Regional Municipality of Halton
Pumping Station Master Plan

Final Report

June 2012

R.V. Anderson Associates Limited
engineering · environment · infrastructure

CANADA'S 50 BEST MANAGED COMPANIES

R.V. Anderson Associates Limited
engineering · environment · infrastructure

2001 Sheppard Avenue East Suite 400
Toronto Ontario M2J 4Z8 Canada
Tel 416 497 8600 Fax 416 497 0342
www.rvanderson.com

July 10, 2012 RVA 081707

The Regional Municipality of Halton
1151 Bronte Road
Oakville, Ontario
L6M 3L1

Attention: Magda Bielawski, P.Eng., PMP, Project Manager, Wastewater Planning

Dear Ms. Bielawski:

Re: Regional Municipality of Halton Pumping Station Master Plan

We are pleased to submit our final report for the above noted study.

The report establishes a preferred servicing strategy for 59 sewage pumping stations along the southern portion of Halton Region and identifies a series of projects to implement the preferred servicing strategy.

We have enjoyed this opportunity to assist the Region with this strategic undertaking.

Please contact the undersigned should you have any questions.

Yours very truly,

R.V. ANDERSON ASSOCIATES LIMITED

Reg Andres, P.Eng
Vice-President

Nick Larson, P.Eng
Associate

Encls.

REGIONAL MUNICIPALITY OF HALTON
PUMPING STATION MASTER PLAN

FINAL REPORT

Prepared for:

Regional Municipality of Halton

R.V. Anderson Associates Limited
engineering · environment · infrastructure
2001 Sheppard Avenue East Suite 400
Toronto Ontario M2J 4Z8 Canada
Tel 416 497 8600 Fax 416 497 0342
www.rvanderson.com

RVA 081707
June 2012

REGIONAL MUNICIPALITY OF HALTON
PUMPING STATION MASTER PLAN

TABLE OF CONTENTS

APPENDICES

LIST OF FIGURES

LIST OF TABLES

Glossary of Terms

MEA – Municipal Engineers Association

EA – Environmental Assessment

INAC – Indian and Northern Affairs Canada

WWTP – Waste Water Treatment Plant

SPS – Sewage Pumping Station

PS – Pumping Station

PIC – Public Information Centre

In-TAC – Internal Technical Advisory Committee

Ex-TAC – External Technical Advisory Committee

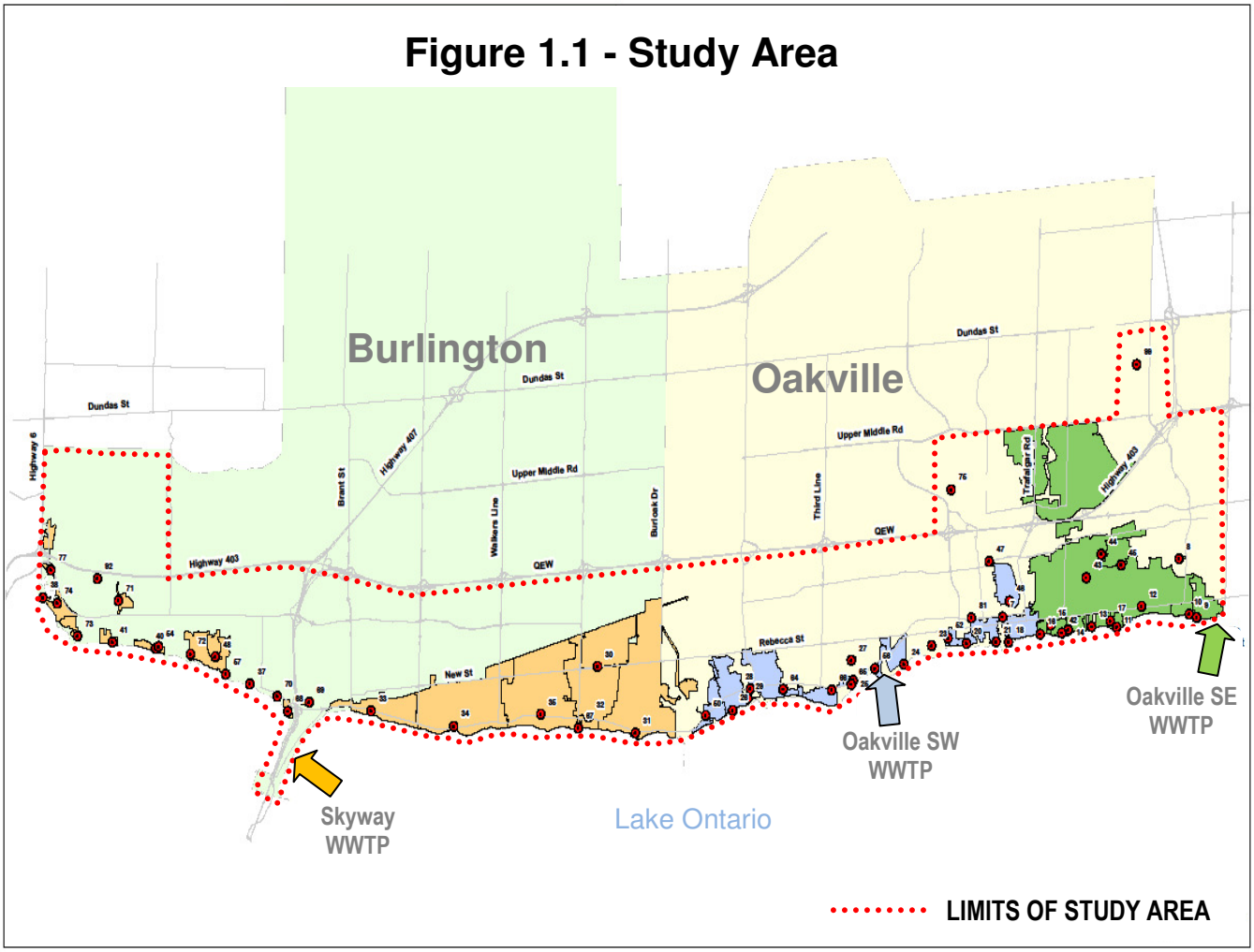
LCA – Life Cycle Analysis

1.0 INTRODUCTION

1.1 Background

This report documents the results of the assessment completed to recommend a pumping station management strategy. The subject of this study was 59 pumping stations that convey wastewater located in the southern half of the Town of Oakville and the City of Burlington (Figure 1.1).

Figure 1.1 - Study Area



In recent years the Region identified the need to upgrade a number of the pumping stations included in the study area to address one or more of the following issues:

1. Normal aging and deterioration processes in the context of lifecycle management (i.e. sustainability) of these facilities.
2. Hydraulic capacity impacted by current needs and future growth demands defined in the Region's *"Sustainable Halton"* program designed to respond to the provincial *Places to Grow* legislation.
3. Operations and maintenance management issues with these pumping stations.

