Appendix D

Transportation Asessment

February 2021

Regional Official Plan Review

EllSo Consulting

Halton REGION

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1. Introduction

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

To identify requirements, Hemson has developed several planning scenarios that focus growth in different areas and achieve different Regional and Local goals. This includes a total of eight (8) scenarios that were further refined into four (4) concepts which were provided for evaluation and analysis.

This memo summarizes the assessment of the he four Growth Concepts, which were reviewed to identify the impact each concept could have on the existing and planned transportation infrastructure. This analysis is a refinement of the high level, preliminary transportation infrastructure analysis of the eight growth scenarios, as presented in staff report LPS41-19, dated June 19, 2019.

Ultimately, a preliminary transportation servicing plan will be developed for the preferred Growth Concept. This memorandum is intended to review the following:

- Summary of planning numbers for the four Growth Concepts provided.
- Transportation servicing opportunities and constraints for the existing and planned infrastructure to 2031.
- Identify high-level servicing needs to meet 2041 and 2051 growth for each of the four concepts.

1.1 Transportation Infrastructure

Halton Region is responsible for planning, constructing, operating, maintaining, and improving a network of major arterial roads which accommodate all modes of travel and allows for the transport of goods and people in a safe and efficient manner. As of the end of 2019, the Regional road system consisted of approximately 1,131 lane-kilometres of roadway (i.e. total length of all lanes of Regional roads) which connects the Region's rural and urban centres and provides connectivity to the provincial highway system.

The Local municipalities are responsible for all other roads which include minor arterials, multi- purpose arterials, collectors, and local roads within the road network. These roads are the primary access to local communities and provide connection to Major Arterial roads and Provincial facilities.

Based on the transportation master plan (TMP) completed in 2011, the Region developed an extensive transportation capital program to accommodate growth to 2031, which included widening most regional roadways in the urban boundary to a 6-lane mid-block cross section by 2031.

1.2 Background Studies

The Region's Transportation Master Plan (TMP) (2031) – The Road to Change was completed in 2011 to support the balanced approach to growth laid out in Regional Official Plan Amendment 38 (ROPA 38). The TMP identified the need to transition to a more balanced transportation network to accommodate increased travel demands on the network to support all modes of transportation. The vision for the TMP was to accommodate various travel choice and support a sustainable and multi-modal transportation network in the future.

The preferred transportation strategy for Halton Region to 2031, included recommendations and initiatives to support the shift toward a multi-modal approach to transportation that included providing additional capacity in the Regional roadway network (i.e. road widenings), active transportation, transportation demand management, and transit. Through the TMP, the Region developed an extensive transportation capital program to accommodate growth to 2031, which included widening most Regional roadways in the urban boundary to a 6-lane mid-block cross section by 2031.

In 2015, the Region completed its first **Active Transportation Master Plan** to develop the required strategy, infrastructure and initiatives to promote non-motorized travel throughout the Region.

Building on the vision and recommendations of the TMP, and in preparation for Metrolinx's Regional Express Rail (RER), Halton Region and its Local municipal partners developed the **Mobility Management Strategy (MMS)** for Halton to guide the evolution of a region-wide inter/intra-regional transportation network over the next 25 years to 2041 This study, completed in 2017, built on the strengths of the existing transportation networks in Halton (Provincial, Regional, and Local) to support the strategic integration of Major Transit Station Areas (MTSAs and focus on enhancing connectivity amongst the Local municipal and intra/inter-regional transit networks. To support these connections, the MMS established a Region-wide grid network of 156 km of Transit Priority Corridors (TPCs) and approximately 36 km of Mobility Links. This network is referred to as the Transit Priority Mobility Network to 2041. These corridors build upon the Higher Order Transit Corridors identified in the Regional Official Plan and TMP documents, with some additions and extensions.

The **Defining Major Transit Requirements in Halton Region (DMTR)**, completed in 2019, is a continuation and fulfilment of the next steps established through the MMS in support of the vision for a multi-modal transportation network. This study evaluated the existing and proposed MTSAs, higher order transit stations and surrounding areas that are planned for intensification to identify infrastructure gaps, potential barriers to development and potential opportunities; and defined the type, form, and function of the TPCs as identified in the MMS. It identified transit infrastructure investment opportunities for the 2031 and 2041 planning horizons to address potential transit demand and enhance transportation mobility and connectivity between existing and proposed MTSAs.

The work undertaken as part of the assessment of the Four Growth Concepts builds on the above noted studies and strategies.

1.3 Basis for Transportation Assessment & Methodology

Transportation infrastructure including regional roadways and major local collectors, transit and provincial facilities were analyzed for each of the four Growth Concepts. For this analysis, the planned 2031 capacities of roadway infrastructure were compared to the projected 2041 and 2051 growth requirements to identify the impact each concept could have on the planned transportation system. Similarly, the 2041 recommended transit priority network from the DMTR was tested against the same 2041 and 2051 growth requirements to identify the impact each concept could have on the future transit system.

This information fed into the Growth Concept evaluation process and provided a high-level assessment of opportunities and constraints. This analysis is a refinement of the high level, preliminary transportation infrastructure analysis of the eight growth scenarios, as presented in LPS41-19.

Ultimately, the transportation strategy will be refined based on a final preferred growth concept and will be subject to further enhancement through future multi modal transportation master plans.

1.3.1 Methodology

2041 and 2051 Population Employment Forecasts – Halton Region

Four Growth Concepts have been prepared and refined based on background analyses, direction from the IGMS Steering Committee and consultation with Regional and local municipal staff, regarding planned development and land supply potential.

Each growth concept includes the new Schedule 3 forecast numbers based on a 2051 planning horizon, a minimum of 50% intensification within the Built-Up Area, a minimum of 65 persons and jobs per hectare. The variation between the four Growth Concepts largely relates to the amount of intensification and/or densification of greenfield land.

More detail on the population and employment forecasts used for the transportation analysis is presented in Section 3 of the IGMS Growth Concepts report.

2041 and 2051 Population Employment Forecasts – Outside Halton Region

Transportation planning encompasses travel within Halton Region and to/from other municipalities. This requires having population/employment numbers of traffic zones outside Halton to properly model travel demand, which were not available for 2051.

For the purpose of this assessment the 2041 Defining Major Transit Report (DMTR) values have been assumed for the population and employment forecasts of the surrounding municipalities for the 2041 and 2051 planning horizon assessments. As such, for the assessment of the four Growth Concepts, a consistent approach among all four concepts was used such that the comparative evaluation of the concepts is not affected by the lack of this data. This assumption will be updated for the preferred growth Concept should this information become available.

2041 and 2051 Transportation Network Outside Halton

Currently, the major municipalities surrounding Halton have not completed their Transportation Master Plan to 2041 or 2051, so a definitive update to transportation infrastructure beyond Halton's boundary for these planning horizons is unavailable. Due to this the lack of information, the 2041 Defining Major Transit Report (DMTR) network improvements until 2041 were assumed outside Halton for both the 2041 and 2051 planning horizons. Thus the 2051 network assumes the same road properties as the 2041 network. As such, for the assessment of the four Growth Concepts, a consistent approach among all four concepts was used such that the comparative evaluation of the concepts is not affected by the lack of this data. This assumption will be updated for the preferred growth Concept should this information become available.

Transit

The Defining Major Transit Requirements in Halton Region (DMTR) study provided the basis for the transit service assumptions for the 2041 planning horizon. This DMTR study included the completion of

an analysis of the corridors identified in the Mobility Management Strategy (MMS) and made recommendations on Regional investments to unlock transit-oriented growth, and identify how mobility and connectivity in the transportation network can be enhanced between growth areas within the Region, with adjacent municipalities, and across the GTHA.

The Preliminary 2041 Recommended Transit Priority Corridor Network – Infrastructure, as defined by the DMTR, formed the basis for the transit services assumed in 2041 in the assessment of the Four Growth Concepts. The 2041 transit service assumed in this analysis is presented in Appendix 1 of this technical memo. The same network was assumed for 2051.

2. Design Criteria & Level of Service

For the purposes of comparing the four Growth Concepts, the level of service thresholds identified in the Halton Region Transportation Master Plan – The Road to Change (2013) and the Halton Region 2017 Development Charges Transportation Technical Report (September 2016) were used. In the context of travel demand forecasting, these studies defined level of service thresholds through a volume to capacity ratio (v/c), with a threshold of 0.9 being the maximum acceptable value. A v/c equal to or greater than 0.9 triggered the need for additional capacity improvements assessment.

A maximum roadway cross-section of six lanes is the design criteria being used by the Region for roadway improvement considerations.

2.1 Modelling Process

The analysis of the Growth Concepts was undertaken using the Region's transportation Capital Program to 2031 as the base in which to determine post 2031 requirements.

The Halton Travel Demand Forecasting Model (the model) was utilized in the analysis of Growth Concepts. The model is a standard 4-stage travel demand model that has been calibrated and validated at the screenline level using the 2011Transportation Tomorrow Survey (TTS) data. As part of this study, the model was updated to reflect the most recent regional roadway improvements to 2031, consideration of adjacent municipality forecasts and network improvements and confirmation of the transit priority corridors as recommended by the DMTR.

Network Update

The Halton EMME Model transit network represents a conceptual network that includes rapid transit improvements identified in the Halton Region Transportation Master Plan, Metrolinx's Plans such as Big Move and Next Wave and Regional Express Rail. The model transit network was updated to include the Recommended Preliminary 2041 Transit Priority Corridors Network identified in the DMTR. A comparison of Halton EMME Model and DMTR model attributes and the physical links was done using GIS program to determine modifications to the Halton model network. Network links and transit routes were added or modified as a result of the comparison.

Demand Matrices

The population and employment values were updated with the forecasts provided by Hemson for the Four Growth Concepts for 2041 and 2051. These values were compared with the population and employment in DMTR Model to ensure consistency between the two models. The results were acceptable in consideration of the respective model make up and objectives.

Multi-Modal Assessment

The Region has a multi-modal approach to address travel demand. The DMTR 2041 model trip table exports were used to develop a transit mode split matrix by traffic zone to replace the policy mode split used in Stage 1 of the IGMS (8 Growth Scenario Evaluation). New transit and auto Origin-Destination matrices were generated as a result of the transit mode split determined in the DMTR model. The same

transit mode split matrix was used across the four scenarios. The same table was used for the 2051 assessment.

Trip Assignment

The trip assignment defined in the Region's travel demand model was used for this assessment without modification.

3. Growth Concepts

Four Growth Concepts were defined by Hemson and submitted to the technical teams for review and determination of potential impacts to the existing and future transportation infrastructure. Exhibit 1 provides a brief description of the four Growth Concepts and assumptions applied in the development of the planning projections.

Exhibit 1 - Overview of Growth Concepts

Concept 1: 60% Densification/ Moderate Greenfield Expansion	Concept 2: 70% Densification / Limited Greenfield Expansion	Concept 3: 80% Densification / Employment Area Only Greenfield Expansion	Concept 4: 50% Intensification / Greatest Amount of Greenfield Expansion
•50% densification to 2031 then 60% densification* to 2051 • Lower share of employment growth in Employment Areas relative to Concept 4	• One-half the amount of new community DGA of Concept 1 • 70% densification* (2031-51) •Share of employment growth in Employment Areas midway between Concepts 1 and 3	•Build out of existing DGA only •About 80% densification* (2031-51) •Least share of employment growth in Employment Areas	•50% intensification in BUA (2021-51) • Greatest share of employment growth in Employment Areas

*Share densification approximates the share of apartments in the mix of total housing growth
Densification from 2031 to 2051 in Concepts 1, 2, 3 and 4 include 10%, 17%, 24% and 2.5% of units as DGA densification, apartment development in DGA strategic growth areas such as Trafalgar Road in north Oakville and Milton

Source: Hemson

A summary of the population and employment for each of the four Growth Concepts is summarized in the following exhibits.

Exhibit 2 - Population Growth

	Population Growth (2016-2041)				Population Growth (2016-2051)			
Scenario: Municipality	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Acton	100	100	500	100	100	100	800	100
Burlington	49,000	50,000	51,000	47,000	74,000	80,000	84,000	70,000
Georgetown	15,000	15,000	15,000	13,000	20,000	24,000	23,000	23,000
Halton Hills	25,000	21,000	21,000	33,000	68,000	49,000	24,000	92,000
Milton	155,000	155,000	147,000	159,000	221,000	216,000	214,000	225,000
Oakville	115,000	116,000	124,000	108,000	148,000	162,000	184,000	134,000
Total	**358,000**	**358,000**	**359,000**	**360,000**	**531,000**	**531,000**	**529,000**	**545,000**

Note: Planning estimates rounded to the closest 1,000.
Planning estimates for Acton rounded to the closest 100.

Exhibit 3 - Employment Growth

Municipality	Employment Growth (2016-2041)				Employment Growth (2016-2051)			
Scenario: Municipality	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Acton	500	300	800	500	1,200	400	1,400	1,300
Burlington	21,000	21,000	21,000	21,000	30,000	32,000	33,000	29,000
Georgetown	4,000	4,000	3,000	4,000	10,000	10,000	5,000	12,000
Halton Hills	13,000	13,000	14,000	14,000	26,000	28,000	25,000	27,000
Milton	66,000	66,000	65,000	66,000	95,000	98,000	97,000	94,000
Oakville	54,000	55,000	56,000	53,000	70,000	74,000	79,000	66,000
Total	**159,000**	**160,000**	**160,000**	**157,000**	**233,000**	**241,000**	**240,000**	**230,000**

Note: Planning estimates rounded to the closest 1,000.
Planning estimates for Acton rounded to the closest 100.

4. Technical Analysis

The analysis of the 2041 and 2051 transportation infrastructure needs for the four Growth Concepts was based on two assessments – Roads and Transit.

4.1 Roads Assessment

Road needs were assessed through the regional transportation network performance, at the screenline level, and the ability of the regional transportation network to accommodate travel demand through that screenline consistent with assessments in the Halton Region Transportation Master Plan – The Road to Change (2013) and the Halton Region 2017 Development Charges Transportation Technical Report (September 2016).

In the context of travel demand forecasting, these studies defined level of service thresholds through a volume to capacity ratio (v/c), with a threshold of 0.9 being the maximum acceptable value. A v/c equal to or greater than 0.9 triggered the need for additional capacity improvements assessment.

A screenline is an imaginary boundary that defines a broad corridor consisting of one or more roadway links). Appendix 2 depicts the Region's screenlines per the current travel demand forecasting tool.

Screenlines where the anticipated volume of vehicles traversing that screenline divided by the capacity of the roadways on that screenline is equal to or greater than 0.9, additional roadway capacity (i.e. lane requirements) was identified as required, on either MTO and/or Regional/local facilities. The Growth Concepts were analyzed as follows:

- Screenline deficiencies were identified for screenlines with a v/c equal to or greater than 0.9;
- Screenline deficiencies were divided into MTO and Regional/Local deficiencies;
- MTO deficiencies were not carried further in the analysis; and
- Regional/local solutions for each deficient screenline were assessed and recommended solutions provided, where possible and feasible.

For each of the Growth Concepts, the deficient screenlines were reviewed in further detail, at the link level, to assess road capacity improvements. Capacity improvements were limited to Regional/local roads.

4.2 Transit

The high priority corridors were analyzed by comparing the passenger demand in the peak hour along the corridor and comparing this demand to the capacity of the service. The base service used for 2051 was as recommended by the DMTR for the 2041 planning horizon.

4.3 Overall Observations

Appendix 3 presents a summary of screenline deficiency by Growth Concept by planning horizon, in graphical form, for all roadway jurisdictions (Region/Local/MTO). These deficiencies have not been assessed or rationalized. The screenlines identified exhibit a v/c ratio equal to or greater than 0.9. Appendix 4 presents the deficient screenlines identifying only the screenlines where a Regional/Local

solution can be implemented after having rationalized the absolute volume of travel demand deficiency for the screenline. The rationalization of the screenline refers to an assessment of the screenline performance. For example, in some instances, when the v/c ratio is equal to or greater than 0.9 (indicating a potential deficiency), further assessment may find that the volumes (absolute value) are sufficiently low such that they are considered insignificant or it fall within the forecasting tolerances of a 20 to 30 year forecast.

There are many screenline deficiencies identified in 2041 and 2051 where the deficient link is a provincial facility (QEW / Highway 403 / Highway 401). In south Halton Region, the QEW, Highway 403 and the Skyway bridge exhibit significant deficiencies in capacity in both planning horizons. In mid-Halton, Highway 401 exhibits significant deficiency in capacity for both planning horizons. As indicated above, these potential provincial facility deficiencies were not analysed further as part of this exercise.

Prior to presenting the findings of the transportation system assessment for each of the four Growth Concepts, it is important to note this current analysis is a refinement of the previous higher-level analysis completed to compare the eight Growth Scenarios. For example:

- The assessment for the eight Growth Scenarios was based on an equal transit mode split of 10% for all Scenarios
- Screenline deficiencies, and resulting solutions, were not constrained to account for, for example, the Region's practice of not widening arterial roads beyond six lanes.

Therefore, a direct comparison of the result of Stage 1 Concepts transportation assessment to the corresponding Growth Concept in the current assessment (Stage 2) may not necessarily yield the same solutions and costing

Growth Concept Assessment – Stage 2 – Four Growth Concepts

A summary of screenlines (SL) requiring capacity improvements for each of the 2041 and 2051 planning horizons, as undertaken for the four Growth Concepts, is presented in Exhibit 4.

In 2041, Growth Concept 2 exhibits two additional screenline deficiencies compared to the other three Concepts. Otherwise, the observed deficient screenlines in this period are common to all four Concepts.

In 2051, Growth Concept 3 exhibits one additional screenline deficiency in 2051 in south Halton Hills. Growth Concept 4 exhibits one additional screenline deficiency in 2051 in the Regional Road 25 / James Snow Parkway area due to higher employment designation in this area. Otherwise, the observed deficient screenlines in this period are common to all four Concepts.

None of the observed screenline deficiencies distinguish one Concept as better or worse among the four Growth Concepts by 2051. With some minor differences, all four Growth Concepts exhibit similar transportation impacts.

Exhibit 4 - Summary - Screenline Deficiency by Growth Concept and Planning Horizon (Regional and Local Solutions Only)

Screenline	2041	2051
SL 75 - Oakville - East of Bronte Road	All Four Growth Concepts exhibit a deficiency at this SL	All Four Growth Concepts exhibit a deficiency at this SL
SL 72 - Oakville - East of Trafalgar Rd.	All Four Growth Concepts exhibit a deficiency at this SL	All Four Growth Concepts exhibit a deficiency at this SL
SL 74 - Halton Hills - West of Winston Churchill	-	Only Growth Concept 3
SL 17 - Milton - East of Thompson Rd.	All Four Growth Concepts exhibit a deficiency at this SL	All Four Growth Concepts exhibit a deficiency at this SL
SL - 14 - Milton - West of Highway 407	All Four Growth Concepts exhibit a deficiency at this SL	All Four Growth Concepts exhibit a deficiency at this SL
SL 35 - Oakville - East Oakville north of QEW	All Four Growth Concepts exhibit a deficiency at this SL	All Four Growth Concepts exhibit a deficiency at this SL
SL 41 - Oakville - Central Oakville north of Dundas St.	-	All Four Growth Concepts exhibit a deficiency at this SL
SL 57 - Milton - Central Milton south of Main St.	Only Growth Concept 2	All Four Growth Concepts exhibit a deficiency at this SL
SL 54 - Halton Hills - West Halton Hills north of Steeles Ave.	-	Only Growth Concept 4
SL 4 - Burlington - West of Walkers Line (North)	All Four Growth Concepts exhibit this deficient SL	All Four Growth Concepts exhibit this deficient SL
SL 55 - Milton - East Milton south of Hwy 401	Only Growth Concept 2	-

4.4 Transportation System Performance

Exhibit 5 presents the system performance for each of the planning horizons by Growth Concept. As presented in the Exhibit, the system performance is relatively similar among all the Growth Concepts.

In the context of these statistics, it is important to note that the overall network performance reflects the PM Peak, and the model reflects 2031 road network and the 2041 transit network as recommended by DMTR for both the 2041 and 2051 planning horizon assessments.

Exhibit 5 - Summary – System Performance by Growth Concept and Planning Horizon

Performance Indicator	**2041**	**2051**
Average Network v / c		
Growth Concept 1	0.58	0.59
Growth Concept 2	0.58	0.59
Growth Concept 3	0.58	0.59
Growth Concept 4	0.58	0.59
Total Vehicle Kilometres (Million kilometres)		
Growth Concept 1	19.49	19.93
Growth Concept 2	19.49	19.93
Growth Concept 3	19.49	19.93
Growth Concept 4	19.50	19.94
Network Average Speed (km/h)		
Growth Concept 1	45	44
Growth Concept 2	45	44
Growth Concept 3	45	44
Growth Concept 4	45	44

5. System Opportunities and Constraints

Many screenlines across the region were identified as needing capacity improvements. This section focusses on only the screenlines where a regional/local solution is feasible and practical.

Capacity improvements can be made from an operational perspective (traffic signal timing adjustments), a shift in travel behaviour (more HOV, transit travel) or through a physical improvement to the transportation infrastructure (road widening). In reference to roadway widening, it has been the Region's practice not to widen roadways more than six lane cross-section at the mid-block location. At intersections there would be more lanes to accommodate left and right turns.

Some operational options to improve capacity include signal timing improvements, localize intersection improvements, such as adding left or right turn lanes, turn restrictions and contra-flow lanes. These operational improvements are proposed in this assessment on a qualitative basis and were generally assumed to be practical and feasible solutions where the absolute volume of traffic not being served was less than 30% of the capacity of the screenline or link being assessed.

For this assessment, and to have a conservative approach to costing, the more traditional method of capacity improvements (roadway widening) was selected, when possible, when evaluating screenline deficiencies. A more through assessment of alternatives options to screenline deficiencies will be undertaken as part of future transportation master plans.

Screenline Assessment

As shown in Exhibit 6, in south Halton Region, Screenlines 4, 75, 72, 41 and 35 demonstrated deficiencies greater than the equivalent of one lane of traffic per direction for both 2041 and 2051 planning horizons.

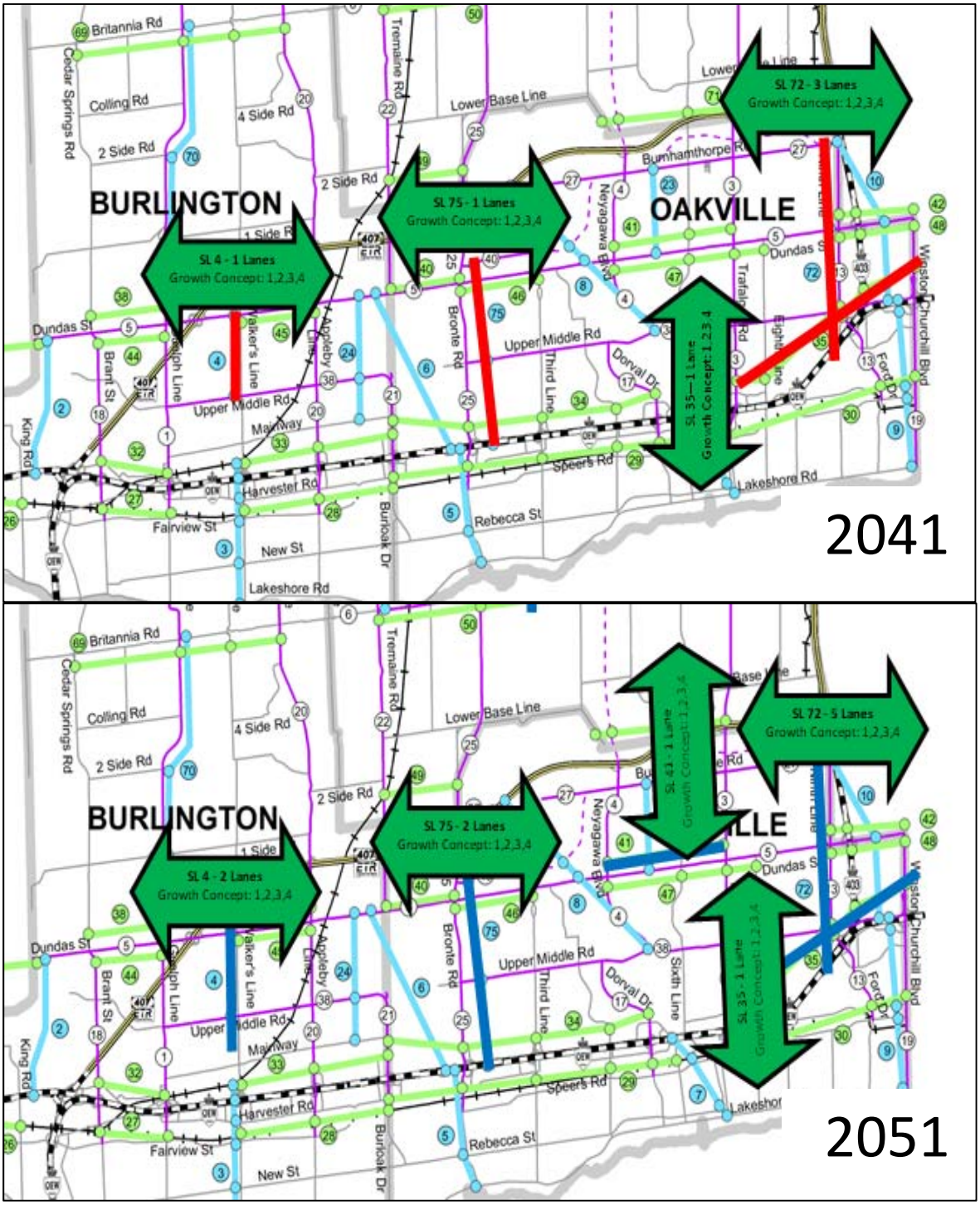
These screenlines include the QEW, Upper Middle Road and Dundas Street as common links. As already indicated, the QEW is under MTO jurisdiction and as such, no solutions are offered as part of this exercise.

