City of Guelph

Water and Wastewater Servicing Master Plan

Volume II – Technical Memorandum 1: Background Review

September 2021

TECHNICAL MEMORANDUM

To:	**Colleen Gammie, P.Eng.**	Company:	**City of Guelph**
	Infrastructure Planning Engineer		
From:	**Sam Ziemann, P.Eng. / Dave Eadie, P.Eng.**	Our File:	**75-41-191370**
		Date:	**September 21, 2021**
Subject:	**TM 1: Background Review**		

City of Guelph
Water and Wastewater Serving Master Plan

TM 1: BACKGROUND REVIEW

C3 WATER INC.
STANTEC CONSULTING LTD.

September 21, 2021

VERSION	DATE	DESCRIPTION OF REVISIONS	REVISED BY	REVIEWED BY
1	March 9, 2020	Draft Background Review	Michelle Scott, Luke Butler, Marc Telmosse	Sam Ziemann, Dave Eadie, Arun Hindupur
2	September 21, 2021	Final: Address City comments and update based on additional background info received.	Michelle Scott, Marc Telmosse	Sam Ziemann

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1.0 INTRODUCTION

A review of background information was completed in support of the City of Guelph (City) Water and Wastewater Servicing Master Plan (MSP). The purpose of this report is to provide an overview of the background information that will be used in the Master Plan and identify any data gaps. A request for information (RFI) has been submitted to the City. The updated RFI log is presented in Appendix A.

2.0 WATER SYSTEM REVIEW

2.1 Existing System Description

The Guelph water distribution system consists of approximately 600 km of watermains throughout three pressure zones.

2.1.1 Water Supply

The primary water source Arkell wells and the Glen Collector system which feed into the F.M. Woods Water Treatment Plant (Woods WTP) via the Arkell Aqueduct. The Woods WTP and pump station supplies approximately 60-80% of the City's drinking water into Zone 1. There are also a number of groundwater supply wells throughout the City. The existing water supply sources and their respective operating capacities and Permits to Take Water (PTTW) are summarized in Table 2.1 below. The operating capacities are sourced from the City's 2019 monthly supply planning data.

Table 2.1 Water Supply

Supply	Zone	Operating Capacity (L/s)	PTTW (L/s)
Arkell 1 (Woods)	1	19	38
Arkell Springs (Woods)	1	333	333
Glen Collector (Woods)	1	81	289
Emma Well	1	27	36
Park Well	1	110	119
Water St. Well	1	29	39
Dean Well	1	17	27
Membro Well	1	37	70
Queensdale Well	1	14	61
University Well	1	28	38
Downey Well	1	58	61
Burke Well	1	67	76
Calico Well	2	12	61
Helmar Well	2	15	38
Paisley Well	2	37	15

2.1.2 Water Pumping Stations

There are three existing pump stations that supply water from Zone 1 into Zone 2 and one pump station that supplies water from Zone 1 into Zone 3. The existing pump stations are summarized in Table 2.2 below.

Table 2.2 Water Pump Stations

Pump Station	Zone	Capacity (L/s)
Woods	1	978
Clythe	2	126
Paisley – Vertical Turbine Pumps	2	212
Paisley – Horizontal In-Line Pumps	2	106
Robertson	2	88
Clair	3	345

2.1.3 Storage

The system has three elevated tanks (ETs) and four storage reservoirs. The system has a total available storage of 54,500 m^3, 39,800 m^3 of which is in Zone 1 and 14,700 m^3 in Zone 2. The existing water storage is summarized in Table 2.3 below.

Table 2.3 Water Storage

Storage	Type	Zone	Volume (m^3)
F.M. Woods	Reservoir	1	29,270
University	Reservoir	1	2,287
Clair	Elevated Tank	1/3	4,500
Verney	Elevated Tank	1	3,790
Paisley	Reservoir	2	11,750
Clythe	Reservoir	2	650
Speedvale	Elevated Tank	2	2,258
Zone 1 Total			39,847
Zone 2 Total			14,658
System Total			**54,505**

2.1.4 Water Demands

The average day demand (ADD) and maximum day demand (MDD) projections for a number of planning horizons are summarized in Table 2.4 below. This will be updated using the 2019 daily water supply data and 2021 population planning information. Diurnal curves will be developed using minute-interval SCADA data. The required SCADA data is available through e.RIS. Demand distribution will be determined using 2019 billing meter records which will be provided by the City. Future demand projections will be updated iteratively with the Guelph Planning department based on potential growth areas and population projections. Per capita demands will be based on the findings of the Water Efficiency Strategy Update (C3W, 2016).

Table 2.4 Water Demands

Year	ADD (L/s)				MDD (L/s)			
Zone	**1**	**2**	**3**	**Total**	**1**	**2**	**3**	**Total**
2018	383	187	13	**583**	577	276	19	**872**
2023	416	201	20	**637**	634	292	30	**956**
2028	459	211	27	**696**	677	309	40	**1025**
2032	489	217	31	**737**	732	317	46	**1095**

2.1.5 Water Distribution System

The existing InfoWater model is representative of the distribution system. The model will be updated using the latest GIS records for the following assets:

1. Watermains
2. Hydrants
3. Valves
4. Water Quality Sites

Pump station layouts in the model will be verified and updated using record drawings. Record drawings will be available through the City's network. Additional system information such as facility elevations and pump performance curves may be collected using surveying and field testing. The water model updates are described further in TM3: Model Update Plan.

2.2 Water Data Gaps

Beginning in 2017, the City of Guelph initiated a data gaps analysis project to identify deficiencies in the City's GIS data related to storm water, wastewater, and water infrastructure. This was followed in December 2019 with a request for proposals and awarding of a project to correct the data gaps previously identified and create a geometric network, the target completion date for the data correction project is September 30th, 2020. The water and wastewater GIS data important to building models is scheduled to be ready by the end of May 2020.

Once the GIS data gaps project is completed, the time to build a hydraulic model will be significantly reduced, both due to the geometric network allowing all elements of the network to have full connectivity and attributes required within the model having no gaps.

It was noted, however, that any model built before the GIS project was completed could see the information contained within it being out of date sooner and requiring a refresher sooner than typical. Querying and joining information between the model and GIS could also be more difficult as water assets will be split and assigned new asset ids during the data correction project.

The GIS data correction project is split into 18 sections tasks. If certain of the tasks were prioritized and completed before a model was built, then the duplication of work between the two projects could be minimized. Table 2.5 below summarizes tasks that would provide the largest benefit to the model build if they were prioritized to be completed first.

Table 2.5 GIS Priorities for Model Build

Section Number	Section Title
9	Breaking Water Mains & Laterals at Point Features
10	Breaking Water Mains & Laterals at Bends
11	Breaking Water Mains at Hydrant Leads
12	Breaking & Merging Water Mains & Laterals Based on Diameter
13	Updating Water Main IDs for Water Main Breaks

Completing these tasks before the model build would result in a one to one match in elements between the model and GIS and will allow bi-directional flow of information between the two sources of data.

It is acknowledged that these tasks may rely on previous sections being completed, such as moving incorrectly placed point features.

2.2.1 Water Data Gaps Update (2021)

C3W was provided with the City's latest water infrastructure GIS data as of May 29, 2020 and the model build was completed in the summer of 2020. Updated GIS data was provided on July 17, 2021 and will be used to update the model as needed.

2.3 Summary of Historical Water Studies

2.3.1 Arkell Aqueduct Study – Redundancy and Resiliency (AECOM, 2019)

The Arkell Aqueduct supplies water from the Arkell Wellfield and Carter Wells to the F.W. Woods WTP and is responsible for approximately 60% of the City's raw water supply. The aqueduct has been identified as a high-risk piece of infrastructure due to the age and conditions as well as lack of redundancy. The aqueduct is divided into three reaches. The middle reach is of highest concern as it is the oldest portion of the aqueduct, installed in 1962. The middle reach is located between Watson Road and Scout Camp and is challenging to access for maintenance and repairs.
The purpose of this study was to provide alternatives for redundancy and resiliency for the aqueduct.
Alternatives identified for upgrading the middle reach of the aqueduct are as follows:

1. Retrofit existing Aqueduct
2. Installation of a second pipe along the same or similar alignment
3. Installation of pipe along municipal roads – north on Watson to Stone Road; west on Stone Road to Scout Camp that is either:
    a. Gravity
    b. Pumped
    c. Gravity and Pumped

Alternatively, repairing or replacing the existing raw water transmission main from Carter wells to Scout Camp was brought forward for review and discussion.

In general, two alternatives were considered for improving the redundancy of the aqueduct and will be carried forward in the MSP:

1. Twin the existing aqueduct along the same path to the Woods WTP
2. Provide partial redundancy by building a new watermain to pump only non-GUDI Arkell wells to the south end of Zone 1 or Zone 3. There are serval possible variations to this alternative.

2.3.2 Downtown Servicing Study (Cole-C3 Water, 2020)

This study assessed recommended water, wastewater and stormwater improvements in the downtown area.

Water servicing alternatives were developed to address downtown areas that did not meet head loss, fire flow or pressure criteria when future demands were applied to the existing infrastructure. The main concerns were areas of high head loss and low fire flow. Pressures were not found to be a concern in the downtown area. The prevalence of small diameter, old, cast iron watermains in the Downtown core was the main cause of high head loss and low flows, therefore several linear pipe upgrades were recommended to improve servicing for future developments to 2031. The proposed water projects are summarized in Figure 2-1 below.

