190-216 Arkell Road
Guelph, Ontario

Functional Servicing Report

Project Location:

190 - 216 Arkell Road
Guelph, Ontario

Prepared for:

Crescent Homes
3-180 Frobisher Drive
Waterloo, ON N2V 2A2

Prepared by:

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

October 10, 2018
Revised: April 7, 2020

MTE File No.: 42063-104

Engineers, Scientists, Surveyors.

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1.0 Introduction

1.1 Overview

MTE Consultants Inc. (MTE) was retained by Crescent Homes to prepare a Functional Servicing Report in support of a Draft Plan of Subdivision Application. The lands that comprise the Draft Plan of Subdivision are made up of a number of properties, including: 190, 202, 210, and 216 Arkell Road, located in the City of Guelph. These lands are herein referred to as the 'subject lands'.

The subject lands are approximately 2.58ha. Refer to **Figure 1.1** for the location of the subject lands. The proposed development plans for the subject lands include a residential subdivision with 24 townhouse units fronting onto a municipal right-of-way, two stacked townhouse condominium blocks, a park block, and a stormwater management (SWM) block. The proposed right-of-way will connect the existing Dawes Avenue northeast of the subject lands and to Arkell Road at its intersection with Summerfield Drive. Refer to the Draft Plan of Subdivision prepared by MHBC, dated March 18, 2020, in **Appendix A** for more details. Approximately one third of the subject lands cannot be developed due to the existing wetland and its setbacks.

1.2 Background Information

The original Functional Servicing Report, prepared by MTE and dated October 10, 2018, was submitted to the City of Guelph (City) as part of a Draft Plan approval process. After discussions with City staff, it was determined that the proposed road connections through the subject lands would establish a municipal right-of-way, thereby warranting a Draft Plan of Subdivision Application. As such, various departments within the City have reviewed the original submission and provided comments to be addressed prior to Draft Plan approval.

1.3 Purpose of Study

The purpose of this report is to address the City comments and develop a comprehensive servicing strategy for the subdivision which outlines how the subdivision can be developed with full municipal services, including sanitary sewage collection, domestic water supply, storm drainage, and utilities.

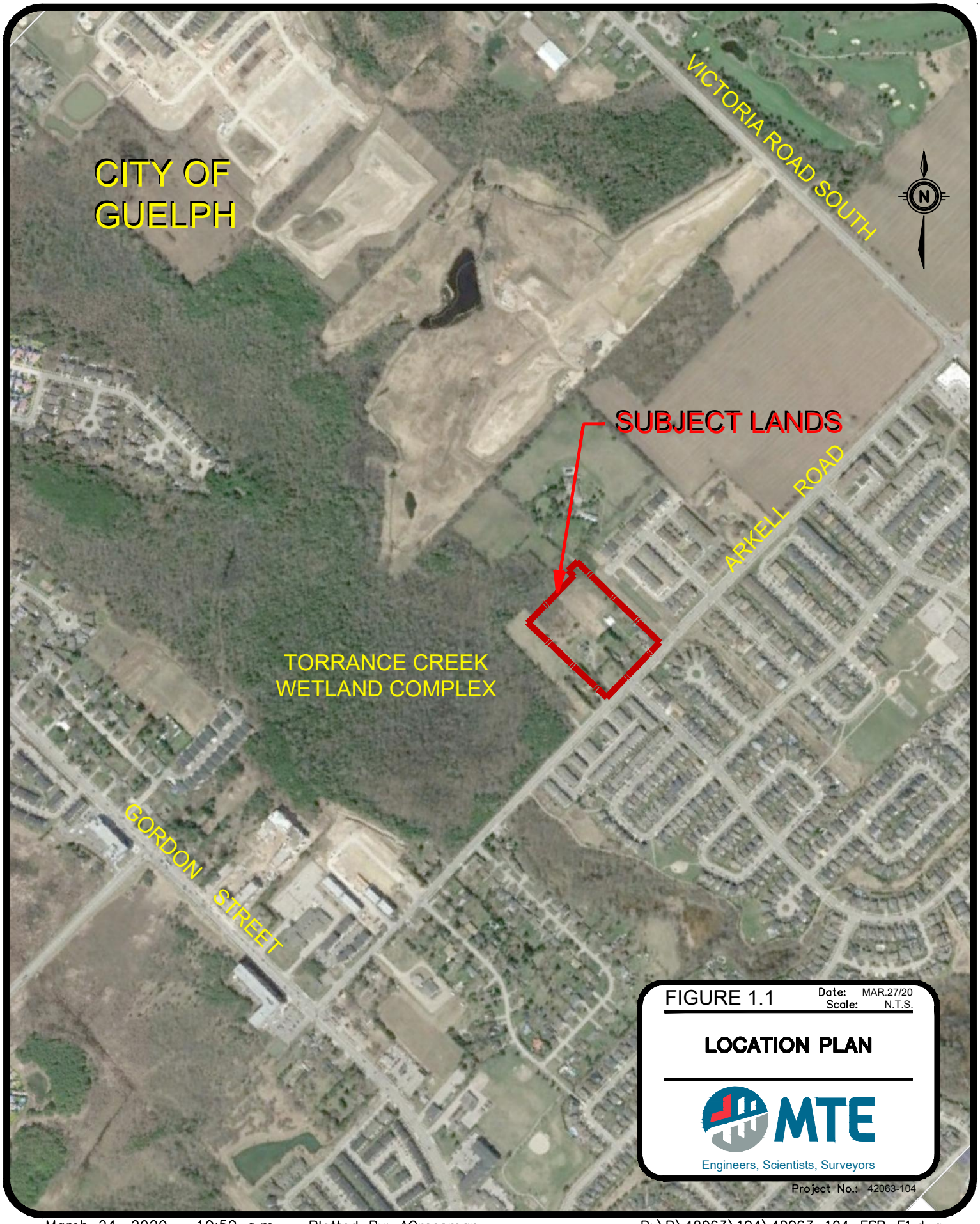

FIGURE 1.1

Date: MAR.27/20
Scale: N.T.S.

LOCATION PLAN

MTE
Engineers, Scientists, Surveyors

Project No.: 42063-104

March 24, 2020 — 10:52 a.m. — Plotted By: ACressman

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2.0 Existing Conditions

The subject lands consist of approximately 2.70ha and are generally bounded by an existing wetland to the northwest, an existing residential development to the northeast, the Arkell Road right-of-way to the southeast, and an existing single family residential property to the southwest. The subject lands are legally described as Part of Lot 6, Puslinch Concession 8 in the City of Guelph. They are currently comprised of four residential properties. Municipal addresses for the individual lots are 190, 202, 210, and 216 Arkell Road. The existing homes will be vacated and demolished prior to development.

MTE conducted a detailed topographical survey of the subject lands in November 2016. Existing site conditions and topography for the subject lands are shown in **Figure 2.1**, as well as the enclosed **MTE Drawing 42063-104-EC1.1**.

The subject lands are relatively flat, with slopes generally ranging from 0.5% to 1.5%. Existing elevations within the lands range from 333.3m along the wetland boundary to approximately 335.0m along Arkell Road. Under pre-development conditions, surface runoff from the subject lands flows northwesterly towards the Torrance Creek wetland complex.

The subject lands are located within the Torrance Creek Subwatershed. The northwesterly portion of the property is comprised of the Torrance Creek Wetland, which lies at the headwaters of a tributary to Torrance Creek. Approximately one-third of the subject lands either lies within the wetland complex or within the required 30m wetland setback.

The proposed service connections for the subject lands can all be provided from Arkell Road. There is an existing 200mm diameter sanitary sewer fronting the subject lands along Arkell Road, with a manhole located approximately at the centreline of Street A, draining southwesterly towards Gordon Street. There is an existing 200mm diameter sanitary stub installed at 0.35% from the aforementioned manhole up to the 190 Arkell Road property line. This existing stub will serve as the sanitary connection for the subject lands.

A 400mm diameter watermain exists along the northern side of Arkell Road and will service the subject lands.

There is an existing 300mm diameter storm sewer fronting a portion of the subject lands southwest of Summerfield Drive. This storm sewer conveys runoff from the Arkell Road right-of-way to an existing stone energy dissipator, approximately 60.0m southwest of the southwestern limit of the subject lands. This energy dissipator outlets into the adjacent portion of the Torrance Creek wetland complex. Additionally, there is an existing 300mm diameter storm sewer fronting Arkell Road, northwest of Summerfield Drive. This sewer conveys runoff to the existing 40.0m long x 3.0m wide x 1.0m deep infiltration gallery located in the boulevard adjacent to the Arkell Meadows subdivision stormwater management facility.

DAWES AVENUE

EXISTING SWM POND

EXISTING RESIDENTIAL

Ex. Asphalt Laneway

Ex. Asphalt Laneway

Ex. CL Road

APPROX. LOCATION OF 40.0m x 3.0m x 1.0m DEEP INFILTRATION GALLERY

Ex. 400ø WM (Approx. Location)

Ex. 200mmø SAN.

Ex. 200mmø SAN.

Ex. 200ø WM

Ex. 400ø WM (Approx. Location)

Ex. 200mmø SAN.

Ex. 400ø WM (Approx. Location)

Ex. 200mmø SAN.

Ex. 200ø WM

Ex. DCB T/G=337.50

Ex. WV

Ex. MH T/G=337.80

Ex. MH T/G=337.65

Ex. DCB T/G=337.47

Ex. MH T/G=337.79

Ex. MH T/G=337.90

Ex. MH T/G=335.43

Ex. MH T/G=335.01

Ex. MH T/G=334.91

Ex. MH T/G=334.84

Ex. MH T/G=334.79

335.0
334.5
334.0
336.5
336.0
335.5
333.5
333.0

MW4
Piezometer Elev.=333.
Mon Well Elev.=334.

[MP1-19]
Piezometer
Elev.=334.48

BH6
BH Elev.=333.996

[MW106-19]
Piezometer
Elev.=334.80

MW5
Piezometer Elev.=334.826
Mon Well Elev.=334.970

[MW105-19]
Piezometer
Elev.=334.76

MW2
Piezometer Elev.=335.041
Mon Well Elev.=335.160

[MW101-19]
Piezometer
Elev.=335.83

BH1
BH Elev.=334.559

MW
Mon Well Elev.=334.415
Piezometer Elev.=334.312

30m WETLAND SETBACK

15m WETLAND SETBACK

LIMIT OF WETLAND (APPROX.)

LEGEND

- SITE BOUNDARY
- LIMIT OF WETLAND
- 15m WETLAND SETBACK
- 30m WETLAND SETBACK
- 334.5 EXISTING CONTOUR
- EXISTING DIRECTION OF DRAINAGE
- EXISTING DRIPLINE
- EXISTING BUILDING
- EXISTING FENCE
- BOREHOLE
- MONITORING WELL

FIGURE 2.1

Date: JAN.10/20
Scale: 1:750

EXISTING CONDITIONS PLAN

MTE
Engineers, Scientists, Surveyors

Project No.: 42063-104

March 30, 2020 — 4:35 p.m. — Plotted By: ACressman

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3.0 Proposed Development

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

- Multi-residential blocks;
- Park block;
- Open Space block;
- Stormwater Management facility;
- Future road widening (Arkell Road); and
- Municipal right-of-way (20.0m width).

Refer to **Appendix A** for the Draft Plan of Subdivision prepared by MHBC (dated March 18, 2020).

3.1 Municipal Right-of-Way

As shown on the Draft Plan, the proposed development is serviced by a single local road from Arkell Road at Summerfield Drive to the existing Dawes Avenue in the neighbouring Arkell Meadows subdivision. The roadway will be constructed to an urban cross-section, including: asphalt pavement, concrete curb and gutters, concrete sidewalks, roadway illumination, and boulevard landscaping. The proposed 20.0m wide right-of-way is to match the existing cross-section design of Dawes Avenue. Refer to **Appendix B** for more details regarding the City's typical 20.0m right-of-way cross-section. The connection of the proposed right-of-way to existing Dawes Avenue will require the removal of the temporary cul-de-sac and the completion of Dawes Avenue within the adjacent Arkell Meadows subdivision.

A geotechnical investigation for the subject lands was completed by Peto MacCallum Ltd., dated October 1, 2018. The proposed pavement structure outlined in the report is summarized in **Table 3.1** below. Additionally, a Road Details design drawing (No. H-5) for the Arkell Meadows subdivision provides a detailed cross-section design for Dawes Avenue. This drawing specifies the pavement structure used for Dawes Avenue; which is also tabulated below. This design meets the minimum requirements of the Peto report and will need to be matched in the construction of the proposed Street A.

