the Baden side, again not applying any demands. The results are for JCT_00352, elevation 346.0, located at Nafziger and the entrance to the Multi-Use Rec Facility. Due the large diameter watermain and the full availability of Baden Tank (not going through the Nafziger PRV) the fire flows are much higher than the results from the Baden side. So while domestic pressures are better on the New Hamburg side, there is more fire flow availability on the Baden. I suspect the servicing solution somehow involves some servicing from both pressure zones.



Kevin Dolishny, P.Eng.

Senior Project Engineer – Servicing and Development Planning
Water Services

Region of Waterloo

t.519-575-4757 x 3862

f.519-575-4452

kdolishny@regionofwaterloo.ca

JCT_00352 Average Day 24 Hour Simulation

| Time | Demand (L/s) | Head (m) | Pressure (m) |
|-----------|--------------|----------|--------------|
| 00:00 hrs | 0.13 | 396.92 | 50.92 |
| 01:00 hrs | 0.13 | 396.89 | 50.89 |
| 02:00 hrs | 0.13 | 396.86 | 50.86 |
| 03:00 hrs | 0.13 | 396.83 | 50.83 |
| 04:00 hrs | 0.13 | 396.79 | 50.79 |
| 05:00 hrs | 0.13 | 396.75 | 50.75 |
| 06:00 hrs | 0.13 | 396.71 | 50.71 |
| 07:00 hrs | 0.51 | 396.62 | 50.62 |
| 08:00 hrs | 0.89 | 396.52 | 50.52 |
| 09:00 hrs | 0.89 | 396.66 | 50.66 |
| 10:00 hrs | 0.89 | 396.77 | 50.77 |
| 11:00 hrs | 0.89 | 396.91 | 50.91 |
| 12:00 hrs | 0.89 | 397.07 | 51.07 |
| 13:00 hrs | 0.89 | 397.23 | 51.23 |
| 14:00 hrs | 0.89 | 397.38 | 51.38 |
| 15:00 hrs | 0.89 | 397.54 | 51.54 |
| 16:00 hrs | 0.89 | 397.71 | 51.71 |
| 17:00 hrs | 0.89 | 397.88 | 51.88 |
| 18:00 hrs | 0.89 | 398.04 | 52.04 |
| 19:00 hrs | 0.89 | 398.20 | 52.20 |
| 20:00 hrs | 0.89 | 398.36 | 52.36 |
| 21:00 hrs | 0.89 | 398.53 | 52.53 |
| 22:00 hrs | 0.89 | 398.71 | 52.71 |
| 23:00 hrs | 0.51 | 398.91 | 52.91 |

Average Day HGL:

| |
|--------|
| 397.37 |
| 398.91 |

Minimum Hour:

JCT_00352 Maximum Day 24 Hour Simulation

| Time | Demand (L/s) | Head (m) | Pressure (m) |
|-----------|--------------|----------|--------------|
| 00:00 hrs | 0.18 | 397.13 | 51.13 |
| 01:00 hrs | 0.18 | 397.36 | 51.36 |
| 02:00 hrs | 0.18 | 397.60 | 51.60 |
| 03:00 hrs | 0.18 | 397.82 | 51.82 |
| 04:00 hrs | 0.18 | 398.04 | 52.04 |
| 05:00 hrs | 0.18 | 398.26 | 52.26 |
| 06:00 hrs | 0.18 | 398.46 | 52.46 |
| 07:00 hrs | 0.72 | 398.61 | 52.61 |
| 08:00 hrs | 1.27 | 398.67 | 52.67 |
| 09:00 hrs | 1.27 | 398.74 | 52.74 |
| 10:00 hrs | 1.27 | 398.79 | 52.79 |
| 11:00 hrs | 1.27 | 398.87 | 52.87 |
| 12:00 hrs | 1.27 | 398.97 | 52.97 |
| 13:00 hrs | 1.27 | 398.87 | 52.87 |
| 14:00 hrs | 1.27 | 398.71 | 52.71 |
| 15:00 hrs | 1.27 | 398.54 | 52.54 |
| 16:00 hrs | 1.27 | 398.39 | 52.39 |
| 17:00 hrs | 1.27 | 398.24 | 52.24 |
| 18:00 hrs | 1.27 | 398.09 | 52.09 |
| 19:00 hrs | 1.27 | 397.92 | 51.92 |
| 20:00 hrs | 1.27 | 397.75 | 51.75 |
| 21:00 hrs | 1.27 | 397.60 | 51.60 |
| 22:00 hrs | 1.27 | 397.47 | 51.47 |
| 23:00 hrs | 0.72 | 397.37 | 51.37 |

Maximum Day HGL:

| |
|--------|
| 398.18 |
| 397.13 |

Peak Hour:



APPENDIX C

USAGE RATES/ WATER DEMANDS & DESIGN VALUES

**WILMOT EMPLOYMENT LANDS
COMMUNITY OF NEW HAMBURG PRESSURE ZONE
Pump Curve Design Sheet**



Project No.: 34896-104
 Date: 19-Dec-18
 Design By: CJC
 File: Q:\34896\104\Water Distribution\34896-104 Region Pressures & Pump Curves.xlsx
 Note: System pressure information is from correspondence to Charles Carré from Kevin Dolishny at the Region of Waterloo on December 18, 2018.

Node 00352 At the entrance to 1282 Nafziger Road
 Elevation = 346.00 m

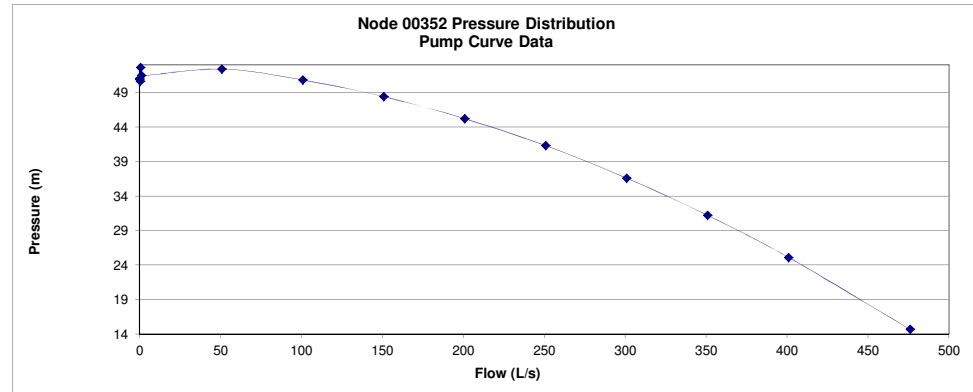
| Average Day | | | |
|-------------|------------|----------|-----------------------|
| Time | Flow (L/s) | Head (m) | Residual Pressure (m) |
| 00:00 hrs | 0.13 | 396.92 | 50.92 |
| 01:00 hrs | 0.13 | 396.89 | 50.89 |
| 02:00 hrs | 0.13 | 396.86 | 50.86 |
| 03:00 hrs | 0.13 | 396.83 | 50.83 |
| 04:00 hrs | 0.13 | 396.79 | 50.79 |
| 05:00 hrs | 0.13 | 396.75 | 50.75 |
| 06:00 hrs | 0.13 | 396.71 | 50.71 |
| 07:00 hrs | 0.51 | 396.62 | 50.62 |
| 08:00 hrs | 0.89 | 396.52 | 50.52 |
| 09:00 hrs | 0.89 | 396.66 | 50.66 |
| 10:00 hrs | 0.89 | 396.77 | 50.77 |
| 11:00 hrs | 0.89 | 396.91 | 50.91 |
| 12:00 hrs | 0.89 | 397.07 | 51.07 |
| 13:00 hrs | 0.89 | 397.23 | 51.23 |
| 14:00 hrs | 0.89 | 397.38 | 51.38 |
| 15:00 hrs | 0.89 | 397.54 | 51.54 |
| 16:00 hrs | 0.89 | 397.71 | 51.71 |
| 17:00 hrs | 0.89 | 397.88 | 51.88 |
| 18:00 hrs | 0.89 | 398.04 | 52.04 |
| 19:00 hrs | 0.89 | 398.20 | 52.20 |
| 20:00 hrs | 0.89 | 398.36 | 52.36 |
| 21:00 hrs | 0.89 | 398.53 | 52.53 |
| 22:00 hrs | 0.89 | 398.71 | 52.71 |
| 23:00 hrs | 0.51 | 398.91 | 52.91 |
| Average = | 0.64 | 397.37 | 51.37 |
| Minimum = | 0.13 | 396.91 | 50.91 |