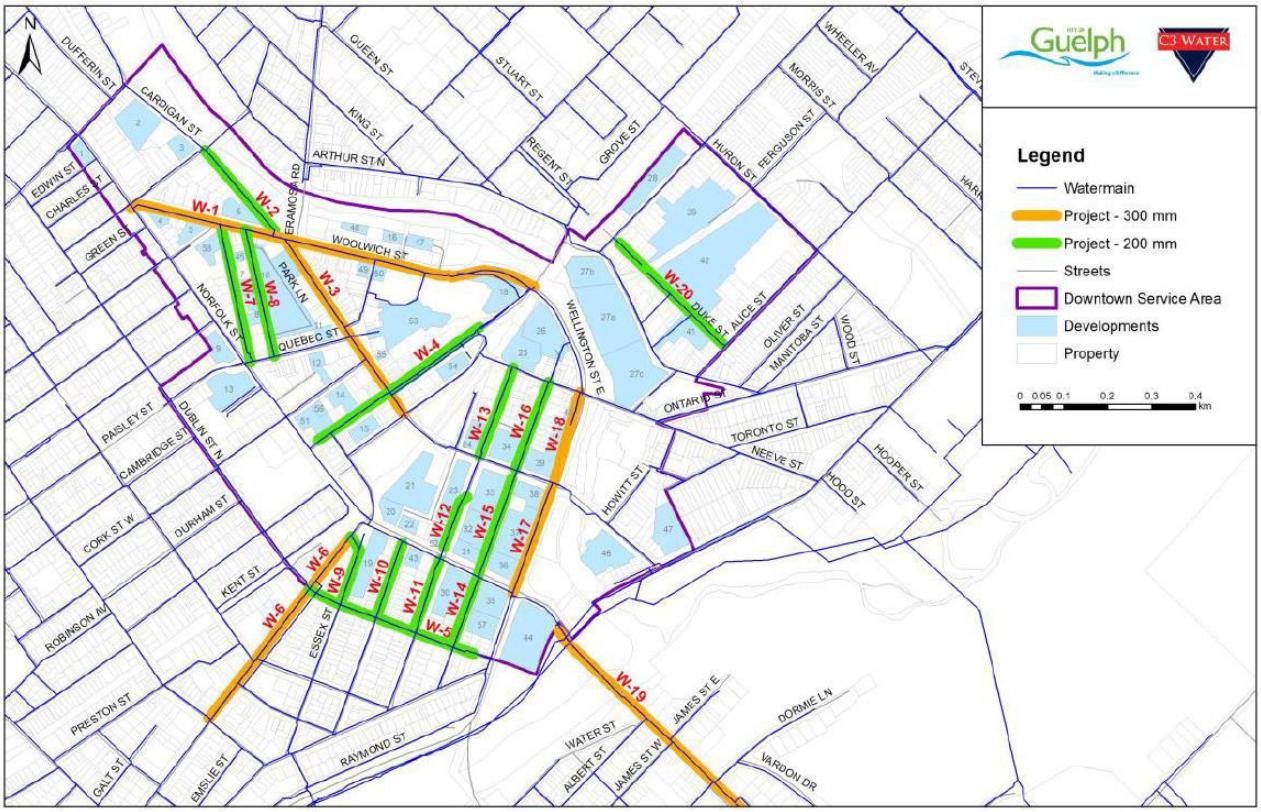

Figure 2-1 Downtown Servicing Water Projects

Table 2.6 below presents the proposed project phasing and overlap based on location.

Table 2.6 Downtown Servicing – Consolidated Project List

Project	Type	Size (mm)	Location	Overlap	Cost
2018 - 2022					
W-1	water	300	Woolwich Street	SAN-1	$875,000
W-3-N	water	300	Wyndham Street N	ST-1	$329,000
W-3-S	water	300	Wyndham Street N	SAN-2, ST-2, ST-3	$250,000
W-11	water	200	Fountain Street		$201,000
W-12	water	200	Fountain Street		$187,000
W-14	water	200	Surrey Street E		$203,000
W-17	water	300	Wellington Street E		$321,000
W-8	water	200	Baker Street		$331,000
SAN-1	sanitary	300	Norfolk Street / Woolwich Street	W-1	$1,392,000
SAN-2	sanitary	375	Quebec Street / Wyndham Street	W-3, ST-2, ST-3	$868,000
ST-1	storm	525	Wyndham Street	W-3-N	$237,000
ST-2	storm	1350	Wyndham Street	SAN-2, W-3-S	$494,000
ST-3	storm	825	Cork Street E		$122,000
TOTAL (2018-2022)					$5,810,000
2023 - 2027					
W-2	water	200	Cardigan Street		$292,000
W-4	water	200	Macdonell Street	ST-4	$546,000
W-6	water	300	Waterloo Avenue		$653,000
W-7	water	200	Yarmouth Street	ST-6	$298,000
W-9	water	200	Essex Street		$192,000
W-13	water	200	Fountain Street E		$254,000
W-15	water	200	Surrey Street E		$282,000
W-16	water	200	Surrey Street E		$307,000
W-18	water	300	Wellington Street E		$280,000
W-19	water	300	Gordon Street		$1,371,000
W-20	water	200	Duke Street	ST-9	$338,000
SAN-3	sanitary	450	Wyndham Street		$161,000
SAN-4	sanitary	300	Gordon Street/Wellington Street E		$16,000
ST-4	storm	900/525	Macdonell Street	W-4	$331,000
ST-5	storm	600/675	Carden Street		$177,000
ST-6	storm	450	Yarmouth Street	W-7	$205,000
ST-7	storm	375/450	Ontario Street		$371,000
ST-8	storm	375/450/525	Manitoba St., Oliver St., Arthur St.		$645,000
ST-9	storm	600	Duke Street	W-20	$270,000
ST-10	storm	375/450/675	Elizabeth Street, Huron Street		$597,000

Table 2.6 Downtown Servicing – Consolidated Project List

Project	Type	Size (mm)	Location	Overlap	Cost
ST-11	storm	1200 (RR)	Between Huron Street and Duke Street, Arthur Street		$2,221,000
ST-12	storm	375	Elizabeth Street		$216,000
				TOTAL (2023-2027)	$9,902,000
2027 - 2031					
W-10	water	200	Nottingham Street		$201,000
W-5	water	200	Dublin Street	ST-13	$400,000
ST-13	storm	750	Dublin Street	W-5	$314,000
				TOTAL (2028-2031)	$915,000
				TOTAL WATER	$8,111,000
				TOTAL WASTEWATER	$2,437,000
				TOTAL STORM	$6,200,000
				GRAND TOTAL	$16,748,000

2.3.3 Wellington-Clair Feedermain Municipal Class EA (AECOM, 2020)

The purpose of this EA was to determine the preferred route for a potable water feedermain between Wellington Street and Clair Road to supply the Clair ET. This is required to improve north-south transmission to meet demands in Zones 1 and 3, south of Clair Road.
Three (3) alternatives were evaluated for the north western portion and two (2) for the south eastern portion of the feedermain in the 2014 EA.
Preferred alternative:

- North: 2A
  - The preferred Feedermain route would start at Wellington Street W., cross the Speed River, travel along Municipal Street past the west side of College Heights Secondary School, cross College Ave. W. to Janefield Ave., follow Janefield Ave to Scottsdale Drive, follow Scottsdale Drive to Ironwood Rd., travel westward along Ironwood Rd. to Kortright Rd. W. and then towards Hanlon Rd as shown in Figure 2-2 below.
- South: 2
  - The preferred sourn portion of the Feedermain route travels along Hanlon Rd. across to Cowan Place towards Southgate Dr., along Laird Rd. to the Clair Tower as shown in Figure 2-3 below.

Two alternative options to the south portion were developed in 2019 based on proposed upgrades along the Hanlon Expressway. The initial south alternative 2 route is within the footprint of the planned South-East ramp on the Hanlon Parkway at Kortright Road. As such, to avoid the Hanlon and Kourtright intersection, two alternative options were developed as shown in Figure 2-4 below. The preferred option will be determined in detailed design.
The project timing is based on recommendations from the Pressure Zone 1 Infrastructure Implementation Plan (C3 Water, 2017)

- Section 1 (North) in 2023
- Section 2 (South) in 2028

The proposed pipe size is 600mm but this is to be confirmed in detailed design. Interconnectivity to the existing network throughout the feedermain has not been confirmed at this stage.

