Prepared By:

The Regional Municipality of Halton

2017 Development Charges Water/Wastewater Technical Report

GMBP File: 715027

September 2016

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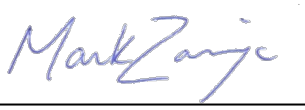

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2017 DEVELOPMENT CHARGES WATER/WASTEWATER TECHNICAL REPORT:

THE REGIONAL MUNICIPALITY OF HALTON

SEPTEMBER 2016

GMBP FILE: 715027

EXECUTIVE SUMMARY

Background

In 2011, Halton Region completed the Sustainable Halton Water and Wastewater Master Plan (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 from 2011 to 2031.

The development capital infrastructure requirements identified in the Master Plan served as one of several key inputs into the establishment of Halton Region's 2012 Development Charges By-law. As the 2012 Development Charges By-law expires in September 2017, a number of technical updates to the Master Plan and its associated Capital Implementation Plan have been undertaken and consolidated into this report entitled "2017 Development Charges Water and Wastewater Technical Report".

The 2017 Technical Report will serve to support the establishment of the 2017 Development Charges By-law and follows the same overall approach as the previous 2012 DC Update Technical Report. The objective of the 2017 Development Charges (DC) Water/Wastewater Technical Report (Technical Report) is to provide the basis for developing costs and capital implementation timing of water and wastewater projects required to service population and employment growth across Halton Region from 2017 to 2031 according to the 2011 Best Planning Estimates (BPEs). The 2016 and 2031 population and employment projections for Halton Region, based on the BPEs, are summarized in Table ES1.

Table ES1 – Best Planning Estimates Population and Employment Projections (2016 to 2031)

	Total 2016 Population	Total 2016 Employment	Total 2031 Population	Total 2031 Employment
Burlington	175,438	98,710	186,169	105,349
Halton Hills	57,922	20,744	91,885	41,962
Milton	124,645	62,553	228,084	114,330
Oakville	198,205	106,485	246,400	128,359
Total	**556,210**	**288,493**	**752,537**	**390,000**

Water and Wastewater Technical Review

A technical review of the water and wastewater system and capital projects identified in the 2011 Master Plan was undertaken which focused on the following key elements:

- re-evaluating per capita water consumption and wastewater generation rates based on historical trending observed in recent years;
- re-assessing existing and future water and wastewater system capacities;
- comparing actual growth uptake with planned theoretical growth projections;
- updating and recalibrating water and wastewater hydraulic models with current system field data;
- identifying opportunities to further optimize water and wastewater system infrastructure; and
- validating the long range Water and Wastewater Capital Implementation Plan to 2031 (i.e. project scope, timing, need and cost) as identified in the 2011 Master Plan, including the potential cancellation/deferral of previously identified infrastructure projects and/or the identification of new infrastructure projects.

The outcomes of the technical review completed since the 2011 Master Plan have been incorporated into this 2017 Development Charges Water and Wastewater Technical Report and are summarized below.

i) Updated Water and Wastewater Design Criteria

The water and wastewater per capita design criteria have been updated to reflect decreasing per capita residential water consumption and wastewater generation trending observed over the last several years. The updated design criteria are summarized in Table ES2

Table ES2 – Water and Wastewater Design Criteria

	Average Day Water Design Criteria	Average Daily Flow Wastewater Design Criteria - Plant	Average Dry Weather Flow Wastewater Design Criteria - System
L/cap/d (Res)	265	360	215
L/emp/d (Non-Res)	225	310	185

ii) Updated Water and Wastewater Capital Implementation Plans

The *BPEs* and updated Design Criteria were used to develop the water and wastewater capital implementation plans that are required to provide the projected water demands from the supply sources to the planned growth and to convey the projected wastewater flows from the planned growth to the treatment facilities.

The Region's water and wastewater hydraulic models were used to confirm and validate the infrastructure project needs outlined in the 2017-2031 capital implementation plans. These models reflect the most recent infrastructure information and have been calibrated based on the best available water demand and wastewater flow data. Some capital project updates and modifications have occurred due to changing system conditions and/or new technical information.

In addition, several water and wastewater projects have been reprogrammed from the 2012-2016 time period into the 2017 to 2031 Capital Implementation Plan. This reprogrammed infrastructure (~ $228M) was comprised of:

- Projects originally identified to service development areas in Boyne West, North Oakville East, Derry Green – Phase II and Highway 407 West Employment areas which did not proceed within the originally planned 2012-2016 timeframe; and
- Projects no longer required within the 2012-2016 timeframe due to lower water system demands associated with the recent trends in historical water consumption (decreasing).

iii) Water and Wastewater Servicing Strategy Revisions

The technical work completed a focused operational review of a number of 2011 Master Plan water and wastewater servicing strategies. The review outcomes noted below have been incorporated into the 2017-2031 Capital Implementation Plan:

- Wastewater flow diversion from the Milton Wastewater Treatment Plant to the Mid-Halton Wastewater Treatment Plant. This flow diversion strategy, which includes ultimate decommissioning of the Milton Wastewater Treatment Plant, will return 16 Mile Creek to a more natural state and achieve wastewater treatment economies of scale.
- Realignment of water pressure zone boundaries in the Town of Milton and the Town of Oakville (Zones 3, 4 and 5) to optimize customer water pressure in these areas.
- The diversion of wastewater flow from the Grandview Wastewater Pumping Station (west area of Burlington). The flow diversion will be achieved by extending the wastewater forcemain from the Bridgeview Wastewater Pumping Station to the Plains Road Trunk Sewer.

iv) Updated Capital Project Cost Estimation

Infrastructure capital projects identified within the 2017 to 2022 timeframe have been updated to reflect best available estimated costs to construct as of January 1, 2017 using a unit costing approach based on recent tender information compiled over the past several years.

Projects previously identified (2012 DC Bylaw) within the 2023 to 2031 timeframe have been inflated using a cost index from 2012 to 2017 dollars in accordance with the Statistics Canada Quarterly Non-Residential Construction Price Statistics used in DC Bylaw 48-12.

Where available, cost estimates from Municipal Class Environmental Assessment Studies or preliminary/detailed design have been applied throughout the 2017-2031 Capital Implementation Plan.

The methodology for preparing the cost estimates for this Technical Report is similar to that of the 2012 DC Update and 2011 Master Plan.

Summary of Capital Implementation Plans

The total cost of the Water and Wastewater Capital Implementation Plan is approximately $1,161M from 2017 to 2031. Table 13 & Table 15 of this Technical Report present the Water and Wastewater Development Capital Implementation Plans (2017 to 2031) respectively; inclusive of phasing and cost (in 2017 dollars).

Below is a list of significant water projects which have been identified for implementation over the next 15 years.

Significant Water Projects 2017-2031:

- Georgetown Lake-based Booster Pumping Station and Feedermain (Zone 6)
- Georgetown Groundwater to Lake-based Servicing Transfer (Stewarttown, Georgetown South and Georgetown Southwest)
- Oakville/Milton Water Pressure Zone Realignment (Zones 3,4, 5) and alterations to Eighth Line, Fourth Line and Neyagawa Pumping Stations
- Boyne East Britannia Trunk Watermain

- Burloak Water Purification Plant – Phase II Expansion
- Oakville Water Purification Plant Rerating
- Georgetown Lake Based Storage Reservoir and Feedermain (Zone 6)
- Zone 4 Reservoir Expansion
- Burloak Booster Pumping Station and Feedermain (Zone 2)
- Wyecroft Zone 2 Interconnecting Trunk Watermain
- Kitchen Booster Pumping Station Expansion
- Neyagawa Booster Pumping Station Expansion

Below is a list of significant wastewater projects which have been identified for implementation over the next 15 years.

Significant Wastewater Projects 2017-2031:

- Mid-Halton Wastewater Treatment Plant – Phase VI / VII Expansion
- Georgetown Eighth Line and Trafalgar Road Trunk Sewer
- Britannia Road Wastewater Pumping Station, Twinned Forcemain, East Trunk Sewer
- Boyne West Internal Trunk Sewer
- Maple Avenue Trunk Sewer and Skyway Wastewater Treatment Plant Inlet Sewer Upsizing
- West River Wastewater Pumping Station Upgrades
- Junction Street Wastewater Pumping Station Upgrades
- Acton Wastewater Treatment Plant Inlet Trunk Upsizing and Agnes Street Pumping Station Upgrades
- Mid-Halton Wastewater Treatment Plant – Phase VIII / IX Expansion (Design only) and Wastewater Pumping Station Expansion at Mid-Halton Wastewater Treatment Plant
- Tremaine Road Wastewater Pumping Station and Forcemain
- South Milton Fourth and Fifth Line Trunk Sewers
- Lower Baseline Wastewater Pumping Station and Twinned Forcemain

Categorizing the Capital Implementation Plans According to the DC By-Law

The recommended projects in the Capital Implementation Plans are categorized according to the DC By-Law structure based on three main categories:

- **Capacity** – project supports Region wide needs at major treatment facilities or trunk linear infrastructure
- **Greenfield** – project supports growth outside of the current urban built boundary
- **Built Boundary** – project supports growth within the current urban built boundary

The following Table ES3 summarizes the Water and Wastewater Development Capital Implementation Plans by DC Category for 2017-2031.

Table ES3 – Water and Wastewater Development Capital Implementation Plan Summary by DC Category

Program	Capacity	Greenfield	Built Boundary	**Total**
Water	$193,137,000	$308,352,000	$33,623,000	$535,112,000
Wastewater	$207,170,000	$352,343,000	$66,176,000	$625,689,000
Total	**$400,307,000**	**$660,695,000**	**$99,799,000**	**$1,160,801,000**

Categorizing the Capital Implementation Plans According to the DC Policy Framework

The water and wastewater development capital implementation plans were developed in order to service the planned growth in Halton Region. However, additional categorization is required in order establish the DC eligible share of the capital implementation plans according to the DC policy framework. This process is consistent with the 2012 DC Update.

The DC policy framework accounts for the following elements:

- **Residential & Non-Residential** – The portions of the capital implementation plans that are associated with servicing water demand and wastewater flow generated by Residential growth and Employment growth.
- **Benefit to Existing** – The portions of the capital implementation plans that also provide a benefit to existing users of water and wastewater services.
- **Post Period Benefit** – The portions of the capital implementation plans that also provide a benefit to growth that will occur beyond 2031.

Consistent with the 2012 DC Update, the total capital cost was categorized in order establish the DC eligible share of the capital implementation plan according to the DC policy framework as outlined in Tables ES4 and ES5.

Table ES4 – Water Development Capital implementation Plan Summary by DC Policy Framework

DC Category	Total Estimated Cost (2017$)	Benefit to Existing (2017$)	Post Period Benefit (2017$)	DC (2017$)	Res (2017$)	Non-Res (2017$)
Capacity	$193,137,000	$2,142,000	-	$190,995,000	$143,249,000	$47,746,000
Greenfield	$308,352,000	$1,349,000	$43,597,000	$263,406,000	$194,922,000	$68,484,000
Built Boundary	$33,623,000	$7,919,000	-	$25,704,000	$19,537,000	$6,167,000
TOTAL	**$535,112,000**	**$11,410,000**	**$43,597,000**	**$480,105,000**	**$357,708,000**	**$122,397,000**

Table ES5 – Wastewater Development Capital implementation Plan Summary by DC Policy Framework

DC Category	Total Estimated Cost (2017$)	Benefit to Existing (2017$)	Post Period Benefit (2017$)	DC (2017$)	Res (2017$)	Non-Res (2017$)
Capacity	$207,170,000	$71,170,000	$18,000,000	$118,000,000	$87,319,000	$30,681,000
Greenfield	$352,343,000	-	-	$352,343,000	$260,733,000	$91,610,000
Built Boundary	$66,176,000	$24,664,000	-	$41,512,000	$31,549,000	$9,963,000
TOTAL	**$625,689,000**	**$95,834,000**	**$18,000,000**	**$511,855,000**	**$379,601,000**	**$132,254,000**

The water and wastewater development capital implementation plans are represented graphically within Figure ES1 and ES2, respectively.

Halton Region
2017 Development Charges
Water and Wastewater
Technical Report

Halton Region
Water Development Capital Implementation Plan (2017-2031)
Figure ES1

BluePlan ENGINEERING
715027-9-W
October, 2016
Data Source: Halton Region
Scale: 1:55,134 | NAD 1983 UTM Zone 17N

Legend

Existing Wastewater Infrastructure

- Wastewater Pumping Station (WWPS)
- Wastewater Treatmentl Plant (WWTP)
- GravitySewer
- Forcemain

DC Projects

Linear

- DC Project - Sewer
- DC Project - Forcemain
- Project Constructed/Imminent/Funded - Sewer
- Project Constructed/Imminent/Funded - Forcemain
- Intensification Project - Sewer

Pumping Station

- DC Project - WWPS
- Project Constructed/Imminent/Funded - WWPS
- Intensification - WWPS

Plant

- DC Project - WWTP
- Project Constructed/Imminent/Funded - WWTP
- WWTP Drainage Area
- Lakebased Service Area Transfer
- Regional Boundary

N

Acton WWTP

Georgetown WWTP

Milton WWTP

Mid-Halton WWTP

Oakville SE WWTP

Oakville SW WWTP

Skyway WWTP

Halton REGION

2017 Development Charges
Water and Wastewater
Technical Report

Halton Region
Wastewater Development Capital Implementation Plan (2017-2031)
Figure ES2

BluePlan ENGINEERING

715027-8-WW
September, 2016
Data Source: Halton Region
Scale: 1:55,000 | NAD 1983 UTM Zone 17N

1. OVERVIEW

1.1 Background

The 2017 Development Charges (DC) Water/Wastewater Technical Report (Technical Report) provides the basis for developing costs and capital implementation timing of water and wastewater projects to service growth across Halton Region from 2017 to year 2031. The servicing strategies and capital implementation plans identified in this Technical Report are based on the 2011 Sustainable Halton Water and Wastewater Master Plan (2011 Master Plan), as well as more recent technical studies undertaken in specific areas. The findings of these technical studies were considered and incorporated when applicable during the preparation of this Technical Report. Some of these technical studies include:

- Acton WWTP Servicing Strategy Review
- Milton WWTP Servicing Strategy Review
- Oakville and Milton Water Distribution System Pressure Zone Review
- Burlington West Wastewater Servicing Review
- Oakville Water Purification Plant Capacity Expansion Class Environmental Assessment Study
- Water/Wastewater Design Criteria Review
- Water/Wastewater Hydraulic Model Calibration and Update

The capital implementation plans for water and wastewater, including the projects' scope, cost and capital implementation timing, presented in this report were developed initially based on the work undertaken as part of the 2011 Sustainable Halton Water and Wastewater Master Plan and the 2012 Development Charges Update Technical Report. This program was further refined using new available information such as:

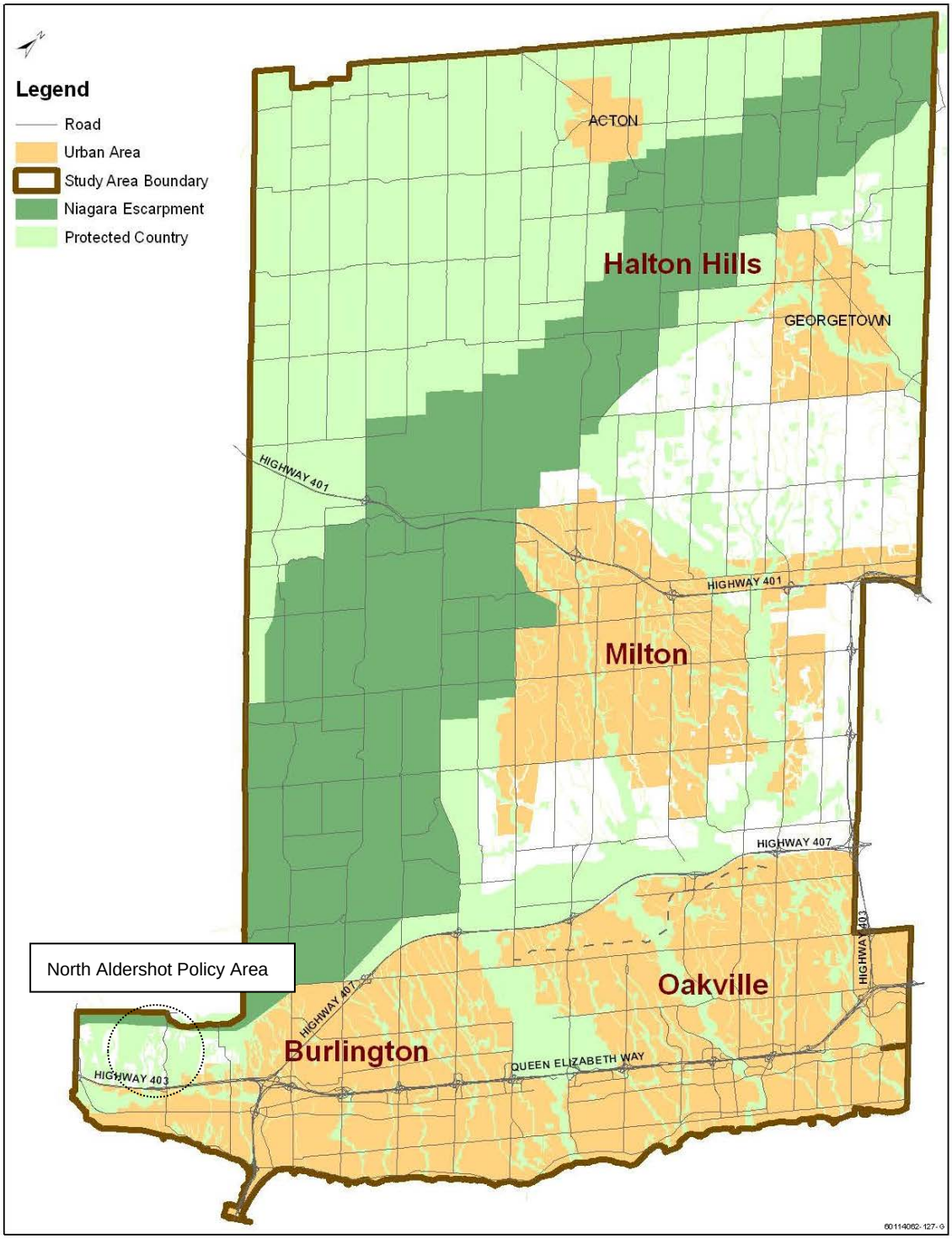
- New Area Servicing Plans, area-specific studies and updated information related to land use
- Technical analysis related to pressure zone boundaries and service areas
- Updated water and wastewater servicing strategies for some isolated areas
- Updated information related to the current capacities of water and wastewater facilities
- Revised water and wastewater design criteria
- Updated and calibrated water and wastewater hydraulic models
- Recent construction costs and trends

1.2 Study Area

The Study Area for the 2017 DC Update encompasses the existing designated urban areas in the Town of Oakville, City of Burlington, Town of Milton and the Town of Halton Hills 401 Corridor as well as the urban areas of Acton and Georgetown (including the hamlets of Stewarttown, Norval, and Glen Williams) located within the Town of Halton Hills. The study area includes development in the existing Urban Built Boundary (Intensification) and new Greenfield development outside of the existing urban areas in Oakville, Milton and Georgetown. The Sustainable Halton Study Area is depicted in Figure 1.

The Study Area land use is based on the Halton Regional Official Plan amended by ROPA 25, ROPA 38 and ROPA 39 through the Sustainable Halton growth planning exercise. Through the Sustainable Halton process, Best Planning Estimates (BPE) data for Population, Occupied Dwelling Units and Employment was developed through to year 2031. The BPE data served as the basis for the master planning exercises and was updated in June 2011 (BPE Data June 2011).

Figure 1 – Study Area



1.3 System overview

1.3.1 Water Supply and Distribution System

Lake Ontario is the source of water for Halton Region's Lake Based System. The Lake Based System is supplied by three water purification plant (WPP) facilities: Burlington WPP, Oakville WPP and Burloak WPP. Pumping Stations and Storage Facilities are connected to trunk feedermains to supply water for the different pressure zones in the system and feed the smaller local distribution watermains.

There are also several municipal well fields which supply water to the Groundwater Based System in North Halton. Groundwater from the Kelso and Walker's Line Well Fields continues to primarily supply the downtown core of Milton. Davidson, Fourth Line and Prospect Park Well Fields supply groundwater in Acton, while Cedarvale, Princess Anne and Lindsay Court Well Fields supply groundwater in Georgetown.

Under the 2011 Sustainable Halton Water and Wastewater Master Plan, improved groundwater based servicing strategies have been established, including new well fields, treatment and storage facilities. With increasing growth in Georgetown and limited available groundwater supply, an expansion of the Lake Based System to Georgetown is required in the upcoming years. Projects that were identified in the Master Plan to expand the Lake Based System into Georgetown were previously endorsed by Regional Council in 2011.

1.3.2 Wastewater Collection and Treatment System

In Halton Region, wastewater treatment plants (WWTP) that receive and treat wastewater are used to differentiate and categorize the main wastewater collection systems. Skyway WWTP, Oakville Southeast WWTP, Oakville Southwest WWTP, Mid-Halton WWTP, and Milton WWTP are the five largest wastewater collection systems within the Burlington, Oakville and Milton areas. The wastewater pumping stations in the collection systems are used to convey flows from service areas at lower elevations to higher elevation sewers that then drain via gravity to the WWTPs. The service area of wastewater pumping stations can range from very small localized areas to large drainage areas. The capacities of the pumping stations vary from approximately 3 L/s to over 1,500 L/s. Along with wastewater pumping stations, local gravity sewers connected to larger trunk sewers make up the wastewater collection systems.

Wastewater collected in the north-central Milton system is treated at the Milton WWTP and discharges clean effluent to the Sixteen Mile Creek, while the newer growth areas in east and south Milton are part of the Mid-Halton WWTP drainage area. The Acton and Georgetown wastewater collection systems are currently separate from the Burlington and Oakville systems. The Acton WWTP treats wastewater collected in Acton and discharges clean effluent to Black Creek. The Georgetown WWTP treats wastewater collected in Georgetown and discharges clean effluent to Silver Creek. With increasing growth in Georgetown and limitations at the Georgetown WWTP, future extension of the Lake Ontario based wastewater system to Georgetown was endorsed by Regional Council in 2011 in order to service the projected growth. Wastewater projects identified in this study were primarily based on the 2011 Sustainable Halton Water and Wastewater Master Plan to achieve the lake based service area expansion in Georgetown.

2. POPULATION AND EMPLOYMENT PROJECTIONS

2.1 Best Planning Estimates (BPE)

Halton Region Best Planning Estimates (BPEs) Data from June 2011 was used to determine the current and future water and wastewater servicing needs established in this Technical Report. This data was geographically distributed by Traffic Survey Zone (TSZ) and contains approved population and employment projections for the Region up to the year 2031 consistent with the Region's Official Plan. The BPE Data is summarized in Tables 1 and 2 below.

Table 1 – Halton Region Population Projections to 2031

	Total Population					
Municipality	2006	2011	2016	2021	2026	2031
Burlington	164,446	173,761	175,438	178,847	182,034	186,169
Halton Hills	54,978	56,066	57,922	61,672	77,003	91,885
Milton	53,938	88,438	124,645	161,750	195,735	228,084
Oakville	165,529	174,780	198,205	221,826	234,121	246,400
Total	**438,891**	**493,045**	**556,210**	**624,094**	**688,894**	**752,537**

Table 2 – Halton Region Employment Projections to 2031

	Total Employees					
Municipality	2006	2011	2016	2021	2026	2031
Burlington	87,854	95,656	98,710	102,846	104,145	105,349
Halton Hills	19,228	19,856	20,744	22,936	32,356	41,962
Milton	27,232	44,452	62,553	81,106	96,631	114,330
Oakville	82,089	90,969	106,485	120,795	122,578	128,359
Total	**216,403**	**250,932**	**288,493**	**327,683**	**355,710**	**390,000**

The above figures include rural (un-serviced) population and employees.