Table 3.1 – Proposed Pavement Structure

Pavement Structure	Depth (mm) – Per the Peto report	Depth (mm) – Per the Arkell Meadows Design
Asphalt Surface	80	90
Granular 'A' Base	150	175
Granular 'B' Sub-base	350	350

3.2 Watercourses

As previously mentioned, the subject lands are located within the Torrance Creek Subwatershed. The western portion of the property is comprised of a section of the Torrance Creek wetland complex, which lies at the headwaters of a tributary to Torrance Creek. Approximately one third of the subject lands either lies within the wetland complex or its 30.0m setback. Under the existing conditions, surface runoff generated onsite is directed towards the wetland. As such, the proposed development strategy will ensure that surface water inputs to the wetland complex are maintained.

4.0 Proposed Grading

4.1 Considerations

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

- Match centreline elevations of existing road grades;
- Match existing and proposed boundary grades around the perimeter of 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 and landscaped area grades;
- Ensure adequate cover is provided, where feasible, over municipal services;
- Minimize impacts to the surrounding natural environmentally sensitive features; and
- Minimize the cut/fill deficit for the subject lands.

4.2 Lot Grading

The proposed Street A will be extended from the limit of Dawes Avenue to the intersection of Arkell Road and Summerfield Drive. Dawes Avenue is currently approximately 4.0m higher in elevation than the adjacent existing grades on the subject lands. In order to match into these existing Dawes Avenue grades, significant fill will be required onsite. The proposed Street A will tie into Dawes Avenue along the 30m wetland setback, where 3:1 side slopes from the road will be required within the 30m wetland setback to match back into existing grades. It should be noted that grading activities will be kept out of the 15m wetland setback.

Utilizing the proposed road layout, preliminary slopes for centreline of road ranging from 0.7% (minimum) to 4.5% (maximum) were used to complete the preliminary lot grading design. The considerations listed above were incorporated into the overall preliminary grading design, which is illustrated in **MTE Drawing 42063-104-AG1.1**.

Preliminary lot grades range from 2.0% (minimum) to 5.0% (maximum); excluding the drainage swales along the northern and southern property lines, which are at 0.7% due to the neighbouring existing grades. Additionally, this range of minimum and maximum lot grades excludes the proposed 3:1 embankments required to match into existing grades along the perimeter of the subject lands, as well as the embankments required for the SWM facility and walkout units.

The lot grading scheme utilizes lookout and walkout lots for the street-fronting townhouses. Blocks 3 and 4 are proposed to be walkout units in order to match into the existing grades along the 30m wetland setback. Block 5 is proposed to utilize lookout lots in order to match into the stormwater management facility grades while maintaining adequate freeboard during the larger storm events.

Preliminary finished grades are designed to minimize the earthmoving (cutting and filling) required for road and lot construction, while maintaining serviceability. The preliminary finished grade contours are shown in the enclosed **MTE Drawing 42063-104-AG1.1**.

It should be noted that the proposed finished basement floor elevations have been set to achieve a minimum 0.5m separation from the composite high groundwater present in the

subject lands, per City of Guelph standards. Please refer to **Appendix E** for a figure depicting the subject lands' composite high groundwater contours.

5.0 Municipal Servicing

5.1 Sanitary Servicing

The existing 200mm diameter sanitary stub fronting the property along Arkell Road, near the centreline of the proposed Street A, will be extended through the subject lands. The stub is connected to an existing manhole along the Arkell Road sanitary sewer. The proposed 200mm diameter sanitary sewer extension is to terminate at a proposed manhole located northeast of the northernmost unit of Block 4.

The proposed townhouses will have individual 100mm diameter service connections from the 200mm diameter sanitary sewer through the subject lands. Additionally, 200mm diameter sanitary stubs will be provided to the property limits of the multiple residential blocks (Blocks 1 and 2). Refer to **Figure 5.1** for more details regarding the sanitary servicing design.

A Sanitary Capacity Assessment was completed by MTE in 2016, which noted capacity constraints 2.63km downstream of the subject lands. At the time of the assessment, the City was undertaking a flow monitoring program and each newly proposed development was being evaluated on a case-by-case basis. However, in comments provided by City staff on April 25, 2019, it was confirmed that there does not appear to be any downstream sanitary capacity issues to accommodate the proposed development.

It has been determined that the required minimum recommended sanitary sewer cover of 2.7m per the City's Design Standards cannot be achieved in portions of the subject lands. This is largely due to the existing sanitary stub provided, which has approximately 1.6m of cover. To ensure adequate serviceability of the subject lands even if 2.7m of cover cannot be met, the basement floor elevations were set in order to provide positive drainage from the sanitary service connections. The preliminary Sanitary Sewer Design Sheet for the proposed development is included in **Appendix C**.

5.2 Water Distribution

The City has noted that the subject lands are located within Pressure Zone 1. This zone is serviced by two elevated towers; Verney and Clair, which are at a hydraulic gradeline (HGL) of 377.2m. The City has confirmed that there is adequate capacity in its existing water supply and distribution system to accommodate the proposed development. However, there is potential for marginal water supply pressures under certain conditions, such as: the peak hour demand scenario at locations with an elevation greater than 346.0m and the average day demand scenario at locations with an elevation greater than 339.0m. Based on preliminary grades being below 339.0m and the proposed looping of the new watermain through Dawes Avenue, these marginal pressures are not expected for the proposed development.

The existing 200mm diameter watermain along Dawes Avenue will be extended through the subject lands, along Street A, and connect to the existing 400mm diameter watermain along Arkell Road. This connection will eliminate the existing dead end watermain at the Dawes Avenue cul-de-sac and provide a locally looped system. The proposed townhouse units will have individual 25mm diameter service connections from the 200mm diameter watermain through the subject lands. Additionally, 200mm diameter watermain stubs will be provided to the property limits of the Site Plan blocks (Blocks 1 and 2).

Furthermore, any existing wells onsite are to be decommissioned in accordance with O. Reg 903 prior to construction. Refer to **Figure 5.2** for more details regarding the proposed water

distribution network. A detailed water distribution analysis will be performed during detailed design.

5.3 Storm Servicing and Drainage

Storm drainage for the proposed development will be provided through a combination of minor (piped) and major (overland) drainage systems. There are several storm drainage catchment areas within the subject lands that are conveyed to the proposed SWM facility. This conveyance will outlet into the proposed SWM facility into the proposed enhanced grass swale within the SWM block. The SWM facility will primarily outlet into SWM Block 8 and ultimately into the Torrance Creek wetland.

The majority of the onsite conveyance will be collected via a storm sewer network, ranging in size from 300mm to 525mm in diameter. The proposed street-fronting townhouse units will have individual 150mm diameter service connections connected to sump pumps, and 375mm and 300mm diameter storm sewer stubs will be provided for Blocks 1 and 2, respectively.

The primary major overland flow route directs flows along Street A towards the SWM Facility inlet. A high point in the right-of-way has been introduced south of the proposed multi-residential blocks to direct their major flows towards the SWM facility as well. Detailed grading within the multi-residential blocks will be determined at the time of the Site Plan Applications. Some portions of uncontrolled flows will be conveyed via grassed swales along the northern and southern property lines directly to the Torrance Creek wetland.

The primary SWM outlet is a 450mm pipe crossing Street A leading southwest to the Block 8 drainage swale, and ultimately to the Torrance Creek wetland. These pipe and drainage swale have been sized to convey up to the 100-year event in FlowMaster. The emergency stormwater outlet is a 2m concrete weir that outlets northeast through a drainage swale towards a 375mm culvert underneath Street A. This culvert has been sized to convey up to the Regional event in FlowMaster. Calculations for these outlets can be seen in **Appendix D**.

Due to the grading restrictions surrounding and within the subject lands, the proposed SWM facility incorporates a Dry Pond design with multiple quality control measures prior to discharging into the SWM facility. An oil/grit separator (OGS) is proposed at the end of the minor storm drainage system, and will provide 60% TSS removal as pre-treatment for the subject lands. The OGS then discharges into the proposed enhanced grass swale within the SWM Facility. Enhanced grass swales have been observed to provide up to 76% TSS removal, as described in the Toronto and Region Conservation Authority's (TRCA) *Low Impact Development Stormwater Management Planning and Design Guide* (2010). MTE believes this "treatment train" approach will provide the required Enhanced (Level 1) quality treatment as required by the City of Guelph and the Ministry of the Environment, Conservation and Parks. Please refer to **Appendix D** for details regarding the proposed OGS unit. Detailed stormwater management information is available in *190-216 Arkell Road – Preliminary Stormwater Management Report* (April 7, 2020).

It has been determined that the required minimum recommended storm sewer cover of 2.7m per the City's Design Standards cannot be achieved in the subject lands. This is largely in order to provide positive drainage towards the primary stormwater outlet. By removing the forebay and introducing the enhanced grass swale and dry pond design, MTE believes that the storm sewer system proposed is as deep as reasonably possible given the grading and servicing constraints. Adequate pipe insulation will be required per the City's standard.

Due to the shallow storm sewer system, the foundation drains will not be able to be collected via gravity to the storm sewer system. The drain shall discharge to a watertight sump, and shall be pumped to the surface rear yard, per the City of Guelph standard alternative to typical foundation drainage.

Refer to **Figure 5.3** and **Appendix D** for more details of the proposed storm sewer system.

LEGEND

- SITE BOUNDARY
- LIMIT OF WETLAND
- 15m WETLAND SETBACK
- 30m WETLAND SETBACK
- EXISTING DRIPLINE
- EXISTING CONTOUR (334.5)
- Ex. MH — Ex. 300mmø SAN. — EXISTING SANITARY SEWER
- Ex. MH — Ex. 375mmø STM. — EXISTING STORM SEWER
- Ex. HYD. — Ex. 200mmø WTM. — EXISTING WATERMAIN
- PROPOSED SANITARY SEWER
- 1 / 0.057 — CATCHMENT ID No. / AREA (ha)
- PROPOSED SANITARY DRAINAGE AREA
- PROPOSED CONTOUR (334.5)

DAWES AVENUE

ARKELL ROAD

SUMMERFIELD DRIVE

T/G=337.02
SAN OBV.=334.42±
DEPTH=2.6m±

T/G=336.94
SAN OBV.=334.32±
DEPTH=2.6m±

T/G=336.44
SAN OBV.=333.99±
DEPTH=2.5m±

T/G=336.36
SAN OBV.=333.91±
DEPTH=2.5m±

T/G=335.98
SAN INV.=333.67±
DEPTH=2.3m±

MH1A
MH2A
MH3A
MH4A
MH5A

200mmø SAN

EX. SAN STUB
INV=333.24±EX

1 / 0.044
2 / 0.360
3 / 0.172
4 / 0.186
5 / 0.356
4 / 0.136

Blk. 6 Park 0.081ha
Blk. 5 Multiple Residential 0.088ha
Blk. 1 Multiple Residential 0.356ha
Blk. 9 Open Space 0.862ha
Blk. 4 Multiple Residential 0.274ha
Blk. 8 Stormwater Management 0.027ha
Blk. 3 Multiple Residential 0.162ha
Blk. 2 Multiple Residential 0.136ha

3:1 MAX

30m WETLAND SETBACK
15m WETLAND SETBACK
LIMIT OF WETLAND (APPROX.)

