

Appendix F

Water and Wastewater Assessment

February 2022

Regional Official Plan Review



Preface

This technical memorandum was originally submitted in November 2021 summarizing the water and wastewater technical analysis and recommendations based on the draft Preferred Growth Concept (PGC) population and employment numbers from September 2021. Since the submission of the November 2021 technical memorandum, there has been a further update to the draft Preferred Growth Concept population and employment numbers based on consultation with the area local municipalities and updated technical planning analysis. The December 2021 draft PGC population and employment numbers were presented at the November 17, 2021, Council Workshop.

An opinion on the potential impacts to Water and Wastewater Servicing recommendations presented in November 2021 from the December 2021 draft PGC numbers is presented in Appendix D of this technical memorandum. This opinion is non-quantitative and without the modelling exercise that led to the November 2021 submission. A detailed analysis (including modelling) of the Preferred Growth Concept will be undertaken in March 2022, once these latest numbers undergo further consultation within the Region and its local municipalities, and any modifications are finalized.

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PREFERRED GROWTH CONCEPT WATER AND WASTEWATER ASSESSMENT

HALTON REGION INTEGRATED GROWTH MANAGEMENT STRATEGY

NOVEMBER 2021

GMBP FILE: 717052

1. INTRODUCTION

As part of Halton Region's Integrated Growth Management Strategy (IGMS) the Region, GM BluePlan, Ellso Consulting and Paradigm are identifying and reviewing the Water, Wastewater, and Transportation requirements to support existing and future needs to 2041 and 2051.

To identify the infrastructure requirements, Hemson has developed several planning scenarios that focus growth in different areas and achieve different Regional and Local goals. This includes a total of eight (8) scenarios that were further refined into four (4) concepts that led to the development of a preferred growth concept. The preferred growth concept was reviewed to identify the potential impact the planning estimates could have on the existing and planned water and wastewater infrastructure and to develop a preliminary water and wastewater servicing plan for the Region.

This memorandum is intended to review the following:

- Summary of planning numbers for the preferred growth concept.
- Identify high-level servicing needs to meet 2041 and 2051 growth for the preferred growth concept.
- Present cost analysis of potential water and wastewater capital improvements required to service growth to 2051.

It is important to note that this analysis is representative of a high level servicing review to support the preferred growth concept planning estimates. Water and wastewater servicing concepts discussed herein are based on opportunities and constraints identified in the existing system through hydraulic modeling and desktop analysis. The servicing needs and associated costs developed for this exercise are conceptual and subject to refinement and detailed planning through the Region's next infrastructure master plan update.

2. BACKGROUND STUDIES

In 2011, Halton Region completed the Sustainable Halton Water and Wastewater Master Plan to support Regional implementation of the Official Plan Amendment (ROPA 38/39) based on the Region's Best Planning Estimates (June, 2011). The Master Plan provided a Region-wide water and wastewater servicing strategy to accommodate growth to 2031. Since that time, the development capital infrastructure requirements identified in the Master Plan have been reviewed and refined through the 2017 Development Charges Update and, more recently, through the 2022 Development Charges Update. The 2022 Development Charges Update Water/Wastewater Technical Report will serve to support the establishment of the 2022 Development Charges By-law, the purpose of which is to recover growth related costs associated with the capital infrastructure required to service new development to 2031.

The water and wastewater assessments undertaken in regard to the preferred growth concept build upon the studies noted above which defined the Regional Water and Wastewater Capital Program to 2031.

3. PREFERRED GROWTH CONCEPT

Population and employment estimates for the preferred growth concept are summarized in the following tables. Additionally, heat maps showing geographical allocation of the population and employment growth projections in both 2041 and 2051 are presented in Appendix A.

Table 1. Population Growth

Municipality	Population Growth		Employment Growth	
	(2016-2041)	(2016-2051)	(2016-2041)	(2016-2051)
Acton	2,300	3,800	1,300	1,900
Burlington	52,000	77,000	16,000	25,000
Georgetown	11,000	17,000	3,000	6,000
Halton Hills	23,000	47,000	20,000	36,000
Milton	163,000	240,000	60,000	94,000
Oakville	113,000	150,000	56,000	74,000
Total	365,000	534,000	156,000	237,000

Note: Planning estimates rounded to the closest 1,000.

Planning estimates for Acton rounded to the closest 100.

Table 2. Water Service Areas

Service Area	Population		Employment	
	2041	2051	2041	2051
Groundwater	80,000	95,000	38,000	47,000
Groundwater Transfer	24,000	25,000	2,000	3,000
Lake Based Water	786,000	914,000	370,000	424,000
New Lake Based Water	22,000	32,000	2,000	13,000
Rural	19,000	34,000	7,000	13,000
Total	931,000	1,100,000	419,000	500,000

Note: Planning estimates rounded to the closest 1,000.

Table 3. Wastewater Service Areas

Service Area	Population		Employment	
	2041	2051	2041	2051
Acton	13,000	14,000	4,000	5,000
Mid-Halton	533,000	657,000	192,000	253,000
Skyway	239,000	264,000	120,000	129,000
Oakville SE	51,000	56,000	51,000	55,000
Oakville SW	74,000	88,000	46,000	51,000
Rural	21,000	21,000	6,000	8,000
Total	931,000	1,100,000	419,000	500,000

*Notes: Planning estimates rounded to the closest 1,000.
 Mid-Halton WWTP includes the service areas of Milton and Georgetown.*

4. METHODOLOGY

Water and wastewater infrastructure, including treatment plants, storage facilities, pumping stations, and pipe networks, were analyzed for the preferred growth concept. For this analysis, the planned 2031 capacities of infrastructure were compared to the projected 2041 and 2051 growth requirements to identify the impact the planning estimates could have on the existing and planned water and wastewater infrastructure. This information was used for the assessment of the preferred growth concept and provided a high-level understanding of opportunities and constraints in the water and wastewater systems. A future water and wastewater servicing concept was developed based on the opportunities and constraints identified. The water and wastewater servicing concept accommodates the preferred growth concept population and employment estimates and provides a reasonable basis for infrastructure cost estimates. It is important to note, however, that the servicing concept and associated costs developed for this exercise are subject to refinement and detailed planning through the Region's next infrastructure master plan update.

4.1 Design Criteria and Level of Service

The water and wastewater design criteria are based on the criteria utilized in the 2022 Development Charges Update. Similarly, level of service assumptions related to the various water and wastewater infrastructure were based on the 2022 Development Charges Update and can be summarized as follows:

- **Water and Wastewater Treatment Plants** were flagged as constrained when the projected future requirement to 2041 and 2051 reached 90% of their 2031 rated capacity. The capacity threshold of 90% is commonly used as the trigger for plant expansions or other measures to reduce/manage flows at the plants.
- **Water Storage Facilities, Water Pumping Stations, and Wastewater Pumping Stations** were flagged as constrained when the projected future requirement to 2041 and 2051 exceeded their 2031 rated capacity.
- **Water Pipes** were flagged as constrained when hydraulic head losses greater than 5m/km were predicted in the 2031 pipe network under maximum day conditions in 2041 and 2051 (based on the results of hydraulic modelling and analysis).
- **Wastewater Pipes** were flagged as constrained when the projected 2041 and 2051 flow in a pipe (q) versus the full pipe capacity of the 2031 pipe network (Q), referred to as q/Q , was 0.85 or higher (based on the results of hydraulic modelling and analysis).

