



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

October 5, 2018

MTE File No.: 42063-104



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1.0 INTRODUCTION

MTE Consultants Inc. was retained by Crescent Homes to complete a Functional Servicing Report in support of a Draft Plan Application for the proposed Arkell Hills property known as 190, 202, 210 and 216 Arkell Road, located in the City of Guelph, as provided on Figure 1.

The subject lands are generally bound by an existing wetland to the north, existing residential to the east, Arkell Road right-of-way to the south and an existing single family residential house to the west. The proposed subdivision lands are approximately 2.58ha in area; however, the northern third of the site cannot be developed due to the existing wetland and its setbacks, therefore the total net developable area, excluding the roadway, is 1.27ha.

The Draft Plan of Subdivision for the proposed development has been prepared by MHBC (dated September 12, 2018) and forms the base for the prosed grading and servicing concepts. The Draft Plan of Subdivision concept includes 34 townhouse units fronting onto a municipal road (Blocks 2 and 3), two 3-storey apartment buildings with a combined total of 32 apartment units (Block 1), a stormwater management facility (Block 5), Arkell Road widening (Block 6) and open space (Block 4). The proposed street will connect the existing Dawes Avenue to Arkell Road at the existing Summerfield Drive and Arkell Road intersection. A copy of the Draft Plan is enclosed as Appendix A.

2.0 EXISTING CONDITIONS AND BACKGROUND INFORMATION

2.1 Topographical Information

MTE completed a detailed topographical survey of the site in the fall of 2016. There is approximately 2m of topographical relief across the site from the south to the north. Elevations across the site range from approximately 335.30masl along the Arkell Road property limit to 333.30masl near the wetland. The adjacent residential subdivision east of the subject property is approximately 4m higher in elevation than the subject property. The existing conditions of the subject property are provided on the enclosed Existing Conditions Plan.

2.2 Pre-Development Conditions

The site is located within the Torrance Creek Subwatershed. The rear 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 northerly portion of the site either lies within the wetland complex or within the required 30m wetland setback.

Under pre-development conditions, surface runoff from the site flows northerly towards the wetland complex.

2.3 Geotechnical Information

In 2017, Peto MacCallum Ltd. carried out a geotechnical investigation for the proposed Arkell Hills Subdivision. The fieldwork for this investigation included six boreholes on the subject property (BH1-BH6).

Based on the results of Peto MacCallum's geotechnical investigation, the subsurface stratigraphy at the site generally consists of topsoil and some localized fill overlying native deposits of sand and gravel. A thick (~3.6m) layer of silt was encountered 2.2m below existing grades on the easterly portion of the site. For further geotechnical information refer to Peto MacCallum's Geotechnical Investigation.

2.4 Hydrogeological Information

A hydrogeological investigation was conducted by MTE. Monitoring wells were installed in four (4) of the boreholes which had been advanced by Peto MacCallum.

MTE has conducted continuous groundwater monitoring since March of 2017. The highest groundwater elevations were observed in April of 2017 and ranged from elevation 333.99masl in the northerly portion of the site to 333.24masl in the southerly portion of the site. These elevations represent depths of 1.05m below existing grade (southerly portion of the site) to above existing grade (northerly portion of the site). The measured groundwater elevations indicate that the shallow groundwater flows from the north to the south (i.e. away from the wetland). For further hydrogeological information refer to MTE's Hydrogeological Report under separate cover.

3.0 MUNICIPAL SERVICING

3.1 Sanitary Servicing

A proposed 200mm diameter sanitary sewer will be extended through the subject property from the existing sanitary stub at the property limits along Arkell Road. The existing sanitary stub is connected to the existing 200mm diameter sanitary sewer on Arkell Road which conveys sanitary flows westerly.

The proposed townhouses will have individual 150mm diameter sanitary service connections from the 200mm diameter sanitary sewer through the subject property and a 200mm diameter sanitary stub will be provided to the property limits of the apartment block. The conceptual servicing is provided on Figure 2.

A Sanitary Capacity Assessment was completed by MTE in 2016 which noted capacity constraints 2.63km downstream of the subject property. At the time of the assessment, the City was undertaking a flow monitoring program and each proposed development was being evaluated on a case-by-case basis. A copy of the Sanitary Capacity Assessment is enclosed as Appendix A.