| Maximum Day | | | |
|-------------|------------|----------|-----------------------|
| Time | Flow (L/s) | Head (m) | Residual Pressure (m) |
| 00:00 hrs | 0.18 | 397.13 | 51.13 |
| 01:00 hrs | 0.18 | 397.36 | 51.36 |
| 02:00 hrs | 0.18 | 397.60 | 51.60 |
| 03:00 hrs | 0.18 | 397.82 | 51.82 |
| 04:00 hrs | 0.18 | 398.04 | 52.04 |
| 05:00 hrs | 0.18 | 398.26 | 52.26 |
| 06:00 hrs | 0.18 | 398.46 | 52.46 |
| 07:00 hrs | 0.72 | 398.61 | 52.61 |
| 08:00 hrs | 1.27 | 398.67 | 52.67 |
| 09:00 hrs | 1.27 | 398.74 | 52.74 |
| 10:00 hrs | 1.27 | 398.79 | 52.79 |
| 11:00 hrs | 1.27 | 398.87 | 52.87 |
| 12:00 hrs | 1.27 | 398.97 | 52.97 |
| 13:00 hrs | 1.27 | 398.87 | 52.87 |
| 14:00 hrs | 1.27 | 398.71 | 52.71 |
| 15:00 hrs | 1.27 | 398.54 | 52.54 |
| 16:00 hrs | 1.27 | 398.39 | 52.39 |
| 17:00 hrs | 1.27 | 398.24 | 52.24 |
| 18:00 hrs | 1.27 | 398.09 | 52.09 |
| 19:00 hrs | 1.27 | 397.92 | 51.92 |
| 20:00 hrs | 1.27 | 397.75 | 51.75 |
| 21:00 hrs | 1.27 | 397.60 | 51.60 |
| 22:00 hrs | 1.27 | 397.47 | 51.47 |
| 23:00 hrs | 0.72 | 397.37 | 51.37 |
| Max Day = | 0.91 | 398.18 | 52.18 |
| Peak Hour = | 1.27 | 397.13 | 51.13 |

| Fire Flow Analysis | | |
|----------------------|----------|-----------------------|
| Available Flow (L/s) | Head (m) | Residual Pressure (m) |
| 0.0 | 399.00 | 53.00 |
| 25.0 | 398.80 | 52.80 |
| 50.0 | 398.40 | 52.40 |
| 75.0 | 397.70 | 51.70 |
| 100.0 | 396.80 | 50.80 |
| 125.0 | 395.70 | 49.70 |
| 150.0 | 394.40 | 48.40 |
| 175.0 | 392.90 | 46.90 |
| 200.0 | 391.20 | 45.20 |
| 225.0 | 389.30 | 43.30 |
| 250.0 | 387.30 | 41.30 |
| 275.0 | 385.00 | 39.00 |
| 300.0 | 382.60 | 36.60 |
| 325.0 | 380.00 | 34.00 |
| 350.0 | 377.20 | 31.20 |
| 375.0 | 374.20 | 28.20 |
| 400.0 | 371.10 | 25.10 |
| 425.0 | 367.80 | 21.80 |
| 450.0 | 364.30 | 18.30 |
| 475.0 | 360.70 | 14.70 |

| Fire Flow Analysis Adjusted for Maximum Day Flows | | |
|---|----------|-----------------------|
| Available Flow (L/s) | Head (m) | Residual Pressure (m) |
| 0.9 | 399.00 | 53.00 |
| 25.9 | 398.80 | 52.80 |
| 50.9 | 398.40 | 52.40 |
| 75.9 | 397.70 | 51.70 |
| 100.9 | 396.80 | 50.80 |
| 125.9 | 395.70 | 49.70 |
| 150.9 | 394.40 | 48.40 |
| 175.9 | 392.90 | 46.90 |
| 200.9 | 391.20 | 45.20 |
| 225.9 | 389.30 | 43.30 |
| 250.9 | 387.30 | 41.30 |
| 275.9 | 385.00 | 39.00 |
| 300.9 | 382.60 | 36.60 |
| 325.9 | 380.00 | 34.00 |
| 350.9 | 377.20 | 31.20 |
| 375.9 | 374.20 | 28.20 |
| 400.9 | 371.10 | 25.10 |
| 425.9 | 367.80 | 21.80 |
| 450.9 | 364.30 | 18.30 |
| 475.9 | 360.70 | 14.70 |

| Node 00352 - Pump Curve Pressure Distribution | | | |
|---|-----------------|---------|----------|
| Demand Scenario | Discharge (L/s) | HGL (m) | Head (m) |
| 0 (Est.) | 0.00 | 397.00 | 51.00 |
| Minimum Hour | 0.13 | 396.92 | 50.92 |
| Average Day | 0.51 | 396.62 | 50.62 |
| Maximum Day | 0.72 | 398.61 | 52.61 |
| Peak Hour | 1.27 | 397.47 | 51.47 |
| Max Day + 50 L/s Fire Flow | 50.91 | 398.40 | 52.40 |
| Max Day + 100 L/s Fire Flow | 100.91 | 396.80 | 50.80 |
| Max Day + 150 L/s Fire Flow | 150.91 | 394.40 | 48.40 |
| Max Day + 200 L/s Fire Flow | 200.91 | 391.20 | 45.20 |
| Max Day + 250 L/s Fire Flow | 250.91 | 387.30 | 41.30 |
| Max Day + 300 L/s Fire Flow | 300.91 | 382.60 | 36.60 |
| Max Day + 350 L/s Fire Flow | 350.91 | 377.20 | 31.20 |
| Max Day + 400 L/s Fire Flow | 400.91 | 371.10 | 25.10 |
| Max Day + 475 L/s Fire Flow | 475.91 | 360.70 | 14.70 |



Wilmot Employment Lands

Community of New Hamburg

Project No: 34896-104

Date: December 19, 2018

By: CJC



Water Demand Calculations

| Location | Node No. | Industrial | | Commercial | | Final Demand ⁴ (l/s) | | | | | Road Elevation (m) |
|---------------------|----------|--------------|---------------------------|-------------|---------------------------|---------------------------------|----------------------|----------------------|-----------------|--|--------------------|
| | | Area (ha) | Demand ³ (l/s) | Area (ha) | Demand ³ (l/s) | Average Day Qavg | Maximum Day Qmax.day | Minimum Hour Qmin.hr | Peak Hour Qpeak | Max Day + Fire Flow ⁵ Qmax.d+fire | |
| | J-1 | 4.79 | 2,497 | | | 2,497 | 6,866 | 0,999 | 10,312 | 206,866 | 340.97 |
| | J-2 | 6.52 | 3,395 | | | 3,395 | 9,336 | 1,358 | 14,020 | 209,336 | 340.07 |
| | J-3 | 4.79 | 2,496 | | | 2,496 | 6,865 | 0,999 | 10,310 | 206,865 | 339.55 |
| | J-4 | 5.06 | 2,637 | | | 2,637 | 7,252 | 1,055 | 10,891 | 207,252 | 338.55 |
| | J-5 | 5.10 | 2,654 | | | 2,654 | 7,298 | 1,061 | 10,960 | 207,298 | 338.59 |
| | J-6 | 5.21 | 2,713 | | | 2,713 | 7,461 | 1,085 | 11,205 | 207,461 | 338.86 |
| | J-7 | 1.95 | 1,013 | | | 1,013 | 2,786 | 0,405 | 4,184 | 202,786 | 339.77 |
| | J-8 | 2.55 | 1,326 | | | 1,326 | 3,645 | 0,530 | 5,474 | 203,645 | 340.44 |
| | J-10 | 2.18 | 1,138 | | | 1,138 | 3,128 | 0,455 | 4,698 | 203,128 | 339.88 |
| | J-11 | 2.25 | 1,169 | | | 1,169 | 3,215 | 0,468 | 4,829 | 203,215 | 340.45 |
| Total Zone 5 | | 40.39 | 21,037 | 0.00 | 0.000 | 21,037 | 57,852 | 8,415 | 86,883 | 209,336 | |

Table Notes:

1. Block areas are based on the Draft Plan by MHBC, dated November 5, 2018.

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 2018 Water and Wastewater Monitoring Report (Region of Waterloo, May 2018)*

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: *Design Guidelines for Drinking-Water Systems*, (MOE, 2008) - Section 3.4.4: Industrial Water Demands

4. Peaking Factors

| | 500-1,000 |
|--------------|-----------|
| Average Day | 1.00 |
| Maximum Day | 2.75 |
| Minimum Hour | 0.40 |
| Peak Hour | 4.13 |

Reference: *Design Guidelines for Drinking-Water Systems*, (MOE, 2008) - Table 3-1: Peaking Factors