2.2 Service Area Projections

The distribution of population and employment growth among the primary geographic regions of the Sustainable Halton Study Area up to year 2031 were prepared in partnership between Halton Region and the Region's individual Local Municipalities. The planning data was further reviewed to determine the growth within the existing Built Boundary as well as Greenfield areas. To evaluate the impact on the water and wastewater systems, it is essential to document the population and employment growth in the service areas connected to the municipal systems. The total serviced population and employment includes the Built Boundary areas, designated Greenfield growth areas as well as a small percentage of rural areas on municipal systems. The rural areas on private systems are not included in the serviced population. The service area population projections are summarized in Table 3 and Table 4.

Table 3 – Service Area Population Projections to 2031

	Serviced Population					
	2006	2011	2016	2021	2026	2031
Oakville	165,409	174,659	198,084	221,704	234,007	246,283
Burlington	160,829	170,180	171,929	175,391	178,646	182,839
Milton	47,525	81,948	118,166	155,185	189,232	221,586
Halton Hills 401 Corridor	0	0	0	0	0	0
Sub-Total South Halton	**373,763**	**426,787**	**488,179**	**552,280**	**601,885**	**650,708**
Acton	10,233	10,034	9,799	10,378	12,877	13,981
Georgetown	37,274	38,705	41,044	44,413	57,452	71,329
Sub-Total North Halton	**47,507**	**48,739**	**50,843**	**54,791**	**70,329**	**85,310**
Total Service Area	**421,270**	**475,526**	**539,022**	**607,071**	**672,214**	**736,018**

Table 4 – Service Area Employment Projections to 2031

	Serviced Employment					
	2006	2011	2016	2021	2026	2031
Oakville	82,089	90,964	106,491	120,803	122,582	128,357
Burlington	87,456	94,982	97,957	102,032	103,312	104,515
Milton	25,579	42,702	60,689	79,210	94,718	112,406
Halton Hills 401 Corridor	1,455	1,630	2,105	3,682	11,115	19,018
Sub-Total South Halton	**196,579**	**230,278**	**267,242**	**305,727**	**331,727**	**364,296**
Acton	3,642	3,791	4,085	4,354	4,744	5,071
Georgetown	12,387	12,617	12,732	13,056	14,583	15,907
Sub-Total North Halton	**16,029**	**16,408**	**16,817**	**17,410**	**19,327**	**20,978**
Total Service Area	**212,608**	**246,686**	**284,059**	**323,137**	**351,054**	**385,274**

Note: Population and Employment Projections are based on the water service area. The wastewater service area is marginally smaller than water.

3. RELATED POLICY AND CRITERIA

3.1 Residential and Employment Servicing

Residential and Employment servicing needs and strategies were developed and reviewed as part of the 2011 Sustainable Halton Water and Wastewater Master Plan. These strategies were developed with consideration of water and wastewater policies and guidelines, as well as regional servicing standards in conjunction with the servicing needs calculated from planning projections and design criteria.

In general, residential and employment servicing considerations are associated with providing service from the trunk facilities, extending servicing from trunk infrastructure to local systems, allowing for system redundancy, addressing security of supply concerns, and maintaining an adequate level of service (e.g. pressures, fire flow) while accounting for future extension of local servicing. It should be noted that employment servicing considerations are similar to those for residential servicing with some exceptions, such as higher fire flow requirements in employment areas.

3.2 System Security of Supply

The 2011 Sustainable Halton Master Plan reviewed growth related needs in both water and wastewater systems. Further evaluation of the systems was performed to determine their ability to provide an adequate level of service to the existing systems and support growth with an appropriate level of supply security. Projects that have been identified by this analysis are most commonly related to addressing isolated service areas, single feeds across significant features such as highways, support for emergency shut down conditions, and overall capacity redundancy for future water demands and wastewater flows.

3.3 Intensification

A detailed intensification study was undertaken as part of the 2011 Master Plan to establish Intensification Projects in the 2012 DC Update. The intensification study analyzed the water and wastewater infrastructure needs within the built boundary areas due to the BPE intensification growth.

The analysis completed in this Technical Report leveraged the updated water and wastewater hydraulic models, the 2011 BPE population and employment projections, and updated design criteria to confirm the need for the previously recommended Intensification Projects. In general, the Intensification Projects remain relatively consistent with the previous recommendations. However, as a result of the updates to the hydraulic models and design criteria some of the water and wastewater projects have been modified or removed. It should be noted that the intensification analysis was completed with the best available information during this study and that further refinements to the Intensification Projects may be required as more detailed information becomes available, such as site-specific intensification development proposals/plans.

3.4 Water Demand and Wastewater Flow Projection Approach

Projections of water demand and wastewater generation (flow rates) for each service area are needed in order to establish the capital infrastructure needs to service new development. Several years of existing measured (actual) flow rates/demands are analyzed to calculate a representative “Starting Point” that reflects a reasonable existing baseline for the purposes of projecting future flow rates/demands. Consistent with the previous Master Plan and DC approach, the flow and demand projections are calculated by quantifying the expected increase due to the additional population and employee growth between 2017 and 2031, consistent with the Official Plan (and BPEs).

The anticipated increase in flow between 2017 and 2031 for each service area is determined by applying design criteria to anticipated growth between 2017 and 2031 based on the best planning estimates. The design criteria are developed using actual measured flow rates/demand data and estimated actual population in the existing

system, and assumes that the per capita and per employee water demand and wastewater generation flow rate will be the same as the current patterns observed in the existing communities as per Ministry of Environment (MOE) Procedure D-5-1. Additional wastewater flow resulting from infiltration and inflow (I&I) into new sewers is estimated using the Region's I&I design criterion.

In 2015-2016, Halton Region undertook a comprehensive review of the water and wastewater design criteria using 2011-2015 demand and flow data and updated estimates of actual population and employee numbers based on the 2011 census. As a result of this review, the water and wastewater design criteria have been revised and incorporated in this Technical Report.

3.4.1 Water Demand Criteria

The revised water demand criteria developed by Halton for use in the 2017 DC are summarized in the tables below. Water Demand from existing serviced areas is calculated from measured data.

Table 5 – Water Demand Criteria

Average Day Water Design Criteria			
Lpcd *	Residential	265	
L/emp/d **	Employment	225	
Max Day and Peak Hour Water Design Criteria		**Max Day Peaking Factor**	**Peak Hour Peaking Factor**
Lake Based	Oakville, Burlington, Milton, Georgetown	1.9	3
Groundwater Based	Milton	1.6	3
	Georgetown		
	Acton		

*Litres per capita per day

**Litres per employee per day

For areas with sufficient storage volume the water supply requirements are based on Maximum Day Demands (MDD). For areas without sufficient storage the water supply requirements are based on Peak Hour Demands (PHD).

Water system capacity needs were developed on the considerations summarized in Table 6.

Table 6 – Water Design Criteria for System Components

Water Design Criteria for System Components		
Component	**Design Criteria**	
Feedermains	Flow capacity	Convey Maximum Day Demand while achieving water velocity guidelines
Local Watermains	Flow capacity	Convey the greater of: • Maximum day demand plus fire flow demand, or • Peak hour demand while achieving water velocity guidelines
Pumping Stations	With adequate zone storage available	Supply maximum day demand to zone and all subsequent zones
	Without adequate storage available	Supply peak hour demand to zone and maximum day demand to all subsequent zones
Storage (reservoirs, water towers)	A – Equalization	25% of maximum day demand
	B – Fire	Largest expected fire in zone (Based on land use)
	C – Emergency	Minimum of 25% of (A+B)
	Total volume	= A + B + C
Fire Flow	Minimum flow (Residential)	5,500 L/min for 2 hours @ minimum 140 kPa (20Psi)
	Minimum Flow (Industrial / Commercial / Institutional)	15,000 L/min for 3 hours @ minimum 140 kPa (20Psi)
System Pressure	Minimum and maximum operating conditions	280 kPa (40 Psi) to 700 kPa (100 Psi)

3.4.2 Wastewater Flow Criteria

The wastewater flow criteria developed by Halton for use in the 2017 DC are summarized in the tables below. Wastewater generation from existing serviced areas is calculated from measured data.

Table 7 – Wastewater Flow Criteria for Treatment Plant

Plant (WWTP)			
Lpcd *	Residential	Average Day Flow	360
L/emp/d **	Employment	Average Day Flow	310

*Litres per capita per day
**Litres per employee per day

Table 8 – Wastewater Flow Criteria for System Components

System (Pumping Stations and Sewers)			
Lpcd *	Residential	Peak Dry Weather Flow	215 x PF
L/emp/d **	Employment	Peak Dry Weather Flow	185 x PF
L/s/ha	I/I Allowance	Inflow and Infiltration Design Allowance	0.286

*Litres per capita per day
**Litres per employee per day
***Total peak flows for new development are calculated by multiplying total dry weather flows by the peaking factors (PF) specified in the Halton Linear Design Manual (based on Harmon formula) and adding the Inflow and Infiltration Design Allowance.

The revised wastewater design criteria were used to estimate the current and future wastewater flows for each service area. For existing catchments and service areas, future flow rates were calculated by adding the projected increase in flows (calculated with the above criteria) to the measured flow from existing service area. Wastewater system capacity needs were developed on the following basis:

- Sewer mains and pumping station facilities were sized for peak wet weather flow rate.
- Wastewater treatment plant rated treatment capacity needs were sized based on the average day flow which includes an average level of extraneous flow within the system.

3.5 Cost Estimating Methodology

The costing approach used for the 2017 Development Charges Update is similar to that of the 2012 DC Update and 2011 Master Plan.

The previous costing methodology applied a unit cost approach, where the total length or capacity needs of the required infrastructure project was multiplied by a base unit cost applicable to the particular construction type (5 m depth sewer, 10 m depth sewer, watermain, wastewater forcemain, L/s or MLD of pumping, ML of storage, MLD of treatment). In cases where construction is to take place in built up areas, such as intensification areas, additional cost escalation factors were applied to the base unit cost. This provides additional project costs to account for utility coordination/relocation, urban reinstatement, and urban construction impacts.

The base cost was made up of the unit cost multiplied by the project length or capacity. Additional costs were added to the base cost to account for creek/road/railway crossings, property acquisition, tunneling requirements, etc. where available. The sum of base cost plus additional cost results in the Base Construction Cost. Subsequently, 35% total engineering costs and contingency allowances were added to the Base Construction Cost to arrive at the Total Project Cost. In general, these are conceptual level cost estimates which have a typical accuracy range of +50%/-25%.

For the purposes of the 2017 DC Update, project costs were further updated as follows:

- Where a cost estimate was available through detailed analysis (EA or project scoping study), that cost was used as the governing project cost estimate.

- For projects required within the next five years, the unit costing approach was used as described above. The unit costs were updated to account for inflation and increase in project costs based on recent tender information compiled over the past several years. These updated unit costs are shown in Appendix A.

- The cost of the remaining projects were estimated based on the cost previously identified in the 2012 DC Update, indexed to January 1, 2017 dollars in accordance with the Statistics Canada Quarterly Non-Residential Construction Price Statistics used in DC By-Law 48-12. If a project scope changed since the 2012 DC Update, the previous (2012) cost was adjusted to reflect the new scope, then that cost was indexed to January 1, 2017 dollars. The Indexing percentages are shown in Appendix A.

3.6 Development Charges Funding Approach

3.6.1 DC By-Law Structure

The Capital Implementation Plan of this Technical Report has been classified according to the DC By-Law structure in three categories: Capacity, Distribution – Greenfield, and Distribution – Built Boundary.

Capacity

This category includes projects that are related to Region-wide needs of water supply/treatment and wastewater treatment, such as:

- Studies
- Projects related to Water Purification Plants and Groundwater Well Fields, such as:
  - Burloak WPP Expansion from 55 MLD to 165 MLD
- Projects related to Wastewater Treatment Plants, such as:
  - Mid-Halton WWTP Expansion from 125 MLD to 175 MLD

This category also includes projects that support the transfer/conveyance of capacity and the deferral/elimination of the need for immediate treatment plant or well field expansions. Projects included in this definition are:

- Major trunk infrastructure that facilitate transmission of water from existing WPPs to Burlington, Oakville, Milton and Halton Hills, such as:
  - Zone 6 PS at Future Zone 4 (TWL 250m) Reservoir
  - Zone 6 Feedermain to No. 10 Sideroad

- Major trunk infrastructure that supports conveyance of wastewater to existing WWTPs, such as:
  - 8th Line Trunk Sewer (No. 10 Sideroad to Steeles Ave.)
  - New Sewer Inlet to Skyway WWTP

Distribution – Greenfield

This category represents projects that support Greenfield growth outside the current Urban Built Boundary (2006) and within the new Sustainable Halton Urban Boundary (2031).

Projects within this category include:

- Infrastructure located in Greenfield service areas
- Infrastructure located within the built boundary that convey flow to or from future growth areas
- Infrastructure includes, but is not limited to pipes, pumping stations and storage facilities.

Distribution – Built Boundary

This category includes projects that support growth within the current Urban Built Boundary as defined under the Places to Growth process. This includes growth to 2031 associated with infill within the Urban Built Boundary as well as intensification within specific areas such as the Urban Growth Centres (UGCs) and corridors as identified under the Sustainable Halton Master Plan.

Projects within this category include:

- Infrastructure located within the Urban Built Boundary
- Infrastructure servicing only infill growth and intensification within the Urban Built Boundary
- Infrastructure identified under the Urban Growth Centres (UGCs) and corridors servicing reviews

3.6.2 Existing Capacity

The servicing strategies for Halton Region were developed in accordance with the servicing policies identified in the Sustainable Halton Water and Wastewater Master Plan. Particularly for major facilities, the strategies are generally developed based on:

- Maximizing existing capacity in facilities
- Scheduling facility capacity expansion when a threshold of approximately 90% of existing rated capacity has been reached
- Ensuring operational effectiveness, flexibility and security of supply
- Maintaining appropriate level of service

Halton Region servicing strategies ensure that when facilities are expanded, there is still some existing capacity remaining, typically in the range of 5 – 10%. This is required to provide and maintain an adequate level of service throughout the systems. Each DC period has benefitted from previous existing capacity remaining, and future expansion will provide the same benefit. Under this program there is no allowance for existing capacity remaining at the existing facilities.

3.6.3 Benefit to Existing (Non – Growth)

The non-growth component has typically been identified for certain projects which benefit the existing service area. These components are associated with upgrades to the existing systems or facilities necessary to maintain service levels to existing residential and non-residential users. These projects may also involve upgrades or expansions which provide additional capacity to meet growth in the service area. When considering intensification, critical security/redundancy requirements and impacts on critical existing trunk infrastructure, additional projects within the existing service area were identified. It should also be noted that there were some benefit to existing (non-growth) components identified in a small number of infrastructure capital projects that are predominantly required to service growth in new urban areas.

With triggers ranging from growth to security/redundancy requirements, the growth related and non-growth related needs and corresponding capacity and costs for each of these projects have been separately identified. Detailed information regarding the allocated costs to Benefit to Existing (non-growth) for each project is shown in Appendix B.

3.6.4 Post Period Benefit

Although the development charge planning horizon is to year 2031, it is good engineering practice to provide sufficient capacity to meet servicing requirements beyond 20 years, particularly for larger diameter trunk piping and major structural components of major supply facilities that have a service life of over 50 years. In addition, the sizing and capacity determined for 2031 needs must also provide a sufficient level of service to the new growth areas, ensure efficient integration with existing infrastructure, and not negatively impact current operations of the systems. Even after making this latter allowance, some infrastructure has been sized to meet needs beyond the development charge planning horizon.

Review of the infrastructure capacity indicated that oversizing was required for some of the trunk facilities. This review showed that for projects with smaller diameter pipes which typically serviced more localized areas, many of these localized areas had only marginal additional flows beyond 2031. The trunk projects which service larger areas service a larger amount of flows beyond 2031. Also, the smaller diameter infrastructure typically cannot be downsized without impacting the system such as water pressures and fire flows for the water system and increased

velocities and surcharging for the wastewater system. Accordingly, the oversizing requirements have been identified for some water feedermain, wastewater trunk sewers and water and wastewater treatment plants.

Quantifying oversizing for these projects has been determined based on comparison of the infrastructure required to meet 2031 needs versus the recommended infrastructure sizing to meet longer term servicing needs. The difference in cost for the recommended size of infrastructure and the size of infrastructure to meet the 2031 horizon has been allocated as the oversizing cost. Any oversizing identified through this analysis has been deducted from the 2031 DC recoverable costs and is to be recovered through subsequent DC by-law(s) covering the post 2031 period.

It should be noted that the 2002 Master Plan as well as the 2007 Master Plan Update considered infrastructure sizing to an urban boundary built out scenario (2031) and post 2021 considerations respectively. Some projects previously oversized to meet the 2031 horizon are now integrated into the current Sustainable Halton program and now no longer have oversizing based on the current 2031 bylaw period.

Additional details for Post Period Benefit calculations are contained in Appendix B.

3.6.5 DC Eligible Infrastructure

Watermains, sewers and water and wastewater facilities are DC eligible depending on criteria presented in the Local Service Guidelines. The linear infrastructure eligibility is summarized below and provided in more detail in Appendix C of this report.

The minimum size for DC eligible watermains is:

- Greater than 400 mm diameter internal to the development
- Greater than and equal to 400 mm diameter external to the development

The minimum size for DC eligible sewers is:

- Greater than 450 mm diameter

The Capital Implementation Plan presented in this DC Technical Report contains projects which lie within the range of the minimum diameter criteria for DC eligible projects. It should be noted that there are certain exceptions with projects that are below the minimum size criteria because they service and benefit growth areas beyond the requirements of a single subdivision within the overall study area. Moreover, the trunk system in small communities such as Acton and Georgetown consists of pipes of smaller size than the trunk system in the Lake Based system in South Halton. Since these pipes provide trunk distribution/conveyance for these small communities, they are also included in the DC Capital Implementation Plan.

3.6.6 Residential / Non-Residential

The Development Charge eligible share of the Capital Implementation Plan (2017-2031) has been split between benefit to residential development versus benefit to non-residential development within each DC by-law category. The residential/non-residential split is based on the percentage of the total anticipated flow increase to be generated by each class of development. This is the standard calculation approach which has been applied by other municipalities (e.g. Peel Region, York Region) and was similarly used during the 2004, 2008 and 2012 Halton DC Updates.

The capacity category is based on region-wide calculated flows. The Distribution-Greenfield category is based on flows calculated from the Greenfield areas only. The Distribution-Built Boundary category is based on flows calculated for the growth within the 2006 Urban Built Boundary only.

For water projects, the splits are based on the maximum day demand attributed to the growth from year 2017 to year 2031. Similarly, for wastewater projects, the splits are based on average day flows for the growth from 2017 to 2031.

Since the impact on water and wastewater services from work at home (WAH) employees is generated from the home and the population/unit forecast already includes these individuals, the water and wastewater calculations and employment demand forecast does not include employees associated with WAH.

For No Fixed Place of Work (NFPOW) employees, the need for water and wastewater services related to these employees has largely been included in the employment forecast by usual place of work (i.e. employment and G.F.A. in the retail and accommodation sectors generated from NFPOW construction employment). Since these employees have no fixed work address, they cannot be captured in the non-residential gross floor area (G.F.A.) calculation. Accordingly, NFPOW employees have been removed from the water and wastewater DC employment forecast and calculation as well as the forecasted water and wastewater demands.

The residential/non-residential contributions based on water demands and wastewater flows are shown Tables 9 and 10 respectively.

Table 9 – Growth Related Water Demands for the DC By-Law Categories

Category	Projected Increase in Water Demand, 2017-2031 (MLD)	Percentage
Capacity (Region Wide)		
Residential	99.5	75%
Non-Residential	33.9	25%
Total	**133.4**	100%
Distribution (Greenfield)		
Residential	67.6	74%
Non-Residential	23.8	26%
Total	**91.4**	100%
Distribution (Built Boundary)		
Residential	31.9	76%
Non-Residential	10.1	24%
Total	**42.0**	100%

Table 10 – Growth Related Wastewater Flows for the DC By-Law Categories

Category	Projected Increase in Wastewater Generation, 2017-2031 (MLD)	Percentage
Capacity (Region Wide)		
Residential	71.1	74%
Non-Residential	24.6	26%
Total	**95.7**	100%
Distribution (Greenfield)		
Residential	48.3	74%
Non-Residential	17.3	26%
Total	**65.6**	100%
Distribution (Built Boundary)		
Residential	22.8	76%
Non-Residential	7.3	24%
Total	**30.1**	100%

3.6.7 Project Timing

The predominant driver for project timing was the need to provide capacity and infrastructure servicing to meet BPE growth. While the BPE growth numbers have not been revised since the 2012 DC Update, changes to projects identified and their subsequent phasing has occurred due to revised water and wastewater design criteria, updated hydraulic models and information derived from the recent technical studies listed in Section 1.1.

Additional analysis has been undertaken through this study to evaluate the timing/phasing of major projects such as new facilities and facility expansions that provide a system-wide benefit as opposed to servicing isolated growth areas. Treatment expansions are scheduled to be in place in order to provide water supply or wastewater treatment capacity within each plants catchment / service area. The timing is driven by the need to provide a capacity expansion when 90% of the capacity is reached. The timing of other facility upgrades can be driven by a combination of BPE growth capacity need, security of supply, operational need or a combination of these elements.

In order to minimize repeated disruption due to infrastructure construction projects and to gain efficiencies in construction, the Water/Wastewater program timing was coordinated with other related works. Where possible, project timing has been aligned with the most recent Halton Region State-of-Good repair capital program for Water, Wastewater and local road improvements as well as Halton's Road Capital Projects program.

4. WATER SERVICING REQUIREMENTS

4.1 Water Service Areas

Water infrastructure needs were identified during this study based on the water demands for each individual service area or pressure zone. The Region's current pressure zones are split based on municipality, with Burlington being serviced by five main lake based zones, B1, B2, B3, B4 and B5, with B1A and B1B servicing Aldershot and B3B, B4A, B5A encompassing the North Aldershot Policy Area. Oakville is currently serviced by lake based Zones O1, O2, O2A, O3 and O4. Milton is currently serviced by one groundwater based Zone M5G and two lake based zones M4L and M5L. Georgetown is serviced by Zones G5G, G6G and G7G. Acton is serviced by a single groundwater based pressure Zone A9G.

One portion of Campbellville is serviced by a single groundwater based pressure Zone C7G. No new connections or serviced growth are planned for Campbellville, and it is excluded from the scope of this report.

Portions of Burlington that are serviced with water from the City of Hamilton supply (Zone B1B) are also excluded from the scope of this study.

The Region has undertaken several water servicing studies as well as zone boundary analysis since the completion of the 2012 DC report. These studies were reviewed and their results incorporated as part of the 2017 DC Update. These results are discussed in the following sections.

4.2 Zone Boundary Re-Alignment

Since the completion of the 2011 Master Plan, the Zone 4 feedermain to Milton has been constructed and commissioned. With the in-situ operation of a new large pressure zone the size of Zone 4 in Milton, data was analyzed to determine if there will be long term issues with high or low pressure within the zone which could potentially lead to less than optimal performance. As a result, extensive analysis has been undertaken by the Region to investigate optimization of the lake based pressure zones within North Oakville and Milton. A major driver for this analysis was the need for appropriate level of service within future growth areas at the top and bottom of Zone M4L/O4 and at the bottom of M5L. The existing and future pressures under peak hour demand, max day demand and average day demand were analyzed under the current operation of the systems and existing zone boundary alignments. It was found that several areas near the boundaries of the pressure zones in question would not be able to provide adequate level of service and would be at risk of low pressure, high pressure, more frequent breaks and increased customer complaints. The preferred servicing solution that was developed to alleviate these future issues consisted of a modification to the Zone O3, O4, M4L and M5L boundaries as shown in Figure 2.