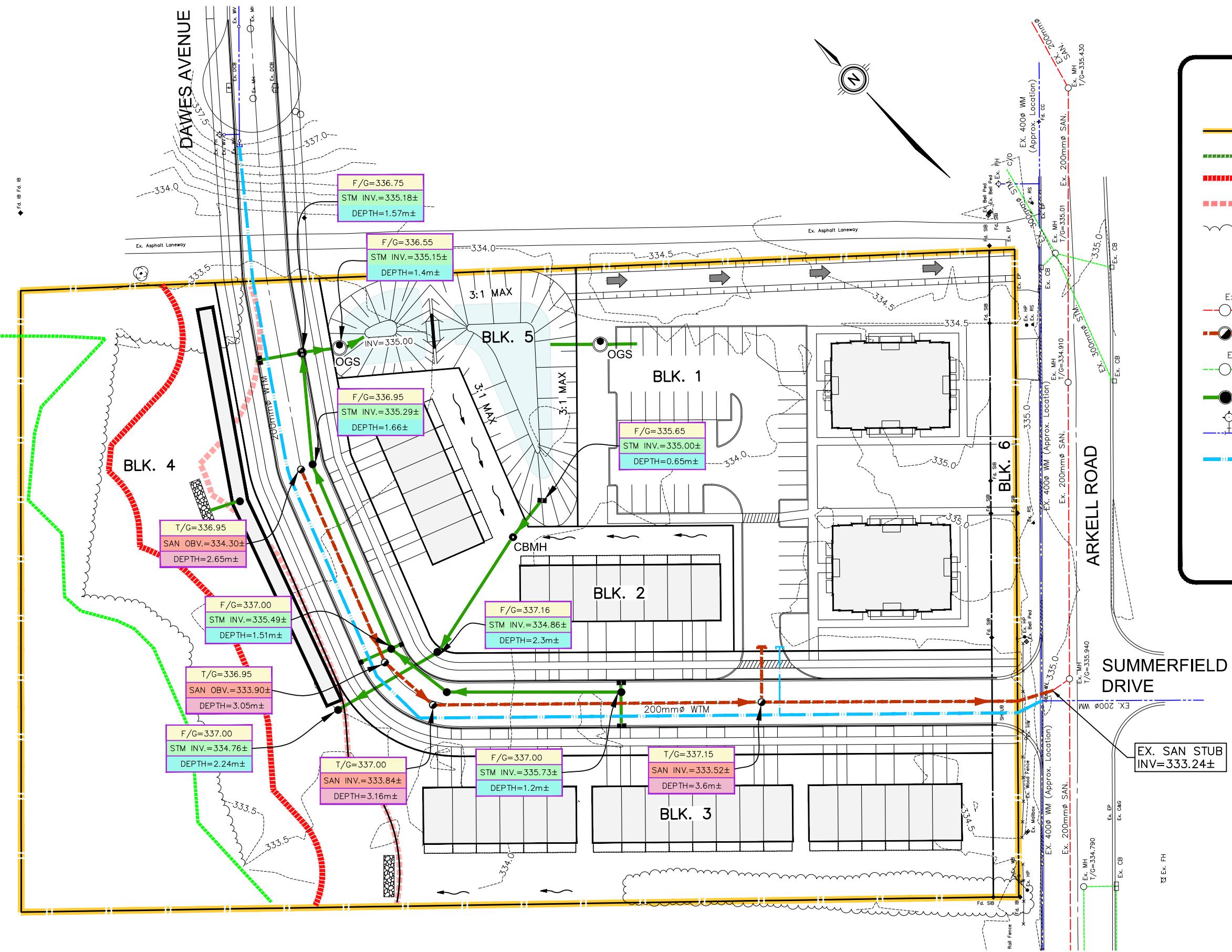


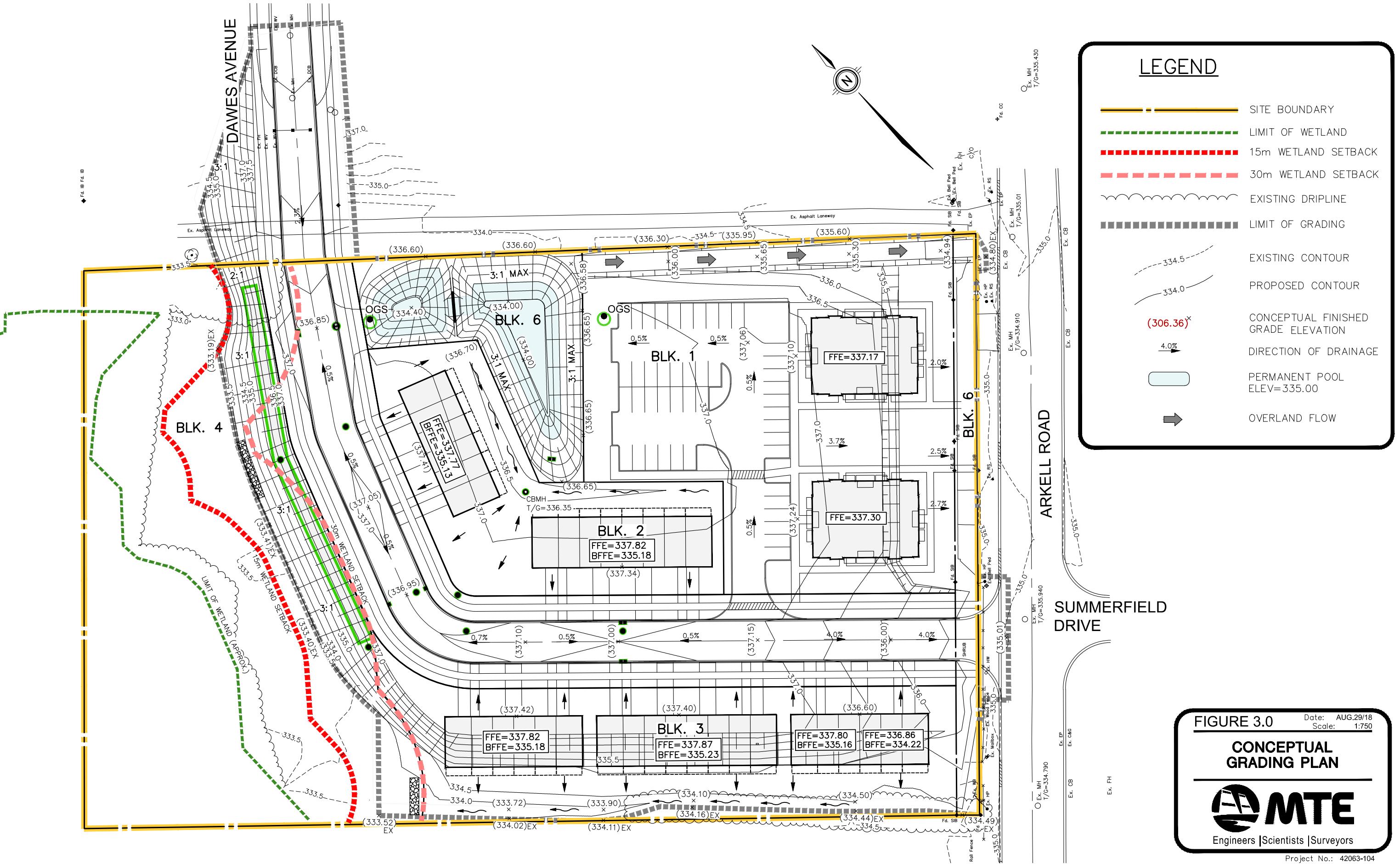
FIGURE 2.0 Date: AUG.29/18
Scale: 1:750

CONCEPTUAL SERVICING PLAN



Engineers | Scientists | Surveyors

Project No.: 42063-104



3.2 Water Distribution

The existing 200mm diameter watermain along Dawes Avenue will be extended through the subject property and connect to the existing 400mm diameter watermain along Arkell Road. This connection will eliminate the existing dead end at the Dawes Avenue cul-de-sac and provide a looped system.

The proposed townhouses will have individual 25mm diameter service connections from the 200mm diameter watermain through the subject property and a 150mm diameter watermain stub will be provided to the property limits of the apartment block. The conceptual servicing is provided on Figure 2.

The City of Guelph has noted that the subject property is located within Pressure Zone 1 which is serviced by two elevated towers, Verney and Clair Tanks which are at a Hydraulic Gradeline of 377.2masl. The City will complete a watermain distribution and pressure analysis to confirm that adequate supply and pressure are available for the proposed development.

Any existing wells on-site are to be decommissioned prior to construction.

3.3 Stormwater Management

The stormwater management analysis and criteria for the proposed development is presented in the *Preliminary Stormwater Management Report* prepared by MTE and are summarized as follows:

- Storm drainage for the proposed development will be provided through a combination of minor (piped) and major (overland) drainage system. The proposed development will drain via storm sewers to the proposed stormwater facility and outlet to an infiltration gallery complete with an overflow to the wetland, as shown on Figure 2. The storm sewer system will be designed for the City of Guelph 5-year design storm event with overland flow routes to the proposed SWM facility and ultimately to Arkell Road through an overflow route.
- The stormwater management design criteria for the site is established by the City of Guelph and Grand River Conservation Authority (GRCA).
- Water quality Enhanced (previously Level 1) - water quality control measures will be provided.
- Surface water inputs to the existing wetland can be maintained at pre-development rates.
- Ground water inputs can be maintained at pre-development levels by directing clean stormwater to infiltration galleries.

- Erosion and Sediment Control measures including sediment fencing, mud mats and sediment traps will be implemented during construction, as determined during Final Design.

4.0 GRADING DESIGN

Traffic access for the proposed development will be provided from Arkell Road and the existing subdivision east of the subject property (Dawes Avenue).