Ex. Asphalt Laneway

APPROX. LOCATION OF 40.0m x 3.0m x 1.0m DEEP INFILTRATION GALLERY

Ex. 400ø WM (Approx. Location)
Ex. 200mmø SAN.
Ex. 200mmø WM
Ex. MH T/G=335.43
Ex. MH T/G=335.01
Ex. MH T/G=334.81
Ex. MH T/G=334.94
Ex. MH T/G=334.79
Ex. DCB T/G=337.50
Ex. DCB T/G=337.47
Ex. MH T/G=337.65
Ex. MH T/G=337.91
Ex. DCB T/G=337.90
Ex. Ditch
Ex. WV
Ex. MH T/G=3
Ex. DCB T/G=337.47
Ex. DCB T/G=337.90
Ex. MH T/G=337.91
Ex. Ditch
Ex. WV
Ex. WV
Ex. MH T/G=3
Ex. DCB T/G=337.50
Ex. MH T/G=337.65
Ex. DCB T/G=337.47

FIGURE 5.1
Date: MAR.27/20
Scale: 1:750

PRELIMINARY SANITARY SERVICING PLAN

MTE
Engineers, Scientists, Surveyors

Project No.: 42063-104

March 25, 2020 — 11:14 a.m. — Plotted By: ACressman

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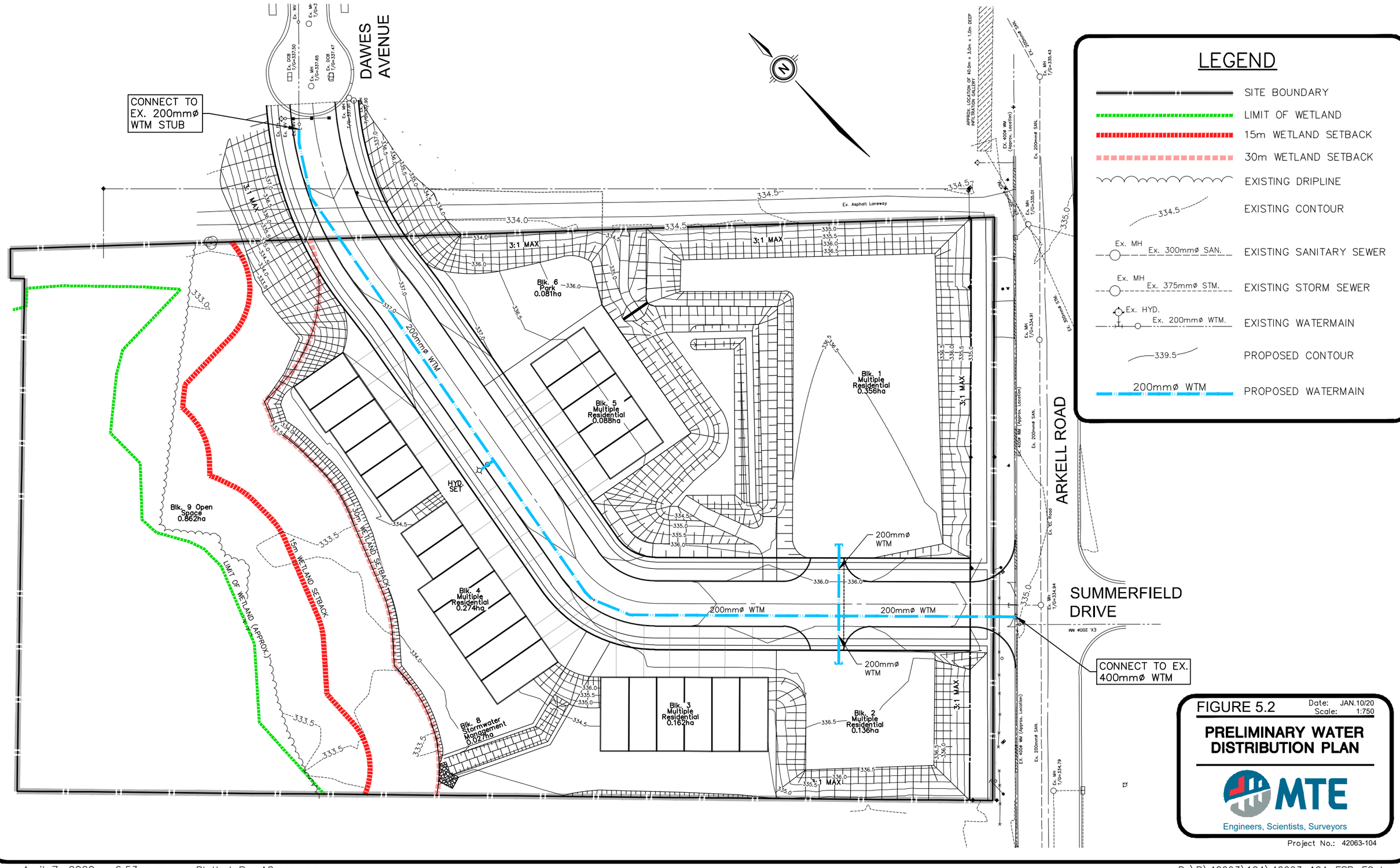

LEGEND

- SITE BOUNDARY
- LIMIT OF WETLAND
- 15m WETLAND SETBACK
- 30m WETLAND SETBACK
- EXISTING DRIPLINE
- 334.5 — EXISTING CONTOUR
- Ex. MH — Ex. 300mmø SAN. — EXISTING SANITARY SEWER
- Ex. MH — Ex. 375mmø STM. — EXISTING STORM SEWER
- Ex. HYD. — Ex. 200mmø WTM. — EXISTING WATERMAIN
- 339.5 — PROPOSED CONTOUR
- 200mmø WTM — PROPOSED WATERMAIN

FIGURE 5.2

PRELIMINARY WATER DISTRIBUTION PLAN

Date: JAN.10/20
Scale: 1:750

MTE
Engineers, Scientists, Surveyors

Project No.: 42063-104

April 7, 2020 — 6:53 p.m. — Plotted By: ACressman

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DAWES AVENUE

ARKELL ROAD

SUMMERFIELD DRIVE

Ex. Asphalt Laneway

375mmø CSP CULVERT

300mmø STM

375mmø STM

450mmø STM

30m WETLAND SETBACK

15m WETLAND SETBACK

LIMIT OF WETLAND (APPROX.)

3:1 MAX

MH2

MH3

CBMH4

MH5

DCBMH6

MH1

CSP9

HW8

OGS7

F/G=336.76
STM OBV.=335.52±
DEPTH=1.2m±

F/G=336.98
STM OBV.=335.75±
DEPTH=1.2m±

F/G=336.38
STM OBV.=335.35±
DEPTH=1.0m±

F/G=335.82
STM OBV.=335.10±
DEPTH=0.7m±

F/G=335.88
STM OBV.=335.15±
DEPTH=0.7m±

F/G=336.36
STM OBV.=335.26±
DEPTH=1.1m±

Blk. 1 Multiple Residential 0.356ha

Blk. 2 Multiple Residential 0.136ha

Blk. 3 Multiple Residential 0.162ha

Blk. 4 Multiple Residential 0.274ha

Blk. 5 Multiple Residential 0.088ha

Blk. 6 Park 0.081ha

Blk. 8 Stormwater Management 0.027ha

Blk. 9 Open Space 0.862ha

1 / 0.356

2 / 0.136

3 / 0.176

4 / 0.235

5 / 0.074

6 / 0.171

Ex. MH T/O=337.90

Ex. MH T/O=337.85

Ex. MH T/O=337.47

Ex. DICB T/O=337.50

Ex. DICB T/O=337.47

Ex. MH T/O=335.43

Ex. MH T/O=335.01

Ex. MH T/O=334.81

Ex. MH T/O=334.94

Ex. MH T/O=334.79

Ex. 200mmø SAN.

Ex. 200mmø WM

Ex. 400ø WM (Approx. Location)

Ex. 200mmø SAN.

APPROX. LOCATION OF 40.0m x 3.0m x 1.0m DEEP INFILTRATION GALLERY

LEGEND

- SITE BOUNDARY
- LIMIT OF WETLAND
- 15m WETLAND SETBACK
- 30m WETLAND SETBACK
- EXISTING DRIPLINE
- 334.5 EXISTING CONTOUR
- Ex. MH — Ex. 300mmø SAN. EXISTING SANITARY SEWER
- Ex. MH — Ex. 375mmø STM. EXISTING STORM SEWER
- Ex. HYD. — Ex. 200mmø WTM. EXISTING WATERMAIN
- PROPOSED STORM SEWER
- RIP RAP
- OVERLAND FLOW
- STORM DRAINAGE AREA
- 339.5 PROPOSED CONTOUR
- DIRECTION OF DRAINAGE/SWALE
- 1 / 0.106 CATCHMENT ID no. / AREA (ha)

FIGURE 5.3

Date: MAR.27/20
Scale: 1:750

PRELIMINARY STORM SERVICING PLAN

MTE
Engineers, Scientists, Surveyors

Project No.: 42063-104

March 25, 2020 — 11:14 a.m. — Plotted By: ACressman

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6.0 Stormwater Management

The proposed stormwater management strategy includes water quality, quantity, and erosion and sedimentation control within a proposed stormwater management facility located near the centre of the subject lands. The SWM strategy for the proposed development is presented in the *190-216 Arkell Road – Preliminary Stormwater Management Report* (April 7, 2020) prepared by MTE. The following summarizes the key points of the report:

- Water quality and quantity control will be provided within one (dry pond) stormwater management facility. 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 SWM facility through the use of an OGS and enhanced grass swale "treatment train" approach;
- Post-development erosion targets will be met;
- Maintain existing surface water volume inputs into significant environmental features; and
- Post-development groundwater inputs will exceed the minimum requirements set forth by the Torrance Creek Subwatershed Study Management Strategy (GRCA, 1999).

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

7.0 Utility Servicing

It is anticipated that Guelph Hydro (electrical), Bell Canada (telephone), Union Gas (natural gas), and Rogers Cable (cable TV) can all adequately service the proposed development through the connection to and extension of existing services from Arkell Road and Dawes Avenue, where required.

8.0 Conclusions and Recommendations

Based on the foregoing analysis, it is concluded that:

- The stormwater management strategy herein outlined will provide the subject lands with appropriate levels of quality, quantity, and erosion controls to meet the criteria set out by the *Torrance Creek Subwatershed Study Management Strategy*, the City of Guelph, and the Grand River Conservation Authority;
- Enhanced quality control of stormwater runoff can be provided by the proposed stormwater management strategy; which includes: a dry pond cell, an ETV certified EF6 OGS unit, and an enhanced grass swale;
- Quantity control targets for post-development peak flows rates to the adjacent wetland can be achieved in the proposed stormwater management facility for all storm events up to and including the Regional storm event;
- Infiltration targets defined within the TCSS can be satisfactorily met through the use of passive infiltration;
- Monthly surface water contributions to the wetland will be maintained or exceeded; and
- Post-development erosion will be mitigated by the use of extended detention of the 25mm storm event.

The findings of this report and the above conclusions lead to the following recommendations:

- Upon completion of detailed design, a quality/quantity control stormwater management facility be constructed to provide control of stormwater as described in Sections 4.0 and 5.0 of this report; and
- That sediment and erosion controls during construction will be implemented as described in Section 7.0 of this report.

All of which is respectfully submitted,

MTE Consultants Inc.

Alex Cressman, E.I.T.
Designer
519-743-6500 ext. 1279
acressman@mte85.com

Valentina Lazic, P.Eng.
Design Engineer
519-743-6500 ext. 1233
vlazic@mte85.com

AJC:tmd
M:\42063\104\02 - Reports\MTE Reports\SWM\March 2020\42063-104_rpt_2020-04-07_Preliminary SWM Report.docx

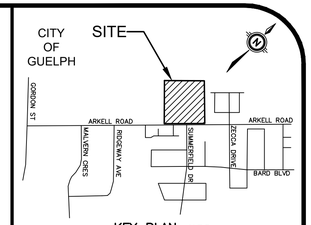
P:\P\42063\104\42063-104-EC1

MTE FILE PATH:

LEGEND

- SITE BOUNDARY
- WETLAND BOUNDARY
- 15m WETLAND SETBACK
- 30m WETLAND SETBACK
- 326 — EXISTING CONTOURS
- Ex. Drop Curb — EXISTING CURB
- EXISTING DRIPLINE
- EXISTING DIRECTION OF DRAINAGE/SWALE
- EXISTING BUILDING
- (TOP) / (BOTTOM) — EXISTING EMBANKMENT (SLOPE AS NOTED)
- Ex. 300mmø SAN. / Ex. MH — EXISTING SANITARY SEWER
- Ex. 200mmø WTM. / Ex. HYD. SET — EXISTING WATERMAIN
- Ex. 375mmø STM. / Ex. MH — EXISTING STORM SEWER
- EXISTING RETAINING WALL
- EXISTING FENCE
- EXISTING PIEZOMETER
- EXISTING BOREHOLE/ MONITORING WELL

CITY OF GUELPH — SITE



KEY PLAN N.T.S.

GEODETIC BM ELEV. = 335.455m
CITY OF GUELPH
#255 BURKE WELL PUMP HOUSE

SITE BENCHMARK ELEV. = 335.455m
SEE ABOVE

NOTE TO CONTRACTOR :

DO NOT SCALE DRAWINGS.

CONTRACTORS MUST CHECK AND VERIFY ALL DIMENSIONS AND REPORT ANY DISCREPANCIES TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.

THE OWNER/ARCHITECT/CONTRACTOR IS ADVISED THAT M.T.E. CONSULTANTS INC. CANNOT CERTIFY ANY COMPONENT OF THE SITE WORKS NOT INSPECTED DURING CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO NOTIFY M.T.E. CONSULTANTS INC. PRIOR TO COMMENCEMENT OF CONSTRUCTION TO ARRANGE FOR INSPECTION.