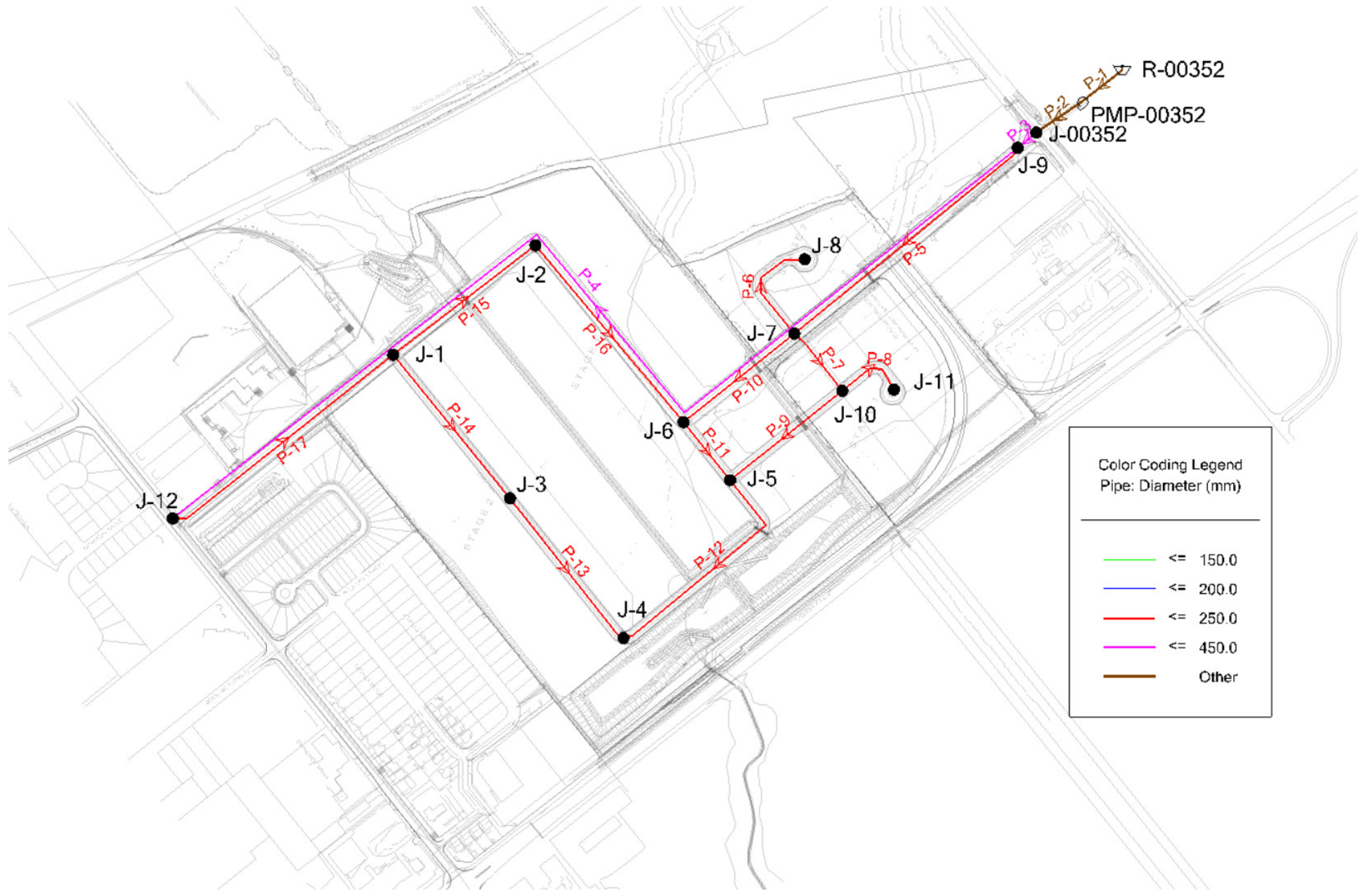
5. Fire Flow

| | |
|------------------------------|-------------------------|
| 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/Industrial | 12,000 l/min 200 l/s |

Reference: *Water Supply for Public Fire Protection (FUS, 1991) - F=220C(A)^{1/2}*

WATERCAD OUTPUT FILES

Water Distribution Network



Active Scenario: Max Day + Fire

| Label | Elevation (m) | Fire Flow Iterations | Satisfies Fire Flow Constraints? | Fire Flow (Needed) (L/s) | Flow (Total Needed) (L/s) | Flow (Total Available) (L/s) | Pressure (Calculated Residual) (kPa) | Pressure (Calculated System Lower Limit) (kPa) | Velocity of Maximum Pipe (m/s) | Pipe w/ Maximum Velocity |
|---------|---------------|----------------------|----------------------------------|--------------------------|---------------------------|------------------------------|--------------------------------------|--|--------------------------------|--------------------------|
| J-1 | 340.97 | 2 | True | 200.00 | 206.87 | 256.87 | 241.1 | 261.1 | 3.30 | P-17 |
| J-2 | 340.07 | 2 | True | 200.00 | 209.34 | 259.34 | 201.7 | 257.4 | 3.16 | P-5 |
| J-3 | 339.55 | 2 | True | 200.00 | 206.86 | 256.86 | 185.2 | 228.5 | 3.24 | P-14 |
| J-4 | 338.55 | 2 | True | 200.00 | 207.25 | 257.25 | 184.7 | 221.1 | 3.19 | P-5 |
| J-5 | 338.59 | 2 | True | 200.00 | 207.30 | 257.30 | 247.9 | 250.4 | 3.37 | P-5 |
| J-6 | 338.86 | 2 | True | 200.00 | 207.46 | 257.46 | 251.5 | 257.4 | 3.37 | P-5 |
| J-7 | 339.77 | 2 | True | 200.00 | 202.79 | 252.79 | 257.7 | 251.1 | 3.53 | P-5 |
| J-8 | 340.44 | 3 | True | 200.00 | 203.65 | 246.07 | 140.1 | 267.7 | 5.01 | P-6 |
| J-9 | 345.25 | 2 | True | 200.00 | 200.00 | 250.00 | 356.8 | 342.6 | 1.94 | P-3 |
| J-10 | 339.88 | 2 | True | 200.00 | 203.13 | 253.13 | 225.7 | 220.1 | 3.48 | P-5 |
| J-11 | 340.45 | 3 | True | 200.00 | 203.22 | 251.14 | 140.1 | 230.2 | 5.12 | P-8 |
| J-12 | 346.59 | 2 | True | 200.00 | 200.00 | 250.00 | 290.4 | 349.3 | 1.94 | P-3 |
| J-00352 | 346.00 | 2 | True | 200.00 | 200.00 | 250.00 | 353.4 | 346.3 | 0.62 | P-5 |

Active Scenario: Avg Day

| ID | Label | Elevation (m) | Demand (L/s) | Hydraulic Grade (m) | Pressure (kPa) |
|-----|---------|---------------|--------------|---------------------|----------------|
| 42 | J-1 | 340.97 | 2.50 | 397.80 | 556.1 |
| 61 | J-2 | 340.07 | 3.40 | 397.79 | 564.9 |
| 43 | J-3 | 339.55 | 2.50 | 397.79 | 570.0 |
| 44 | J-4 | 338.55 | 2.64 | 397.79 | 579.7 |
| 62 | J-5 | 338.59 | 2.65 | 397.79 | 579.4 |
| 63 | J-6 | 338.86 | 2.71 | 397.79 | 576.7 |
| 45 | J-7 | 339.77 | 1.01 | 397.80 | 567.9 |
| 65 | J-8 | 340.44 | 1.33 | 397.79 | 561.3 |
| 118 | J-9 | 345.25 | 0.00 | 397.89 | 515.2 |
| 96 | J-10 | 339.88 | 1.14 | 397.79 | 566.8 |
| 64 | J-11 | 340.45 | 1.17 | 397.79 | 561.2 |
| 119 | J-12 | 346.59 | 0.00 | 397.87 | 501.9 |
| 113 | J-00352 | 346.00 | 0.00 | 397.89 | 507.8 |

Active Scenario: Max Day

| ID | Label | Elevation (m) | Demand (L/s) | Hydraulic Grade (m) | Pressure (kPa) |
|-----|---------|---------------|--------------|---------------------|----------------|
| 42 | J-1 | 340.97 | 6.87 | 396.77 | 546.1 |
| 61 | J-2 | 340.07 | 9.34 | 396.72 | 554.4 |
| 43 | J-3 | 339.55 | 6.87 | 396.71 | 559.5 |
| 44 | J-4 | 338.55 | 7.25 | 396.71 | 569.2 |
| 62 | J-5 | 338.59 | 7.30 | 396.72 | 568.9 |
| 63 | J-6 | 338.86 | 7.46 | 396.72 | 566.3 |
| 45 | J-7 | 339.77 | 2.79 | 396.77 | 557.8 |
| 65 | J-8 | 340.44 | 3.65 | 396.76 | 551.2 |
| 118 | J-9 | 345.25 | 0.00 | 397.37 | 510.1 |
| 96 | J-10 | 339.88 | 3.13 | 396.73 | 556.4 |
| 64 | J-11 | 340.45 | 3.22 | 396.73 | 550.8 |
| 119 | J-12 | 346.59 | 0.00 | 397.26 | 495.9 |
| 113 | J-00352 | 346.00 | 0.00 | 397.39 | 503.0 |

Active Scenario: Min Hour

| ID | Label | Elevation (m) | Demand (L/s) | Hydraulic Grade (m) | Pressure (kPa) |
|-----|---------|---------------|--------------|---------------------|----------------|
| 42 | J-1 | 340.97 | 1.00 | 397.94 | 557.5 |
| 61 | J-2 | 340.07 | 1.36 | 397.94 | 566.3 |
| 43 | J-3 | 339.55 | 1.00 | 397.94 | 571.4 |
| 44 | J-4 | 338.55 | 1.06 | 397.94 | 581.2 |
| 62 | J-5 | 338.59 | 1.06 | 397.94 | 580.8 |
| 63 | J-6 | 338.86 | 1.09 | 397.94 | 578.2 |
| 45 | J-7 | 339.77 | 0.40 | 397.94 | 569.3 |
| 65 | J-8 | 340.44 | 0.53 | 397.94 | 562.7 |
| 118 | J-9 | 345.25 | 0.00 | 397.96 | 515.8 |
| 96 | J-10 | 339.88 | 0.45 | 397.94 | 568.2 |
| 64 | J-11 | 340.45 | 0.47 | 397.94 | 562.6 |
| 119 | J-12 | 346.59 | 0.00 | 397.95 | 502.7 |
| 113 | J-00352 | 346.00 | 0.00 | 397.96 | 508.5 |