Detailed information about the design criteria and level of service is provided in Appendix B.

5. TECHNICAL ANALYSIS AND SYSTEM IMPACT

The analysis of the 2041 and 2051 water and wastewater infrastructure needs for the preferred growth concept was based on the assessment of the regional water and wastewater networks' performance and the ability of the different infrastructure components to accommodate the proposed increase in demands and flows due to growth. The findings of the analysis and the potential impacts to the water and wastewater systems for the preferred growth concept are summarized below.

5.1.1 Water Treatment

The results of the water treatment plant demand projections analysis are described below and summarized in Table 4.

- The lake based water system has sufficient capacity to support growth to 2041. However, the projected demands of the lake based water system reach 90% of the combined rated capacity of the plants, triggering an additional capacity expansion in the system to service growth to 2051. Expansion of the lake based water purification plants will be required in order to support overall growth in the lake based water system.
- The Acton groundwater system has sufficient capacity to supply the projected water demands in the service area to 2051. However, the projected demands of the Acton system reach 90% of the available treated water supply triggering a capacity upgrade or other water servicing solution to support growth beyond 2051.
- The Milton groundwater system does not have sufficient capacity to supply the projected water demands in the service area to 2041 and beyond. A capacity upgrade or other water servicing solution will be required in the 2031-2041 timeframe to support the significant growth projected in the Milton groundwater service area (e.g., Old Milton West, Old Milton East, parts of Milton UGC).
- The Georgetown groundwater system has sufficient capacity to service the projected demands to 2051.

Table 4. Summary of Water Treatment Plant Demand Projections Analysis

System	2041	2051
Lake based water	✓	✗
Acton GW	✓	!
Milton GW	✗	✗
Georgetown GW	✓	✓

✓ < 90% Rated Capacity

90% Rated Capacity < ! < Rated Capacity

✗ > Rated Capacity

5.1.2 Water Storage

For the majority of water pressure zones in the Region, the existing and planned water storage capacity is adequate to 2051. However, deficiencies were identified for both the 2041 and 2051 horizons for three water pressure zones:

- Zone G6L – south Georgetown (2041 Deficiency = ~2 ML; 2051 Deficiency = ~5 ML)
- Zone 250 – south Milton, east Milton, 401 Corridor, and north Oakville (2041 Deficiency = ~15 ML; 2051 Deficiency = ~35 ML)
- Zone O2 – central Oakville (2041 OK; 2051 Deficiency = ~2 ML)

Since a significant portion of the future growth is allocated in the service areas where these pressure zones are located, such as North Oakville, Milton, Halton Hills 401 corridor and Georgetown, the deficiencies are not unexpected.

Table 5. Water Storage Requirements Summary

Pressure Zone	2041	2051
Acton	✓	✓
Zone B1/O1	✓	✓
Zone B1A	✓	✓
Zone B2	✓	✓
Zone B3	✓	✓
Zone B3A/B4A	✓	✓
Zone B4	✓	✓
Zone G6G	✓	✓
Zone G6L	✗	✗
Zone M5G	✓	✓
Zone O2	✓	✗
Zone O3	✓	✓
Zone 250	✗	✗
Zone 267	✓	✓

5.1.3 Water Pumping Stations (PS)

For the majority of water pressure zones in the Region, the existing and planned pumping capacity is adequate to 2051. However, deficiencies were identified for both the 2041 and 2051 horizons for five water pressure zones. Generally, these pumping deficiencies are driven by increased transfer need required through to the 250 and G6L (303) Pressure Zones.

- Zone 250 – south Milton, east Milton, north Oakville (2041 marginally OK; 2051 Deficiency = ~60 ML/D)
- Zone G6L – south Georgetown (2041 Deficiency = ~5 ML/D; 2051 Deficiency = ~15 ML/D)
- Zone O2 – central Oakville (2041 Deficiency = ~50 ML/D; 2051 Deficiency = ~70 ML/D)
- Zone O3 – north Oakville (2041 marginally OK; 2051 Deficiency = ~55 ML/D)
- Zone 223 – north Oakville (2041 Deficiency = ~10 ML/D; 2051 Deficiency = ~15 ML/D)

It is noted that each of the above Pressure Zones are primarily focused on the eastern side of the system with flows through Oakville towards Milton and Georgetown. In addition to the identified pumping capacity deficiencies, the analysis shows that there may be challenges moving water from west to east across the system in order to service growth areas in north Oakville, Milton and Georgetown. This will be addressed through the next master plan update.

Table 6. Water Pumping Requirements Summary

Pressure Zone	2041	2051
Zone B1A	✓	✓
Zone B2	✓	✓
Zone B3	✓	✓
Zone B4	✓	✓
Zone B5	✓	✓
Zone G6L	✗	✗
Zone O2	✗	✗
Zone O3	!	✗
Zone 223	✗	✗
Zone 250	!	✗
Zone 267	✓	✓

*Note: Certain pressure districts (e.g., O1, B1, Acton, G6G, M5G) are not listed in the above table because they are supplied directly from water treatment plants rather than pumping stations. For these areas, the water treatment needs (Section 5.1.1) helps to identify whether system upgrades are anticipated.

5.1.4 Water Network

A high-level analysis of the water network was completed to identify constraints in the system. The system was assessed based on the headlosses that the watermains experienced in the hydraulic model for the different scenarios (2031, 2041 and 2051) under maximum day conditions. The table below summarizes the increases in length of watermain experiencing high headloss over each 10-year period.

Table 7. Water Network Analysis Summary

Headlosses	Diameter (mm)	2031 to 2041	2041 to 2051
		Length (km)	
>5m/km	150-400	3.6	5.4
	400-600	0.04	0.06
	600-900	1.0	0.8
	900-1200	0	0.8
	>1200	0	0
Total (km)		4.6	7.1

In addition to the above intensification driven watermain upgrades, extension of the system will also be required to service greenfield areas such as Halton Hills / Georgetown (south of 10 Sideroad), Halton Hills 401 Corridor and South Milton.

5.1.5 Wastewater Treatment

The results of the wastewater treatment plant flow projections analysis are described below and summarized in Table 8.

- The Acton WWTP and Oakville SE WWTP have sufficient capacity to service growth to 2051, however flows are projected to reach the 90% of the rated capacity of the plants by this time. A capacity expansion or other measures to reduce/manage the flows at the plants will be required to support growth beyond 2051.
- The planned Mid-Halton WWTP expansion (to 225 ML/d) will provide sufficient capacity to service growth to 2041, however flows are projected to reach 90% of the rated capacity of the plant by this time. A capacity expansion will be required to support growth beyond 2041.
- The Oakville SW WWTP does not have sufficient capacity to accommodate the projected flows to 2051. Significant growth in the service area is projected to cause flows at this plant to reach 90% of the rated capacity by 2041.
- The Skyway WWTP is projected to have flows reaching 90% of the rated capacity by 2041, which would trigger the need for a capacity expansion or other measures to reduce/manage the flows at the plant. In addition, 2051 flows are projected to marginally surpass the rated capacity of the plant.