The existing Dawes Avenue cul-de-sac will be extended through the subject property to Arkell Road at the intersection of Arkell Road and Summerfield Drive. Dawes Avenue is currently located approximately 4m higher in elevation than the existing grades on the subject property. In order to match into these existing grades, significant fill will be required on-site. The proposed road will tie into Dawes Avenue along the 30m wetland setback and 3:1 side slopes from the road to the existing grades will be required within the 30m wetland setback. Fill will be kept out of the 15m wetland setback.

Utilizing the proposed road layout, centre line road grades and associated lot grading was designed to generally meet the following criteria:

- Match existing road grades at subdivision accesses;
- Match existing or proposed boundary grades around the perimeter of the site;
- Ensure adequate cover is provided over municipal services;
- Ensure “major” overland flow routes are directed to SWM facility and ultimately to Arkell Road, and;
- Comply with municipal standards for minimum and maximum road grades.

Preliminary centerline road grades range from 0.5% (minimum) to 4% (maximum) and generally slope to the proposed SWM facility as shown on Figure 2.

Walkout townhomes are proposed west of the proposed right-of-way and split drainage townhomes are proposed east of the proposed right-of-way. Preliminary lot grades are typically 2-6%, and 3:1 embankments where necessary to match existing grades. For conceptual finished grade contours refer to Figure 3.

The proposed roadway will be constructed to a 20m right-of-way local urban cross-section, including asphalt pavement, concrete curb and gutters, concrete sidewalks, roadway illumination and boulevard landscaping all in accordance with the City of Guelph SD-48.

5.0 UTILITY SERVICING

It is anticipated that Guelph Hydro (electrical), Bell Canada (telephone), Union Gas (gas) and Rogers Cable (cable TV) can be adequately service the proposed development through extension of their services.

6.0 SUMMARY

The main findings of the functional servicing report for the proposed subdivision at 90, 202, 210 and 216 Arkell Road are:

1. The sanitary sewer will be extended through the site from the existing sanitary sewer on Arkell Road.
2. Water supply for the proposed development will be provided by extending the existing watermain on Dawes Avenue through the site and connect to the existing watermain on Arkell Road.
3. Stormwater management for the development can be accommodated in the proposed on-site SWM facility as outlined in the *Preliminary Stormwater Management Report*.
4. The proposed overall site grading will provide for “major” overland flow conveyance to Arkell Road. The proposed grading will also provide adequate cover over municipal services and match existing road, boundary grades or setback grades with appropriate slopes and/or retaining walls.
5. 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.

Jeff Lerch, P.Eng
Design Engineer

Garrett Korber, P.Eng.
Project Manager

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APPENDIX A

DRAFT PLAN OF SUBDIVISION

DRAFT PLAN OF SUBDIVISION

Legal Description

PART OF LOT 6, CONCESSION 8, GEOGRAPHICAL TOWNSHIP OF PUSLINCH.
CITY OF GUELPH
COUNTY OF WELLINGTON

Owner's Certificate

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

DATE:

?????????????????????????????

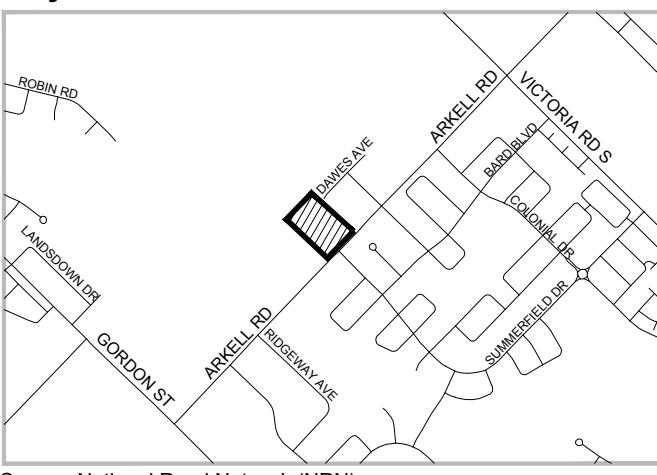
Surveyor's Certificate

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.

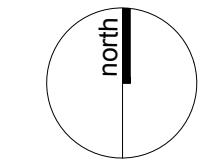
DATE:

?????????????????????????????

Key Plan



Subject Lands



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

Area Schedule

61T

Description	Lots/Blocks	Units	Area (ha)
Multiple Residential	1-3	66	1.112
Open Space	4		0.863
Stormwater Management	5		0.141
Road Widening	6		0.063
Roads			0.398
Total	6	66	2.577

Notes

1. All dimensions are in metres unless otherwise shown.
2. Delineation - Natural Resource Solutions Inc. (NRSI) June, 2016.
3. Wetland Limits - Natural Resource Solutions Inc. (NRSI) August, 2016.
4. Property boundary is approximate, based on MTC Existing Conditions Plan and Wellington County Survey plans 61R-773, 61R-819.
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.

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.

Revision No. Date Issued / Revision By



Approval Stamp Date September 12, 2018

File No. 15246A

Plan Scale 1:400 (Arch D)

Drawn By G.C.

Project Arkell Road - Guelph Checked By D.A.