To address observed deficiencies in the transportation system that are within the ability of the Region or its local municipalities to resolve, the options to improve the east/west travel performance is through some operational improvements, as discussed above, an increase in transit use (primarily along the Dundas St. transit priority corridor), and the addition of a lane of traffic per direction is required in this part of Halton Region, generally from Guelph Line to Ninth Line.

In addition to the above roadway improvements the road and transit service capacity along Dundas St is reached in 2041. To address travel demand forecasted to 2051, consideration of a higher order service will be required at least from Bronte Rd to the Halton-Peel boundary. This could include a bi-articulated bus running on 5-minute headway or an articulated LRT vehicle on 15-minute headway, as examples. The final and best solution for this corridor would be addressed as part of future transportation master plans.

Ford Drive would need to be widened to six lanes between Kingsway Dr. and Royal Windsor Rd. to address the identified one-lane deficiency at Screenline 35.

Exhibit 6 – South Halton Screenline Deficiencies



As shown in Exhibit 7, in mid-Halton Region, Screenlines 14 and 17 demonstrated deficiencies greater than the equivalent of one lane of traffic per direction for both 2041 and 2051 planning horizons. However, all the roadways that make up these screenlines are already at six lanes in cross-section and cannot be further widened. There are no opportunities within this area for any new links to add capacity.

Screenline 57 requires capacity improvements by 2051 for all of the Growth Concepts. Within the ability of the Region or Milton, the options to improve the north/south travel performance is through some operational improvements, as discussed above, an increase in transit use, and the addition of a lane on James Snow Parkway and the redesignation of this corridor to an access control corridor ("parkway"), generally between Highway 401 and Britannia Rd. Growth Concept 4 would require the "parkway" be extended north of Highway 401 to Regional Road 25.

Screenlines 17 and 14 must rely on a transit solution as there are no opportunities to add lanes on the existing regional roadways (Steeles Ave, Derry Rd and Britannia Rd) and adding a lane on Main St or Louis St Laurent will not address the full east/west demand observed by 2051.

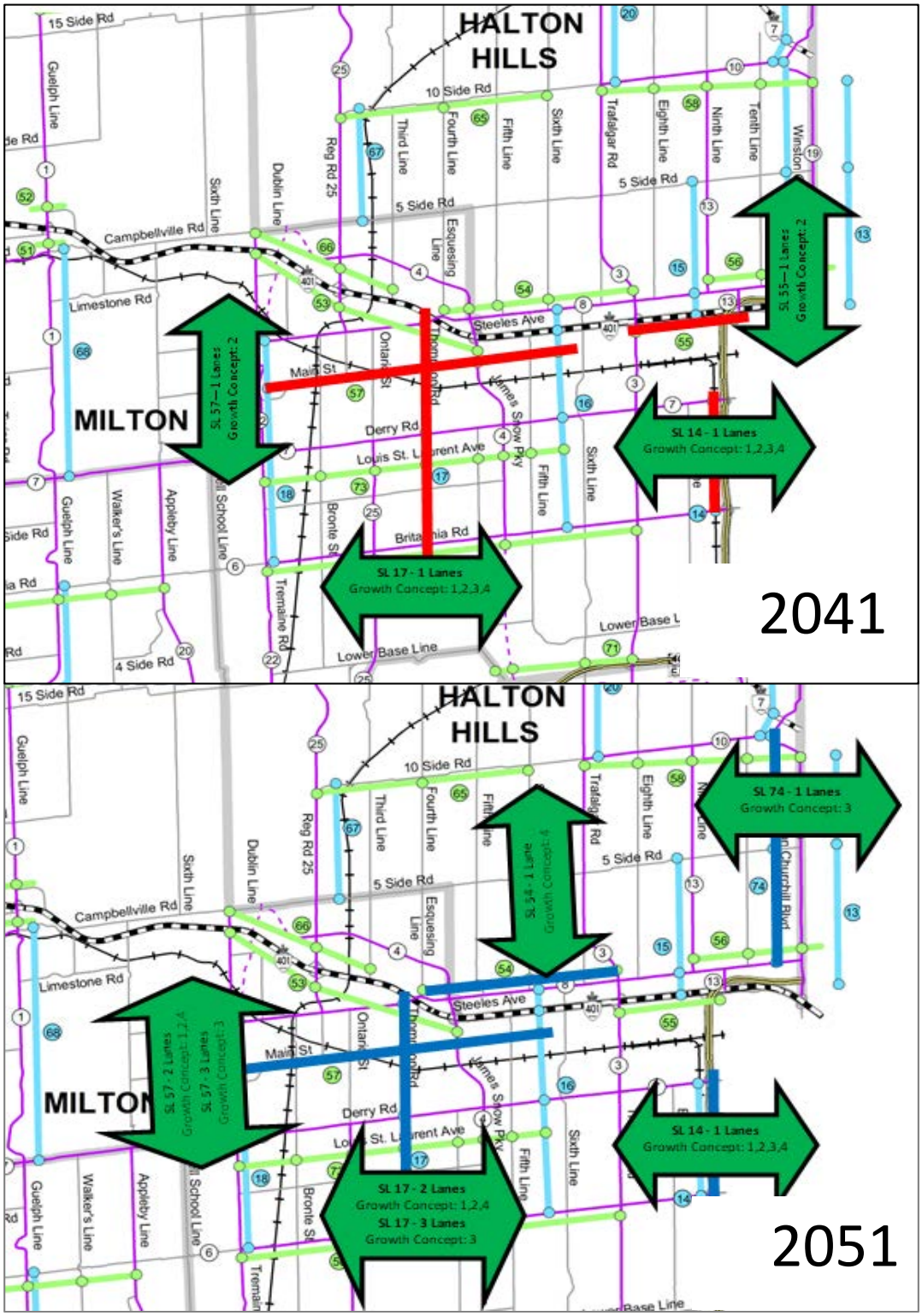
By 2041, and only to address Growth Concept 2, Ninth Line would need to be widened to 6 lanes or have a significant shift to transit usage to avoid this infrastructure requirement (Screenline 55). For this assessment, it was assumed the roadway would be widened.

In south Halton Hills, the transportation deficiencies are generally attributed to Highway 401.

By 2051, and only to address Growth Concept 3, 5 Side Road would need to be widened to 4 lanes (Screenline 74).

Notwithstanding the above Regional/Local improvements, it must be noted that there will be significant congestion along the provincial facilities, affecting the regional transportation system.

Exhibit 7 – Mid-Halton & South Halton Hills Screenline Deficiencies



Summary of Screenline Capacity Improvements

The required transportation system improvements by Screenline for each Growth Concept are summarized in Exhibit 8.

Exhibit 8 – Transportation System Improvements (2031 – 2051)

Potential Solution*	Growth Concept			
	1	2	3	4
Road				
Additional 2 lanes (South Halton) - Guelph Line to Ninth Line	✓	✓	✓	✓
Ford Dr – Kingsway Dr to Royal Windsor Dr	✓	✓	✓	✓
James Snow Parkway - Highway 401 to Britannia	✓	✓	✓	✓
James Snow Parkway - Highway 401 to RR 25				✓
Neyagawa - Highway 407 to Dundas	✓	✓	✓	✓
5 Side Road - Peel Boundary to Ninth Line			✓	
Ninth Line - Steeles to Derry		✓		
Transit				
Steeles Ave Transit Improvements**	✓	✓	✓	✓
Derry Rd Transit Improvements**	✓	✓	✓	✓
Britannia Rd Transit improvements**	✓	✓	✓	✓
Dundas St Transit Improvements	✓	✓	✓	✓

**Subject to undertaking of transportation master plan and Class Environmental Assessment process*

***Combination of either/or both of, reduced headway and use of articulated buses.*

Exhibit 9 presents the approximate lane-kilometres per direction that would be required per scenario based on the travel demand on various screenlines. The second row presents the Potentially Achievable lane-kilometres that could be implemented considering the design criteria. In other words, there is more demand for road travel by 2051 than roads available to be widened, hence the need to also turn to other modes of transportation (transit, active transportation).

Exhibit 9 – Lane-kilometres Required vs Achievable per Growth Scenario (2031 – 2051)

Lane – Kilometres	Growth Concept			
	1	2	3	4
Demand	64	67	67	68
Potentially Achievable	31	34	34	35

*lane-kilometres noted are per direction of travel

The above capital and transit improvements are still subject to a thorough review as part of the upcoming Multi-Modal Transportation Master Plan but are sufficient for the purposes of conducting the current comparative assessment of the four Growth Concepts.

6. Transportation Servicing Cost Assessment

Capital cost estimates were prepared for the recommendations noted above.

6.1 Roads

A preliminary high-level cost analysis was performed for each of the four Growth Concepts to determine a range of potential road and transit improvements required to service growth to 2051. The preliminary high-level cost analysis included a compilation of cost estimates consistent with previous master planning cost estimating approach. The expected accuracy range for this analysis presents a typical variation of -30% and +50% representing a Class 4 cost estimates as per the Association for the Advancement of Cost Engineering (AACE) Cost Estimate Classification System.

Costs do not include any property requirements as it is not practical to define this need as this level of analysis.

Exhibit 10 presents a summary of the preliminary high-level cost analysis for road improvements suggested by 2051.

The roadway costs among the Growth Concepts were within 15%, concluding that no one scenario stands out from a cost perspective given the ROM of the cost analysis.

Exhibit 10 – Summary of Increase in Road Capital Costs by Growth Concepts

Growth Concept	2031 to 2051
1	$525 million to $1.13 Billion
2	$525 million to $1.13 Billion
3	$604 million to $1.29 Billion
4	$607 million to $1.3 Billion

6.2 Transit Costs

Based on the above servicing scenarios, preliminary high-level costs were derived for the transit component of the regional transportation system, as presented in Exhibit 11.

It is important to note the preliminary high-level costs presented below are from 2031 to 2051 and in addition to the 2031 cost estimate recommendations from the DMTR. The Transit Priority Networks includes $261M in new transit infrastructure by 2031, which includes transit station infrastructure, transit priority infrastructure including TSP, fibre optic communications, and queue jump lanes. In addition to infrastructure costs, transit fleet requirements in the range of $117M have also been allocated by 2031 and approximately $39M, per year, to cover Operations and Maintenance (O&M) costs to 2031.

To address 2051 planning horizon transit demand and to address vehicular demand that could not be serviced by the road system, two transit service scenarios were evaluated. The first scenario considered the combination of increased headway (ranging from 3 minutes to 10 minutes) and/or the bus type (standards vs articulated) to generate the capacity to meet the forecasted demand. The second scenario considered fixing the headway to a minimum of 5 minutes and addressing the demand through larges (articulated) buses.

Based on the above servicing scenarios, costs were derived for the transit component of the regional transportation system, as presented in Exhibit 11.

Exhibit 11 – Summary of Increase in Transit Costs by Growth Concepts

Growth Concept	2031 to 2051 Capital	2031 – 2051 O & M
1	$97.6 million to $209 million	$115 million to $247 million
2	$97.6 million to $209 million	$115 million to $247 million
3	$97.6 million to $209 million	$115 million to $247 million
4	$97.6 million to $209 million	$115 million to $247 million

The capital costs and O&M costs were within 5% and 8% respectively, for the two transit servicing scenarios discussed above.

7. Summary of Key Findings and Conclusions

In looking at the four Growth Concepts in both 2041 and 2051, the observed screenline deficiencies are very similar with very minor changes within a focused area.

All the Growth Concepts include the same screenlines for which a solution cannot be reasonably defined or have significant social or environmental implications. Where solutions are more practical or feasible, the solution for each deficient screenline is the same among the four concepts.

Where a Growth Concept had a unique screenline deficiency, that deficiency was not considered to be significant enough in the aggregate to identify the Growth Concept as better or worse from a transportation perspective.

The ROM level costing of transportation infrastructure and transit services forecasted to serve 2051 conditions was 15% among the Growth Concepts. Concept 3 and 4 had the potential for a marginally higher transportation capital cost, depending on the transportation solution, but not significant enough to distinguish these two growth concepts from the others.

No Growth Concept stands out more than another, in the aggregate, from a technical or financial perspective from a transportation performance point of view.

As presented in this section, the planned 2031 capacities of infrastructure were compared to the projected 2051 growth requirements to identify high-level system constraints and opportunities. The analysis demonstrated that for transportation infrastructure, there are no substantial differences in infrastructure opportunities and constraints to 2051 when the four Growth Concepts are compared relative to one another.

The estimates of future capacity requirements to 2051 are approximate and intended to provide a high-level assessment of potential future capacity constraints and opportunities. This assessment was appropriate only for the relative comparison of the four Growth Concepts. The analysis is subject to further refinement through this study (preferred Growth Concept) and the future transportation master plans.

Through its transportation planning efforts to-date, Halton Region recognizes that mobility evolves with urbanization. The Region is ensuring in its planning processes that transportation corridors are protected now and, as its transportation system evolves, climate friendly transportation solutions are possible into 2051 and beyond.

Appendices

EllSo Consulting

Appendix 1

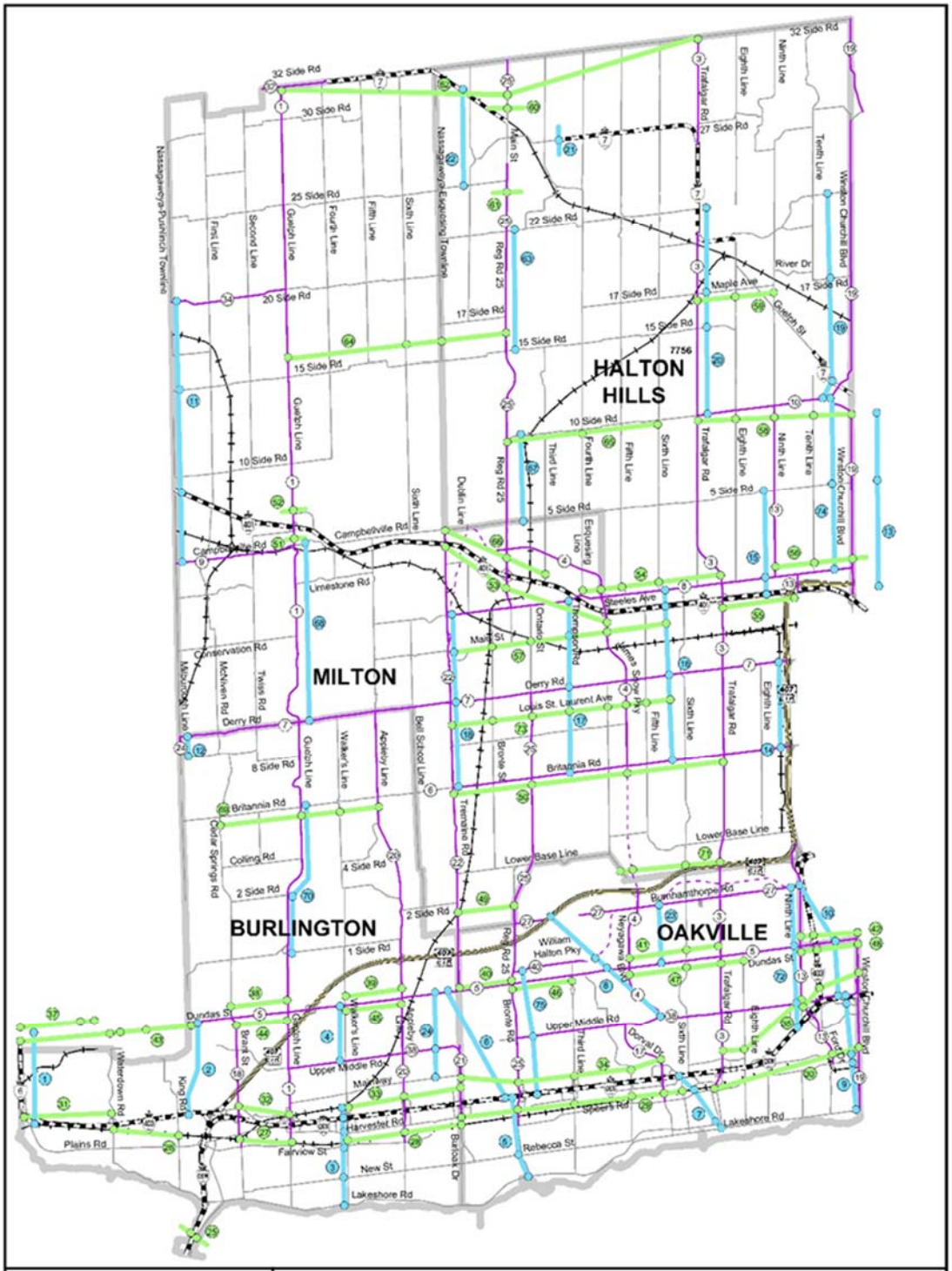
2041 Recommendation of the Defining Major Transit Requirements in Halton Region (DMTR)


Preliminary 2041 Recommended Transit Priority Corridor Network - Infrastructure
To Guelph Kitchener/Waterloo
HALTON HILLS
Acton
Hwy 7
Main St
25 Side Rd
22 Side Rd
20 Side Rd
17 Side Rd
15 Side Rd
10 Side Rd
5 Side Rd
Regional Rd 25
Georgetown
Maple Ave
Guelph St
To Mount Pleasant
Mountainview Rd
Winston Churchill Blvd
MILTON
First Line
Second Line
Guelph Line
Fourth Line
Fifth Line
Sixth Line
Third Line
Eighth Line
Ninth Line
Tenth Line
Potential Expansion to Cambridge
401
Steeles Ave
Gateway Terminal / Shoppers World
Lisgar
Conservation Rd
Main St
Milton
Derry Rd
407
Meadowvale Town Centre
Thomason Rd
Britannia Rd
Appleby Line
Tremaine Rd
Bronte St
James Snow Pkwy
Erin Mills Town Centre
BURLINGTON
2 Side Rd
1 Side Rd
Burnhamthorpe Rd
Trafalgar Rd
University of Toronto Mississauga
Dundas St
403
Neyagawa Blvd
Brant St
Guelph Line
Walker's Line
Upper Middle Rd
Clarkson
OAKVILLE
QEW
Aldershot
Plains Rd
Burlington
Burlington Downtown
New St
Lakeshore Rd
Appleby
Bronte
Rebecca St
Oakville
Hamilton GO
0
5
Kilometres
Legend
Urban Area
GO Train Station
GO Rail Corridor
Future GO Train Station
Proposed GO Rail Corridor
Commuter Lot
Regional Transit Node
Proposed Regional Transit Node
Transit Priority Corridor
Type
Mixed
Priority Bus Corridor
BRT Corridor
Form
Mixed Traffic
(2, 4, 6 lanes)
Mixed Traffic + Queue Jump + Transit Signal Priority (TSP)
(4, 6 lanes)
HOV Lanes + TSP
(6 lanes)
Bus Only Lanes + TSP
(6 lanes)

EllSo Consulting

Appendix 2

Regional Screenlines



Regional Screenlines (As of February 2019)

Legend

- Major Roads
- Highway
- Toll Highway
- Regional Roads
- Proposed Regional Roads
- Railway Lines
- Halton Municipal Boundary
- North - South Screenlines
- East - West Screenlines
- North - South Screenline Identification Number
- East - West Screenline Identification Number

Halton REGION

March 2019

0 1 2 4 6

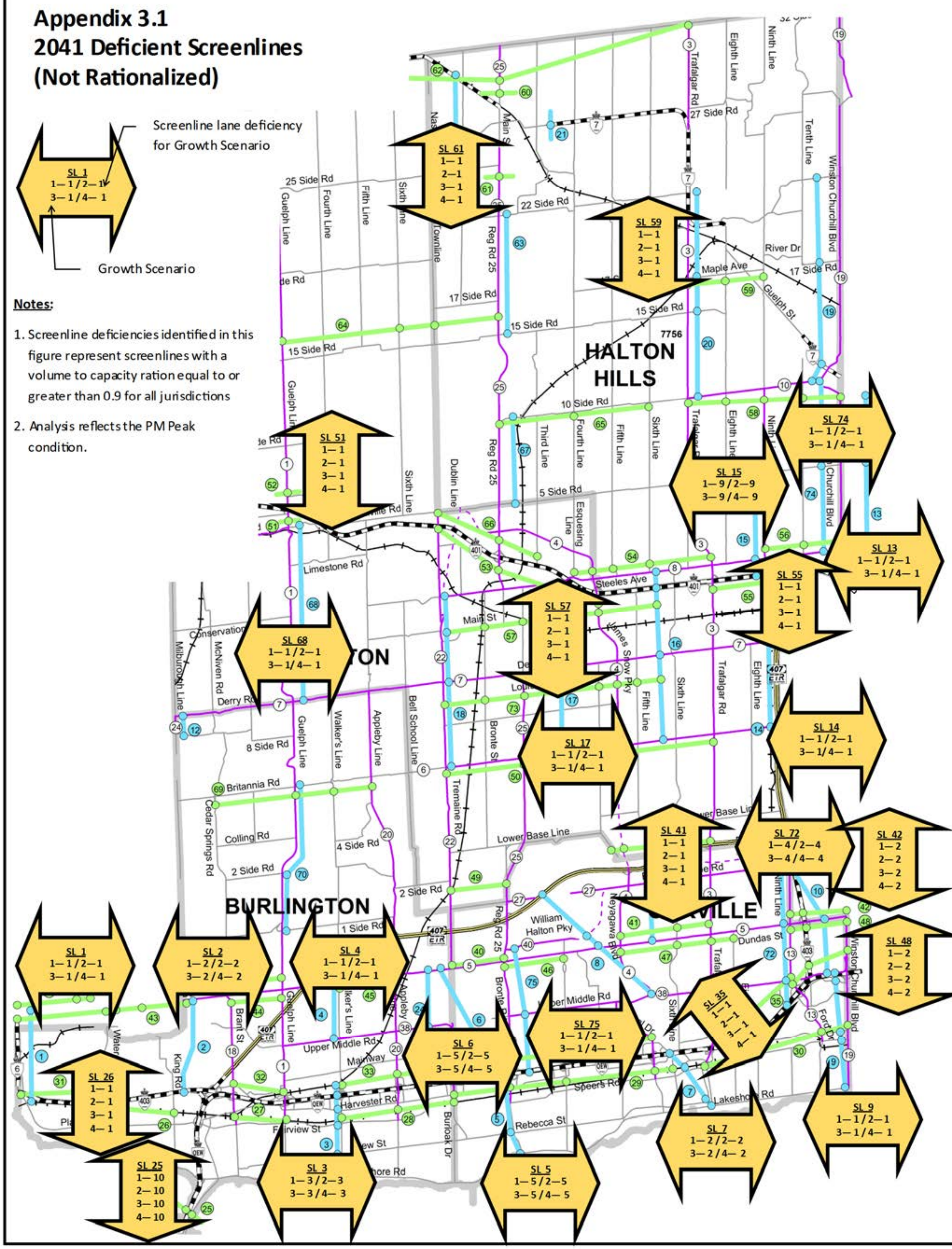
Kilometres

EllSo Consulting

Appendix 3

Regional and MTO screenline deficiency by Growth Concept

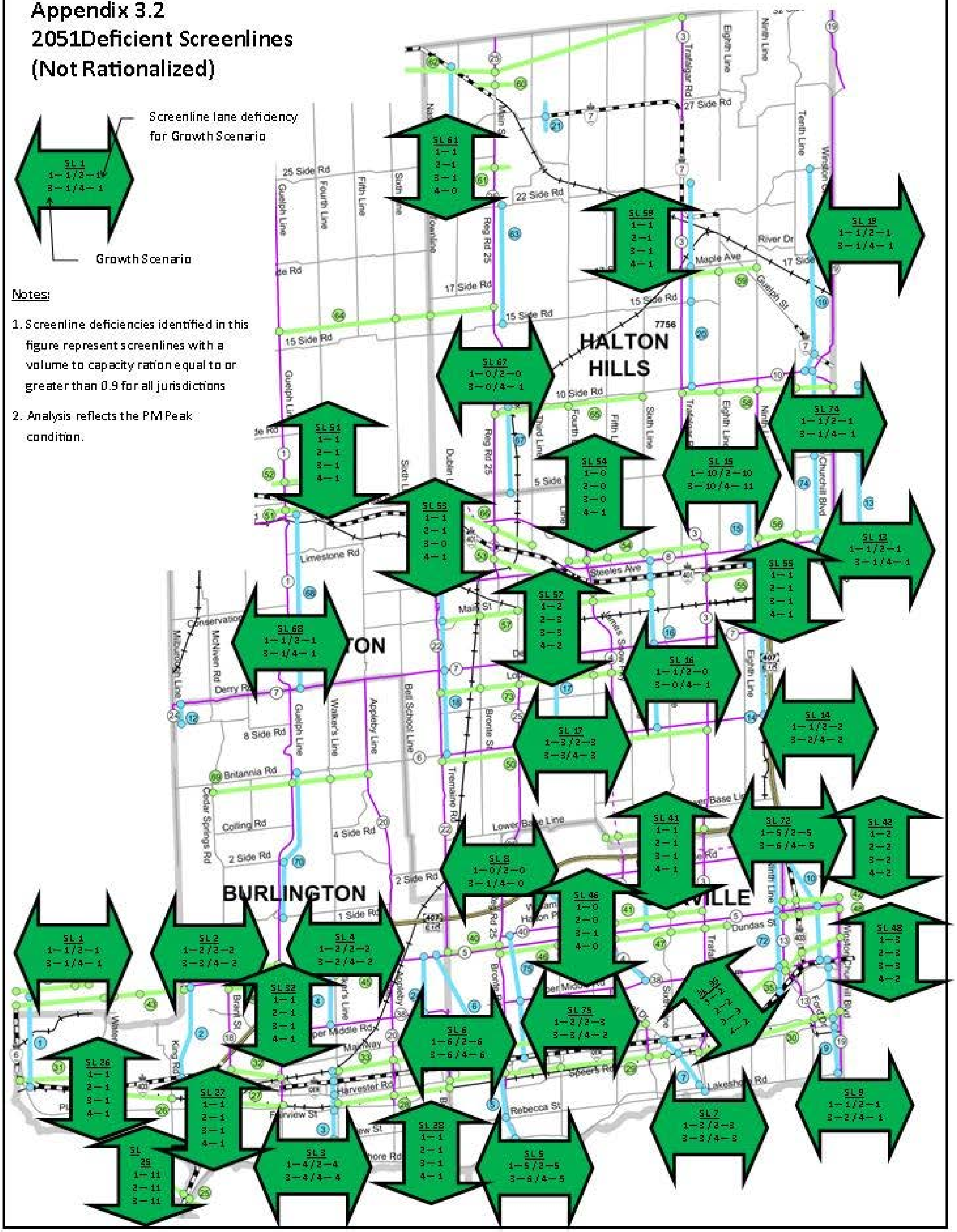
Appendix 3.1
2041 Deficient Screenlines
(Not Rationalized)



Notes:

1. Screenline deficiencies identified in this figure represent screenlines with a volume to capacity ration equal to or greater than 0.9 for all jurisdictions
2. Analysis reflects the PM Peak condition.