Table 8. Summary of Wastewater Treatment Plant Flow Projections Analysis

WWTP	2041	2051
Acton	✓	!
Mid-Halton	!	✗
Oakville SE	✓	!
Oakville SW	!	✗
Skyway	!	✗

✓ < 90% Rated Capacity

90% Rated Capacity < ! < Rated Capacity

✗ > Rated Capacity

5.1.6 Wastewater Pumping Stations (WWPS)

Wastewater pumping station requirements have been analyzed for both existing pumping stations as well as proposed WWPSs in the current Regional capital program. Results show that two existing WWPSs (North and Ninth Line WWPS) are deficient by 2041.

- North WWPS (2051 Deficiency ~1,400 litres per second) – consistent with servicing additional flows from Milton and Georgetown transfer service areas.
- Ninth Line WWPS (2051 Deficiency ~100 litres per second) – WWPS is currently being upgraded to ensure capacity is available to service 2031 peak flow.

The analysis of the proposed/planned WWPSs in the Region’s current capital program (to 2031) shows that the following WWPS will require adjustments to the planned capacities:

- Drumquin (~1,500 litres per second required capacity) – consistent with projected new growth in the service area from Georgetown, Milton south east and Halton Hills 401 growth corridor.
- Lower Base Line (~940 litres per second required capacity) – consistent with projected new growth in the service area from Georgetown, Milton south-east and Halton Hills 401 growth corridor.

Table 9. Wastewater Pumping Stations Analysis

WWPS	2041	2051
Existing		
North	✘	✘
Ninth Line	✘	✘
Proposed/Planned		
Drumquin	✘	✘
Lower Base Line	✘	✘

5.1.7 Wastewater Network

A high-level analysis of the wastewater network was completed to identify constraints in the system. The system was assessed using hydraulic modeling to identify pipes where typical operating ranges would be exceeded ($q/Q > 0.85$), indicating capacity deficiencies.

Table 10. Wastewater Network Analysis Summary

Diameter (mm)	2031 to 2041	2041 to 2051
	>0.85 q/Q (Km)	
<150	-	0.1
150-250	4.7	1.5
300-400	4.5	3.7
450-675	2.7	1.4
750-900	0.6	0.8
1050-1200	0.1	0.3
>1200	0.1	0.8
Total (km)	12.7	8.6

In addition to the above intensification driven sewer upgrades, extension of the system will also be required to service greenfield areas such as Halton Hills / Georgetown (south of 10 Sideroad), Halton Hills 401 Corridor and South Milton.

5.1.8 Halton Hills Employment Area Lands Assessment

As part of the preferred growth concept assessment, the Region has requested GM BluePlan to examine two potential options for Employment Area Lands in Halton Hills shown in Figure 1.



Figure 1. Halton Hills Employment Area Lands Options

The following is a summary of observations from the water and wastewater assessment of the two options:

- In terms of water servicing, Option 2 is a simpler area to service than Option 1 would be. Option 2 is generally located between 6th Line and 8th Line, slightly north of Steeles Avenue and has ground elevations typically between 209m and 218m. These elevations can be adequately serviced by the 250 Pressure Zone and would connect to the proposed MP-6641 watermain along Hornby Road north of Steeles. Once connected to the already planned Master Plan project, only local servicing would be needed to support the area.
- Option 1 is located north of 5 Sideroad, between 10th Line and Winston Churchill and has ground elevations typically between 211m and 230m, with a significant portion above 220m. This is important because above 220m, the area would not be able to be serviced by the 250 Pressure Zone. This means that it would either require a localized booster pump station to support high elevation areas or it would need additional watermains to be serviced from the north down (from Georgetown – G6L).
- Similarly, in terms of wastewater servicing, both areas can be serviced by extension of the existing/planned wastewater system noting that Option 2 could be a simpler area to service than Option 1. This is due to the fact that Option 2 is in closer proximity to existing and planned wastewater infrastructure than Option 1.
- Both options are located within the Mid-Halton WWTP and Lake Water Based service areas and do not have an impact on treatment capacities.

6. WATER AND WASTEWATER SERVICING COST ASSESSMENT

A cost assessment was completed to determine a high-level cost of the potential water and wastewater capital improvements required to service growth to 2051. The cost assessment was based on the infrastructure requirements identified during the technical analysis (Section 5) and overall high-level servicing strategies as depicted in Appendix C – Conceptual Water & Wastewater Servicing Strategies.

The cost analysis includes a compilation of Class 4 cost estimates for vertical and linear water and wastewater infrastructure consistent with the previous master planning cost estimating approach and utilizing current unit rates for linear and vertical infrastructure projects. The expected accuracy range for this analysis presents a typical variation of -30% and +50% consistent with Class 4 cost estimates as per the Association for the Advancement of Cost Engineering (AACE) Cost Estimate Classification System.

Table 11 summarizes the cost assessment for water and wastewater infrastructure. It is important to note that costs developed are in present day dollars (2021\$) and have not been escalated to account for inflation or construction increases in the future.

Table 11. Summary of Cost Assessment for Water and Wastewater Infrastructure

Period	2031-2041 (2021 dollars)	2041-2051 (2021 dollars)
Water		
WTP	\$ 94 - 201 M	\$ 107 - 228 M
Storage	\$ 35 - 75 M	\$ 52 - 110 M
Pumping	\$ 40 - 85 M	\$ 92 - 196 M
Linear	\$ 38 - 81 M	\$ 41 - 89 M
Wastewater		
WWTP	\$ 279 - 598 M	\$ 62 - 132 M
Pumping	\$ 67 - 144 M	\$ 79 - 169 M
Linear	\$ 67 - 143 M	\$ 132 - 289 M
Total Capital Cost	\$ 669 - 1326 M	\$ 564 - 1209 M

Note: Totals may not add up due to rounding.

In addition to the capital cost for water and wastewater infrastructure, Table 12 presents a high-level cost for the operation and maintenance of water and wastewater infrastructure required from 2031-2051.

Table 12. O&M Cost for Water and Wastewater Infrastructure

Period	2031-2041 (2021 dollars)	2041-2051 (2021 dollars)
Water	\$ 7 - 16 M	\$ 48 - 102 M
Wastewater	\$ 28 - 60 M	\$ 78 - 168 M
Total	\$ 35 - 76 M	\$ 126 - 270 M

7. SUMMARY OF KEY FINDINGS AND CONCLUSIONS

As part of Halton Region's Integrated Growth Management Strategy, a review of the Preferred Growth Concept was completed to identify the impact the growth forecast to 2041 and 2051 could have on the existing and planned water and wastewater infrastructure. The results of the analysis and impacts to the water and wastewater system can be summarized as follows:

Water Treatment

The water treatment plant demand projections analysis leads to the following observations:

- The lake based water system (as of 2031) will have sufficient capacity to support growth to 2041. However, additional capacity will be required to support growth to 2051.
- The Acton and Georgetown groundwater systems have sufficient capacity to service the projected demands to 2051. However, the projected demands of the Acton system reach 90% of the available treated water supply triggering a capacity upgrade or other water servicing solutions to support growth beyond 2051.
- The Milton groundwater system does not have sufficient capacity to supply the projected water demands in the service area to 2041 and beyond. A capacity upgrade or other water servicing solutions will be required by 2031 to support significant growth projected in the Milton groundwater service area.