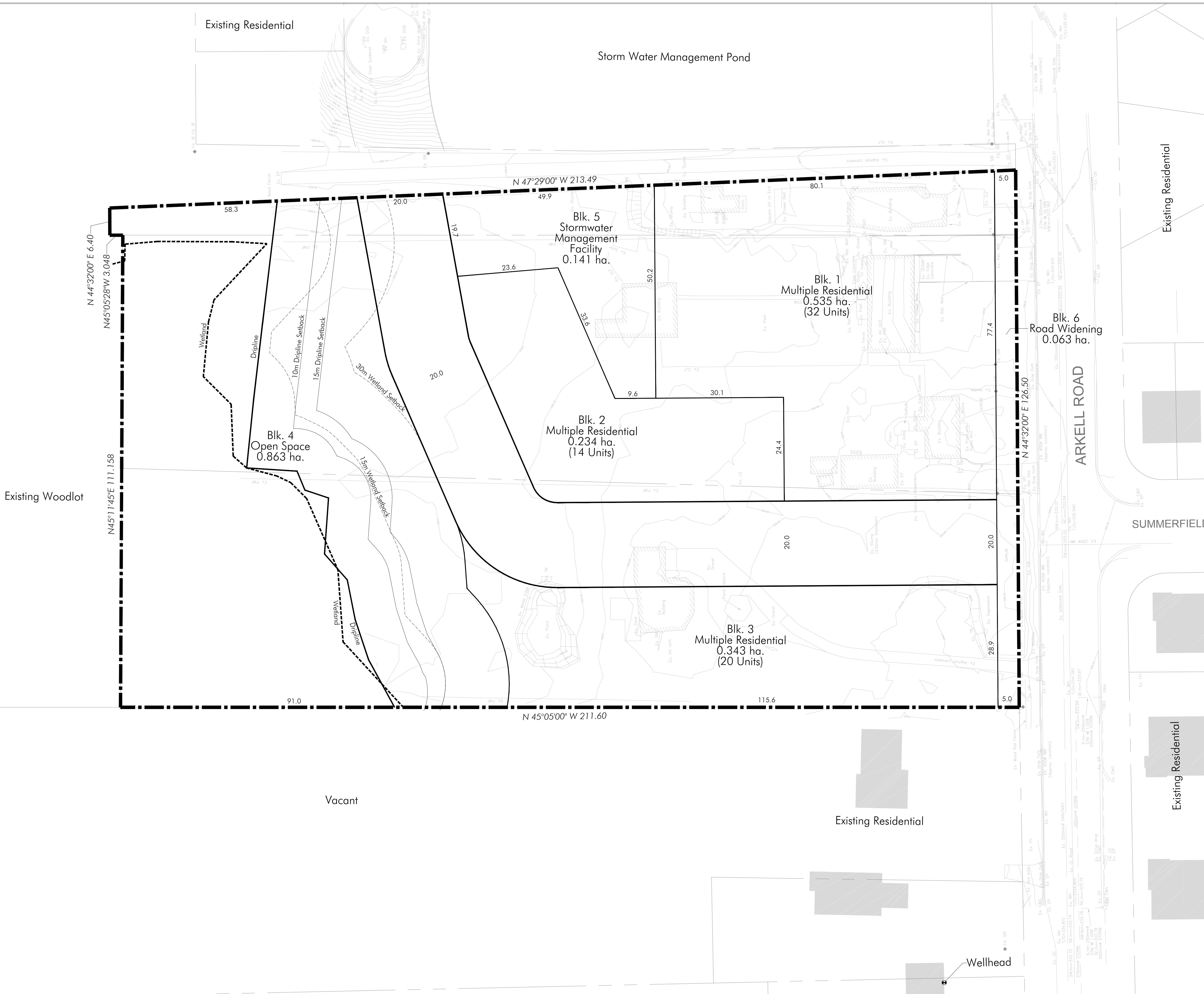
Applicant Other



File Name DRAFT PLAN Dwg No. 1 of 1

Scale Bar 0 5 10 25m

K:\15246A-Crescent Homes-Arkell Road-Guelph.Dwg|Draft Plan September 12, 2018.dwg





APPENDIX B

SANITARY CAPACITY ASSESSMENT



TECHNICAL MEMORANDUM

TO:	Mr. Nitin Jain	MTE FILE NO.:	C42063-100
COMPANY:	Crescent Homes 15 Curzon Crescent Guelph, ON N1K 0B3	DATE:	November 3, 2016
EMAIL:	nitin@crescenthomes.ca	FROM:	Gavin Vermeer, P.Eng
FAX:	-	PROJECT NAME:	Arkell Road Properties
CC:	Jason Cabral, MTE		

Re: SANITARY CAPACITY ASSESSMENT

MTE is pleased to submit this technical memorandum detailing the results of the sanitary capacity assessment. Crescent Homes wishes to develop a parcel of land on the northwest side of Arkell Road in the vicinity of the intersection of Arkell Road and Summerfield Drive. The purpose of the sanitary capacity assessment is to determine if there is sufficient additional capacity in the existing sanitary sewers, up to the nearest local trunk sewer, to accommodate the sanitary flows from the potential new development. Crescent Homes wishes to develop a parcel of land that could include as many as 124 townhome units, the maximum density permitted.

MTE obtained plan and profile drawings, from the City of Guelph, of the area around the potential development to the nearest local sanitary trunk sewer. The path of the sanitary sewer from the development to the nearest trunk is southwest along Arkell Road, then southeast onto Ridgeway Avenue. The sewer follows Ridgeway Avenue to Malvern Crescent. From there the sewer runs southeast through an easement onto Oakridge Crescent and continues southeast until it ties into a 525 millimetre diameter local sanitary trunk sewer on Pine Ridge Drive, as shown on Figure 1.0.

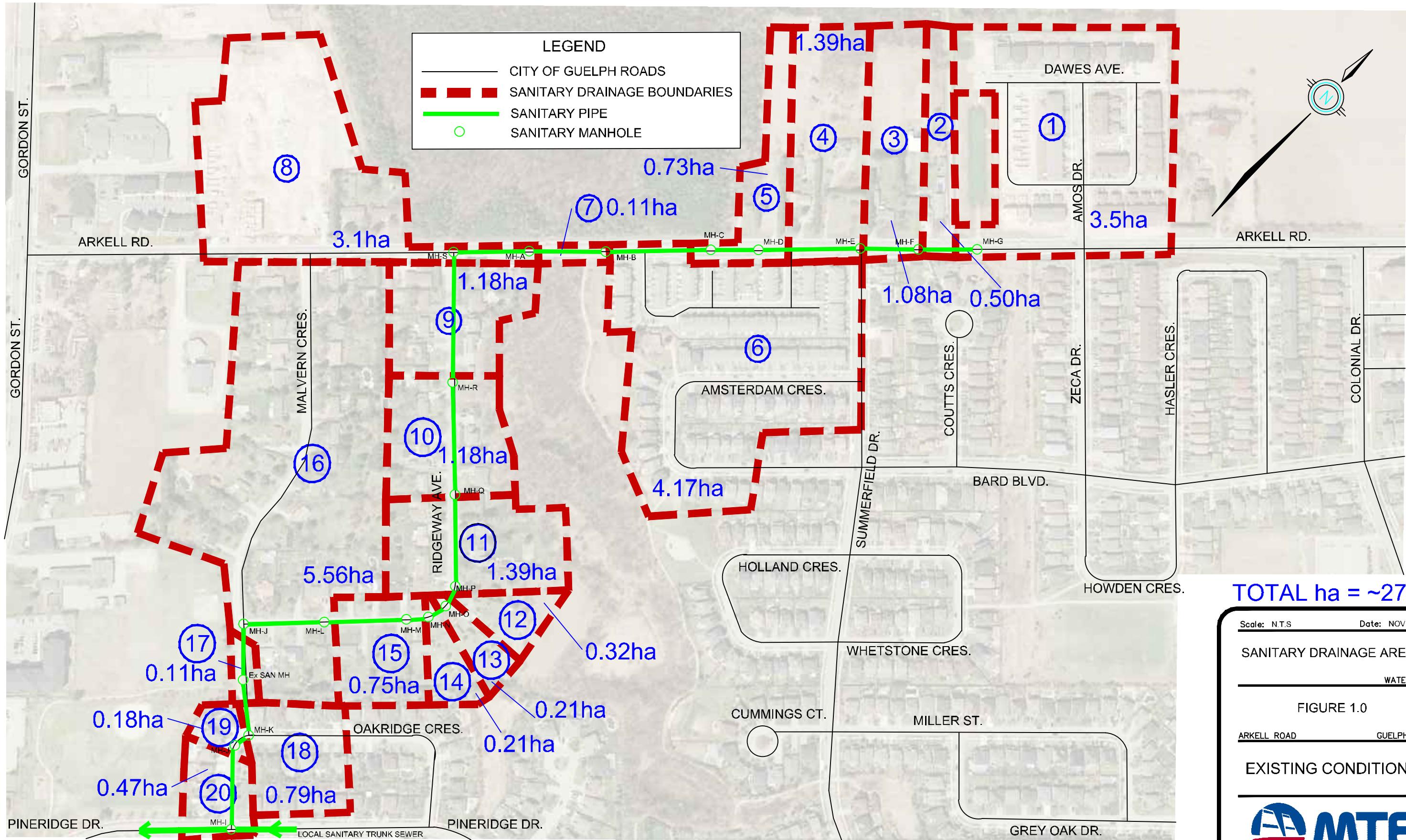
The sanitary analysis was completed using two different methods. The first method was completed according to City of Guelph design criteria which use only area as a means of calculating of peak flows. The sanitary catchment areas were estimated, as shown on Figure 1.0. This method typically calculates higher than actual flows for design purposes. Despite this, based on the estimated sanitary catchment areas there is sufficient capacity in the existing sewer for the potential new development. The second method was used to calculate potentially more accurate values based on the actual current density. The calculation of peak flows was done using the number of units discharging into the sanitary sewers. This method made assumptions for the number of people per unit (based on unit type), average daily per capita discharge rates, and multiplied by a peak factor. Inflow and infiltration were also estimated based on the criteria provided in the Region of Waterloo and Area Municipalities Design Guidelines. This method also confirmed there is sufficient capacity available in the existing sanitary sewers. The results of both methods are presented on the sanitary capacity analysis sheets, attached.