No.	REVISION	BY	DATE
8.			
7.			
6.			
5.			
4.			
3.			
2.			
1.	ISSUED FOR DRAFT PLAN APPROVAL	IXC	APR.3/20

MTE
Engineers, Scientists, Surveyors
519-743-6500

OWNER
CRESCENT HAVEN HOMES INC.
180 FROBISHER DRIVE UNIT 3 WATERLOO

PROJECT
ARKELL ROAD PROPERTIES
216 ARKELL ROAD GUELPH

DRAWING
EXISTING CONDITIONS PLAN

Project Manager: I.CEKIC	Project No.: 42063-104
Design By: CJC/AJC	Checked By: VAL
Drawn By: SXP/KAT	Checked By: AJC
Surveyed By: MTE	Drawing No.: EC1.1
Date: Dec.04/19	
Scale: 1:400	Sheet 1 of 1

March 31, 2020 - 8:53:39 AM - Plotted By: Alex Cressman

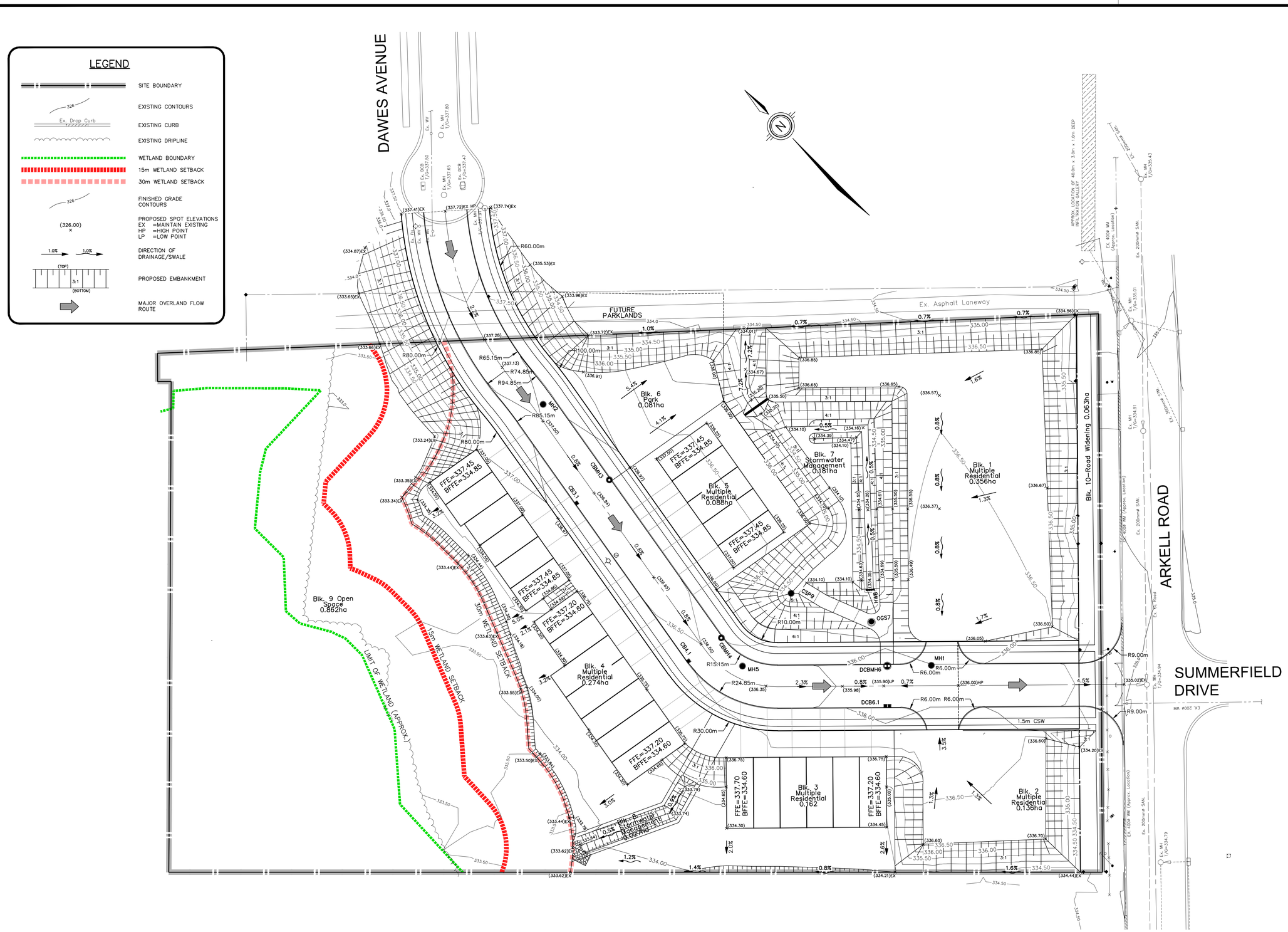
P:\P\42063\104\42063-104-AG1

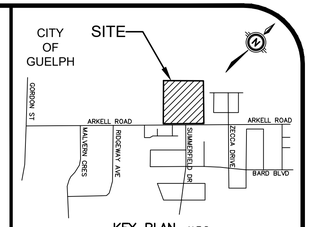
MTE PLOT PATH:

March 31, 2020 - 8:54:37 AM - Plotted By: Alex Cressman

LEGEND

- SITE BOUNDARY
- EXISTING CONTOURS (326)
- EXISTING CURB (Ex. Drop Curb)
- EXISTING DRIPLINE
- WETLAND BOUNDARY
- 15m WETLAND SETBACK
- 30m WETLAND SETBACK
- FINISHED GRADE CONTOURS (326)
- PROPOSED SPOT ELEVATIONS (326.00) EX =MAINTAIN EXISTING, HP =HIGH POINT, LP =LOW POINT
- DIRECTION OF DRAINAGE/SWALE (1.0% (TOP) 3:1 (BOTTOM) 1.0%)
- PROPOSED EMBANKMENT
- MAJOR OVERLAND FLOW ROUTE





GEODETIC BM ELEV. = 335.455m
CITY OF GUELPH
#255 BURKE WELL PUMP HOUSE

SITE BENCHMARK ELEV. = 335.455m
SEE ABOVE

NOTE TO CONTRACTOR :

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No.	REVISION	BY	DATE
8.			
7.			
6.			
5.			
4.			
3.			
2.			
1.	ISSUED FOR DRAFT PLAN APPROVAL	IKC	APR.03/20

MTE
Engineers, Scientists, Surveyors
519-743-6500

OWNER
CRESCENT HAVEN HOMES INC.
180 FROBISHER DRIVE UNIT 3 WATERLOO

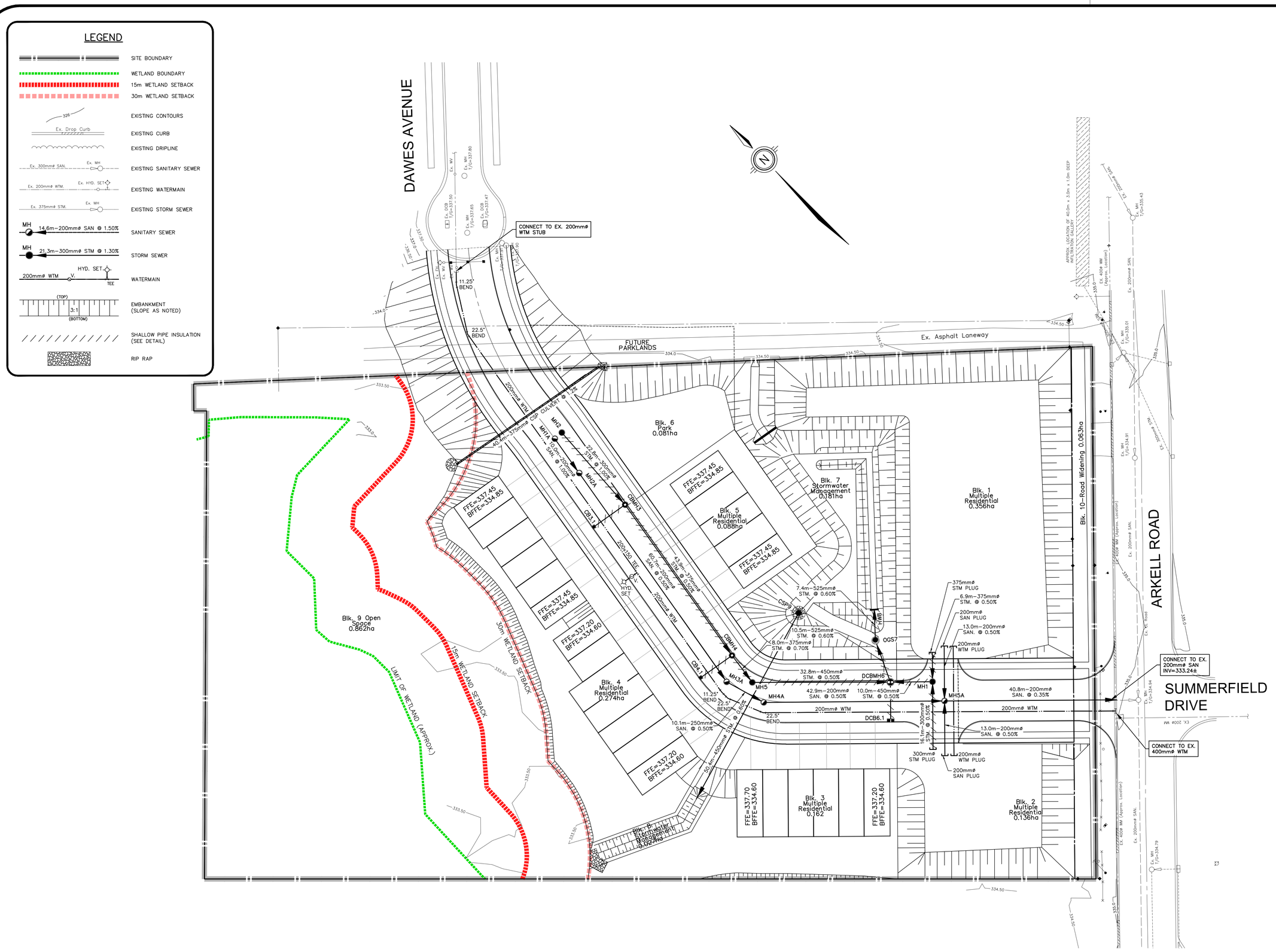
PROJECT
ARKELL ROAD PROPERTIES
216 ARKELL ROAD GUELPH

DRAWING
AREA GRADING PLAN

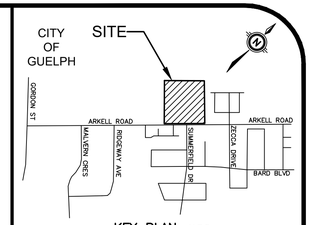
Project Manager	I.CEKIC	Project No.	42063-104
Design By	AJC	Checked By	VAL
Drawn By	SXP/KAT	Checked By	AJC
Surveyed By	MTE	Drawing No.	AG1.1
Date	Mar.30/20		
Scale	1:400	Sheet 1 of 1	

LEGEND

- SITE BOUNDARY
- WETLAND BOUNDARY
- 15m WETLAND SETBACK
- 30m WETLAND SETBACK
- EXISTING CONTOURS
- EXISTING CURB
- EXISTING DRIPLINE
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN
- EXISTING STORM SEWER
- SANITARY SEWER
- STORM SEWER
- WATERMAIN
- EMBANKMENT (SLOPE AS NOTED)
- SHALLOW PIPE INSULATION (SEE DETAIL)
- RIP RAP



CITY OF GUELPH — SITE



KEY PLAN N.T.S.

GEODETIC BM ELEV. = 335.455m
CITY OF GUELPH
#255 BURKE WELL PUMP HOUSE

SITE BENCHMARK ELEV. = 335.455m
SEE ABOVE

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No.	REVISION	BY	DATE
8.			
7.			
6.			
5.			
4.			
3.			
2.			
1.	ISSUED FOR DRAFT PLAN APPROVAL	IXC	APR.03/20

MTE
Engineers, Scientists, Surveyors
519-743-6500

OWNER
CRESCENT HAVEN HOMES INC.
180 FROBISHER DRIVE UNIT 3 WATERLOO

PROJECT
ARKELL ROAD PROPERTIES
216 ARKELL ROAD GUELPH

DRAWING
GENERAL PLAN OF SERVICES

Project Manager: I.CEKIC	Project No.: 42063-104
Design By: AJC	Checked By: VAL
Drawn By: SXP/KAT	Checked By: AJC
Surveyed By: MTE	Drawing No.: GP1.1
Date: Mar.25/20	
Scale: 1:400	Sheet 1 of 1

Appendix A

Draft Plan of Subdivision (Reduced)

DRAFT PLAN OF SUBDIVISION

Legal Description
PART OF LOT 6, CONCESSION 8, GEOGRAPHICAL TOWNSHIP OF PUSLINCH,
CITY OF GUELPH

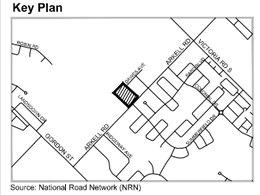
Owner's Certificate
I HEREBY AUTHORIZE MACNAUGHTON HERMSEN BRITTON CLARKSON PLANNING LIMITED TO SUBMIT THIS PLAN FOR APPROVAL.