Water Storage

- For the majority of water pressure zones in the Region, the existing and planned water storage capacity is adequate to 2051. However, deficiencies were identified for both the 2041 and 2051 horizons for three water pressure zones (Zone G6L, Zone 250 and Zone O2).
- These water storage needs are consistent with projected growth located in areas such as North Oakville, Milton, Halton Hills 401 corridor and Georgetown.

Water Pumping

- For the majority of water pressure zones in the Region, the existing and planned pumping capacity is adequate to 2051. However, deficiencies were identified for both the 2041 and 2051 horizons for five water pressure zones (Zone 250, Zone G6L, Zone O2, Zone O3 and Zone 223).
- These pumping capacity needs are consistent with projected growth located in areas such as North Oakville, Milton, Halton Hills 401 corridor and Georgetown.

Water Network

- As part of the water network analysis, linear upgrades were identified both for intensification needs and for greenfield needs.
- Intensification driven upgrades were determined by identifying water mains that are projected to experience headlosses greater than 5m/km with the projected future demands.
- In addition to the intensification driven linear upgrades, extension of the system will also be required to service greenfield areas such as Halton Hills / Georgetown (south of 10 Sideroad), Halton Hills 401 Corridor and South Milton.

Wastewater Treatment

The wastewater treatment plant flow projections analysis leads to the following observations:

- The wastewater system (as of 2031) will have sufficient capacity to support growth to 2041 except for the Oakville SW Wastewater Treatment Plant (WWTP).
- Projected flows to 2051 identify the need for a capacity expansion or other measures to reduce/manage flows at the Mid-Halton, Skyway and Oakville SW wastewater treatment plants.
- The Acton and Oakville SE WWTPs have sufficient capacity to service the projected flows to 2051. However, the projected flows in the service areas reach 90% of the rated capacity of the plants triggering a capacity upgrade or other measures to reduce/manage the flows at the plants to support growth beyond 2051.

Wastewater Pumping

- Wastewater pumping requirements were identified for North WWPS and Ninth Line WWPS.
- Analysis of the proposed/planned WWPS shows that Drumquin and Lower Base Line WWPS would require adjustments to the planned station capacities.

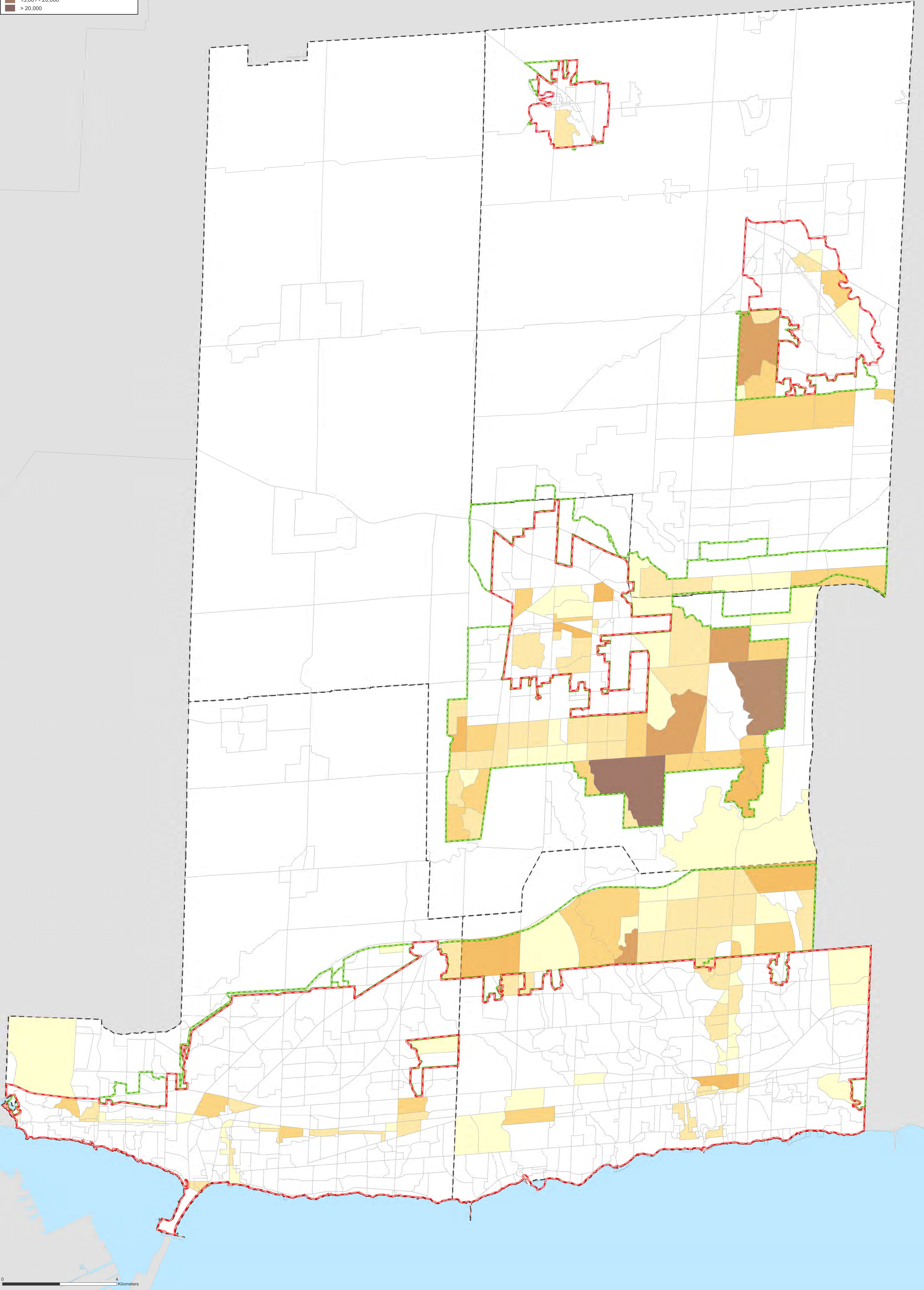
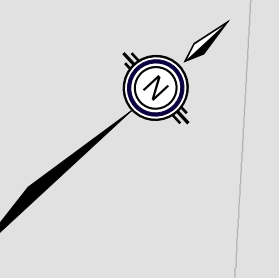
Wastewater Network

- As part of the wastewater network analysis, linear upgrades were identified both for intensification needs and for greenfield needs.
- Intensification driven upgrades were determined by identifying pipes where typical operating ranges would be exceeded indicating capacity deficiencies in the system.
- In addition to the above intensification driven sewer upgrades, extension of the system will also be required to service greenfield areas such as Halton Hills / Georgetown (south of 10 Sideroad), Halton Hills 401 Corridor and South Milton.