TECHNICAL MEMORANDUM

MTE also wishes to convey some additional general information that was obtained verbally from representatives of the City of Guelph, that is relevant to the potential development. According to representatives from the City, their sanitary model shows that there are capacity issues on the trunk sewer on Clairfields Drive West, approximately 2.36 kilometres downstream of the proposed development at the intersection of Dawn Avenue and Clairfields Drive West. The trunk sewer on Clairfields Drive West receives flow from the trunk sewer on Pine Ridge Drive. The City is in the process of undertaking a flow monitoring program to verify in the field the information that is being provided by the model. This program is not yet complete and the data not yet available. In the meantime, the City informed MTE that each proposal is being evaluated on a case-by-case basis to ensure that the sanitary capacity isn't greatly exceeded prior to future upgrades.

M:\42063\100\Correspondance\42064-100_mem_Crescent Homes_2016-11-03_Sanitary Capacity Assessment\42063-100_mem_Crescent Homes_2016-11-03_C_Sanitary Capacity Assessment.docx



Scale: N.T.S. Date: NOV.01/16
 SANITARY DRAINAGE AREAS
 WATERLOO
 FIGURE 1.0
 ARKELL ROAD GUELPH, ON
 EXISTING CONDITIONS
MTE
 Engineers | Scientists | Surveyors

SUBDIVISION NAME CITY OF GUELPH				SANITARY SEWER CAPACITY ANALYSIS - AREA METHOD CITY OF GUELPH ENGINEERING SERVICES					Design Parameters							
									Average Daily Flow							
Project Number:	42063-100			Residential	1.00 L/s/ha	Manning's "n"	0.013									
Date:	November 2, 2016			Commercial	1.70 L/s/ha											
Design By:	GDV			Industrial	1.70 L/s/ha	Velocity	(m/s)									
Checked By:	VAL			School/Mult Fam	2.50 L/s/ha	Minimum	0.6									
File:	Q:\42063\100\Sanitary Capacity Analysis\42063 - Sanitary Sewer Capacity Assessment Spreadsheet - Arkell Road Development.xlsx			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		AREA (A) ha	CONTRIBUTING UNIT TYPE	SANITARY COEFF.	SANITARY FLOW L/s	CUMULATIVE FLOW L/s	PIPE SIZE mm	PIPE TYPE	LENGTH m	SLOPE %	CAPACITY L/s	FULL FLOW VELOCITY m/s	ACTUAL FLOW VELOCITY m/s	% PIPE FULL %
		FROM MH	TO MH													
Arkell Road	1	0	G	3.50	Residential	1.00	3.5000	3.5000	200	PVC	11.4	0.32	18.5442	0.5906	0.4534	18.9%
	2	G	F	0.50	Residential	1.00	0.5000	4.0000	200	PVC	46.0	0.65	26.4295	0.8417	0.6064	15.1%
	3	F	E	1.08	Residential	1.00	1.0800	5.0800	200	PVC	57.5	0.51	23.4109	0.7456	0.5953	21.7%
	4	E	D	1.39	Residential	1.00	1.3900	6.4700	200	PVC	98.8	0.30	17.9553	0.5718	0.5251	36.0%
	5	D	C	0.73	Residential	1.00	0.7300	7.2000	200	PVC	52.4	0.27	17.0339	0.5425	0.5196	42.3%
	6	C	B	4.17	Residential	1.00	4.1700	11.3700	200	PVC	98.8	0.30	17.9553	0.5718	0.6051	63.3%
	7	B	A	0.11	Residential	1.00	0.1100	11.4800	250	PVC	58.0	0.30	32.5552	0.6635	0.6058	35.3%
Ridgeway Avenue	8	A	S	3.10	Residential	1.00	3.1000	14.5800	250	PVC	90.8	0.30	32.5552	0.6635	0.6451	44.8%
	9	S	R	1.18	Residential	1.00	1.1800	15.7600	250	PVC	110.0	0.27	30.8845	0.6295	0.6326	51.0%
	10	R	Q	1.18	Residential	1.00	1.1800	16.9400	250	PVC	110.0	0.28	31.4513	0.6410	0.6529	53.9%
	11	Q	P	1.39	Residential	1.00	1.3900	18.3300	250	PVC	88.6	0.28	31.4513	0.6410	0.6654	58.3%
	12	P	O	0.32	Residential	1.00	0.3200	18.6500	250	PVC	20.0	0.25	29.7187	0.6057	0.6397	62.8%
Malvern Crescent	13	O	N	0.21	Residential	1.00	0.2100	18.8600	250	PVC	20.0	0.25	29.71866	0.6057	0.6413	63.5%
	14	N	M	0.21	Residential	1.00	0.2100	19.0700	250	PVC	24.0	0.25	29.7187	0.6057	0.6429	64.2%
	15	M	L	0.75	Residential	1.00	0.7500	19.8200	250	PVC	80.0	0.25	29.71866	0.6057	0.6485	66.7%
	16	L	J	5.56	Residential	1.00	5.5600	25.3800	250	PVC	78.0	0.25	29.71866	0.6057	0.6803	85.4%
Oakridge Crescent	17	J	Ex San MH	0.11	Residential	1.00	0.1100	25.4900	250	PVC	58.6	0.20	26.5812	0.5418	0.6168	95.9%
	18	Ex San MH	K	0.79	Residential	1.00	0.7900	26.2800	250	PVC	49.0	0.25	29.7187	0.6057	0.6838	88.4%
	19	K	J	0.18	Residential	1.00	0.1800	26.4600	250	PVC	16.4	0.49	41.6061	0.8480	0.8983	63.6%
	20	J	I	0.47	Residential	1.00	0.4700	26.9300	250	PVC	72.1	0.23	28.5051	0.5810	0.6608	94.5%