DATE:_____

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:_____

Key Plan



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. MULTIPLE RESIDENTIAL, OPEN SPACE		
E. AS SHOWN	F. AS SHOWN	G. AS SHOWN
H. MUNICIPAL WATER SUPPLY	I. LOAM	J. AS SHOWN
K. ALL SERVICES AS REQUIRED	L. AS SHOWN	

Area Schedule **61T_____**

Description	Lots/Blocks	Units	Area (ha)
Multiple Residential	1-5	72	1.015
Park	6		0.082
Stormwater Management	7, 8		0.207
Open Space	9		0.862
Road Widening	10		0.063
Roads			0.347
Total	**10**	**72**	**2.577**

Notes
1. All dimensions are in metres unless otherwise shown
2. Dripline Limits - Natural Resource Solutions Inc. (NRSI) June, 2016
3. Wetland Limits - Natural Resource Solutions Inc. (NRSI) August, 2016
4. Property boundary is approximate, based on MTE Existing Conditions Plan and Wellington County Survey plans 61R-773, 61R-2819
5. Surrounding parcel boundaries are approximate/ taken from Vumap (First Base Solutions) aerial imagery
6. Unit yield based on Conceptual Site Plan prepared by MHBC Planning
7. Building footprints outside of subject lands gathered from City of Guelph open data

Revision No.	Date	Issued / Revision	By
10.	March 18, 2020	SWM revision;	G.C.
9.	January 6, 2020	Update/ Issued for Review;	G.C.
8.	December 11, 2019	Update/ Issued for Review;	G.C.
7.	October 9, 2019	Update/ Issued for Review;	G.C.
6.	July 8, 2019	Update/ Issued for Review;	G.C.
5.	December 6, 2018	Update/ Issued for Review;	G.C.
3.	September 12, 2018	Update/ Issued for Review;	G.C.
2.	July 4, 2017	Update/ Issued for Review;	G.C.
1.	March 13, 2017	Issued for Review;	G.C.

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

Approval Stamp

Date January 6, 2020
File No. 15246A
Plan Scale 1:400 (36x24)
Drawn By G.C.
Checked By D.A.
Project Arkell Road - Guelph
Other

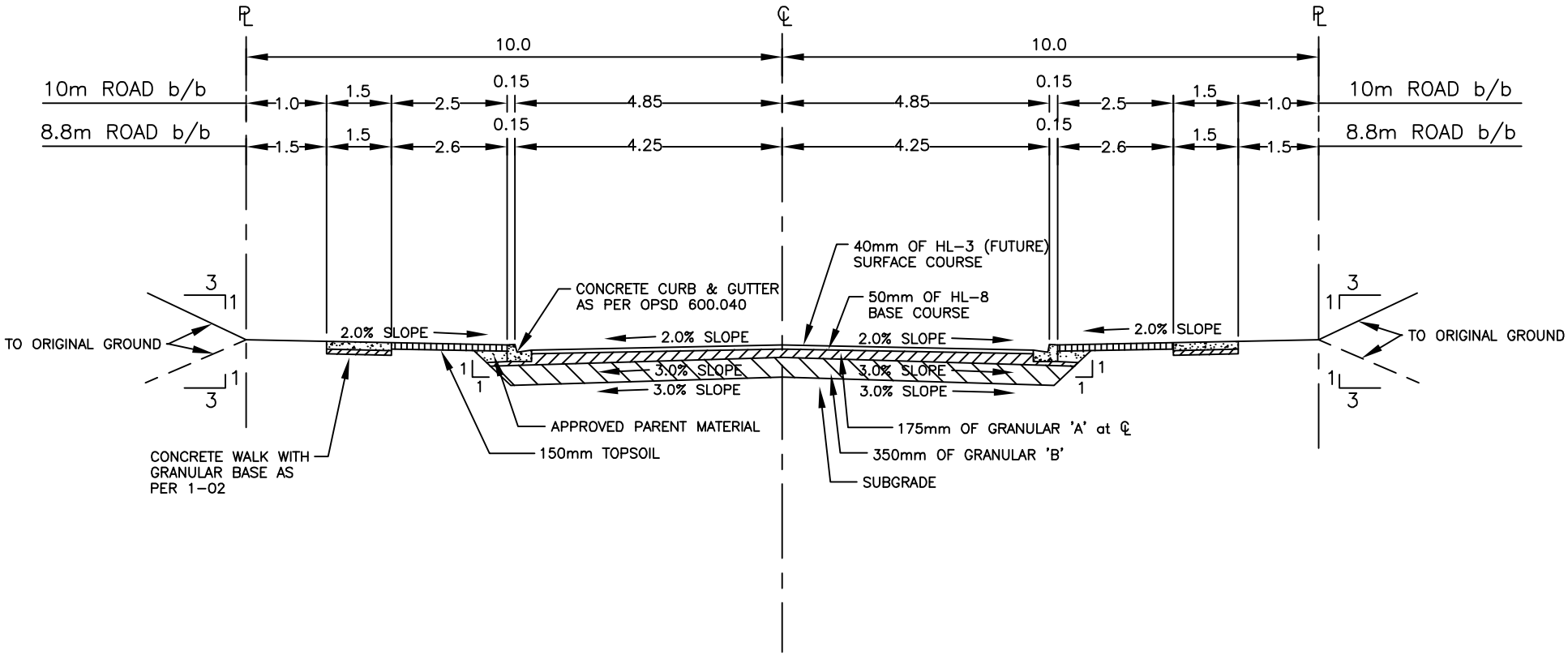
Applicant
Crescent Homes
151 Curzon Crescent
Guelph, ON. N1K 0B3
P: 647.523.6487

File Name **DRAFT PLAN**
Dwg No. 1 of 1
Scale Bar 2.5 0 5 10 25m

K:\15246A-Crescent Homes-Arkell Road-Guelph\DP\Draft Plan March 18 2020.dwg

Appendix B

20.0m Urban Right-of-Way



CITY OF GUELPH STANDARD DRAWING

TYPICAL CROSS SECTION FOR 10m & 8.8m ROADS - 20m R.O.W.

DATE DRAWN: AUG/88	REV. No.: R-11	
DESCRIPTION: REVIEWED DEC/2011		
REV. DATE: DEC/11	REV. BY.: G.F./C.M.C.	ENGINEERING
APPROVED BY:		5 - 48

CITY ENGINEER

Appendix C

Sanitary Sewer Analysis

190-216 ARKELL ROAD
CITY OF GUELPH

SANITARY SEWER DESIGN SHEET

ENGINEERING SERVICES

Project Number: 42063-104
Date: March 23, 2020
Design By: AJC
Checked By: VAL
File: Q:\42063\104\STM\42063-104 Storm Sewer Design Sheet AJC.xlsx

Drainage Area Plan No: N/A

Design Parameters

Average Daily Flow

Residential	1.00 L/s/ha	Manning's "n"	0.013	
Commercial	1.70 L/s/ha			
Industrial	1.70 L/s/ha	**Velocity**	**(m/s)**	
School/Multl-Res	2.50 L/s/ha	Minimum	0.6	
Apt (150upha)	6.00 L/s/ha	Maximum	3.0	
Apt (295upha)	7.00 L/s/ha			

LOCATION				SANITARY FLOW					DESIGN							
STREET	AREA NUMBER	MANHOLE LOCATION FROM MH	MANHOLE LOCATION TO MH	AREA (A)	CONTRIBUTING UNIT TYPE	SANITARY COEFF.	SANITARY FLOW	CUMULATIVE FLOW	PIPE SIZE	PIPE TYPE	LENGTH	SLOPE	CAPACITY	FULL FLOW VELOCITY	ACTUAL FLOW VELOCITY	% PIPE FULL
				ha		*L/s/ha*	*L/s*	*L/s*	*mm*		*m*	*%*	*L/s*	*m/s*	*m/s*	*%*
Street A	1	MH1A	MH2A	0.044	MULTI-RESIDENTIAL	2.50	0.1100	0.1100	200	PVC	10.0	1.00	32.7818	1.0440	0.2301	0.3%
Street A	2	MH2A	MH3A	0.360	MULTI-RESIDENTIAL	2.50	0.9000	1.0100	200	PVC	60.7	0.50	23.1802	0.7382	0.3681	4.4%
Street A	3	MH3A	MH4A	0.172	MULTI-RESIDENTIAL	2.50	0.4300	1.4400	200	PVC	10.1	0.50	23.1802	0.7382	0.4095	6.2%
Street A	4	MH4A	MH5A	0.186	MULTI-RESIDENTIAL	2.50	0.4650	1.9050	200	PVC	42.9	0.50	23.1802	0.7382	0.4450	8.2%
Block 1	5	Plug	MH5A	0.356	MULTI-RESIDENTIAL	2.50	0.8900	0.8900	200	PVC	13.0	0.50	23.1802	0.7382	0.3543	3.8%
Block 2	6	Plug	MH5A	0.136	MULTI-RESIDENTIAL	2.50	0.3400	0.3400	200	PVC	13.0	0.50	23.1802	0.7382	0.2637	1.5%
Street A	-	MH5A	Ex. MH	0.000	-	0.00	0.0000	3.1350	200	PVC	40.8	0.35	19.3940	0.6176	0.4537	16.2%

* All sanitary design flows include an allowance for peaking and 10.0 cm/ha/day for infiltration.

Appendix D

Storm Sewer Analysis

190-216 ARKELL ROAD

CITY OF
GUELPH, Ontario

Project Number: 42063-104
Date: March 12, 2020
Design By: AJC
Checked By: JPL
File: Q:\42063\104\STM\42063-104 Storm Sewer Design Sheet AJC.xlsx

STORM SEWER DESIGN SHEET

ENGINEERING AND PUBLIC WORKS

Drainage Area Plan No: N/A

Design Parameters

5 YEAR STORM

Q=kAIR, k=0.00278
Intensity (I) = a/(tc+b)^c
a = 1593
b = 11.0
c = 0.8789

Manning's "n" 0.013
Min. Velocity 0.600 m/s
Max. Velocity 6.000 m/s

LOCATION				STORMWATER FLOW 5 YEAR STORM								DESIGN					
STREET	AREA NUMBER	MANHOLE LOCATION FROM MH	MANHOLE LOCATION TO MH	AREA (A)	RUNOFF COEFF. (C)	A x C	CUMUL. A x C	CONCENTRATION TIME TOTAL	CONCENTRATION TIME IN PIPE	RAIN INTENSITY (I)	FLOW (Q)	PIPE SIZE	LENGTH	SLOPE	CAPACITY	FULL FLOW VELOCITY	PIPE FULL
				ha		*ha*	*ha*	*min*	*min*	*mm/hr*	*L/s*	*mm*	*m*	*%*	*L/s*	*m/s*	*%*
BLOCK 1	1	PLUG	MH1	0.356	0.70	0.2492	0.2492	5.0000	0.0927	139.28833	96.49561	375	6.9	0.50	123.97713	1.1225	77.83
BLOCK 2	2	PLUG	MH1	0.136	0.70	0.0952	0.0952	5.0000	0.2774	139.28833	36.86349	300	16.4	0.50	68.37776	0.9673	53.91
		MH1	DCBMH6			0.0000	0.3444	5.2774	0.1235	137.20013	131.35979	450	10.0	0.50	201.60049	1.2676	65.16
Western Site Block	3	MH2	CBMH3	0.176	0.75	0.1320	0.1320	5.0000	0.2740	139.28833	51.11324	300	22.8	1.00	96.70076	1.3680	52.86
	4	CBMH3	CBMH4	0.235	0.75	0.1763	0.3083	5.2740	0.5729	137.22490	117.59282	375	43.9	0.50	123.97713	1.1225	94.85
	5	CBMH4	MH5	0.074	0.75	0.0555	0.3638	5.8469	0.0885	133.11501	134.60923	375	8.0	0.70	146.69172	1.3282	91.76
	6	MH5	DCBMH6	0.171	0.75	0.1283	0.4920	5.9354	0.3812	132.50334	181.23277	450	32.8	0.50	201.60049	1.2676	89.90
		DCBMH6	OGS7	0.000	0.00	0.0000	0.8364	6.3166	0.1004	129.93629	302.12681	525	10.5	0.60	333.12480	1.5389	90.69
		OGS7	HW8	0.000	0.00	0.0000	0.8364	6.4170	0.0708	129.27774	300.59556	525	7.4	0.60	333.12480	1.5389	90.24

Stormceptor®

FORTERRA

Stormceptor® EF Sizing Report

ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION STORMCEPTOR®

03/18/2020

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

Project Name:	190-216 Arkell
Project Number:	42063-104
Designer Name:	Alex Cressman
Designer Company:	MTE Consultants Inc.
Designer Email/Phone:	acressman@mte85.com
EOR Name:	
EOR Company:	
EOR Email/Phone:	