APPENDIX A: HEAT MAPS

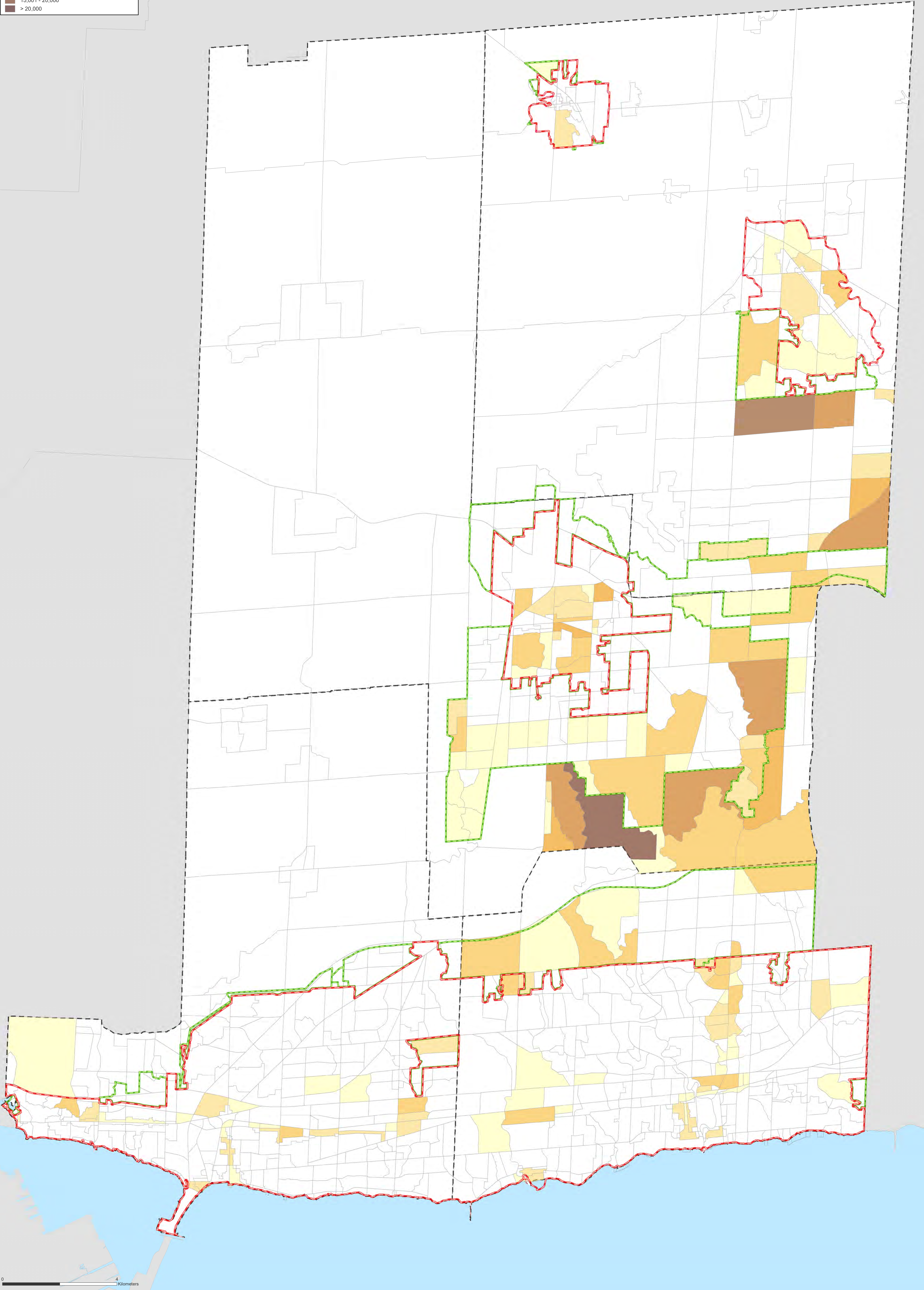
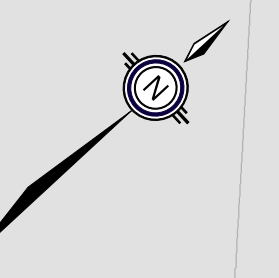
Preferred Growth Concept Option 1 (2031-2041)

Growth Scenario	General Features
<= 250	Municipal Boundaries
251 - 500	Waterbody
501 - 1,000	Regional Built Boundary
1,001 - 2,500	DC By-law
2,501 - 5,000	Greenfield Boundary
5,001 - 10,000	
10,001 - 15,000	
15,001 - 20,000	
> 20,000	



Preferred Growth Concept Option 1 (2041-2051)

Growth Scenario	General Features
<= 250	Municipal Boundaries
251 - 500	Waterbody
501 - 1,000	Regional Built Boundary
1,001 - 2,500	DC By-law
2,501 - 5,000	Greenfield Boundary
5,001 - 10,000	
10,001 - 15,000	
15,001 - 20,000	
> 20,000	



0 4 Kilometers

**APPENDIX B:
DESIGN CRITERIA AND LEVEL OF SERVICE**

Appendix B - Design Criteria & Level Of Service

Water

Water design criteria and level of service are based on 2022 Development Charges Update as follows:

Table B.1 Water Design Criteria

Water Design Criteria			
Per Capita Criteria	Residential	265	L/cap/d
	Employment (Blended) ¹	225	L/emp/d
Peaking Factor	Max Day (Lake based)	1.9	
	Max Day (Groundwater)	1.6	
	Peak Hour	3.0	
Level of Service	Target Pressure Range	40-100	psi
	Hydraulic Losses	<5.0	m/km
Storage	MECP Calculated A+B+C where: A = 25% x Max Day Demand B = Fire Storage as per MECP Table C = 25% x (A+B)		
Pumping	Pumping firm capacity to provide max day demand for downstream pressure zones Firm capacity based on capacity with largest pump out of service		
Treatment	Treatment plant upgrade triggers at 90% of rated treatment capacity		

¹The planning scenarios do not break down Employment into separate categories of Industrial, Commercial, Institutional. As such, a blended ICI per capita criteria was used.

Wastewater

Similar to water, the design criteria and level of service is based on the 2022 Development Charges Update as follows:

Table B.2 Wastewater Design Criteria

Wastewater Design Criteria			
Per Capita Criteria	Residential	360	L/cap/d
	Employment (Blended) ¹	310	L/emp/d
Peaking Factor	Harmon	2-4	
Extraneous Flow	Peak Extraneous Flow	0.286	litres per second/ha
Level of Service	q/Q	<0.85	
Pumping	<ul style="list-style-type: none"> • Pumping firm capacity to provide peak wet weather flow for drainage area • Firm capacity based on capacity with largest pump out of service 		
Treatment	Treatment plant upgrade triggers at 90% of rated treatment capacity		

¹The planning scenarios do not break down Employment into separate categories of Industrial, Commercial, Institutional. As such, a blended ICI per capita criteria was used.