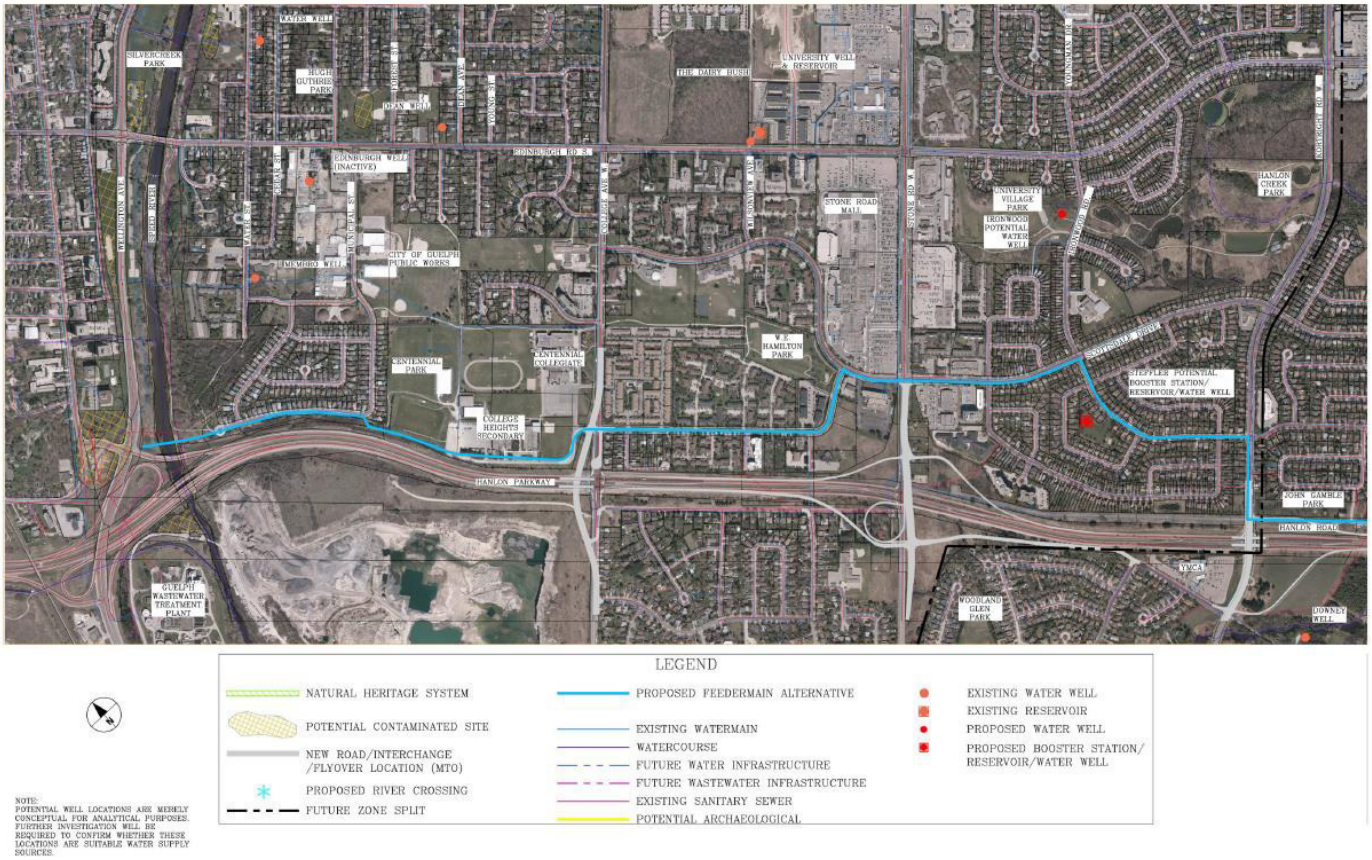

Figure 2-2 Wellington-Clair Feedermain North Section – Preferred Alternative 2A

Figure 2-3 Wellington-Clair Feedermain South Section – Preferred Alternative 2

Figure 2-4 South Section – Optional Alternatives

2.3.4 Other Studies

Other relevant water studies and projects that are currently in progress that will be referenced at part of the WWSMP are the following:

1. Zone 2 Storage EA (Ongoing)
2. Clythe Well Treatment Upgrades EA
3. Guelph Water Supply Master Plan (Ongoing)
4. Robertson BPS EA (Ongoing)
5. Paisley PS Upgrades (Ongoing)
6. FM Woods PS Upgrades (Ongoing)
7. Clair Maltby Secondary Plan Water Servicing
8. Guelph Innovation District Water and Wastewater Study

3.0 WASTEWATER SYSTEM REVIEW

3.1 Collection System

The City provided the GIS data for the sanitary sewer collection system infrastructure, reflective of the asset database as of January 2020. Relevant information includes pipe geometry such as size, invert, length, and slope, as well as material, construction date, etc. The information available from the collection system shapefiles (line and point) form the basis for the model network development.

3.1.1 Sanitary Sewer Network

The following sections summarize the data that was extracted from the provided shapefiles, the initial data quality check, and pertinent assumptions. Figure 3-1 illustrates the sanitary sewer system within the study area boundary, which is summarized in Table 3.1.

Table 3.1 Sanitary Sewer Collection System Details

Description	System
Total Length (km)	533.1
Gravity System Length (km)	510.4[1]
Pressure System Length (km)	13.5
Min. Dimension (mm)	200
Max. Dimension (mm)	1650
Oldest Pipe (year)	1902
# of GIS Pipe Segments	8565

[1] *The pipes with a diameter of 150 mm or less are excluded and are assumed private connections.*

The City's sanitary sewer system is primarily gravity-based. There are approximately 520 km of gravity sanitary sewers within the study area, with pipe diameters ranging from 200 mm to 1650 mm. Over 85% of the sanitary system has pipe diameters of 375 mm or less. The sanitary sewer system eventually discharges into the Guelph Wastewater Treatment Plant (WWTP) located in the central west-end of the City on the banks of the Speed River.

The York Trunk is the main trunk of the sanitary sewer system centrally located along the Speed and Eramosa Rivers, that flows east to west to the treatment plant. Several collectors discharge into the main trunk:

- The south of the City is serviced in its majority by a 900 - 1200 mm collector on the western limit of the City that ultimately crosses the Speed River through a siphon to connect to the WWTP. Two other smaller 675 mm and 750 mm collectors service the South-East Side of the City. They connect to the York Trunk after crossing Eramosa River through two other siphons.
- The North Side of the City is serviced by four main collectors. The North-West is serviced by a 1050 mm pipe that connects to the main trunk on Imperial Rd S with a 600 mm connection. This reduction in sewer size is irregular, however the capacities of the sewers are similar with an increased slope on the smaller 600 mm sewer. The North-Centre of the City is serviced by a 900 mm pipe that runs southernly on Dawson Rd and Alma St and ultimately connects to the main trunk at the intersection of Waterloo Rd and Wellington St. The North-East is serviced by two collectors: a 825 mm along the West shore of Speed River, and a 800 mm on York St.

Over 45% of the sanitary collection system is composed of polyvinyl chloride (PVC) pipe. The remainder is split amongst several pipe materials, including asbestos cement, reinforced concrete, non-reinforced

concrete, vitrified clay, iron, clay tile, etc. The sanitary sewers range from 1 to 100+ years old, with the older infrastructure located in the downtown core.

Data Gaps and Engineering Validation

A review of the City's GIS data for the sanitary sewer collection system infrastructure was completed to establish a base understanding of the information available. The reviewed GIS data includes three shapefiles: wwGravityMain, wwPressureMain and wwMaintenanceHole, from January 6, 2020.

The most important sewer characteristics needed for model development are the diameter, invert elevations, shape, and length. There were several (20) pipe sections of unknown dimensions and several (156) with missing inverts.

For model development, maintenance holes (MHs) become nodes for which the parameter of interest is the rim elevation. The study area contains a total of 8,235 MHs based on the GIS data. Over 25% of the rim elevations were missing from the supplied data and will have to be inferred from the LiDAR data that we understand will be provided by the City. The depth and invert information are missing for all the MHs and will be inferred from the rim elevations and invert pipe elevations.

Based on the current GIS files from January 6, 2020, there are connectivity errors affiliated with the existing attributes, with incorrect or missing MH references in the linework that require corrections to allow importation and/or simulations in the model. It is understood that the City's GIS Department is currently undertaking an asset attribute update project that is concurrently addressing many of these gaps and topology issues, with anticipated completion by end of May 2020. Receipt and direct use of this information will ensure alignment with City updates including common naming of new/missing elements. Note that assumptions and/or inference of missing characteristics is sometimes possible. Additional topographic surveying to confirm elevations may be warranted in areas where collection system upgrades are identified as required, however. The existing GIS data gaps and connectivity issues are summarized in Figure 3-2.

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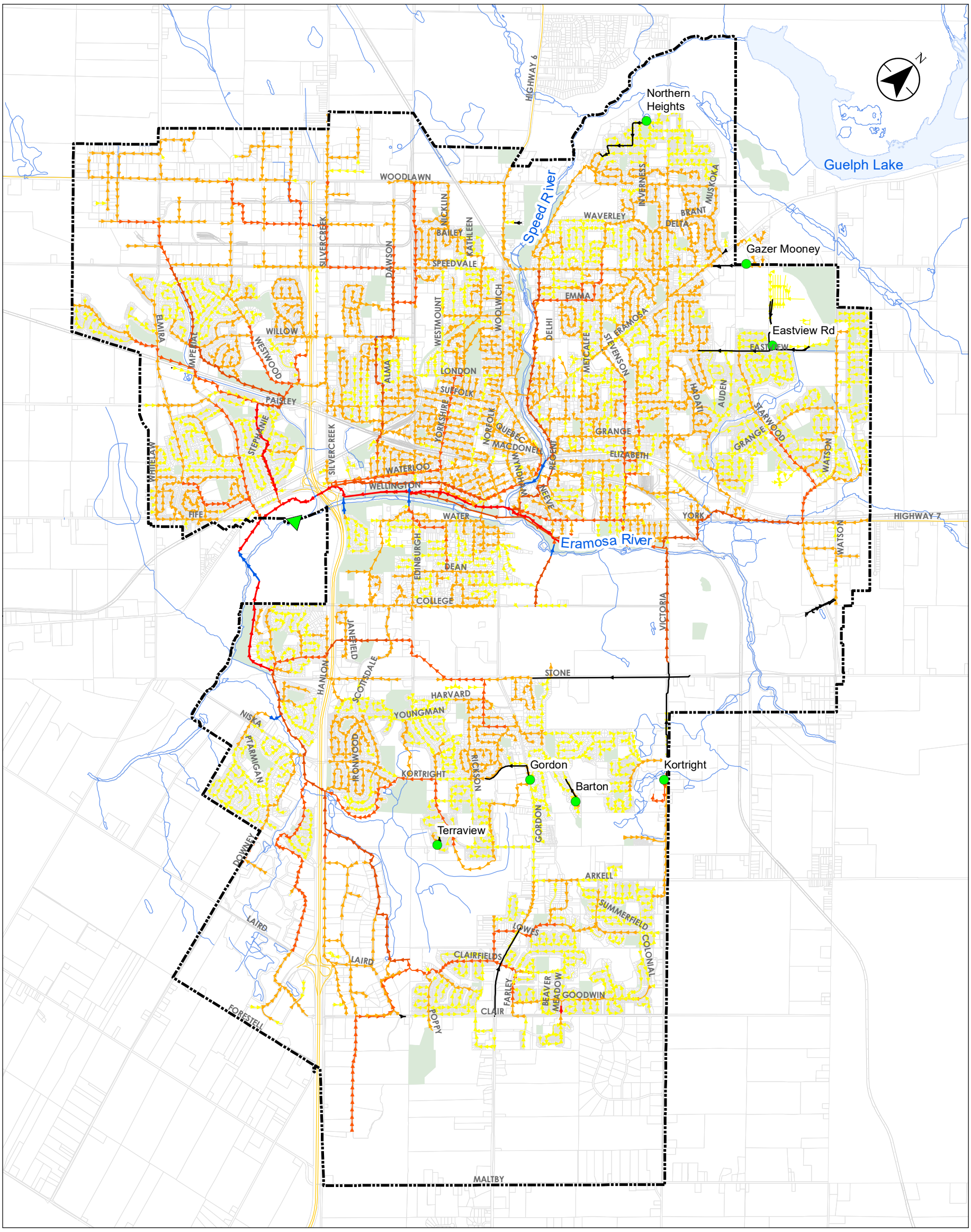