In order to implement this strategy, new pressure zones will be created and existing pressure zone boundaries will be adjusted. The new pressure zones are currently identified by their proposed Top Water Level (TWL). A brief description of the zone boundary changes is as follows:

- Existing Zone O3 (TWL 198 m): Upper boundary of Zone O3 shifted to the south – zone size reduced; East portion removed and assigned to new Zone TWL 211
- Existing Zone O4 (TWL 236 m): Zone O4 eliminated; existing service area transferred to Zones TWL 211 and TWL 223.5
- Existing Zone M4L (TWL 236 m): Zone M4L eliminated; existing serviced area now part of new Zone 250
- New Zone TWL 211: New zone within existing northeast Oakville service area generally between the Ninth Line and Winston Churchill Blvd
- New Zone TWL 223.5: New zone predominantly within North Oakville (most of former Zone O4, part of former Zone O3)
- New Zone TWL 250: New zone within Milton and part of North Oakville. This zone makes up the majority of the lake based service area within Milton and will be the major growth area to 2031

- Existing Zone M5L (TWL 267 m): Lower boundary of Zone M5L shifted to north – zone size reduced; remainder transferred to new Zone TWL 250

Implementation of the zone boundary re-alignment is anticipated to be completed by 2019 and will require several capital projects as follows:

- 7496 – Decommissioning of Burnhamthorpe Water Tower
- 7500 – Milton West Watermain Looping (400 mm)
- 7503 – 300 mm watermain on Sixth Line from Hays Blvd to River Glen Blvd
- 7509 – Neyagawa Pumping Station alterations
- 7516 – Fourth Line Pumping Station alterations
- 7514 – Eighth Line Pumping Station alterations
- 7515 – Implementation of up to 20 new system Pressure Reducing Valves (PRVs)

Further project details are found in Table 13, Figure 2 and Figure 3.

4.3 Oakville Water Purification Plant Rerating

The 2011 Master Plan recommended that the existing Oakville WPP be expanded from 109 MLD to 130 MLD to ensure that the growing demand for drinking water within Halton Region for the 2031 planning horizon is met. The Master Plan also identified the potential for an interrelated project to consider extending the plant's existing water intake.

Based on the results of the Municipal Class Environmental Assessment (Class EA) study the preferred solution to achieve the capacity increase is through rerating of the Oakville WPP which includes in-plant upgrades and performance optimization. These plant works will also sufficiently address treatment challenges associated with infrequent raw water high turbidity episodes; thus, avoiding the need to extend the plant water intake.

Legend

Water Pressure Zone

- A9G
- B1
- B1A
- B1B
- B2
- B2A
- B3
- B3A
- B3B
- B4
- B4A
- B5A
- B5
- C7G
- G6G
- G7G
- G5G
- G6L
- O1
- O2
- O2A
- O2B
- O3
- M5G
- TWL = 211m
- TWL = 223.5m
- TWL = 250m
- TWL = 267m

Other

- Booster/Pumping Station (PS)
- Reservoir (RES)
- Water Purification Plant (WPP)
- Pressure Reducing Valve (PRV)
- Well Field (WELL)
- Elevated Water Storage Tank (TANK)
- Roads
- Municipal Boundary

THIRD LINE RES
PROSPECT PARK WPP
A9G
HIGHWAY 7
SIXTH LINE
22ND SIDEROAD RES (GW)
LAKE BASED RES
G7G
MOORE PARK PS
G6G
NO 22 SIDE ROAD
NO 17 SIDE ROAD
GEORGETOWN WPP
TODD ROAD TANK
NORVAL TANK
G6L
G5G
NO 15 SIDE ROAD
FIRST LINE
GUELPH LINE
ZONE 5 RES
FOURTH LINE
FIFTH LINE
ZONE 4 RES
ZONE 6 PS
EIGHTH LINE
TENTH LINE
WINSTON CHURCHILL BOULEVARD
HIGHWAY 401
C7G
KELSO WPP AND WELL
JAMES SNOW PARKWAY
TWL = 267m
MILTON TANK
HIGHWAY 407
TREMAINE ROAD
STEELES AVENUE
MAIN STREET RES
M5G
DERRY ROAD
THOMPSON ROAD
FOURTH LINE PS
JAMES SNOW PARKWAY
TWL = 250m
BRITTANIA ROAD
TWL= 223.5m
REGIONAL ROAD 25
FOURTH LINE
FIFTH LINE
SIXTH LINE
TRAFALGAR ROAD
EIGHTH LINE
HIGHWAY 407
MOORE RES
TWL = 223.5m
O3
NEYAGAWA PS
NEYAGAWA BOULEVARD
WILLIAM HALTON PARKWAY
TWL = 211m
EIGHTH LINE 223.5m PS
EIGHTH LINE RES
ZONE 3 PS
NINTH LINE
HEADON RES
APPLEBY LINE RES AND PS
BEAUFORT RES AND PS
B5
B4
B3
B3A
B2A
BAILIE RES AND PS
WALKERS LINE
APPLEBY LINE
UPPER MIDDLE ROAD
KITCHEN RES AND PS
TRAFALGAR ROAD
O2B
O2A
NORTH ALDERSHOT RES
B5A
B4A
B3B
B1B
TYANDAGA RES AND PS
BRANT STREET RES AND PS
WASHBURN RES AND PS
B2
O2
McCRANEY RES
THIRD LINE
NOTTINGHILL GATE
DAVIS ROAD PS
WATERDOWN ROAD RES AND PS
MOUNT FOREST RES AND PS
GUELPH LINE
QUEEN ELIZABETH WAY
BURLOAK PS
HARVESTER ROAD
B1A
PLAINS ROAD
FAIRVIEW STREET
KINGSWAY PS
QUEEN ELIZABETH WAY
BRANT STREET
B1
NEW STREET
BURLOAK DRIVE
O1
REBECCA STREET
FOURTH LINE
LAKESHORE ROAD
OAKVILLE WPP
BURLOAK WPP
BURLINGTON WPP
LAKESHORE ROAD
EIGHTH LINE
O1
Lake Ontario

Figure 2: Halton Region
Future Water Pressure Zones

Halton REGION
GIS & Information Management
Public Works Department

0 0.75 1.5 3 4.5 6 Km

August 2016

R:\Infrastructure Management\Infrastructure Data\Projects\Development Capital Update\Madga Bielawski Request

Figure 3: Region of Halton Lake-based Water System Schematic

PROPOSED NEW ZONE 3/4/5 WITH 2012-2016 ALLOCATION PROGRAM

Existing 2015
Zone 1 | Zone 2 | Zone 3
Zone 4 | Zone 5 | Zone 6
Zone 1A | Zone O-4
Proposed 2012-2016
Proposed Post 2016
TFC = Theoretical Firm Capacity (ML/d)

Zone TWL Levels:

Zone 6
TWL = 303.00m

Zone 5
TWL = 267.00m

Zone 4
TWL M-4 & O-4 = 250.00m
TWL B-4 = 236.22m

TWL = 223.50m

Zone 3
TWL B-3 = 200.15 to 203.30m
TWL O-3 = 198.00m

Zone 2
TWL B-2 = 167.78m
TWL O-2 = 167.64m

Zone 1
TWL = 135m

General Ground Elevation Levels:

G6L = 266.51m
G6L = 232.58m
ML-5 =232.28m
ML-5 = 196.63m
B-4 = 202.34m
M-4 = 215.91m
B-4 = 165.80m
M-4 = 179.58m
O-4 = 191.81m
O-4 = 153.08m
B-3 = 166.30m
O3 = 163.99m
B-3 = 129.73m
O-3 = 127.58m
B-2 = 133.10m
O-2 = 133.69m
B-2 = 97.36m
O-2 = 97.22m
B-1 = 101.36m
O-1 = 100.71m
B-1 = 64.60m
O-1 = 64.58m

Zone 6 Reservoir
TWL 303m
10 ML

Zone 6 PS

Zone 5 Reservoir
TWL 267.0m
20.20 ML

Zone 4 Reservoir
TWL 250.0m
15 ML

TWL 267.0m
6.83 ML
Steeles Ave.
Zone 5

PS B-5A
TWL 278m

PRV B-4A
TWL 236m

Proposed Storage
Expansion 3.95 ML
Zone 4 Beaufort
Reservoir
TWL 236.22m
2.05 ML

Beaufort
PS B-5
TFC = 1.0 ML/d

Zone B-3B
Reservoir
TWL 200m

Zone 3 Tyandaga
Reservoir
TWL 203.3m
4.74 ML

Tyandaga
PS B-4
TFC = 1.96 ML/d

Zone 3 Headon
Reservoir
TWL 200.15m
17.80 ML

Fourth Line BPS M-5
TFC = 30 ML/d
TWL 250m

PRV B-3A
TWL 214m

Zone 3 Moore
Reservoir
TWL 198.0m
32.00 ML

Zone O-4
PRV

PRV Zone211
TWL 211m

Bailie
PS B-4
TFC = 16.3 ML/d

Zone 2 Bailie
Reservoir
TWL 167.94m
17.50 ML

Zone 2 Appleby
Reservoir
TWL 167.60m
33.30 ML

Appleby
PS B-3, O-3
TFC = 40 ML/d

Neyagawa
BPS M-4 250m
TFC = 100 ML/d

Eighth Line
PS O-4 223.5m
TFC = 43.7 ML/d

Zone 2 Eighth
Line Reservoir
TWL 167.64m
17.30 ML

Zone 1 Kitchen
Reservoir
TWL 135.0m
39.50 ML

Kitchen PS M-5
TFC = 75 ML/d

Kitchen PS O-3
TFC = 75 ML/d

Eight Line
BPS O-3
TFC = 45 ML/d

PRV B-2A
TWL 185.4m

PRV O-2B
TWL 192m

PRV O-2A
TWL 174m

Zone 1A
Waterdown
Reservoir
TWL 140.21m
7.27 ML

Waterdown Rd.
PS B-3B

Waterdown Rd.
PS B-2

Zone 1 Brant St.
Reservoir
TWL 135.02m
11.50 ML

Brant St.
PS B-3

Zone 1 Washburn
Reservoir
TWL 135.03m
13.50 ML

Proposed Storage
Expansion 11.5 ML

Washburn
PS B-2
TFC = 109.2 ML/d

Washburn
PS B-3
TFC = 60 ML/d

Mount Forest
Reservoir
TWL 126.64m
5.68 ML

Mount Forest
PS B-2
TFC = 2.3 ML/d

Kingsway
BPS B-1A
TFC = 30 ML/d

Burloak (Kraken)
BPS O-2, B-2
TFC = 60 ML/d

Zone 1 McCraney
Reservoir
TWL 128.02m
17.00 ML

Davis Rd.
BPS O-2
TFC = 74 ML/d

Burlington WPP

Burloak WPP

Oakville WPP

4.4 Water Demand Projections

Based on the 2011 BPE data, updated design criteria, and future zone boundary re-alignment, the following table identifies the water demand projections for major milestone years to 2031.

Table 11 – Water Demand Projections

	Average Day Total Residential & ICI Demand (ML/D)				Maximum Day Total Residential & ICI Demand (ML/D)				Peak Hour Total Residential & ICI Demand (ML/D)			
Pressure Zone	2016	2021	2026	2031	2016	2021	2026	2031	2016	2021	2026	2031
B1 O1	48.7	50.3	51.8	53.4	92.5	95.6	98.5	101.5	146.1	150.9	155.5	160.2
B1A	4.6	4.7	4.7	4.8	8.7	9.0	9.0	9.1	13.7	14.1	14.2	14.4
B3B B4A B5A	0.1	0.1	0.1	0.1	0.1	0.3	0.3	0.3	0.2	0.4	0.4	0.4
B2	10.2	10.5	10.5	10.7	19.5	19.9	20.0	20.4	30.7	31.4	31.6	32.2
B2A	0.6	0.6	0.6	0.6	1.1	1.1	1.1	1.1	1.7	1.7	1.7	1.7
B3	14.1	14.4	14.5	14.9	26.9	27.4	27.5	28.2	42.4	43.3	43.5	44.6
B4,B3A	2.7	2.7	2.7	2.7	5.1	5.1	5.1	5.2	8.0	8.1	8.1	8.2
B5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2
211	2.8	3.0	3.0	3.0	5.4	5.7	5.6	5.8	8.5	9.0	8.9	9.1
223	8.3	12.7	14.5	16.6	15.7	24.1	27.5	31.6	24.9	38.0	43.4	49.9
250	18.4	28.9	40.0	50.7	35.0	54.8	76.1	96.4	55.2	86.6	120.1	152.2
267	6.3	8.4	10.1	11.7	12.0	16.0	19.3	22.3	18.9	25.3	30.4	35.2
G5G G6G	8.8	6.4	6.9	8.5	14.2	10.2	11.0	13.5	26.5	19.1	20.7	25.4
G6L	0.0	3.4	6.4	8.6	0.0	6.5	12.2	16.3	0.0	10.2	19.2	25.7
G7G	0.3	0.3	0.3	0.3	0.5	0.5	0.5	0.5	1.0	1.0	1.0	1.0
A9	3.4	3.6	4.3	4.6	5.4	5.7	6.9	7.4	10.2	10.8	12.9	13.9
O2	9.8	11.3	12.5	13.9	18.7	21.5	23.7	26.5	29.5	33.9	37.4	41.8
O2A	1.7	1.7	1.7	1.7	3.3	3.2	3.2	3.2	5.1	5.1	5.0	5.1
O2B	0.9	0.9	0.9	0.9	1.6	1.6	1.6	1.7	2.6	2.6	2.6	2.6
O3	20.8	21.0	21.1	21.8	39.5	40.0	40.1	41.3	62.3	63.1	63.4	65.3
M5G	7.0	8.2	8.9	9.3	11.2	13.1	14.3	14.9	21.1	24.5	26.7	27.9
Total Serviced	**169.6**	**193.1**	**215.6**	**239.0**	**316.3**	**361.4**	**403.6**	**447.3**	**508.7**	**579.3**	**646.9**	**717.1**

Note: Supply to Zone B1B is provided by the City of Hamilton; B1B demands have been excluded from the above table.
Campbellville is excluded from the above table.

4.5 Water Storage Requirements

The water storage requirements by pressure zone is provided in the following table. More detailed information can be found in Appendix D of this Technical Report.

Table 12 – Water Storage Requirements

	Total Storage Requirement (ML)			
Pressure Zone Service Area	2016	2021	2026	2031
B1, O1	33.1	34.1	35.0	35.9
B1A	6.9	7.0	7.0	7.1
B3B, B4A, B5A	4.2	4.3	4.3	4.3
B2	10.3	10.4	10.5	10.6
B3, B2A	12.9	13.1	13.1	13.4
B4,B3A	5.8	5.8	5.8	5.8
250, 223.5, 211	21.7	30.6	38.3	46.0
267	7.9	9.2	10.2	11.2
G5G, G6G, G7G	8.6	7.4	7.6	8.4
G6L	4.2	6.2	8.0	9.3
A9	5.1	5.2	5.5	5.7
O2	10.1	10.9	11.6	12.5
O3, O2A, O2B	18.1	18.2	18.3	18.6
M5G	7.7	8.3	8.7	8.9

Note: Service Areas for several facilities consist of multiple pressure zones. The total storage requirement for these service areas is calculated based on the combined storage need for all of the zones within the service area.

Note: Zone B5 is a very small service area and does not currently have water storage. There are no current plans to add storage to this zone

5. WATER CAPITAL IMPLEMENTATION PLAN

The Water Capital Implementation Plan is outlined by DC by-law structure category in Table 13. This table provides the Regional Project Identification numbers, project descriptions and cost estimates. The total Water Program cost for 2017 – 2031 is $535M as presented in Table 13.

The preferred water servicing strategy is shown in Figure 4 and is based on the following key area components:

Milton Water Servicing

- Milton Lake Based Service area includes areas outside of the Milton Core groundwater service area; the lake based service area consists of Zone M5L and new Zone TWL 250 m and portion of new Zone TWL 223.5 m.
- Water supply to this service area is via the existing lake based WPPs (Burlington, Oakville, Burloak) and is pumped through the existing and proposed pumping stations and reservoirs to Milton.
- Small, isolated groundwater service areas will be transferred to the lake based system. Most of the existing groundwater-serviced area (M5G) will remain on groundwater through 2031.

Key infrastructure components of the Milton Lake Based Water Servicing Strategy are:

- Zone 3/4/5 switchover projects
- Trunk linear and facility upgrades within Burlington and Oakville to supply water to the north
- Sub-trunk distribution network within Milton Greenfield growth areas along Trafalgar corridor, south of Britannia and Tremaine Rd
- Local infrastructure upgrades within core area of Milton through intensification program to meet demand projections and fire flow needs related to intensification growth
- Decommissioning of Walker's Line Well and Pumping Station
- Rerating of Oakville and Burloak WPP to provide additional treated water supply for growth – common to all lake based service areas experiencing growth
- Boyne East Watermain Trunk

Georgetown Water Servicing

- Provide new lake based water supply to new Greenfield growth area in southwest Georgetown as well as transfer South Georgetown and Stewarttown to lake based supply. This will enable the groundwater system to remain within sustainable yields.
- New lake based pressure Zone G6L to be introduced
- Lake based water storage capacity at the 22 Sideroad Reservoir to support growth
- Lake based water supply will be from the existing lake based WPPs and will be pumped through the existing and proposed pumping stations and reservoirs throughout the distribution system
- Water treatment capacity provisions for Norval and Glen Williams (currently only parts of these areas are serviced).

Key infrastructure components of the Georgetown Lake Based Water Servicing Strategy are:

- New Zone 6 Pumping Station and TWL 250 Reservoir on Trafalgar Rd
- Trafalgar Rd Zone 6 Feedermains and sub-trunk distribution network within south Georgetown
- New Zone 6 Reservoir at 22nd Sideroad
- Zone 2 transmission upgrades, Burloak Zone 2 and Neyagawa Zone TWL 250m PS Facility capacity upgrades to supply water to upper zones
- Local infrastructure upgrades to meet demand projections and fire flow needs related to intensification growth

Oakville Water Servicing

- North Oakville Greenfield growth east of Sixteen Mile Creek to be predominantly serviced by the Oakville supply system with supplemental flow from Burloak/Burlington WPPs into transmission network
- North Oakville lies mainly within new pressure zone TWL 223 m (with a small area within Zone TWL 250 m) and will be supplied by Eighth Line Pumping Station as well as through PRVs down from pressure zone TWL 250 m
- North Oakville west of Sixteen Mile Creek lies within existing pressure zone O3 and will be serviced via zone 3 pumping from Oakville (Kitchen Z3) and Burlington (Washburn and Appleby Z3) via Dundas St crossing

Key infrastructure components of the Oakville Lake Based Water Servicing Strategy are:

- Rerating of Oakville and Burloak WPP to provide additional treated water supply for growth
- Zone 3/4/5 switchover projects to service Zone TWL 223.5 m and 250 m
- Sub-trunk distribution network within North Oakville Greenfield growth area
- Decommissioning of Burnhamthorpe Elevated Tower
- Zone O2 interconnection along Wyecroft Rd
- Kitchen Booster Pumping Station expansion
- 407 Employment Area Watermain Trunk

Burlington Central Water Servicing

- The Burlington Central Water servicing areas consists of areas within Zones B1 to B5 and B1A generally south of Hwy 407 and Dundas St.
- Water supply is provided mainly from the Burlington WPP through existing transmission watermains, pumping stations and reservoirs in the Burlington system

Key infrastructure components of the Core Burlington Lake Based Water Servicing Strategy are:

- Local infrastructure upgrades to meet demand projections and fire flow needs related to intensification growth

North Aldershot Policy Area Water Servicing

- The North Aldershot Policy Area is identified in Figure 1 and occupies a portion of Zone B2 and Zones B3B, B4A, and B5A.
- This area will be supplied mainly from the Burlington WPP through transmission mains, pumping stations and reservoirs in the Burlington system, however, due to topography, this area requires servicing via several pressure zones
- Currently, transmission, pumping and storage upgrades are recommended, however this area will require a separate study to further refine these infrastructure upgrades

Acton Water Servicing

- Acton is supplied by local groundwater wells and operates under a single pressure zone A9G
- Increase transmission redundancy from the Third Line Reservoir

Key infrastructure components of the Acton Groundwater Servicing Strategy are:

- Transmission watermains on No 32 Side Road and RR 25 to support growth

Region IPFS ID	Project Description	Municipality	Project Type	Size / Capacity	Length (m)	Total Estimated Cost (2017$)	Benefit to Existing (2017$)	Post Period Benefit (2017$)	DC (2017$)	Res (2017$)	Non-Res (2017$)	Annualized Funding Requirements 2017 (CRITICAL PROJECTS)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Capacity																										
5951	Design of Burloak WPP Phase 2 Expansion from 55 to 165ML/d (OAK)	OAK	PLANT	110 ML/d		$ 11,975,000	$ -	$ -	$ 11,975,000	$ 8,981,000	$ 2,994,000	$ -	$ -	$ -	$ -	$ -	$ 11,975,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6372	Construction of Burloak WPP Phase 2 Expansion from 55 to 165ML/d (OAK)	OAK	PLANT	110 ML/d		$ 130,601,000	$ -	$ -	$ 130,601,000	$ 97,951,000	$ 32,650,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 130,601,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6684	Construction of Oakville WPP Re-rating from 109 to 130 ML/d (OAK)	OAK	PLANT	21 ML/d		$ 10,000,000	$ 1,000,000	$ -	$ 9,000,000	$ 6,750,000	$ 2,250,000	$ -	$ 10,000,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6685	Bulk Water Stations on Existing Sites (REG)	REG	PS			$ 1,997,000	$ -	$ -	$ 1,997,000	$ 1,498,000	$ 499,000	$ -	$ -	$ 399,000	$ -	$ 1,598,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7496	Decommissioning of Burnhamthorpe Water Tower (OAK)	OAK	RESERVOIR			$ 1,000,000	$ 50,000	$ -	$ 950,000	$ 713,000	$ 237,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 200,000	$ -	$ 800,000	$ -	$ -	$ -	$ -	$ -	$ -
7499	2 system PRV's on Mountain View and Eighth Line at the creek (Georgetown Lakebased Transfer Implementation) (Construction) (HHGEO)	HHGEO	MAIN			$ 345,000	$ -	$ -	$ 345,000	$ 259,000	$ 86,000	$ -	$ 69,000	$ -	$ 276,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7502	Halton Water Master Plan (REG)	REG	STUDY			$ 1,950,000	$ -	$ -	$ 1,950,000	$ 1,463,000	$ 487,000	$ -	$ 350,000	$ -	$ -	$ -	$ -	$ 800,000	$ -	$ -	$ -	$ -	$ 800,000	$ -	$ -	$ -
7506	750mm WM on Trafalgar Rd from Zone 4 Reservoir to No 10 Siderd (Zone G6L) - Construction (HHGEO)	HHGEO	MAIN	750	1,519	$ 5,639,000	$ -	$ -	$ 5,639,000	$ 4,229,000	$ 1,410,000	$ -	$ 5,639,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7508	20 ML/d Zone G6L Pumping Station at Zone 4 Reservoir - Construction (HHGEO)	HHGEO	PS	20 ML/d		$ 4,880,000	$ -	$ -	$ 4,880,000	$ 3,660,000	$ 1,220,000	$ -	$ 4,880,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7509	Neyagawa Pumping Station alterations to support Zone 3/4/5 Boundary Re-alignment (100 MLD) (OAK)	OAK	PS			$ 7,466,000	$ 373,000	$ -	$ 7,093,000	$ 5,320,000	$ 1,773,000	$ -	$ 1,493,000	$ -	$ 5,973,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7510	Water Distribution System Analysis (REG)	REG	STUDY			$ 1,650,000	$ -	$ -	$ 1,650,000	$ 1,238,000	$ 412,000	$ 110,000	$ 110,000	$ 110,000	$ 110,000	$ 110,000	$ 110,000	$ 110,000	$ 110,000	$ 110,000	$ 110,000	$ 110,000	$ 110,000	$ 110,000	$ 110,000	$ 110,000
7511	Water Supply Capacity Annual Monitoring Report (REG)	REG	STUDY			$ 750,000	$ -	$ -	$ 750,000	$ 563,000	$ 187,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000
7512	System Wide Transient Analysis Modelling Study (REG)	REG	STUDY			$ 500,000	$ -	$ -	$ 500,000	$ 375,000	$ 125,000	$ -	$ 500,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7513	4th Line Pumping Station alterations to support Zone 3/4/5 Boundary Re-alignment (MIL)	MIL	PS			$ 1,884,000	$ 94,000	$ -	$ 1,790,000	$ 1,343,000	$ 447,000	$ -	$ 377,000	$ -	$ 1,507,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7514	8th Line Zone 4 Pumping Station alterations to support Zone 3/4/5 Boundary Re-alignment (OAK)	OAK	PS			$ 4,500,000	$ 225,000	$ -	$ 4,275,000	$ 3,206,000	$ 1,069,000	$ -	$ 900,000	$ -	$ 3,600,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7515	System PRV implementation to support Zone 3/4/5 Boundary Re-alignment (REG)	REG	MAIN			$ 8,000,000	$ 400,000	$ -	$ 7,600,000	$ 5,700,000	$ 1,900,000	$ -	$ 1,600,000	$ -	$ 6,400,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Capacity						**$ 193,137,000**	**$ 2,142,000**	**$ -**	**$ 190,995,000**	**$ 143,249,000**	**$ 47,746,000**	**$ 160,000**	**$ 25,968,000**	**$ 559,000**	**$ 17,916,000**	**$ 1,758,000**	**$ 12,135,000**	**$ 131,761,000**	**$ 160,000**	**$ 960,000**	**$ 160,000**	**$ 160,000**	**$ 960,000**	**$ 160,000**	**$ 160,000**	**$ 160,000**
Greenfield																										
3713	400mm WM on Burnhamthorpe Rd from Trafalgar Rd to new North Oakville road (Zone O4) (Design) (OAK)	OAK	MAIN	400	1,359	$ 468,000	$ -	$ -	$ 468,000	$ 346,000	$ 122,000	$ -	$ 468,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
4983	400mm WM on new North Oakville road from Burnhamthorpe Rd to Dundas St (Zone O4) (Design) (OAK)	OAK	MAIN	400	2,101	$ 635,000	$ -	$ -	$ 635,000	$ 470,000	$ 165,000	$ -	$ 635,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
5627	600mm WM through North Oakville Lands from Tremaine Rd to Bronte Rd (Zone O3) (OAK)	OAK	MAIN	600	3,004	$ 7,739,000	$ -	$ -	$ 7,739,000	$ 5,727,000	$ 2,012,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,548,000	$ -	$ 6,191,000	$ -	$ -	$ -	$ -	$ -	$ -
5850	1050mm WM on Upper Middle Rd from Burloak Drive to Appleby Line (Zone B2) (Construction) (BUR)	BUR	MAIN	1050	1,760	$ 10,283,000	$ -	$ 3,496,000	$ 6,787,000	$ 5,022,000	$ 1,765,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 10,283,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
5853	600mm WM on Tremaine Rd from Dundas St to approximately 950 m north (North Oakville Lands) (Zone O3) (OAK)	OAK	MAIN	600	927	$ 1,422,000	$ -	$ -	$ 1,422,000	$ 1,052,000	$ 370,000	$ -	$ -	$ -	$ -	$ -	$ 284,000	$ -	$ 1,138,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
5881	400 mm WM from Waterdown pumping station along North Service Rd to King Rd (Zone B2) (BUR)	BUR	MAIN	400	2,916	$ 7,055,000	$ -	$ -	$ 7,055,000	$ 5,221,000	$ 1,834,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,411,000	$ -	$ 5,644,000	$ -	$ -	$ -	$ -	$ -	$ -
6318	300mm WM on No 14 Siderd from Tremaine Rd. to Milton Reservoir (Zone M5G) (MIL)	MIL	MAIN	300	840	$ 1,799,000	$ 1,349,000	$ -	$ 450,000	$ 333,000	$ 117,000	$ -	$ 279,000	$ 1,520,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6367	Burloak Pumping Station Phase 1, 60 ML/d (Zone B2) - Construction (BUR)	BUR	PS	60 ML/d		$ 13,693,000	$ -	$ 8,764,000	$ 4,929,000	$ 3,647,000	$ 1,282,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 13,693,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6368	1050mm WM on Burloak Dr from the QEW to Upper Middle Rd (Zone B2) - Construction (OAK)	OAK	MAIN	1050	1,870	$ 9,766,000	$ -	$ 4,102,000	$ 5,664,000	$ 4,191,000	$ 1,473,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 9,766,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6443	400mm WM on Burnhamthorpe Rd from Trafalgar Rd to new North Oakville road (Zone O4) (Construction) (OAK)	OAK	MAIN	400	1,359	$ 2,547,000	$ -	$ -	$ 2,547,000	$ 1,885,000	$ 662,000	$ -	$ -	$ -	$ 2,547,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6444	400mm WM from Burnhamthorpe Rd to Dundas St on new North Oakville road (Zone O4) (Construction) (OAK)	OAK	MAIN	400	2,101	$ 3,461,000	$ -	$ -	$ 3,461,000	$ 2,561,000	$ 900,000	$ -	$ -	$ -	$ 3,461,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6597	300mm WM on RR 25 from No. 32 Siderd to 640 m north of Wallace St. (Zone A9G) (HHACT)	HHACT	MAIN	300	1,250	$ 1,430,000	$ -	$ -	$ 1,430,000	$ 1,058,000	$ 372,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 286,000	$ -	$ 1,144,000	$ -	$ -	$ -	$ -	$ -	$ -
6600	300 mm WM on No. 32 Siderd from RR 25 to 3rd Line Reservoir (Zone A9G) (HHACT)	HHACT	MAIN	300	1,360	$ 1,333,000	$ -	$ -	$ 1,333,000	$ 986,000	$ 347,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 267,000	$ -	$ 1,066,000	$ -	$ -	$ -	$ -	$ -	$ -
6603	400mm WM on 8th Line from 10th Siderd to existing 400mm (Zone G6L) (HHGEO)	HHGEO	MAIN	400	1,200	$ 2,324,000	$ -	$ -	$ 2,324,000	$ 1,720,000	$ 604,000	$ -	$ -	$ 361,000	$ 1,963,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6608	750mm WM on Trafalgar from 15th Siderd to 22nd Siderd Lake Based Reservoir (Zone G6L) (HHGEO)	HHGEO	MAIN	750	4,300	$ 16,339,000	$ -	$ -	$ 16,339,000	$ 12,091,000	$ 4,248,000	$ -	$ -	$ 2,533,000	$ 13,806,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6609	400mm WM on 17th Siderd from Trafalgar Rd to Main St (Zone G6L) (HHGEO)	HHGEO	MAIN	400	1,323	$ 2,504,000	$ -	$ -	$ 2,504,000	$ 1,853,000	$ 651,000	$ -	$ -	$ 388,000	$ 2,116,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6611	600mm WM on No 10 Siderd from 8th Line to 9th Line (Zone G6L) (HHGEO)	HHGEO	MAIN	600	1,440	$ 3,951,000	$ -	$ -	$ 3,951,000	$ 2,924,000	$ 1,027,000	$ -	$ 612,000	$ 3,339,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6612	600mm WM on No 10 Siderd from 9th Line to 10th Line (Zone G6L) (HHGEO)	HHGEO	MAIN	600	1,398	$ 4,459,000	$ -	$ -	$ 4,459,000	$ 3,300,000	$ 1,159,000	$ -	$ 691,000	$ 3,768,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6613	600mm WM on No 10 Siderd from 10th Line to Adamson St S (Zone G6L) (HHGEO)	HHGEO	MAIN	600	673	$ 1,606,000	$ -	$ -	$ 1,606,000	$ 1,188,000	$ 418,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 321,000	$ -	$ 1,285,000	$ -	$ -

Region IPFS ID	Project Description	Municipality	Project Type	Size / Capacity	Length (m)	Total Estimated Cost (2017$)	Benefit to Existing (2017$)	Post Period Benefit (2017$)	DC (2017$)	Res (2017$)	Non-Res (2017$)	Annualized Funding Requirements													
												2017 (CRITICAL PROJECTS)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
6614	600 mm WM on Adamson St from 10th Sideard to Guelph St (Zone G6L) (HHGEO)	HHGEO	MAIN	600	1,241	$ 2,661,000	$ -	$ -	$ 2,661,000	$ 1,969,000	$ 692,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 532,000	$ -	$ 2,129,000	$ -	$ -
6615	600mm WM on Guelph St from Adamson St to Bovaird Dr (Region of Peel) (Zone G6L) (HHGEO)	HHGEO	MAIN	600	1,280	$ 1,971,000	$ -	$ -	$ 1,971,000	$ 1,459,000	$ 512,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 394,000	$ -	$ 1,577,000	$ -	$ -
6616	400mm WM on Thompson Rd South from Brittania Rd to approx. 1,211 south (Zone M4) (MIL)	MIL	MAIN	400	1,211	$ 1,746,000	$ -	$ -	$ 1,746,000	$ 1,292,000	$ 454,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 349,000	$ -	$ 1,397,000	$ -	$ -	$ -	$ -	$ -
6617	400mm WM on new roadway south of Britannia Rd from Thompson Rd South to 4th Line (Zone M4) (MIL)	MIL	MAIN	400	1,345	$ 2,278,000	$ -	$ -	$ 2,278,000	$ 1,686,000	$ 592,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 456,000	$ -	$ 1,822,000	$ -	$ -	$ -	$ -	$ -
6618	400mm WM on new roadway south of Britannia Rd from 4th Line to 5th Line (Zone M4) (MIL)	MIL	MAIN	400	1,379	$ 2,314,000	$ -	$ -	$ 2,314,000	$ 1,712,000	$ 602,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 463,000	$ -	$ 1,851,000	$ -	$ -	$ -	$ -	$ -	$ -
6619	400mm WM on new roadway south of Britannia Rd from 5th Line to 6th Line (Zone M4) (MIL)	MIL	MAIN	400	1,405	$ 1,559,000	$ -	$ -	$ 1,559,000	$ 1,154,000	$ 405,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 312,000	$ -	$ 1,247,000	$ -	$ -	$ -	$ -	$ -	$ -
6620	400mm WM on 6th Line from Britannia Rd to 600 m south (Zone M4) (MIL)	MIL	MAIN	400	600	$ 1,078,000	$ -	$ -	$ 1,078,000	$ 798,000	$ 280,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 216,000	$ -	$ 862,000	$ -	$ -	$ -	$ -	$ -	$ -
6621	400mm WM on 6th Line from Britannia Rd to future Louis St. Laurent Blvd. (Zone M4) (MIL)	MIL	MAIN	400	1,503	$ 2,763,000	$ -	$ -	$ 2,763,000	$ 2,045,000	$ 718,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 553,000	$ -	$ 2,210,000	$ -	$ -	$ -	$ -	$ -	$ -
6622	400mm WM on 6th Line from Derry Rd to future Louis St. Laurent Blvd (Zone M4) (MIL)	MIL	MAIN	400	1,600	$ 3,328,000	$ -	$ -	$ 3,328,000	$ 2,463,000	$ 865,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 666,000	$ -	$ 2,662,000	$ -	$ -	$ -	$ -	$ -	$ -
6623	400mm WM on 5th Line from Britannia Rd to future Louis St. Lauren Blvd (Zone M4) (MIL)	MIL	MAIN	400	1,484	$ 2,034,000	$ -	$ -	$ 2,034,000	$ 1,505,000	$ 529,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 407,000	$ -	$ 1,627,000	$ -	$ -	$ -	$ -	$ -	$ -
6624	400mm WM on 4th Line from Britannia Rd to 650 m south (Zone M4) (MIL)	MIL	MAIN	400	636	$ 724,000	$ -	$ -	$ 724,000	$ 536,000	$ 188,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 145,000	$ -	$ 579,000	$ -	$ -	$ -	$ -	$ -
6625	400mm WM on Lower Base Line (East) from 4th Line to 5th Line (Zone M4) (MIL)	MIL	MAIN	400	1,387	$ 2,714,000	$ -	$ -	$ 2,714,000	$ 2,008,000	$ 706,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 543,000	$ -	$ 2,171,000	$ -	$ -	$ -	$ -	$ -
6626	400mm WM on 5th Line from Britannia Rd to 650 m south (Zone M4) (MIL)	MIL	MAIN	400	648	$ 736,000	$ -	$ -	$ 736,000	$ 545,000	$ 191,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 147,000	$ -	$ 589,000	$ -	$ -	$ -	$ -	$ -
6627	400mm WM on 4th Line from 650 m south of Britannia Rd to Lower Base Line (West) (Zone M4) (MIL)	MIL	MAIN	400	1,759	$ 2,322,000	$ -	$ -	$ 2,322,000	$ 1,718,000	$ 604,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 464,000	$ -	$ 1,858,000	$ -	$ -	$ -	$ -	$ -
6628	400mm WM on 5th Line from 650 m south of Britannia Rd to Lower Base Line (West) (Zone M4) (MIL)	MIL	MAIN	400	1,738	$ 3,081,000	$ -	$ -	$ 3,081,000	$ 2,280,000	$ 801,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 616,000	$ -	$ 2,465,000	$ -	$ -	$ -	$ -	$ -
6629	600mm WM on Louis St. Laurent Ave from 5th Line to 6th Line (Zone M4) (MIL)	MIL	MAIN	600	1,363	$ 2,651,000	$ -	$ -	$ 2,651,000	$ 1,962,000	$ 689,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 530,000	$ -	$ 2,121,000	$ -	$ -	$ -	$ -	$ -
6630	600mm WM on Louis St. Laurent Ave from 6th Line to Trafalgar Rd (Zone M4) (MIL)	MIL	MAIN	600	1,386	$ 4,358,000	$ -	$ -	$ 4,358,000	$ 3,225,000	$ 1,133,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 872,000	$ -	$ 3,486,000	$ -	$ -	$ -	$ -	$ -
6631	400mm WM on Louis St. Laurent Ave from Trafalgar Rd to 8th Line (Zone M4) (MIL)	MIL	MAIN	400	1,399	$ 2,725,000	$ -	$ -	$ 2,725,000	$ 2,017,000	$ 708,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 545,000	$ -	$ 2,180,000	$ -	$ -	$ -	$ -	$ -
6632	400mm WM on Britannia Rd from Trafalgar Rd to 600 m east (Zone M4) (MIL)	MIL	MAIN	400	595	$ 1,071,000	$ -	$ -	$ 1,071,000	$ 793,000	$ 278,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 214,000	$ -	$ 857,000	$ -	$ -	$ -	$ -	$ -
6633	400mm WM on Britannia Rd from 600 m east of Trafalgar Rd to 8th Line (Zone M4) (MIL)	MIL	MAIN	400	685	$ 1,167,000	$ -	$ -	$ 1,167,000	$ 864,000	$ 303,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 233,000	$ -	$ 934,000	$ -	$ -	$ -	$ -	$ -
6634	400mm WM on new Milton Rd from Trafalgar Rd to approximately 700 m east (Zone M4) (MIL)	MIL	MAIN	400	698	$ 1,571,000	$ -	$ -	$ 1,571,000	$ 1,163,000	$ 408,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 314,000	$ -	$ 1,257,000	$ -	$ -	$ -	$ -	$ -
6635	400mm WM on 8th Line from Derry Rd. to future Louis St. Laurent Blvd (Zone M4) (MIL)	MIL	MAIN	400	1,610	$ 2,947,000	$ -	$ -	$ 2,947,000	$ 2,181,000	$ 766,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 589,000	$ -	$ 2,358,000	$ -	$ -	$ -	$ -	$ -
6636	400mm WM on 8th Line from Britannia Rd to future Louis St. Laurent Blvd (Zone M4) (MIL)	MIL	MAIN	400	1,471	$ 2,338,000	$ -	$ -	$ 2,338,000	$ 1,730,000	$ 608,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 468,000	$ -	$ 1,870,000	$ -	$ -	$ -	$ -	$ -
6637	400mm WM on new roadway from Britannia Rd to approx. 1,200 m south (Zone M4) (MIL)	MIL	MAIN	400	1,146	$ 1,679,000	$ -	$ -	$ 1,679,000	$ 1,242,000	$ 437,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 336,000	$ -	$ 1,343,000	$ -	$ -	$ -	$ -	$ -
6638	400mm WM on Derry Rd from Trafalgar Rd to 8th Line (Zone M4) (MIL)	MIL	MAIN	400	1,348	$ 1,528,000	$ -	$ -	$ 1,528,000	$ 1,131,000	$ 397,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 306,000	$ -	$ 1,222,000	$ -	$ -	$ -	$ -	$ -
6641	400 mm WM on Hornby Rd from Steeles Ave to Trafalgar Rd (Zone 250) (HHS)	HHS	MAIN	400	1,500	$ 2,368,000	$ -	$ -	$ 2,368,000	$ 1,752,000	$ 616,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 474,000	$ -	$ 1,894,000	$ -	$ -	$ -	$ -	$ -	$ -
6642	400 mm WM in the 401 growth corridor north of Steeles from Hornby Rd to Trafalgar Rd (Zone 250) (HHS)	HHS	MAIN	400	926	$ 1,810,000	$ -	$ -	$ 1,810,000	$ 1,339,000	$ 471,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 362,000	$ -	$ 1,448,000	$ -	$ -	$ -	$ -	$ -	$ -
6643	400 mm WM in the 401 growth corridor north of Steeles from Trafalgar Rd to approximately 400m east of 8th Line (Zone 250) (HHS)	HHS	MAIN	400	1,013	$ 2,640,000	$ -	$ -	$ 2,640,000	$ 1,954,000	$ 686,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 528,000	$ -	$ 2,112,000	$ -	$ -	$ -	$ -	$ -	$ -
6644	400mm WM in the 401 growth corridor from Steeles Ave to approximately 300 m north (Zone 250) (HHS)	HHS	MAIN	400	357	$ 1,141,000	$ -	$ -	$ 1,141,000	$ 844,000	$ 297,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 228,000	$ -	$ 913,000	$ -	$ -	$ -	$ -	$ -	$ -
6645	400mm WM in the 401 growth corridor north of Steeles Ave. from 1,000 m west of 9th Line to 900 m east of 9th Line (Zone 250) (HHS)	HHS	MAIN	400	1,759	$ 1,931,000	$ -	$ -	$ 1,931,000	$ 1,429,000	$ 502,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 386,000	$ -	$ 1,545,000	$ -	$ -
6646	400mm WM in the 401 growth corridor from Steeles Ave to approximately 330 m north (Zone 250) (HHS)	HHS	MAIN	400	327	$ 1,110,000	$ -	$ -	$ 1,110,000	$ 821,000	$ 289,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 222,000	$ -	$ 888,000	$ -	$ -
6647	400mm WM in the 401 growth corridor north of Steeles Ave. from 600 m west of 10th Line to 1,000 m east of 10th Line (Zone 250) (HHS)	HHS	MAIN	400	1,582	$ 2,136,000	$ -	$ -	$ 2,136,000	$ 1,581,000	$ 555,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 427,000	$ -	$ 1,709,000	$ -	$ -
6648	400mm WM in the 401 growth corridor from Steeles Ave to 340 m north (Zone 250) (HHS)	HHS	MAIN	400	338	$ 1,512,000	$ -	$ -	$ 1,512,000	$ 1,119,000	$ 393,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 302,000	$ -	$ 1,210,000	$ -	$ -
6649	400mm WM on Esquesing Line from James Snow Parkway to approximately 800 m north (Zone 267) (MIL)	MIL	MAIN	400	784	$ 1,270,000	$ -	$ -	$ 1,270,000	$ 940,000	$ 330,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 254,000	$ -	$ 1,016,000	$ -	$ -	$ -	$ -	$ -
6650	400mm WM on new roadway from Esquesing Line to approximately 360 m west of Boston Church Rd (Zone 267)	MIL	MAIN	400	2,029	$ 3,443,000	$ -	$ -	$ 3,443,000	$ 2,548,000	$ 895,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 689,000	$ -	$ 2,754,000	$ -	$ -	$ -	$ -	$ -
6652	400mm WM on new roadway from 400 m west of Third Line to No 5 Sideard (Zone 267) (MIL)	MIL	MAIN	400	695	$ 1,177,000	$ -	$ -	$ 1,177,000	$ 871,000	$ 306,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 235,000	$ -	$ 942,000	$ -	$ -	$ -	$ -	$ -
6653	400mm WM on No 5 Sideard from approximately 400 m west of 3rd Line to 3rd Line (Zone 267) (MIL)	MIL	MAIN	400	390	$ 465,000	$ -	$ -	$ 465,000	$ 344,000	$ 121,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 93,000	$ -	$ 372,000	$ -	$ -	$ -	$ -	$ -
6654	750mm WM on Trafalgar Rd from 10th Sideard to approximately 1,700 m north of 10th Sideard (Zone G6L) (HHGEO)	HHGEO	MAIN	750	1,658	$ 5,423,000	$ -	$ -	$ 5,423,000	$ 4,013,000	$ 1,410,000	$ -	$ 840,000	$ -	$ 4,583,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Region IPFS ID	Project Description	Municipality	Project Type	Size / Capacity	Length (m)	Total Estimated Cost (2017$)	Benefit to Existing (2017$)	Post Period Benefit (2017$)	DC (2017$)	Res (2017$)	Non-Res (2017$)	Annualized Funding Requirements													
												2017 (CRITICAL PROJECTS)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
6655	750mm WM on Trafalgar from 1,700 m north of 10th Siderd to 15th Siderd (Zone G6L) (HHGEO)	HHGEO	MAIN	750	1,444	$ 4,861,000	$ -	$ -	$ 4,861,000	$ 3,597,000	$ 1,264,000	$ -	$ 753,000	$ -	$ 4,108,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6657	400mm WM on Tremaine Rd from Britannia Rd to 2,200 m south of Britannia Rd (Zone 223.5) (MIL)	MIL	MAIN	400	2,208	$ 3,632,000	$ -	$ -	$ 3,632,000	$ 2,688,000	$ 944,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 726,000	$ -	$ 2,906,000	$ -	$ -	$ -	$ -
6659	400mm WM on new road alignment from Tremaine Rd to approximately 360 m west (Zone 223.5) (MIL)	MIL	MAIN	400	392	$ 467,000	$ -	$ -	$ 467,000	$ 346,000	$ 121,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 93,000	$ -	$ 374,000	$ -	$ -	$ -
6662	600 mm WM on Wyecroft Rd from Burloak Dr to the 900mm WM on the SE corner of the 3rd line and QEW (OAK)	OAK	MAIN	600	4,740	$ 16,341,000	$ -	$ -	$ 16,341,000	$ 12,092,000	$ 4,249,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,268,000	$ -	$ 13,073,000	$ -	$ -	$ -	$ -
6666	750mm WM on Neyagawa Blvd. from Burnhamthorpe Rd W to Lower Base Line W (MIL)	MIL	MAIN	750	2,667	$ 8,699,000	$ -	$ 7,829,000	$ 870,000	$ 644,000	$ 226,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,740,000	$ 6,959,000
6694	10 ML Zone G6L Storage at 22nd Siderd (HHGEO)	HHGEO	RESERVOIR	10 ML		$ 11,660,000	$ -	$ -	$ 11,660,000	$ 8,628,000	$ 3,032,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,332,000	$ -	$ 9,328,000	$ -	$ -	$ -	$ -	$ -
6697	15 ML storage expansion at Zone M4 Reservoir (TWL = 250m) (HHGEO)	HHGEO	RESERVOIR	15 ML		$ 16,609,000	$ -	$ -	$ 16,609,000	$ 12,291,000	$ 4,318,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,322,000	$ -	$ 13,287,000	$ -	$ -	$ -	$ -
6701	Kitchen Zone O3 Pumping Station Expansion by 80 ML/d (OAK)	OAK	PS	80 MLD		$ 12,830,000	$ -	$ 8,596,000	$ 4,234,000	$ 3,133,000	$ 1,101,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,566,000	$ -	$ 10,264,000	$ -	$ -
6702	40 ML/d Expansion at the Neyagawa Pumping Station (OAK)	OAK	PS	40 ML/d		$ 7,200,000	$ -	$ -	$ 7,200,000	$ 5,328,000	$ 1,872,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,440,000	$ -	$ 5,760,000	$ -	$ -	$ -	$ -
6863	Waterdown Road Pumping Station Expansion (Zones B2, B3A & B5A) (BUR)	BUR	PS			$ 5,629,000	$ -	$ -	$ 5,629,000	$ 4,165,000	$ 1,464,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,126,000	$ -	$ 4,503,000	$ -	$ -	$ -	$ -	$ -
7014	400 mm WM from Waterdown Reservoir Pumping Station to new North Aldershot Reservoir (Zone B3A) (BUR)	BUR	MAIN	400	1,505	$ 2,437,000	$ -	$ -	$ 2,437,000	$ 1,803,000	$ 634,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 487,000	$ -	$ 1,950,000	$ -	$ -	$ -
7284	400mm WM and valve chamber to be constructed on Neyagawa Blvd (Regional Road 4) (OAK)	OAK	MAIN	400	10	$ 223,000	$ -	$ -	$ 223,000	$ 165,000	$ 58,000	$ -	$ 223,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7357	400mm WM on Sixth Line from the proposed William Halton Parkway (RR 40) southward approximately 300m (OAK)	OAK	MAIN	400	300	$ 270,000	$ -	$ -	$ 270,000	$ 200,000	$ 70,000	$ -	$ 270,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7497	400mm WM on Sixth Line from approximately 300m southward of William Halton Parkway (RR 40) to Burnhamthorpe Rd (OAK)	OAK	MAIN			$ 642,000	$ -	$ -	$ 642,000	$ 475,000	$ 167,000	$ -	$ 642,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7498	Lake Based Servicing transfer of Derry Rd/R.R. 25 area (MIL)	MIL	MAIN	300		$ 280,000	$ -	$ -	$ 280,000	$ 207,000	$ 73,000	$ -	$ -	$ -	$ 56,000	$ -	$ 224,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7501	400mm WM on new North Oakville Rd west of Neyagawa Blvd. (OAK)	OAK	MAIN	400	2,000	$ 3,000,000	$ -	$ -	$ 3,000,000	$ 2,220,000	$ 780,000	$ -	$ -	$ 600,000	$ -	$ 2,400,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7504	1200mm WM on Britannia Rd from 4th Line to RR 25 (Zone M4) - Construction (MIL)	MIL	MAIN	1200	2,858	$ 25,000,000	$ -	$ 8,000,000	$ 17,000,000	$ 12,580,000	$ 4,420,000	$ -	$ 25,000,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7505	1050mm WM on Burloak Dr from Burloak Pumping Station to the QEW - Construction (OAK)	OAK	MAIN	1050	270	$ 6,690,000	$ -	$ 2,810,000	$ 3,880,000	$ 2,871,000	$ 1,009,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 6,690,000	$ -	$ -	$ -	$ -	$ -	$ -
7507	600mm WM on 10th Siderd from Trafalgar Rd to 8th Line (Zone G6L) - Construction (HHGEO)	HHGEO	MAIN	600	1,408	$ 3,675,000	$ -	$ -	$ 3,675,000	$ 2,720,000	$ 955,000	$ -	$ 3,675,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7570	4.5 ML North Aldershot in ground Reservoir (Zone B3B) (BUR)	BUR	RESERVOIR	4.5 ML		$ 5,623,000	$ -	$ -	$ 5,623,000	$ 4,161,000	$ 1,462,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 200,000	$ 1,085,000	$ -	$ 4,338,000	$ -	$ -	$ -	$ -
Total Greenfield						**$ 308,352,000**	**$ 1,349,000**	**$ 43,597,000**	**$ 263,406,000**	**$ 194,922,000**	**$ 68,484,000**	**$ -**	**$ 34,088,000**	**$ 12,509,000**	**$ 32,640,000**	**$ 2,400,000**	**$ 508,000**	**$ 11,379,000**	**$ 59,809,000**	**$ 45,282,000**	**$ 75,523,000**	**$ 4,908,000**	**$ 10,264,000**	**$ 10,343,000**	**$ 1,740,000**	**$ 6,959,000**
Built Boundary																									
6602	7.5 ML storage expansion at Waterdown Reservoir (existing site) (Zone B1A) (BUR)	BUR	RESERVOIR	7.5 ML		$ 8,305,000	$ 7,724,000	$ -	$ 581,000	$ 442,000	$ 139,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,661,000	$ -	$ 6,644,000	$ -	$ -	$ -	$ -
6704	200mm WM on Brock Ave from Elgin Street to Lakeshore Rd (BUR)	BUR	MAIN	200	212	$ 454,000	$ -	$ -	$ 454,000	$ 345,000	$ 109,000	$ -	$ -	$ -	$ 91,000	$ -	$ 363,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6705	200mm WM on Regina Drive from Maple Avenue to Ecole Renaissance Schoolyard (BUR)	BUR	MAIN	200	176	$ 377,000	$ -	$ -	$ 377,000	$ 287,000	$ 90,000	$ -	$ -	$ -	$ 75,000	$ -	$ 302,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6708	300mm WM on Elizabeth St from James St to approximately 95 m north (BUR)	BUR	MAIN	300	95	$ 192,000	$ -	$ -	$ 192,000	$ 146,000	$ 46,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 38,000	$ -	$ 154,000	$ -	$ -	$ -	$ -	$ -
6709	300mm WM on Plains Rd East from north of Grandview Rd to twinned section on Plains Rd (BUR)	BUR	MAIN	300	982	$ 2,460,000	$ -	$ -	$ 2,460,000	$ 1,870,000	$ 590,000	$ -	$ 492,000	$ 1,968,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6710	300mm WM on Plains Rd East (Twinning adjacent to 6709) (BUR)	BUR	MAIN	300	341	$ 671,000	$ -	$ -	$ 671,000	$ 510,000	$ 161,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 134,000	$ 537,000	$ -
6711	300mm WM on Birchwood Avenue from Plains Rd East southwards towards Fairwood Place East (BUR)	BUR	MAIN	300	53	$ 111,000	$ -	$ -	$ 111,000	$ 84,000	$ 27,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 22,000	$ -	$ 89,000	$ -	$ -
6712	300mm WM on Gallagher Rd from Plains Rd East to 160 m Northerly (BUR)	BUR	MAIN	300	127	$ 256,000	$ -	$ -	$ 256,000	$ 195,000	$ 61,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 51,000	$ -	$ 205,000	$ -	$ -
6713	300mm WM on Downsview Rd from Plains Rd East to Dowland Crescent (BUR)	BUR	MAIN	200	144	$ 238,000	$ -	$ -	$ 238,000	$ 181,000	$ 57,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 48,000	$ -	$ 190,000	$ -	$ -
6714	300mm WM on Brant St from Fairview St to 180 m northerly (BUR)	BUR	MAIN	300	183	$ 405,000	$ -	$ -	$ 405,000	$ 308,000	$ 97,000	$ -	$ -	$ -	$ 81,000	$ -	$ 324,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6715	300mm WM on Woodview Rd from Fairview St to 100 m Northerly (BUR)	BUR	MAIN	300	100	$ 231,000	$ -	$ -	$ 231,000	$ 176,000	$ 55,000	$ -	$ -	$ -	$ 46,000	$ -	$ 185,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6716	200mm WM on from end of Commerce Crt north to Fairview St (BUR)	BUR	MAIN	200	96	$ 370,000	$ -	$ -	$ 370,000	$ 281,000	$ 89,000	$ -	$ -	$ -	$ 74,000	$ -	$ 296,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6717	300mm WM on Fairview St from Appleby Line to Taylor Crescent (BUR)	BUR	MAIN	300	377	$ 1,000,000	$ -	$ -	$ 1,000,000	$ 760,000	$ 240,000	$ -	$ -	$ -	$ 200,000	$ -	$ 800,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6721	300mm WM on Ontario St South from Main St East to Parkway Drive East (MIL)	MIL	MAIN	300	980	$ 2,082,000	$ -	$ -	$ 2,082,000	$ 1,582,000	$ 500,000	$ 416,000	$ 1,666,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6722	300mm WM on Woodward Avenue between Martin St and Ontario St North (MIL)	MIL	MAIN	300	703	$ 1,776,000	$ -	$ -	$ 1,776,000	$ 1,350,000	$ 426,000	$ 410,000	$ 1,366,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6723	400mm WM on Bronte St between Main St West and Barton St (MIL)	MIL	MAIN	400	551	$ 1,212,000	$ -	$ -	$ 1,212,000	$ 921,000	$ 291,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 242,000	$ -	$ 970,000	$ -	$ -	$ -