**APPENDIX C:
CONCEPTUAL WATER & WASTEWATER SERVICING STRATEGIES**

Conceptual Servicing

- 2031 Strategy
- 2031-2051 New / Expanded Strategy

Planned Projects to 2031

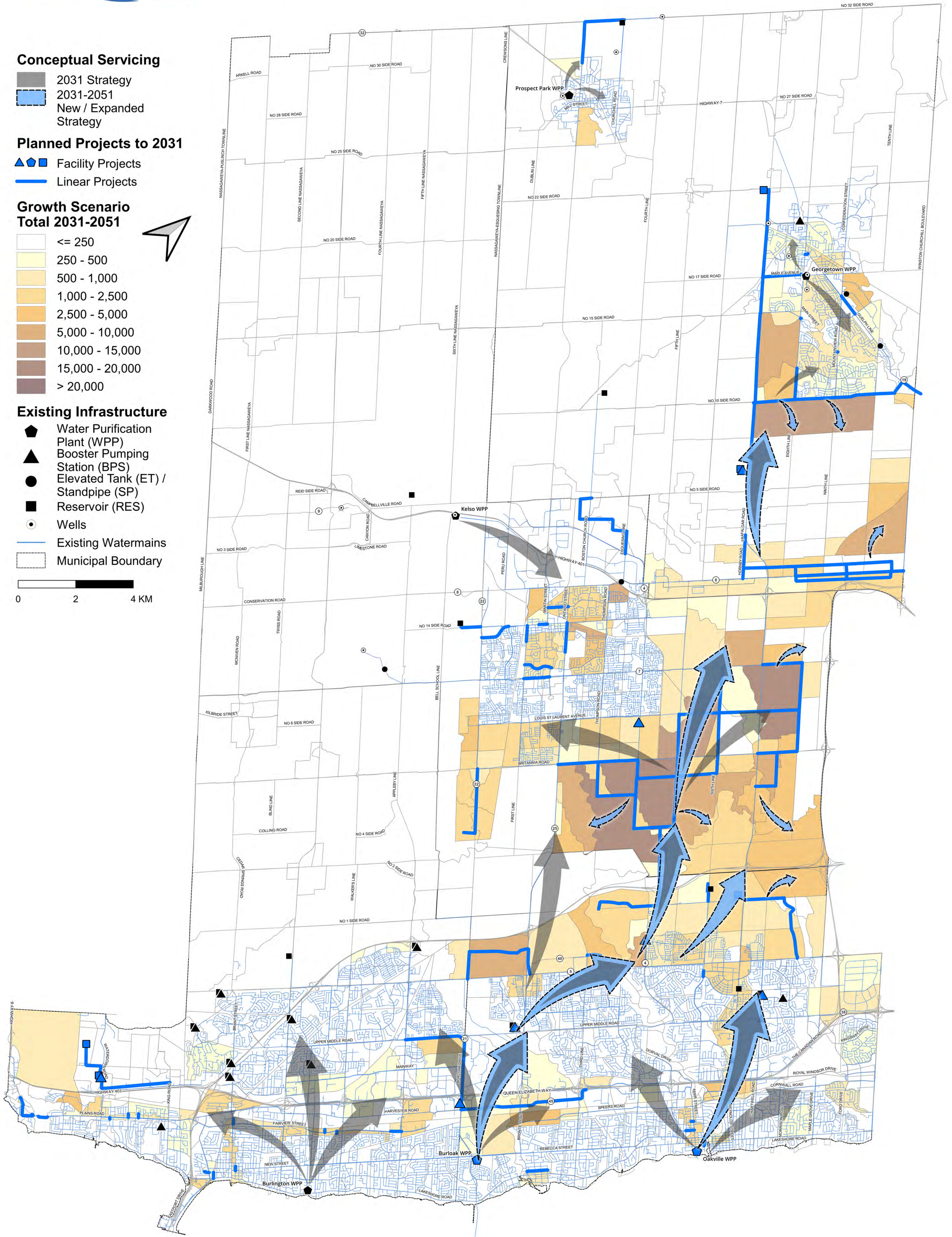
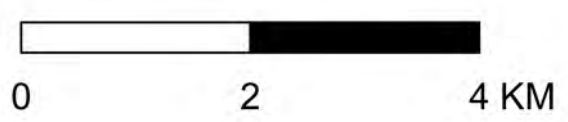
- Facility Projects
- Linear Projects

Growth Scenario Total 2031-2051

- <= 250
- 250 - 500
- 500 - 1,000
- 1,000 - 2,500
- 2,500 - 5,000
- 5,000 - 10,000
- 10,000 - 15,000
- 15,000 - 20,000
- > 20,000

Existing Infrastructure



- Water Purification Plant (WPP)
- Booster Pumping Station (BPS)
- Elevated Tank (ET) / Standpipe (SP)
- Reservoir (RES)
- Wells
- Existing Watermains
- Municipal Boundary




Conceptual Servicing

-  2031 Strategy
-  2031-2051 New / Expanded Strategy

Planned Projects to 2031





-  Facility Projects
-  Linear Projects

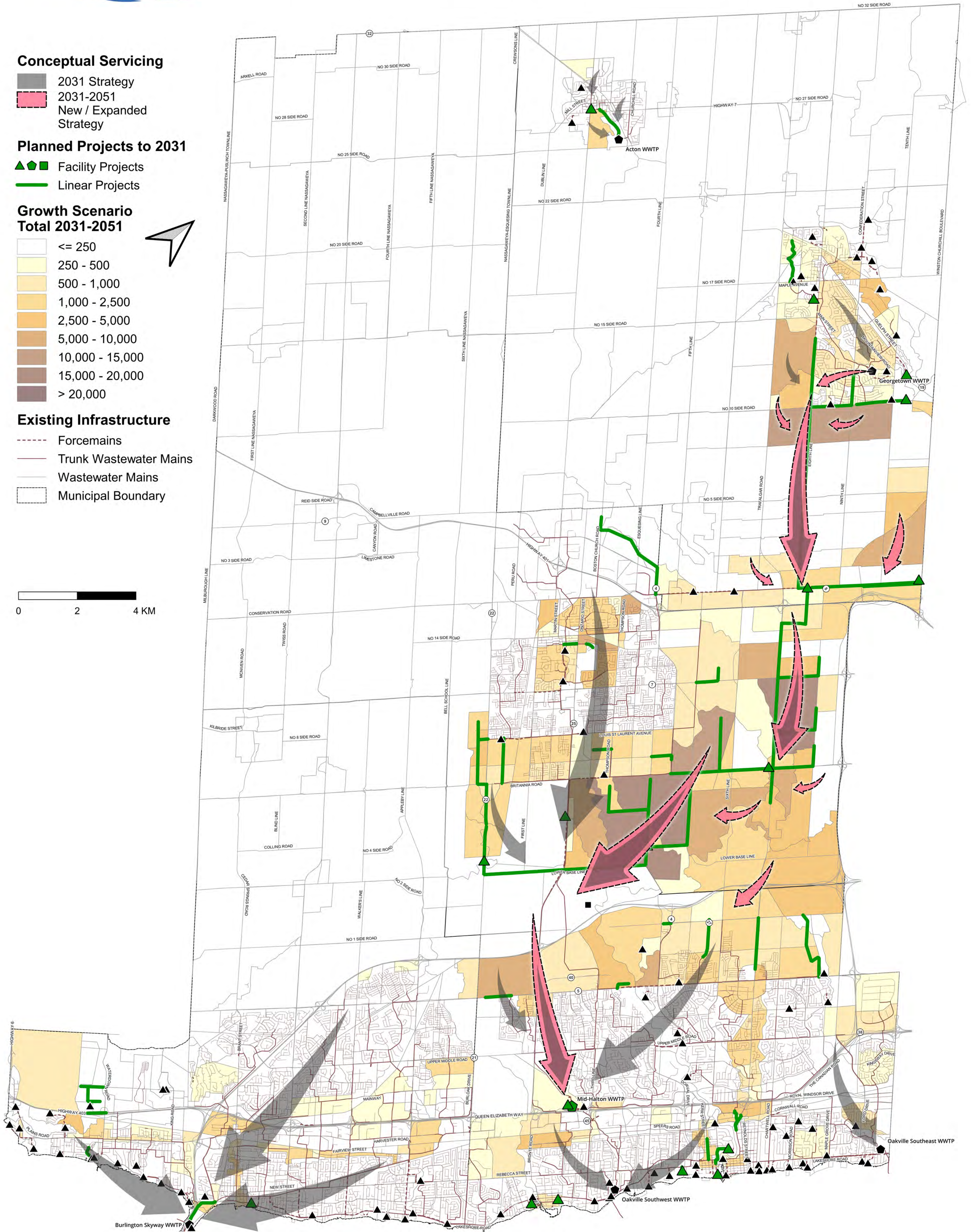
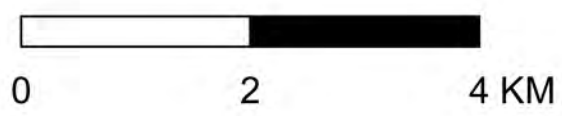
Growth Scenario Total 2031-2051