Site Name:	190-216 Arkell
Drainage Area (ha):	0.99
% Imperviousness:	81.00

Runoff Coefficient 'c': 0.78

Particle Size Distribution:	CA ETV
Target TSS Removal (%):	60.0
Require Hydrocarbon Spill Capture?	No
Upstream Flow Control?	No
Required Water Quality Runoff Volume Capture (%):	
Estimated Water Quality Flow Rate (L/s):	
Peak Conveyance (maximum) Flow Rate (L/s):	
Site Sediment Transport Rate (kg/ha/yr):	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EF4	53
EF6	60
EF8	63
EF10	65
EF12	67

Recommended Stormceptor EF Model: EF6

Estimated Net Annual Sediment (TSS) Load Reduction (%): 60

imbrium

THIRD-PARTY TESTING AND VERIFICATION

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

PERFORMANCE

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

PARTICLE SIZE DISTRIBUTION (PSD)

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

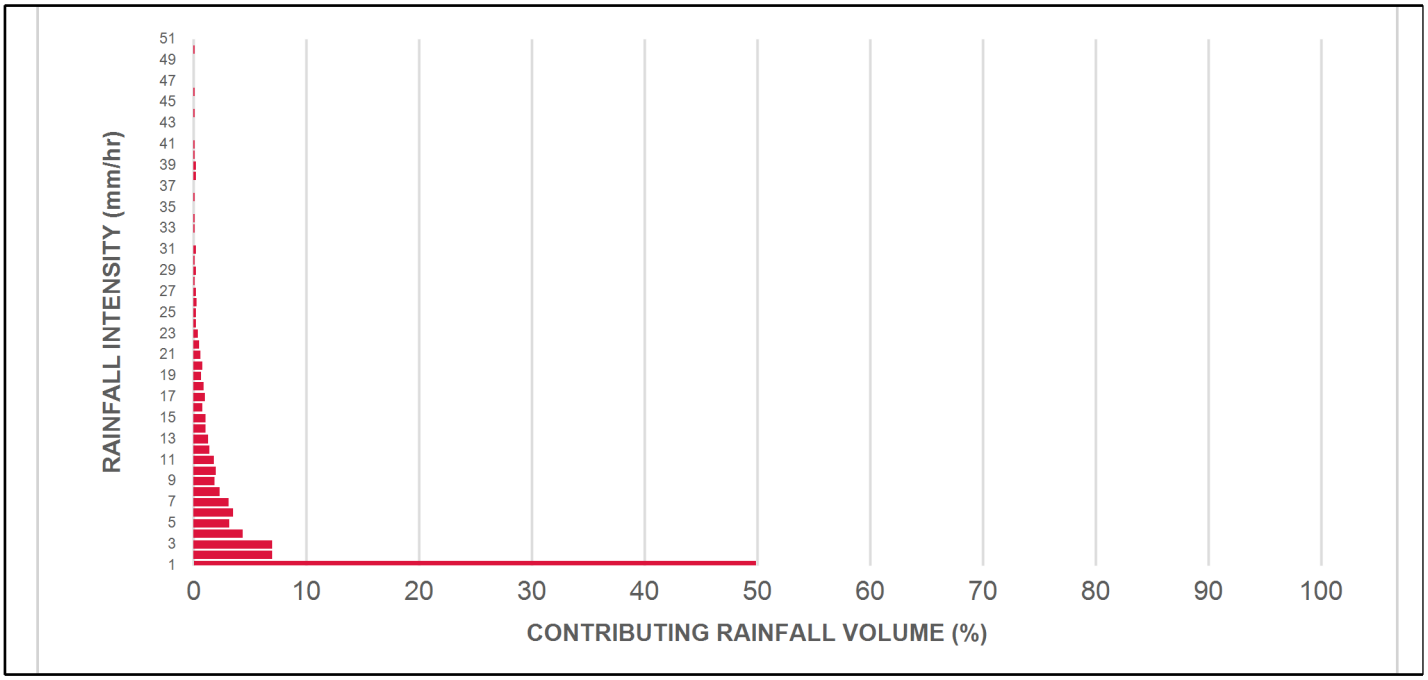
Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
1	49.9	49.9	2.16	130.0	49.0	69	34.3	34.3
2	7.0	56.9	4.33	260.0	99.0	63	4.4	38.8
3	7.0	63.9	6.49	389.0	148.0	59	4.1	42.9
4	4.4	68.3	8.65	519.0	197.0	55	2.4	45.3
5	3.2	71.5	10.82	649.0	247.0	53	1.7	47.0
6	3.5	75.0	12.98	779.0	296.0	51	1.8	48.8
7	3.1	78.1	15.14	909.0	345.0	50	1.5	50.3
8	2.3	80.4	17.31	1038.0	395.0	48	1.1	51.4
9	1.9	82.3	19.47	1168.0	444.0	48	0.9	52.3
10	2.0	84.3	21.63	1298.0	494.0	47	0.9	53.3
11	1.8	86.1	23.80	1428.0	543.0	47	0.8	54.1
12	1.4	87.5	25.96	1558.0	592.0	46	0.6	54.8
13	1.3	88.8	28.12	1687.0	642.0	46	0.6	55.4
14	1.1	89.9	30.29	1817.0	691.0	46	0.5	55.9
15	1.1	91.0	32.45	1947.0	740.0	45	0.5	56.4
16	0.8	91.8	34.61	2077.0	790.0	45	0.4	56.7
17	1.0	92.8	36.77	2206.0	839.0	45	0.4	57.2
18	0.9	93.7	38.94	2336.0	888.0	45	0.4	57.6
19	0.7	94.4	41.10	2466.0	938.0	44	0.3	57.9
20	0.8	95.2	43.26	2596.0	987.0	44	0.4	58.2
21	0.6	95.8	45.43	2726.0	1036.0	44	0.3	58.5
22	0.5	96.3	47.59	2855.0	1086.0	45	0.2	58.7
23	0.4	96.7	49.75	2985.0	1135.0	46	0.2	58.9
24	0.2	96.9	51.92	3115.0	1184.0	46	0.1	59.0
25	0.2	97.1	54.08	3245.0	1234.0	47	0.1	59.1

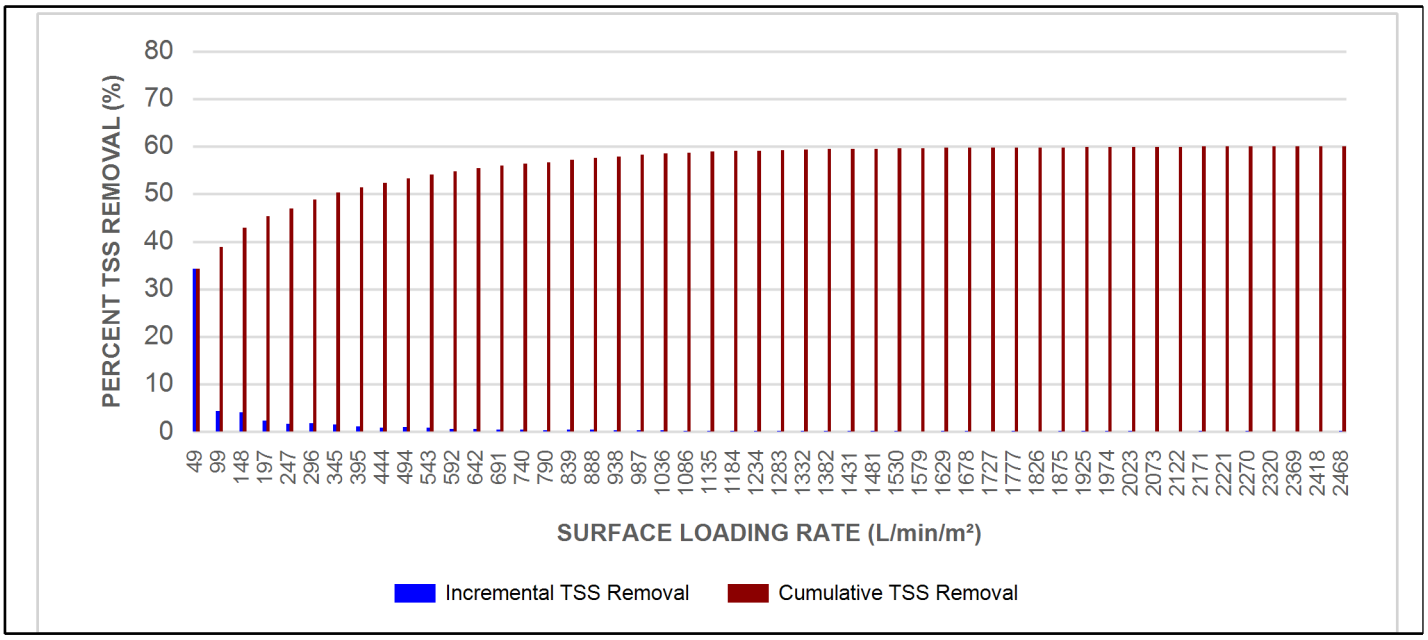
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
26	0.3	97.4	56.24	3375.0	1283.0	48	0.1	59.2
27	0.2	97.6	58.41	3504.0	1332.0	48	0.1	59.3
28	0.1	97.7	60.57	3634.0	1382.0	49	0.0	59.4
29	0.2	97.9	62.73	3764.0	1431.0	48	0.1	59.5
30	0.1	98.0	64.90	3894.0	1481.0	46	0.0	59.5
31	0.2	98.2	67.06	4024.0	1530.0	45	0.1	59.6
32	0.0	98.2	69.22	4153.0	1579.0	43	0.0	59.6
33	0.1	98.3	71.39	4283.0	1629.0	42	0.0	59.7
34	0.1	98.4	73.55	4413.0	1678.0	41	0.0	59.7
35	0.0	98.4	75.71	4543.0	1727.0	40	0.0	59.7
36	0.1	98.5	77.88	4673.0	1777.0	39	0.0	59.7
37	0.0	98.5	80.04	4802.0	1826.0	38	0.0	59.7
38	0.2	98.7	82.20	4932.0	1875.0	37	0.1	59.8
39	0.2	98.9	84.37	5062.0	1925.0	36	0.1	59.9
40	0.1	99.0	86.53	5192.0	1974.0	35	0.0	59.9
41	0.1	99.1	88.69	5322.0	2023.0	34	0.0	59.9
42	0.0	99.1	90.86	5451.0	2073.0	33	0.0	59.9
43	0.0	99.1	93.02	5581.0	2122.0	32	0.0	59.9
44	0.1	99.2	95.18	5711.0	2171.0	32	0.0	60.0
45	0.0	99.2	97.35	5841.0	2221.0	31	0.0	60.0
46	0.1	99.3	99.51	5971.0	2270.0	30	0.0	60.0
47	0.0	99.3	101.67	6100.0	2320.0	30	0.0	60.0
48	0.0	99.3	103.84	6230.0	2369.0	29	0.0	60.0
49	0.0	99.3	106.00	6360.0	2418.0	28	0.0	60.0
50	0.1	99.4	108.16	6490.0	2468.0	28	0.0	60.0
Estimated Net Annual Sediment (TSS) Load Reduction =								**60 %**

imbrium

RAINFALL DATA FROM WATERLOO WELLINGTON AP RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

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

SCOUR PREVENTION AND ONLINE CONFIGURATION

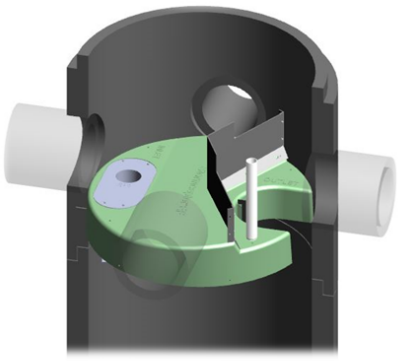
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test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

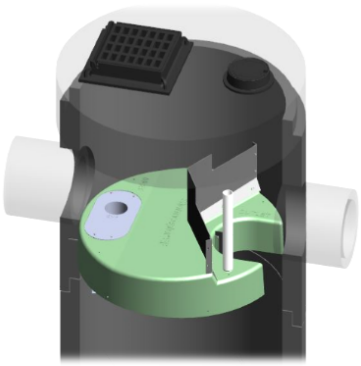
DESIGN FLEXIBILITY

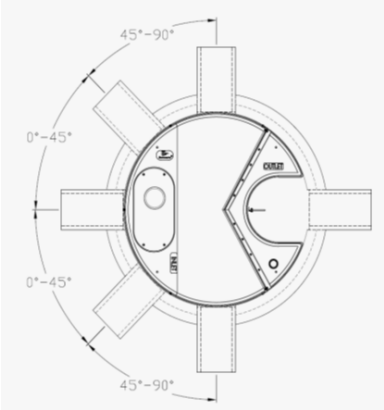
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend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

OIL CAPTURE AND RETENTION

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







INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.