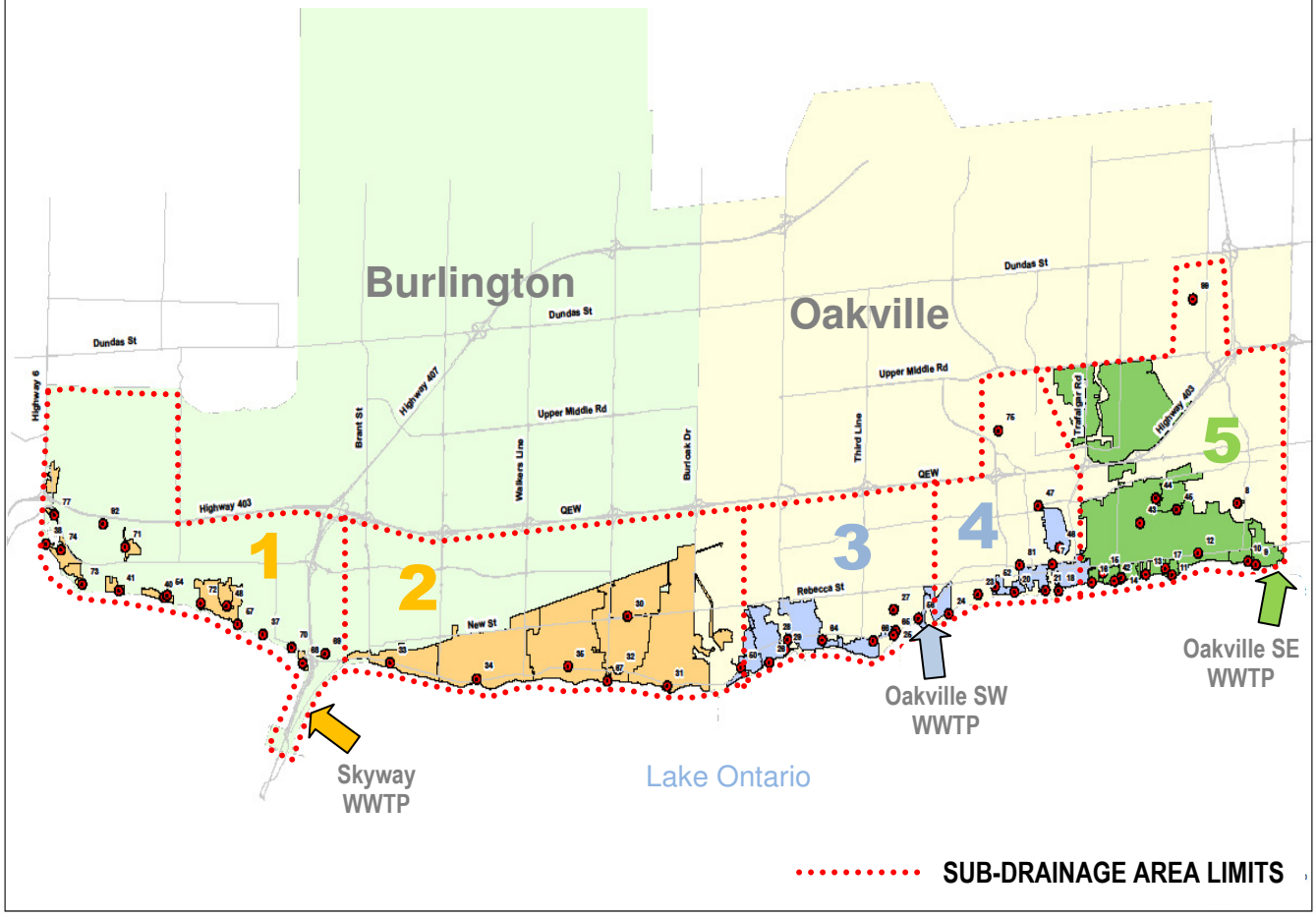
While condition and capacity deficiencies defined many of the works to be undertaken with respect to each individual station, the long term efficiency and effectiveness of wastewater conveyance raised the question of rationalizing this network of 59 pumping stations as a broader management consideration. These issues were central to the Region's decision to proceed with a pumping station Master Plan for this area.

R.V. Anderson Associates Limited was retained by Halton Region to complete the Master Plan for the 59 wastewater pumping stations owned and operated by the Region in the Study Area. The overall Master Plan study followed the framework of a Municipal Class Environmental Assessment under the MEA Class EA process.

1.2 Study Overview

The objective of this study was to prepare a comprehensive plan for asset renewal which considers future needs and infrastructure optimization for 59 wastewater pumping stations. The pumping stations were divided over 3 drainage areas, namely Burlington, Oakville South West (SW) and Oakville South East (SE); with each drainage area carrying flows to their respective wastewater treatment plant. Due to the location of the treatment plants and differing flow directions of sewage within the Burlington and Oakville SW drainage, both areas were split into two sub-drainage areas. Together with the single sub-drainage area for Oakville SE the study area was divided into 5 sub-drainage areas for purposes of evaluating the pumping station servicing strategies. These sub-drainage areas were based on the major flow patterns to their respective plants as portrayed in Figure 1.2 – Sub-Drainage Areas.

Figure 1.2 – Sub-Drainage Areas



Pumping Stations

1&2 Sub-Drainage Areas to Skyway WWTP

3&4 Sub-Drainage Areas to Oakville SW WWTP

5 Sub-Drainage Area to Oakville SE WWTP

The 59 pumping stations underwent an assessment of their physical condition, hydraulic capacity and the overall efficiency in servicing the drainage areas. The physical condition assessment involved an inspection of each station with renewal and replacement needs identified, as well as to identify any operating and maintenance issues for each station. The hydraulic assessment involved both theoretical analyses and field pumping tests at the stations to establish the hydraulic capacity and to make a determination regarding expansion or upgrade requirements of each station to meet growth projections.

These assessments were completed as part of the initial assessment work and were reported separately to the Region. A summary of the condition and capacities of each of the pumping

stations is provided in *Appendix A – Evaluation Tables.* Efficiency assessments were also completed which included a review of the pumping station elevations and locations to determine the most effective servicing concept for each drainage area.

1.3 EA Process

This study was carried out as a Municipal Class Environmental Assessment Master Plan and followed Approach #1 from the MEA Municipal Class Environmental Assessment (October 2000, as amended in 2007 and 2011). An Approach #1 EA Master Plan process follows a broad level of assessment. As such, this Master Plan will be the basis for and used in support of more detailed studies that will be required to confirm servicing strategy and to identify the specific projects in order to fulfill the Municipal Class EA requirements. It is anticipated that the specific projects resulting from the preferred strategy will be subject to either Schedules A+ or B of the Municipal Class EA.