Region IPFS ID	Project Description	Municipality	Project Type	Size / Capacity	Length (m)	Total Estimated Cost (2017$)	Benefit to Existing (2017$)	Post Period Benefit (2017$)	DC (2017$)	Res (2017$)	Non-Res (2017$)	Annualized Funding Requirements												
												2017 (CRITICAL PROJECTS)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
6724	300mm WM on Main St East between James St and Martin St (MIL)	MIL	MAIN	300	292	$ 575,000	$ -	$ -	$ 575,000	$ 437,000	$ 138,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 115,000	$ -	$ 460,000	$ -	$ -	$ -
6725	300mm WM on Laurier Avenue between Bronte St and Commercial St (MIL)	MIL	MAIN	300	1,003	$ 2,436,000	$ -	$ -	$ 2,436,000	$ 1,851,000	$ 585,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 487,000	$ -	$ 1,949,000	$ -	$ -	$ -	$ -
6726	300mm WM on Sovereign St between Bronte Rd and East St (OAK)	OAK	MAIN	300	721	$ 2,097,000	$ -	$ -	$ 2,097,000	$ 1,594,000	$ 503,000	$ -	$ 419,000	$ -	$ 1,678,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6728	300mm WM on Cowan Ave between Kerr St and Inglewood Drive (OAK)	OAK	MAIN	300	87	$ 653,000	$ -	$ -	$ 653,000	$ 496,000	$ 157,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 131,000	$ -	$ 522,000	$ -	$ -	$ -	$ -
6729	300mm WM on Deane Ave between Kerr St and Felan Ave (OAK)	OAK	MAIN	300	291	$ 1,049,000	$ -	$ -	$ 1,049,000	$ 797,000	$ 252,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 210,000	$ -	$ 839,000	$ -	$ -	$ -	$ -
6731	300mm WM on Forsythe St between Rebecca St and Burnet St (OAK)	OAK	MAIN	300	314	$ 617,000	$ -	$ -	$ 617,000	$ 469,000	$ 148,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 123,000	$ -	$ 494,000	$ -	$ -	$ -	$ -
6733	300 mm Replacement on Cross St from Guelph St to Main St (HHGEO)	HHGEO	MAIN	300	106	$ 214,000	$ -	$ -	$ 214,000	$ 163,000	$ 51,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 43,000	$ -	$ 171,000	$ -
6735	300 mm replacement on Guelph St between Mountainview Rd North and Sinclair Ave (HHGEO)	HHGEO	MAIN	300	788	$ 1,955,000	$ -	$ -	$ 1,955,000	$ 1,486,000	$ 469,000	$ -	$ 391,000	$ -	$ 1,564,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7500	Milton West Looping - 400mm WM on Derry Rd from Santa Maria Blvd. to Bronte St South, and a 400 mm WM on Main St West from Scott Blvd. to Tremaine Road. (MIL)	MIL	MAIN	400	2,003	$ 3,737,000	$ 187,000	$ -	$ 3,550,000	$ 2,698,000	$ 852,000	$ -	$ 579,000	$ -	$ 3,158,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7503	300 mm WM on Sixth Line from Hays Blvd to River Glen Blvd. Project required to support Zone 3/4/5 Boundary Re-alignment (OAK)	OAK	MAIN	300	220	$ 150,000	$ 8,000	$ -	$ 142,000	$ 108,000	$ 34,000	$ -	$ 30,000	$ -	$ 120,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Built Boundary						**$ 33,623,000**	**$ 7,919,000**	**$ -**	**$ 25,704,000**	**$ 19,537,000**	**$ 6,167,000**	**$ 826,000**	**$ 4,943,000**	**$ 1,968,000**	**$ 7,087,000**	**$ -**	**$ 2,270,000**	**$ 38,000**	**$ 1,661,000**	**$ 1,347,000**	**$ 6,880,000**	**$ 4,774,000**	**$ 1,121,000**	**$ -**	**$ 708,000**	**$ -**
Total						**$ 535,112,000**	**$ 11,410,000**	**$ 43,597,000**	**$ 480,105,000**	**$ 357,708,000**	**$ 122,397,000**	**$ 986,000**	**$ 64,999,000**	**$ 15,036,000**	**$ 57,643,000**	**$ 4,158,000**	**$ 14,913,000**	**$ 143,178,000**	**$ 61,630,000**	**$ 47,589,000**	**$ 82,563,000**	**$ 9,842,000**	**$ 12,345,000**	**$ 10,503,000**	**$ 2,608,000**	**$ 7,119,000**

Legend

Existing Infrastructure
- Existing Pumping Station (PS)
- Existing Reservoir (RES)
- Existing Water Purification Plant (WPP)
- Existing Standpipe
- Existing Well Field (Well)
- Existing Elevated Tower (ET)
- Existing Watermain

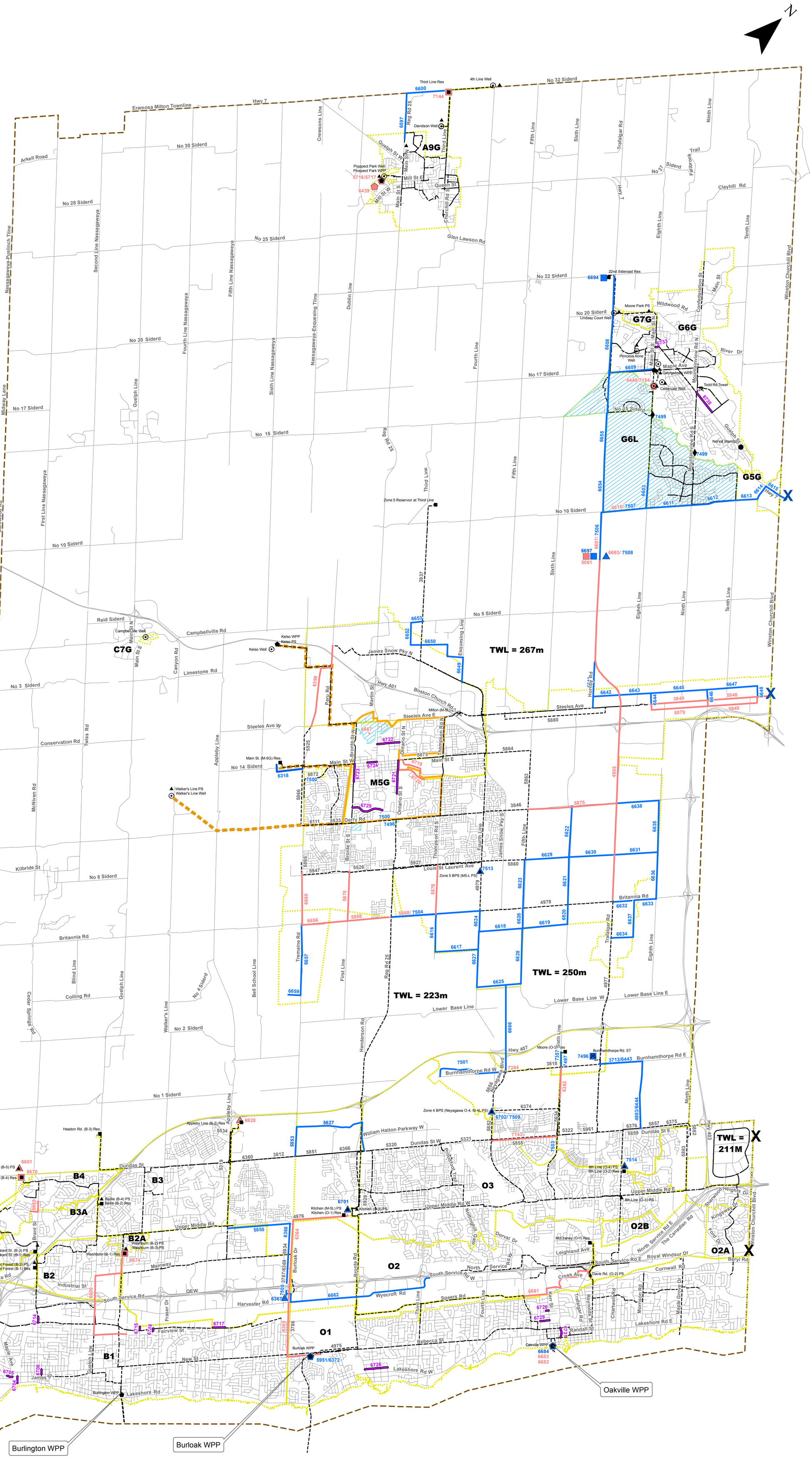
Pumping Station
- DC Project - Pumping Station
- Project Constructed/Imminent/Funded - Pumping Station

Water Treatment Plant
- DC Project - WPP
- Project Constructed/Imminent/Funded - WPP

Reservoir
- DC Project - Storage
- Project Constructed/Imminent/Funded - Storage

Well
- Project Constructed/Imminent/Funded - Well

Linear
- DC Project - Linear
- Project Constructed/Imminent/Funded - Linear
- Intensification Project
- 5320 Previous IPFS number for existing watermain
- Existing Interregional connections
- New Interregional connections
- Water Pressure Zone
- Existing Central Milton Groundwater Service Area Boundary
- Lakebased Service Area Transfer



Halton Region
2017 Development Charges
Water and Wastewater
Technical Report

Halton Region
Water Development Capital Implementation Plan (2017-2031)
Figure 4

BluePlan Engineering
715027-9-W
October, 2016
Data Source: Halton Region
Scale: 1:55,134 | NAD 1983 UTM Zone 17N

6. WASTEWATER SERVICING REQUIREMENTS

6.1 Wastewater Service Areas

The wastewater service areas were reviewed and confirmed through the 2017 DC Technical Report. Peak wet weather flow calculations were determined for each individual SGU. Subsequently project requirements were confirmed as well as the downstream impacts to trunk sewers, Wastewater Pumping Stations (WWPS) and Wastewater Treatment Plants (WWTP). Wastewater flows and capacity requirements were determined through evaluation of the following areas:

- Wastewater Treatment Plant Drainage Area - WWTP
- Trunk Catchment Areas – Trunk Sewers and WWPS
- Local Catchment Areas – Sub-trunk Sewers

The Region has undertaken several wastewater servicing studies since the completion of the 2012 DC report. These studies were reviewed and their results incorporated as part of the 2017 DC Update. These results are discussed in the following sections.

6.2 Milton Wastewater Servicing Review

Further to the 2011 Master Plan and subsequent 2012 DC Update, an additional study was undertaken to review the long term strategy for the Milton WWTP. Currently, the Milton WWTP services areas generally in central and north Milton. The WWTP has the ability to pump flows in excess of its current rated capacity to the south into the Mid-Halton WWTP catchment area.

The ultimate outcome of the Milton WWTP study determined that the most cost effective and technically viable long term solution for wastewater servicing in the area was to decommission the Milton WWTP and send all wastewater flows to Mid-Halton WWTP.

The future Wastewater drainage areas are identified by their downstream WWTP and are depicted in Figure 5.

6.3 Burlington Wastewater Servicing Review

Additional technical study was undertaken to review the 2011 Master Plan wastewater servicing strategy for part of the municipal wastewater collection system (west area of Burlington).

The findings from this technical review resulted in a revised wastewater flow diversion strategy in this area which eliminated the need to upsize the Grandview Wastewater Pumping Station. As part of this strategy, the diversion of wastewater flow from the Grandview Wastewater Pumping Station (west area of Burlington) was achieved by extending the wastewater forcemain from the Bridgeview Wastewater Pumping Station to the Plains Road Trunk Sewer. Through this revised wastewater strategy, the 2011 Master Plan need to upsize the Grandview Wastewater Pumping Station and its associated upstream inlet sewers have been eliminated.

In addition, updated wastewater system flow information (i.e. reduced sewer infiltration and inflow) and model recalibration in this area have determined that the 2011 Master Plan strategy need to upsize the existing Plains Road trunk sewer is no longer required.

6.4 Acton Wastewater Servicing Review

Additional review of the potential to divert flows from Acton WWTP to the Georgetown WWTP (which would allow decommissioning of the Acton WWTP) was completed.

Key findings of this review included:

- The most practical and least expensive route for a wastewater trunk sewer between Acton and Georgetown would be within the provincial Highway 7 right-of-way. However the Ontario Ministry of Transportation (MTO), which governs this road corridor, indicated they would not permit such infrastructure within this right-of-way and would impose significant setback conditions that would require the sewer to be located outside of their road corridor within private properties.
- Alternative routes, such as an easement through private property parallel to Highway 7, were considered but were deemed to be much more expensive and impactful to property owners and the environment.
- The trunk sewer project would need to be constructed and commissioned by 2019 to accommodate the projected growth in servicing needs in Acton.

It was concluded that the original 2011 Master Plan wastewater servicing strategy to expand the Acton WWTP should proceed, and that the Acton to Georgetown wastewater flow diversion alternative strategy not be pursued. The implementation of the Acton WWTP expansion will continue to be funded through the 2012 Allocation Plan.

Legend

- Skyway WWTP
- Mid-Halton WWTP
- Oakville SE WWTP
- Oakville SW WWTP
- Milton WWTP Decommission and Transfer to Mid-Halton WWTP
- Acton WWTP
- Georgetown WWTP
- Georgetown Transfer Area to Mid-Halton WWTP
- Regional Boundary
- Waterbody

Acton WWTP

Georgetown WWTP

Milton WWTP

Mid-Halton WWTP

Oakville SE WWTP

Oakville SW WWTP

Skyway WWTP

2017 Development Charges
Water and Wastewater
Technical Report

Halton Region
Future Wastewater Drainage Areas
Figure 5

715027-41-WW
June 2016
Data Source: Halton Region
Scale: 1:55,000 | NAD 1983 UTM Zone 17N

6.5 Wastewater Flow Projections

The following table outlines the flow projections for each WWTP, including transfer of flow between WWTP catchment areas.

Table 14 – Wastewater Flow Projections

		Average Day Flow Rates (MLD)			
	Drainage Area	**2016**	**2021**	**2026**	**2031**
1	**Acton WWTP**	**3.5**	**3.8**	**4.8**	**5.2**
2	**Georgetown WWTP (after transfer)**	**17.8**	**19.2**	**11.4**	**12.5**
2.1	Georgetown WWTP (Incl. Glen Williams and Norval)	17.8	19.2	20.0	22.3
2.2	*Transfer to Mid-Halton WWTP*	0.0	0.0	-8.6	-9.7
3	**Milton WWTP (after transfer)**	**13.7**	**0.0**	**0.0**	**0.0**
3.1	Milton WWTP	13.7	17.2	19.3	21.7
3.2	*Diverted to Mid-Halton WWTP*	0.0	-17.2	-19.3	-21.7
4	**Mid-Halton WWTP (Incl. transfer from Georgetown and Milton)**	**68.3**	**109.6**	**143.4**	**169.0**
4.1	Mid-Halton WWTP (no transfer)	68.3	92.4	115.5	137.6
4.2	*Georgetown Transfer to Mid-Halton WWTP*	0.0	0.0	8.6	9.7
4.3	*Milton WWTP Diverted to Mid-Halton WWTP*	0.0	17.2	19.3	21.7
5	**Oakville SE WWTP**	**20.6**	**20.9**	**20.9**	**21.6**
6	**Oakville SW WWTP**	**30.8**	**33.7**	**36.0**	**38.4**
7	**Skyway WWTP**	**101.3**	**103.4**	**104.8**	**106.8**

7. WASTEWATER CAPITAL IMPLEMENTATION PLAN

The Wastewater Capital Implementation Plan is outlined by DC policy category in Table 15. This table provides the Regional Project Identification numbers, project descriptions and cost estimates. The total Wastewater Program cost from 2017-2031 is $626M as presented in Table 15.