Active Scenario: Peak Hour

| ID | Label | Elevation (m) | Demand (L/s) | Hydraulic Grade (m) | Pressure (kPa) |
|-----|---------|---------------|--------------|---------------------|----------------|
| 42 | J-1 | 340.97 | 10.31 | 395.36 | 532.3 |
| 61 | J-2 | 340.07 | 14.02 | 395.25 | 540.0 |
| 43 | J-3 | 339.55 | 10.31 | 395.23 | 545.0 |
| 44 | J-4 | 338.55 | 10.89 | 395.22 | 554.6 |
| 62 | J-5 | 338.59 | 10.96 | 395.24 | 554.4 |
| 63 | J-6 | 338.86 | 11.21 | 395.25 | 551.9 |
| 45 | J-7 | 339.77 | 4.18 | 395.35 | 543.9 |
| 65 | J-8 | 340.44 | 5.47 | 395.34 | 537.3 |
| 118 | J-9 | 345.25 | 0.00 | 396.64 | 502.9 |
| 96 | J-10 | 339.88 | 4.70 | 395.27 | 542.1 |
| 64 | J-11 | 340.45 | 4.83 | 395.27 | 536.5 |
| 119 | J-12 | 346.59 | 0.00 | 396.40 | 487.5 |
| 113 | J-00352 | 346.00 | 0.00 | 396.68 | 496.0 |



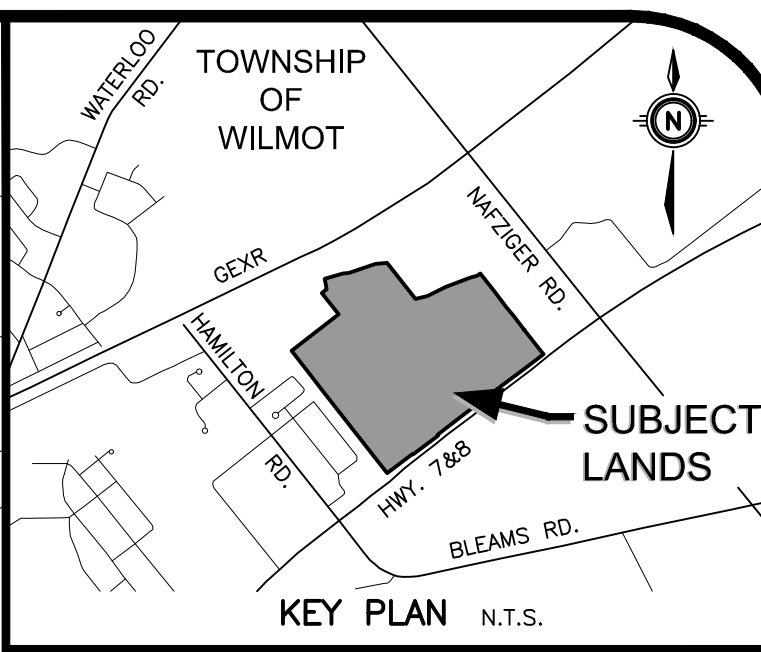
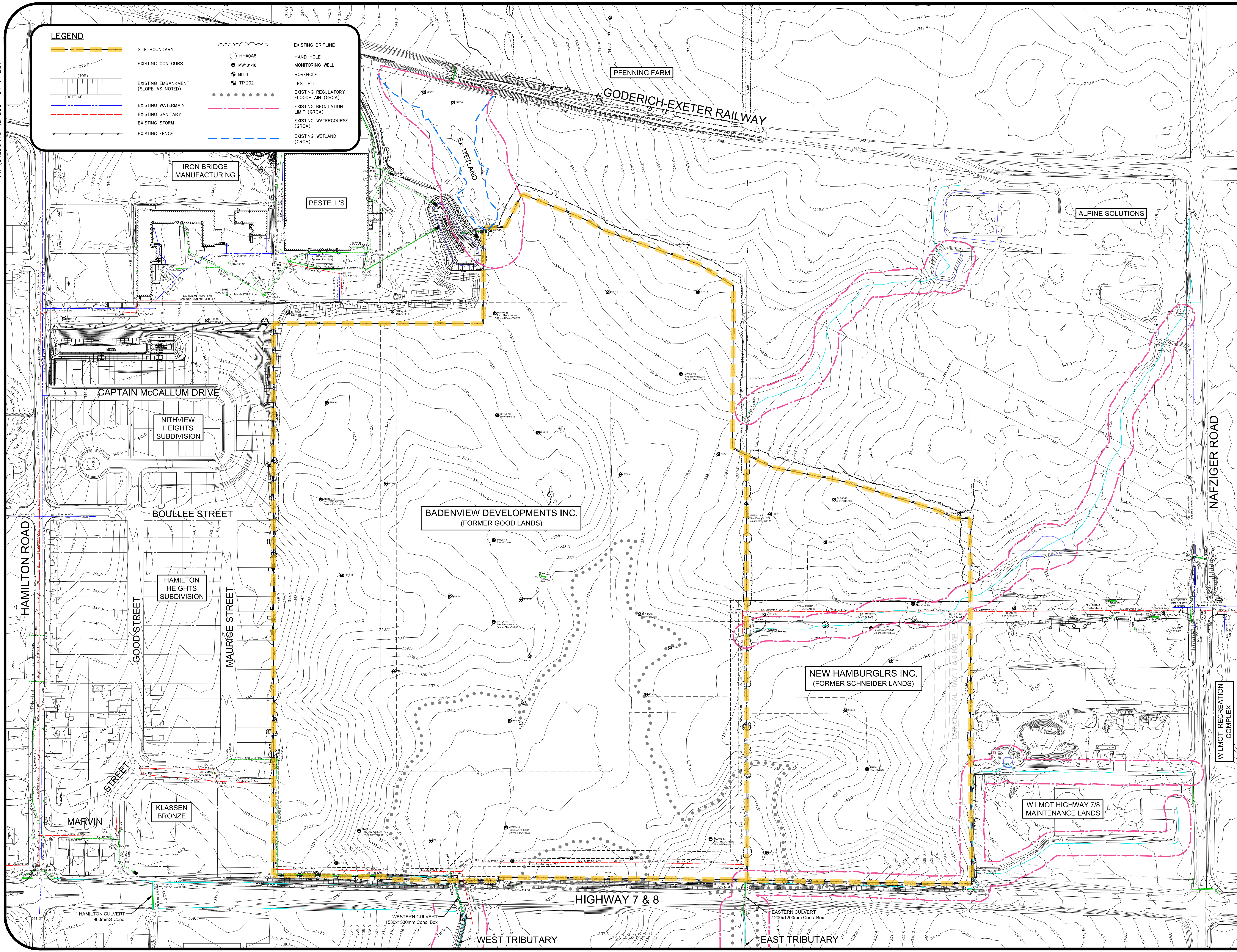
STORM SEWER ANALYSIS

| | | | |
|--|-------------------------------------|---|--|
| WILMOT EMPLOYMENT LANDS | STORM SEWER DESIGN SHEET | Design Parameters | |
| TOWNSHIP OF WILMOT, Ontario | ENGINEERING AND PUBLIC WORKS | 5 YEAR STORM | |
| Project Number: 34896-104 Date: December 18, 2018 Design By: NED Checked By: MSB File: Q:\34896\104\Sanitary\34896-104-Sanitary Sewer Design Sheet.xls | Drainage Area Plan No: PRELIM-ST1.1 | Q=kAIR, k=0.00278 Manning's "n" 0.013 Intensity (I) = a/(tc+b) ^c Min. Velocity 0.800 m/s a = 1593 Max. Velocity 6.000 m/s b = 11 c = 0.8789 | |