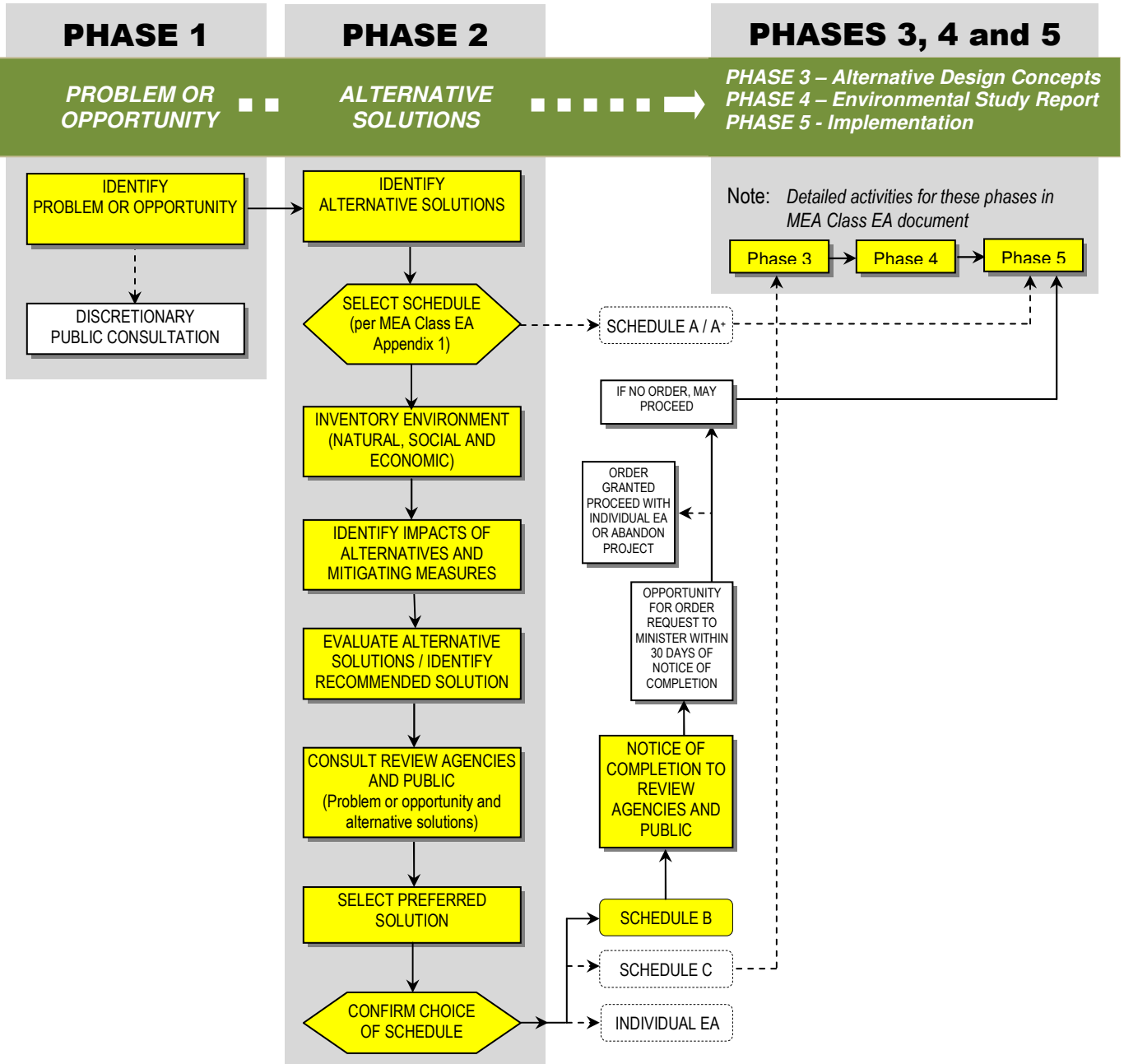
For clarification, Schedule A and A+ projects are pre-approved activities and may proceed without further EA process with the exception that the public is to be advised prior to A+ activity implementation. Schedule B projects identified in the context of an Approach #1 Master Plan process will require additional screening and investigations so that Phases 1 and 2 of the Municipal Class EA process are satisfied for each project. A project file will also be required for all Schedule B undertakings.

The general outline of the Class EA process is shown in *Figure 1.3 – MEA Class EA Flowchart*.

Part II Order Requests

Part II Orders will only be possible for the individual projects identified in this Master Plan which are subject to further Municipal Class EA requirements, not for the Master Plan itself.

Figure 1.3 – MEA Class EA Flow Chart



Project Team

The project team included Halton Region staff as well as multiple consultants. R.V. Anderson Associates Limited (RVA) was the lead consultant for this project. Sub-consultants used are as follows:

- Heritage reviews - Archaeological Services Inc. (ASI)[1]
- Environmental concerns - LGL Limited (LGL)[2]
- Public consultation and communication - Kidd Consulting[3].

The project team was responsible for determining and justifying the type of schedule for each project recommended in the Master Plan.

Public Consultation Overview

Initial work on this project began in 2009 with the collection of condition assessment data from the Region of Halton. After review and analysis of all the data provided, a total of four public information centres (PICs) were conducted over the course of the project to allow for public feedback regarding the project's recommendations. Two initial PICs were held in March 2010, in Burlington and Oakville, to gauge public reaction and determine if any steps were missed in the evaluation process. Flyers were distributed to local residents and local residential organizations were contacted regarding the impending PICs. After receiving suggestions at the initial PICs, two additional PICs were held in June 2010, also in Burlington and Oakville, to propose the preferred solution for each sub-drainage area. Internal Technical Advisory Committee (In-TAC) and External Technical Advisory Committee (Ex-TAC) meetings also took place at various times over the course of the project to allow for feedback from Halton Region staff and external stakeholders. Detailed information on the consultation program is included in *Section 6 – Public Consultation* and *Appendix E – Detailed Consultation Program Information*.

1.4 Report Structure

The structure of this report is as follows: Sections 2 and 3 outline the opportunity statement and describe the study area of the project, Sections 4 and 5 describe the alternative servicing concepts and how they were evaluated, Section 6 describes the public consultations processes

[1] Archaeological Services Inc., 528 Bathurst Street, Toronto, Ontario M5S 2P9.

[2] LGL Limited environmental research associates, 3365 Harvester Road, Ground Level, Burlington, ON L7N 3N2

[3] Kidd Consulting, 7 Oneida Avenue, Toronto, ON, M5J 2E2

that were undertaken as part of the assessment process, and Section 7 describes the overall preferred pumping station management strategy for the 59 pumping stations in the study area.

2.0 PROBLEM / OPPORTUNITY STATEMENT

In the context of the MEA Class EA process, the following problem/opportunity statement was presented to the public and formally adopted for this Master Plan project.

Halton Region owns and operates 59 sewage pumping stations in the 3 drainage areas serviced by the Burlington, Oakville SW and Oakville SE Wastewater Treatment Plants. The Region has undertaken this Master Plan to rationalize the sewage pumping system and to establish a servicing strategy for the Region that will effectively and efficiently meet the needs of today and the future.

This study addresses and incorporates three important issues:

1. Normal aging and operational deterioration of the pumping stations.
2. Capacity demands (current demands and future demands associated with *Sustainable Halton* and *Places to Grow*).
3. Operational efficiency/concerns of the system.

3.0 STUDY AREA INFORMATION

3.1 Overview

A review of the study area was carried out to determine an environmental inventory, including natural, heritage and social characteristics and the general information that would support the evaluation of alternative servicing strategies. The work was carried out by the specialists included in the study team in the following areas:

1. Natural environmental assessment (LGL Limited)
2. Built heritage resources and cultural heritage landscape assessments (Archaeological Services Inc.)
3. Land uses in study area (RVA)
4. Condition and hydraulic capacity assessments of each PS (RVA)
5. Pumping station networks within each sub-drainage area (RVA)
6. Hydraulic modeling and flow projections in support of sustainable Halton Growth Forecast to 2031 (AECOM).