The preferred wastewater servicing strategy is depicted in Figure 6 and is based on the following area components:

Milton Wastewater Servicing

- The Milton lake based wastewater service area generally consists of the newer areas of Milton surrounding the Milton core. The Milton core as well as areas north of Main St are serviced by the existing Milton WWTP
- Upon future decommissioning of the Milton WWTP and construction of a new WWPS to pump flows south, Milton will be entirely serviced by the Mid-Halton WWTP
- Future growth flow in Milton will be conveyed to the Mid-Halton WWTP via the existing Boyne Trunk sewer and three new WWPS.

Key components of the wastewater servicing strategy for Milton are:

- South Tremaine WWPS and Forcemain – servicing areas generally west of RR25 and south of Britannia Rd, including Milton Education Village
- Decommissioning of Boyne WWPS and transfer of flow to new Boyne Trunk Sewer
- Trunk sewer infrastructure along Eighth Line, Trafalgar Rd, Britannia Rd, 5th Line and Lower Baseline
- Trafalgar/Britannia WWPS and Forcemain – servicing Greenfield growth flows along Trafalgar Rd, Georgetown and the Georgetown Lake Based transfer area.
- Lower Baseline WWPS and Forcemain – servicing Greenfield growth areas in Georgetown, Georgetown Lake Based transfer area, Milton (Trafalgar Corridor and south of Britannia)
- Local infrastructure upgrades to meet flow projections related to intensification growth
- Mid-Halton WWTP treatment upgrades to provide additional wastewater treatment capacity for growth

Georgetown Wastewater Servicing

- Georgetown is currently serviced exclusively by the stream-based Georgetown WWTP
- Upon completion of the lake based trunk sewer infrastructure, two service areas can be transferred to the Mid-Halton WWTP catchment area: Existing Main St WWPS Drainage Area and Existing South Georgetown Area located south of the Silver Creek
- New Greenfield growth areas in southwest Georgetown will also be serviced by the lake based trunk sewer infrastructure

Key components of the wastewater servicing strategy for Georgetown are:

- Maintain capacity at the Georgetown WWTP
- Upgrade existing sewers and WWPSs to receive intensification flow
- Georgetown Lake based transfer infrastructure: trunk sewers, pumping stations and forcemains along Eighth Line, Trafalgar Rd, Britannia Rd, Fifth Line and Lower Base Line
- Mid-Halton WWTP treatment upgrades to provide additional wastewater treatment capacity for growth

Oakville Wastewater Servicing

- North Oakville Greenfield growth east of Sixteen Mile Creek will flow to the Mid-Halton WWTP via North Oakville East WWPS and Third Line Trunk Sewer
- Oakville UGC , which is anticipated to experience intensification growth will be serviced by the new Rebecca Trunk Sewer, which ultimately outlets to the Oakville SW WWTP

Key components of the wastewater servicing strategy for Oakville are:

- Sub-Trunk sewers conveying flow south to Dundas St Trunk sewer and North Oakville East WWPS
- Local WWPS and sewer infrastructure upgrades through intensification program to meet flow projections related to intensification growth
- West River WWPS Capacity Upgrades

Burlington Wastewater Servicing

- The Wastewater strategy for Burlington is to maintain conveyance to the Skyway WWTP via existing trunk sewers and WWPS throughout the City.
- Growth flows within the Skyway WWTP catchment area are predominantly generated by intensification growth

Key components of the wastewater servicing strategy for Burlington are:

- Trunk sewer upgrades along Maple Ave and Lakeshore Rd just upstream of the Skyway WWTP
- Local WWPS and sewer infrastructure upgrades through intensification program to meet flow projections related to intensification growth
- Junction Street WWPS Capacity Upgrades
- Diversion of wastewater flow from the Grandview Wastewater Pumping Station (west area of Burlington)

Acton Wastewater Servicing

- The Wastewater strategy for Acton is to maintain conveyance to the Acton WWTP via existing and upgraded trunk sewers and WWPS

Key components of the wastewater servicing strategy for Acton are:

- Trunk sewer twinning along existing Black Creek Trunk Sewer alignment
- Agnes St. WWPS upgrades

North Aldershot Policy Area Wastewater Servicing

- The North Aldershot Policy Area is located north of Hwy 403, along Waterdown Rd and is identified within Figure 1.
- Currently, a gravity sewer is identified to service this area; the servicing scheme will be confirmed in the Area Servicing Plan.

Wastewater Development Capital Implementation Plan
Table 15

Region IPFS ID	Project Description	Municipality	Project Type	Size / Capacity	Length (m)	Total Estimated Cost (2017$)	Benefit to Existing (2017$)	Post Period Benefit (2017$)	DC (2017$)	Res (2017$)	Non-Res (2017$)	Annualized Funding Requirements													
												2017 (CRITICAL PROJECTS)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Capacity																										
6588	Mid-Halton WWTP expansion from 125 ML/d to 175 ML/d (OAK)	OAK	PLANT	50 ML/d		$ 99,761,000	$ 36,912,000	$ -	$ 62,849,000	$ 46,508,000	$ 16,341,000	$ 1,995,000	$ -	$ 17,957,000	$ -	$ 79,809,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7517	Halton Wastewater Master Plan (REG)	REG	STUDY			$ 2,050,000	$ -	$ -	$ 2,050,000	$ 1,517,000	$ 533,000	$ -	$ 450,000	$ -	$ -	$ -	$ -	$ 800,000	$ -	$ -	$ -	$ -	$ 800,000	$ -	$ -	$ -
7518	Wastewater Collection System Analysis (REG)	REG	STUDY			$ 1,650,000	$ -	$ -	$ 1,650,000	$ 1,221,000	$ 429,000	$ 110,000	$ 110,000	$ 110,000	$ 110,000	$ 110,000	$ 110,000	$ 110,000	$ 110,000	$ 110,000	$ 110,000	$ 110,000	$ 110,000	$ 110,000	$ 110,000	$ 110,000
7519	Wastewater Treatment Capacity Annual Monitoring Report (REG)	REG	STUDY			$ 750,000	$ -	$ -	$ 750,000	$ 555,000	$ 195,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000
7521	Black Creek Monitoring Program (HHACT)	HHACT	STUDY			$ 400,000	$ -	$ -	$ 400,000	$ 296,000	$ 104,000	$ -	$ -	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ -	$ -	$ -	$ -	$ -
7528	North WWPS expansion of 1,200 L/s at Mid-Halton WWTP (OAK)	OAK	PS	1200 L/s		$ 22,564,000	$ 11,508,000	$ -	$ 11,056,000	$ 8,181,000	$ 2,875,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,513,000	$ -	$ 18,051,000	$ -	$ -	$ -
7532	New 2400 mm WWM inlet to Skyway WWTP parallel to QEW (BUR)	BUR	MAIN	2400	1,114	$ 24,462,000	$ 22,750,000	$ -	$ 1,712,000	$ 1,267,000	$ 445,000	$ 150,000	$ 3,768,000	$ -	$ 20,544,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7536	Regional Sanitary Sewer System Invert Survey (REG)	REG	STUDY			$ 350,000	$ -	$ -	$ 350,000	$ 259,000	$ 91,000	$ -	$ 350,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7538	Peer Review of InfoWorks Model Calibration (REG)	REG	STUDY			$ 100,000	$ -	$ -	$ 100,000	$ 74,000	$ 26,000	$ -	$ 100,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7545	Flow Monitoring for Wastewater Model Calibration (REG)	REG	STUDY			$ 325,000	$ -	$ -	$ 325,000	$ 241,000	$ 84,000	$ -	$ 325,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7548	Mid-Halton WWTP expansion from 175 ML/d to 225 ML/d (Design)	OAK	PLANT	50 ML/d		$ 18,000,000	$ -	$ 18,000,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 18,000,000	$ -
7549	900 mm WWM on 8th Line from 10th Side Rd to 5th Side Rd - Construction (HHGEO)	HHGEO	MAIN	900	3,097	$ 24,072,000	$ -	$ -	$ 24,072,000	$ 17,813,000	$ 6,259,000	$ -	$ -	$ 24,072,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7550	900 mm WWM on 8th Line from 5th Side Rd to Steeles Ave - Construction (HHGEO)	HHGEO	MAIN	900	3,083	$ 9,530,000	$ -	$ -	$ 9,530,000	$ 7,052,000	$ 2,478,000	$ -	$ -	$ 9,530,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7552	1050 mm WWM on Steeles Ave from 8th Line to Crossing Easement - Construction (HHGEO)	HHGEO	MAIN	1050	375	$ 3,156,000	$ -	$ -	$ 3,156,000	$ 2,335,000	$ 821,000	$ -	$ -	$ 3,156,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Capacity						**$ 207,170,000**	**$ 71,170,000**	**$ 18,000,000**	**$ 118,000,000**	**$ 87,319,000**	**$ 30,681,000**	**$ 2,305,000**	**$ 5,153,000**	**$ 54,925,000**	**$ 20,754,000**	**$ 80,019,000**	**$ 210,000**	**$ 1,010,000**	**$ 210,000**	**$ 210,000**	**$ 4,723,000**	**$ 160,000**	**$ 19,011,000**	**$ 160,000**	**$ 18,160,000**	**$ 160,000**
Greenfield																										
4994	600 mm WWM on new North Oakville road from Burnhamthorpe Rd to Dundas St (OAK)	OAK	MAIN	600	2,690	$ 8,184,000	$ -	$ -	$ 8,184,000	$ 6,056,000	$ 2,128,000	$ -	$ 1,268,000	$ -	$ 6,916,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
5906	750 mm WWM on new road alignment from Louis St. Laurent to Britannia Rd (MIL)	MIL	MAIN	750	1,544	$ 10,288,000	$ -	$ -	$ 10,288,000	$ 7,613,000	$ 2,675,000	$ -	$ 1,594,000	$ -	$ 8,694,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
5907	300 mm WWM North Aldershot Servicing (BUR)	BUR	MAIN	300	2,090	$ 4,563,000	$ -	$ -	$ 4,563,000	$ 3,377,000	$ 1,186,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 913,000	$ -	$ 3,650,000	$ -	$ -	$ -	$ -	$ -
6481	450 mm WWM on internal road parallel to Dundas St from west of 16 Mile Creek Bridge to 190 m east of Proudfoot Trail (OAK)	OAK	MAIN	450	400	$ 480,000	$ -	$ -	$ 480,000	$ 355,000	$ 125,000	$ -	$ -	$ 75,000	$ -	$ 405,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6496	Twinned 250mm WWFM from Norval WWPS to new WWPS #6570 at Mountainview Rd (HHGEO)	HHGEO	FM	250	1,900	$ 1,333,000	$ -	$ -	$ 1,333,000	$ 986,000	$ 347,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 267,000	$ -	$ 1,066,000
6497	300 mm WWM on Derry Rd from 8th Line to Trafalgar Rd (MIL)	MIL	MAIN	300	1,361	$ 885,000	$ -	$ -	$ 885,000	$ 655,000	$ 230,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 177,000	$ -	$ 708,000	$ -	$ -	$ -	$ -	$ -
6498	450 mm WWM on new road from 8th Line to Trafalgar Rd (MIL)	MIL	MAIN	450	1,380	$ 1,651,000	$ -	$ -	$ 1,651,000	$ 1,222,000	$ 429,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 330,000	$ -	$ 1,321,000	$ -	$ -	$ -	$ -	$ -
6499	300 mm WWM on Britannia Rd from 8th Line to Trafalgar/ Britannia WWPS (MIL)	MIL	MAIN	300	1,370	$ 1,148,000	$ -	$ -	$ 1,148,000	$ 850,000	$ 298,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 230,000	$ -	$ 918,000	$ -	$ -	$ -	$ -	$ -
6500	600 mm WWM on 4th Line from new road to Lower Base Line WWPS (MIL)	MIL	MAIN	600	1,272	$ 4,632,000	$ -	$ -	$ 4,632,000	$ 3,428,000	$ 1,204,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 926,000	$ -	$ 3,706,000	$ -	$ -	$ -	$ -	$ -
6501	450 mm WWM on 4th Line from south of Britannia Rd to new road (MIL)	MIL	MAIN	450	1,021	$ 3,722,000	$ -	$ -	$ 3,722,000	$ 2,754,000	$ 968,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 744,000	$ -	$ 2,978,000	$ -	$ -	$ -	$ -	$ -
6502	525 mm WWM on Thompson Rd and new internal road from south of Britannia to 4th Line (MIL)	MIL	MAIN	525	2,241	$ 2,520,000	$ -	$ -	$ 2,520,000	$ 1,865,000	$ 655,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 504,000	$ -	$ 2,016,000	$ -	$ -	$ -	$ -	$ -
6503	300 mm WWM on 8th Line from north of Derry Rd to Derry Rd (MIL)	MIL	MAIN	300	625	$ 537,000	$ -	$ -	$ 537,000	$ 397,000	$ 140,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 107,000	$ -	$ 430,000	$ -	$ -	$ -	$ -	$ -
6504	450 mm WWM on 8th Line from north of new road to new road (MIL)	MIL	MAIN	450	738	$ 864,000	$ -	$ -	$ 864,000	$ 639,000	$ 225,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 173,000	$ -	$ 691,000	$ -	$ -	$ -	$ -	$ -
6505	300 mm WWM on 8th Line from north of Britannia Rd to Britannia Rd (MIL)	MIL	MAIN	300	692	$ 424,000	$ -	$ -	$ 424,000	$ 314,000	$ 110,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 85,000	$ -	$ 339,000	$ -	$ -	$ -	$ -	$ -
6506	750 mm WWM on 9th Line from Argyll Rd to 10th Side Rd - Georgetown South Connection (HHGEO)	HHGEO	MAIN	750	1,143	$ 8,320,000	$ -	$ -	$ 8,320,000	$ 6,157,000	$ 2,163,000	$ -	$ 1,290,000	$ -	$ 7,030,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6508	Decommissioning of HH WWPS #3, connection to new 8th Line trunk sewer and conversion of site to septage receiving facility (HHS)	HHS	PS			$ 785,000	$ -	$ -	$ 785,000	$ 581,000	$ 204,000	$ -	$ -	$ -	$ 157,000	$ -	$ 628,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6552	450mm WWM on new road alignment in Milton Education Village from Louis St Laurent extension to 1115 m south (MIL)	MIL	MAIN	450	1,115	$ 883,000	$ -	$ -	$ 883,000	$ 653,000	$ 230,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 177,000	$ -	$ 706,000	$ -	$ -	$ -	$ -	$ -
6553	450 mm WWM on Louis St Laurent extension from 340m west of Tremaine Rd to Tremaine Rd (MIL)	MIL	MAIN	450	340	$ 844,000	$ -	$ -	$ 844,000	$ 625,000	$ 219,000	$ -	$ 844,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6554	600 mm WWM on Lower Base Line from WWFM discharge approx 650 m west of 1st Line to RR 25 (MIL)	MIL	MAIN	600	1,911	$ 9,034,000	$ -	$ -	$ 9,034,000	$ 6,685,000	$ 2,349,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,807,000	$ -	$ 7,227,000	$ -	$ -	$ -	$ -	$ -
6555	New 225 L/s WWPS on Tremaine Rd at Lower Base Line (MIL)	MIL	PS	225 L/s		$ 7,314,000	$ -	$ -	$ 7,314,000	$ 5,412,000	$ 1,902,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,463,000	$ -	$ 5,851,000	$ -	$ -	$ -	$ -	$ -	$ -
6556	Twin 400 mm WWFM from Tremaine WWPS to Lower Base Line, approx. 650 m west of 1st Line (MIL)	MIL	FM	400	1,135	$ 4,520,000	$ -	$ -	$ 4,520,000	$ 3,345,000	$ 1,175,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 904,000	$ -	$ 3,616,000	$ -	$ -	$ -	$ -	$ -	$ -

Wastewater Development Capital Implementation Plan

Table 15

Region IPFS ID	Project Description	Municipality	Project Type	Size / Capacity	Length (m)	Total Estimated Cost (2017$)	Benefit to Existing (2017$)	Post Period Benefit (2017$)	DC (2017$)	Res (2017$)	Non-Res (2017$)	Annualized Funding Requirements														
												2017 (CRITICAL PROJECTS)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
6557	600 mm WWM on Tremaine Rd from approximately 1500 m north of South Tremaine Rd WWPS to South Tremaine Rd WWPS (MIL)	MIL	MAIN	600	1,539	$ 6,583,000	$ -	$ -	$ 6,583,000	$ 4,871,000	$ 1,712,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,317,000	$ -	$ 5,266,000	$ -	$ -	$ -	$ -	$ -
6559	525 mm WWM on Tremaine Rd from Britannia Rd to 1050 m south of Britannia Rd (MIL)	MIL	MAIN	525	1,050	$ 4,629,000	$ -	$ -	$ 4,629,000	$ 3,425,000	$ 1,204,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 926,000	$ -	$ 3,703,000	$ -	$ -	$ -	$ -	$ -
6560	525 mm WWM on James Snow Pkwy and new road alignment from Steeles Ave to Esquesing Line (MIL)	MIL	MAIN	450	1,708	$ 2,065,000	$ -	$ -	$ 2,065,000	$ 1,528,000	$ 537,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 413,000	$ -	$ 1,652,000	$ -	$ -	$ -	$ -	$ -
6561	450 mm WWM on new road and Britannia Rd from Milton Education Village to Tremaine Rd (MIL)	MIL	MAIN	450	710	$ 562,000	$ -	$ -	$ 562,000	$ 416,000	$ 146,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 112,000	$ -	$ 450,000	$ -	$ -	$ -	$ -	$ -
6562	450 mm WWM on new road from 440 m north of Derry Rd to Derry Rd and 525 mm WWM on Derry Rd from 725 m east of 5th Line to 5th Line (MIL)	MIL	MAIN	525	725	$ 1,465,000	$ -	$ -	$ 1,465,000	$ 1,084,000	$ 381,000	$ -	$ 227,000	$ -	$ 1,238,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6564	525 mm WWM on new alignment from Esquesing Line to 3rd Line (MIL)	MIL	MAIN	525	2,104	$ 3,157,000	$ -	$ -	$ 3,157,000	$ 2,336,000	$ 821,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 631,000	$ -	$ 2,526,000	$ -	$ -	$ -	$ -	$ -
6567	Twinned 300mm WWFM on 10th Side Rd from 9th Ln to New WW #9 (HHGEO)	HHGEO	FM	300	690	$ 1,006,000	$ -	$ -	$ 1,006,000	$ 744,000	$ 262,000	$ -	$ 157,000	$ 849,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6570	360 L/s WWPS at 10 Side Rd/9th Line (HHGEO)	HHGEO	PS	360 L/s		$ 8,363,000	$ -	$ -	$ 8,363,000	$ 6,189,000	$ 2,174,000	$ -	$ 1,420,000	$ -	$ 6,943,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6578	525 WWM on Trafalgar Rd from south of Britannia Rd to Britannia Rd/ Trafalgar Rd WWPS (MIL)	MIL	MAIN	525	1,176	$ 4,389,000	$ -	$ -	$ 4,389,000	$ 3,248,000	$ 1,141,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 878,000	$ -	$ 3,511,000	$ -	$ -	$ -	$ -
6581	1350 mm WWM on 5th Line from Britannia Rd to Lower Base Line (MIL)	MIL	MAIN	1350	2,461	$ 15,678,000	$ -	$ -	$ 15,678,000	$ 11,602,000	$ 4,076,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,136,000	$ -	$ 12,542,000	$ -	$ -	$ -	$ -	$ -
6582	1350 mm WWM on Lower Base Line from 5th Line to 4th Line (MIL)	MIL	MAIN	1350	1,378	$ 10,003,000	$ -	$ -	$ 10,003,000	$ 7,402,000	$ 2,601,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,001,000	$ -	$ 8,002,000	$ -	$ -	$ -	$ -	$ -
6583	525 mm WWM on new road from 1400 m north of Britannia Rd to Britannia Rd (MIL)	MIL	MAIN	525	1,366	$ 5,727,000	$ -	$ -	$ 5,727,000	$ 4,238,000	$ 1,489,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,145,000	$ -	$ 4,582,000	$ -	$ -	$ -	$ -	$ -	$ -
6584	1,805 L/s WWPS at Lower Base Line and 4th Line (MIL)	MIL	PS	1,805 L/s		$ 30,369,000	$ -	$ -	$ 30,369,000	$ 22,473,000	$ 7,896,000	$ -	$ 607,000	$ -	$ -	$ -	$ -	$ 6,074,000	$ -	$ 23,688,000	$ -	$ -	$ -	$ -	$ -	$ -
6585	Twinned 900 mm WWFM from Lower Base Line to RR 25 (MIL)	MIL	FM	900	3,532	$ 63,500,000	$ -	$ -	$ 63,500,000	$ 46,990,000	$ 16,510,000	$ -	$ 1,270,000	$ -	$ -	$ -	$ -	$ 11,430,000	$ -	$ 50,800,000	$ -	$ -	$ -	$ -	$ -	$ -
6586	750 mm WWM on 8th Line from Argyll Rd to 10th Side Rd (HHGEO)	HHGEO	MAIN	750	1,059	$ 3,135,000	$ -	$ -	$ 3,135,000	$ 2,320,000	$ 815,000	$ -	$ -	$ 486,000	$ 2,649,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6587	600 mm WWM on 8th Line from Miller Rd to Argyll Rd (HHGEO)	HHGEO	MAIN	600	1,225	$ 2,671,000	$ -	$ -	$ 2,671,000	$ 1,977,000	$ 694,000	$ -	$ -	$ 415,000	$ 2,256,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6589	35 L/s WWPS on 10th Side Rd in Norval (HHGEO)	HHGEO	PS	35 L/s		$ 731,000	$ -	$ -	$ 731,000	$ 541,000	$ 190,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 146,000	$ 585,000
7168	450 mm sewer on Burnhamthorpe Rd from Neyagawa Blvd. to King's Christian Collegiate (OAK)	OAK	MAIN	450		$ 130,000	$ -	$ -	$ 130,000	$ 96,000	$ 34,000	$ -	$ 130,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7520	600 mm WWM crossing Dundas St and 600 mm WWM on Dundas St from 900m west of Colonel Williams Parkway to Colonel Williams Parkway (Construction) (OAK)	OAK	MAIN	600	884	$ 3,849,000	$ -	$ -	$ 3,849,000	$ 2,848,000	$ 1,001,000	$ -	$ -	$ 3,849,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7522	525 mm WWM through developer subdivision from ID 5063 to Burnhamthorpe Rd W (OAK)	OAK	MAIN	525	1,250	$ 1,944,000	$ -	$ -	$ 1,944,000	$ 1,439,000	$ 505,000	$ -	$ 301,000	$ -	$ 1,643,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7523	600 mm WWM on Trafalgar Rd from ID 5062 to Burnhamthorpe Rd East (OAK)	OAK	MAIN	600	1,750	$ 3,567,000	$ -	$ -	$ 3,567,000	$ 2,640,000	$ 927,000	$ 553,000	$ 3,014,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7524	450 mm WWM through developer subdivison from ID 6114 on Thompson Rd westerly (MIL)	MIL	MAIN	450	630	$ 756,000	$ -	$ -	$ 756,000	$ 559,000	$ 197,000	$ -	$ 117,000	$ -	$ 639,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7529	1050 mm WWM on Trafalgar Rd from Derry Rd to Golf Course - Construction (MIL)	MIL	MAIN	1050	1,805	$ 7,307,000	$ -	$ -	$ 7,307,000	$ 5,407,000	$ 1,900,000	$ -	$ -	$ 7,307,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7530	1050 mm WWM on Trafalgar Rd from Golf Course to Britannia Rd / Trafalgar Rd WWPS - Construction (MIL)	MIL	MAIN	1050	1,256	$ 11,134,000	$ -	$ -	$ 11,134,000	$ 8,239,000	$ 2,895,000	$ -	$ -	$ 11,134,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7531	525mm WWM on Fourth Line from Britannia Rd to approximately 900 m north (MIL)	MIL	MAIN	525	900	$ 4,337,000	$ -	$ -	$ 4,337,000	$ 3,209,000	$ 1,128,000	$ -	$ 673,000	$ -	$ 3,664,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7533	Twinned 750 mm WWFM on Britannia Rd from Trafalgar Rd to 6th Line - Construction (MIL)	MIL	FM	750	1,344	$ 11,774,000	$ -	$ -	$ 11,774,000	$ 8,713,000	$ 3,061,000	$ -	$ 11,774,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7534	450 mm WWM on new road in Milton Education Village from 800m north of Louis St Laurent extension to Louis St Laurent extension (MIL)	MIL	MAIN	450	800	$ 634,000	$ -	$ -	$ 634,000	$ 469,000	$ 165,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 127,000	$ -	$ 507,000	$ -	$ -	$ -	$ -	$ -
7535	1200 mm WWM on Britannia Rd from 6th Line to 5th Line - Construction (MIL)	MIL	MAIN	1200	1,400	$ 13,707,000	$ -	$ -	$ 13,707,000	$ 10,143,000	$ 3,564,000	$ -	$ 13,707,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7547	1200 mm WWM on Britannia Rd to 5th Line to James Snow Pkwy - Construction (MIL)	MIL	MAIN	1200	625	$ 5,812,000	$ -	$ -	$ 5,812,000	$ 4,301,000	$ 1,511,000	$ -	$ 5,812,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7551	1,200 L/s WWPS on Trafalgar Rd/ Britannia Rd - Construction (MIL)	MIL	PS	1,200 L/s		$ 22,107,000	$ -	$ -	$ 22,107,000	$ 16,359,000	$ 5,748,000	$ -	$ 334,000	$ 21,773,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7553	1050 mm WWM 401 Crossing from Steeles Ave to Auburn Rd - Construction (MIL)	MIL	MAIN	1050	1,250	$ 13,843,000	$ -	$ -	$ 13,843,000	$ 10,244,000	$ 3,599,000	$ -	$ -	$ 13,843,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7554	1050 mm WWM on Auburn Rd from Hwy 401 crossing easement to Trafalgar Rd - Construction (MIL)	MIL	MAIN	1050	870	$ 4,473,000	$ -	$ -	$ 4,473,000	$ 3,310,000	$ 1,163,000	$ -	$ -	$ 4,473,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7555	1050 mm WWM on Trafalgar Rd from Auburn Rd to Derry Rd - Construction (MIL)	MIL	MAIN	1050	1,850	$ 10,005,000	$ -	$ -	$ 10,005,000	$ 7,404,000	$ 2,601,000	$ -	$ -	$ 10,005,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Greenfield						**$ 352,343,000**	**$ -**	**$ -**	**$ 352,343,000**	**$ 260,733,000**	**$ 91,610,000**	**$ 553,000**	**$ 44,539,000**	**$ 74,209,000**	**$ 41,829,000**	**$ 405,000**	**$ 628,000**	**$ 21,016,000**	**$ 14,836,000**	**$ 89,415,000**	**$ 59,338,000**	**$ 3,511,000**	**$ -**	**$ 413,000**	**$ -**	**$ 1,651,000**
Built Boundary																										
6492	825-900 mm WWM on Maple Avenue East Between Lakeshore Rd and Plains Rd East (BUR)	BUR	MAIN	825-900	2,710	$ 9,239,000	$ 7,391,000	$ -	$ 1,848,000	$ 1,404,000	$ 444,000	$ 1,475,000	$ 7,764,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6493	375 mm WWM on Atwood Ave/Murno Circle and existing sewer alignment from Berton Blvd to Maple Ave (HHGEO)	HHGEO	MAIN	375	1,693	$ 2,726,000	$ 2,126,000	$ -	$ 600,000	$ 456,000	$ 144,000	$ -	$ -	$ 422,000	$ 2,304,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6511	Twinning of 525 - 600 mm WWM from Elgin St South along Black Creek alignment to Acton WWTP (HHACT)	HHACT	MAIN	525-600	1,252	$ 3,028,000	$ 1,847,000	$ -	$ 1,181,000	$ 898,000	$ 283,000	$ -	$ 50,000	$ -	$ 462,000	$ -	$ 2,516,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Wastewater Development Capital Implementation Plan
Table 15