| LOCATION | | | | STORMWATER FLOW | | | | | | | | DESIGN | | | | | |
|---|-------------|------------------|--------|-----------------------|-------------------|--------------------|---------------------------|---------------------|-----------------------|------------------------------------|------------------------|------------------------|--------------------|-------------------|------------------------|-------------------------|-----------------------|
| STREET | AREA NUMBER | MANHOLE LOCATION | | AREA (A) <i>ha</i> | RUNOFF COEFF. (C) | A x C <i>ha</i> | CUMUL. A x C <i>ha</i> | CONCENTRATION TIME | | RAIN INTENSITY (I) <i>mm/hr</i> | FLOW (Q) <i>L/s</i> | PIPE SIZE <i>mm</i> | LENGTH <i>m</i> | SLOPE <i>%</i> | CAPACITY <i>L/s</i> | FULL PIPE FULL VELOCITY | |
| | | FROM MH | TO MH | | | | | TOTAL <i>min</i> | IN PIPE <i>min</i> | | | | | | | FLOW <i>m/s</i> | PIPE FULL <i>%</i> |
| Area to SWM Inlet # 1 (West Inlet) | | | | | | | | | | | | | | | | | |
| Street 1 | 1 | MH1.1 | MH1 | 1.080 | 0.75 | 0.8100 | 0.8100 | 15.0000 | 0.0892 | 90.90666 | 204.70362 | 525 | 10.5 | 1.00 | 430.06227 | 1.9867 | 47.60 |
| Street 1 | 2 | MH1 | MH7 | 0.810 | 0.62 | 0.5022 | 1.3122 | 15.0892 16.0031 | 0.9139 | 90.63341 | 330.62306 | 525 | 171.0 | 2.50 | 679.98816 | 3.1412 | 48.62 |
| External (Iron Bridge) | 3 | MH5 | MH7 | 2.060 | | | 0.0000 | 15.0000 16.4283 | 1.4283 | 90.90666 | 257.00000 | 525 | 135.0 | 0.50 | 304.09995 | 1.4048 | 84.51 |
| External (Nithview Heights) | 4 | Ex. MH6 | MH7 | 0.500 | 0.30 | 0.1500 | 0.1500 | 10.0000 10.1524 | 0.1524 | 109.67742 | 45.73549 | 300 | 28.4 | 10.00 | 305.79465 | 4.3261 | 14.96 |
| Street 1 | 5 | MH7 | MH10 | 0.440 | 0.62 | 0.2728 | 1.7350 | 16.4283 | 1.1484 | 86.73259 | 675.33732 | 825 | 140.0 | 0.50 | 1015.00629 | 1.8988 | 66.54 |
| Street 2 | 6 | MH10 | MH12 | 2.920 | 0.62 | 1.8104 | 3.5454 | 17.5768 | 1.1123 | 83.66155 | 1081.58593 | 1050 | 153.0 | 0.50 | 1930.91431 | 2.2299 | 56.01 |
| Street 2 | 7 | MH12 | CBMH14 | 4.740 | 0.75 | 3.5550 | 7.1004 | 18.6890 | 1.4111 | 80.90046 | 1853.90327 | * 1200 | 180.0 | 0.30 | 2135.42252 | 1.8881 | 86.82 |
| Street 2 | 8 | CBMH14 | CBMH17 | 4.710 | 0.75 | 3.5325 | 10.6329 | 20.1001 | 1.6856 | 77.66538 | 2552.74686 | * 1350 | 232.8 | 0.30 | 2923.41550 | 2.0424 | 87.32 |
| Street 2 | 9 | CBMH17 | MH21 | 0.500 | 0.68 | 0.3400 | 10.9729 | 21.7857 | 1.8923 | 74.14476 | 2518.76083 | * 1350 | 260.8 | 0.30 | 2923.41550 | 2.0424 | 86.16 |
| West Inlet | | MH21 | HW22 | | | 0.0000 | 10.9729 | 23.6780 | 0.1973 | 70.57680 | 2409.92157 | * 1350 | 27.0 | 0.30 | 2923.41550 | 2.0424 | 82.44 |
| | | | | 17.760 | | | | 23.8753 | | | | | | | | | |
| * Dentoos elliptical pipes used | | | | | | | | | | | | | | | | | |
| Area to SWM Inlet # 2 (East Inlet) | | | | | | | | | | | | | | | | | |
| Street 1 | 10 | CBMH23 | MH24 | 0.850 | 0.70 | 0.5950 | 0.5950 | 10.0000 | 1.1646 | 109.67742 | 181.41743 | 525 | 94.0 | 0.40 | 271.99526 | 1.2565 | 66.70 |
| Street 1 | 11 | MH24 | CBMH26 | 3.610 | 0.75 | 2.7075 | 3.3025 | 11.1646 | 0.7516 | 104.59601 | 960.29073 | 900 | 90.9 | 0.40 | 1144.94130 | 1.7997 | 83.87 |
| Street 1 | 12 | CBMH26 | CBMH28 | 2.210 | 0.75 | 1.6575 | 4.9600 | 11.9162 | 1.3507 | 101.57506 | 1400.59812 | 1050 | 180.0 | 0.40 | 1727.06226 | 1.9945 | 81.10 |
| | | CBMH28 | MH30 | | | | 4.9600 | 13.2669 14.0160 | 0.7491 | 96.58881 | 1331.84384 | 1050 | 98.9 | 0.40 | 1727.06226 | 1.9945 | 77.12 |
| Street 3 | 13 | MH29 | MH30 | 0.530 | 0.62 | 0.3286 | 0.3286 | 10.0000 10.1429 | 0.1429 | 109.67742 | 100.19120 | 450 | 17.0 | 1.70 | 371.73293 | 2.3373 | 26.95 |
| Street 2 | 14 | MH30 | CBMH31 | 1.130 | 0.75 | 0.8475 | 6.1361 | 14.0160 | 0.1271 | 94.04218 | 1604.20523 | 1200 | 15.8 | 0.30 | 2135.42252 | 1.8881 | 75.12 |
| | | CBMH31 | MH34 | | | | 6.1361 | 14.1430 14.9422 | 0.7992 | 93.62440 | 1597.07850 | 1200 | 99.3 | 0.30 | 2135.42252 | 1.8881 | 74.79 |
| Street B | 15 | CBMH33 | MH34 | 0.280 | 0.62 | 0.1736 | 0.1736 | 10.0000 10.1141 | 0.1141 | 109.67742 | 52.93120 | 450 | 12.0 | 2.00 | 403.20097 | 2.5352 | 13.13 |

| LOCATION | | | | STORMWATER FLOW | | | | | | | | DESIGN | | | | | |
|--|-------------|------------------|---------|-----------------|-------------------|-------------|--------------------|--------------------|----------------|-----------------------------|-----------------|-----------------|-------------|------------|-----------------|--------------------|----------------|
| STREET | AREA NUMBER | MANHOLE LOCATION | | AREA (A) ha | RUNOFF COEFF. (C) | A x C ha | CUMUL. A x C ha | CONCENTRATION TIME | | RAIN INTENSITY (I) mm/hr | FLOW (Q) L/s | PIPE SIZE mm | LENGTH m | SLOPE % | CAPACITY L/s | FULL FLOW VELOCITY | |
| | | FROM MH | TO MH | | | | | TOTAL min | IN PIPE min | | | | | | | m/s | PIPE FULL % |
| Street 2 (East Inlet) | 16 | MH34 | CBMH35 | 1.690 | 0.75 | 1.2675 | 7.5772 | 14.9422 | 0.5509 | 91.08456 | 1918.66136 | 1200 | 70.6 | 0.30 | 2135.42252 | 1.8881 | 89.85 |
| | | CBMH35 | HW37 | | | | 7.5772 | 15.4931 | 0.3700 | 89.41787 | 1883.55303 | 1200 | 47.3 | 0.30 | 2135.42252 | 1.8881 | 88.21 |
| | | | | 10.300 | | | | 15.8631 | | | | | | | | | |
| Area to Street 3 Culvert (Channel #3) | | | | | | | | | | | | | | | | | |
| Street 3 | 17 | SITE | MH38 | 0.890 | 0.75 | 0.6675 | 0.6675 | 15.0000 | 0.0893 | 90.90666 | 168.69094 | 450 | 10.0 | 1.00 | 285.10614 | 1.7926 | 59.17 |
| | | | | | | | | 15.0893 | | | | | | | | | |
| Street 3 | 18 | SITE | MH38 | 0.670 | 0.75 | 0.5025 | 0.5025 | 15.0000 | 0.0958 | 90.90666 | 126.99206 | 450 | 10.0 | 1.00 | 285.10614 | 1.7926 | 44.54 |
| | | | | | | | | 15.0958 | | | | | | | | | |
| Street 3 | 19 | MH38 | MH44 | 0.900 | 0.62 | 0.5580 | 1.7280 | 15.0958 | 0.8775 | 90.61340 | 435.29226 | 525 | 160.8 | 2.00 | 608.19990 | 2.8096 | 71.57 |
| | | | | | | | | 15.9733 | | | | | | | | | |
| Easement (External properties) | 20 | MH41 | MH42 | 0.950 | 0.75 | 0.7125 | 0.7125 | 15.0000 | 0.4501 | 90.90666 | 180.06337 | 450 | 51.2 | 1.00 | 285.10614 | 1.7926 | 63.16 |
| | 21 | MH42 | MH43 | 1.530 | 0.75 | 1.1475 | 1.8600 | 15.4501 | 0.4066 | 89.54569 | 463.02287 | 600 | 58.2 | 1.00 | 614.01154 | 2.1716 | 75.41 |
| | 22 | MH43 | MH44 | 0.980 | 0.75 | 0.7350 | 2.5950 | 15.8567 | 0.1361 | 88.35314 | 637.38835 | 675 | 21.1 | 1.00 | 840.58815 | 2.3490 | 75.83 |
| Street 3 | | MH77 | CULVERT | | | | 4.3230 | 15.9733 | 0.4007 | 88.01731 | 1057.78675 | 825 | 56.9 | 0.60 | 1111.88368 | 2.0800 | 95.13 |
| | | | | 5.920 | | | | 16.3739 | | | | | | | | | |
| Area to Street 3 Culvert (Channel #2) | | | | | | | | | | | | | | | | | |
| Street 3 | 23 | CBMH50 | MH51 | 0.850 | 0.70 | 0.5950 | 0.5950 | 10.0000 | 0.2850 | 109.67742 | 181.41743 | 525 | 23.0 | 0.40 | 271.99526 | 1.2565 | 66.70 |
| | | | | | | | | 10.2850 | | | | | | | | | |
| Street A | 24 | MH45 | MH47 | 1.760 | 0.75 | 1.3200 | 1.3200 | 10.0000 | 0.8849 | 109.67742 | 402.47227 | 675 | 77.0 | 0.30 | 460.40909 | 1.2866 | 87.42 |
| | 25 | MH47 | MH51 | 0.470 | 0.75 | 0.3525 | 1.6725 | 10.8849 | 1.1505 | 105.77017 | 491.78369 | 750 | 106.0 | 0.30 | 609.76693 | 1.3802 | 80.65 |
| | | | | | | | | 12.0354 | | | | | | | | | |
| Street 3 | | MH51 | MH52 | | | | 2.2675 | 12.0354 | 0.6554 | 101.11276 | 637.37944 | 825 | 64.4 | 0.30 | 786.22049 | 1.4708 | 81.07 |
| | | MH52 | CULVERT | | | | 2.2675 | 12.6908 | 0.0695 | 98.65012 | 621.85582 | 825 | 6.8 | 0.30 | 786.22049 | 1.4708 | 79.09 |
| | | | | 3.080 | | | | 12.7603 | | | | | | | | | |
| Area to Street B Culvert (Channel #2) | | | | | | | | | | | | | | | | | |
| Street B | 26 | MH33 | MH55 | 2.400 | 0.75 | 1.8000 | 1.8000 | 15.0000 | 0.5011 | 90.90666 | 454.89693 | 750 | 55.5 | 0.50 | 787.20572 | 1.7819 | 57.79 |
| Street B | 27 | MH55 | MH57 | 1.560 | 0.75 | 1.1700 | 2.9700 | 15.5011 | 0.9209 | 89.39403 | 738.09075 | 750 | 111.9 | 0.50 | 787.20572 | 1.7819 | 93.76 |
| | | MH57 | CULVERT | | | | 2.9700 | 16.4220 | 0.2278 | 86.75012 | 716.26107 | 750 | 27.6 | 0.50 | 787.20572 | 1.7819 | 90.99 |
| | | | | 3.960 | | | | 16.4220 | | | | | | | | | |