A background information and assessment report was prepared for the natural environmental inventory and assessment by LG (*Appendix C*). Similarly, cultural heritage and archaeological assessment reports were prepared by ASI (*Appendix D*). The information from these reports was used to populate the *Evaluation Tables* in *Appendix A* and to support the evaluation of alternatives in *Appendix B*.

The land use and condition / hydraulic assessments information prepared by RVA are all summarized in the *Appendix A - Evaluation Tables* for each pumping station. A discussion of the pumping station networks and their functionality are summarized below.

Wastewater System

Halton Region provides wastewater services to homes and business in the study area through collection and treatment systems. The collection system comprises a network of pipes that convey sewage from the homes and businesses to the wastewater treatment plants. The wastewater treatment plants then subject the influent wastewater to a series of processes that results in clean water that is safe to discharge into the receiving body.

Most sewage is conveyed in the pipe network by gravity from high elevations to low elevations. However, in some instances the pipe elevations are too low to be able to drain via gravity to the wastewater treatment plants. In these cases, sewage pumping stations are required to lift or pump the sewage to other sewer pipes that are at higher elevations that can then continue to flow by means of gravity to the wastewater treatment plants. The pressurized pipes that convey sewage from the low elevation sewers to higher elevation sewers are referred to as forcemains.

The Region owns and operates 59 pumping stations in the study area of this project. The pumping stations vary in size depending on the amount of sewage they are designed to convey. The smallest type of pumping station is a small pre-fabricated unit that is typically installed below grade and has little to no above-ground structure. The medium sized pumping stations have large concrete tanks, or wet wells, where the sewage collects and submersible pumps. These stations typically have a modest amount of superstructure such as an electrical control panel. The largest type of pumping station has large pumps, a separate reservoir where the sewage collects before it is pumped (i.e. wet well), and a significant superstructure above grade. Of the 59 pumping stations included in the study area for this project, 23 are of the pre-fabricated variety, 21 are submersible and 13 are large wet/dry facilities.

Generally, it is preferable to avoid pumping stations in a wastewater collection system as they consume energy and have higher and more complex operational requirements as compared to gravity sewers. This study investigates whether it is preferable to maintain the current network of pumping stations in the study area or to replace all, or a number of them, with gravity sewers.

Details of the pumping station networks within each sub-drainage area are noted below including information received from operations staff during the site visit / condition assessment activities. Information summarizing the condition, age, hydraulic capacity and operating characteristic are included in *Appendix A – Evaluation Tables*.

3.2 Burlington West Sub-drainage Area

The Burlington West drainage area consists of 15 pumping stations over a 10 km wide sub-drainage area (Figure 3.1 & Table 3.1). The drainage area includes major transportation corridors and covers the land east of Plains Road West and Hwy 403, to just west of the QEW and Lakeshore Road. The existing trunk sewer drains in an easterly direction, with flows terminating at the Skyway WWTP. Overall the drainage area consists of 9 submersible type pumping stations, 4 pre-fabricated type pumping stations and 2 large stations with above ground superstructures.

Table 3.1 – Burlington West SPS Inventory

RMOH-ID	Name	Location	Date of Initial Construction	Type
77	BRIDGEVIEW STREET PUMPING STATION	1261 SPRING GARDEN ROAD, BURLINGTON	1964	Concrete Submersible
38	SPRING GARDEN ROAD PUMPING STATION	834 SPRING GARDEN ROAD, BURLINGTON	1981	Concrete Submersible
74	GRANDVIEW AVENUE PUMPING STATION	761 GRANDVIEW AVENUE, BURLINGTON	1981	Concrete Submersible
73	BAYSHORE BOULEVARD PUMPING STATION	614 BAYSHORE BOULEVARD, BURLINGTON	1981	Concrete Submersible
92	GARDEN TRAILS PUMPING STATION	547 GENISTA DRIVE, BURLINGTON	2004	Wet Well/Dry Well
71	UNSWORTH AVENUE PUMPING STATION	1094 UNSWORTH AVENUE, BURLINGTON	1972	Prefabricated
41	DANFORTH PLACE PUMPING STATION	836 DANFORTH PLACE, BURLINGTON	1973	Prefabricated
40	OAKLAND PARK COURT PUMPING STATION	79 OAKLAND PARK COURT, BURLINGTON	1982	Concrete Submersible
54	LASALLE PARK ROAD PUMPING STATION	600 LASALLE PARK, BURLINGTON	1970	Wet Well/Dry Well
72	NORTHSHORE BOULEVARD (#14) PUMPING STATION	131 NORTHSHORE BOULEVARD, BURLINGTON	1973	Concrete Submersible
48	CARDINAL DRIVE PUMPING STATION	305 CARDINAL DRIVE, BURLINGTON	1970	Prefabricated

RMOH-ID	Name	Location	Date of Initial Construction	Type
57	NORTHSHORE BOULEVARD (#5) PUMPING STATION	374 NORTHSHORE BOULEVARD, BURLINGTON	1970	Wet Well/Dry Well
37	EDGEWATER CRESCENT PUMPING STATION	604 EDGEWATER CRESCENT, BURLINGTON	1971	Prefabricated
70	STILLWATER CRESCENT PUMPING STATION	535 STILLWATER CRESCENT, BURLINGTON	1975	Concrete Submersible
68	INDIAN ROAD PUMPING STATION	477 INDIAN ROAD, BURLINGTON	1975	Concrete Submersible

Figure 3.1- Burlington West Sub-Drainage Area

According to operational records, none of the pumping stations in this sub-drainage area have experienced overflows in the past two years. Some pumping stations have 2031 peak inflow estimates that exceed their firm capacity. The pumping stations in this sub-drainage area are in various states of condition ranging in age from 1 year to 46 years. It is noted that pumping station #54 was rebuilt in 2009.

The east end of the sub-drainage area is primarily made up of residential units, with a golf course and pockets of park land in between. A quarry is located among residential units in the middle of the sub-drainage area, with equal parts green space and residential to the west end of the sub-drainage area. Heavy vehicular traffic travels along the north end of the sub-drainage area, via the 403, while Lake Ontario lies at the south end of the sub-drainage area.