Legend

- Study Area
- Parks
- Watercourse
- Railway
- Expressway / Highway
- Major Road
- Property
- Forcemain
- Siphon

Sanitary Sewer by Diameter

- < 200 mm
- 250 mm - 375 mm
- 450 mm - 600 mm
- 675 mm - 900 mm
- > 1075 mm
- Pump Station
- Wastewater Treatment Plant

0 500 1,000 metres

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Stantec

C3 WATER

Project Location
City of Guelph

165640298

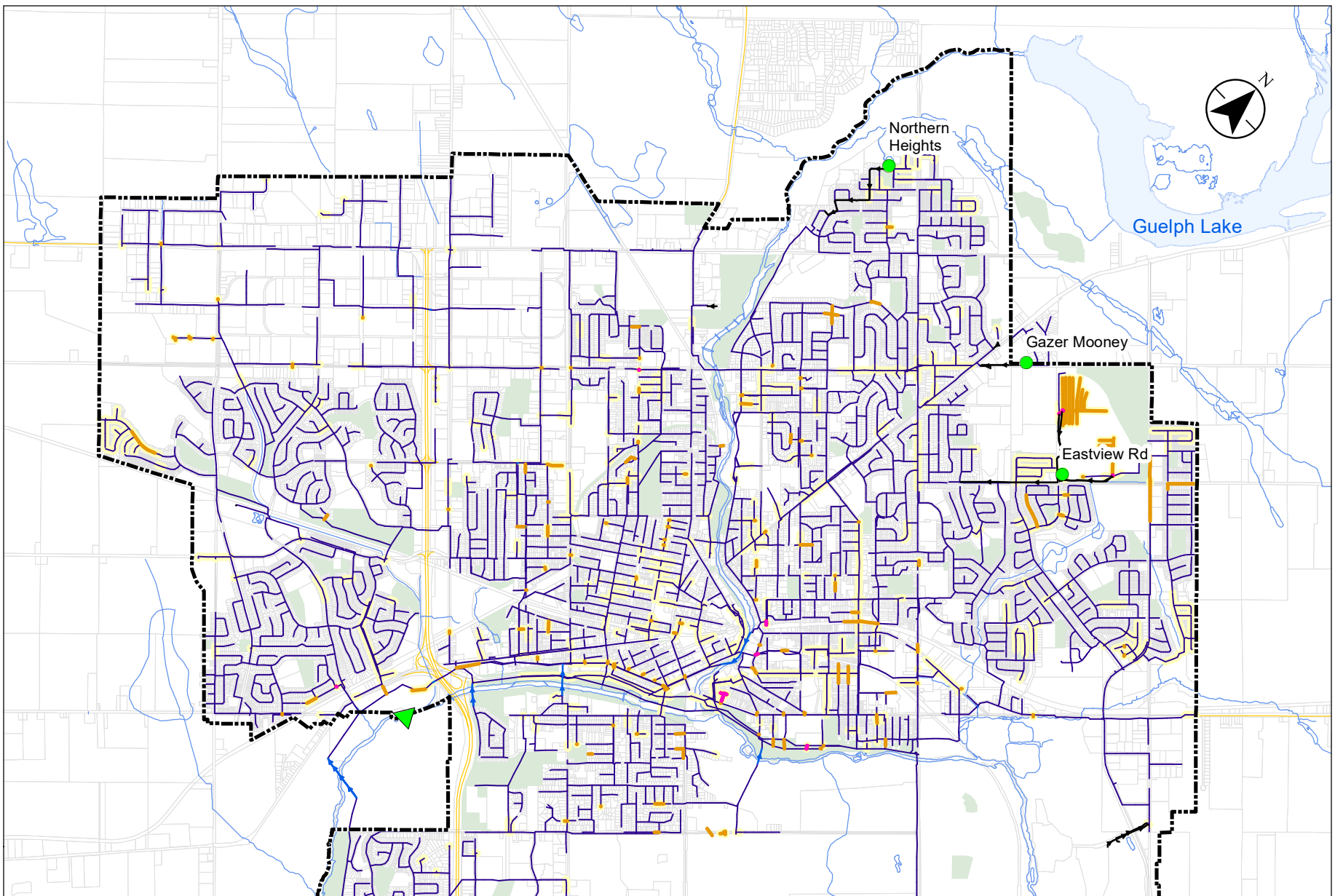
Client/Project
CITY OF GUELPH WATER AND WASTEWATER SERVICING MASTER PLAN – TM1 BACKGROUND REVIEW

Figure No.
3-1

Title
Sanitary Sewer System

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2018.



Legend

- Study Area
- Parks
- Watercourse
- Railway
- Expressway / Highway
- Major Road
- Property
- Forcemain
- Siphon
- Pump Station
- Wastewater Treatment Plant
- Sanitary Sewers with Missing Diameter & Invert
- Sanitary Sewers withMissing Diameter
- Sanitary Sewers with Missing Invert
- Sanitary Sewers with Connectivity Issue
- Sanitary Sewers

0 500 1,000 metres

1:48,717 (At Original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2018.

Stantec

Project Location
City of Guelph

165640298

Client/Project
CITY OF GUELPH WATER AND WASTEWATER SERVICING MASTER PLAN – TM1 BACKGROUND REVIEW

Figure No.
3-2

Title
Data Gap Assessment

3.1.2 Hydraulic Structures

The wwPressureMain shapefile was provided by the City. This layer provides data on two types of hydraulic structures: forcemains and siphons. Construction and design drawings of pumping stations were also provided. The location of pumping stations was also extracted from the existing sanitary sewer model. There are data gaps identified at this time that will need to be rectified during the model development task.

3.1.2.1 Pumping Stations

There are nine sanitary system pumping stations within the City. Table 3.2 provides their characteristics and understanding from the drawings provided. Private pumping stations (or pumping stations understood as privately owned) were not considered. The Old Corrections Facility Pumping Station and the receiving forcemain along Stone Rd E have been identified as abandoned. This understanding will be validated with the City and updated if necessary, before being introduced into the model. Figure 3-1 presents the location of the pumping stations.

Table 3.2 Sanitary Pump Station Characteristics

Sanitary Pump Station (Address)	Total Number of Pumps		Wet Well Invert Level (m)		Wet Well Roof Level (m)		Total Wet Well Plan Area (m^2)		Switch On Level (m)		Switch Off Level (m)		Pump Discharge (L/s)		Overflow Level (m)		Forcemain		Notes
	Initial Review	Model	Initial Review	Model	Initial Review	Model	Initial Review	Model	Initial Review	Model	Initial Review	Model	Initial Review	Model	Initial Review	Model	Initial Review	Model	
Barton (49 Robin Road)	2	2	330.20	330.20	333.00	Rim[2]: 336.6	7.1	7.069	330.90 331.10	330.90 331.10	330.50	330.50 330.50	6.3L/s @ 7.1m TDH	Pump Curve	No overflow		375m of 100mm	316m of 100mm	
Gazer Mooney[1] (672 Speedvale Ave E)	3	1 (ideal)	113.00	338.023	128.00	Rim: 345.634	91.6	8.92	114.00	339.39	113.00	339.08	2.3L/s@ 12.8m TDH (P1+P2) 14.9L/s@ 22.3 m TDH (P3)	Ideal Pump, flows up to 11.4 L/s	No overflow		425m of 100mm	435m of 100mm	
Gordon Street (1020 Gordon St)	2	1 (ideal)	327.40	327.40	336.00	Rim: 332.55	Variable Area from 2.2m^2 to 28.06m^2		328.60 328.80	328.60	327.85	327.85	15.4L/s @ 17.1m TDH	Ideal Pump	No overflow		730m of 150mm	741m of 150mm	Gordon St PS in calibration, but removed in existing conditions because decommissioned
Kortright (1005 Victoria Rd S)	3	2	321.50	321.50	335.25	Rim: 335.55	15.1	15.12	323.74 324.04 324.34	323.74 324.04	322.44	322.44 322.44	65.3L/s @ 26.8m TDH	Pump Curve	331.61		1400m of 350mm	1458m of 350mm	
Northern Heights (68 Ingram Drive)	2	2	337.65	337.65	347.09	Rim: 347.69	11.4	11.4	339.15 339.75	339.45 339.75	338.25	338.25 338.25	33.0L/s @ 38.4m TDH	Pump Curve	344.40		1010m of 350mm	1004m of 150mm	
Terraview (51 Terraview Cres)	2	2	319.74	319.44	326.40	Rim: 326.454	7.1	7.297	320.34 320.36	320.34	319.88	319.98	13.0L/s @ 9.5m TDH	Pump Curve	No overflow		146m of 100mm	153m of 100mm	
Nima Trail (Shakespeare Dr)	3	2	340.70	347.73	349.00	Rim: 350.47	10.2	10.179	341.60 341.80	348.18 348.38	341.25	348.03 348.03	13.0L/s @19.5m TDH	Ideal Pump, flows up to 11.6 L/s	346.75m		242m of 150mm	79m of 50mm	2 pumps in calibration, only 1 pump retained in existing conditions Ideal pump for existing conditions; pump curve available to be used for future conditions
Old Corrections Facility (588 Stone Rd E)	Abandoned (ab.)	Not modelled (n.m.)	ab.	n.m.	ab.	n.m.	ab.	n.m.	ab.	n.m.	ab.	n.m.	ab.	n.m.	ab.	n.m.	ab.	n.m.	PS not in model – PS and forcemain along Stone Rd E discharging into MH1750 at Stone Rd E & Colborn St has been abandoned
Landfill Eastview Rd (186 Eastview Rd)	6	1 (ideal)	Main: 352.71 West: 338.6 South: 338.6	352.71	Main: 359.25 West: 344.6 South: 344.83	Rim: 359.25	Main: 10.469 West: 4.524 South: 4.524	Main: 10.509 South: 4.524 West: 4.524	Main: 354.46 356.71 West: 341.1 South: 341.1 342.85	353.16	Main: 353.71 West: 339.35 South: 339.35	353.01	Unavailable	Ideal Pump, flows up to 19.6 L/s	Main: No West: 341.82 South: No		Main: 964.7m of 150mm West: 670.4m of 150mm South: 440.5m of 150mm	965m of 150mm	Site includes 3 PS, each contains 2 pumps; assumed that pumps work in alternating sequence (only 1 pump modelled)

[1] *Absolute elevation based on a datum.*
[2] *Ground elevation in model.*

3.1.2.2 Siphons

The sanitary sewer collection system includes thirteen siphons as shown in Table 3.3. Siphons are used to allow wastewater to flow through a pipe under low-lying areas or obstructions such as rivers, streams, dips in elevation, railroads or other utilities, where flow by gravity is impeded. Siphons achieve flow due to the difference in hydrostatic pressure, eliminating the need for pumping. The flow changes from upstream gravity flow to pressurized flow through the siphon sections. Siphons are critical structures in sewer collection systems as a failure may cause the collection system to surcharge. These structures are prone to debris build-up and given their submerged conditions can be difficult to maintain.