0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.

45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

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

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft^3)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	197	52	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	348	92	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	545	144	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	874	231	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	1219	322	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity

** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft^3)

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

STANDARD STORMCEPTOR EF/EFO DRAWINGS

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

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

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

Table of TSS Removal vs Surface Loading Rate Based on Third-Party Test Results
Stormceptor® EF

SLR (L/min/m^2)	TSS % REMOVAL	SLR (L/min/m^2)	TSS % REMOVAL	SLR (L/min/m^2)	TSS % REMOVAL	SLR (L/min/m^2)	TSS % REMOVAL
1	70	660	46	1320	48	1980	35
30	70	690	46	1350	48	2010	34

imbrium

60	67	720	45	1380	49	2040	34
90	63	750	45	1410	49	2070	33
120	61	780	45	1440	48	2100	33
150	58	810	45	1470	47	2130	32
180	56	840	45	1500	46	2160	32
210	54	870	45	1530	45	2190	31
240	53	900	45	1560	44	2220	31
270	52	930	44	1590	43	2250	30
300	51	960	44	1620	42	2280	30
330	50	990	44	1650	42	2310	30
360	49	1020	44	1680	41	2340	29
390	48	1050	45	1710	40	2370	29
420	48	1080	45	1740	39	2400	29
450	48	1110	45	1770	39	2430	28
480	47	1140	46	1800	38	2460	28
510	47	1170	46	1830	37	2490	28
540	47	1200	47	1860	37	2520	27
570	46	1230	47	1890	36	2550	27
600	46	1260	47	1920	36	2580	27
630	46	1290	48	1950	35		

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

PART 1 – GENERAL

1.1 WORK INCLUDED

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

1.2 REFERENCE STANDARDS & PROCEDURES

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

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

1.3 SUBMITTALS

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

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

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

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

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

2.1.1

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

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

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

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

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

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

Culvert Calculator Report
SWM Outlet Pipe 450mm

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	335.01	m	Headwater Depth/Height	1.99	
Computed Headwater Elev	335.01	m	Discharge	0.3317	m³/s
Inlet Control HW Elev.	334.80	m	Tailwater Elevation	333.80	m
Outlet Control HW Elev.	335.01	m	Control Type	Outlet Control	

Grades					
Upstream Invert	334.10	m	Downstream Invert	333.80	m
Length	50.40	m	Constructed Slope	0.005952	m/m

Hydraulic Profile					
Profile	CompositeM2PressureProfile		Depth, Downstream	0.40	m
Slope Type	Mild		Normal Depth	N/A	m
Flow Regime	Subcritical		Critical Depth	0.40	m
Velocity Downstream	2.19	m/s	Critical Slope	0.009688	m/m

Section					
Section Shape	Circular		Mannings Coefficient	0.012	
Section Material	Corrugated HDPE (Smooth Interior)		Span	0.46	m
Section Size	450 mm		Rise	0.46	m
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	335.01	m	Upstream Velocity Head	0.21	m
Ke	0.20		Entrance Loss	0.04	m

Inlet Control Properties					
Inlet Control HW Elev.	334.80	m	Flow Control	Submerged	
Inlet Type	Beveled ring, 33.7° bevels		Area Full	0.2	m²
K	0.00180		HDS 5 Chart	3	
M	2.50000		HDS 5 Scale	B	
C	0.02430		Equation Form	1	
Y	0.83000				

Culvert Calculator Report
SWM Emergency Culvert 375mm

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	335.21	m	Headwater Depth/Height	3.26	
Computed Headwater Elev	335.21	m	Discharge	0.4966	m³/s
Inlet Control HW Elev.	334.83	m	Tailwater Elevation	333.24	m
Outlet Control HW Elev.	335.21	m	Control Type	Outlet Control	

Grades					
Upstream Invert	333.72	m	Downstream Invert	333.24	m
Length	40.40	m	Constructed Slope	0.011881	m/m

Hydraulic Profile					
Profile	CompositeM2PressureProfile		Depth, Downstream	0.44	m
Slope Type	Mild		Normal Depth	N/A	m
Flow Regime	Subcritical		Critical Depth	0.44	m
Velocity Downstream	3.06	m/s	Critical Slope	0.020768	m/m

Section					
Section Shape	Circular		Mannings Coefficient	0.012	
Section Material	Corrugated HDPE (Smooth Interior)		Span	0.46	m
Section Size	450 mm		Rise	0.46	m
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	335.21	m	Upstream Velocity Head	0.47	m
Ke	0.20		Entrance Loss	0.09	m

Inlet Control Properties					
Inlet Control HW Elev.	334.83	m	Flow Control	Submerged	
Inlet Type	Beveled ring, 33.7° bevels		Area Full	0.2	m²
K	0.00180		HDS 5 Chart	3	
M	2.50000		HDS 5 Scale	B	
C	0.02430		Equation Form	1	
Y	0.83000				

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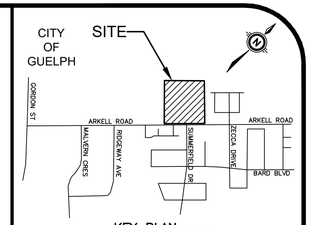
MTE FILE PATH:

LEGEND

- SITE BOUNDARY
- WETLAND BOUNDARY
- 15m WETLAND SETBACK
- 30m WETLAND SETBACK
- 326 — EXISTING CONTOURS
- Ex. Drop Curb — EXISTING CURB
- EXISTING DRIPLINE
- EXISTING DIRECTION OF DRAINAGE/SWALE
- EXISTING BUILDING
- (TOP) / (BOTTOM) — EXISTING EMBANKMENT (SLOPE AS NOTED)
- Ex. 300mmø SAN. / Ex. MH — EXISTING SANITARY SEWER
- Ex. 200mmø WTM. / Ex. HYD. SET — EXISTING WATERMAIN
- Ex. 375mmø STM. / Ex. MH — EXISTING STORM SEWER
- EXISTING RETAINING WALL
- EXISTING FENCE
- EXISTING PIEZOMETER
- EXISTING BOREHOLE/ MONITORING WELL

CITY OF GUELPH — SITE



KEY PLAN N.T.S.

GEODETIC BM ELEV. = 335.455m
CITY OF GUELPH
#255 BURKE WELL PUMP HOUSE

SITE BENCHMARK ELEV. = 335.455m
SEE ABOVE

NOTE TO CONTRACTOR :

DO NOT SCALE DRAWINGS.

CONTRACTORS MUST CHECK AND VERIFY ALL DIMENSIONS AND REPORT ANY DISCREPANCIES TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.

THE OWNER/ARCHITECT/CONTRACTOR IS ADVISED THAT M.T.E. CONSULTANTS INC. CANNOT CERTIFY ANY COMPONENT OF THE SITE WORKS NOT INSPECTED DURING CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO NOTIFY M.T.E. CONSULTANTS INC. PRIOR TO COMMENCEMENT OF CONSTRUCTION TO ARRANGE FOR INSPECTION.

No.	REVISION	BY	DATE
8.			
7.			
6.			
5.			
4.			
3.			
2.			
1.	ISSUED FOR DRAFT PLAN APPROVAL	IXC	APR.3/20

MTE
Engineers, Scientists, Surveyors
519-743-6500

OWNER
CRESCENT HAVEN HOMES INC.
180 FROBISHER DRIVE UNIT 3 WATERLOO

PROJECT
ARKELL ROAD PROPERTIES
216 ARKELL ROAD GUELPH

DRAWING
EXISTING CONDITIONS PLAN

Project Manager: I.CEKIC	Project No.: 42063-104
Design By: CJC/AJC	Checked By: VAL
Drawn By: SXP/KAT	Checked By: AJC
Surveyed By: MTE	Drawing No.: EC1.1
Date: Dec.04/19	
Scale: 1:400	Sheet 1 of 1

March 31, 2020 - 8:53:39 AM - Plotted By: Alex Cressman

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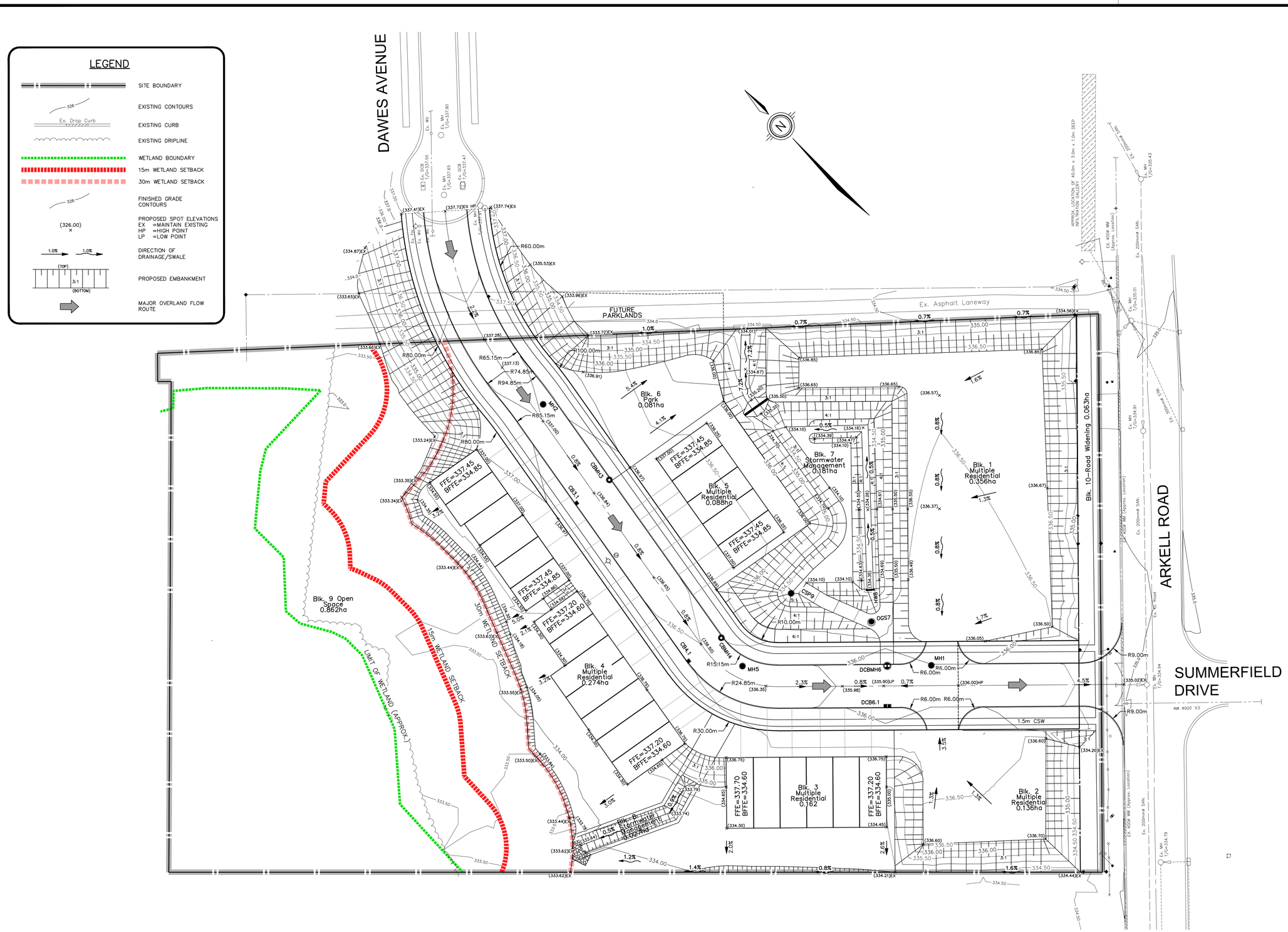
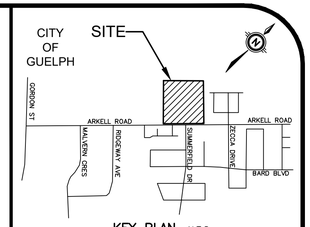
MTE PLOT PATH:

March 31, 2020 - 8:54:37 AM - Plotted By: Alex Cressman

LEGEND

- SITE BOUNDARY
- EXISTING CONTOURS (326)
- EXISTING CURB (Ex. Drop Curb)
- EXISTING DRIPLINE
- WETLAND BOUNDARY
- 15m WETLAND SETBACK
- 30m WETLAND SETBACK
- FINISHED GRADE CONTOURS (326)
- PROPOSED SPOT ELEVATIONS (326.00) EX =MAINTAIN EXISTING, HP =HIGH POINT, LP =LOW POINT
- DIRECTION OF DRAINAGE/SWALE (1.0% (TOP) 3:1 (BOTTOM) 1.0%)
- PROPOSED EMBANKMENT
- MAJOR OVERLAND FLOW ROUTE