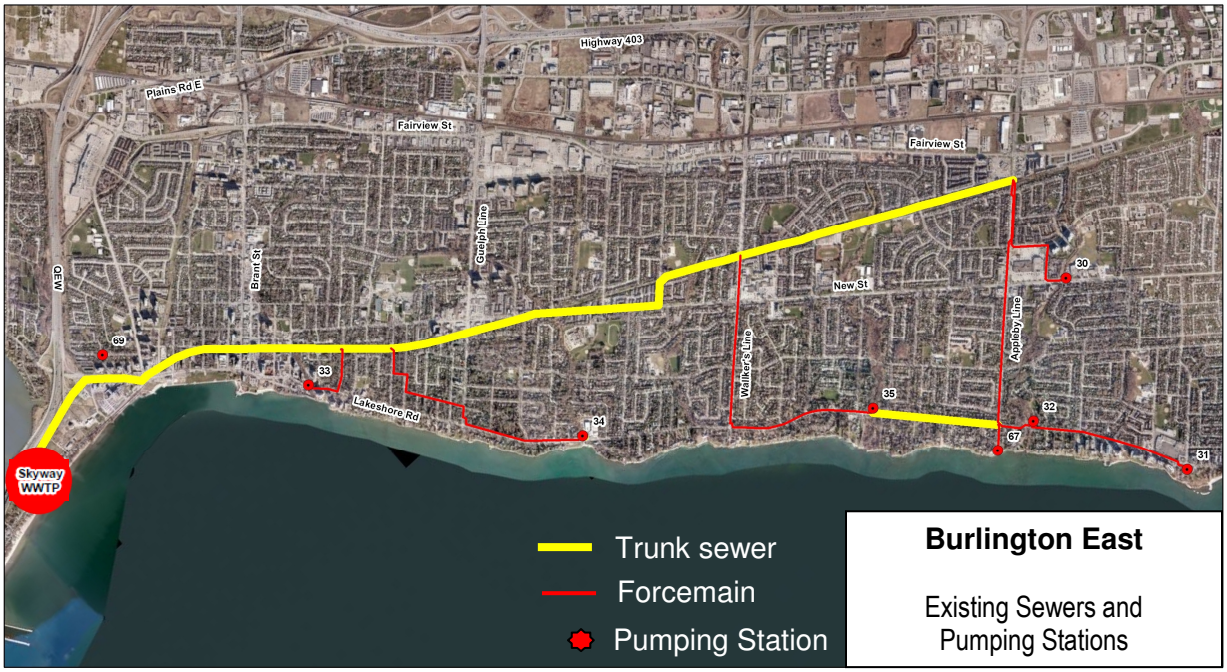
3.3 Burlington East Sub-drainage Area

The Burlington East drainage area consists of 8 pumping stations over a 10 km wide sub-drainage area (Figure 3.2 & Table 3.2). The drainage area covers the land east of the QEW and Lakeshore Road, to just west of the Lakeshore Road and Great Lakes Boulevard. The trunk sewer drains in a westerly direction, with flows terminating at the Skyway WWTP. Overall the drainage area consists of 2 submersible type pumping stations and 6 large stations with significant above ground superstructures.

Table 3.2 – Burlington East SPS Inventory

RMOH-ID	Name	Location	Date of Initial Construction	Type
31	ELIZABETH GARDENS PUMPING STATION	5390 LAKESHORE ROAD, BURLINGTON	1978	Wet Well/Dry Well
30	PINEDALE PUMPING STATION	5151 NEW STREET, BURLINGTON	1983	Wet Well/Dry Well
32	LAKESHORE ROAD (#6) PUMPING STATION	5061 LAKESHORE ROAD, BURLINGTON	1972	Wet Well/Dry Well
67	APPLEBY PLACE PUMPING STATION	107 APPLEBY PLACE, BURLINGTON	1975	Concrete Submersible
35	LAKESHORE ROAD (#10) PUMPING STATION	4281 LAKESHORE ROAD, BURLINGTON	1964	Wet Well/Dry Well
34	LAKESHORE ROAD (#9) PUMPING STATION	3237 LAKESHORE ROAD, BURLINGTON	2004	Wet Well/Dry Well
33	JUNCTION STREET PUMPING STATION	2137 LAKESHORE ROAD, BURLINGTON	1964	Wet Well/Dry Well
69	BELLVIEW STREET PUMPING STATION	1189 BELLVIEW STREET, BURLINGTON	1970	Concrete Submersible

Figure 3.2- Burlington East Sub-Drainage Area



This sub-drainage area has two pumping stations, Elizabeth Gardens PS (#31) and 4281 Lakeshore Road PS (#35), that have experienced overflows in recent years. In both cases the overflow occurrences are rare. Pumping stations #32 and #35 are in poor condition and require short term renewal or rehabilitation. The other pumping stations in this sub-drainage area are in average to good condition and range between 6 and 46 years of age.

The east end of the sub-drainage area is primarily made up of residential units, with park land and a small meandering water body. The middle of the sub-drainage area consists of another meandering water body, some green spaces and low density residential units. The west end consists of heavy residential units, some light commercial and a shopping mall. The western boundary of the sub-drainage area has heavy vehicular traffic due to the QEW.

3.4 Oakville SW West Sub-drainage Area

The Oakville Southwest West (OSW) drainage area consists of 7 pumping stations over a 4 km wide sub-drainage area (Figure 3.3 & Table 3.3). The drainage area covers the land east of Lakeshore Road and Great Lakes Boulevard, to immediately west of Lakeshore Road and Sandwell Drive. The trunk sewer drains in an easterly direction, with flows terminating at the Oakville SW WWTP. Overall the drainage area consists of 4 submersible type pumping stations,

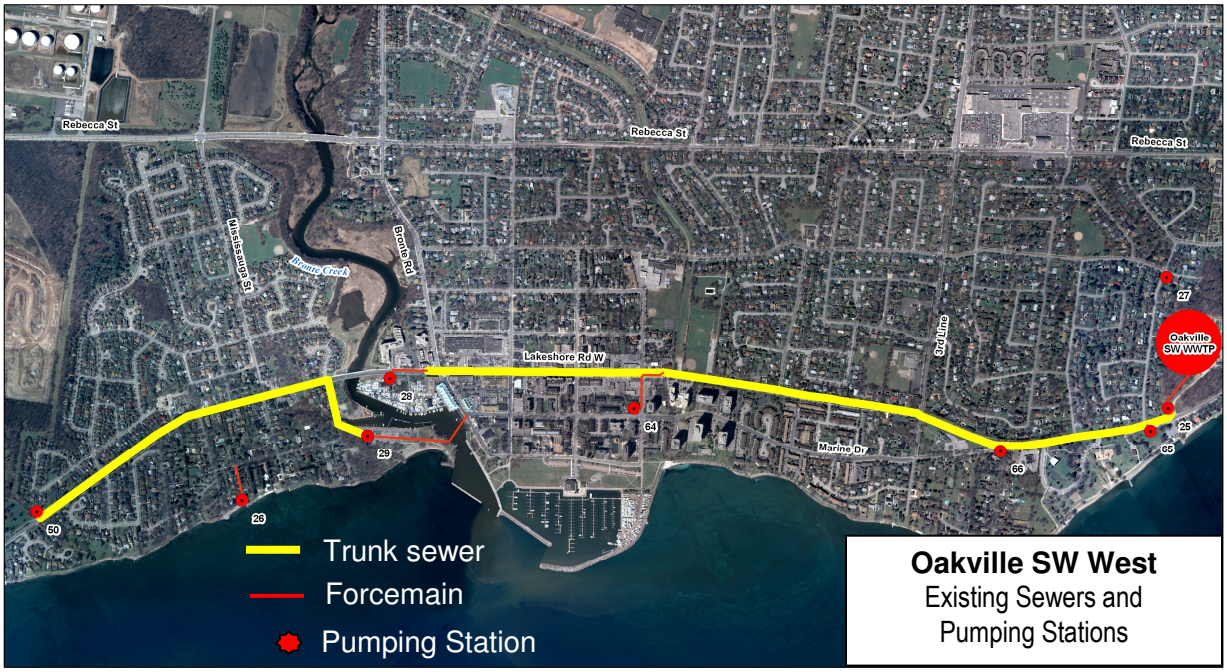
3 pre-fabricated type pumping stations and 1 large station with a significant above ground superstructure.