Most of the siphons in the City are present because of the Speed or Eramosa river crossings. A few siphons were also built to avoid a conflict with existing storm sewers. The siphons will be modelled in detail, with special attention to the collectors, to adequately represent the head losses caused by such a system.

Table 3.3 Siphon Details

Siphon	ID	Length (m)	Dimension (mm)	Constraint
Eramosa St/Stevenson St	0001	17.4	200	Utility crossing
Willow Rd/Guelph St	0002	18.9	750	Storm sewer crossing
Campbell Rd/Hwy 6	0032 0033	21.4	200 450	Watercourse crossing
Alma St/Mercer St	0037	7.0	600	Storm sewer crossing
River Speed West of WWTP	0004@0021	430.0	300 600 750	Speed River crossing
River Speed East of WWTP	0026@0031	205.0	150 250	Speed River crossing
River Speed Edinburgh Rd	0022@0024	271.0	400	Speed River crossing
River Speed Elizabeth St to Wellington St	0034@0036	428.0	450	Speed River crossing
Eramosa River Lang Way to Eramosa River Trail	0038	146.2	500	Eramosa River crossing
Stevenson St S/York Rd	0039	9.3	450	Storm sewer crossing
Beaumont Cres/Elizabeth	0040 0041	11.2	450 450	Watercourse crossing
Ptarmigan St	008 009	162.8	150 200	Watercourse crossing
Wellington St W East of WWTP	0043	31.6	1650	Watercourse crossing

3.1.3 Recent Sanitary Sewer Collection System Works

Several recent works have been completed between 2012 to 2019. These have a "Planned" status in the City's GIS sewer database. They represent approximately 18 km of new conduits (514 elements). Currently, the available data for these conduits varies. Approximately 10% of conduits have no invert, and 25% of conduits have no length. Most of the conduits are not linked to manholes. These missing elements will be required prior to including them in the model during development.

As noted, the City has an ongoing GIS Migration project with a specific Wastewater Gap Strategy. A strategy will have to be developed conjointly with the City in order to build the new sanitary model with the best data available to provide results with a high level of confidence.

3.2 Existing Wastewater Models

The City maintains a hydraulic model of its wastewater collection system. It was initially developed in XPSWMM but was migrated to InfoSWMM in 2008 as part of the original Water and Wastewater Master Plan. The model was premised on being focused on the trunk system, therefore not all pipes were simulated. For representing Dry Weather Flow (DWF), the model allocates the following flows to nodes based on a population/land-use distribution:

- a constant baseflow representing groundwater infiltration (GWI)
- a residential flow with a weekday diurnal pattern
- an industrial-commercial-institutional (ICI) flow with a weekday diurnal pattern

Dry weather flow parameters were calibrated based on data collected by eight flow meters in 2006. Future flows were based on assumed locations of growth with design parameters applied for population density by land use, and sewage generation rates.

For representing Wet Weather Flow (WWF) response, the existing wastewater model uses the RTK Unit Hydrograph method. It is comprised of three characteristic triangular unit hydrographs representing the fast response (inflow), moderate response (foundation drains), and slow response (groundwater leakage). The 9 RTK parameters were determined for each of the eight calibrated metersheds and applied to the corresponding nodes.

The coverage of the 2008 calibration was at the trunk level with only eight flow meters for the size of the system. The modelling results showed that the sewer system was performing well, and therefore no additional flow meters were installed. The last major city-wide model update was completed in 2013. The project consisted mostly of an update of the sewer network with the most recent works realized by the City since 2008. No calibration was performed during this update since no major problem had emerged since the last calibration. Additional flow monitoring is discussed in Section 3.3.

Several development projects have required updates of the City's InfoSWMM model since 2013. Those collection system updates are mostly of a local scale (i.e. not trunk level measures). Table 3.4 provides an overview of the existing wastewater models available to help with the completion of the present master plan. It remains to be seen if those models will be imported to help in the creation of a new sanitary sewer model, or simply referenced. Connectivity inferences will exist in these model that could be leveraged. Some of the development models may only be input points (i.e. Clair-Maltby), while the Downtown Secondary Plan existing system will be more heavily relied upon for both existing and future conditions.

Table 3.4 Existing Wastewater Models

Model Name	2008 InfoSWMM Sanitary Model	2013-11-21-Guelph_Sanitary_Model-60298422	Clair-Gordon (Original 2013, Updates 2017 & 2019)	NiMa 2017	Clair-Maltby	Guelph Innovation District (January 2015)	Downtown Secondary Plan (January 2020)
Scope	WW Master Plan	WW Master Plan Update	Secondary Plan	Secondary Plan	Secondary Plan	Secondary Plan	Secondary Plan
DWF methodology	Baseflow with Constant Pattern FM_B Sanitary flow: Allocated with 2006 Water Billing Data and Land use Information + Population calculated from Census, Traffic Zone Information and Landuse Data (parcel) RES with Daily Pattern FUT_RES with Daily Pattern ICI with Daily Pattern FUT_ICI with Daily Pattern FUT_II with Daily Pattern 8 Daily Patterns FM1 to FM8 Calibrated	Same Base population than 2008 study No calibration RES with Daily Pattern FUT_RES with Daily Pattern ICI with Daily Pattern FUT_ICI with Daily Pattern FUT_II with Daily Pattern 8 Daily Patterns FM1 to FM8	5 New Daily Patterns Calibrated No baseflow	New calibration: 5 Flow Meters 2 DWF periods: summer and spring 5 New Daily Patterns New DWF allocated to the model junctions using the same proportion originally used in the 2008 model	Same Base population than 2013 model No calibration	Appears to be spreadsheet loading based with 300L/cap/day + Harmon Peak Factor	Uses water consumption records and parcel-based allocations. Diurnal patterns maintained from existing 2008 MP model.
WWF methodology	RDII: RTK Unit Hydrograph 8 RTK UH with Allocated Sewershed Area at each node Calibrated WWF allocation: no information (assumption: same process than DWF, parcel based)	Same Base RDII than 2008 study No calibration	5 new RTK UH Calibrated	Calibration of RDII UH Addition of 5 New RDII UH with new calibrated RTK parameters, allocated to the same watershed area than the 2008 model	Same Base RDII than 2013 model No calibration	Appears to be spreadsheet loading based with 0.1L/s/ha applied.	RDII methodology not presented. Future growth generated flow uses the City's Development Engineering Manual with area specific rates that include peaking factors and extraneous flow allowances.
Growth methodology	Plan for a 2031 population of 175k Based on Future Traffic Zone Information Allocated like the existing population	Future population removed from the 2008 study and re-applied as per the traffic zone information	Local growth associated with plan of subdivision and site plan applications	Local growth associated with plan of subdivision and site plan applications	Same Future population than 2013 model with Addition of Clair-Maltby Lands Population	Site Statistics for Sustainability Analysis and Block Plans Official Plan	Growth (~16,000ppl) identified in the Downtown Secondary Plan (DSP) in 4 phases.
Other	Information collected from the 2013 model and the modelling report Network transferred from an existing XPSWMM model	Baseline model created in 2008 GIS update of sanitary network: 1,487 new pipes (18%) No calibration in 2013	VH-SWMM	InfoSWMM	ICM Based on the SP Report	PCSWMM A sensitivity analysis was completed using the City's area-based flow generation parameters.	Converted to PCSWMM from InfoSWMM

3.3 Flow Monitoring Study 2016-2020

The City has retained Cole Engineering to perform a Flow Monitoring Study for the 2016-2020 period. This project intends to verify existing sanitary flows with the City's sanitary network with a focus on development priority areas.

The monitoring program consists of eight sanitary sewer flow monitors and two rainfall gauges, which are distributed across two study areas: the Clair-Gordon Study Area and Downtown Focus Area. Five flow monitors and one rainfall gauge are currently deployed in the Clair-Gordon Study Area while three flow monitors and one rainfall gauge are deployed in the Downtown Area. The Clair-Gordon Study Area represents a catchment area of roughly 440 ha while the Downtown Area represents 79 ha.

Based on the data collected during the last three years, both areas showed limited infiltration due to the groundwater level. In terms of rain-derived inflow and infiltration (RDII), the Gordon-Clair Area showed little response to wet weather. However, the wet weather flow observed for the Downtown Area showed that a reasonable amount of rainfall enters the sanitary system. It is explained by the fact that the sewer network is older and therefore more prone to infiltration. Cross connections, foundation drains and roof drains are also more likely to be connected to an older sanitary network. Further detailed analysis of the flow data will be presented in the model build and calibration technical memorandum where magnitudes of rainfall events and the corresponding responses will be considered.