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

SUBDIVISION NAME CITY OF GUELPH				EX. CONDITIONS SANITARY SEWER CAPACITY ANALYSIS - UNIT DENSITY METHOD CITY OF GUELPH ENGINEERING SERVICES											Analysis Parameters								
				Unit Density ¹		Single or Semi - Townhouse -	3.25 2.44	Manning's "n"	0.013	Velocity (m/s)													
Project Number:	42063-100	Date:	November 2, 2016	Drainage Area Plan No:	42063-100-Figure 1.0							Load Generation and I/I Rate ²											
Design By:	GDV	Checked By:	VAL									350 L/cd 0.15 L/s/ha		Minimum	0.6	Maximum	3.0						
File:	Q:\42063\100\Sanitary Capacity Analysis\42063 - Sanitary Sewer Capacity Assessment Spreadsheet - Arkell Road Development.xlsx																						
LOCATION				SANITARY FLOW CALCULATIONS											ANALYSIS								
STREET	AREA NUMBER	MANHOLE LOCATION		Approx. Area	No. of Single and Semi Detached Units	No. of Townhouse Units	Total Population ¹	Avg. Flow	Peak Factor	Peak Flow	Inflow/ Infiltration	Total Flow (Peak+I/I)	CUMULATIVE FLOW	PIPE SIZE	PIPE TYPE	LENGTH	SLOPE	CAPACITY	FULL FLOW VELOCITY	ACTUAL FLOW VELOCITY	% PIPE FULL		
		FROM MH	TO MH		ha.	#	#	c	L/s	L/s	L/s	L/s	L/s	L/s	mm		m	%	L/s	m/s	m/s	%	
Street Name	1	O	G	4.11	12	64	195	0.79	2.0000	1.5812	0.6165	2.1977	2.1977	200	PVC	11.4	0.32	18.5442	0.5906	0.3964	11.9%		
	2	G	F	0.65	0	0	0	0.00	4.5000	0.0000	0.0975	0.0975	2.2952	200	PVC	46.0	0.65	26.4295	0.8417	0.5163	8.7%		
	3	F	E	1.46	0	0	0	0.00	4.5000	0.0000	0.2190	0.2190	2.5142	200	PVC	57.5	0.51	23.4109	0.7456	0.4864	10.7%		
	4	E	D	3.41	0	0	0	0.00	4.5000	0.0000	0.5115	0.5115	3.0257	200	PVC	98.8	0.30	17.9553	0.5718	0.4251	16.9%		
	5	D	C	0.26	0	0	0	0.00	4.5000	0.0000	0.0390	0.0390	3.0647	200	PVC	52.4	0.27	17.0339	0.5425	0.4107	18.0%		
	6	C	B	3.98	0	60	146	0.59	2.0000	1.1861	0.5970	1.7831	4.8478	200	PVC	98.8	0.30	17.9553	0.5718	0.4854	27.0%		
	7	B	A	0.16	33	22	161	0.65	2.0000	1.3038	0.0240	1.3278	6.1756	250	PVC	58.0	0.30	32.5552	0.6635	0.5101	19.0%		
	8	A	S	3.04	0	0	0	0.00	4.5000	0.0000	0.4560	0.4560	6.6316	250	PVC	90.8	0.30	32.5552	0.6635	0.5205	20.4%		
	9	S	R	1.11	12	93	266	1.08	2.0000	2.1544	0.1665	2.3209	8.9525	250	PVC	110.0	0.27	30.8845	0.6295	0.5449	29.0%		
	10	R	Q	1.17	10	0	33	0.13	2.4432	0.3217	0.1755	0.4972	9.4497	250	PVC	110.0	0.28	31.4513	0.6410	0.5606	30.0%		
	11	Q	P	1.09	8	0	26	0.11	2.5386	0.2674	0.1635	0.4309	9.8806	250	PVC	88.6	0.28	31.4513	0.6410	0.5672	31.4%		
	12	P	O	0.47	3	0	10	0.04	2.9656	0.1171	0.0705	0.1876	10.0682	250	PVC	20.0	0.25	29.7187	0.6057	0.5472	33.9%		
	13	O	N	0.29	1	0	3	0.01	3.4126	0.0449	0.0435	0.0884	10.1566	250	PVC	20.0	0.25	29.7187	0.6057	0.5485	34.2%		
	14	N	M	0.28	1	0	3	0.01	3.4126	0.0449	0.0420	0.0869	10.2436	250	PVC	24.0	0.25	29.7187	0.6057	0.5497	34.5%		
	15	M	L	0.94	7	0	23	0.09	2.5964	0.2393	0.1410	0.3803	10.6238	250	PVC	80.0	0.25	29.7187	0.6057	0.5550	35.7%		
	16	L	J	0.95	4	0	13	0.05	2.8408	0.1496	0.1425	0.2921	10.9159	250	PVC	78.0	0.25	29.7187	0.6057	0.5591	36.7%		
	17	J	Ex San MH	0.41	21	0	68	0.28	2.1418	0.5922	0.0615	0.6537	11.5696	250	PVC	58.6	0.20	26.5812	0.5418	0.5229	43.5%		
	18	Ex San MH	K	0.05	0	0	0	0.00	4.5000	0.0000	0.0075	0.0075	11.5771	250	PVC	49.0	0.25	29.7187	0.6057	0.5679	39.0%		
	19	K	J	0.16	12	0	39	0.16	2.3665	0.3739	0.0240	0.3979	11.9750	250	PVC	16.4	0.49	41.6061	0.8480	0.7326	28.8%		
	20	J	I	0.36	4	0	13	0.05	2.8408	0.1496	0.0540	0.2036	12.1786	250	PVC	72.1	0.23	28.5051	0.5810	0.5580	42.7%		

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

Notes

- Estimates for unit density obtained from Region of Waterloo's Water and Wastewater Monitoring Report, May 2016.
- Load generation rate and I/I rate obtained from the Region of Waterloo and Area Municipalities Design Guidelines and Supplemental Specifications for Municipal Services, January 2016.