Some pumping stations have 2031 peak inflow estimates that exceed their firm capacity.

Table 3.3 – Oakville SW - West SPS Inventory

RMOH-ID	Name	Location	Date of Initial Construction	Type
50	SHELDON CREEK WASTEWATER PUMPING STATION	3251 LAKESHORE ROAD WEST , OAKVILLE WEST	1982	Concrete Submersible
26	TIMBER LANE WASTEWATER PUMPING STATION	2 TIMBER LANE , OAKVILLE WEST	1975	Prefabricated
28	BRONTE YACHT CLUB WASTEWATER PUMPING STATION	2505 LAKESHORE ROAD WEST, OAKVILLE WEST	UNKNOWN	Concrete Submersible
29	WEST RIVER WASTEWATER PUMPING STATION	51 WEST RIVER STREET, OAKVILLE WEST	1966	Wet Well/Dry Well
64	MARINE DRIVE WASTEWATER PUMPING STATION	2285 MARINE DRIVE, OAKVILLE WEST	1969	Prefabricated
66	BELVEDERE WASTEWATER PUMPING STATION	60 BELVEDERE DRIVE, OAKVILLE WEST	1962	Prefabricated
27	HIXON STREET WASTEWATER PUMPING STATION	1334 HIXON STREET, OAKVILLE WEST	1985	Concrete Submersible
65	CORONATION PARK WASTEWATER PUMPING STATION	1420 LAKESHORE ROAD WEST, OAKVILLE WEST	1985	Concrete Submersible

Figure 3.3- Oakville SW West Sub-Drainage Area



It should be noted that pumping stations #27 and #66 were constructed to reduce basement flooding in the east side of the sub-drainage area that was caused when the trunk sewer surcharged during severe wet weather events. The surcharging issues in the trunk sewer must be alleviated before these pumping stations can be eliminated.

This sub-drainage area is typically made up of residential units mixed with light commercial uses and park land; however there are industrial and commercial units to the north of the sub-drainage area. Bronte Creek also passes through the western end of the sub-drainage area.

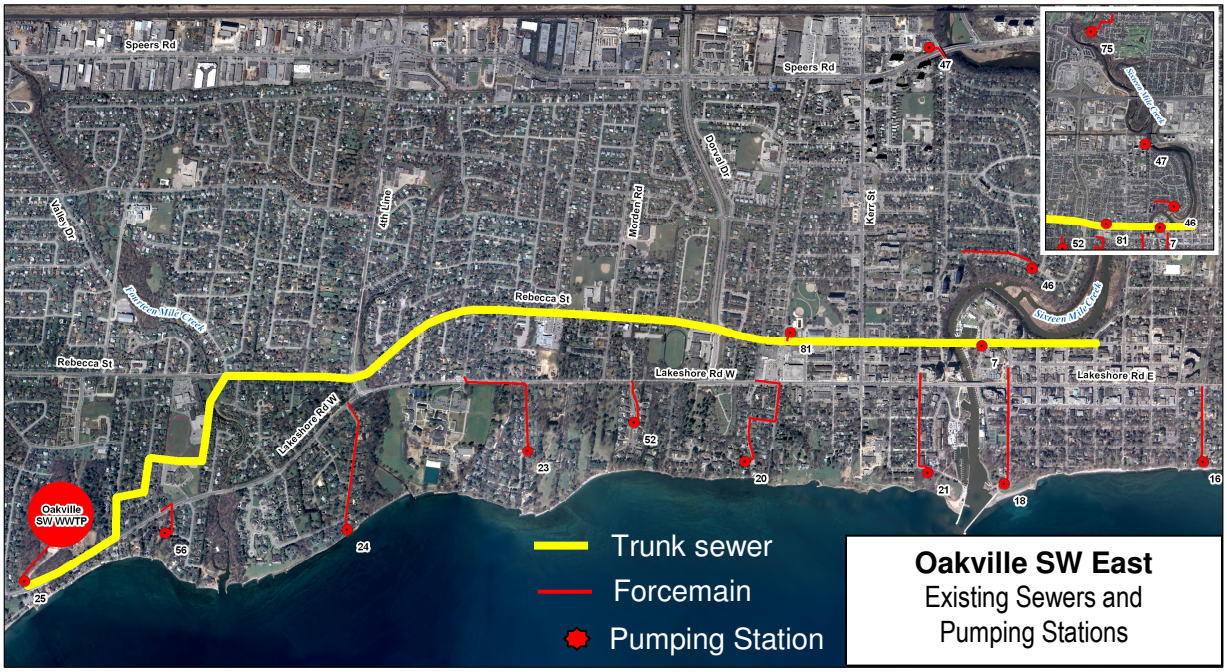
3.5 Oakville SW East Sub-drainage Area

The Oakville Southwest East drainage area consists of 14 pumping stations over a 6 km wide sub-drainage area (Figure 3.4 & Table 3.4). The drainage area covers the land east of Lakeshore Road and Sandwell Drive, to just west of the Lakeshore Road and 2nd Street. The trunk sewer drains in a westerly direction, with flows terminating at the Oakville Southwest WWTP. Overall the drainage area consists of 3 submersible type pumping stations, 8 pre-fabricated type pumping stations and 3 large stations with significant above ground superstructures.

Table 3.4 – Oakville SW - East SPS Inventory

RMOH-ID	Name	Location	Date of Initial Construction	Type
16	FIRST STREET WASTEWATER PUMPING STATION	20 FIRST STREET, OAKVILLE EAST	1985	Prefabricated
18	NAVY STREET WASTEWATER PUMPING STATION	4 NAVY STREET, OAKVILLE EAST	1985	Wet Well/ Dry Well
75	OVERTON PLACE WASTEWATER PUMPING STATION	250 OVERTON PLACE, OAKVILLE WEST	1969	Prefabricated
47	SHEPHERD ROAD WASTEWATER PUMPING STATION	10 SHEPHERD ROAD, OAKVILLE WEST	1973	Prefabricated
46	RIVERSIDE DRIVE WASTEWATER PUMPING STATION	265 RIVERSIDE DRIVE, OAKVILLE WEST	1963	Prefabricated
7	WATER STREET WASTEWATER PUMPING STATION	130 WATER STREET, OAKVILLE WEST	1967	Prefabricated
21	WALKER STREET WASTEWATER PUMPING STATION	10 WALKER STREET, OAKVILLE WEST	1996	Concrete Submersible
81	REBECCA STREET WW STORAGE TANK PUMPING STATION	171 REBECCA STREET, OAKVILLE WEST	1998	Wet Well/ Dry Well
20	LAKEWOOD DRIVE WASTEWATER PUMPING STATION	231 LAKEWOOD DRIVE, OAKVILLE WEST	1971	Prefabricated
52	SHOREWOOD PLACE WASTEWATER PUMPING STATION	304 SHOREWOOD PLACE, OAKVILLE WEST	2000	Concrete Submersible
23	BIRCH HILL LANE WASTEWATER PUMPING STATION	35 BIRCH HILL LANE, OAKVILLE WEST	1964	Prefabricated
24	WESTDALE ROAD WASTEWATER PUMPING STATION	135 WESTDALE ROAD, OAKVILLE WEST	1965	Prefabricated
56	STIRLING DRIVE WASTEWATER PUMPING STATION	1204 STIRLING DRIVE, OAKVILLE WEST	2004	Concrete Submersible
25	WEST 18 WASTEWATER PUMPING STATION	1385 LAKESHORE ROAD WEST, OAKVILLE WEST	1960	Wet Well/ Dry Well

Figure 3.4 - Oakville SW East Sub-Drainage Area



Some pumping stations have 2031 peak inflow estimates that exceed their firm capacity. The pumping stations in this sub-drainage area range from 6 years to 47 years of age.