Appendix 3.2
2051Deficient Screenlines
(Not Rationalized)



Notes:

1. Screenline deficiencies identified in this figure represent screenlines with a volume to capacity ration equal to or greater than 0.9 for all jurisdictions
2. Analysis reflects the PM Peak condition.

EllSo Consulting

Appendix 4

Regional Screenline deficiency by Growth Concept

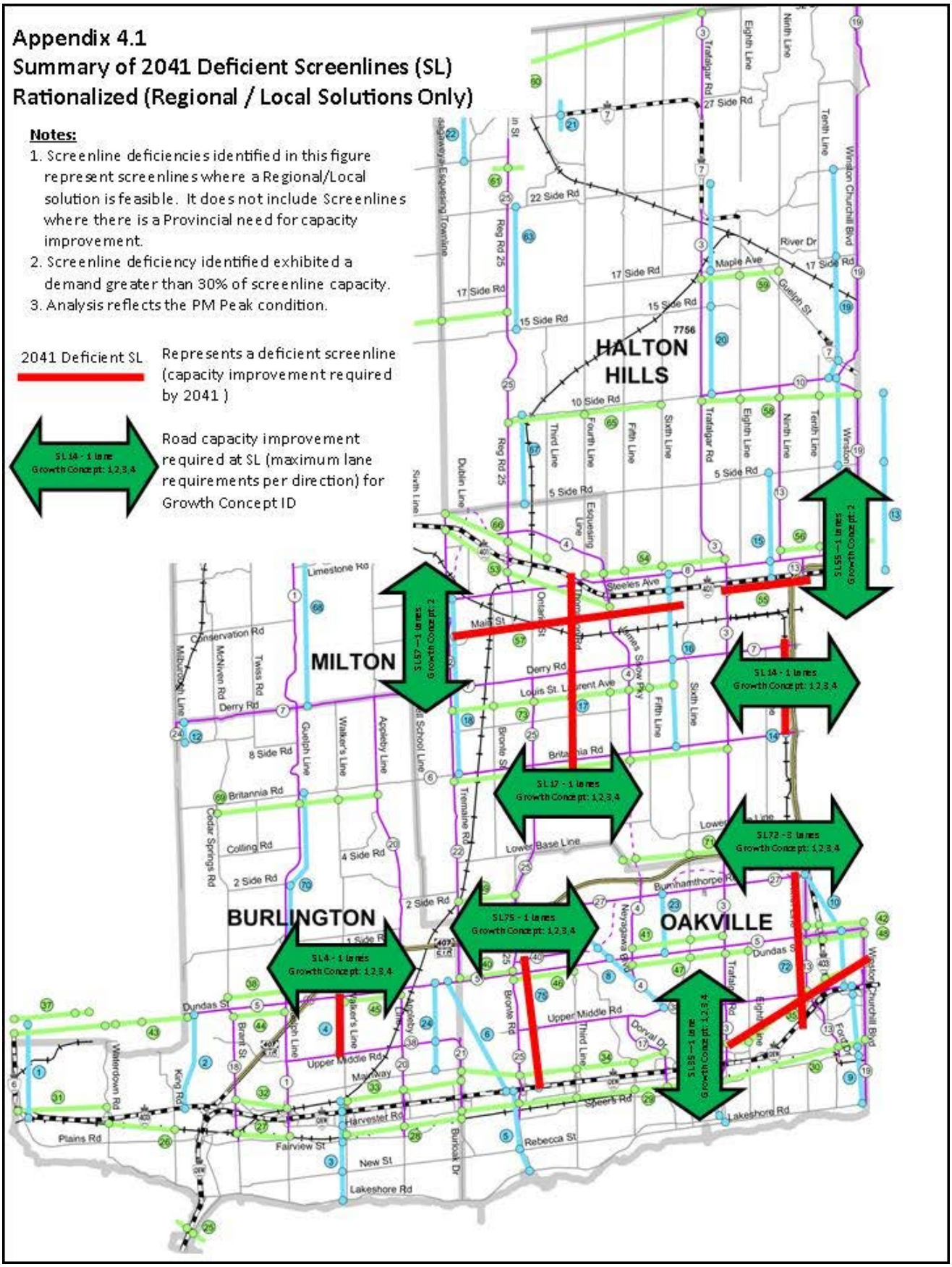
Appendix 4.1
Summary of 2041 Deficient Screenlines (SL)
Rationalized (Regional / Local Solutions Only)

Notes:

1. Screenline deficiencies identified in this figure represent screenlines where a Regional/Local solution is feasible. It does not include Screenlines where there is a Provincial need for capacity improvement.
2. Screenline deficiency identified exhibited a demand greater than 30% of screenline capacity.
3. Analysis reflects the PM Peak condition.

2041 Deficient SL — Represents a deficient screenline (capacity improvement required by 2041)

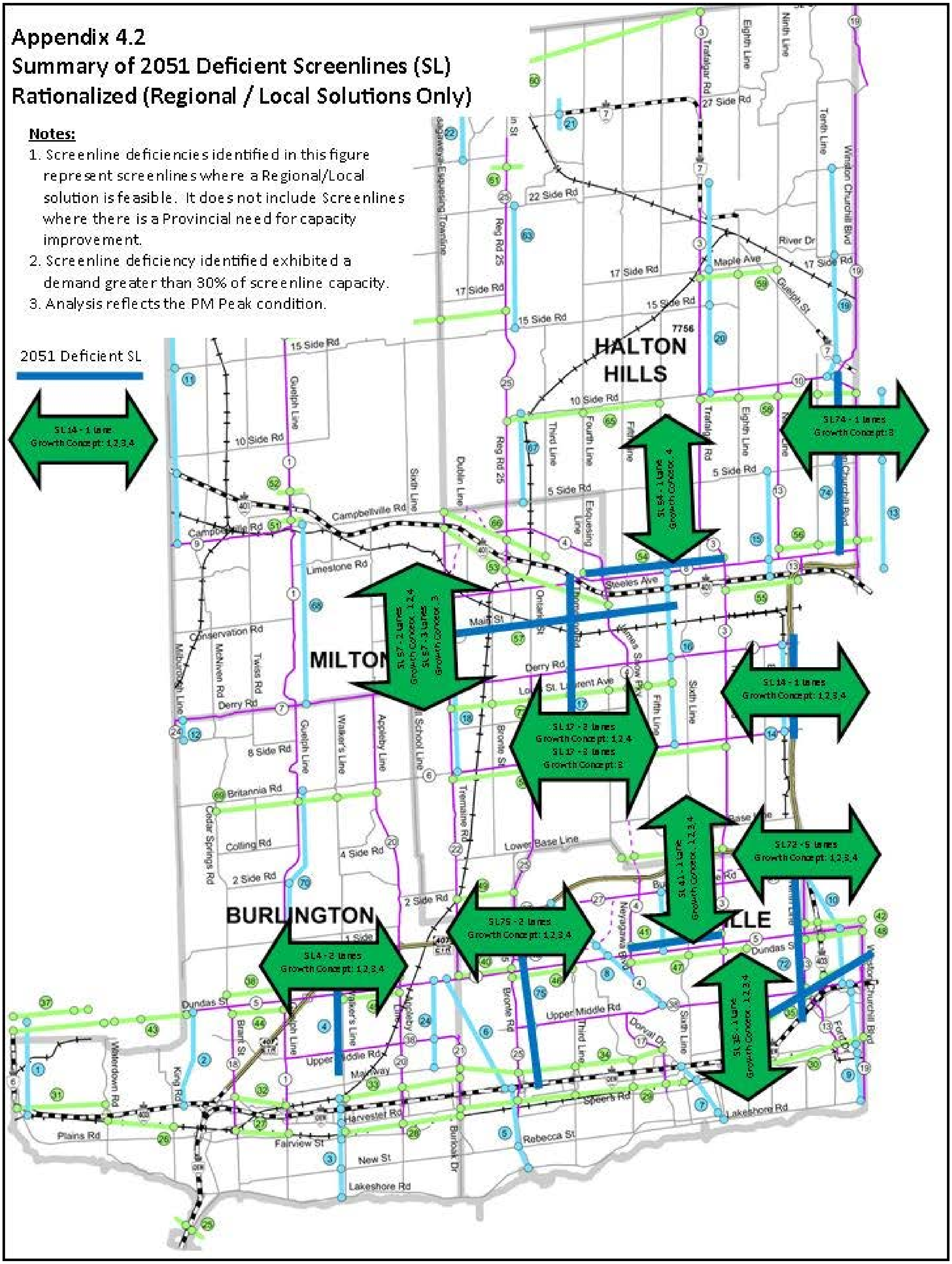
SL14 - 1 lanes Growth Concept: 1,2,3,4 — Road capacity improvement required at SL (maximum lane requirements per direction) for Growth Concept ID



Appendix 4.2
Summary of 2051 Deficient Screenlines (SL) Rationalized (Regional / Local Solutions Only)

Notes:

1. Screenline deficiencies identified in this figure represent screenlines where a Regional/Local solution is feasible. It does not include Screenlines where there is a Provincial need for capacity improvement.
2. Screenline deficiency identified exhibited a demand greater than 30% of screenline capacity.
3. Analysis reflects the PM Peak condition.



Appendix E

Water and Wastewater Assessment

February 2021

Regional Official Plan Review

BluePlan ENGINEERING

Halton REGION

Prepared By:

Halton Region Integrated Growth Management Strategy

Technical Memo – Water and Wastewater Assessment

GMBP File: 717052

GUELPH | OWEN SOUND | LISTOWEL | KITCHENER | LONDON | HAMILTON | GTA

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APPENDICES

TECHNICAL MEMO – WATER AND WASTEWATER ASSESSMENT

HALTON REGION INTEGRATED GROWTH MANAGEMENT STRATEGY

GMBP FILE: 717052

1. INTRODUCTION

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

To identify requirements, Hemson has developed several planning scenarios that focus growth in different areas and achieve different Regional and Local goals. This includes a total of eight (8) scenarios that were further refined into four (4) concepts which were provided for evaluation and analysis. The four (4) concepts were reviewed to identify the impact each concept could have on the existing and planned water and wastewater infrastructure.

Ultimately, a preliminary water and wastewater servicing plan will be developed for the preferred growth option. This memorandum is intended to review the following:

- Summary of planning numbers for the four concepts provided.
- Water and wastewater servicing opportunities and constraints for the existing and planned infrastructure to 2031.
- Identify high-level servicing needs to meet 2041 and 2051 growth for each of the four concepts.

This information will feed into the growth concepts evaluation process. Ultimately, the water and wastewater servicing strategies will be further refined based on a final preferred growth concept.

2. DESIGN CRITERIA & LEVEL OF SERVICE

This section establishes the Master Plan level per capita demand/flow assumptions as well as the intended level of service for the systems.

2.1 Water

Water design criteria and level of service are based on 2017 Development Charges Update as follows:

Table 1. Water Design Criteria

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

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

2.2 Wastewater

Similar to water, the design criteria and level of service is based on the 2017 Development Charges Update as follows:

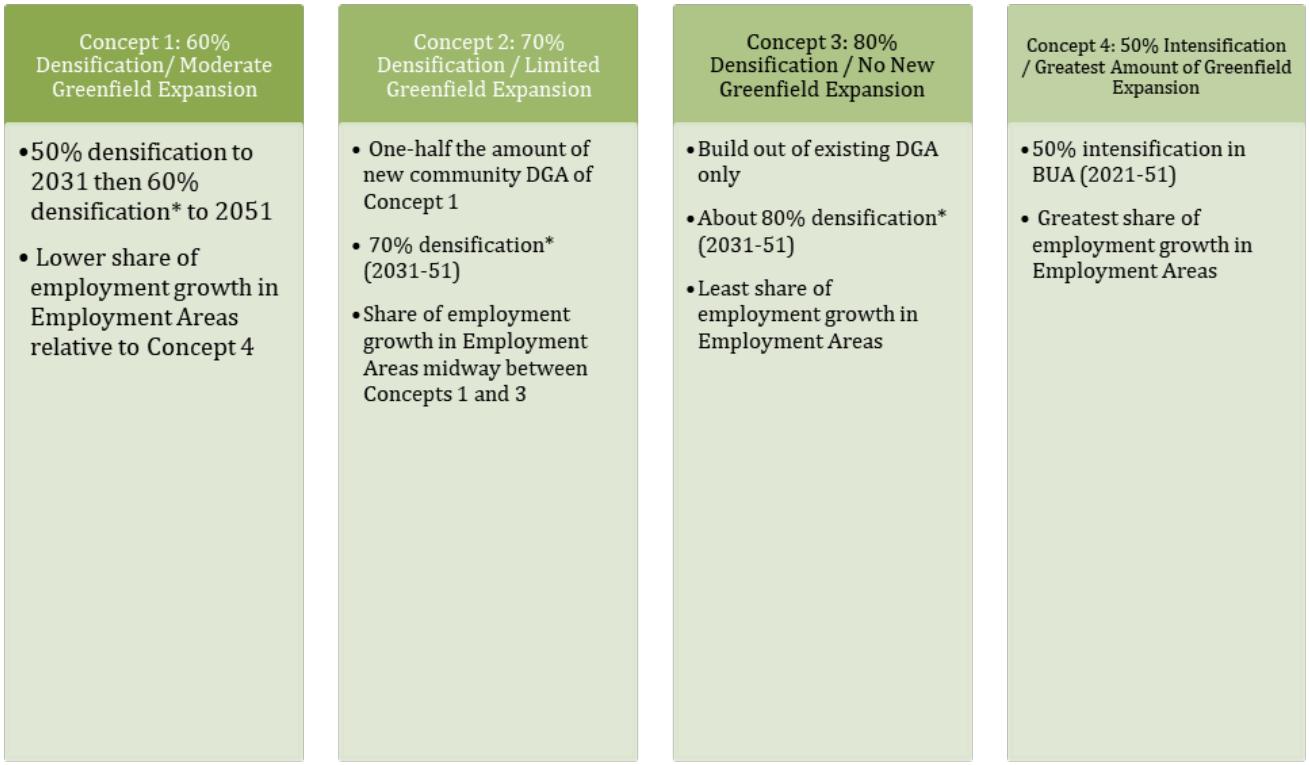
Table 2. Wastewater Design Criteria

Per Capita Criteria	Residential	360	L/cap/d
	Employment (Blended)[1]	310	L/emp/d
Peaking Factor	Harmon	2-4	
Extraneous Flow	Peak Extraneous Flow	0.286	litres per second/ha
Level of Service	q/Q	<0.85	
Pumping	• Pumping firm capacity to provide peak wet weather flow for drainage area • Firm capacity based on capacity with largest pump out of service		
Treatment	Treatment plant upgrade triggers at 90% of rated treatment capacity		

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

3. GROWTH SCENARIOS

Four (4) growth concepts were reviewed to determine potential impacts to the existing and future water and wastewater infrastructure. The following provides a brief description of the four growth concepts and assumptions applied in the development of the planning projections:



*Share densification approximates the share of apartments in the mix of total housing growth
Densification from 2031 to 2051 in Concepts 1, 2, 3 and 4 include 10%, 17%, 24% and 2.5% of units as DGA densification, apartment development in DGA strategic growth areas such as Trafalgar Road in north Oakville and Milton

Figure 1 – Overview of Growth Concepts

A summary of the population and employment for each of the four planning concepts is summarized in the following tables. Additionally, heat maps showing geographical allocation of the population and employment growth for each concept are presented in Appendix A.

Table 3. Population Growth[1]

Municipality	Population Growth (2016-2041)				Population Growth (2016-2051)			
	1	2	3	4	1	2	3	4
Acton	100	100	500	100	100	100	800	100
Burlington	49,000	50,000	51,000	47,000	74,000	80,000	84,000	70,000
Georgetown	15,000	15,000	15,000	13,000	20,000	24,000	23,000	23,000
Halton Hills	25,000	21,000	21,000	33,000	68,000	49,000	24,000	92,000
Milton	155,000	155,000	147,000	159,000	221,000	216,000	214,000	225,000
Oakville	115,000	116,000	124,000	108,000	148,000	162,000	184,000	134,000
Total	**358,000**	**358,000**	**359,000**	**360,000**	**531,000**	**531,000**	**529,000**	**545,000**

Note: Planning estimates rounded to the closest 1,000. Planning estimates for Acton rounded to the closest 100.

Table 4. Employment Growth[2]

Municipality	Employment Growth (2016-2041)				Employment Growth (2016-2051)			
	1	2	3	4	1	2	3	4
Acton	500	300	800	500	1,200	400	1,400	1,300
Burlington	21,000	21,000	21,000	21,000	30,000	32,000	33,000	29,000
Georgetown	4,000	4,000	3,000	4,000	10,000	10,000	5,000	12,000
Halton Hills	13,000	13,000	14,000	14,000	26,000	28,000	25,000	27,000
Milton	66,000	66,000	65,000	66,000	95,000	98,000	97,000	94,000
Oakville	54,000	55,000	56,000	53,000	70,000	74,000	79,000	66,000
Total	**159,000**	**160,000**	**160,000**	**157,000**	**233,000**	**241,000**	**240,000**	**230,000**

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

Planning estimates for Acton rounded to the closest 100.

Table 5. Water Service Areas - Population

[1] Growth allocations for Acton will be finalized as part of the Preferred Growth Concept
[2] Ibid

Service Area	Population 2041				Population 2051			
	1	2	3	4	1	2	3	4
Groundwater	87,000	89,000	89,000	85,000	104,000	110,000	109,000	105,000
Groundwater Transfer	25,000	25,000	25,000	25,000	26,000	28,000	27,000	28,000
Lake Based Water	769,000	769,000	770,000	767,000	916,000	907,000	915,000	917,000
New Lake Based Water	24,000	21,000	21,000	29,000	31,000	32,000	23,000	39,000
Rural	19,000	19,000	19,000	19,000	20,000	20,000	20,000	20,000
Total	**924,000**	**924,000**	**925,000**	**925,000**	**1,097,000**	**1,097,000**	**1,095,000**	**1,109,000**

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

Table 6. Water Service Areas - Employment

Service Area	Employment 2041				Employment 2051			
	1	2	3	4	1	2	3	4
Groundwater	38,000	38,000	38,000	38,000	48,000	48,000	46,000	49,000
Groundwater Transfer	3,000	3,000	2,000	3,000	5,000	4,000	3,000	6,000
Lake Based Water	372,000	373,000	372,000	370,000	428,000	437,000	437,000	423,000
New Lake Based Water	4,000	4,000	4,000	4,000	9,000	10,000	9,000	10,000
Rural	5,000	5,000	7,000	5,000	6,000	6,000	8,000	6,000
Total	**423,000**	**423,000**	**423,000**	**420,000**	**496,000**	**505,000**	**503,000**	**493,000**

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

Table 7. Wastewater Service Areas - Population

Service Area	Population 2041				Population 2051			
	1	2	3	4	1	2	3	4
Acton	10,000	10,000	11,000	10,000	10,000	10,000	11,000	10,000
Milton	39,000	38,000	40,000	38,000	51,000	51,000	55,000	51,000
MidHalton	433,000	431,000	427,000	439,000	545,000	529,000	518,000	561,000
Skyway	237,000	238,000	239,000	235,000	262,000	268,000	272,000	258,000
Oakville SE	51,000	51,000	52,000	51,000	55,000	56,000	57,000	55,000
Oakville SW	76,000	77,000	78,000	74,000	89,000	93,000	95,000	85,000
Georgetown	36,000	36,000	35,000	35,000	41,000	43,000	42,000	42,000
Georgetown South	21,000	21,000	21,000	21,000	22,000	23,000	23,000	23,000
Glen Williams	2,200	2,300	2,300	2,200	2,500	2,600	2,600	2,600
Norval	400	400	400	400	400	500	500	500
Rural	19,000	19,000	19,000	19,000	20,000	20,000	20,000	20,000
Total	**924,000**	**924,000**	**925,000**	**925,000**	**1,097,000**	**1,097,000**	**1,095,000**	**1,109,000**

Table 8. Wastewater Service Areas - Employment

Service Area	Employment 2041				Employment 2051			
	1	2	3	4	1	2	3	4
Acton	3,000	3,000	3,000	3,000	4,000	3,000	4,000	4,000
Milton	37,000	37,000	41,000	37,000	42,000	42,000	48,000	42,000
MidHalton	136,000	137,000	135,000	135,000	179,000	185,000	181,000	177,000
Skyway	121,000	121,000	122,000	121,000	130,000	132,000	133,000	129,000
Oakville SE	50,000	50,000	49,000	50,000	55,000	56,000	55,000	54,000
Oakville SW	49,000	49,000	49,000	50,000	54,000	55,000	56,000	54,000
Georgetown	17,000	17,000	17,000	17,000	22,000	22,000	18,000	23,000
Georgetown South	3,000	3,000	2,000	3,000	4,000	4,000	2,000	5,000
Glen Williams	100	100	100	100	100	100	100	100
Norval	200	200	200	200	200	200	200	200
Rural	5,000	5,000	5,000	5,000	6,000	6,000	6,000	6,000
Total	**423,000**	**423,000**	**423,000**	**420,000**	**496,000**	**505,000**	**503,000**	**493,000**

Notes: Planning estimates rounded to the closest 1,000. Planning estimates for Glen Williams and Norval rounded to the closest 100. Georgetown refers to existing community generally north of Silver Creek which will continue to be serviced by the Georgetown WWTP. South Georgetown refers to communities generally south of Silver Creek and in Stewarttown, as well as the Vision Georgetown area which will be conveyed to Mid-Halton WWTP.

4. TECHNICAL ANALYSIS

This section reviews the calculation of demands, flows, infrastructure impacts and preliminary infrastructure needs for each growth concept for comparison purposes.

4.1 Demand and Flow Projections – Starting Point Methodology

To project future requirements for the Region's water and wastewater treatment capacity, starting point analyses were completed. Starting point analyses are used as a baseline for projecting future water treatment demand and wastewater treatment flow for the purposes of determining the need for phasing and scope of expansion activities to add treatment capacity in the systems. This was done on a plant by plant basis or by service area for each of the four (4) concepts using the current demand/flow plant recorded data and projected growth demand/flow calculated according to the design criteria previously described in Section 2.

4.1.1 Water Treatment Plant Demand Projections Analysis

The water treatment plant demand projections analysis shows that there are no major differences among the four growth concepts. The results of the analysis are described below and summarized in Table 9.

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

Table 9. Summary of Water Treatment Plant Demand Projections Analysis

System	2041				2051			
	1	2	3	4	1	2	3	4
Lake based water	✓	✓	✓	✓	✗	✗	✗	✗
Acton GW	✓	✓	✓	✓	✓	✓	✓	✓
Milton GW	✗	✗	✗	✗	✗	✗	✗	✗
Georgetown GW	✓	✓	✓	✓	✓	✓	✓	✓

✓ < 90% Rated Capacity 90% Rated Capacity< ! <Rated Capacity ✗ >Rated Capacity

4.1.2 Wastewater Treatment Plant Flow Projections Analysis

The wastewater treatment plant flow projections analysis shows that there are no major differences among the four growth concepts. The results of the analysis are described below and summarized in Table 10.