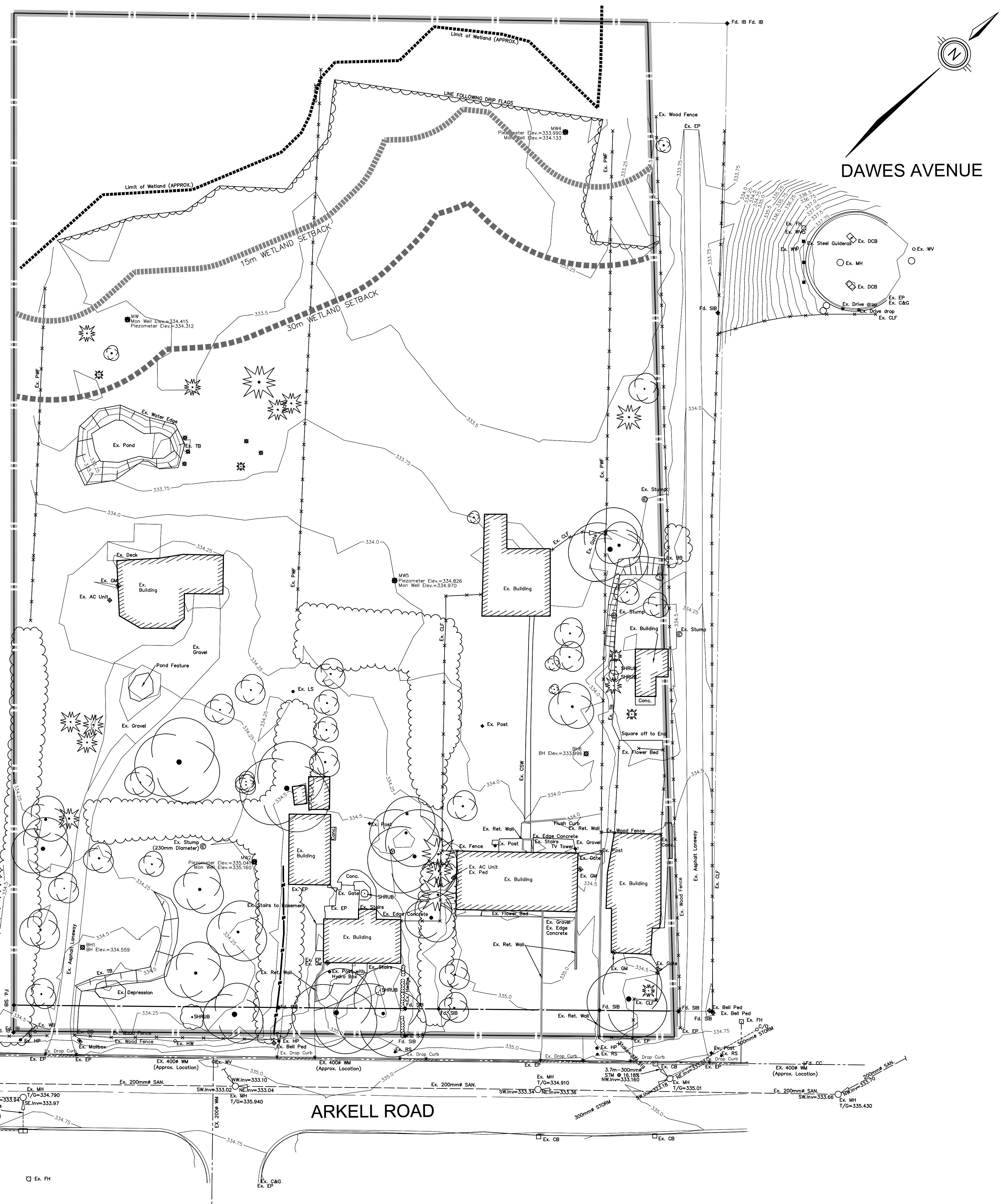
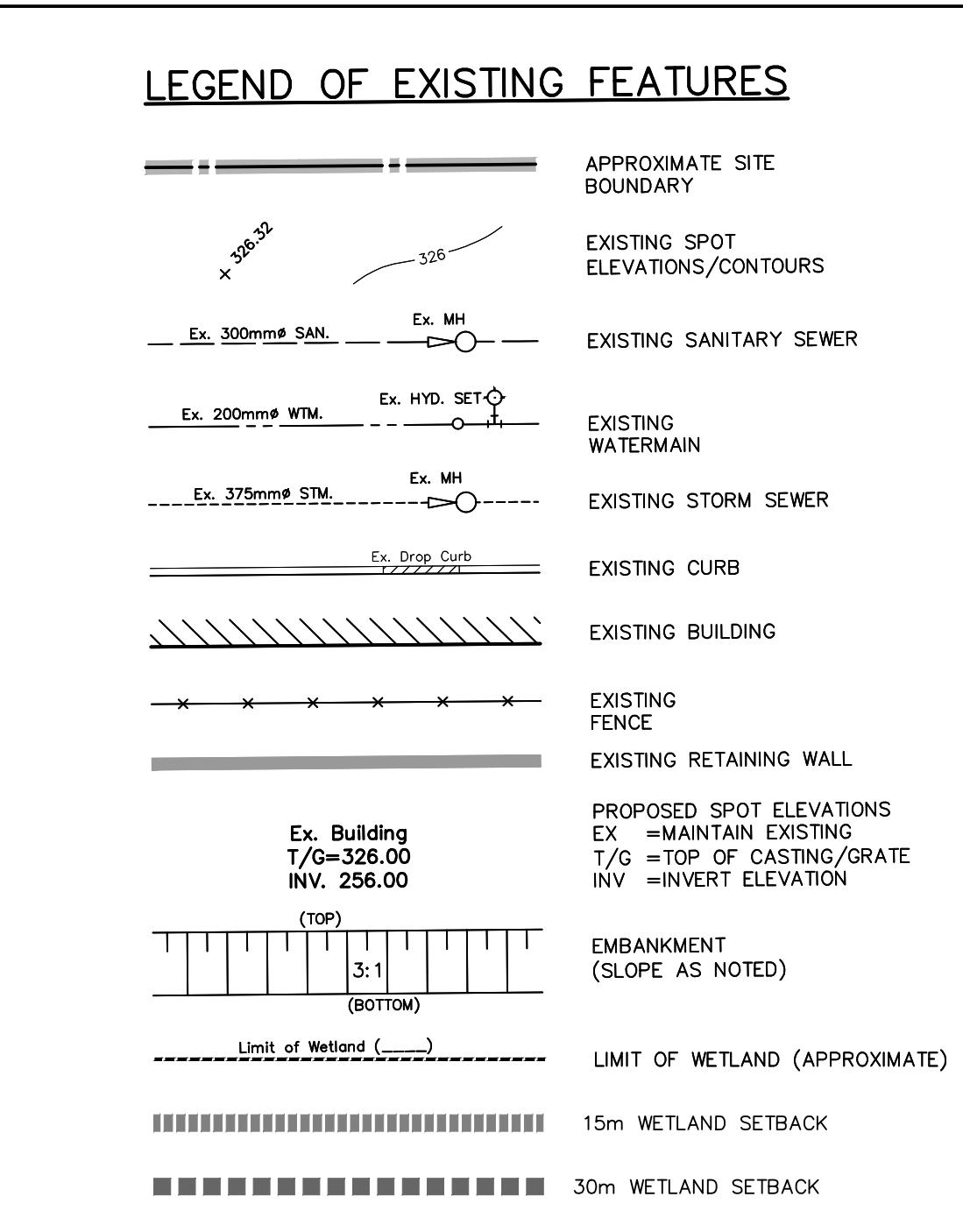
SUBDIVISION NAME CITY OF GUELPH				PR. CONDITIONS SANITARY SEWER CAPACITY ANALYSIS - UNIT DENSITY METHOD CITY OF GUELPH ENGINEERING SERVICES											Analysis Parameters													
				Unit Density		Single or Semi -	3.25	Manning's "n"	0.013	Velocity (m/s)		Load Generation and I/I Rate	Minimum	0.6	Maximum	3.0												
Project Number:	42063-100	Date:	November 2, 2016			Design By:	GDV	Checked By:	VAL			File:	Drainage Area Plan No: 42063-100-Figure 1.0															
						Q:\42063\100\Sanitary Capacity Analysis\42063 - Sanitary Sewer Capacity Assessment Spreadsheet - Arkell Road Development.xlsx																						
LOCATION						SANITARY FLOW CALCULATIONS											ANALYSIS											
STREET	AREA NUMBER	MANHOLE LOCATION		FROM MH	TO MH	Approx. Area	No. of Single and Semi Detached Units	No. of Townhouse Units	Total Population ¹	Avg. Flow	Peak Factor	Peak Flow	Inflow/ Infiltration	Total Flow (Peak+I/I)	CUMULATIVE FLOW	PIPE SIZE	PIPE TYPE	LENGTH	SLOPE	CAPACITY	FULL FLOW VELOCITY	ACTUAL FLOW VELOCITY	% PIPE FULL					
		ha.	#	#	#	c	L/s			L/s	L/s	L/s	L/s	L/s	mm		m	%	L/s	m/s	m/s	%						
Street Name																												
1	0	G	4.11	12	64	195	0.79	2.0000	1.5812	0.6165	2.1977	2.1977	200	PVC	11.4	0.32	18.5442	0.5906	0.3964	11.9%								
2	G	F	0.65	0	0	0	0.00	4.5000	0.0000	0.0975	0.0975	2.2952	200	PVC	46.0	0.65	26.4295	0.8417	0.5163	8.7%								
3	F	E	1.46	0	0	0	0.00	4.5000	0.0000	0.2190	0.2190	2.5142	200	PVC	57.5	0.51	23.4109	0.7456	0.4864	10.7%								
4	E	D	3.41	0	124	303	1.23	2.0000	2.4513	0.5115	2.9628	5.4770	200	PVC	98.8	0.30	17.9553	0.5718	0.5020	30.5%								
5	D	C	0.26	0	0	0	0.00	4.5000	0.0000	0.0390	0.0390	5.5160	200	PVC	52.4	0.27	17.0339	0.5425	0.4840	32.4%								
6	C	B	3.98	0	60	146	0.59	2.0000	1.1861	0.5970	1.7831	7.2991	200	PVC	98.8	0.30	17.9553	0.5718	0.5421	40.7%								
7	B	A	0.16	33	22	161	0.65	2.0000	1.3038	0.0240	1.3278	8.6269	250	PVC	58.0	0.30	32.5552	0.6635	0.5605	26.5%								
8	A	S	3.04	0	0	0	0.00	4.5000	0.0000	0.4560	0.4560	9.0829	250	PVC	90.8	0.30	32.5552	0.6635	0.5683	27.9%								
9	S	R	1.11	12	93	266	1.08	2.0000	2.1544	0.1665	2.3209	11.4038	250	PVC	110.0	0.27	30.8845	0.6295	0.5819	36.9%								
10	R	Q	1.17	10	0	33	0.13	2.4432	0.3217	0.1755	0.4972	11.9010	250	PVC	110.0	0.28	31.4513	0.6410	0.5965	37.8%								
11	Q	P	1.09	8	0	26	0.11	2.5386	0.2674	0.1635	0.4309	12.3319	250	PVC	88.6	0.28	31.4513	0.6410	0.6020	39.2%								
12	P	O	0.47	3	0	10	0.04	2.9656	0.1171	0.0705	0.1876	12.5195	250	PVC	20.0	0.25	29.7187	0.6057	0.5797	42.1%								
13	O	N	0.29	1	0	3	0.01	3.4126	0.0449	0.0435	0.0884	12.6079	250	PVC	20.0	0.25	29.7187	0.6057	0.5808	42.4%								
14	N	M	0.28	1	0	3	0.01	3.4126	0.0449	0.0420	0.0869	12.6949	250	PVC	24.0	0.25	29.7187	0.6057	0.5818	42.7%								
15	M	L	0.94	7	0	23	0.09	2.5964	0.2393	0.1410	0.3803	13.0751	250	PVC	80.0	0.25	29.7187	0.6057	0.5862	44.0%								
16	L	J	0.95	4	0	13	0.05	2.8408	0.1496	0.1425	0.2921	13.3672	250	PVC	78.0	0.25	29.7187	0.6057	0.5896	45.0%								
17	J	Ex San MH	0.41	21	0	68	0.28	2.1418	0.5922	0.0615	0.6537	14.0209	250	PVC	58.6	0.20	26.5812	0.5418	0.5489	52.7%								
18	Ex San MH	K	0.05	0	0	0	0.00	4.5000	0.0000	0.0075	0.0075	14.0284	250	PVC	49.0	0.25	29.7187	0.6057	0.5969	47.2%								
19	K	J	0.16	12	0	39	0.16	2.3665	0.3739	0.0240	0.3979	14.4263	250	PVC	16.4	0.49	41.6061	0.8480	0.7707	34.7%								
20	J	I	0.36	4	0	13	0.05	2.8408	0.1496	0.0540	0.2036	14.6299	250	PVC	72.1	0.23	28.5051	0.5810	0.5847	51.3%								