* Dentes elliptical pipes used



GEODETIC BM ELEV. = 342.487m
ONE STOREY RED BRICK BUILDING (H&N BRASS CO.) ON THE NORTH SIDE OF HWY.7&8, BEING 0.6km SOUTH ALONG PEEL ST. EVANGELICAL UNITED CHURCH IN NEW HAMBURG. TABLET IS SET HORIZONTALLY IN SOUTH FACE OF CONC. 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. = 336.032m
CUT CROSS ON CONCRETE BOX CULVERT LOCATED WEST OF FIELD ENTRANCE.

NOTE TO CONTRACTOR :
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| 1. | ISSUED FOR DRAFT PLAN APPROVAL | DRH | DEC.17/18 |
| No. | REVISION | | BY DATE |

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|------------------------------------|---------------|
| | |
| Engineers Scientists Surveyors | |
| (519) 743-6500 | www.mte85.com |

OWNERS
BADENVIEW DEVELOPMENTS INC.
NEW HAMBURGLRS INC.

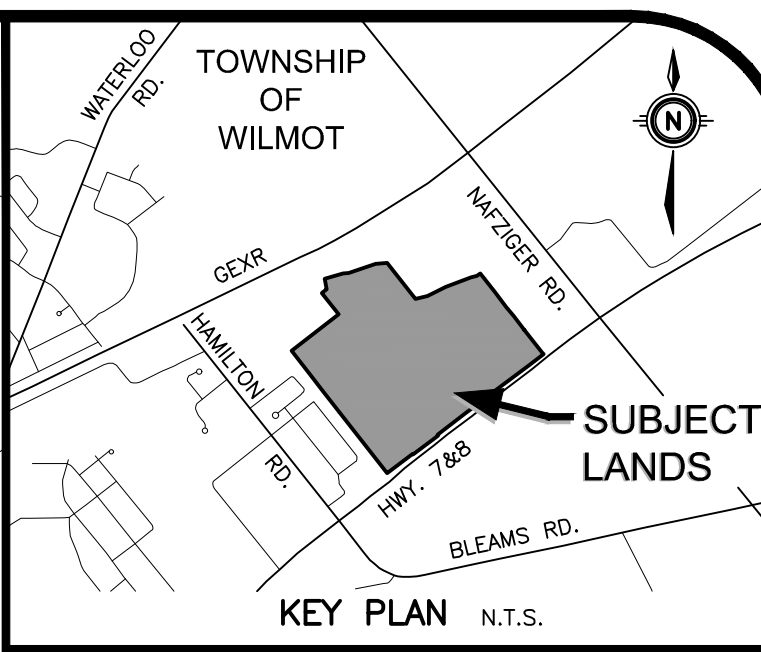
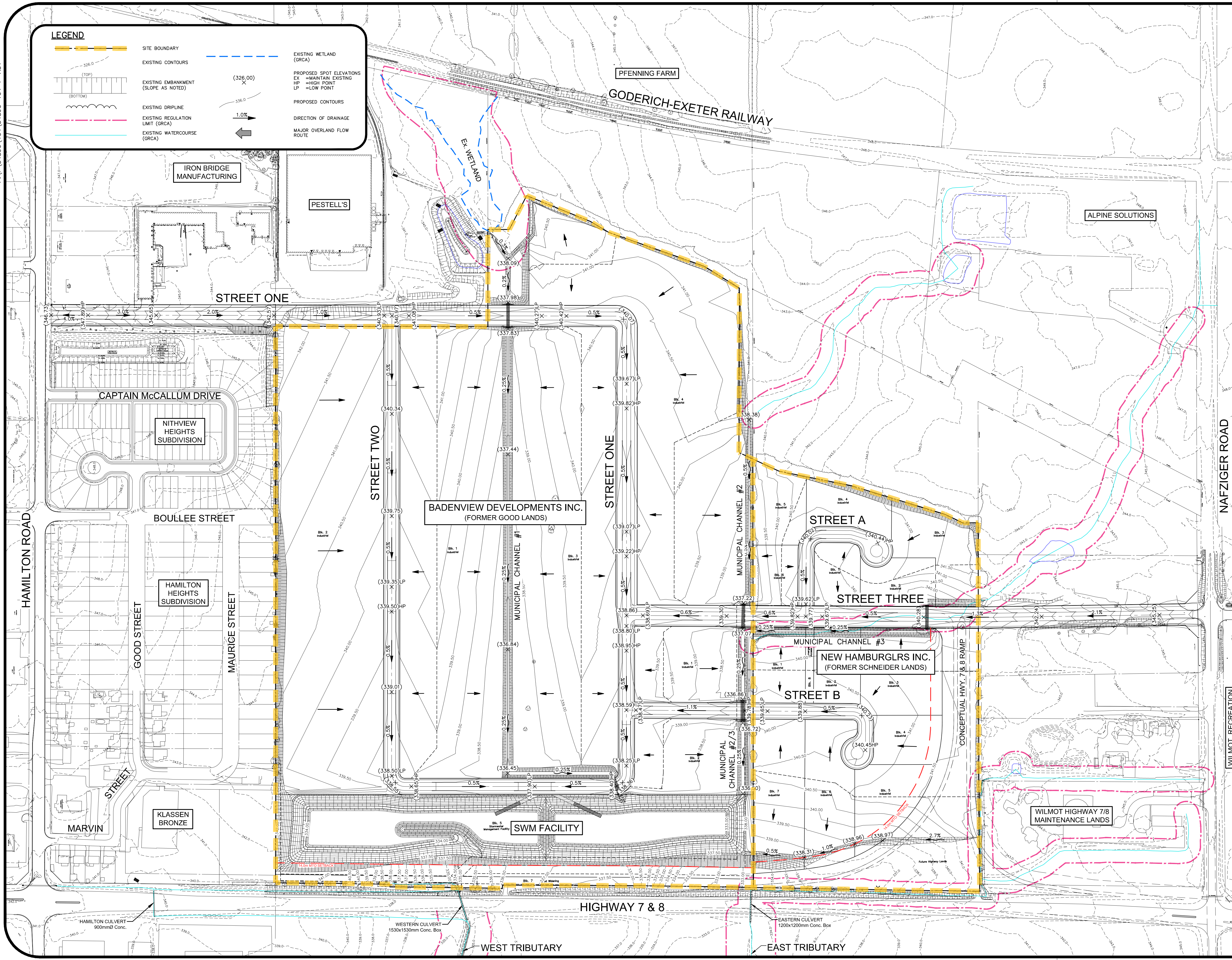
PROJECT
WILMOT EMPLOYMENT LANDS
New Hamburg

DRAWING
EXISTING CONDITIONS PLAN

| | | | |
|-----------------|-----------|--------------|------------------------|
| Project Manager | D.HICKS | Project No. | 34896-104 39219-104 |
| Design By | NED | Checked By | GMK |
| Drawn By | RXB | Checked By | NED |
| Surveyed By | MTE | Drawn No. | |
| Date | Oct.23/18 | EC1.1 | |
| Scale | 1:2000 | Sheet | of |

LEGEND

| | | | |
|--|--------------------------------------|--|---|
| | SITE BOUNDARY | | EXISTING WETLAND (GRCA) |
| | EXISTING CONTOURS | | PROPOSED SPOT ELEVATIONS EX = MAINTAIN EXISTING HP = HIGH POINT LP = LOW POINT |
| | EXISTING EMBANKMENT (SLOPE AS NOTED) | | PROPOSED CONTOURS |
| | EXISTING DRIPLINE | | DIRECTION OF DRAINAGE |
| | EXISTING REGULATION LIMIT (GRCA) | | MAJOR OVERLAND FLOW ROUTE |
| | EXISTING WATERCOURSE (GRCA) | | |



GEODETIC BM ELEV. = 342.487m
 ONE STOREY RED BRICK BUILDING (H&N BRASS CO.) ON THE NORTH SIDE OF HWY.7&8, BEING 0.6km SOUTH ALONG PEEL ST. EVANGELICAL UNITED CHURCH IN NEW HAMBURG. TABLET IS SET HORIZONTALLY IN SOUTH FACE OF CONC. 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. = 336.032m
 CUT CROSS ON CONCRETE BOX CULVERT LOCATED WEST OF FIELD ENTRANCE.