Region IPFS ID	Project Description	Municipality	Project Type	Size / Capacity	Length (m)	Total Estimated Cost (2017$)	Benefit to Existing (2017$)	Post Period Benefit (2017$)	DC (2017$)	Res (2017$)	Non-Res (2017$)	Annualized Funding Requirements														
												2017 (CRITICAL PROJECTS)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
6515	300 mm WWM on Childs Drive between the south entrance of Satok Crescent and Nipissing Road (MIL)	MIL	MAIN	300	241	$ 445,000	$ -	$ -	$ 445,000	$ 338,000	$ 107,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 89,000	$ -	$ 356,000	$ -	$ -	$ -
6517	450 mm WWM on Oak St between Ontario St South and Fulton St (MIL)	MIL	MAIN	450	387	$ 1,115,000	$ -	$ -	$ 1,115,000	$ 847,000	$ 268,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 223,000	$ -	$ 892,000	$ -	$ -	$ -
6527	Twin 600 mm WWM on service road to Marine Drive WWPS from Marine Drive (OAK)	OAK	MAIN	600	20	$ 153,000	$ -	$ -	$ 153,000	$ 116,000	$ 37,000	$ -	$ 26,000	$ -	$ 127,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6530	300 mm WWM on Kerr St between Forster Park and Rebecca St (OAK)	OAK	MAIN	300	710	$ 957,000	$ -	$ -	$ 957,000	$ 727,000	$ 230,000	$ -	$ -	$ -	$ 149,000	$ -	$ 808,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6531	250 mm WWM on Chisholm/Rebecca St between Forsyth St and Chisholm St on Rebecca St and on Chisholm St between Rebecca St and 45 m north of Lakeshore Rd West (OAK)	OAK	MAIN	250	202	$ 233,000	$ -	$ -	$ 233,000	$ 177,000	$ 56,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 47,000	$ -	$ 186,000	$ -	$ -	$ -
6535	450 mm WWM on Trafalgar Rd from 10 m north of Inglehart Street North to Cross Ave (OAK)	OAK	MAIN	450	412	$ 1,273,000	$ -	$ -	$ 1,273,000	$ 967,000	$ 306,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 255,000	$ -	$ 1,018,000	$ -	$ -	$ -	$ -	$ -	$ -
6537	675 mm WWM on Trafalgar Rd, through GO lot and on Argus St from Spruce St to 60 m north of Cross Ave (OAK)	OAK	MAIN	675	737	$ 3,503,000	$ -	$ -	$ 3,503,000	$ 2,662,000	$ 841,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 701,000	$ -	$ 2,802,000	$ -	$ -	$ -	$ -	$ -	$ -
7526	Agnes St WWPS Strategy. Scoping Study, EA, Design and Construction (HHACT)	HHACT	PS			$ 7,239,000	$ 6,008,000	$ -	$ 1,231,000	$ 936,000	$ 295,000	$ -	$ 50,000	$ 150,000	$ 1,002,000	$ -	$ 6,037,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7527	Upsize WWM on Lasalle Park Road from Fairwood Pl to Lasalle WWPS (BUR)	BUR	MAIN	375	255	$ 683,000	$ -	$ -	$ 683,000	$ 519,000	$ 164,000	$ -	$ -	$ 137,000	$ -	$ 546,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7537	Junction St WWPS Capacity Upgrade to 150 L/s WWPS - Design and Construction (BUR)	BUR	PS	150 L/s		$ 12,277,000	$ -	$ -	$ 12,277,000	$ 9,331,000	$ 2,946,000	$ -	$ 2,455,000	$ -	$ 9,822,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7539	Norval WWPS - Capacity upgrade (HHGEO)	HHGEO	PS			$ 347,000	$ -	$ -	$ 347,000	$ 264,000	$ 83,000	$ -	$ 69,000	$ -	$ 278,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7540	Decommissioning of Riverside WWPS and Shorewood Place WWPS (OAK)	OAK	PS			$ 300,000	$ -	$ -	$ 300,000	$ 228,000	$ 72,000	$ -	$ 60,000	$ 240,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7541	Walker St WWPS - I/I reduction Program to gain capacity at the station. Scoping Study, Design and Construction (OAK)	OAK	PS			$ 2,347,000	$ -	$ -	$ 2,347,000	$ 1,784,000	$ 563,000	$ -	$ -	$ 286,000	$ -	$ -	$ -	$ 349,000	$ -	$ 1,712,000	$ -	$ -	$ -	$ -	$ -	$ -
7542	Main St WWPS Capacity Upgrade (HHGEO)	HHGEO	PS			$ 260,000	$ -	$ -	$ 260,000	$ 198,000	$ 62,000	$ -	$ -	$ -	$ 260,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7543	Gravity Sewers from Decommissioned Riverside WWPS and Shorewood Place SPS to New Rebecca Trunk (OAK)	OAK	MAIN	200-300	918	$ 3,900,000	$ -	$ -	$ 3,900,000	$ 2,964,000	$ 936,000	$ -	$ 780,000	$ 3,120,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7544	Boyne WWPS - Decommissioning upon completion of gravity sewers #7159, #6382, #6381 (MIL)	MIL	PS			$ 100,000	$ -	$ -	$ 100,000	$ 76,000	$ 24,000	$ -	$ 20,000	$ 80,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7546	750 mm WWM on No 10 Side Road from WWPS #100 to Eighth Line (in order to decommission WWPS #100) (HHGEO)	HHGEO	MAIN	750	670	$ 4,477,000	$ -	$ -	$ 4,477,000	$ 3,403,000	$ 1,074,000	$ -	$ 694,000	$ 3,783,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7556	West River WWPS - Capacity Upgrade to 120 L/s WWPS - Design and Construction, including 450 mm inlet WWM to the station on Service Rd from West River St to West River WWPS (OAK)	OAK	PS	120 L/s		$ 11,574,000	$ 7,292,000	$ -	$ 4,282,000	$ 3,254,000	$ 1,028,000	$ -	$ 2,315,000	$ -	$ 9,259,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Built Boundary						**$ 66,176,000**	**$ 24,664,000.00**	**$ -**	**$ 41,512,000.00**	**$ 31,549,000.00**	**$ 9,963,000.00**	**$ 1,475,000**	**$ 14,283,000**	**$ 8,218,000**	**$ 23,663,000**	**$ 546,000**	**$ 9,361,000**	**$ 1,305,000**	**$ -**	**$ 5,532,000**	**$ 359,000**	**$ -**	**$ 1,434,000**	**$ -**	**$ -**	**$ -**
TOTAL						**$ 625,689,000**	**$ 95,834,000**	**$ 18,000,000**	**$ 511,855,000**	**$ 379,601,000**	**$ 132,254,000**	**$ 4,333,000**	**$ 63,975,000**	**$ 137,352,000**	**$ 86,246,000**	**$ 80,970,000**	**$ 10,199,000**	**$ 23,331,000**	**$ 15,046,000**	**$ 95,157,000**	**$ 64,420,000**	**$ 3,671,000**	**$ 20,445,000**	**$ 573,000**	**$ 18,160,000**	**$ 1,811,000**

Legend

Existing Wastewater Infrastructure

- Wastewater Pumping Station (WWPS)
- Wastewater Treatmentl Plant (WWTP)
- GravitySewer
- Forcemain

DC Projects

Linear

- DC Project - Sewer
- DC Project - Forcemain
- Project Constructed/Imminent/Funded - Sewer
- Project Constructed/Imminent/Funded - Forcemain
- Intensification Project - Sewer

Pumping Station

- DC Project - WWPS
- Project Constructed/Imminent/Funded - WWPS
- Intensification - WWPS

Plant

- DC Project - WWTP
- Project Constructed/Imminent/Funded - WWTP
- WWTP Drainage Area
- Lakebased Service Area Transfer
- Regional Boundary

N

Acton WWTP

Georgetown WWTP

Milton WWTP

Mid-Halton WWTP

Oakville SE WWTP

Oakville SW WWTP

Skyway WWTP

Halton Region
Wastewater Development Capital Implementation Plan (2017-2031)
Figure 6

2017 Development Charges
Water and Wastewater
Technical Report

715027-8-WW
September, 2016
Data Source: Halton Region
Scale: 1:55,000 | NAD 1983 UTM Zone 17N

APPENDIX A - UPDATED LINEAR UNIT COSTS AND INDEX

2016 Unit Costs

Sewer Unit Cost – 5m Depth

Diameter	Excavation			Granular Bedding			Pipe			Backfill			Subtotal Unit Cost	Restoration	Manhole Allowance	Total Unit Cost
	Volume	Cost	Unit Cost	Volume	Cost	Unit Cost	Supply Cost	Installation	Pipe Supply + Install	Vol	Cost	Unit Cost				
(mm)	(m^3/m)	($/$m^3$)	($/m)	(m^3/m)	($/$m^3$)	($/m)	($/m)	($/m)	($/m)	(m^3/m)	($/$m^3$)	($/m)	($/m)	($/m)	($/m)	(2016$/m)
300	5.0	$32	$160	1.0	$67	$67	$77	$44	$122	4.0	$13	$53	$402	$106	$110	**$618**
375	5.5	$32	$176	1.0	$67	$67	$96	$44	$140	4.5	$13	$60	$443	$106	$110	**$659**
450	6.0	$32	$192	1.1	$67	$74	$123	$44	$167	4.9	$13	$65	$498	$107	$110	**$715**
525	6.5	$32	$208	1.2	$67	$81	$148	$44	$192	5.3	$13	$70	$551	$108	$110	**$769**
600	7.0	$32	$224	1.4	$67	$94	$195	$44	$239	5.6	$13	$74	$632	$108	$250	**$990**
675	8.5	$32	$272	1.9	$67	$128	$295	$53	$348	6.6	$13	$87	$835	$122	$250	**$1,208**
750	9.0	$32	$288	2.0	$67	$134	$390	$53	$443	7.0	$13	$93	$958	$123	$250	**$1,331**
825	9.5	$32	$304	2.2	$67	$148	$452	$53	$505	7.3	$13	$97	$1,054	$124	$250	**$1,428**
900	9.5	$32	$304	2.4	$67	$161	$542	$53	$595	7.1	$13	$94	$1,155	$126	$400	**$1,680**
975	10.0	$32	$320	2.5	$67	$168	$625	$53	$678	7.5	$13	$99	$1,265	$139	$400	**$1,804**
1050	11.5	$32	$368	3.1	$67	$208	$715	$53	$768	8.4	$13	$111	$1,455	$140	$400	**$1,995**
1200	12.5	$32	$400	3.4	$67	$228	$896	$53	$949	9.1	$13	$121	$1,698	$142	$400	**$2,239**
1350	13.5	$32	$432	3.9	$67	$262	$1,096	$60	$1,155	9.6	$13	$127	$1,976	$144	$333	**$2,454**
1500	14.0	$32	$448	4.2	$67	$282	$1,341	$60	$1,401	9.8	$13	$130	$2,261	$158	$333	**$2,752**
1800	16.0	$32	$512	5.1	$67	$343	$1,942	$60	$2,001	10.9	$13	$144	$3,000	$162	$333	**$3,496**
2100	17.5	$32	$560	6.0	$67	$403	$2,581	$60	$2,641	11.5	$13	$152	$3,756	$166	$400	**$4,322**
2400	19.5	$32	$624	7.0	$67	$470	$3,433	$60	$3,493	12.5	$13	$166	$4,753	$170	$400	**$5,323**
3000	23.0	$32	$736	9.0	$67	$605	$5,261	$60	$5,320	14.0	$13	$185	$6,846	$178	$400	**$7,424**

Sewer Unit Cost – 10m Depth

Diameter	Excavation			Granular Bedding			Pipe			Backfill			Subtotal Unit Cost	Restoration	Manhole Allowance	Total Unit Cost
	Volume	Cost	Unit Cost	Volume	Cost	Unit Cost	Supply Cost	Installation	Pipe Supply + Install	Vol	Cost	Unit Cost				
(mm)	(m^3/m)	($/$m^3$)	($/m)	(m^3/m)	($/$m^3$)	($/m)	($/m)	($/m)	($/m)	(m^3/m)	($/$m^3$)	($/m)	($/m)	($/m)	($/m)	(2016$/m)
300	35.0	45	$1,575	1.0	67	$67	$77	$44	$122	34.0	$13	$450	$2,214	$195	$200	**$2,609**
375	36.0	$45	$1,620	1.0	67	$67	$96	$44	$140	35.0	$13	$464	$2,291	$195	$200	**$2,686**
450	37.0	45	$1,665	1.1	67	$74	$123	$44	$167	35.9	$13	$476	$2,382	$200	$200	**$2,782**
525	38.0	$45	$1,710	1.2	67	$81	$148	$44	$192	36.8	$13	$488	$2,471	$200	$200	**$2,871**
600	39.0	45	$1,755	1.4	67	$94	$195	$44	$239	37.6	$13	$498	$2,587	$202	$350	**$3,139**
675	42.0	$45	$1,890	1.9	67	$128	$295	$53	$348	40.1	$13	$531	$2,897	$205	$350	**$3,452**
750	43.0	45	$1,935	2.0	67	$134	$390	$53	$443	41.0	$13	$543	$3,056	$208	$350	**$3,613**
825	44.0	$45	$1,980	2.2	67	$148	$452	$53	$505	41.8	$13	$554	$3,187	$215	$350	**$3,752**
900	44.0	45	$1,980	2.4	67	$161	$542	$53	$595	41.6	$13	$551	$3,288	$218	$600	**$4,105**
975	45.0	$45	$2,025	2.5	67	$168	$625	$53	$678	42.5	$13	$563	$3,434	$220	$600	**$4,253**
1050	48.0	45	$2,160	3.1	67	$208	$715	$53	$768	44.9	$13	$595	$3,731	$223	$600	**$4,554**
1200	50.0	$45	$2,250	3.4	67	$228	$896	$53	$949	46.6	$13	$617	$4,044	$225	$600	**$4,870**
1350	52.0	45	$2,340	3.9	67	$262	$1,096	$60	$1,155	48.1	$13	$637	$4,394	$225	$567	**$5,186**
1500	53.0	$45	$2,385	4.2	67	$282	$1,341	$60	$1,401	48.8	$13	$647	$4,714	$225	$567	**$5,506**
1800	57.0	45	$2,565	5.1	67	$343	$1,942	$60	$2,001	51.9	$13	$688	$5,596	$233	$567	**$6,396**
2100	60.0	$45	$2,700	6.0	67	$403	$2,581	$60	$2,641	54.0	$13	$715	$6,459	$246	$733	**$7,438**
2400	64.0	45	$2,880	7.0	67	$470	$3,433	$60	$3,493	57.0	$13	$755	$7,598	$253	$733	**$8,585**
3000	71.0	$45	$3,195	9.0	67	$605	$5,261	$60	$5,320	62.0	$13	$821	$9,941	$273	$733	**$10,947**

Watermain & Forcemain Unit Costs

Diameter	Excavation			Granular Bedding			Pipe			Backfill			Subtotal Unit Cost	Restoration	Total Unit Cost
	Volume	Cost	Cost	Volume	Cost	Cost	Supply Cost	Installation	Pipe Supply + Install	Vol	Cost	Cost			
(mm)	(m3/m)	($/m3)	($/m)	(m3/m)	($/m3)	($/m)	($/m)	($/m)	($/m)	(m3/m)	($/m3)	($/m)	($/m)	($/m)	(2016 $/m)
400	5.3	$45	$236	1.9	$67	$128	$295	$57	$353	3.4	$13	$44	$761	$107	**$868**
450	5.3	$45	$236	2.0	$67	$134	$390	$57	$447	3.3	$13	$43	$861	$107	**$968**
500	6.3	$45	$284	2.2	$67	$148	$452	$57	$510	4.1	$13	$54	$995	$108	**$1,104**
600	6.3	$45	$284	2.4	$67	$161	$542	$162	$705	3.9	$13	$52	$1,201	$108	**$1,309**
750	8.9	$45	$402	2.5	$67	$168	$625	$162	$787	6.4	$13	$85	$1,442	$123	**$1,565**
900	13.3	$45	$599	3.1	$67	$208	$715	$162	$877	10.2	$13	$135	$1,819	$126	**$1,944**
1050	14.4	$45	$649	3.4	$67	$228	$896	$189	$1,085	11.0	$13	$146	$2,108	$140	**$2,248**
1200	16.9	$45	$762	3.9	$67	$262	$1,096	$221	$1,316	13.0	$13	$173	$2,514	$142	**$2,655**
1350	20.6	$45	$928	4.2	$67	$282	$1,341	$303	$1,644	16.4	$13	$218	$3,072	$144	**$3,216**
1500	22.1	$45	$992	3.1	$67	$207	$1,606	$347	$1,954	19.0	$13	$251	$3,404	$158	**$3,562**
1650	23.6	$45	$1,063	5.1	$67	$343	$1,942	$380	$2,322	18.5	$13	$245	$3,973	$158	**$4,131**
1800	27.6	$45	$1,240	3.5	$67	$233	$2,252	$398	$2,650	24.1	$13	$319	$4,442	$162	**$4,605**
2100	30.6	$45	$1,378	6.0	$67	$403	$2,581	$398	$2,979	24.6	$13	$326	$5,087	$166	**$5,253**

Tunneling Construction Costs

Diameter	Total Unit Cost
(mm)	($/m)
150	$ 1,300
200	$ 1,300
250	$ 1,300
300	$ 1,300
325	$ 1,300
350	$ 1,300
375	$ 6,300
400	$ 6,300
450	$ 6,300
500	$ 6,300
525	$ 6,300
600	$ 6,300
675	$ 6,300
750	$ 6,300
825	$ 9,800
900	$ 9,800
975	$ 9,800
1050	$ 9,800
1200	$ 9,800
1350	$ 13,000
1500	$ 13,000
1650	$ 13,000
1800	$ 13,000
2100	$ 13,000
2400	$ 13,000
3000	$ 13,000

Index to January 2017

	2011		2012		2013		2014		2015		2016 Estimated	
	Index	Yr/Yr	Index	Yr/Yr	Index	Yr/Yr	Index	Yr/Yr	Index	Yr/Yr	Index	Yr/Yr
		% Chng		% Chng		% Chng		% Chng		% Chng		% Chng
4th Quarter	150.0	n/a	152.0	1.3%	152.2	0.1%	155.1	1.9%	157.7	1.7%	160.4	1.7%

Index to January 2017 (Total % Change 2012-2016) = **6.92%**

APPENDIX B - BENEFIT TO EXISTING AND POST PERIOD BENEFIT CALCULATIONS

Benefit to Existing and Post Period Benefit Calculations

WATER (Benefit to Existing)

ID	Description	BTE	DC	Benefit to Existing Rationale
6318	300mm WM on No 14 Siderd from Tremaine Rd. to Milton Reservoir (Zone M5G) (MIL)	75%	25%	This project is integral to the groundwater supply strategy for Milton. This project is required to support the existing users and related infill in the Milton groundwater service area only. Demand percentage based on Milton groundwater service area. 7.0 MLD existing / 9.3 MLD total future = 75%
6602	7.5 ML storage expansion at Waterdown Reservoir (existing site) (Zone B1A) (BUR)	93%	7%	There is currently insufficient storage to meet existing demands. This project is required to provide additional storage to support servicing to existing users as well as to support future demands. This facility provides floating storage as well as operational storage for supply to downstream pressure zones. Demand percentage based on Burlington service area. 118.7MLD existing/127.3MLD total future = 93%
6684	Construction of Oakville WPP Re-rating from 109 to 130 ML/d (OAK)	10%	90%	The Oakville WPP project is focused on providing additional capacity for new growth. The project scope is anticipated to include works required to refurbish and upgrade components of the existing facility. There is inherent benefit to the existing rated capacity of the facility through implementation of the upgrades. The high level assessment of the benefit to existing service area is 10%.
7496	Decommissioning of Burnhamthorpe Water Tower (OAK)	5%	95%	Due to the scale and location of growth, the Zone 3/4/5 pressure zone modification was required in order to optimize water pressure in growth areas. As a result of this change, some existing users at the upper and lower end of the old zones will experience some improvements to level of service (slight pressure increase in areas of low pressure and slight pressure decrease within areas of high pressure). Growth would not be supported under the existing pressure zones without implementation of this zone switchover. However, the Zone 3/4/5 zone boundary change will provide some marginal improvements in levels of service to some existing users. The high level assessment of the benefit to existing customers is 5%.
7500	Milton West Looping - 400mm WM on Derry Rd from Santa Maria Blvd. to Bronte St South, and a 400 mm WM on Main St West from Scott Blvd. to Tremaine Road. (MIL)	5%	95%	Due to the scale and location of growth, the Zone 3/4/5 pressure zone modification was required in order to optimize water pressure in growth areas. As a result of this change, some existing users at the upper and lower end of the old zones will experience some improvements to level of service (pressure increase in areas of low pressure and pressure decrease within areas of high pressure). Growth would not be supported under the existing pressure zones without implementation of this zone switchover. The high level assessment of the benefit to existing customers is 5%.
7503	300 mm WM on Sixth Line from Hays Blvd to River Glen Blvd. Project required to support Zone 3/4/5 Boundary Re-alignment (OAK)	5%	95%	Due to the scale and location of growth, the Zone 3/4/5 pressure zone modification was required in order to optimize water pressure in growth areas. As a result of this change, some existing users at the upper and lower end of the old zones will experience some improvements to level of service (slight pressure increase in areas of low pressure and slight pressure decrease within areas of high pressure). Growth would not be supported under the existing pressure zones without implementation of this zone switchover. However, the Zone 3/4/5 zone boundary change will provide some marginal improvements in levels of service to some existing users. The high level assessment of the benefit to existing customers is 5%.
7509	Neyagawa Pumping Station alterations to support Zone 3/4/5 Boundary Re-alignment (100 MLD) (OAK)	5%	95%	Due to the scale and location of growth, the Zone 3/4/5 pressure zone modification was required in order to optimize water pressure in growth areas. As a result of this change, some existing users at the upper and lower end of the old zones will experience some improvements to level of service (slight pressure increase in areas of low pressure and slight pressure decrease within areas of high pressure). Growth would not be supported under the existing pressure zones without implementation of this zone switchover. However, the Zone 3/4/5 zone boundary change will provide some marginal improvements in levels of service to some existing users. The high level assessment of the benefit to existing customers is 5%.
7513	4th Line Pumping Station alterations to support Zone 3/4/5 Boundary Re-alignment (MIL)	5%	95%	Due to the scale and location of growth, the Zone 3/4/5 pressure zone modification was required in order to optimize water pressure in growth areas. As a result of this change, some existing users at the upper and lower end of the old zones will experience some improvements to level of service (slight pressure increase in areas of low pressure and slight pressure decrease within areas of high pressure). Growth would not be supported under the existing pressure zones without implementation of this zone switchover. However, the Zone 3/4/5 zone boundary change will provide some marginal improvements in levels of service to some existing users. The high level assessment of the benefit to existing customers is 5%.