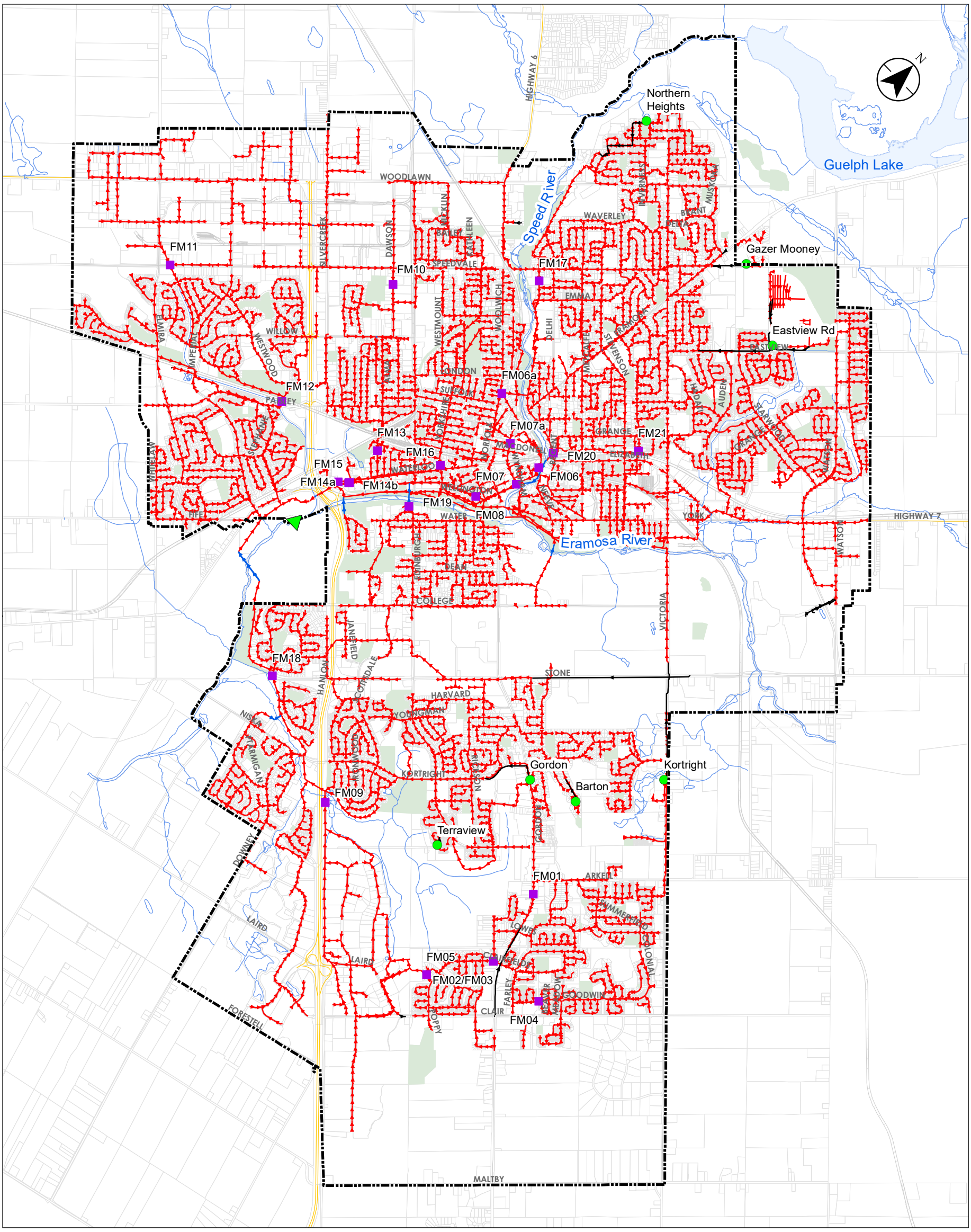
Six additional flow meters were installed by Cole in the fall of 2019 and an additional 10 in early 2020. Figure 3-3 shows the flow meters location. The data provided by those flow meters will be considered for use to recalibrate the new sanitary sewer model.

3.4 Inflow and Infiltration (I/I) Study

The City's on-going operational monitoring efforts, previous servicing studies, and historical data have all shown that there are elevated levels of wet weather flows in various parts of the system that merit further investigation and action to mitigate these impacts. Therefore, the City has initiated the inflow and infiltration (I/I) program update to the original 2012 study, intended to target these critical areas starting with Area 1: the downtown core.

The primary driver is providing capacity assurance to support near and long-term growth objectives – both for intensification and new growth. This program has the added benefits of helping to address other operational risks (e.g. sewer back-up, operating costs) while also renewing system assets. Area 1 was commenced in August of 2019, undertaking various field investigations/reviews including lot drainage inventory, smoke and dye-testing, and review of CCTV data.

The field activities were halted in spring of 2020 due to COVID-19 restrictions, and thus the I/I Remediation Plan has not been finalized. Through these investigations, data analysis and systems evaluations, the objective will be to establish cost-effective and prioritized rehabilitation, repair and/or replacement projects that will effectively "move-the-needle" on getting extraneous flow out of the system.



Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
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Project Location
City of Guelph

165640298

Client/Project
CITY OF GUELPH WATER AND WASTEWATER SERVICING MASTER PLAN – TM1 BACKGROUND REVIEW

Figure No.
3-3

Title
Flow Meter Locations

4.0 BASELINE POPULATION, GROWTH, & LANDUSE

4.1 Land Use Distribution

Figure 4-1 illustrates the generalized land use classifications within the study area boundary while the land use types are summarized in Table 4.1. This classification is based on the City of Guelph Official Plan. Figure 4-1 and Table 4.1 excludes Guelph Innovation District and Downtown Secondary Plan.

Table 4.1: General Land Use Classification

General Land Use Classification		Study Area	
		Land Use Area (ha)	Percentage of Total
Residential	Low Density	4.2[1]	0.1%
	Low Density Greenfield	366.2	6.9%
	Medium Density	291.4	5.5%
	High Density	100.9	1.9%
Mixed	Community Mixed Use Centre	99.9	1.9%
	Mixed Business	9.1	0.2%
	Mixed Office Commercial	30.8	0.6%
	Mixed Use Corridor	82.5	1.6%
Industrial/ Commercial/ Institutional	Corporate Business Park	146.3	2.7%
	Industrial	1077.0	20.2%
	Institutional / Research Park	40.0	0.8%
	Major Institutional	265.0	5.0%
	Neighbourhood Commercial Centre	48.3	0.9%
	Service Commercial	167.1	3.1%
Other	Open Space and Park	396.6	7.5%
	Reserve Lands	237.3	4.5%
	Natural Areas	1895.7	35.5%
	Utility & Special Study Area	61.2	1.1%
Total **(Excludes GID and Downtown Secondary Plan)**		5319.5	100%

[1]To be confirmed

The City's land use distribution is primarily (35.5%) classified as natural areas. Residential areas comprise 14% of the study area. Under development areas shown as low-density greenfield represents 6.9% of the total land area. institutional, commercial, and industrial areas comprise about 32% of the study area, with industrial uses dominating. Many large industrial properties are located at the North West and South West end of the City. Note that this distribution excludes the GID and Downtown areas.

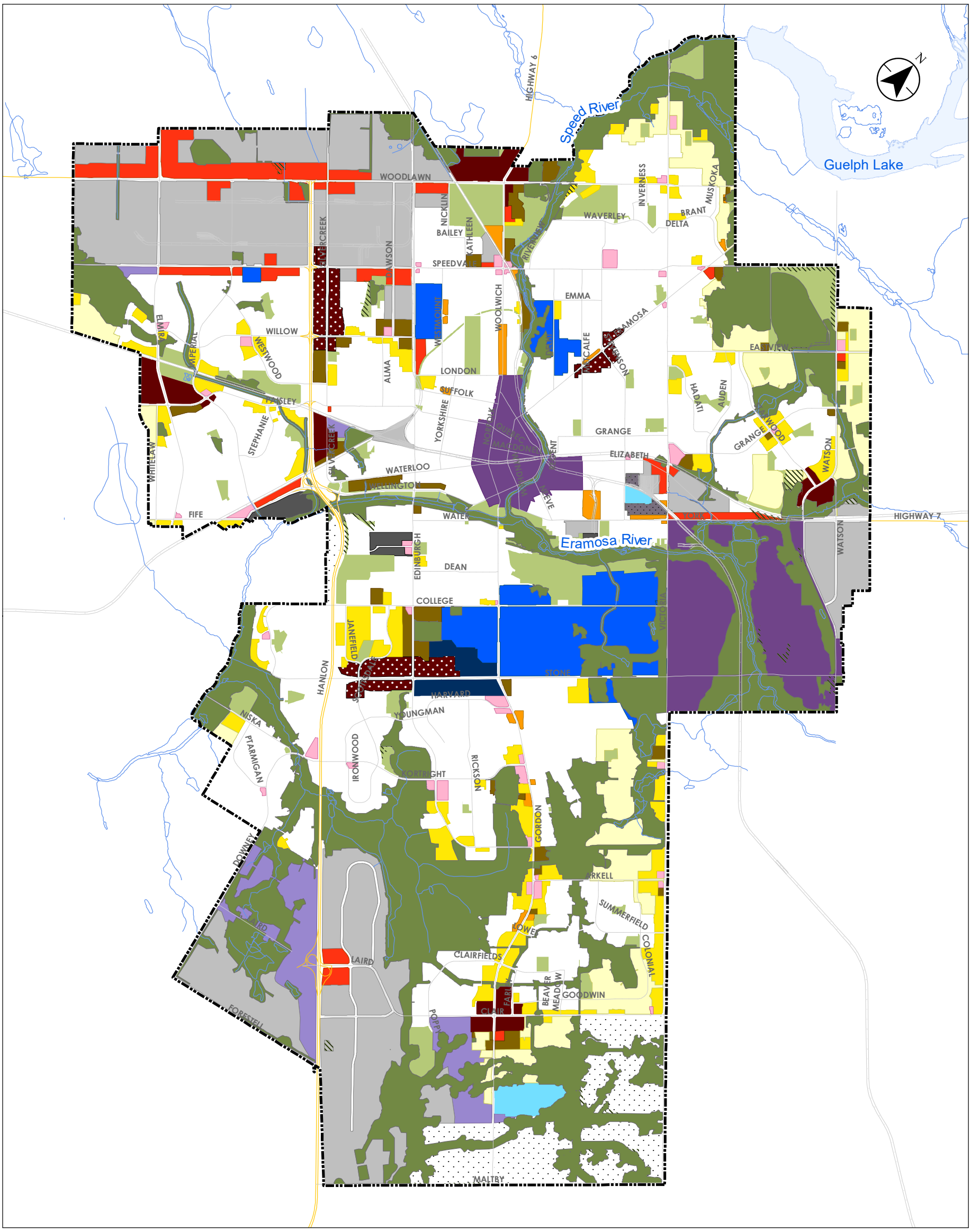
4.2 Population Distribution

The 2016 Census Data was used to assess the population distribution of the study area. Dissemination Areas (DA) were used as they provide the most precise data available.