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| 1. | ISSUED FOR DRAFT PLAN APPROVAL | DRH | DEC.17/18 |
| No. | REVISION | BY | DATE |

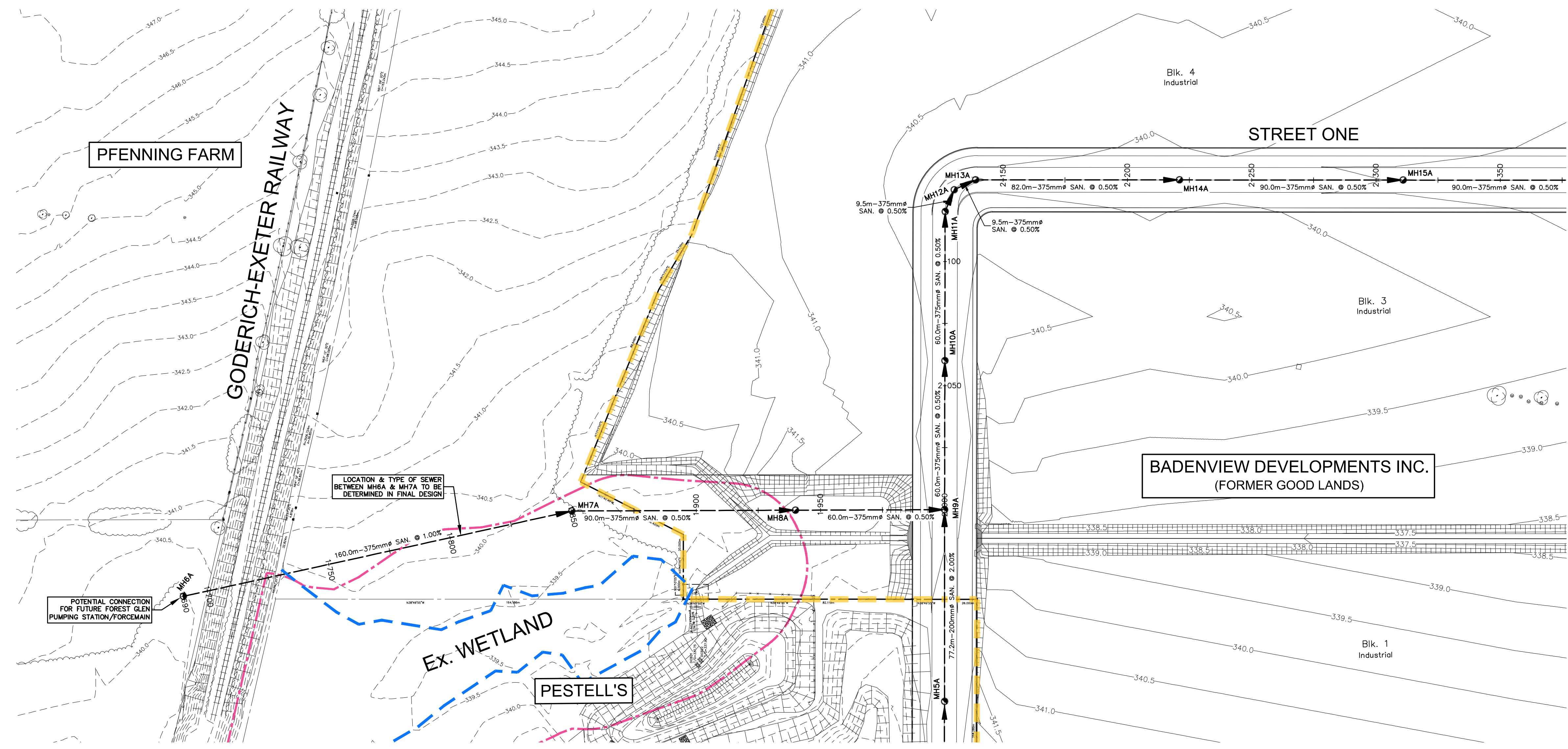
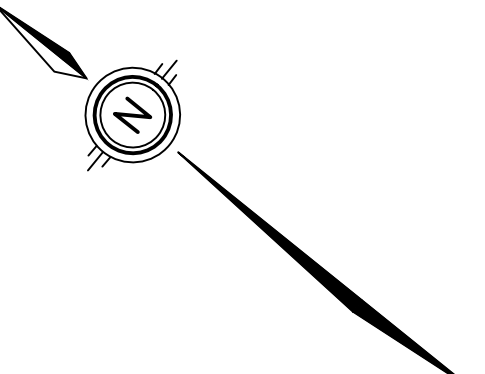
MTE
 Engineers | Scientists | Surveyors
 (519) 743-6500 www.mte85.com

OWNERS
BADENVIEW DEVELOPMENTS INC.
NEW HAMBURGLRS INC.

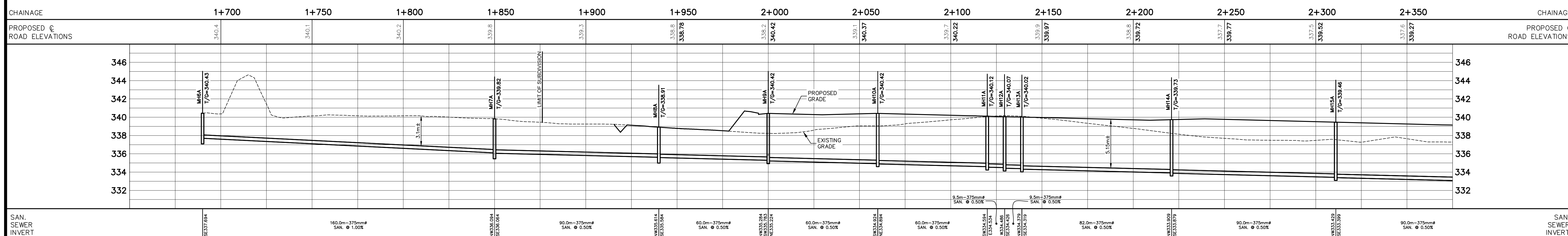
PROJECT
WILMOT EMPLOYMENT LANDS
 New Hamburg

DRAWING
PRELIMINARY FINISHED GRADE CONTOUR PLAN

| | | | |
|-----------------|-----------|-------------|------------------------|
| Project Manager | D.HICKS | Project No. | 34896-104 39219-104 |
| Design By | NED | Checked By | GMK |
| Drawn By | RXB | Checked By | NED |
| Surveyed By | MTE | Drawing No. | AG1.1 |
| Date | Oct.23/18 | Scale | 1:2000 |
| Sheet | | Sheet of | |



SANITARY TRUNK SEWER

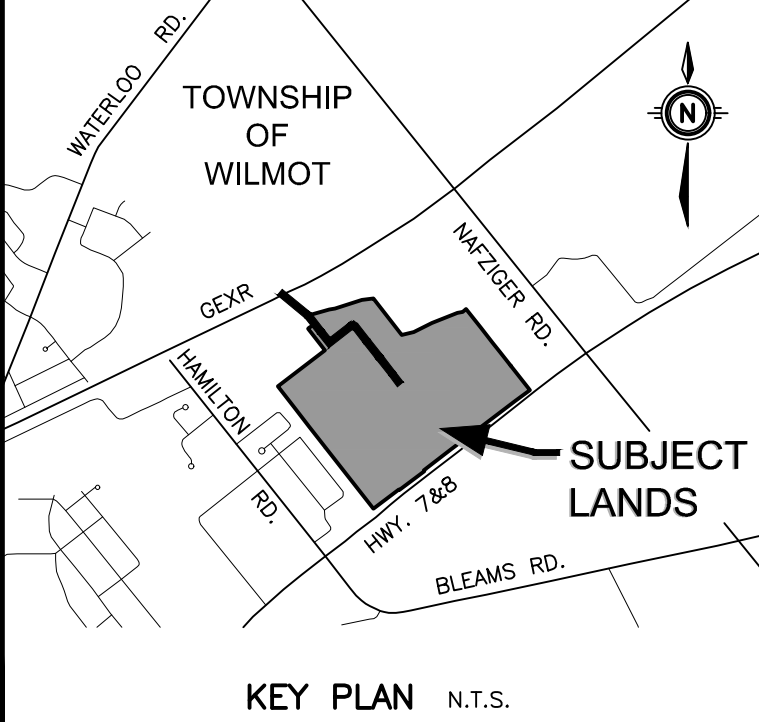


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|-------------------|----------|----------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|--------------------------|---------------------------|---------------------------|---------------------------|-------------------|
| SAN. SEWER INVERT | SE37.824 | 160.0m-375mm# SAN. @ 1.00% | 60.0m-375mm# SAN. @ 0.50% | 90.0m-375mm# SAN. @ 0.50% | 60.0m-375mm# SAN. @ 0.50% | 60.0m-375mm# SAN. @ 0.50% | 60.0m-375mm# SAN. @ 0.50% | 60.0m-375mm# SAN. @ 0.50% | 60.0m-375mm# SAN. @ 0.50% | 9.5m-375mm# SAN. @ 0.50% | 82.0m-375mm# SAN. @ 0.50% | 90.0m-375mm# SAN. @ 0.50% | 90.0m-375mm# SAN. @ 0.50% | SAN. SEWER INVERT |
|-------------------|----------|----------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|--------------------------|---------------------------|---------------------------|---------------------------|-------------------|