- Acton WWTP and Georgetown WWTP have sufficient capacity to service growth to 2051.
- Mid-Halton WWTP expansion to 225 megalitres per day will provide sufficient capacity to service growth to 2041. However, further capacity expansion will be required to service growth to 2051.
- Oakville SE WWTP has sufficient capacity to service growth to 2051, however flows are projected to reach the 90% of the rated capacity of the plant by this time.
- Oakville SW WWTP does not have sufficient capacity to accommodate the projected flows to 2051. While recorded flows at this plant have remained consistent for the past 4 years, significant growth in the service area (additional 50,000 people + jobs by 2051) causes projected flows at this plant to reach the 90% of the rated capacity by 2041.
- Skyway WWTP shows projected flows to 2041 reach 90% of the rated capacity of the plant in all concepts, triggering a capacity expansion or other measures to reduce/manage the flows at the plant. In addition, 2051 flows are projected to marginally surpass the rated capacity of the plant for concepts 2 and 3.

Table 10. Summary of Wastewater Treatment Plant Flow Projections Analysis

WWTP	2041				2051			
	1	2	3	4	1	2	3	4
Acton	✓	✓	✓	✓	✓	✓	✓	✓
Georgetown	✓	✓	✓	✓	✓	✓	✓	✓
Milton	-	-	-	-	-	-	-	-
Mid-Halton	!	!	!	!	✗	✗	✗	✗
Oakville SE	✓	✓	✓	✓	!	!	!	!
Oakville SW	✗	✗	✗	✗	✗	✗	✗	✗
Skyway	!	!	!	!	!	✗	✗	!

✓ < 90% Rated Capacity 90% Rated Capacity < ! < Rated Capacity ✗ > Rated Capacity

Graphs depicting the results of the water and wastewater treatment plants demand/flow projections analysis can be found in **Appendix A** and **Appendix B**, respectively.

4.2 Modelling Analysis and System Impacts

Hydraulic modelling analysis was required to assess potential impacts on the water and wastewater system for each of the four growth concepts. The analysis was completed using the Region's hydraulic water and wastewater models as follows:

InfoWater

Scenarios Existing Boundaries 2016, 2021

Scenarios Future Boundaries 2021, 2026, 2031

InfoSewer

Scenarios 2016, 2021, 2026, 2031

4.2.1 Hydraulic Models Loading and Analysis

The water and wastewater hydraulic model loading and analysis were completed for high-level comparison between concepts. The model allocation of water demands and wastewater flows was based on planning projections for future 2041 and 2051 scenarios. For each of the four growth concepts, the models were loaded according to the following process:

1. Population and Employment projections for all four concepts by milestone years (2016, 2021, 2031, 2041, 2051) were received in the Region's Traffic Zones and Small Geographical Units (SGUs) layers.
2. Growth water demands and wastewater flows were calculated for each SGU within the existing and future service areas.
3. Growth water demands and wastewater flows were distributed evenly amongst all nodes within a particular SGU in the hydraulic models using the future planned 2031 network as a baseline.
4. For new greenfield growth areas, new infrastructure was added to the model in order to facilitate loading.
5. Preliminary sizing and alignments of the water and wastewater infrastructure was assumed and will be further refined upon selection of the preferred growth alternative.

The hydraulic modelling exercise was completed to assess the potential impact of the four growth concepts on the following water and wastewater regional infrastructure:

<u>Water</u>

Storage (reservoirs, elevated tanks)

Pumping Stations

Linear infrastructure (watermains)

<u>Wastewater</u>

Sanitary Pumping Stations

Linear infrastructure (sewers)

The results of the modelling analysis and impacts to the water and wastewater system are summarized in the next sections.

4.2.2 Water Storage

For both the 2041 and 2051 planning periods, water storage deficiencies were identified across all four concepts for the following pressure zones:

- Zone G6L – south Georgetown (2041 Deficiency = 1 to 3 mega litres; 2051 Deficiency = 3 to 13 mega litres)
- Zone 250 – south Milton, east Milton, 401 Corridor, and north Oakville (2041 Deficiency = 11 to 12 mega litres; 2051 Deficiency = 25 to 26 mega litres)
- Zone O2 – central Oakville (2041 Deficiency = <1 mega litre; 2051 Deficiency = 2 to 4 mega litres)

Table 11. Water Storage Requirements Summary

Pressure Zone	2041				2051			
	1	2	3	4	1	2	3	4
250	✗	✗	✗	✗	✗	✗	✗	✗
267	✓	✓	✓	✓	✓	✓	✓	✓
Acton	✓	✓	✓	✓	✓	✓	✓	✓
B1/O1	✓	✓	✓	✓	✓	✓	✓	✓
B1A	✓	✓	✓	✓	✓	✓	✓	✓
B2	✓	✓	✓	✓	✓	✓	✓	✓
B3	✓	✓	✓	✓	✓	✓	✓	✓
B3A/B4A	✓	✓	✓	✓	✓	✓	✓	✓
B4	✓	✓	✓	✓	✓	✓	✓	✓
G6L	✗	✗	✗	✗	✗	✗	✗	✗
G6G	✓	✓	✓	✓	✓	✓	✓	✓
M5G	✓	✓	✓	✓	✓	✓	✓	✓
O2	!	!	!	!	✗	✗	✗	✗
O3	✓	✓	✓	✓	✓	✓	✓	✓

The deficiencies identified occur in common infrastructure across all concepts and only vary in magnitude. For instance, there is significant variability in Zone G6L storage deficit in the 2051 scenarios. Concept 3 had a noticeably smaller deficiency (3ML) compared to the other concepts (10, 7 and 13 ML deficits for Concepts 1, 2 and 4 respectively).

In addition, the pressure zones affected were expected. A significant portion of the growth is allocated in the service areas where these pressure zones are located such as North Oakville, Milton, Halton Hills 401 corridor and Georgetown.

4.2.3 Water Pumping Stations

Similar to the storage requirements, the water pumping requirements identified as part of this analysis were largely consistent across the four scenarios for both 2041 and 2051. These deficiencies vary in magnitude and are generally located in the same pressure zones identified in previous sections:

- Zone G6L – south Georgetown (2041 Deficiency = ~8 megalitres per day; 2051 Deficiency = ~8 to 43 megalitres per day)
- Zone 250 – south Milton, east Milton, north Oakville (2041 Deficiency = ~25 megalitres per day; 2051 Deficiency = 61 to 98 megalitres per day)
- Zone O3 – north Oakville (2041 marginal capacity at Kitchen; 2051 Deficiency = 32 to 62 megalitres per day)
- Zone O2 – central Oakville (2041 Deficiency = ~32 megalitres per day; 2051 Deficiency = ~38 to 41 megalitres per day)

Table 12. Water Pumping Requirements Summary

Pressure Zone	2041				2051			
	1	2	3	4	1	2	3	4
8th Line (223)	✓	✓	✓	✓	✓	✓	✓	✓
8th Line (O3)	✓	✓	✓	✓	✓	✓	✓	✓
Appleby Line (B3)	✓	✓	✓	✓	✓	✓	✓	✓
Bailie (B4)	✓	✓	✓	✓	✓	✓	✓	✓
Beaufort (B5)	✓	✓	✓	✓	✓	✓	✓	✓
Burloak (Z2)	✓	✓	✓	✓	✓	✓	✓	✓
Davis (O2)	✘	✘	✘	✘	✘	✘	✘	✘
Kingsway (B1A)	✓	✓	✓	✓	✓	✓	✓	✓
Kitchen (M5L)	✓	✓	✓	✓	✓	✓	✓	✓
Kitchen (O3)	!	!	!	!	✘	✘	✘	✘
Neyagawa (250)	✘	✘	✘	✘	✘	✘	✘	✘
Washburn (B2)	✓	✓	✓	✓	✓	✓	✓	✓
Washburn (B3)	✓	✓	✓	✓	✓	✓	✓	✓
Zone 6 (G6L/303)	✘	✘	✘	✘	✘	✘	✘	✘

Kitchen O3 was flagged as deficient in the 2051 scenario. The modelling exercise is showing that there is some difficulty to move water across the system from Zone O3 to Neyagawa PS to service Zone 250 and zones above. Further analysis of the preferred scenario is required to refine the pumping requirements and strategies to solve this issue. Overall, Concept 3 would have the smallest pumping deficiencies due to reduced transfer north through Kitchen, Neyagawa and Zone 6 PS.

4.2.4 Water Network

A high level analysis of the water network was also performed. The system was assessed based on the headlosses that the watermains experienced in the model for the different scenarios under maximum day conditions.

As part of this analysis, only the watermains triggered subsequent to 2031 were considered. This is based on the assumption that any existing or future deficiencies in the system prior to 2031 would be resolved through the Region's current capital program. Likewise, deficiencies prior to 2031 would be common across all scenarios and would not act as a differentiator between scenarios, which is the main purpose of the analysis.

Table 13. Water Network Analysis Summary

Headlosses	Diameter (mm)	Scenarios (2031-2041)				Scenarios (2041-2051)			
		1	2	3	4	1	2	3	4
		Length (km)							
2-5 m/km	400-600	2,852	3,066	3,426	2,419	7,839	8,452	6,691	9,908
	600-900	784	914	921	484	5,313	5,566	1,502	4,808
	900-1200	663	663	663	870	3,463	3,468	3,502	3,461
	>1200	12	12	12	12	4,997	3,758	2,137	5,973
>5m/km	400-600	221	221	221	221	1,013	1,109	1,107	1,017
	600-900	1,018	1,018	1,018	1,450	1,250	763	763	818
	900-1200	0	0	0	0	86	79	27	86
	>1200	0	0	0	0	0	0	0	0
Total (km)		**5,550**	**5,894**	**6,261**	**5,455**	**23,961**	**23,194**	**15,729**	**26,071**

As shown in Table 13 above, the range of pipes length showing headlosses between 2-5 m/km and greater than 5m/km is generally consistent across the four concept scenarios, with Concept 4 showing slightly lower numbers for the 2041 growth year than the other scenarios. However, for the 2051 scenario, Concept 3 has noticeably lower totals than the other concepts.

In addition, it should be noted that due to the absence of new greenfield designated areas for residential purposes in Concept 3, this concept would require less water linear infrastructure to extend servicing to new lands when compared to the other concepts.

4.2.5 Wastewater Pumping Stations (WWPS)

Wastewater pumping station requirements were identified for existing pumping station as well as proposed WWPS in the current Regional capital program. The analysis of the existing WWPS shows that North and Ninth Line WWPS were identified as deficient by 2041 in all scenarios.

- North WWPS (2041 Deficiency = 980-1050 litres per second ; 2051 Deficiency 1410-1860 litres per second) – consistent with servicing additional flows from Milton and Georgetown transfer service areas; and,
- Ninth Line WWPS (2041 Deficiency = 50 litres per second ; 2051 Deficiency 80-90 litres per second) – SPS is currently being upgraded to 731 litres per second to service 2031 peak flow.

Table 14. Wastewater Pumping Stations Analysis

Existing WWPS	Existing Firm Capacity	2041				2051			
		1	2	3	4	1	2	3	4
North	3,656 + 1,200 (Planned)	✘	✘	✘	✘	✘	✘	✘	✘
Ninth Line	526	✘	✘	✘	✘	✘	✘	✘	✘

Recent flow monitoring downstream of the Ninth Line station indicates that peak flows may be less than estimated. There is potential that the proposed upgrades will be sufficient to service growth in the catchment beyond 2031. Future peak flows to the station could be confirmed utilizing the Region's calibrated InfoWorks model that is currently in development.

The analysis of the proposed/planned WWPS in the 2031 Capital Program shows that the following WWPS would require adjustments to the planned capacities:

- Trafalgar (1380-1920 litres per second required capacity) – consistent with projected new growth in the service area from Georgetown, Milton south east and Halton Hills 401 growth corridor
- Lower Base Line (1840-2530 litres per second required capacity) – consistent with projected new growth in the service area from Georgetown, Milton south east and Halton Hills 401 growth corridor
- Tremaine South (230-280 litres per second required capacity) – consistent with projected growth in southwest Milton and Milton Education Village.

Table 15 below summarizes the currently planned and required capacities for the identified planned WWPS across the four growth concepts.

Table 15. Proposed Wastewater Pumping Stations Analysis

Future WWPS	2031 Capacity (litres per second)	2041				2051			
		1	2	3	4	1	2	3	4
Trafalgar/ Drumquin	1,200	✓	✓	✓	✓	✗	✗	✗	✗
Lower Base Line	1,805	✓	✓	✓	✓	✗	✗	✓	✗
Tremaine South	225	✓	✓	✓	✓	✗	✗	✗	✗

Overall, wastewater pumping requirements were largely consistent across the four concepts. However, Concept 3 shows the smallest pumping requirements for most of the pumping stations identified.

4.2.6 Wastewater Network

A high level analysis of the wastewater network was also performed. The system was assessed based on projected flow in pipe (q) versus the total theoretical capacity of the pipe (Q), referred to as (q/Q) that the sanitary sewers are experiencing in the model for the different scenarios under peak wet weather conditions.

As part of this analysis, only the sewers triggered subsequent to 2031 were considered. This is based on the assumption that any existing or future deficiencies in the system prior to 2031 would be resolved through the Region's current capital program. Likewise, deficiencies prior to 2031 would be common across all scenarios and would not act as a differentiator between scenarios which is the main purpose of the analysis.

Table 16. Wastewater Network Analysis Summary

Diameter (mm)	2031-2041				2041-2051			
	1	2	3	4	1	2	3	4
	>0.85 q/Q (km)				>0.85 q/Q (km)			
<150	-	-	-	-	0.1	0.1	0.1	0.1
150-250	2.4	2.5	3.0	2.3	2.0	3.2	3.1	2.2
300-400	3.8	3.8	3.9	3.8	2.4	2.7	3.1	2.4
450-675	-	-	-	-	3.2	2.3	3.2	3.0
750-900	0.9	0.9	0.9	0.8	0.6	0.8	1.4	0.5
1050-1200	-	-	-	-	0.1	0.1	0.1	0.1
>1200	-	-	-	-	0.3	-	-	0.3
Total (km)	**7.1**	**7.2**	**7.7**	**6.9**	**8.6**	**9.2**	**10.8**	**8.5**

As shown in Table 16 above, the range of sewer length showing q/Q values greater than 0.85 is generally consistent across the four concept scenarios, with Concept 4 showing slightly lower numbers for the 2041 growth year than the other scenarios. However, for the 2051 Scenario, Concept 3 has noticeably higher totals than the other concepts which is attributed to higher levels of intensification.

In addition, it should be noted that due to the absence of new greenfield designated areas for residential purposes in Concept 3, this concept would require less wastewater linear infrastructure to extend servicing to new lands when compared to the other concepts.

5. 2031 SYSTEM OPPORTUNITIES AND CONSTRAINTS

A high level review of the opportunities for growth and constrained capacity based on the existing infrastructure and 2031 planned infrastructure (as identified through the 2017 Development Charges Update) was completed and included the following:

- Estimated available capacity within existing and planned infrastructure.

- Planned infrastructure as outlined in the 2011 Sustainable Halton Water & Wastewater Master Plan and 2017 Development Charges Update.
- Preliminary review of potential impacts of growth from 2031 to 2041/2051 with focus on future growth and expansion areas outlined by Hemson; and,
- Review of opportunities and constraints intended to inform the planning process and to compare planning options from a high-level servicing perspective.

5.1 Opportunities and Constraints

- Planned 2031 infrastructure focuses on providing servicing within new Greenfield Areas in north Oakville, Milton and Halton Hills (Georgetown).
- The location and scale of growth in Milton, Halton Hills 401 Corridor and South Georgetown has a direct impact on the capacity and size requirements of future water and wastewater infrastructure.
- Concepts with low or no new Designated Greenfield Areas (DGAs) beyond the 2031 time horizon require lower capital and operations / maintenance investment because of the limited need to extend servicing to new areas.
- Intensification will maximize use of existing infrastructure and provide opportunities for integration with state of good repair programs.
- Growth planned in the south portion of the lake based system will generally require less new infrastructure than similar growth planned further north. This is due to increased pumping and conveyance requirements when moving water north to supply upper pressure zones and, conversely, collecting and conveying wastewater from north to south for treatment.
- It is recognized that growth in Burlington offers opportunities to maximize use of available capacity in the west water system, but at the same time creates deficiencies at the wastewater plant that will need to be addressed.

5.1.1 Water

Table 17 below is separated by treatment plant service area and summarizes the review of the treatment, trunk conveyance, storage and trunk pumping opportunities and constraints within the water system out to 2041/2051.

5.1.2 Wastewater

Table 18 below is separated by treatment plant service area and summarizes the review of the treatment, trunk conveyance and trunk pumping opportunities and constraints within the wastewater system out to 2041/2051.

Table 17. Water Opportunities and Constraints

Area	Treatment	Conveyance	Storage	Pumping
Acton (Groundwater – A9G)	• Adequate supply from existing wells to service growth to 2051 • No significant growth within Acton from 2031 to 2051	• DC conveyance upgrade project identified • Planned expansion area is limited; adequate conveyance capacity throughout Acton	• Adequate existing storage to meet 2051 needs	• Adequate existing well pumping to supply 2051 needs within Acton's single Pressure Zone A9G
Georgetown (Groundwater – G6G, G7G)	• Adequate supply from existing wells to service 2051; lake based peel-off area reduces demand from G6G and further supports intensification growth within downtown Georgetown	• Overall, adequate trunk conveyance capacity for groundwater based service area	• Todd Rd Tower storage to support intensification within G6G • Adequate existing G6G storage to meet 2051 needs	• Adequate existing well pumping to supply 2051 groundwater needs within G6G and G7G
Milton (Groundwater – M5G)	• M5G demands approaching capacity by 2031 • Milton groundwater system does not have sufficient capacity to supply the projected water demands in the service area to 2051	• Minor conveyance upgrades to support intensification within downtown Milton M5G	• Adequate existing storage to meet 2051 needs	• Adequate existing pumping to meet 2051 needs
Georgetown (Lake Based – G6L)	• The lake based water system has sufficient capacity to support growth to 2041. However, the projected demands of the lake based water system reach the 90% of the combined rated capacity of the plants triggering an additional capacity expansion in the system to service growth to 2051 • Expansion to Burloak WTP required in order to support overall lake based growth and new Georgetown G6L lake based service area	• Adequate Lake based trunk conveyance to G6L from Trafalgar trunk – twin 900 mm mains • Servicing of North Oakville, Milton and Georgetown relies heavily on 16 Mile Creek Crossings (Dundas, Upper Middle, Rebecca) • Distribution watermains to be sized to support projected growth in areas south and west of Georgetown	• New 22nd Sideroad Reservoir identified in DC to service G6L to 2031; expansion required for growth beyond 2031	• G6L pumping station to be constructed at Zone 250m reservoir; capacity increase may be required to supply 2051 G6L needs. • Growth varies significantly between Concepts 1 and 4 leading to significant variance of the capacity increases required for 2051.
Milton (Lake Based – Zone TWL 267m, 250m)	• Expansion to Burloak WTP required in order to support overall lake based growth	• There are two spines to convey water to M5L (Kitchen route (direct to M5L) and Neyagawa route (via TWL 250)). • However, after the pressure zone boundary re-alignment, there will only be one path for water to reach TWL 250. • Servicing of North Oakville, Milton and Georgetown relies heavily on 16 Mile Creek Crossings (Dundas, Upper Middle, Rebecca)	• M5L in ground storage adequate to supply growth to 2051 • New Zone 250m reservoir will support significant growth; expansion will be required for growth beyond 2031	• Zone 250m: largest area and largest growth area fed by single station (Neyagawa), which would require expansion to meet growth to 2041 & 2051; redundancy may be required for long term • Zone 267m (M5L): supplied by Kitchen plus Neyagawa (via Zone 5 BPS)
Burlington & Oakville (Lake Based – B1, B2, B3, B4, B5, O1, O2, O2A, O2B, O3, TWL 211m, TWL 223.5m, TWL 250m)	• Expansion to Burloak WTP required in order to support overall lake based growth	• Increased trunk conveyance with recent/underway projects (Burloak, Kitchen) • Servicing of North Oakville, Milton and Georgetown relies heavily on 16 Mile Creek Crossings (Dundas, Upper Middle, Rebecca) • Challenges in transferring available capacity on the west side across to the east.	• Northwest Burlington study underway to review system operation and opportunities for improvement • In general, adequate storage to support growth in Burlington and Oakville to 2031; further review of storage needs will be required depending on Preferred Growth Scenario. Oakville Zone 2 demonstrates a marginal	• Zone 3/4/5 pressure boundary re-alignment will require modification of Pumping stations (currently underway) • In general, adequate pumping to support growth in Burlington and Oakville to 2031; further review of 2031-2051 intensification needs will be required depending on Preferred Growth Scenario

			storage deficiency that is consistent across all concepts.	• Davis PS capacity constraints to support Oakville UGC • Kitchen O3 PS capacity constraint in 2051 scenarios due to increases in Neyagawa

Table 18. Wastewater Opportunities and Constraints

Area	Treatment	Conveyance	Pumping
Acton WWTP	• Upgrade from 4.5 megalitres per day to 5.6 megalitres per day at Acton WWTP adequate for 2051 growth • No significant growth within Acton from 2031 to 2051	• Black Creek Trunk sewer upgrade identified; capacity constraints within 2031 growth (addressed in the current capital program to 2031). • Maple Leaf Lands servicing constrained due to conveyance needs, however no major growth identified	• Agnes WWPS upgrade/relocation required due to capacity constraints within 2031 growth (addressed in the current capital program to 2031).
Georgetown (Georgetown WWTP) (Mid-Halton WWTP – peel-off area)	• South Georgetown wastewater peel off strategy (flow diverted to Mid-Halton) frees up capacity at Georgetown WWTP to support intensification growth	• Georgetown WW strategy to consider new growth areas south and west of Georgetown • Opportunity to utilize 8th Line Trunk /Trafalgar Trunk sewer to service projected growth to 2051 • Second Trunk may be triggered (9th Line or 10th Line) • New sewers will be required to extend servicing to new areas and support growth to 2051 (e.g. west of Trafalgar Road and north of No. 10 Side Road) required to service Georgetown South growth	• Main St WWPS / Silver Creek Trunk sewer flow split and optimization may be required • Most WWPSs have adequate capacity to support proposed 2051 growth
Milton (Mid-Halton WWTP)	• Milton WWTP decommissioned, flow pumped to Mid-Halton • All new growth within Milton planned to flow to Mid-Halton; which requires upgrades to service 2041 and 2051 growth in the drainage area	• DC projects (i.e., current capital program to 2031) will, generally, provide adequate capacity to service growth to 2041 • Increase in Eighth Line/Trafalgar Trunk sewer capacity required north of Steeles Avenue to support 2051 growth in Georgetown (Concepts 1 and 2) • Increase in Trafalgar Trunk capacity required south of Steeles Avenue to support 2051 growth in Georgetown (Concepts 1, 2 and 4) • Increase in Fifth Line / Lower Base Line trunk sewer capacity required to support 2051 growth (All Concepts) • Increase in capacity for trunk sewers upstream of Tremaine South WWPS to support 2051 growth (All Concepts) • Various new sewers will be required to extend servicing to new areas and support growth to 2051 (e.g. east of Trafalgar Road and north of No. 5 Side Road, west of Fourth Line and north of Lower Base Line, east of Fifth Line and north of Lower Base Line West, east of Trafalgar Road and south of Britannia Road East).	• Proposed Britannia/Trafalgar WWPS – capacity increase required for 2051 growth • Proposed Lower Baseline WWPS – capacity increase required for 2041 and 2051 – significant constructability constraints have been identified for the proposed Forcemain, including the crossing of Sixteen Mile Creek • Tremaine WWPS will have adequate capacity to support 2041 growth but will require additional capacity to support 2051 growth
Oakville (Mid-Halton WWTP)	• Georgetown and Milton transfers as well as 2031-2051 growth result in Mid-Halton WWTP upgrade trigger of >225 megalitres per day	• Proposed North Oakville trunk sewers planned for buildout of service area • Existing Trunk conveyance to Mid-Halton adequate to 2051	• North WWPS – constraints due to added flow from Milton WWTP and Georgetown WWTP (addressed through the current capital program to 2031) . The WWPS will require additional capacity beyond planned 2031 capacity to support growth to 2051.
Oakville (SE WWTP)	• Oakville SE WWTP – adequate capacity for growth to 2051	• Adequate trunk conveyance capacity to 2051	• 9th Line WWPS - capacity constraints prior to 2031. There is an ongoing upgrade project at 9th Line WWPS to resolve this issue. The WWPS will require additional capacity beyond planned 2031 capacity to support growth to 2051.

Oakville (SW WWTP)	• Oakville SW WWTP – constraints identified, and capacity upgrade triggered by 2041	• Adequate trunk conveyance capacity to 2051	• Mainly local WWPS – modelling and further detailed review required
Burlington (Skyway WWTP)	• Skyway WWTP – adequate capacity for growth to 2041. Capacity upgrade or flow diversion solution required for growth beyond 2041	• Subtrunk upgrades may be triggered by increased intensification along Fairview corridor and Plains Rd corridor	• Smaller local WWPS along Lakeshore – modelling and further detailed review required

6. SUMMARY OF KEY FINDINGS AND CONCLUSIONS

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

Water Treatment

The water treatment plant demand projections analysis shows that there are no major differences among the four growth concepts. The following observations were noted for all concepts:

- The lake based water system (as of 2031) will have sufficient capacity to support growth to 2041. However, additional capacity will be required to support growth to 2051 in all concepts.
- Acton and Georgetown groundwater systems have sufficient capacity to service the projected demands to 2051.
- Milton groundwater system does not have sufficient capacity to supply the projected water demands in the service area to 2041 and beyond.