This sub-drainage area is typically made up of residential units mixed with light commercial uses and park land; however there are industrial and commercial units to the north of the sub-drainage area. Two creeks pass through this sub-drainage area; 16 Mile Creek crosses through the western end of the sub-drainage area; and 14 Mile Creek passes through the eastern end.

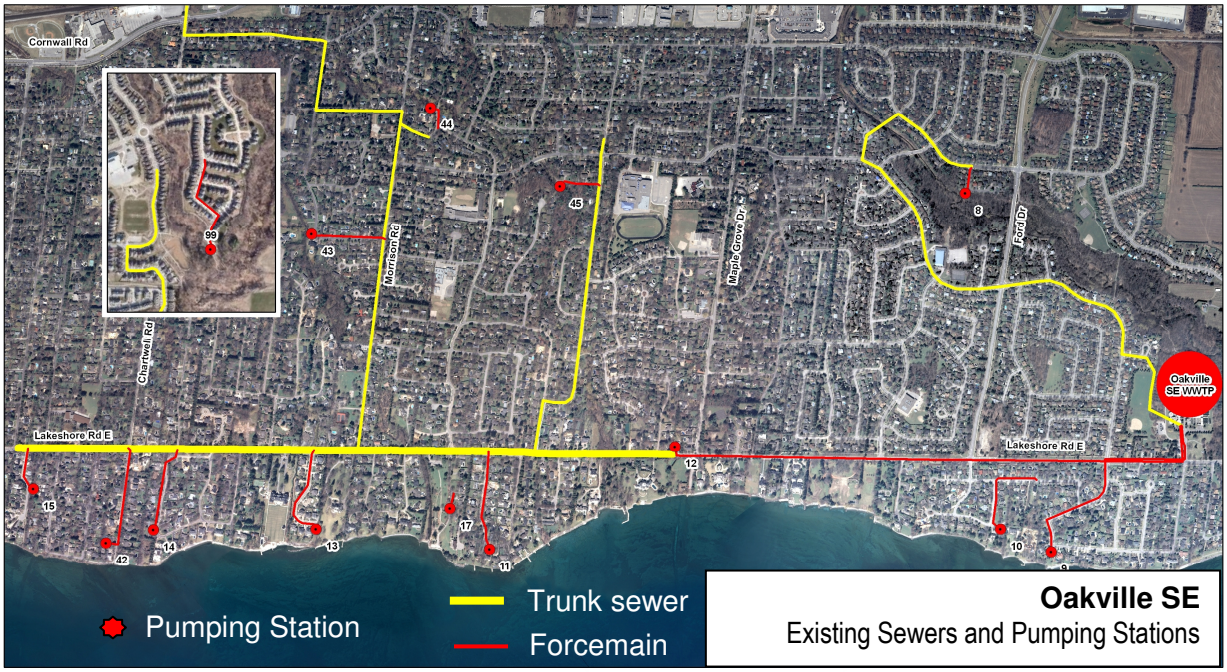
3.6 Oakville Southeast Sub-drainage Area

The Oakville Southeast drainage area consists of 14 pumping stations over a 4.5 km wide sub-drainage area (Figure 3.5 & Table 3.5). The drainage area covers the land east of Lakeshore Road and 2nd Street, to just west of the Lakeshore Road and Winston Churchill Boulevard. The trunk sewer drains in an easterly direction, with flows terminating at the Oakville Southeast WWTP. Overall the drainage area consists of 6 submersible type pumping stations, 7 pre-fabricated type pumping stations and 1 large station with an above ground superstructure.

Table 3.5 – Oakville SE SPS Inventory

RMOH-ID	Name	Location	Date of Initial Construction	Type
9	CARRINGTON PLACE WASTEWATER PUMPING STATION	2354 CARRINGTON PLACE, OAKVILLE EAST	1972	Prefabricated
10	CHANCERY LANE WASTEWATER PUMPING STATION	2290 CHANCERY LANE, OAKVILLE EAST	1975	Prefabricated
8	CEDARBERRY WASTEWATER PUMPING STATION	2262 CEDARBERRY COURT, OAKVILLE EAST	1977	Concrete Submersible
99	JOSHUA CREEK WASTEWATER PUMPING STATION	2313 ROCK POINT DRIVE, OAKVILLE EAST	2005	Concrete Submersible
12	NINTH LINE WASTEWATER PUMPING STATION	1541 LAKESHORE ROAD, OAKVILLE EAST	1968	Wet Well/Dry Well
45	WEAVER WASTEWATER PUMPING STATION	1380 WEAVER AVENUE, OAKVILLE EAST	1972	Prefabricated
44	CUMNOCK WASTEWATER PUMPING STATION	1281 CUMNOCK CRESCENT, OAKVILLE EAST	1974	Prefabricated
43	MORRISON HEIGHTS WASTEWATER PUMPING STATION	1152 MORRISON HEIGHTS, OAKVILLE EAST	1973	Prefabricated
11	ENNISCLARE DRIVE WASTEWATER PUMPING STATION	8 ENNISCLARE DRIVE, OAKVILLE EAST	1972	Concrete Submersible
17	GAIRLOCH GARDENS WASTEWATER PUMPING STATION	1302 LAKESHORE ROAD, OAKVILLE EAST	1977	Concrete Submersible
13	BEL AIR ESTATES WASTEWATER PUMPING STATION	54 BEL AIR ESTATES, OAKVILLE EAST	1988	Concrete Submersible
14	ARGYLE DRIVE WASTEWATER PUMPING STATION	1034 ARGYLE DRIVE, OAKVILLE EAST	1975	Prefabricated
42	CHARTWELL ROAD WASTEWATER PUMPING STATION	16 CHARTWELL ROAD, OAKVILLE EAST	1965	Prefabricated
15	RAYMAR PLACE WASTEWATER PUMPING STATION	59 RAYMAR PLACE, OAKVILLE EAST	1985	Concrete Submersible

Figure 3.5 - Oakville SE Sub-Drainage Area



The pumping stations in this sub-drainage area have not experienced any overflows in recent years. Some pumping stations have 2031 peak inflow estimates that exceed their firm capacity. The pumping stations in this sub-drainage area range between 5 and 42 years of age.