-  <= 250
-  250 - 500
-  500 - 1,000
-  1,000 - 2,500
-  2,500 - 5,000
-  5,000 - 10,000
-  10,000 - 15,000
-  15,000 - 20,000
-  > 20,000



Existing Infrastructure

-  Forcemains
-  Trunk Wastewater Mains
-  Wastewater Mains
-  Municipal Boundary



**APPENDIX D:
OPINION LETTER ON IMPACTS TO WATER AND WASTEWATER
SERVICING FROM THE DRAFT DECEMBER 2021 PGC
POPULATION AND EMPLOYMENT NUMBERS**



Date: 1/12/2022 File: 717052
 To: Russell Mathew – Hemson Consulting
 From: Chris Campbell – GM BluePlan
 Project: Halton Region IGMS
 Subject: Opinion Letter on Impacts to Water and Wastewater Servicing from the Draft December 2021 PGC population and employment numbers

LETTER OF OPINION

The purpose of this letter is to present an opinion on the potential impacts to the infrastructure analysis and recommendations, as presented in the IGMS Water and Wastewater Technical Memorandum (herein referred to as the September 2021 technical analysis), from the December 2021 release of draft Preferred Growth Concept (PGC) population and employment numbers for the Halton Region Integrated Growth Management Strategy (IGMS).

1. Introduction

Since the submission of the September 2021 technical analysis, there has been a further update to the draft Preferred Growth Concept (PGC) based on consultation with the area local municipalities and updated technical planning analysis - the December 2021 draft PGC population and employment numbers. These numbers were presented at the November 17, 2021, Council Workshop.

In order to meet the current IGMS timelines and reporting to Regional Council, it has been decided that the December 2021 draft PGC numbers be assessed on a non-quantitative basis without the rigorous modelling exercise that comprised the September 2011 analysis. A detailed analysis (including modelling) of the December 2021 draft PGC numbers will be undertaken in March 2022, once these latest numbers undergo further consultation within the Region and its local municipalities, and any modifications to the numbers are finalized.

2. Planning Estimates Review

December 2021 draft population/employment numbers for the Preferred Growth Concept are summarized in the following tables.

Table 1. Population Growth (December 2021 draft PGC population/employment numbers)

Municipality	Population Growth		Employment Growth	
	(2016-2041)	(2016-2051)	(2016-2041)	(2016-2051)
Burlington	52,000	77,000	18,000	27,000
Halton Hills	39,000	63,000	24,000	42,000
Milton	144,000	221,000	56,000	91,000
Oakville	130,000	175,000	58,000	77,000
Total	365,000	534,000	156,000	237,000

Note: Planning estimates rounded to the closest 1,000.
 Totals may not add up due to rounding

Table 2. Water Service Areas (December 2021 draft PGC population/employment numbers)

Service Area	Population		Employment	
	2041	2051	2041	2051
Groundwater	78,000	89,000	39,000	45,000
Groundwater Transfer	21,000	22,000	2,000	3,000
Lake Based Water	781,000	880,000	366,000	416,000
New Lake Based Water	29,000	87,000	5,000	27,000
Rural	22,000	23,000	7,000	10,000
Total	931,000	1,100,000	420,000	500,000

Note: Numbers rounded to the closest 1,000.
 Totals may not add up due to rounding.

Table 3. Wastewater Service Areas (December 2021 draft PGC population/employment numbers)

Service Area	Population		Employment	
	2041	2051	2041	2051
Acton WWTP	12,000	13,000	4,000	4,000
Mid-Halton WWTP	539,000	667,000	196,000	253,000
Skyway WWTP	241,000	264,000	120,000	129,000
Oakville SE WWTP	48,000	52,000	47,000	55,000
Oakville SW WWTP	70,000	81,000	45,000	51,000
Rural	21,000	22,000	7,000	8,000
Total	931,000	1,100,000	420,000	500,000

Notes: Numbers rounded to the closest 1,000.

Mid-Halton WWTP includes the service areas of Milton and Georgetown.

Totals may not add up due to rounding.

Changes to the Draft PGC population and employment numbers can be summarized at a high-level as follows:

- In general, the December 2021 Draft PGC numbers show the same population and employment growth to 2041 as well as 2051 Region-wide totals as the September 2021 Draft PGC numbers.
- The projections for several areas across the Region were modified with most significant changes in Milton, the Trafalgar Corridor in Oakville and North Oakville area. Less significant changes were observed in parts of Burlington and Halton Hills.
- Overall, approximately ~118,000 people+jobs were re-allocated amongst geographic areas in the Region. Some changes are considered minor (less than 500 people+jobs), but others are higher and have the potential to have an impact on servicing.
- There are some significant changes in the projected growth at the municipality level such as:
 - Additional population growth (~24,000) in Oakville to 2051.
 - Reduction of population growth in Georgetown (~ -6,000) and Milton (~ -20,000) to 2051.
 - Additional employment growth (~2,000) in Burlington and (~3,000) in Oakville to 2051.
 - Reduction of employment growth (~ -1,000) in Halton Hills and (~ -4,000) in Milton to 2051.
- Changes in the water service area were limited to additional population (~6,000) and employment (~3,000) growth in the lake based water service area. Similar reduction was observed in the groundwater service areas.
- The most significant change in the wastewater service areas was observed in the Mid-Halton Wastewater Treatment Plant (WWTP) catchment area with an increase of population growth (~18,000). Employment growth was increased in Mid-Halton (~2,000) and Skyway (~1,000) WWTP catchment areas with a reduction of employment growth in the Oakville SE WWTP catchment area (~4000). Other service areas experienced minor +/- adjustments.