Water Storage

- The deficiencies identified occur in common infrastructure across all concepts and only vary in magnitude. For the most part Concept 3 had the smallest deficiencies.
- Water storage requirements were identified for Zone G6L, Zone 250 and Zone O2 consistent with projected growth located in areas such as North Oakville, Milton, Halton Hills 401 corridor and Georgetown.

Water Pumping

- Water pumping requirements were largely consistent across the four concepts and were identified for Zone G6L, Zone 250, Zone O3 and Zone O2.
- Concept 3 shows the smallest pumping deficiencies due to reduced transfer north through Kitchen, Neyagawa and Zone 6 PS.

Water Network

- The range of pipes length showing headlosses between 2-5 m/km and greater than 5m/km is generally consistent across the four concept scenarios. However, Concept 3 has noticeably lower pipe length totals than the other concepts in 2051 .

Wastewater Treatment

The wastewater treatment plant flow projections analysis shows that there are no major differences among the four growth concepts. The following observations were noted for all concepts:

- The lake base wastewater system (as of 2031) will have sufficient capacity to support growth to 2041 except for the Oakville SW Wastewater Treatment Plant (WWTP).
- Projected flows to 2051 identify the need for a capacity expansion (or other measures to reduce/manage flows) at the Mid-Halton, Skyway and Oakville SW wastewater treatment plants.

Wastewater Pumping

- Wastewater pumping requirements were largely consistent across the four concepts and were identified for North WWPS and Ninth Line WWPS.
- Analysis of the proposed/planned WWPS shows that Trafalgar/Drumquin, Lower Base Line and Tremaine South WWPS would require adjustments to the planned station capacities.
- Concept 3 shows the smallest pumping requirements for most of the pumping stations identified.

Wastewater Network

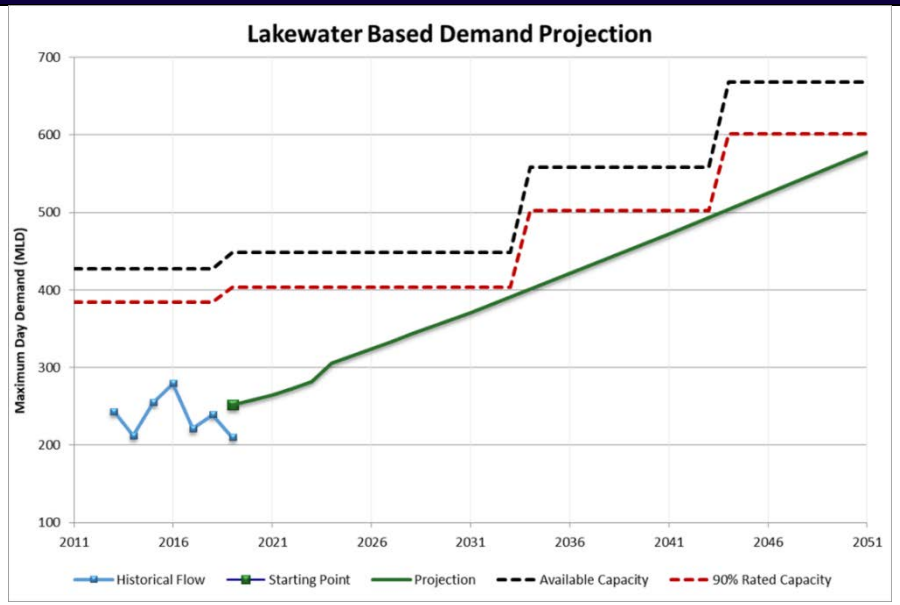
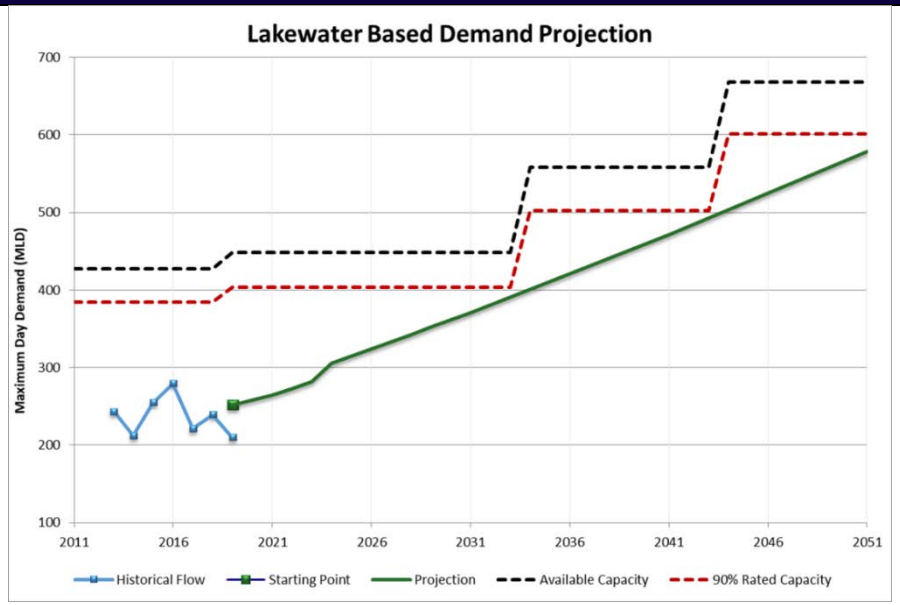
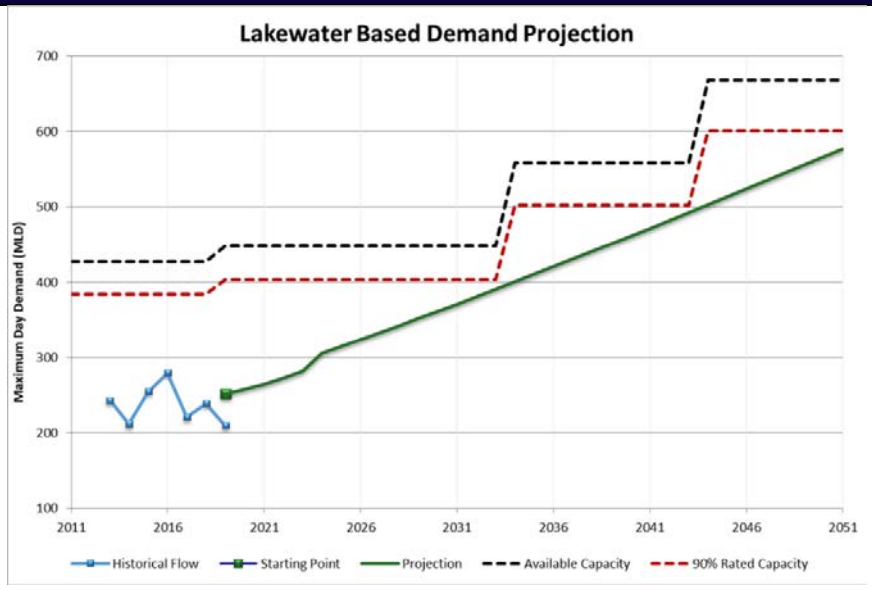
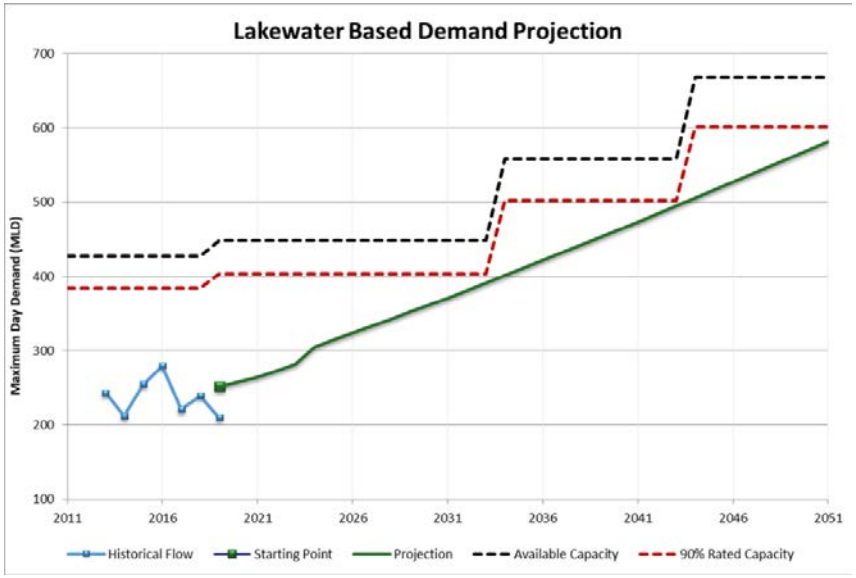
- The range of sewer length showing q/Q values greater than 0.85 is generally consistent across the four concepts. However, Concept 3 has noticeably higher totals than the other concepts.

In general, deficiencies identified for the water and wastewater systems occur in common locations across all concepts and only vary in overall magnitude. i.e. no concept has unique, specific deficiencies that aren't seen in other concepts.

However, it is recognized that due to the location of growth and the absence of new residential designated greenfield areas beyond the 2031 time horizon in Concept 3, this concept shows less requirements for storage, pumping and linear infrastructure when compared to the other concepts.

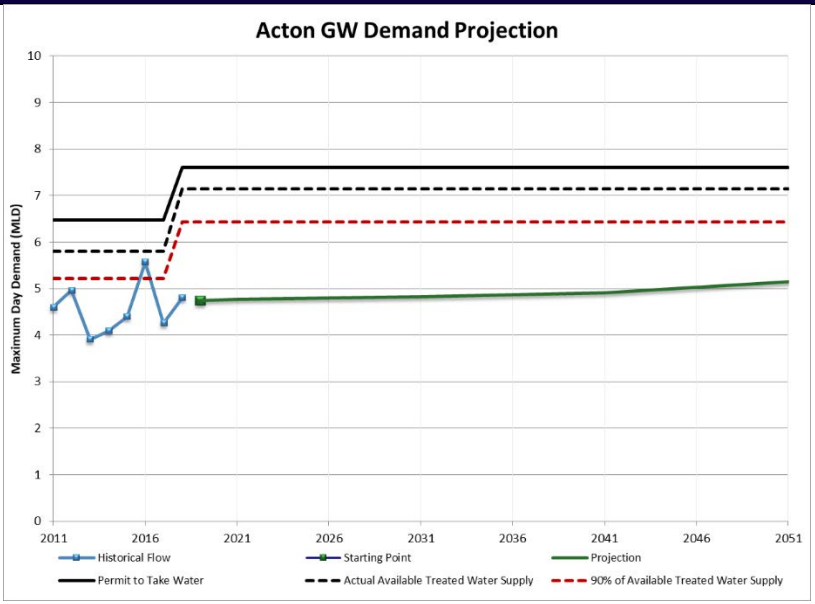
APPENDIX A:
WATER DEMAND PROJECTIONS

Lake based water

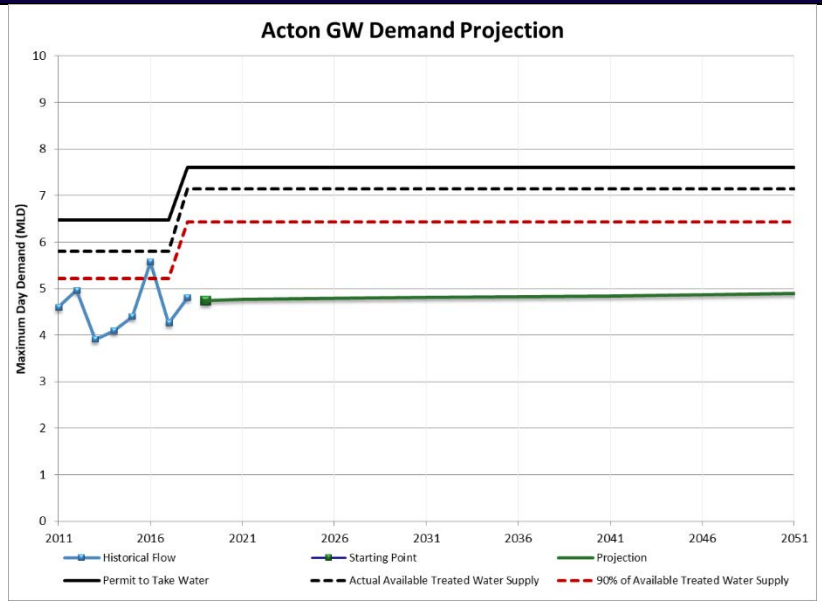
Scenario 1	Scenario 2
	
Scenario 3	**Scenario 4**
	

Acton Groundwater

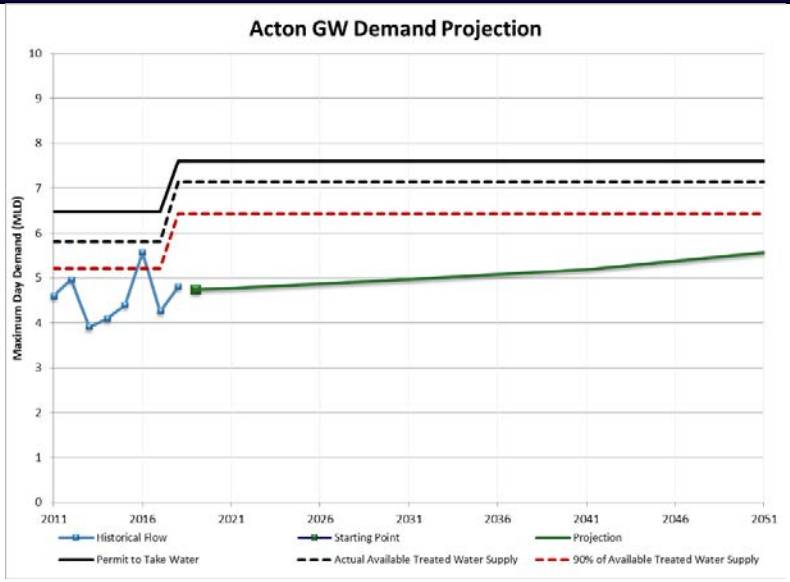
Scenario 1



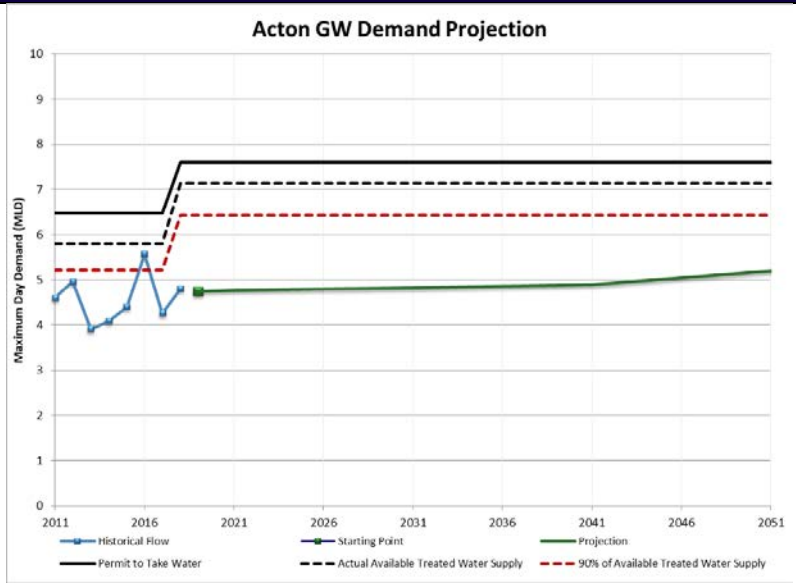
Scenario 2



Scenario 3

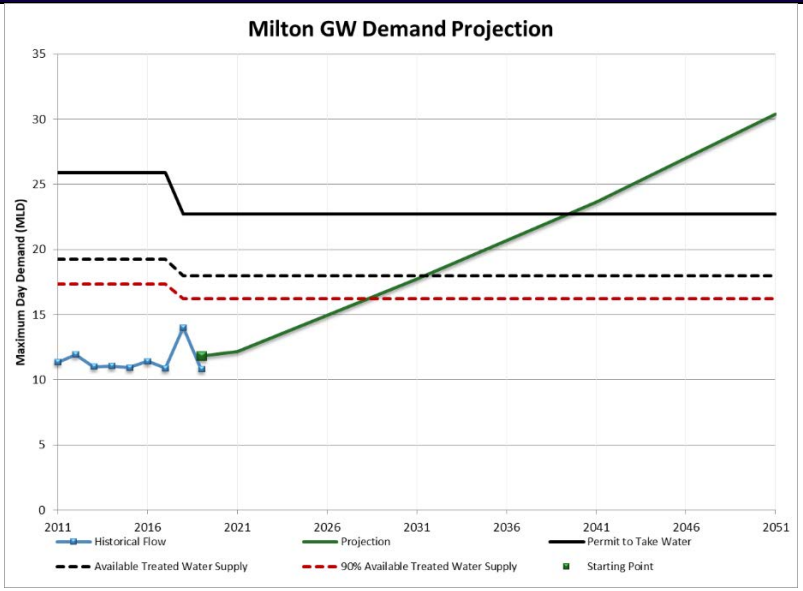


Scenario 4

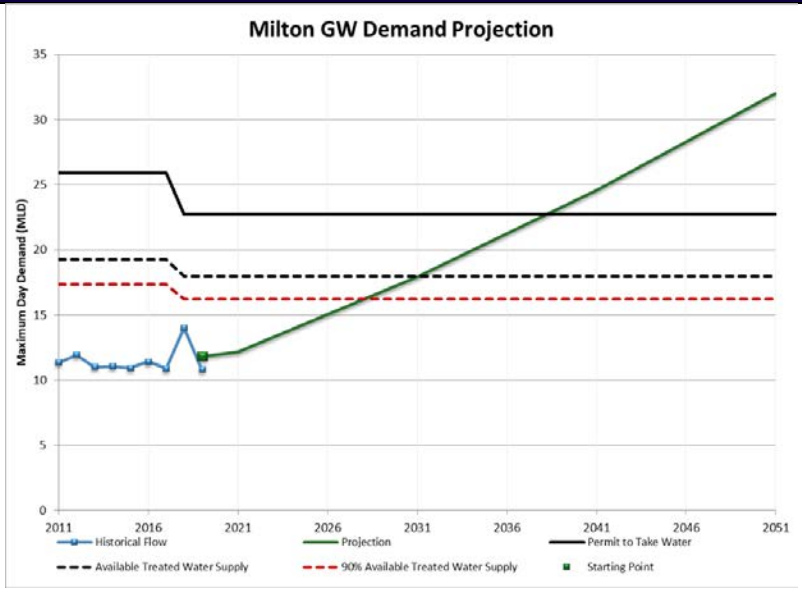


Milton Groundwater

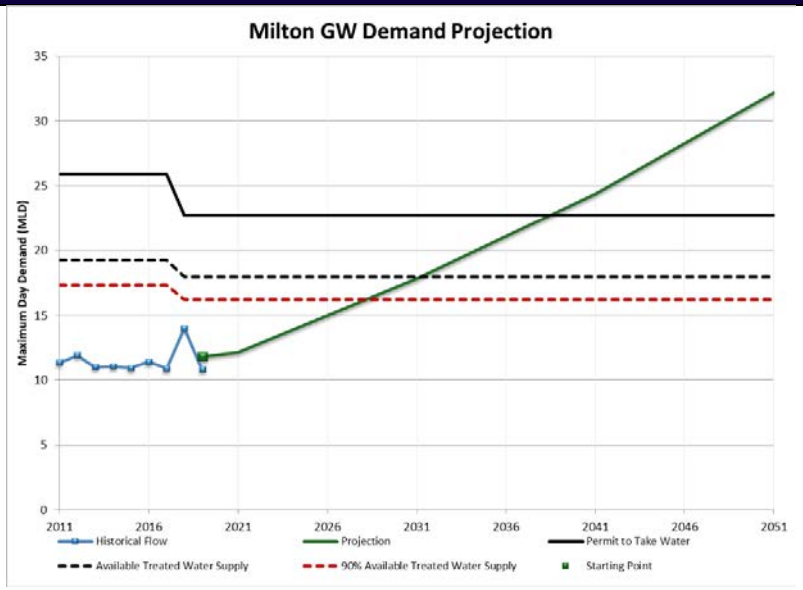
Scenario 1



Scenario 2



Scenario 3



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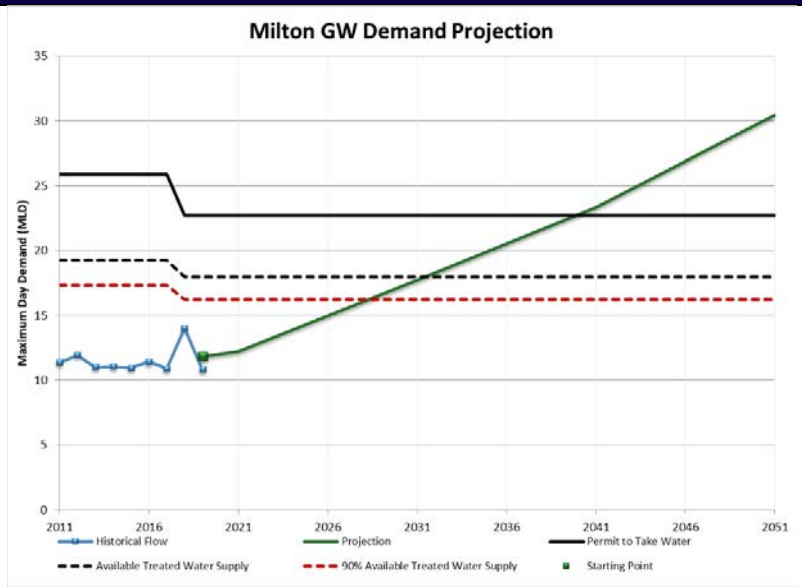
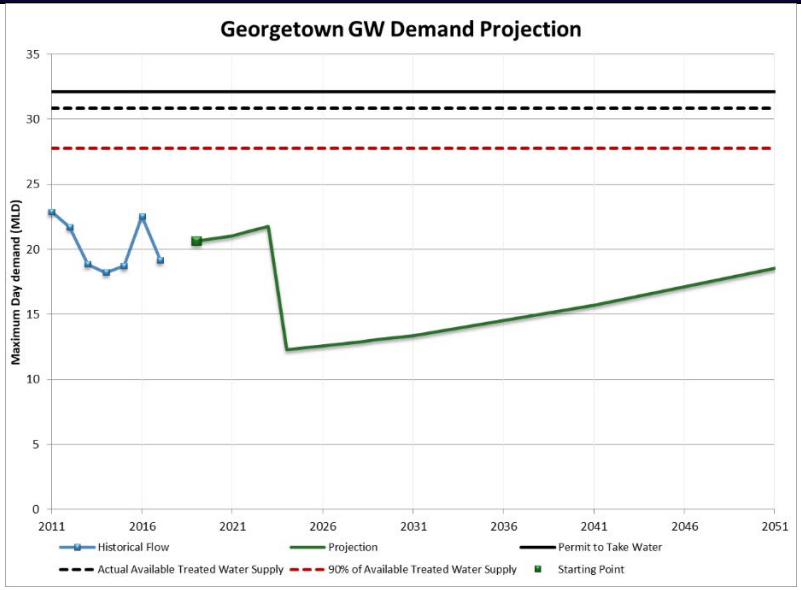


Georgetown Groundwater

Scenario 1



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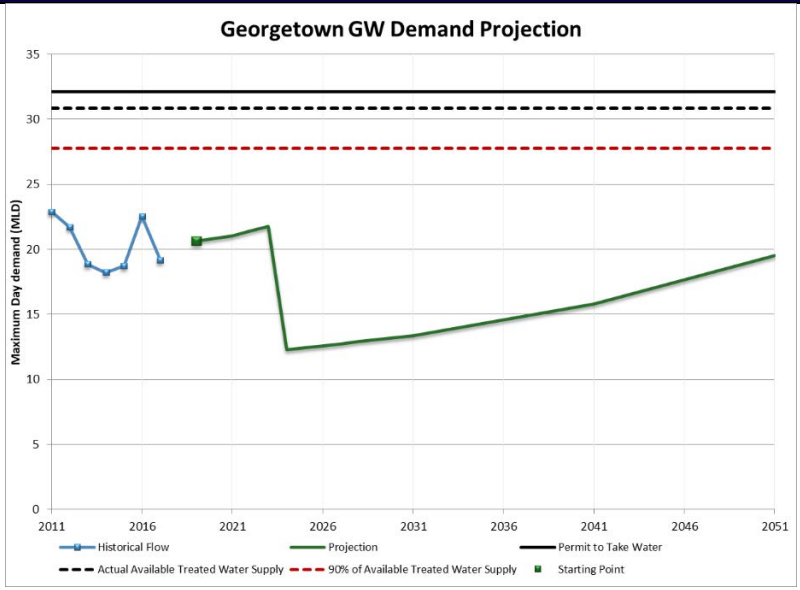