The residential population of 131,794 distributed over the total City boundary area of 87,217 ha results in a relatively low average density of 1.5 persons/ha as the City has many non-residential areas (see Figure

4-2). The highest density areas are located in the northern part of the city (Onward Willow, Old City and Grange Hill East). In the southern part of the city, the district areas (Clairfields and Westminter Woods) centered around Victoria Rd and Claire Rd are densely populated. The maximum density from this census data analysis is 103 persons/ha.

The City's water consumption data may be used to validate the allocation of the census population findings as the model build is expected to be more discretized (i.e., on a maintenance hole basis).



Legend

- Study Area
- Watercourse
- Railway
- Expressway / Highway
- Major Road
- Wastewater Treatment Plant

Land Use Designations

- Community Mixed Use Centre
- Neighbourhood Commercial Centre
- Mixed Use Corridor
- Service Commercial
- Mixed Office Commercial
- Special Study Area
- Utility Area
- Open Space and Park
- Low Density Residential
- Low Density Greenfield Residential
- Medium Density Residential
- High Density Residential
- Secondary Plans
- Industrial
- Corporate Business Park
- Institutional / Research Park
- Major Institutional
- Mixed Business
- Regeneration Areas
- Reserve Lands
- Significant Natural Areas and Natural Areas
- Natural Areas Overlay

Notes

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Stantec

C3 WATER

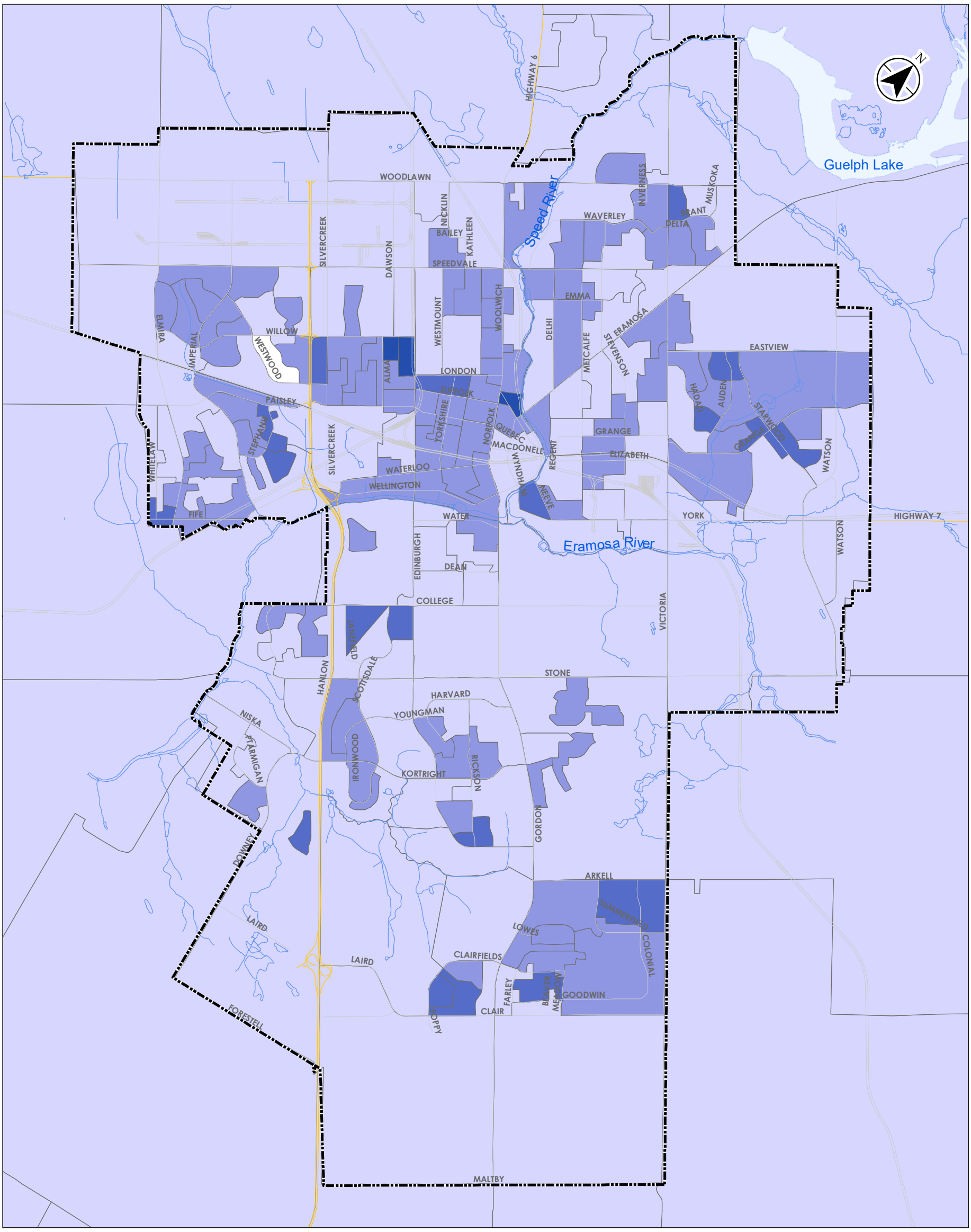
Project Location
City of Guelph

165640298

Client/Project
CITY OF GUELPH WATER AND WASTEWATER SERVICING MASTER PLAN – TM1 BACKGROUND REVIEW

Figure No.
4-1

Title
Generalized Land Use



Legend

- Study Area
- Watercourse
- Railway
- Expressway / Highway
- Major Road

Residential Density (residents/ha)

- 0 - 25
- 25 - 50
- 50 - 75
- 75 - 100
- > 100

0 500 1,000 metres

1:48,717 (At Original document size of 11x17)

Stantec

C3 WATER

Project Location
City of Guelph

165640298

Client/Project
CITY OF GUELPH WATER AND WASTEWATER SERVICING MASTER PLAN – TM1 BACKGROUND REVIEW

Figure No.
4-2

Title
2016 Residential Population Distribution

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
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5.0 EXISTING ENVIRONMENTAL CONDITIONS

A review of existing environmental conditions is undertaken during the Master Plan/Class EA process in order to help inform the development and evaluation of alternative solutions. This includes the existing socio-economic environment, natural heritage and cultural heritage environments, in addition to technical reviews and modeling of the water and wastewater infrastructure systems.

5.1 Archeological Resources

It is a requirement under the Municipal Class EA planning process to consider archaeological resources through the evaluation of alternative solutions. Much of the study area retains archaeological potential; however, the extent of this potential is currently unknown. Recommendations for further archaeological assessment will be made upon the identification of project study areas, with reference to the Ministry of Heritage, Sport, Tourism, and Culture Industries' (MHSTCI) *Criteria for Evaluating Archaeological Potential checklist*.

5.2 Built Cultural Heritage and Cultural Heritage Landscapes

It is also a requirement under the Municipal Class EA planning process to consider cultural heritage resources through the evaluation of alternative solutions. The City has a rich and diverse cultural history seen through its Built Cultural Heritage Resources, and a number of Cultural Heritage Landscapes, some of which have been identified on the City's Municipal Register of Cultural Heritage Properties. These Cultural Heritage Resources should be considered through the evaluation of alternative solutions. Upon the identification of project studies areas, screening of potential cultural heritage resources and impact assessment will be undertaken, with reference to the MHSTCI's *Criteria for evaluating potential for Built Heritage Resources and Cultural Heritage Landscapes*.

5.3 Natural Heritage

Guelph has an expansive Natural Heritage System (NHS) which comprises a significant portion of the lands within the City's corporate boundary, especially in the southern and eastern extents of the City (refer to Figure 5-1 for an overview of the NHS). The NHS includes two rivers – the Speed and the Eramosa – which run through north Guelph, and a number of locally and provincially significant wetlands and woodlands.

Guelph's Official Plan outlines policies for the Natural Heritage System, including Significant Natural Areas, Natural Areas and Wildlife Crossing Areas. While the policies do not always preclude development in these areas, they are intended to protect them from adverse impacts of development by allowing limited, compatible forms of development.

The following describe to natural features which are designated in Guelph's Official Plan as contributing to Significant Natural Areas, Natural Areas and Wildlife Crossings.

Significant Natural Areas

- Areas of Natural and Scientific Interest (ANSIs)
- Provincially and Locally Significant Wetlands
- Surface Water Features and Fish Habitat
- Significant Wildlife Habitat
- Significant Woodlands
- Significant Valleylands
- Significant Landforms
- Ecological Linkages
- Restoration Areas

Natural Areas

- Cultural Woodlands
- Habitat for Significant Species
- Other Wetlands

Schedule 2 of Guelph's Official Plan maps land use throughout the City and shows Significant Natural Areas and Natural Areas in context with adjacent and nearby land uses. Similarly, Schedule 4, 4A, 4B, 4C, 4D and 4E of the Official Plan provide an overview of the Natural Heritage System, ANSIs & Wetlands, Surface Water Features & Fish Habitat, Significant Woodlands, Significant Valleylands & Significant Landforms, and Significant Wildlife Habitat & Habitat for Significant Species, respectively.