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

Notes

- Estimates for unit density obtained from Region of Waterloo's Water and Wastewater Monitoring Report, May 2016.
- Load generation rate and I/I rate obtained from the Region of Waterloo and Area Municipalities Design Guidelines and Supplemental Specifications for Municipal Services, January 2016.

SITE BENCHMARK



A site plan titled "KEY PLAN N.T.S." showing a plot of land outlined in red. A specific area within the plot is shaded with diagonal lines. The plan includes several labeled streets: ARKELL ROAD (horizontal), RIDGEWAY AVE (vertical), SUMMERFIELD DR (diagonal), ZECCA DRIVE (vertical), BARD BLVD (vertical), and MALVERN CRES (vertical). A north arrow is located in the top right corner, and the word "SITE" is written vertically along the left edge of the plot.

DETIC BM ELEV. = 335.455m
OF GUELPH
BURKE WELL PUMP HOUSE

LETTER TO CONTRACTOR :

OT SCALE DRAWINGS.
TRACTORS MUST CHECK AND VERIFY ALL DIMENSIONS

REPORT ANY DISCREPANCIES TO THE ENGINEER BEFORE
PROCEEDING WITH THE WORK.

DRAWINGS REMAIN THE PROPERTY OF THE ENGINEER
AND SHALL NOT BE REPRODUCED OR REUSED WITHOUT THE
EXPLICIT WRITTEN CONSENT OF THE ENGINEER.

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

UED FOR APPROVAL	JJC	AUG.27/18
UED TO CLIENT	JJC	JAN.05/17
P E V I S L O N	PY	DATE



Making a Difference

© Z12.6500

CURZON CRESECENT GUELPH, ON
ECT

ARKELL ROAD CRESCENT HOMES

EXISTING CONDITIONS PLAN

ct Manager J.CABRAL	Project No. 42063-100
n By	Checked By
n By SXP	Checked By WSS
yed By CWT	Drawing No.
Apr.17/17	EC1.1
1:400	Sheet 1 of 1