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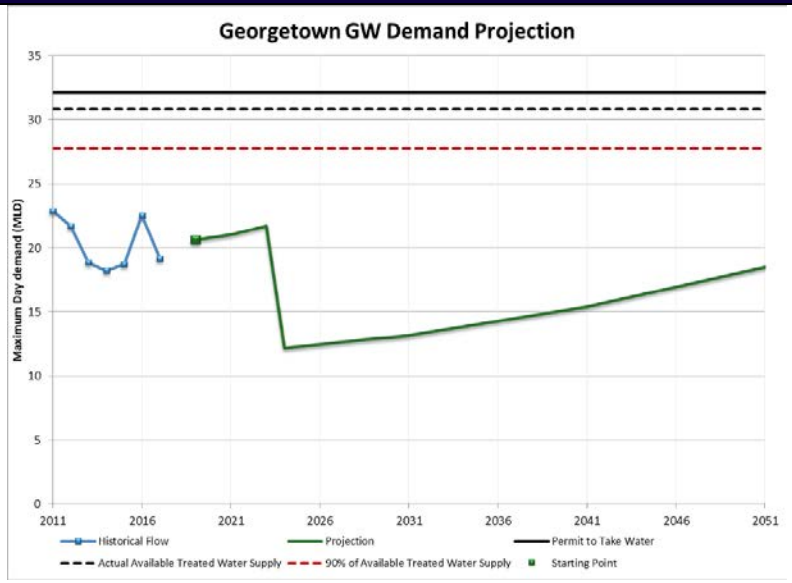

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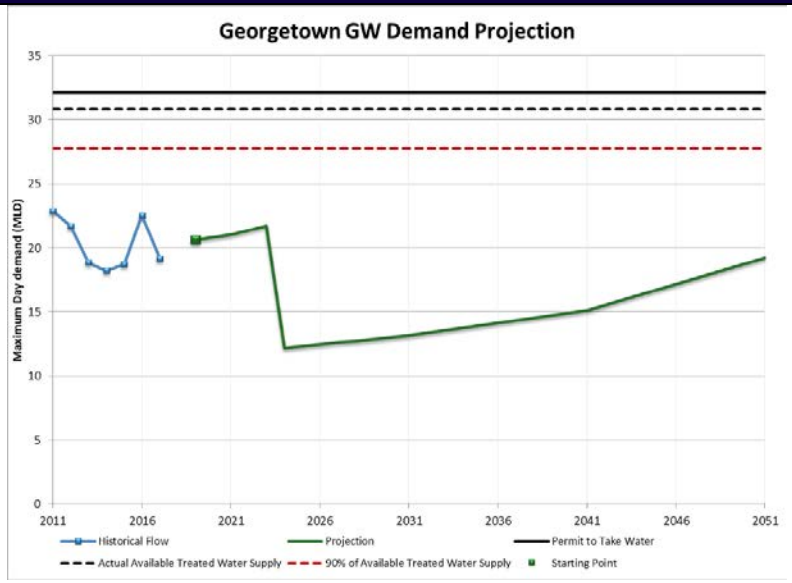
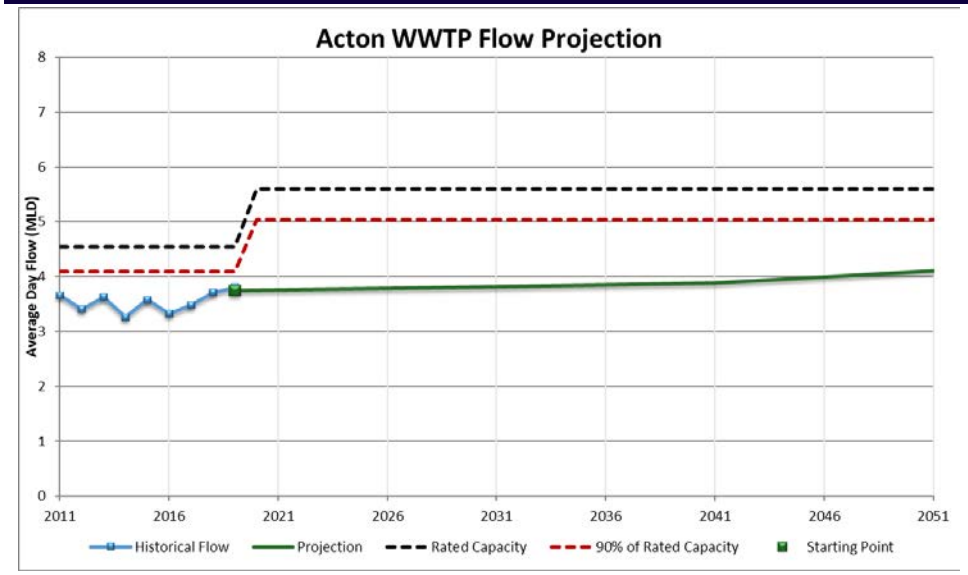


APPENDIX B:
WASTEWATER FLOW PROJECTIONS

Acton WWTP

Scenario 1



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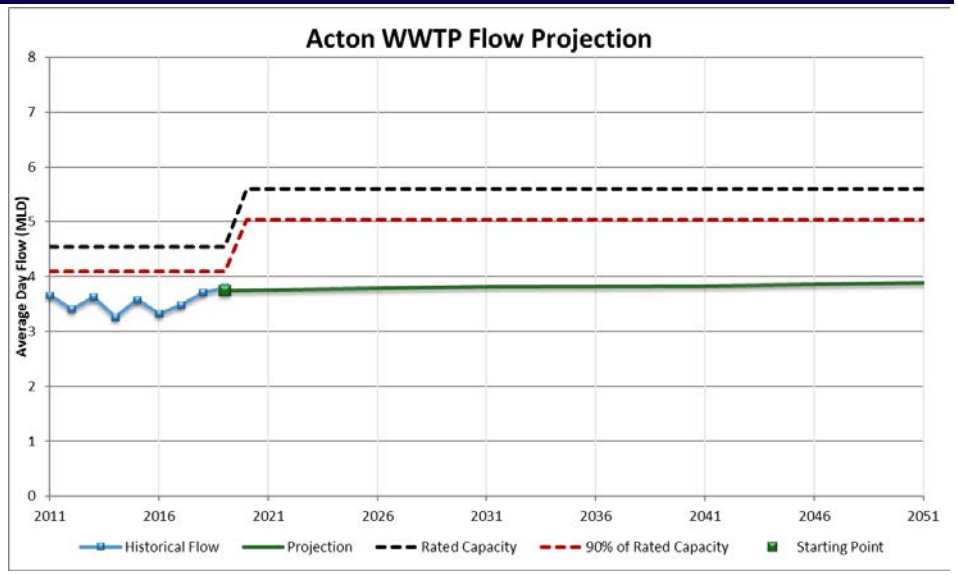

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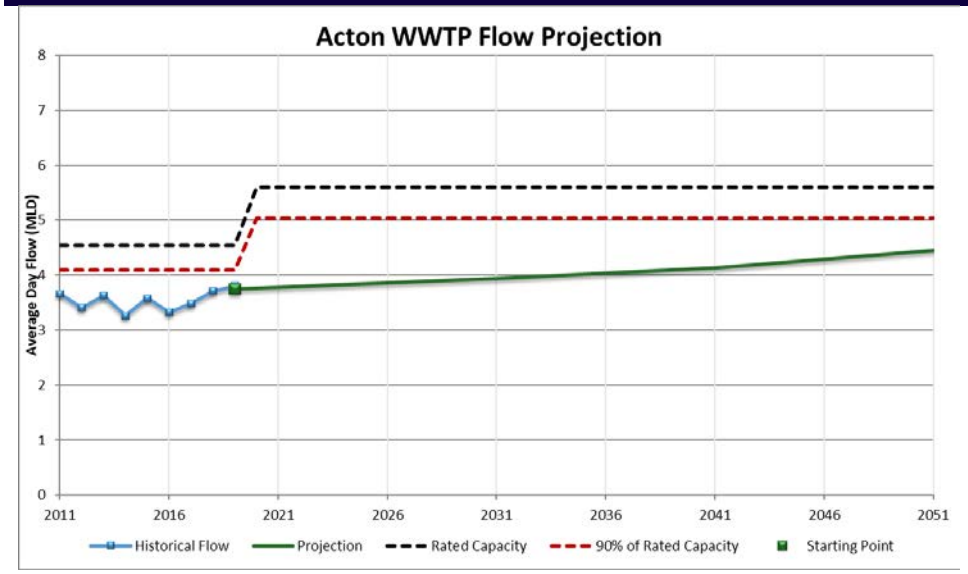

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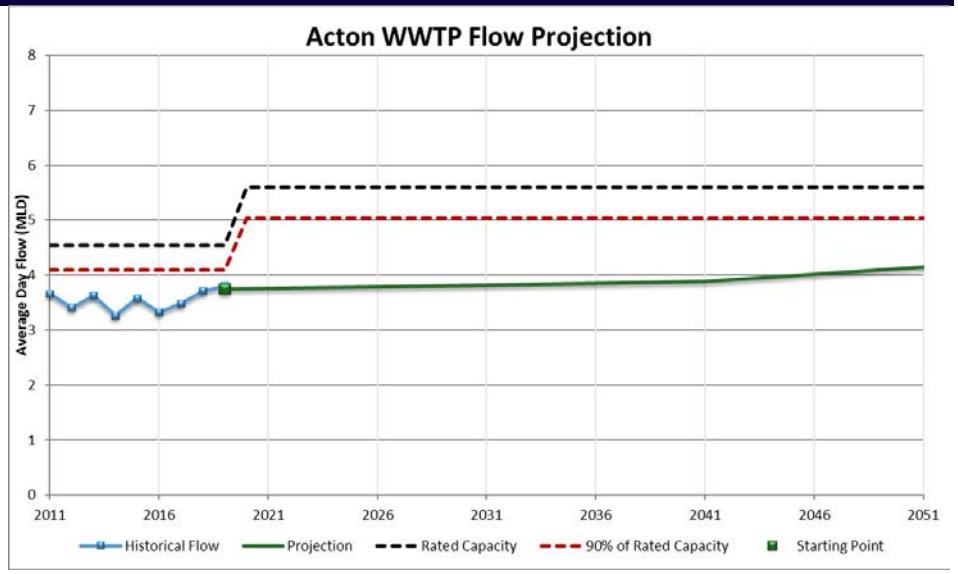
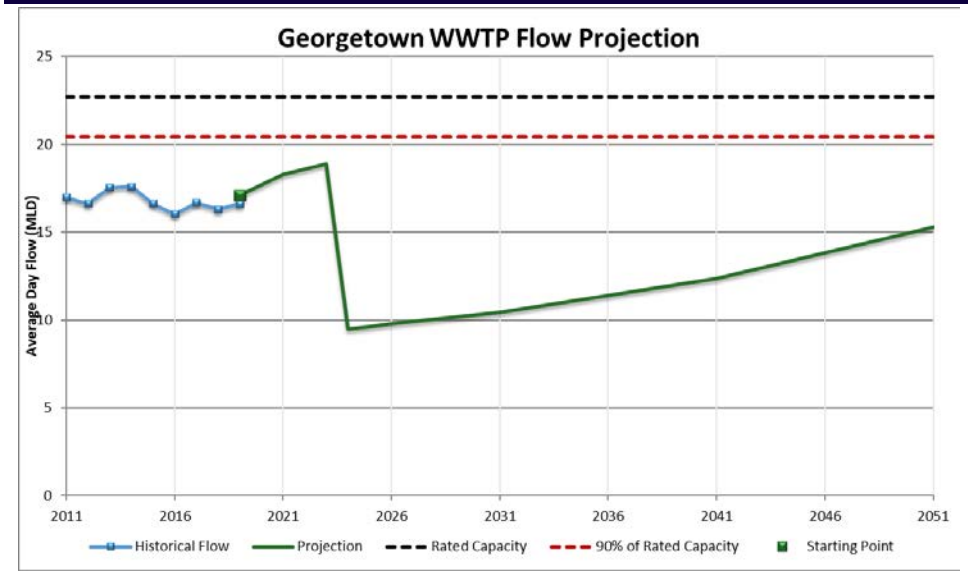


Georgetown WWTP

Scenario 1



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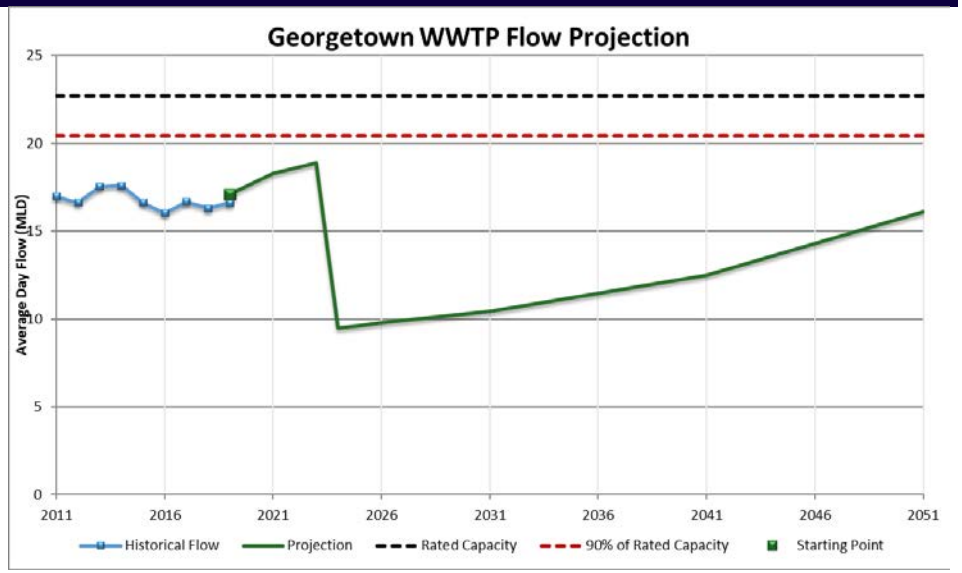

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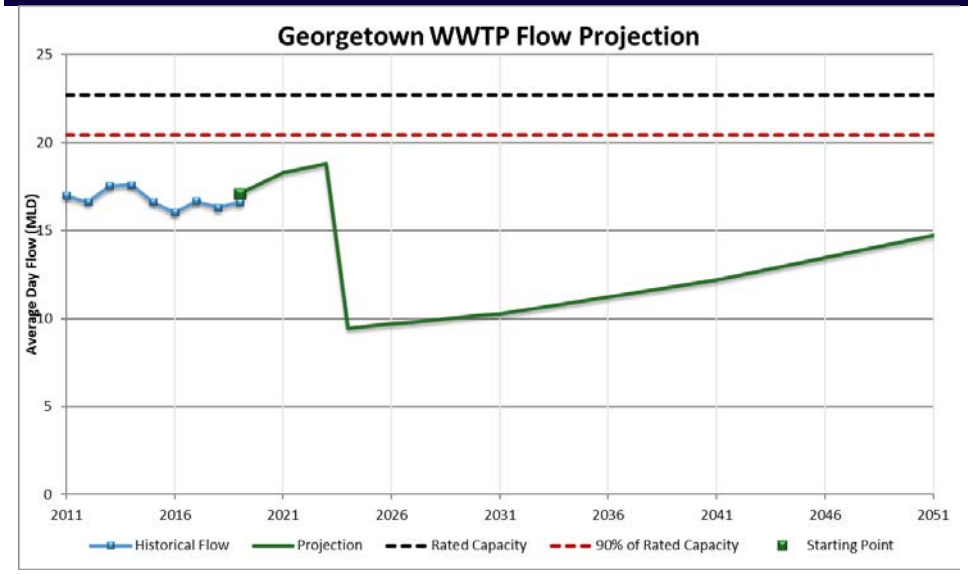

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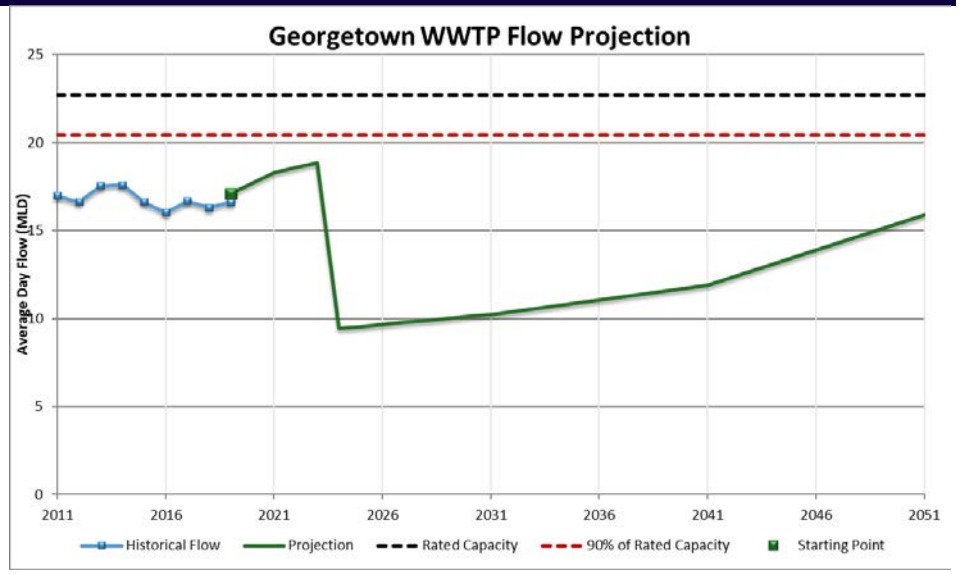
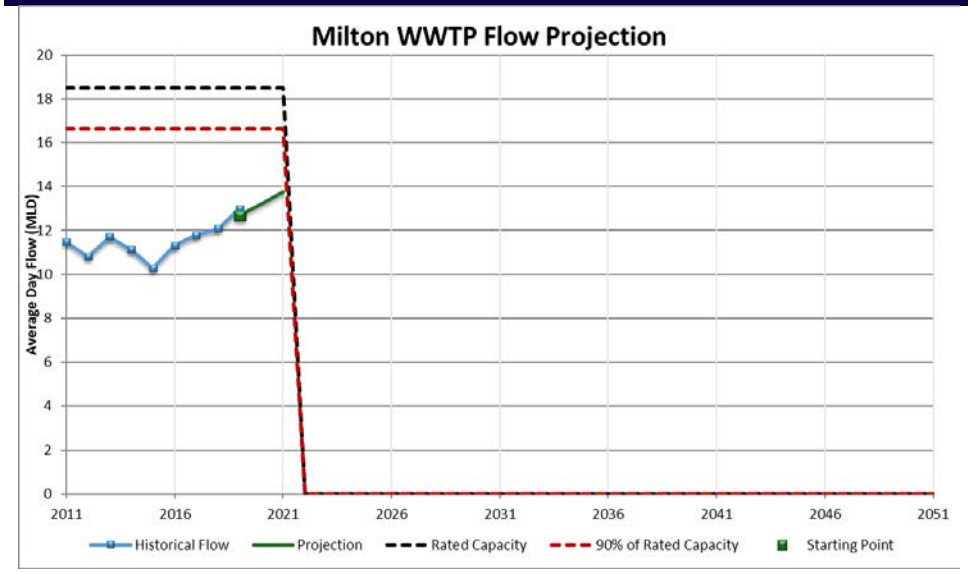


Milton WWTP

Scenario 1



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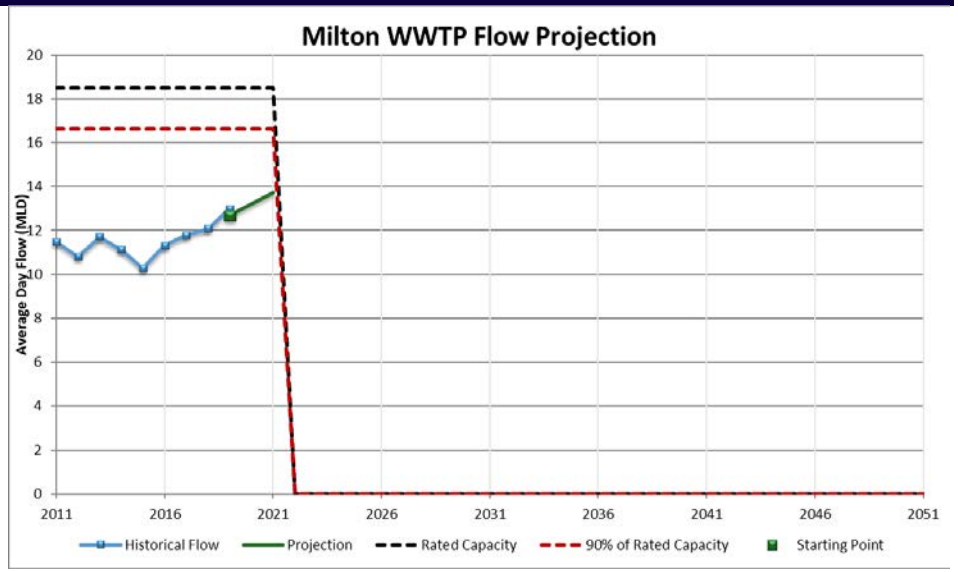

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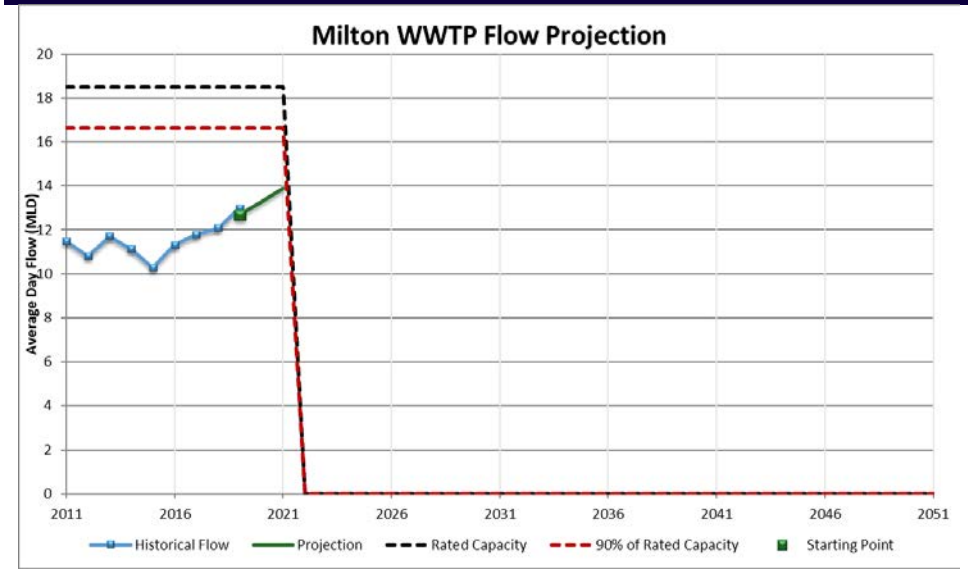

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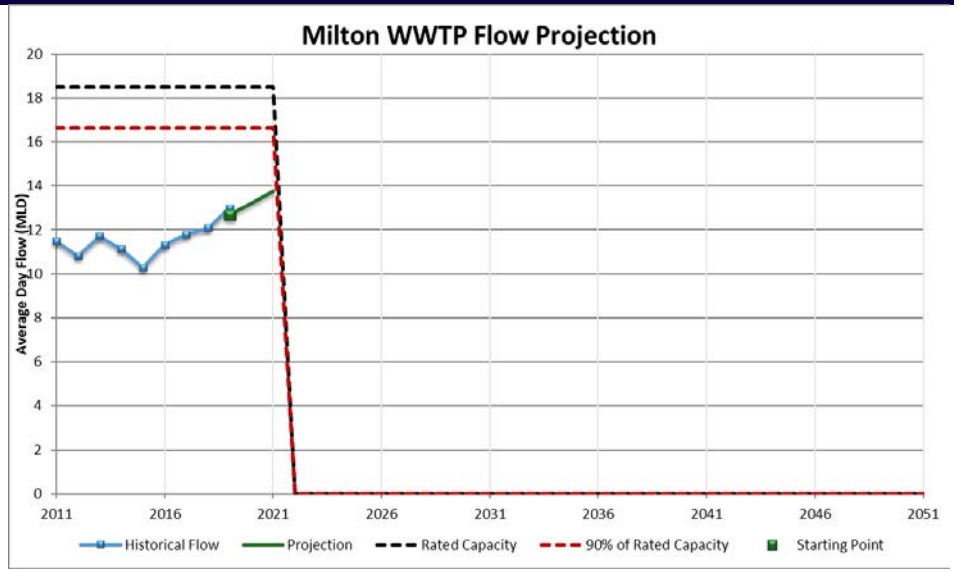
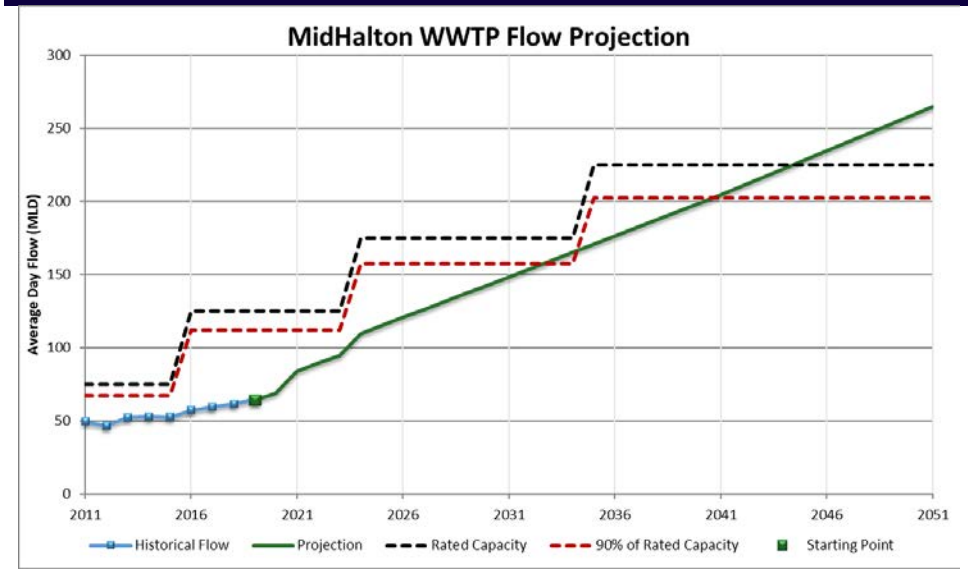