3. Potential Impact of Draft Preferred Growth Concept Population and Employment Numbers Change on Water and Wastewater Infrastructure Assessment and Recommendations from September 2021 Technical Analysis

Water Treatment

- Previous projected water demands generated from the September 2021 draft PGC numbers for the lake based water system reached 90% of the combined rated capacity of the plants, triggering a capacity expansion in the system to service growth to 2051. The December 2021 draft PGC numbers project further additional growth in the lake based water system by 2051 compared to the September 2021 draft PGC numbers and will further increase the capacity expansion required for the lake based water system. This is a result in a shift of growth projections from the ground water systems to the lake based system.

- Previous projected water demands generated from the September 2021 draft PGC numbers for the Acton system reached 90% of the available treated water supply triggering a capacity upgrade or other water servicing solution to support growth beyond 2051. A reduction of growth observed in the December 2021 draft PGC numbers when compared to the September 2021 draft PGC numbers for the Acton groundwater service area will potentially alleviate some future capacity constraints maintaining the projected water demands below the 90% of the available treated water supply.
- The Milton groundwater system does not have sufficient capacity to supply the projected water demands in the service area to 2041 and beyond for either the September 2021 draft PGC projections or the December 2021 draft PGC projections. It is noted that reduced growth observed in the December 2021 draft PGC numbers when compared to the September 2021 draft PGC numbers for the Milton groundwater service area will potentially alleviate some future capacity constraints, but most likely be insufficient to alleviate the full capacity deficiency previously identified.
- The Georgetown groundwater system has sufficient capacity to service the September 2021 draft PGC projected demands and the December 2021 draft PGC projected demands to 2051.

Water Storage

The September 2021 technical analysis identified deficiencies for both the 2041 and 2051 horizons for three water pressure zones: Zone G6L, Zone 250 and Zone O2. Based on a high-level review of the December 2021 draft PGC numbers, it is expected that water storage deficiencies in these pressure zones will continue. Moreover, additional growth allocation in North Oakville will require further review of Pressure Zones O3 and 223 (part of combined service of 250 and 211) to better assess potential impacts on storage capacity in these areas.

Water Pumping Stations

The September 2021 technical analysis identified deficiencies for both the 2041 and 2051 horizons for five water pressure zones: Zone G6L, Zone O2, Zone O3, Zone 223 and Zone 250. Based on a high-level review of the December 2021 draft PGC numbers, it is expected that water pumping deficiencies in these pressure zones will continue but may change in order of magnitude; therefore, further detailed analysis is recommended.

Water Network

A detailed water network analysis supported by hydraulic modelling has not been completed at this time for the December 2021 draft PGC numbers. However, based on the changes in location and timing observed, it is anticipated that there will be impacts to phasing/timing of linear infrastructure including advancing servicing to new areas that were previously projected to develop at a later time (e.g. area north east of the Halton Hills 401 corridor).

Wastewater Treatment

- The Acton WWTP flows generated from the September 2021 draft PGC numbers were previously projected to reach 90% of the rated capacity of the plant by 2051. A reduction of growth observed in the December 2021 draft PGC numbers when compared to the September 2021 draft PGC numbers for the Acton WWTP service area will potentially alleviate some future capacity constraints maintaining the projected wastewater flows below the 90% of the rated capacity of the plant.
- A capacity expansion (beyond the planned 225 ML/d) was previously identified using the September 2021 draft PGC numbers for the Mid-Halton WWTP. The additional growth projected in the December 2021 draft PGC numbers in the Mid-Halton service area will increase the capacity expansion required for this plant to support growth beyond 2041.
- Previous projected flows generated from the September 2021 draft PGC numbers for the Oakville SE WWTP reached 90% of the rated capacity of the plant triggering a capacity expansion or other measures to reduce/manage the flows at the plants to support growth beyond 2051. Based on the December 2021 draft PGC numbers, reduction of population and employment growth in the WWTP service area has the potential to reduce the projected flows of this plant below the capacity trigger.
- Significant growth in the Oakville SW WWTP service area was previously projected using the September 2021 draft PGC numbers to cause flows at this plant to reach 90% of the rated capacity by 2041. Based on the December 2021 draft PGC numbers the reduction of growth in the WWTP service area will most likely be insufficient to alleviate or avoid the capacity requirements previously identified.



- Using the previous September 2021 draft PGC numbers the Skyway WWTP was projected to have flows reaching 90% of the rated capacity by 2041, which would trigger the need for a capacity expansion or other measures to reduce/manage the flows at the plant. The minor increase in employment growth in the service area as projected in the December 2021 draft PGC numbers will most likely not have a significant impact on previous recommendations for this plant.

Wastewater Pumping Stations (WWPS)

The September 2021 technical analysis identified deficiencies for two existing pumping stations: North WWPS and Ninth Line WWPS. Based on a high-level non-quantitative review of the December 2021 draft PGC numbers, it is anticipated that these deficiencies will continue. In addition, previous analysis identified further refinement of capacities for the proposed/planned Drumquin and Lower Base Line WWPS. Based on the changes in location observed in the December 2021 draft PGC numbers, there is potential that the proposed capacities of these stations will need to be further refined and potentially reduced. Further detailed analysis of existing and planned WWPS is recommended.

Wastewater Network

A detailed wastewater network analysis supported by hydraulic modelling has not been completed at this time for the December 2021 draft PGC numbers. However, based on the changes in location and timing observed, it is anticipated that there will be impacts to phasing/timing of linear infrastructure including advancing servicing to new areas that were previously projected to develop at a later time (e.g., area north east of the Halton Hills 401 corridor).

4. Conclusions

Based on this high-level non-quantitative review of the December 2021 draft PGC numbers, it is anticipated that there will be a number of impacts to the recommendations in the IGMS W/WW Technical Memo (September 2021 technical analysis), primarily in the order of magnitude, extent and phasing of the infrastructure requirements to 2051. The extent or magnitude of the potential impacts to water and wastewater infrastructure cannot be defined at this time and will be reviewed in detail once modelling of the final PGC population and employment numbers is undertaken in March 2022.

It is important to note the water and wastewater servicing strategies and improvements carried forward through the IGMS W/WW Technical Memo (November 2021) and in this opinion letter, are conceptual and define a snapshot in time. These recommendations will be further refined and confirmed during the Water and Wastewater Master Plan Update, which is scheduled to start in 2022.

Yours Truly,

GM BluePlan Engineering Ltd.

Per:

A handwritten signature in black ink, appearing to read 'Chris Campbell', written over a light blue grid background.

Chris Campbell, MTP, MCIP, RPP, MRTPI
Infrastructure Planning