WATER (Benefit to Existing)

ID	Description	BTE	DC	Benefit to Existing Rationale
7514	8th Line Zone 4 Pumping Station alterations to support Zone 3/4/5 Boundary Re-alignment (OAK)	5%	95%	Due to the scale and location of growth, the Zone 3/4/5 pressure zone modification was required in order to optimize water pressure in growth areas. As a result of this change, some existing users at the upper and lower end of the old zones will experience some improvements to level of service (slight pressure increase in areas of low pressure and slight pressure decrease within areas of high pressure). Growth would not be supported under the existing pressure zones without implementation of this zone switchover. However, the Zone 3/4/5 zone boundary change will provide some marginal improvements in levels of service to some existing users. The high level assessment of the benefit to existing customers is 5%.
7515	System PRV implementation to support Zone 3/4/5 Boundary Re-alignment (REG)	5%	95%	Due to the scale and location of growth, the Zone 3/4/5 pressure zone modification was required in order to optimize water pressure in growth areas. As a result of this change, some existing users at the upper and lower end of the old zones will experience some improvements to level of service (slight pressure increase in areas of low pressure and slight pressure decrease within areas of high pressure). Growth would not be supported under the existing pressure zones without implementation of this zone switchover. However, the Zone 3/4/5 zone boundary change will provide some marginal improvements in levels of service to some existing users. The high level assessment of the benefit to existing customers is 5%.

WATER (Post Period Benefit)

ID	Description	PPB	DC	Post Period Benefit Rationale
5850	1050mm WM on Upper Middle Rd from Burloak Drive to Appleby Line (Zone B2) (Construction) (BUR)	34%	66%	This feedermain will support water supply to meet the 2031 needs. This is also a critical feedermain for mature state post 2031 servicing. This section of feedermain is being oversized to support the post 2031 strategy. A 750 mm watermain would be required for 2031 servicing only. The feedermain is recommended to e oversized to 1050mm for post 2031. The Post Period Benefit has been calculated as the cost difference between a 1050 mm feedermain and a 750 mm feedermain.
6367	Burloak Pumping Station Phase 1, 60 ML/d (Zone B2) - Construction (BUR)	64%	36%	This facility is required to meet servicing needs for the 2031 service areas. This facility is also critical for the long term mature state strategy for post 2031 growth. 60 MLD will be installed as part of Phase I, an additional 60 MLD pumping capacity will be installed in Phase II (beyond 2031). The station is being constructed to its ultimate building size in Phase I, and thus Phase II will not require a building expansion. Part of the Phase I building cost is therefore attributed to Phase II (post-period) capacity. 40 MLD of the total 120 MLD is required for the 2031 growth demand. • Total cost for full 120 MLD capacity is $14,965,000 (Phase I + Phase II). • Only 40 MLD out of the total 120 MLD is required for 2031: 1/3 x $14,965,000 = $4,988,000 in period DC cost. • In-period (up to 2031) project cost for 2031 = $13,693,000, but $4.988M is needed in period, therefore, Phase I Post Period benefit = $4,988,000/$13,693,000 = 36% DC, 64% PPB
6368	1050mm WM on Burloak Dr from the QEW to Upper Middle Rd (Zone B2) - Construction (OAK)	42%	58%	This feedermain will support water supply to meet the 2031 needs. This is also a critical feedermain for mature state post 2031 servicing. This section of feedermain is being oversized to support the post 2031 strategy. A 750 mm watermain would be required for 2031 servicing only. The feedermain is recommended to e oversized to 1050mm for post 2031. The Post Period Benefit has been calculated as the cost difference between a 1050 mm feedermain and a 750 mm feedermain.
6666	750mm WM on Neyagawa Blvd. from Burnhamthorpe Rd W to Lower Base Line W (MIL)	90%	10%	2031 water supply capacity to the Milton and Halton Hills service areas is primarily provided through the Zone 5 spine and the Zone 4 2nd spine. This feedermain provides additional security of supply to Zone 4 as well as provides improved level of service to Zone 4. The feedermain capacity will support future growth beyond 2031. It is estimated that the feedermain provides 10% benefit to the 2031 service area.
6701	Kitchen Zone O3 Pumping Station Expansion by 80 ML/d (OAK)	67%	33%	Additional Zone 3 pumping capacity is required to support 2031 needs. The next expansion at the Kitchen PS will require expansion to the building. The additional demand for Zone 3 up to 2031 is approximately 45 MLD. 80 MLD of additional pumping capacity will be installed, however the building expansion will be constructed to accommodate the ultimate capacity of 135 MLD. 45 MLD of the total 135 MLD (33%) is required for growth to 2031. The balance of costs is Post Period Benefit.
7504	1200mm WM on Britannia Rd from 4th Line to RR 25 (Zone M4) - Construction (MIL)	32%	68%	The post 2031 servicing strategy will require a new water supply feed to Milton. It is anticipated that this feedermain will ultimately connect to Britannia Road and support to the Trafalgar feedermain. This section of feedermain is being oversized to support the post 2031 strategy. A 750 mm feedermain would be required for 2031 servicing only. The feedermain is recommended to be oversized to 1200 mm for post 2031. The Post Period Benefit has been calculated as the cost difference between a 1200 mm feedermain and a 750 mm feedermain.
7505	1050mm WM on Burloak Dr from Burloak Pumping Station to the QEW - Construction (OAK)	42%	58%	This feedermain will support water supply to meet the 2031 needs. This is also a critical feedermain for mature state post 2031 servicing. This section of feedermain is being oversized to support the post 2031 strategy. A 750 mm watermain would be required for 2031 servicing only. The feedermain is recommended to e oversized to 1050mm for post 2031. The Post Period Benefit has been calculated as the cost difference between a 1050 mm feedermain and a 750 mm feedermain.

WASTEWATER (Benefit to Existing)

ID	Description	BTE	DC	Benefit to Existing Rationale
6492	825-900 mm WWM on Maple Avenue East Between Lakeshore Rd and Plains Rd East	80%	20%	Project required to address existing capacity deficiency as well as growth flow BTE share is ratio of the existing capacity deficiency, relative to the total increase in capacity required for both existing and growth BTE calculated as [Existing deficiency /(growth flow + existing deficiency)] BTE = 109/(109+27) =80%
6493	375 mm WWM on Atwood Ave/Murno Circle and existing sewer alignment from Berton Blvd to Maple Ave	78%	22%	Project required to address existing capacity deficiency as well as growth flow BTE share is ratio of the existing capacity deficiency, relative to the total increase in capacity required for both existing and growth BTE calculated as [Existing deficiency /(growth flow + existing deficiency)] BTE = 14/(14+4) =78%
6511	Twinning of 525 - 600 mm WWM from Elgin Street South along Black Creek alignment to Acton WWTP (HHACT)	61%	39%	Project required to address existing capacity deficiency as well as growth flow BTE share is ratio of the existing capacity deficiency, relative to the total increase in capacity required for both existing and growth BTE calculated as [Existing deficiency /(growth flow + existing deficiency)] BTE = 22/(22+14) =61%
6588	Mid-Halton WWTP expansion from 125 ML/d to 175 ML/d	37%	63%	Project required to address growth flow and support Milton Decommissioning BTE share is calculated as Milton WWTP Capacity ÷ Mid Halton Capacity BTE calculated as 18.5 MLD / 50 MLD = 37%
7526	Agnes WWPS Strategy - New station or gravity option. Scoping Study and EA, design and construction	83%	17%	Project required to address existing capacity deficiency as well as growth flow BTE share is ratio of the existing capacity deficiency, relative to the total increase in capacity required for both existing and growth BTE calculated as [Existing deficiency /(growth flow + existing deficiency)] BTE = 58/(58+12) =83%
7528	North PS expansion at Mid-Halton WWTP	51%	49%	Project required to address growth flow and support Milton Decommissioning BTE share is calculated as (PWWF going to Milton WWTP in 2021) ÷ North SPS Capacity Upgrade BTE calculated as (609 L/s PWWF in 2021) / (1200 L/s North WWPS capacity)= 51%
7532	New 2400 mm sewer inlet to Skyway WWTP parallel to QEW	93%	7%	Project required to address existing capacity deficiency as well as growth flow BTE share is ratio of the existing capacity deficiency, relative to the total increase in capacity required for both existing and growth BTE Calculated as existing deficiency /(growth flow + existing deficiency). BTE = 822/(822+(4,998-4,934)) = 822/886 = 93%
7556	West River WWPS - Replacement of 120 L/s WWPS - Design and Construction, including 450 mm inlet WWM to the station on Service Rd from West River St to WWPS	63%	37%	Project Required to address existing capacity deficiency as well as growth flow BTE share is ratio of the existing capacity deficiency, relative to the total increase in capacity required for both existing and growth BTE Calculated as [Ex deficiency/(growth flow + existing deficiency)]. BTE = 10/(10+6) = 63%

PWWF = Peak Wet Weather Flow

WASTEWATER (Post Period Benefit)

ID	Description	PPB	DC	Post Period Benefit Rationale
7548	Mid-Halton WWTP expansion from 175 ML/d to 225 ML/d (Design)	100%	0%	Upgrade to 225 ML/d is dedicated to post 2031 growth. The design cost will have 100% Post Period Benefit.

APPENDIX C - LOCAL SERVICE GUIDELINES

2. LOCAL SERVICE POLICY

2.1 Water and Wastewater

The following guideline sets out in general the size of water and wastewater infrastructure that constitutes a development charge project. Other infrastructure will be treated as a local service, which is the direct responsibility of a landowner under a development agreement.

2.1.1 Watermains

- Internal to the development (servicing of vacant lands)
  - Greater than 400 mm:

    Development charges main
  - 400 mm or less:

    Developer responsibility within subdivision agreement

- External to the development (mains on existing roads but requiring a local connection)
  - 400 mm or greater:

    Development charges main
  - Less than 400 mm:

    Developer responsibility within subdivision agreement

Exception to these policies is feeder mains required to connect from a well or reservoir to the network. All feeder mains are considered to be development charges projects regardless of the size of the main.

External watermains of any size required for a development to be connected to an existing local main are considered to be the developers' responsibility.

2.1.2 Booster Stations and Reservoirs

- All water booster pumping stations and reservoirs projects are considered to be development charges projects.

2.1.3 Wastewater Mains

- Internal or external (i.e., local connection) to the development
  - Greater than 450 mm:

    Development charges main
  - 450 mm or less:

    Developer responsibility within subdivision agreement

2.1.4 Lift Stations

- Lift stations internal to a development and fed by mains which qualify for the development charges project list are considered to be development charges projects. Lift stations fed by mains that do not qualify for the development charges project list are the responsibility of the developer

- Existing lift stations that have to be expanded as part of a new development are the responsibility of the benefiting developer and will be dealt with as part of the subdivision agreement

The above policy guidelines are general principles by which staff will be guided in considering development applications. However, each application will be considered on its own merits having regard to, among other factors, the nature, type and location of the development and any existing and proposed development in the surrounding area, these policy guidelines, the location and type of services required and their relationship to the proposed development and existing and proposed development in the area, and subsection 59(2) of the *Development Charges Act, 1997*.

APPENDIX D - DETAILED WATER STORAGE TABLES

Water Storage Requirements

2016							A: Fire Storage				B: Equalization	C: Emergency	TOTAL REQUIRED STORAGE (A+B+C)
Pressure Zone	Service Area	2031 Total Projection				MDD (2016 modelled plus growth)	Equivalent Population	Fire Flow	Duration	A	25% of Max Day Demand	25% of A + B	
		Population	Industrial	Commercial	Institutional	(MLD)		(L/s)	(hrs)	(ML)	(ML)	(ML)	(ML)
B1 + O1	B1 & O1	141,994	14,141	34,665	7,106	92.5	186,528	311	3	3.4	23.1	6.6	33.1
B1A	B1A	11,550	2,322	3,396	617	8.7	16,891	311	3	3.4	2.2	1.4	6.9
B3B,B4A,B5A	B3B, B4A, B5A	1,341	0	0	17	0.1	1,354	311	3	3.4	0.0	0.8	4.2
B2	B2	19,782	21,928	19,209	743	19.5	57,494	311	3	3.4	4.9	2.1	10.3
B3	B3, B2A	50,547	4,919	7,405	513	27.9	61,339	311	3	3.4	7.0	2.6	12.9
B4	B4, B3A	9,577	103	440	132	5.1	10,092	311	3	3.4	1.3	1.2	5.8
250	250, 223, 211	123,392	13,367	15,398	6,720	56.1	154,019	311	3	3.4	14.0	4.3	21.7
267	267	14,580	19,904	13,788	3,877	12.0	49,061	311	3	3.4	3.0	1.6	7.9
G6G	G5G, G6G, G7G	41,094	4,816	5,381	2,591	14.2	52,160	311	3	3.4	3.5	1.7	8.6
G6L	G6L	14,840	319	287	251	0.0	15,593	311	3	3.4	0.0	0.8	4.2
A9	A9G	9,928	1,518	1,491	1,099	5.4	13,515	250	3	2.7	1.4	1.0	5.1
O2	O2	22,302	26,486	15,547	2,066	18.7	63,768	311	3	3.4	4.7	2.0	10.1
O3	O3, O2A, O2B	73,405	3,920	6,606	6,389	44.4	87,435	311	3	3.4	11.1	3.6	18.1
M5G	M5G	20,622	1,954	4,959	2,268	11.2	27,956	311	3	3.4	2.8	1.5	7.7

Note: Service Areas for several facilities consist of multiple pressure zones. The total storage requirement for these service areas is calculated based on the combined storage need for all of the zones within the service area.

Note: Zone B5 is a very small service area and does not currently have water storage. There are no current plans to add storage to this zone

2021							A: Fire Storage				B: Equalization	C: Emergency	TOTAL REQUIRED STORAGE (A+B+C)
Pressure Zone	Service Area	2031 Total Projection				MDD (2016 modelled plus growth)	Equivalent Population	Fire Flow	Duration	A	25% of Max Day Demand	25% of A + B	
		Population	Industrial	Commercial	Institutional	(MLD)		(L/s)	(hrs)	(ML)	(ML)	(ML)	(ML)
B1 + O1	B1 & O1	146,208	14,765	36,740	7,342	95.6	193,003	311	3	3.4	23.9	6.8	34.1
B1A	B1A	11,976	2,375	3,516	717	9.0	17,538	311	3	3.4	2.2	1.4	7.0
B3B,B4A,B5A	B3B, B4A, B5A	1,653	0	0	18	0.3	1,668	311	3	3.4	0.1	0.9	4.3
B2	B2	20,072	22,163	19,767	746	19.9	58,418	311	3	3.4	5.0	2.1	10.4
B3	B3, B2A	51,119	5,061	8,175	515	28.5	62,579	311	3	3.4	7.1	2.6	13.1
B4	B4, B3A	9,656	108	458	134	5.1	10,190	311	3	3.4	1.3	1.2	5.8
250	250, 223, 211	167,887	19,398	24,681	9,771	84.6	213,891	311	3	3.4	21.1	6.1	30.6
267	267	18,008	21,885	16,977	4,863	16.0	57,619	311	3	3.4	4.0	1.8	9.2
G6G	G5G, G6G, G7G	26,909	4,617	5,294	2,342	10.2	37,489	311	3	3.4	2.5	1.5	7.4
G6L	G6L	17,538	319	287	251	6.5	18,291	311	3	3.4	1.6	1.2	6.2
A9	A9G	10,502	1,644	1,618	1,111	5.7	14,323	250	3	2.7	1.4	1.0	5.2
O2	O2	26,894	26,675	16,784	2,303	21.5	69,584	311	3	3.4	5.4	2.2	10.9
O3	O3, O2A, O2B	73,805	3,998	6,774	6,804	44.8	88,377	311	3	3.4	11.2	3.6	18.2
M5G	M5G	22,956	2,290	6,706	3,108	13.1	32,513	311	3	3.4	3.3	1.7	8.3

Note: Service Areas for several facilities consist of multiple pressure zones. The total storage requirement for these service areas is calculated based on the combined storage need for all of the zones within the service area.

Note: Zone B5 is a very small service area and does not currently have water storage. There are no current plans to add storage to this zone

2026							A: Fire Storage				B: Equalization	C: Emergency	TOTAL REQUIRED STORAGE (A+B+C)
Pressure Zone	Service Area	2031 Total Projection				MDD (2016 modelled plus growth)	Equivalent Population	Fire Flow	Duration	A	25% of Max Day Demand	25% of A + B	
		Population	Industrial	Commercial	Institutional	(MLD)		(L/s)	(hrs)	(ML)	(ML)	(ML)	(ML)
B1 + O1	B1 & O1	151,684	14,956	37,244	7,404	98.5	199,074	311	3	3.4	24.6	7.0	35.0
B1A	B1A	11,941	2,406	3,548	739	9.0	17,576	311	3	3.4	2.2	1.4	7.0
B3B,B4A,B5A	B3B, B4A, B5A	1,641	0	0	18	0.3	1,656	311	3	3.4	0.1	0.9	4.3
B2	B2	20,088	22,305	19,897	754	20.0	58,684	311	3	3.4	5.0	2.1	10.5
B3	B3, B2A	51,110	5,163	8,322	521	28.6	62,785	311	3	3.4	7.2	2.6	13.1
B4	B4, B3A	9,625	118	467	136	5.1	10,179	311	3	3.4	1.3	1.2	5.8
250	250, 223, 211	202,831	27,539	30,897	14,074	109.2	265,576	311	3	3.4	27.3	7.7	38.3
267	267	21,088	24,747	17,625	4,950	19.3	64,385	311	3	3.4	4.8	2.0	10.2
G6G	G5G, G6G, G7G	28,792	4,745	5,454	2,363	11.0	39,637	311	3	3.4	2.8	1.5	7.6
G6L	G6L	28,688	323	1,151	593	12.2	30,300	311	3	3.4	3.0	1.6	8.0
A9	A9G	12,977	1,867	1,749	1,140	6.9	17,157	250	3	2.7	1.7	1.1	5.5
O2	O2	31,079	26,737	17,279	2,372	23.7	74,222	311	3	3.4	5.9	2.3	11.6
O3	O3, O2A, O2B	74,031	4,006	6,790	6,831	45.0	88,646	311	3	3.4	11.2	3.7	18.3
M5G	M5G	24,720	2,369	7,478	3,893	14.3	35,527	311	3	3.4	3.6	1.7	8.7

Note: Service Areas for several facilities consist of multiple pressure zones. The total storage requirement for these service areas is calculated based on the combined storage need for all of the zones within the service area.

Note: Zone B5 is a very small service area and does not currently have water storage. There are no current plans to add storage to this zone

2031							A: Fire Storage				B: Equalization	C: Emergency	TOTAL REQUIRED STORAGE (A+B+C)
Pressure Zone	Service Area	2031 Total Projection				MDD (2016 modelled plus growth)	Equivalent Population	Fire Flow	Duration	A	25% of Max Day Demand	25% of A + B	
		Population	Industrial	Commercial	Institutional	(MLD)		(L/s)	(hrs)	(ML)	(ML)	(ML)	(ML)
B1 + O1	B1 & O1	156,537	15,745	37,812	7,556	101.5	205,307	311	3	3.4	25.4	7.2	35.9
B1A	B1A	12,169	2,436	3,641	740	9.1	17,899	311	3	3.4	2.3	1.4	7.1
B3B,B4A,B5A	B3B, B4A, B5A	1,643	0	0	18	0.3	1,658	311	3	3.4	0.1	0.9	4.3
B2	B2	20,530	22,394	20,194	754	20.4	59,421	311	3	3.4	5.1	2.1	10.6
B3	B3, B2A	52,140	5,274	8,763	521	29.3	64,231	311	3	3.4	7.3	2.7	13.4
B4	B4, B3A	9,821	119	471	136	5.2	10,378	311	3	3.4	1.3	1.2	5.8
250	250, 223, 211	233,030	39,776	40,879	15,610	133.8	317,263	311	3	3.4	33.5	9.2	46.0
267	267	25,418	26,127	18,135	5,098	22.3	70,711	311	3	3.4	5.6	2.2	11.2
G6G	G5G, G6G, G7G	34,523	4,921	5,859	2,463	13.5	45,914	311	3	3.4	3.4	1.7	8.4
G6L	G6L	36,829	343	1,558	811	16.3	38,914	311	3	3.4	4.1	1.9	9.3
A9	A9G	14,070	2,007	1,859	1,215	7.4	18,541	250	3	2.7	1.9	1.1	5.7
O2	O2	34,674	27,645	18,821	2,596	26.5	80,033	311	3	3.4	6.6	2.5	12.5
O3	O3, O2A, O2B	76,091	4,133	7,076	7,153	46.2	91,303	311	3	3.4	11.6	3.7	18.6
M5G	M5G	25,693	2,770	7,619	3,953	14.9	37,090	311	3	3.4	3.7	1.8	8.9

Note: Service Areas for several facilities consist of multiple pressure zones. The total storage requirement for these service areas is calculated based on the combined storage need for all of the zones within the service area.

Note: Zone B5 is a very small service area and does not currently have water storage. There are no current plans to add storage to this zone