GEODETIC BM ELEV. = 335.455m
CITY OF GUELPH
#255 BURKE WELL PUMP HOUSE

SITE BENCHMARK ELEV. = 335.455m
SEE ABOVE

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No.	REVISION	BY	DATE
8.			
7.			
6.			
5.			
4.			
3.			
2.			
1.	ISSUED FOR DRAFT PLAN APPROVAL	IKC	APR.03/20

MTE
Engineers, Scientists, Surveyors
519-743-6500

OWNER
CRESCENT HAVEN HOMES INC.
180 FROBISHER DRIVE UNIT 3 WATERLOO

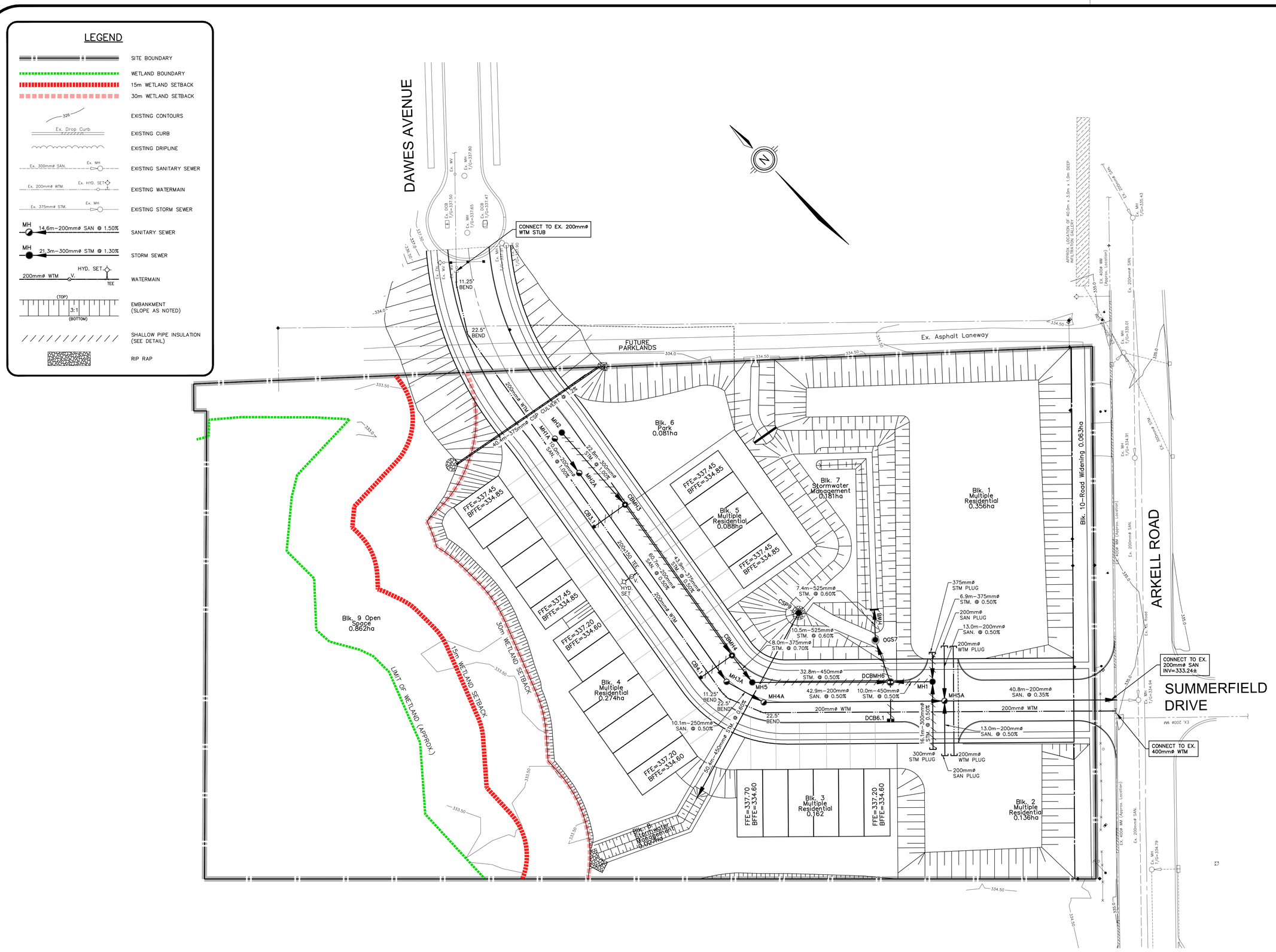
PROJECT
ARKELL ROAD PROPERTIES
216 ARKELL ROAD GUELPH

DRAWING
AREA GRADING PLAN

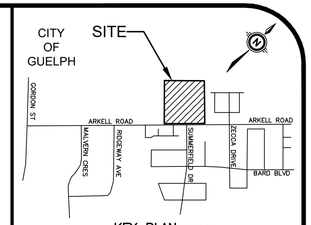
Project Manager	I.CEKIC	Project No.	42063-104
Design By	AJC	Checked By	VAL
Drawn By	SXP/KAT	Checked By	AJC
Surveyed By	MTE	Drawing No.	AG1.1
Date	Mar.30/20		
Scale	1:400	Sheet 1 of 1	

LEGEND

- SITE BOUNDARY
- WETLAND BOUNDARY
- 15m WETLAND SETBACK
- 30m WETLAND SETBACK
- EXISTING CONTOURS
- EXISTING CURB
- EXISTING DRIPLINE
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN
- EXISTING STORM SEWER
- SANITARY SEWER
- STORM SEWER
- WATERMAIN
- EMBANKMENT (SLOPE AS NOTED)
- SHALLOW PIPE INSULATION (SEE DETAIL)
- RIP RAP



CITY OF GUELPH — SITE



KEY PLAN N.T.S.

GEODETIC BM ELEV. = 335.455m
CITY OF GUELPH
#255 BURKE WELL PUMP HOUSE

SITE BENCHMARK ELEV. = 335.455m
SEE ABOVE

NOTE TO CONTRACTOR :

DO NOT SCALE DRAWINGS.

CONTRACTORS MUST CHECK AND VERIFY ALL DIMENSIONS AND REPORT ANY DISCREPANCIES TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.

THE OWNER/ARCHITECT/CONTRACTOR IS ADVISED THAT M.T.E. CONSULTANTS INC. CANNOT CERTIFY ANY COMPONENT OF THE SITE WORKS NOT INSPECTED DURING CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO NOTIFY M.T.E. CONSULTANTS INC. PRIOR TO COMMENCEMENT OF CONSTRUCTION TO ARRANGE FOR INSPECTION.

No.	REVISION	BY	DATE
8.			
7.			
6.			
5.			
4.			
3.			
2.			
1.	ISSUED FOR DRAFT PLAN APPROVAL	IXC	APR.03/20

MTE
Engineers, Scientists, Surveyors
519-743-6500

OWNER
CRESCENT HAVEN HOMES INC.
180 FROBISHER DRIVE UNIT 3 WATERLOO

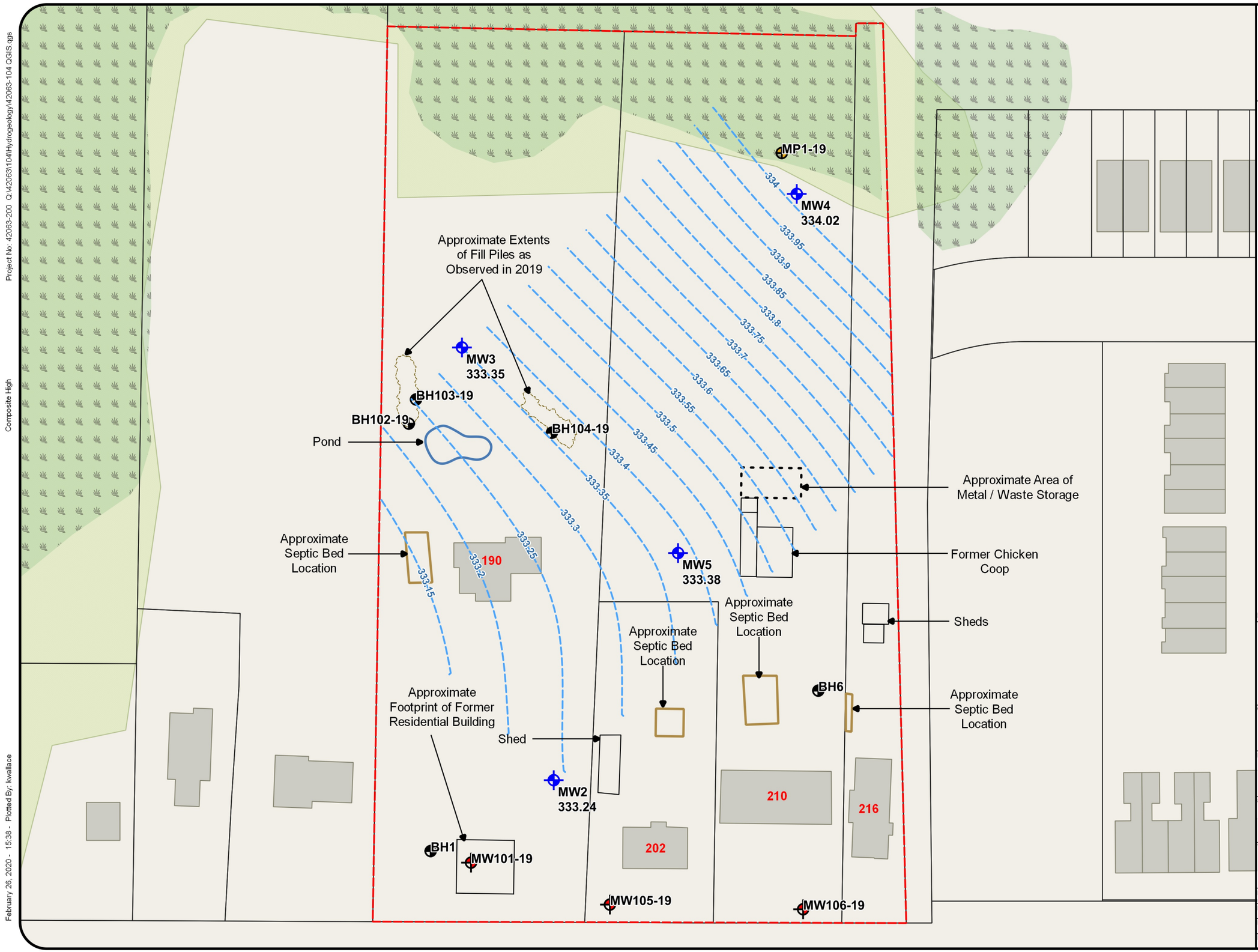
PROJECT
ARKELL ROAD PROPERTIES
216 ARKELL ROAD GUELPH

DRAWING
GENERAL PLAN OF SERVICES

Project Manager: I.CEKIC	Project No.: 42063-104
Design By: AJC	Checked By: VAL
Drawn By: SXP/KAT	Checked By: AJC
Surveyed By: MTE	Drawing No.: GP1.1
Date: Mar.25/20	
Scale: 1:400	Sheet 1 of 1

Appendix E

Composite High Groundwater



NORTH

PROJECT NORTH

Legend

- Property Boundary
- Study Area
- Wooded Area
- Provincial Significant Wetlands

Investigative Locations

- Borehole - ESA
- Minipiezometer
- ESA Wells (not used in composite high determination)
- Groundwater Monitoring Well & High Groundwater Elevation (mamsl)

Note:

Maximum groundwater elevations are those measured during the continuous groundwater level monitoring of select on-Site groundwater monitoring wells.

Monitoring period: March 27, 2017 to December 6, 2019.

Data Sources:

Contains information licensed under the Open Government License Ontario

0 8 16 24 32 40 m

Scale (11x17): 1:850

Project CRS: NAD83 / UTM zone 17N

MTE

Engineers,Scientists, Surveyors

Ph. (519) 743-6500

Client	Crescent Homes Ltd.
Project	Hydrogeological Investigation
Site	190-216 Arkell Road, Guelph
Title	**Composite High Groundwater**
Reviewed By	-
Prepared By	KLW
Drawn By	KLW
Date	Feb. 2020
Project No	42063-104
Figure No	-

Project No: 42063-200 Q:\42063\1041Hydrogeology\42063-104 QGIS.qgs

Composite High

February 26, 2020 - 15:38 - Plotted By: kwallace