These environmental features should be considered during the evaluation of alternative solutions. For individual projects identified through this Master Plan, site-specific environmental reviews should be conducted to confirm the presence/absence of significant natural features, habitats and resources, including Species at Risk (SAR), and to ensure appropriate mitigation measures are in place.

This Schedule is to be read in conjunction with the other Schedules and the text of The Official Plan

Guelph Lake

Speed River

Eramosa River

HANLON EXPY

C.N.R.

G.J.R.

WOODLAWN RD W

WOODLAWN RD E

SPEEDVALE AVE W

SPEEDVALE AVE E

WILLOW RD

EASTVIEW RD

LONDON RD W

PAISLEY RD

SUFFOLK ST W

PAISLEY ST

GRANGE ST

GRANGE RD

MACDONELL ST

ELIZABETH ST

WATERLOO AVE

WELLINGTON ST W

WELLINGTON ST E

WATER ST

MUNICIPAL ST

DEAN AVE

COLLEGE AVE W

COLLEGE AVE E

STONE RD W

STONE RD E

HARVARD RD

YORK RD

FIFE RD

WELLINGTON RD 124

WELLINGTON RD 31

Township of Guelph/Eramosa

Township of Puslinch

ELMIRA RD N

SILVERCREEK PKY N

IMPERIAL RD N

DAWSON RD

EDINBURGH RD N

NICKLIN RD

KATHLEEN ST

RIVERVIEW DR

WAVERLEY DR

BRANT AVE

MUSKOKA DR

VICTORIA RD N

WESTMOUNT RD

WOOLWICH ST

EMMA ST

DELHI ST

STEVENSON ST N

ERAMOSA RD

ALMA ST N

WESTWOOD RD

IMPERIAL RD S

STEPHANIE DR

SILVERCREEK PKY S

YORKSHIRE ST N

NORFOLK ST

WYNDHAM ST N

ARTHUR ST N

METCALFE ST

HADATY RD

AUDEN RD

STARWOOD DR

WATSON PKY N

WHITELAW RD

ELMIRA RD S

JANEFIELD AVE

EDINBURGH RD S

GORDON ST

STEVENSON ST S

INVERNESS ST

WATSON PKY S

WATSON RD S

FLEMING RD

YORK RD

NISKA RD

IRONWOOD RD

SCOTTSDALE DR

WOODBRIDGE DR

PFAFFMAN DR

KORTRIGHT RD W

KORTRIGHT RD E

ROCKSON AVE

HANLON CREEK BLVD

LAIRD RD

LAIRD RD W

FORESTELL RD

SOUTHGATE DR

SOUTHWATER

CLAIRFIELDS DR W

CLAIRFIELDS DR E

FAIRVIEW DR

BENTHEDGE DR

PINE RIDGE DR

SUMMERFIELD DR

COLONIAL DR

CLAIR RD W

CLAIR RD E

ARKELL RD

MALTBY RD W

MALTBY RD E

VICTORIA RD S

GORDON ST

COOKS MILL RD

HUME RD

SIDEROAD 10 N

SIDEROAD 12

SIDEROAD 10

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Legend

- City Streets
- Future City Streets
- County Roads
- Railways
- Watercourses
- Waterbodies
- Corporate Boundary
- County of Wellington Greenland System

Natural Heritage System

Significant Natural Areas

- Significant Natural Areas*
- Ecological Linkages
- Restoration Areas

Natural Areas

- Natural Areas*
- Natural Areas Overlay

Wildlife Crossings

- Deer Crossings
- Amphibian Crossings
- Other Wildlife Crossing Opportunities

***Note: Significant Natural Areas and Natural Areas designations include minimum buffers, where applicable.**

1 0.5 0 1 KM

Projection: UTM 17N NAD83
Produced by the City of Guelph
Planning Services
March 2018 Consolidation

CITY OF GUELPH OFFICIAL PLAN

SCHEDULE 4: NATURAL HERITAGE SYSTEM

Natural Heritage System

CITY OF Guelph Making a Difference

I:\gis_staging\Planning\OFFICIAL PLAN MAPPING NEW\OPA 48 March 2018 Consolidation\OPSchedule4-NHS_January2018Consolidation.mxd

APPENDIX A
Request for Information Log

Item #		Description	Received File?	Date Received	Notes
1		**GIS Layers**			
	a	Watermains	Yes	6-Jan-20	
	b	Hydrants	Yes	6-Jan-20	
	c	Valves	Yes	6-Jan-20	
	d	Streets	Yes	6-Jan-20	
	e	Parcels	Yes	6-Jan-20	
	f	Land Use	Yes	6-Jan-20	
	g	Storm Assets	Yes	6-Jan-20	
	h	Sewer Assets	Yes	6-Jan-20	
	i	Population	Yes	6-Jan-20	
	j	Water-billing records	Yes		
	k	Address points	Yes	6-Jan-20	
	l	Watercourses	Yes		
	m	Roads	Yes	6-Jan-20	
	n	Pump Stations - Barton/Gazer Mooney/Gordon/Kortright/Northern Heights/Terraview/Nima Trails/Stone/Eastview	Yes	29-May-20	Included in wastewater GIS database
	o	Flow Monitoring Locations	Yes	07-Jan-2020 16-Jul-2020	FM01-10 received in January 2020. FM report received in July 2020.
2		Digital Elevation Model	Yes	19-May-20	
3		Background Reports			
	a	Clair-Maltby Secondary Plan	Yes		
	b	Innovation District	Yes		
	c	Downtown Servicing Study	Yes	30-Mar-20	
	d	Clair-Gordon Sanitary Servicng Capacity	Yes	30-Mar-20	
	e	Wellington-Clair Feedermain Municipal Class EA	Yes	12-Mar-20	
	f	Sanitary Flow Monitoring Reports	Yes	30-Mar-20	
	g	Arkell Well Study	Yes	18-Nov-19	
4		FlowWorks Site Login	Yes	20-Dec-20	
5		City Wastewater Model	Yes	6-Jan-20	
6		Map/List of Wastewater SCADA Sites and Data Availablility	Yes	6-Jan-20	Access to actual SCADA data missing
7		Reserve Capacity Spreadsheet	Yes	10-Jan-20	
8		List of Capital Projects Since Previous Master Plan	Yes		
9		Current Capital Forecast	Yes		
10		Operation and Maintenance History	Yes		
11		Record Drawings of Special Structures & Any O&M for these	Yes	26-Mar-20	
	a	Siphons: Alma Mercer, Elizabeth-Beaumont, Eramosa River, Hanlon-Massey-Campbell, Hanlon-Wellington, Ptarmigan, Speed River - Crane Park, Speed River - Manor Park, Speed River - Municipal Street, Speed River - Neeve-Wellington, Stevenson-Eramosa, Willow-Guelph, York-Stevenson	Yes		
	b	Beaver Meadow Storage	Yes		
	c	Gosling Garden Storage	Yes		
	d	Confirm list of special structures	Yes	11-Dec-20	List of special structures confirmed by City in \\cd1004-f01\01656\active\165640298\preliminary\0_Data\1_fromCity\20201211_Adam_RFI_Items
12		Pumping Station Data	Partial	6-Jan-20	Need confirmation on the presence of some overflows, see below
	a	Barton Estates	Yes - please confirm there is no overflow	6-Jan-20 19-Aug-2020	Drawings & pump curve received - Please confirm no existing overflow
	b	Gazer Mooney	Yes - please confirm there is no overflow & how VFD operates (duties)	6-Jan-20 19-Aug-2020	Confirm if VFD operation. Unclear how this pump ramps up from low flow (2.4L/s) to design capacity (14.9L/s). Require overflow information. Drawings received - there doesn't appear to be an overflow. Please confirm. Pump name plate received & pump curve found from manufacturer
	c	Gordon Street	Yes	6-Jan-20	Confirm status of 3rd (future?) pump. Confirm upstream flow split (shown in GIS but not DWGs). City identified this will be decommisioned in the future. Included in existing conditions models and removed for future.
	d	Kortright Heights	Yes	6-Jan-20 19-Aug-2020	
	e	Landfill on Eastview	Yes	6-Jan-20 19-Aug-2020	City confirmed this location discharges leachate only. Will look to confirm rate to include as a constant Pump name plate received & pump curve found from manufacturer Also received flow data & drawings

f	NiMa Trails	Yes	6-Jan-20 22-Jun-2020 13-Aug-2020 19-Aug-2020	Drawings & pump curves received City has since then indicated that temporary PS to be maintained in the future
g	Northern Heights	YES		
h	Old Corrections Facility	YES		City confirmed this can be removed
i	Terraview	Yes - confirm that there is no overflow		Drawings received - there doesn't appear to be an overflow. Please confirm.
13	Asset Management Criticality Assessment Files	No		
14	Watermain Break History	Yes	16-Nov-20	
15	Engagement Plan Template	Yes	12-Nov-20	\\cd1004-f01\01656\active\165640298\preliminary\0_Data\1_fromCity\20201112_Reg_RFI_Items\Stakeholder Community Engagement
16	Population Forecasting Template	No		Population projections expected to be provided in Fall 2021
17	City Rain Gauges (location and depth time series)	Yes	20-Dec-19	
18	WWTP operational data	Partial	12-Nov-20	**An estimated high water level condition from January 12, 2020 was provided by Adam Geldart on August 19, 2020. Normal operating conditions remain outstanding. We have assumed flow conditions for now - this should be prioritized**
19	Thiessen Polygon Description	No (no longer needed)		
20	NiMA Analaysis Model report	Yes	10-Jan-20	Tech memo: \\cd1004-f01\01656\active\165640298\preliminary\0_Data\1_fromCity\20200110_DropBox_DPP_NiMA
21	Model calibration methodology and supporting documentation (i.e. calibration plots and/or tables)	Yes		
a	Clair-Gordon	Yes	13-Dec-20	\\cd1004-f01\01656\active\165640298\preliminary\0_Data\1_fromCity\Clair Gordon report (compressed Dec 17 edit).pdf
b	NiMa	Yes	10-Jan-20	Tech memo: \\cd1004-f01\01656\active\165640298\preliminary\0_Data\1_fromCity\20200110_DropBox_DPP_NiMA