Mid-Halton WWTP

Scenario 1



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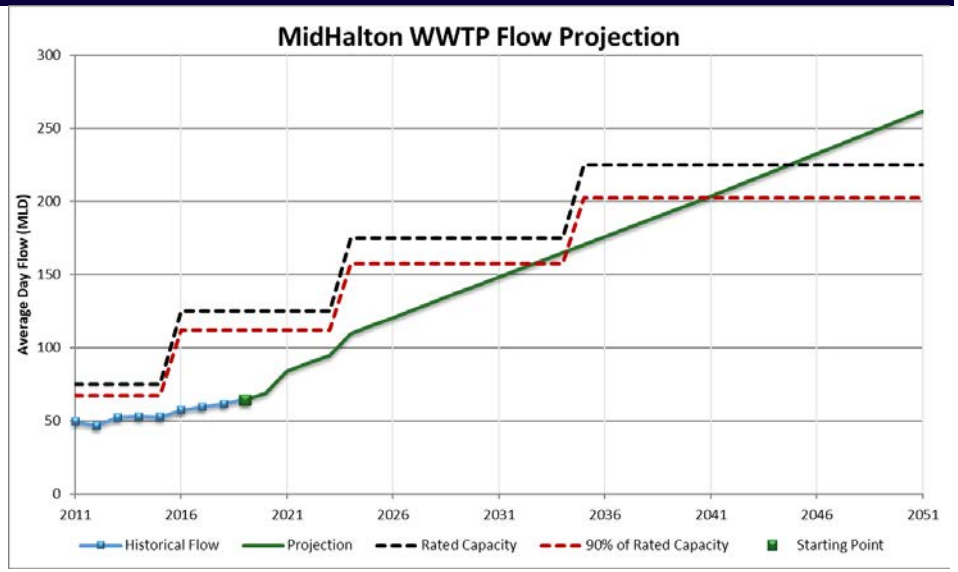

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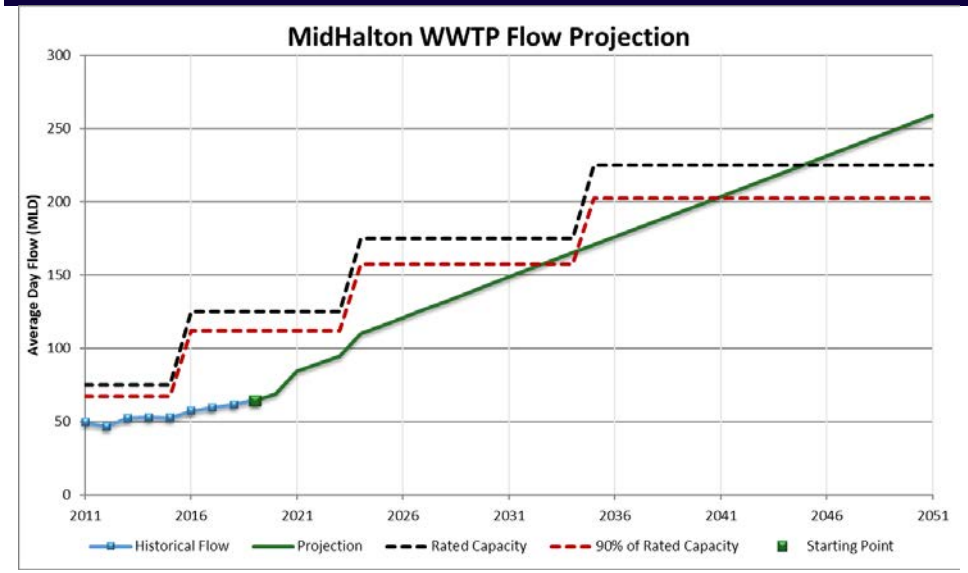

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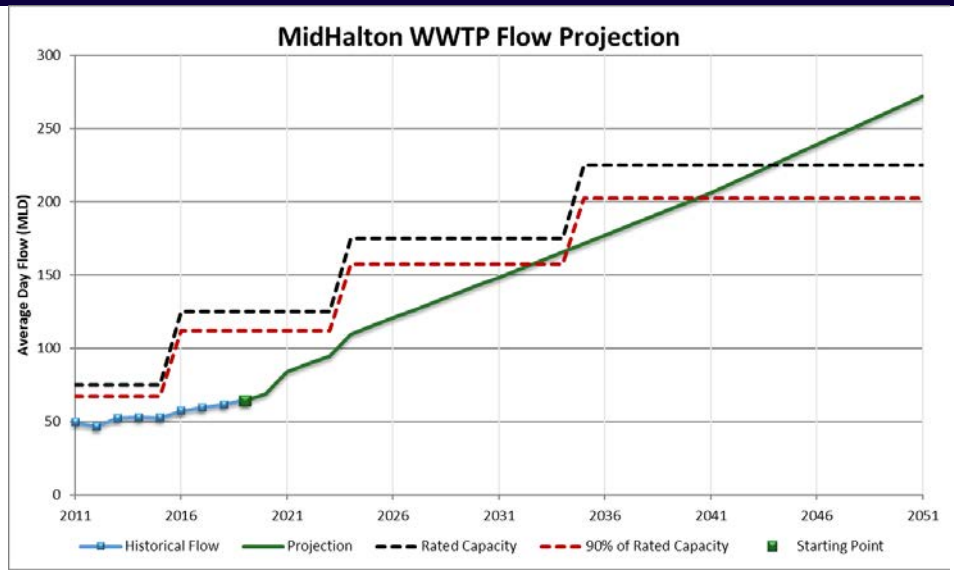

Oakville SE WWTP

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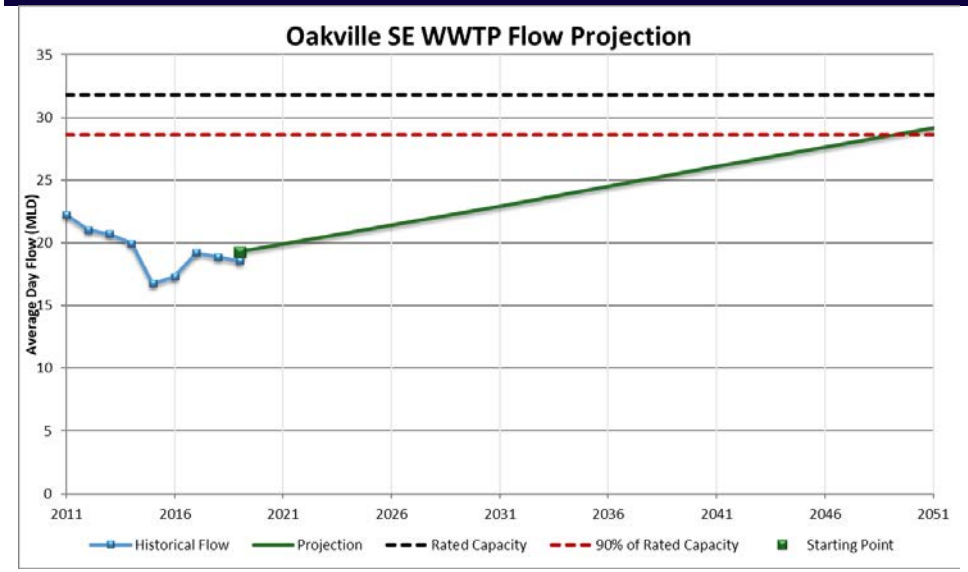

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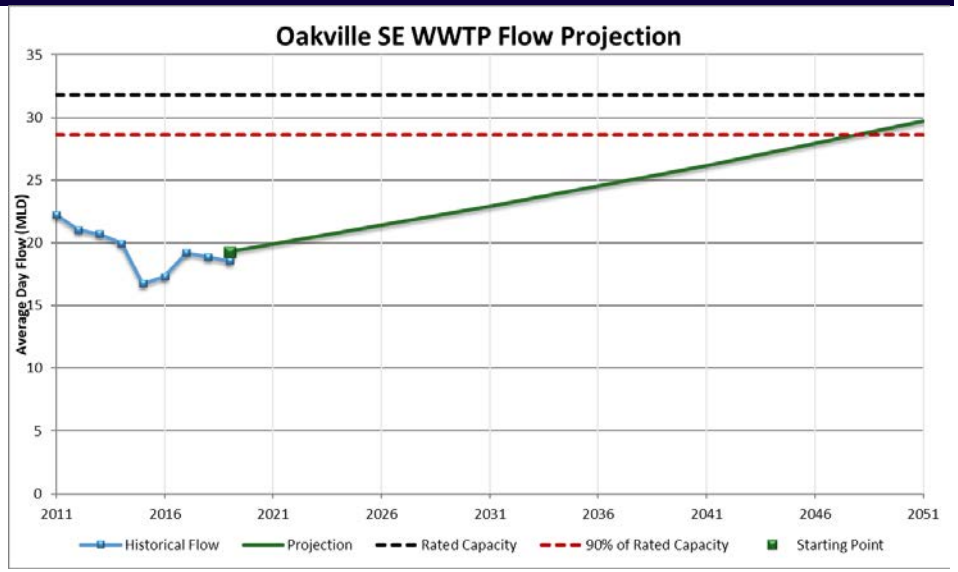

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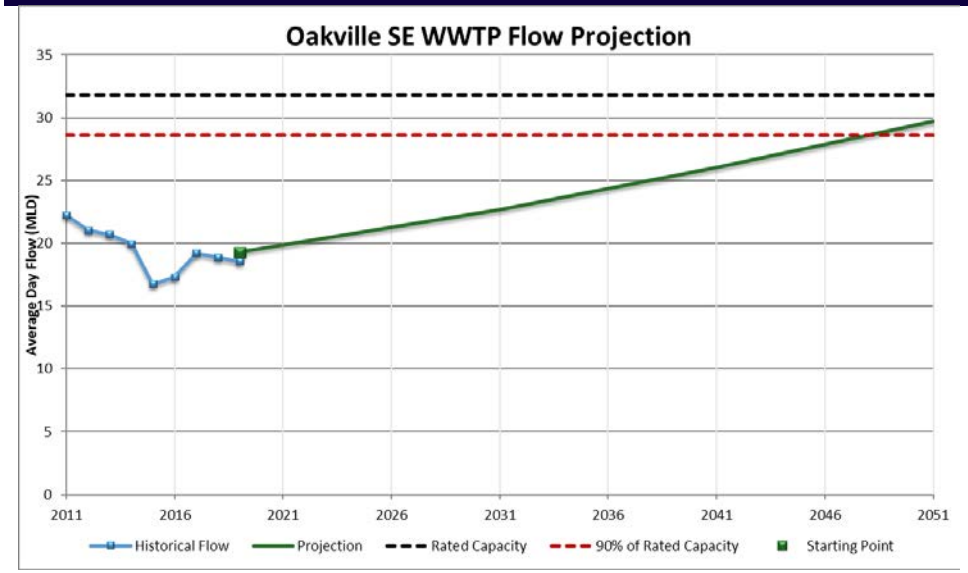

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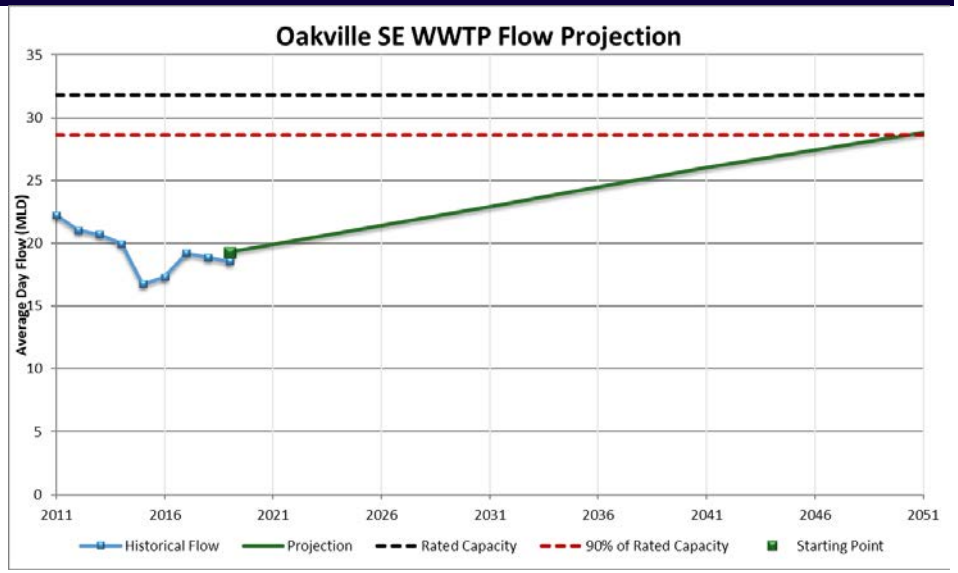

Oakville SW WWTP

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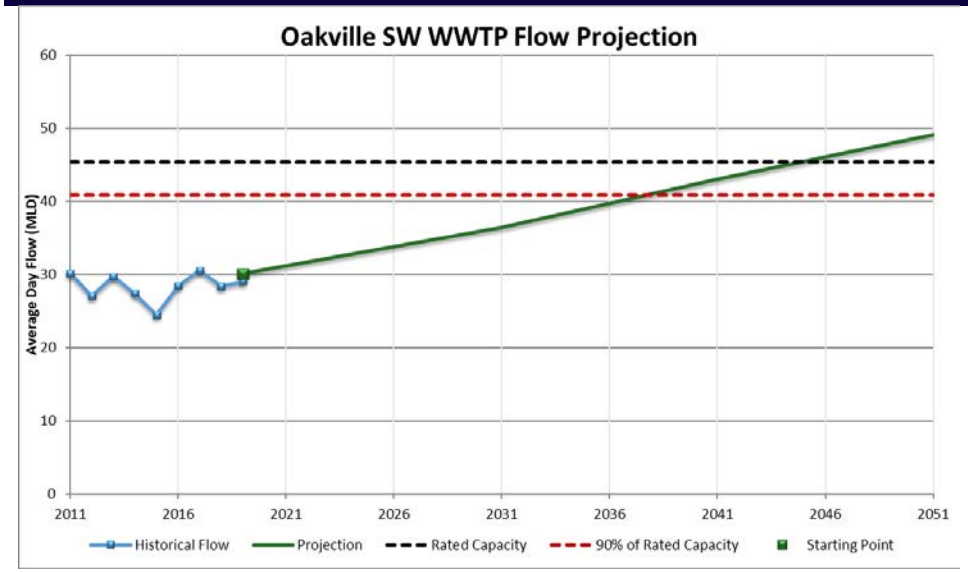

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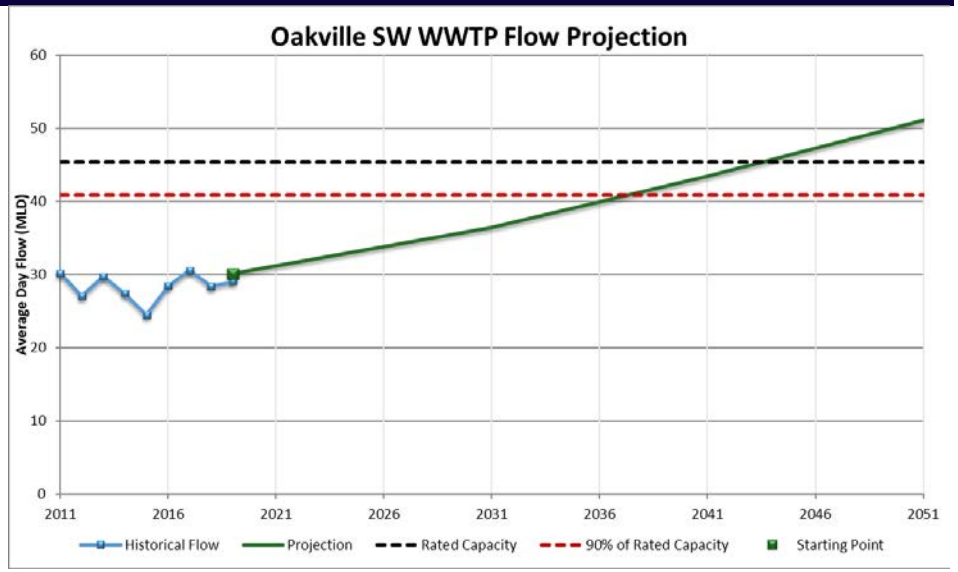

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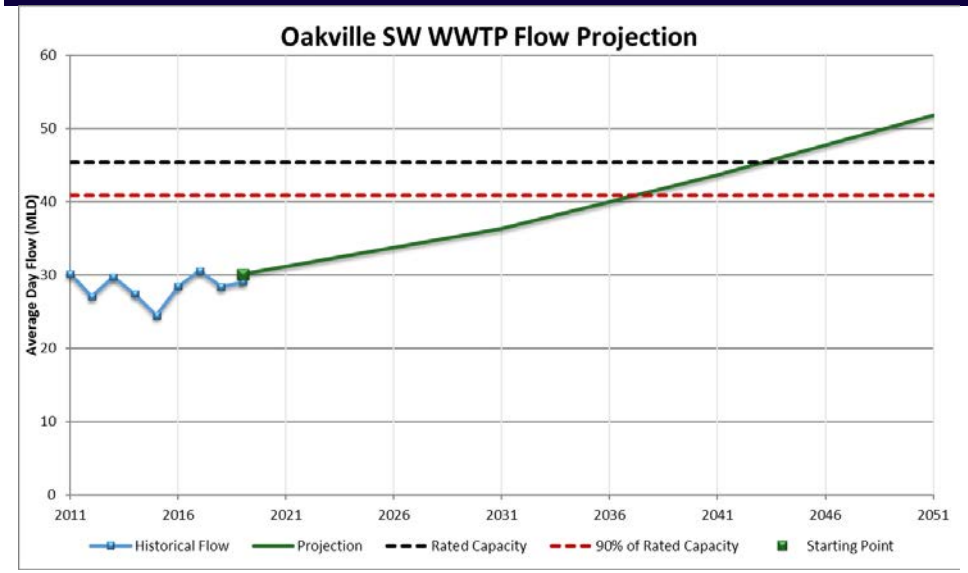

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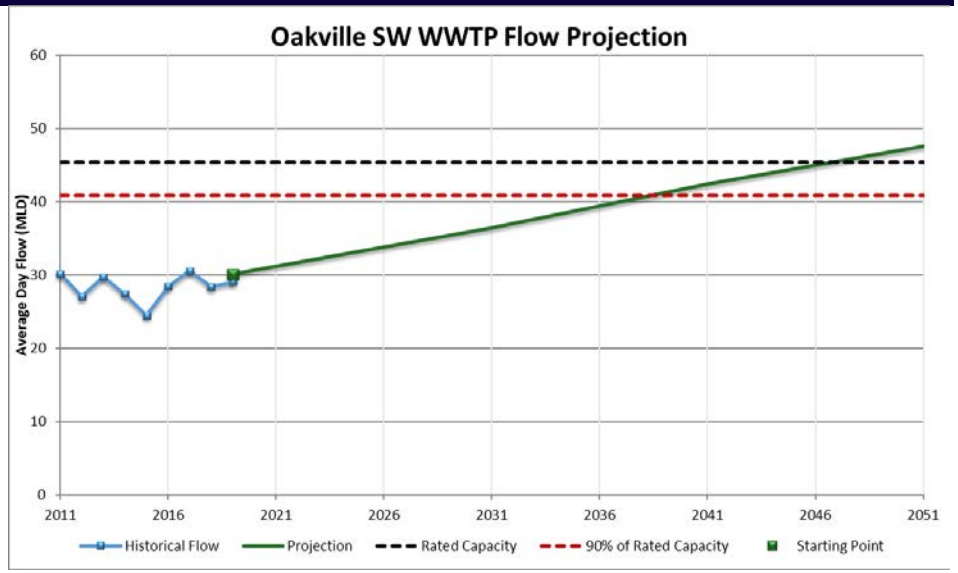
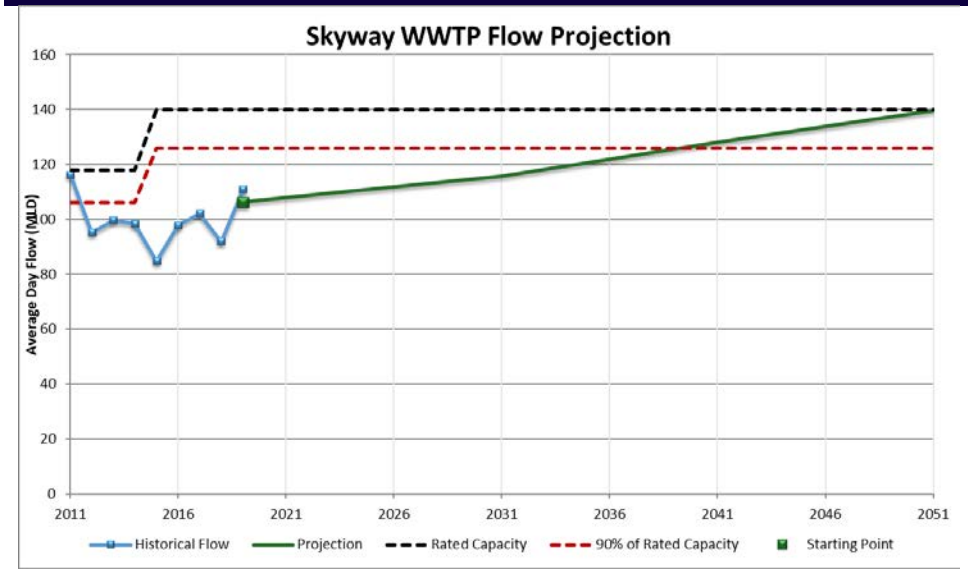


Skyway WWTP

Scenario 1



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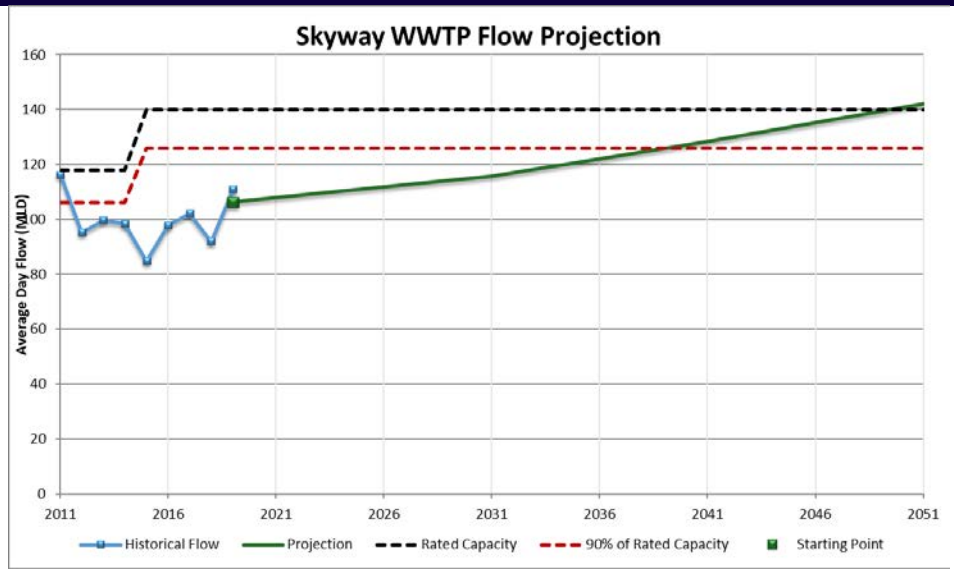

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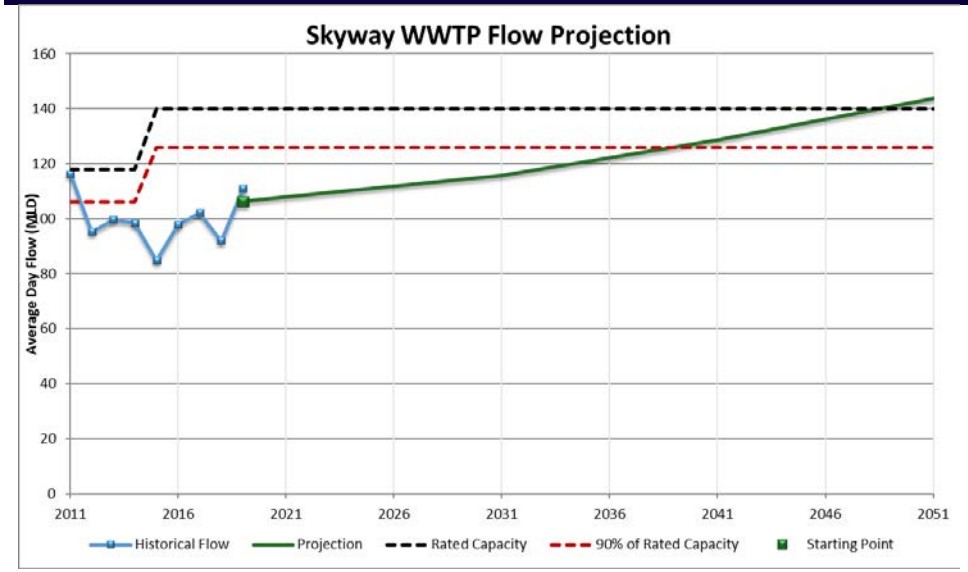

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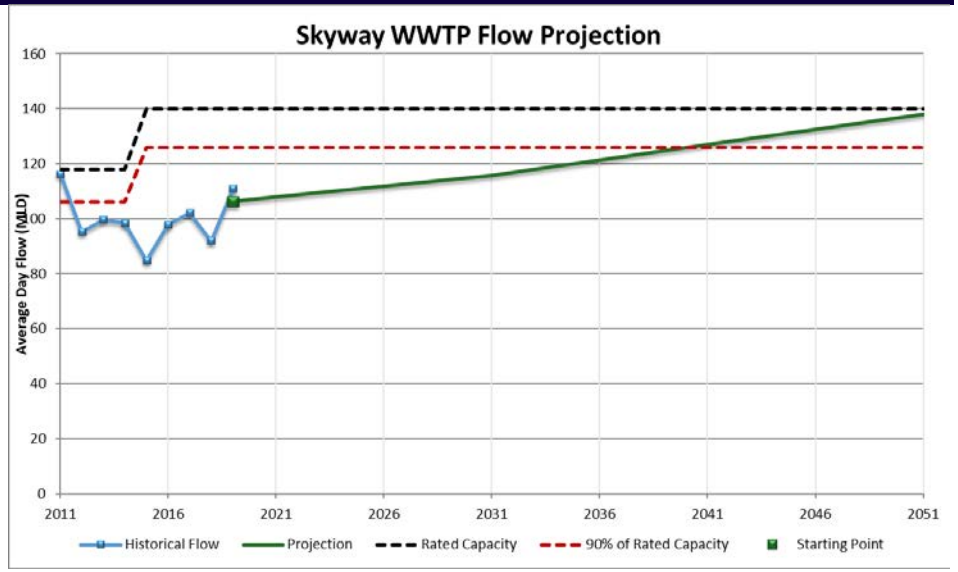

Appendix F

Fiscal Impact Assessment

February 2021

Regional Official Plan Review

HEMSON

Halton REGION

Contents

1. PURPOSE OF THE FISCAL IMPACT ANALYSIS

The planning policy regime in Ontario requires that planning for development occurs in a way that promotes the financial well-being of local governments. For example, in accordance with the requirements of the Provincial Policy Statement (PPS) infrastructure and public service facilities, including amenities located within defined settlement areas, must be financially viable.