LEGEND

- SITE BOUNDARY
- EXISTING EMBANKMENT (SLOPE AS NOTED)
- EXISTING CONTOURS
- EXISTING DRIPLINE
- EXISTING REG. LIMIT (GRCA)
- EXISTING WATERCOURSE (GRCA)
- PROPOSED CONTOURS
- SANITARY SEWER
- PROPOSED EMBANKMENT (SLOPE AS NOTED)

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| 1. | ISSUED FOR DRAFT PLAN APPROVAL | DPH DEC.17/18 |
| No. | REVISION | BY DATE |

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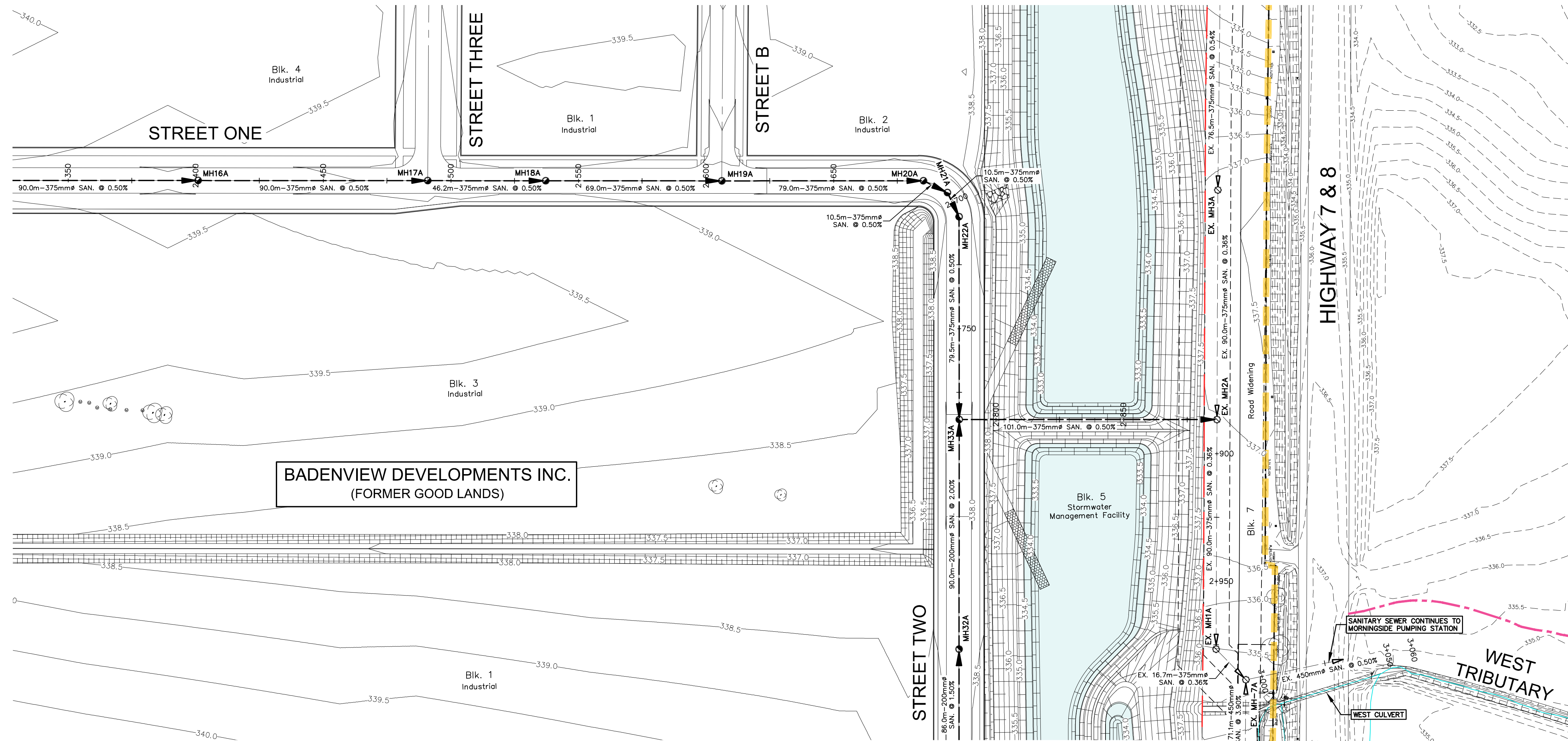
OWNERS
 BADENVIEW DEVELOPMENTS INC.
 NEW HAMBURGLRS INC.

PROJECT
 WILMOT EMPLOYMENT LANDS
 New Hamburg

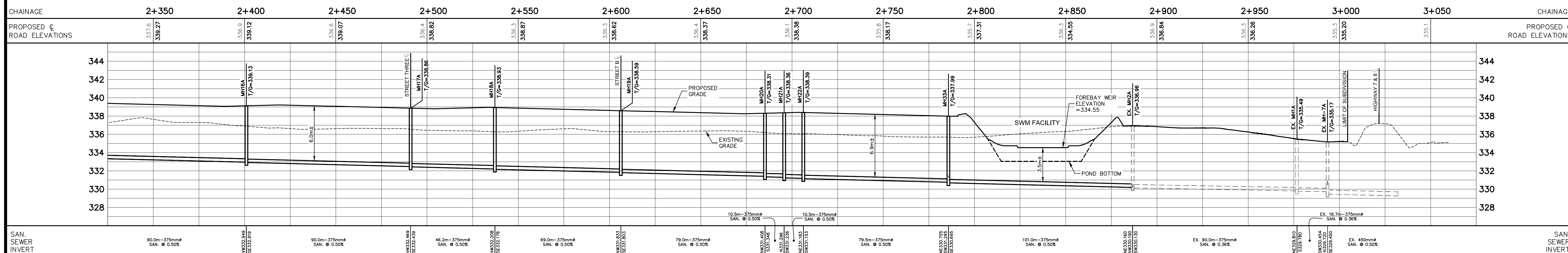
DRAWING
 SANITARY TRUNK SEWER
 STA. 1+680 to STA. 2+350

MTE
 Engineers | Scientists | Surveyors
 (519) 743-6500 www.mte85.com

| | | | |
|-----------------|-----------|-------------|------------------------|
| Project Manager | D.HICKS | Project No. | 34896-104 39219-104 |
| Design By | NED | Checked By | GMK |
| Drawn By | RXB | Checked By | NED |
| Surveyed By | MTE | Drawing No. | SA1.1 |
| Date | Dec.12/18 | Scale | H-1:1000, V-1:200 |
| Sheet | 1 of 2 | | |



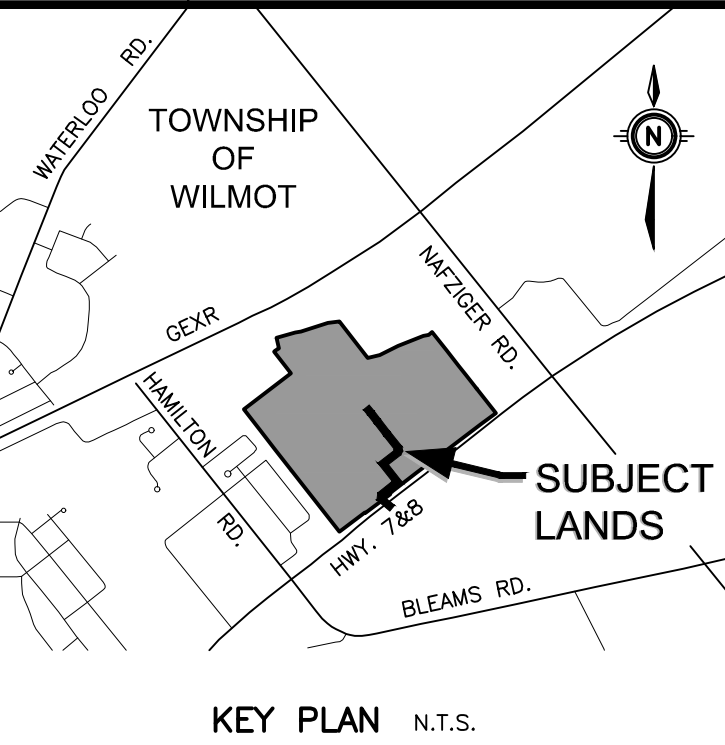
SANITARY TRUNK SEWER



LEGEND

- SITE BOUNDARY
- EXISTING EMBANKMENT (SLOPE AS NOTED)
- EXISTING CONTOURS
- EXISTING DRIPLINE
- EXISTING REG. LIMIT (GRCA)
- EXISTING WATERCOURSE (GRCA)
- PROPOSED CONTOURS
- SANITARY SEWER
- PROPOSED EMBANKMENT (SLOPE AS NOTED)

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|-----|--------------------------------|---------------|
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 WILMOT EMPLOYMENT LANDS

DRAWING
 SANITARY TRUNK SEWER
 STA. 2+350 to STA. 3+050

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Project Manager D. HICKS
Design By NED
Drawn By RXB
Surveyed By MTE
Date Dec.12/18
Scale H-1:1000, V-1:200

Project No. 34896-104
39219-104
Checked By GMK
Checked By NED
Drawing No. SA1.2
Sheet 2 of 2