The Growth Plan for the Greater Golden Horseshoe (GGH) also supports the policies of the PPS and requires that infrastructure and public service facilities be financially viable over their full life cycle. Therefore, this analysis places emphasis on maximizing the utilization of existing infrastructure and examining the financial viability of infrastructure with regard to the impact on property tax rates. This approach is consistent with the requirements of relevant planning legislation and represents prudent fiscal planning. It is noted that the Region and all four of the local municipalities' existing fiscal policies and practices are sound and promote fiscal sustainability, this analysis is based on those policies and practices.

As part of the *IGMS Growth Concepts Discussion Paper*, a fiscal impact analysis of the four Growth Concepts has been undertaken. The impact analysis is used to evaluate the concepts for the purposes of determining the Preferred Growth Concept (see Chapter 9 of the *IGMS Growth Concepts Discussion Paper)*. Specifically, the Fiscal Impact Assessment relates to the following evaluation measure:

> "2.3.3 Least negative (most positive) net financial impact on the Region and its Local Municipalities"

Therefore, the analysis reflects an order of magnitude assessment of the real tax impacts over the 30-year period from 2021 -2051 for each concept. In addition, the analysis of each concept has been developed independently for each of the four area municipalities and the tax funded services for the Region.

On a final note, detailed transit, roads, water and wastewater costs have been developed through the analysis in Chapter 8 of the *IGMS Growth Concepts Discussion Paper*. Therefore, the fiscal impact analysis looks solely at the tax funded services for the Region and the local area municipalities.

2. Overview of Key Assumptions

This section outlines the key underlying assumptions in developing the Fiscal Impact Analysis. The overview outlines assumptions related to both operating and capital expenditures related to growth as well as revenue from taxation, driven by assessment growth.

A. Fiscal Model Structure

Figure 1 provides a schematic overview of the financial model structure used in the analysis. The base parameters of the model, or primary inputs, includes financial documents such as capital and operating budgets as well as long-range financial planning policies. Other key inputs to the model include growth forecast projections (e.g. population, household and employment growth) from each of the Growth Concepts as well as capital and operating cost drivers. Independent models have been developed for the Region and each of the four local area municipalities; however, the analysis includes an evaluation, and discussion, of the cumulative impacts of the Growth Concepts.

The model also accounts for municipal revenues generated from assessment (property taxes) and non-tax revenues. The model assumes that costs and revenues increase in proportion to increased needs associated to growth to maintain current levels of service. The net impact of the expenditures less revenues results in the tax rate impact, which is used to assess the fiscal effect in any given concept.

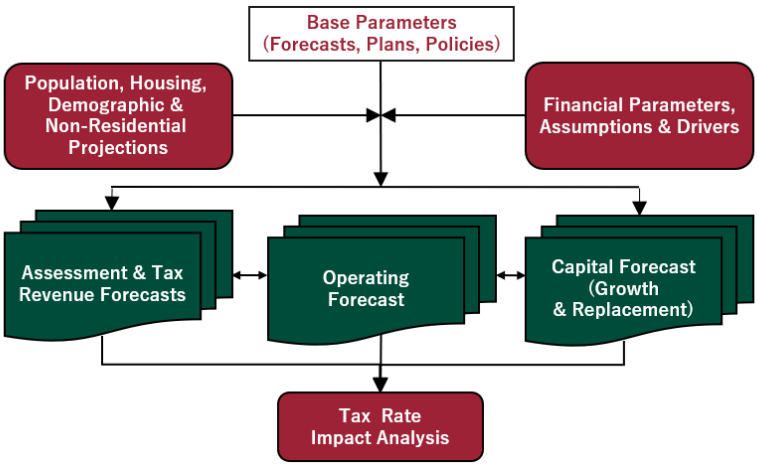

Figure 1: Fiscal Impact Model Methodology

B. KEY FISCAL IMPACT ANALYSIS ASSUMPTIONS

The financial analysis is informed based on information provided by the Region and local area municipalities including the 2018 Capital and Operating budgets as well as relevant financial plans and policies (e.g. long-range financial planning documents). In addition, the most recent approved Development Charge Background Studies inform the base models and financial analysis. For the purposes of this analysis, the recent legislative changes to the *Development Charges Act* (*Act* have not been factored into the analysis, however it is expected that these changes DCA) and *Planning* would be relatively minor at the Regional level and have a similar impact for each Growth Concept, therefore this analysis is valid for comparison purposes. It is recognized that the impact of the changes at the local municipal level is unclear.

It is important to note, that the findings of the analysis are largely focused on the period from 2031 – 2051 as each Growth Concept is identical in over the 2021 – 2031 period, however average annual tax impacts are assessed over the full 30-year period. Since the development forecast in each growth concept varies from 2031 – 2051, this allows for the comparative analysis to be developed. The following sections outline key detailed assumptions for operating, capital and asset management related growth costs.

i. Overarching Assumptions

A number of key overarching assumptions are used that are common across all four area municipalities and the Region. The following assumptions are key to developing this analysis:

- The analysis assumes that the Region and local municipalities will continue with the "status quo" approach to utilizing property tax revenues; in other words, the current financial policies and practices are maintained into the future. For user fee revenue sources, it is assumed that the Region and all local municipalities will continue to base these charges on current cost recovery ratios with the exception of building permit and planning fees, assumed to be at full cost recovery.

- Importantly, the financial analysis assumes that current service levels are maintained and does not account for service enhancements or changes to how services are delivered by the Region and local municipalities. The current services for which the local municipalities and the Region are responsible for has been maintained. In particular, transit services are currently the responsibility of the local municipalities, this assumption has been maintained for the purposes of the analysis. As mentioned in Chapter 8 of the *IGMS Growth Concepts Discussion Paper,* the transit analysis has

found that transit service costs are similar across concepts on a region-wide basis with no specific determination on any future transit governance structures.

- The planning period of the financial analysis aligns with the forecast population, housing and employment growth (2021-2051) presented as part of the four Growth Concepts. The analysis is based on the average annual cumulative impact over the planning period from 2021-2051.

- The financial forecast does not consider increases in capital and/or operating costs resulting from inflation. Excluding the net effects of inflation on future expenditures allows for a comparative impact of the four Growth Concepts over the longer-term planning period to 2051. Therefore, all values are expressed in constant 2020 dollars.

- It is important to note, under the recent changes to the *Development Charges Act* the 10% discount associated to general services is no longer applicable and municipalities can now recover this amount through development charges. For the purposes of the analysis, no adjustments were made to account for this change as it was determined it would have a marginal effect on the overall result of the analysis. In addition, no assumptions have been made on determination of CBC revenues, as the Region and area municipalities will be undergoing reviews over the next year to determine whether a CBC Strategy is feasible.

ii. Growth Related Net Operating Cost Assumptions

Net operating costs in the analysis have been forecasts based on the assumption that additional population and employment will continue to pressure the Region and its local municipalities to maintain levels of service. Therefore, net costs are expected to grow to 2051. The analysis accounts for net costs associated to growth. The methodology used to forecast increased net operating costs is as follows:

- For some services, such as those associated to general government administration or library services, costs are forecast based on a dollar per capita approach. Operating costs for these types of services are assumed to grow with increased demand from residents, therefore a parameter of operating costs per capita was determined based on the 2018 budget or data from long range financial plans. This approach is used for local area municipalities and the Region.

- For engineered services, particularly roads, operating costs are assumed to increase on a dollar per dollar of infrastructure basis. It is assumed that operating costs related to roads will grow based on the timing of infrastructure as opposed to pure population

growth. These parameters were determined based on each municipality's existing asset base and population.

- Non-tax revenues, which largely includes revenues from user fees or upper levels of government for Regional services, are expected to continue to grow in line with the development forecasts in each of the Growth Concepts. These non-tax revenues are applied against increased costs to calculate net operating costs from growth.

iii. Growth Related Capital Cost Assumptions

Halton Region and its local municipalities have different servicing responsibilities. The Region provides services that benefit large geographic areas such as the regional road network. The Region is also responsible for social and community services (e.g. social housing, public health, childcare, affordable housing, senior services, waterfront parks, etc), paramedics, police, waste diversion and others. In contrast, local municipalities are responsible for services that provide a local benefit to the residents and employees (e.g. local roads, libraries, fire services, parks and recreation, public works, general administration of the municipality etc.). The services provided by local municipalities are planned and delivered to reflect the needs, and desired services levels, of the individual municipalities.

Capital costs in the analysis have been forecasts based on the assumption that additional population and employment will continue to put pressure on the Region and its local municipalities to provide new infrastructure to maintain levels of service. Therefore, costs are expected to grow to 2051. To allow for some variation across concepts capital cost drivers are based on population or household growth. The methodology used to forecast increased capital costs associated to growth is outlined in Table 1.

Table 1: Growth Related Capital Assumptions

SERVICE AREA	REGION	LOCAL AREA MUNICIPALITIES
General Services (incl. Transit)	Growth related capital costs will continue to grow in line with population growth. Additional dollars per capita of infrastructure are assumed based on the historical level of service in the DC Study. Additional transit service costs are also expected to increase, however no assumptions have been made on changes to governance structure.	

SERVICE AREA	REGION	LOCAL AREA MUNICIPALITIES
Roads	Growth related capital costs are based on the findings of the transportation analysis outlined in Appendix B and C of the *IGMS Growth Concepts Discussion Paper*.	Growth related capital costs will continue to grow in line with household growth. Cost parameters are determined based on average growth related costs per household (differentiated by low, medium and high density development). Average costs have been informed based on the DC roads capital program for each municipality.

Note: Additional transit capital costs have been determined on a regional basis. The fiscal impact analysis assumes that local area municipalities will continue to provide transit services in addition to regional requirements.

To fund increased capital costs associated with growth, the Region and local area municipalities must rely on a range of revenue sources to fund this infrastructure, with the largest sources being development charges and tax funding. In particular, the analysis assumes that the Region and local municipalities will continue to maximize development charge recoveries and other available funding tools for development-related infrastructure over the long-term planning period to 2051.

iv. Asset Management

Additional tax funded contributions for asset repair and replacement have also been accounted for in the analysis. This is in line with good asset management practices. These additional costs provide for expenditures (or savings) for replacement of capital. These costs would typically be accounted as transfers to capital reserves in municipal budgets. Asset management contributions are made up of two components:

- Recognizing that the assessment base in all areas of the Region are assumed to grow over time, additional funds for replacement of existing infrastructure is assumed. This recognizes that additional funds can be made available to address existing funding deficiencies to address the infrastructure backlog. These amounts are assumed to increase in proportion to population growth. Existing capital reserve balances and ongoing gas tax funding are used against these expenditures.

- Additional provisions for future replacement of growth-related infrastructure based on depreciation is also assumed. It is recognized that as new assets are acquired, best practice is to, at minimum, contribute to capital reserves at a level equivalent to annual depreciation.[1]

[1] These contributions do not include costs associated to local infrastructure such as roads built by developers.

C. TAX REVENUE ASSUMPTIONS

Although there is an inherent cost of growth based on rules set out in the DCA for comparing each concept, Region and local municipal up-front costs for growth related infrastructure is assumed to be fully funded from development charges. However, operating costs and future replacement of these assets will need to be funded largely from tax revenues. In this analysis, tax revenues are a direct function of assessment growth. As the Region and local area municipalities continue to grow, it is expected that the assessment base will also grow to 2051.

Weighted taxable assessment will increase in the Region in relation to the growth forecasts identified in each Growth Concept for both the residential and non-residential sector. To account for each tax class, only taxable weighted assessment is included in the forecast.[2] The residential forecast is based on average assessed values by housing type in each local municipality. The individual household forecast by density therefore drives the forecasted growth in assessment and provides for some variation across each concept. These values were developed based on a sample of units built over the last 10-years and informed by long-range financial plan documents. Table 2 below sets out the assessment per unit assumptions. It is important to note that the assessment remains the same throughout the forecast period and thus assumes a similar style of building types across the four Growth Concepts (i.e. the size and number of rooms within apartment building).

Table 2: Average Weighted Assessment per Unit

RESIDENTIAL	BURLINGTON	OAKVILLE	HALTON HILLS	MILTON
Singles/Semis (Low Density)	$700,000	$1,140,000	$690,000	$560,000
Multiples (Medium Density)	$420,000	$530,000	$420,000	$380,000
Apartments (High Density)	$360,000	$430,000	$280,000	$300,000

The non-residential forecast is based on an average assessed values per square metre of building space. It is assumed that all population-related employment included in the forecast is in the commercial occupied tax class. Building space added in the employment land category is assumed to be in the industrial occupied tax class. The categories of Major Office, Employment Land, and Population Related are consistent with the employment

[2] Discussions on taxable assessment all refer to weighted assessment in this analysis.

categories used in the IGMS forecasts for each concept. Table 3 outlines the average assessment parameters for each non-residential category.

Table 3: Average Weighted Assessment per Square Metre

NON-RESIDENTIAL	BURLINGTON	OAKVILLE	HALTON HILLS	MILTON
Major Office	$4,000	$4,000	$2,500	$2,500
Employment Land	$3,000	$3,000	$1,500	$1,500
Population-Related	$4,000	$4,000	$2,500	$2,500

3. Fiscal Observations of the Four Growth Concepts

The financial modelling exercise provides a comparative analysis of the financial impacts of development under each Growth Concept through an examination of cumulative net tax impacts at the Region and local municipal level. The cumulative impact provides an important perspective for comparison purposes as it illustrates which concept achieves the lowest net impact for both the Region and local area municipalities.

Importantly, the financial conclusions presented in this report are just one category of evaluation criteria that are used to develop the Preferred Growth Concept. As such, the fiscal impact analysis should be considered within the broader context of the four IGMS evaluation themes.

A. SUMMARY OF OBSERVATIONS

Table 3 illustrates the percentage impact to property taxes for the Region and local area municipalities under each concept. Average annual tax increases from 2021-2051 provide a measure of the net fiscal impact from growth associated to each growth concept. The financial analysis included in this report is for comparative purposes across concepts expressed as an order of magnitude which will be further refined as part of the Preferred Growth Concept. Once the Preferred Growth Concept is established, master plans and related analysis will need to be undertaken to validate fiscal impact assumptions and further refine costs. As such, no specific dollar amounts are referenced.

Table 3: Average Annual Tax Increases 2021-2051

MUNICIPALITY	CONCEPT 1	CONCEPT 2	CONCEPT 3	CONCEPT 4
Burlington	3.90%	3.92%	3.97%	3.91%
Oakville	2.96%	3.03%	3.10%	2.93%
Milton	3.56%	3.60%	3.64%	3.51%
Halton Hills	2.38%	2.53%	2.63%	2.19%
Halton Region	2.47%	2.53%	2.56%	2.42%

Note: Tax impacts related to growth related costs do not include inflation.

Based on Table 3 above, some observations can be made based on a purely comparative approach across concepts. For any given municipality, there is little variation in tax impacts between concepts given that all estimated tax rate impacts are within a 1% difference. This

result is expected, given that expenditures and revenues are driven by the development forecasts in each individual concept, which also show low variability. Only Halton Hills shows some variability as the population forecast for Halton Hills is more variable relative to the Regional total population by 2051.

In analyzing the tax rate impacts as per the requirements of the IGMS evaluation criteria, and given the low variability, Concepts 1 and 4 provide a more favourable outcome. That is, Concepts 1 and 4 illustrate the "least negative/most positive" net impact. This result is a function of a few key drivers:

- There is little variation on the cost requirements to service growth between each Concept. This is attributed to the similarity of each of the concept development forecasts of population, housing and employment.

- There is however more variation on tax revenues, driven by growth in the assessment base.

    - Concepts with higher shares of low and medium density units, tend to have higher relative cumulative assessment. This is due to relatively higher average assessment values for these types of units. Furthermore, comparing concepts on an assessment per capita basis, shows Concepts 1 and 4 with relatively higher levels of assessment per capita (see Table A1 in Appendix A). However, the tax revenue potential of high-density development may improve over time. Higher rates of intensification in Concepts 2 and 3 would likely result in changes to sizes and configuration of apartment units as a greater share of families would need to accommodate these units. Such shifts in housing configuration may increase the assessment for Concepts 2 and 3.
    - Non-residential assessment tends to be very similar across concepts (see Table A2 in Appendix A); however, it makes up a higher share of the overall assessment base by 2051 for all concepts. The current Regional average residential/non-residential share is about 80%/20%. This is expected to shift to about 75%/25% by 2051 based on the growth concept forecasts.
    - Differences in average assessment values across municipalities account for some of this variation. This more so affects the Regional tax base as taxation revenue for the Region comes from the sum of all area municipal assessment.

It is important to emphasize, that despite growth in assessment (and tax revenue), as the main differentiating factor across concepts, many of the tax impacts across all concepts well exceed 3% per year. Recognizing that the Region and area municipalities will continue

to maintain good fiscal practices, these amounts well exceed average inflation and current budget practices.

4. Fiscal Policy and Planning Considerations

Although the findings of the Fiscal Impact Analysis show that Concepts 1 and 4 are only slightly preferred it is expected that for any growth concept some key fiscal planning and policy considerations need to be considered.

1. The Region and local area municipalities will need to continue to monitor costs and revenues associated to growth over time. It is important to recognize that in addition to meeting the needs of growth, existing budgetary pressures will continue and need to be balanced against the services provided to residents and business. Furthermore, intensification is usually associated to higher relative costs for some services, in particular for services such as parks, fire and transit.

    a. Typically, demand for developed parks tend to be higher in areas of high intensification. This results from additional maintenance and operating costs as parks in more urbanized areas tend to have higher quality amenities and higher levels of service for residents.

    b. Fire services will tend to be higher in areas of high intensification, at least over the short-term as it relates to up front costs. Intensification areas will have higher density units, and therefore higher building heights. As a result, specialized equipment is required for fire emergency personnel to deal with emergencies in taller buildings.

    c. A similar situation occurs for transit services. Higher intensification usually creates a higher demand for the movement of people, therefore transit infrastructure may be required to accommodate residents and employees. With this said this analysis does not assume that fundamental changes would occur for transit services. For example, no new transit services are assumed in Halton Hills. However, local area municipalities will need to cognizant that these services may be demanded by residents in the future.

2. The Region and local area municipalities are expected to continue to increase taxes based on a responsible approach to fiscal management. With this said, monitoring of fiscal pressures should continue through the Region's and local area municipal long-term financial planning exercises to identify challenges before they occur.

a. 2020 has created a unique and challenging situation for the Region and local area municipalities. Pandemic mitigation initiatives have been undertaken across the region. These initiatives are expected to continue and therefore will have short-term fiscal impacts for both levels of government. With this said, the IGMS analysis extends over a period of 30 years to 2051 and it is unclear at this time what effects the Covid-19 pandemic will have for fiscal impacts at that time.

3. The Region and local area municipalities will need to continue to closely monitor shifts in tax revenues associated to assessment growth. This analysis assumes that the assessment base will grow in line with development forecasts to 2051. With this said, in recent years non-residential assessment has grown much slower than expected, attributed to slower than expected levels of non-residential development. This pattern is expected to continue.

    a. It is important to note that Regional staff are currently undertaking an analysis to determine a realistic or more achievable level of non-residential development across the Region. The main foundation of the IGMS analysis achieving Provincial targets by 2051, however it is important to recognize that development may fall behind, particularly for non-residential development.

    b. Furthermore, assessment increases are subject to MPAC phase-in rules and data availability, which lags behind. There have also been a number of re-assessments which have put pressure on tax revenues. Although this factor has not been assumed in the analysis, it is expected that other re-assessments may occur over the next few years. These factors put upward pressure on tax rates across any given concept.

4. The Region and local area municipalities will need to provide additional infrastructure to meet the demands of growth. Therefore, it is recommended to continue to maximize revenues from development charges. Recent changes to the *Development Charges Act* have removed the 10% discount for general services, therefore this presents an opportunity for additional growth related cost recoveries moving forward.

5. It is recommended that the Region and local area municipalities continue to consider the strategic use debt, as appropriate, for major capital investments. The use of debt should be guided by considerations for affordability, equity and fairness, and fiscal flexibility. The Region and local area municipalities already have debt policies in place which should be reviewed on an ongoing basis, especially in periods of high growth.

6. The Region and local area municipalities have continued to contribute to tax funded capital reserves for the long-term repair and replacement of assets. With this said, as growth occurs and new infrastructure assets are acquired consideration will need to be made for additional savings for future repair and replacement of this infrastructure as well.
7. Capital deficiencies related to existing infrastructure will continue to create fiscal challenges. As growth continues, the Region and local municipalities will need to carefully assess the risks of undertaking additional growth related infrastructure projects while at the same time providing funds to address existing capital works needed to maintain older infrastructure. Although the Region and local area municipalities strive to provide sufficient funding to maintain existing infrastructure it is important that infrastructure deficits continue to be monitored, while at the same time committing to funding capital needs created by growth.

8. Local infrastructure will continue to be a significant cost component for some of the local area municipalities, across all concepts. This cost impact is associated to increased costs to operate and maintain contributed assets as well as the costs associated to long-term replacement. These costs will be significant for local area municipalities especially for concepts where additional local roads are acquired particularly for situations where more low and medium density development occurs. This will add additional pressures to existing capital backlogs.

5. Fiscal Indicators

TABLE A1: WEIGHTED ASSESSMENT PER CAPITA 2021 VS 2051					
Municipality	**2021**	**Concept 1 (2051)**	**Concept 2 (2051)**	**Concept 3 (2051)**	**Concept 4 (2051)**
Burlington	$237,493	$234,025	$230,925	$228,557	$235,646
% from Concept 1 in 2051			*-1.3%*	*-2.3%*	*0.7%*
Oakville	$295,066	$308,124	$300,390	$289,596	$314,675
% from Concept 1 in 2051			*-2.5%*	*-6.0%*	*2.1%*
Milton	$190,893	$194,950	$193,644	$194,522	$199,327
% from Concept 1 in 2051			*-0.7%*	*-0.2%*	*2.2%*
Halton Hills	$208,314	$220,895	$219,932	$230,406	$220,407
% from Concept 1 in 2051			*-0.4%*	*4.3%*	*-0.2%*
Halton Region	$244,337	$242,990	$240,525	$239,177	$245,675
% from Concept 1 in 2051			*-1.0%*	*-1.6%*	*1.1%*

Note: 2051 is compared relative to Concept 1 to show relative difference only.

TABLE A2: EMPLOYMENT SHARE FROM TOTAL REGIONAL 2021 VS 2051					
Municipality	**2021**	**Concept 1 (2051)**	**Concept 2 (2051)**	**Concept 3 (2051)**	**Concept 4 (2051)**
Burlington	36%	25%	25%	25%	25%
Oakville	40%	35%	35%	36%	34%
Milton	16%	27%	27%	27%	27%
Halton Hills	9%	13%	12%	11%	14%