This sub-drainage area is typically made up of residential units mixed with light commercial uses and park land. At the eastern end of the sub-drainage area there are large industrial and commercial units, located along Highway 403, with residential developments to the north and south.

4.0 ALTERNATIVE SOLUTIONS

Based on the problem / opportunity statement and the Region's interest to undertake a rationalization of the existing network of pumping stations, the basic question to be asked is if there is a reasonable cause and justifiable ability to replace the existing pumping stations with a modified or different conveyance system. Using a lifecycle analysis (LCA), an attempt was made to determine if it would be more cost effective to install deep trunk gravity sewers to convey the sewage at a depth that overcomes the current need for pumping and its associated costs and operational complexities. The LCA approach is described in more detail in Section 5.

The above query led to the identification of three (3) potential servicing concepts. These concepts define the alternative solutions for consideration in the context of the Class EA process and are described generically in the following sub-sections.

4.1 Alternative 1 – Status Quo (Do Nothing)

The status quo servicing strategy assumes that all of the existing pumping stations will remain in service. In the context of the Class EA process, this is the "do nothing" option that serves as a basis of comparison for other alternatives. The pumping stations would be independently assessed on a continual (lifecycle) basis in terms of long term investments needed to upgrade and sustain them in good service. This strategy would include regular operating and maintenance activities, as well as typical lifecycle capital investments to update, rehabilitate and replace the various components of the station based on normal deterioration.

4.2 Alternative 2 – Partial Deep Gravity Sewer / Tunnel (Eliminate some PSs)

The partial deep gravity sewer/tunnel strategy assumes that certain individual pumping stations will be eliminated with the construction of intermittent sections of deep gravity trunk sewers. The trunk sewers will terminate at either an existing or new pumping station. If the section of trunk sewer terminates at an existing pumping station then it is likely that the facility will need to be upgraded to be able to pump the wastewater from the trunk sewer to existing sewers that drain via gravity to the wastewater treatment plant. The individual stations will be connected to the trunk sewer sections with local sewers. In this alternative, there will still be several existing pumping stations in each drainage area that will remain. The life cycle activities of these existing stations will be managed in the same manner as described above in Section 4.1.

4.3 Alternative 3 – Deep Gravity Sewer / Tunnel (Eliminate all PSs)

The full deep gravity sewer/tunnel strategy assumes that all individual pumping stations will be eliminated with the construction of continuous sections of deep gravity trunk sewers. The trunk sewers will terminate at the wastewater treatment plants. In cases where the trunk sewer terminates at an elevation lower than the existing inlet to the wastewater treatment plant, additional works will be required to pump the sewage into the existing plant. As with Alternative 2, the decommissioning of all stations to be eliminated is to be included in the costs, along with the inherent savings in O&M costs that would be eliminated with the pumping station.

The specific description of the alternatives will vary in each of the five (5) sub-drainage areas based on their unique characteristics in terms of land use forms, geographic features and contours. These factors influenced the configuration of the existing pumping station networks to service the conveyance of wastewater, specifically in terms of the number and location of pumping stations within each sub-drainage area.

While Alternative 1 (retain all pumping stations in service) and Alternative 3 (eliminate all pumping stations) are fairly straight-forward options to describe for each sub-drainage area, there is a large variability in the way Alternative 2 could be defined with any number of combinations of pumping stations that could be eliminated and retained.

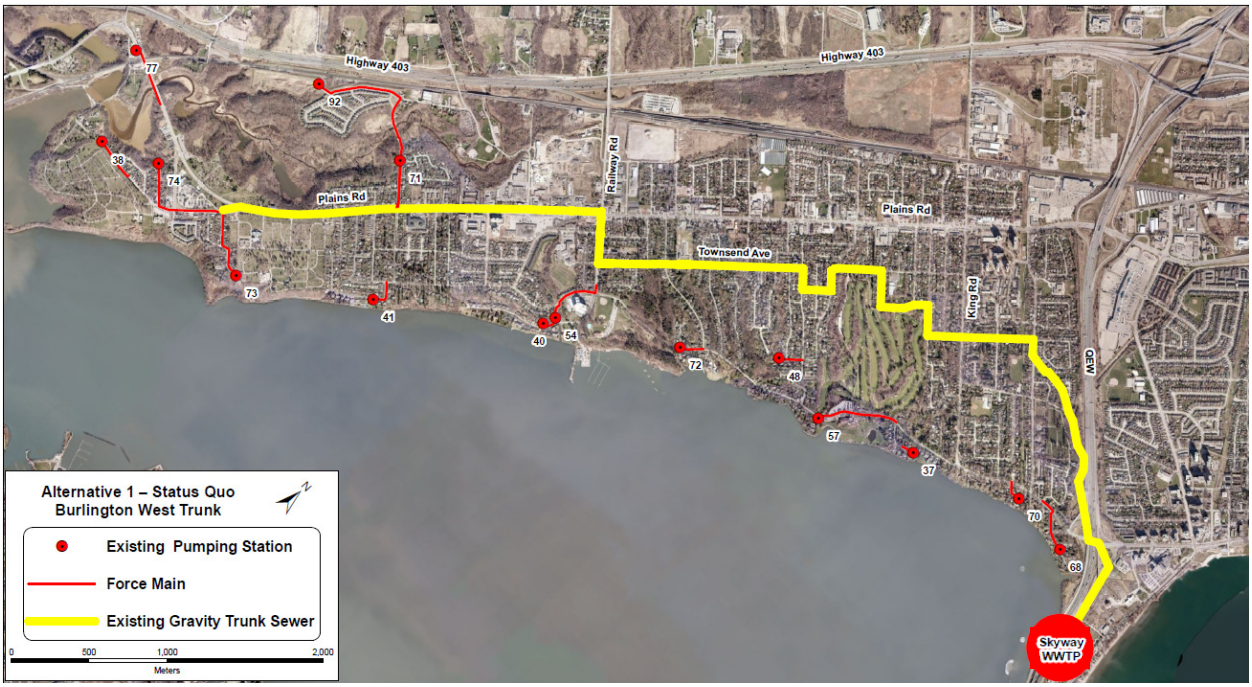
In order to establish a specific configuration for purposes of the comparative evaluation, particularly for Alternative 2 for each sub-drainage area, each pumping station went through a preliminary screening process to determine if elimination was possible (i.e. go/ no go scenario). Once individual assessments of each pumping station were conducted, a group approach was undertaken to define the servicing options for each sub-drainage area that would be used for the comparative analysis.

Figures 4.1 to 4.5 present an overview of the three alternative solutions for each sub-drainage area.

Figure 4.1 – Burlington West Trunk

Alternative 1 – Status Quo

- retain all 15 pumping stations



Alternative 2 – Partial Deep Gravity Sewer / Tunnel

- eliminate 10 out of 15 pumping stations / construct new deep tunnel and connecting sewers

Figure 4.1 – Burlington West Trunk (cont'd)

Alternative 3 – Deep Gravity Sewer / Tunnel

- eliminate all 15 pumping stations / construct new deep tunnel and connecting sewers

Figure 4.2 – Burlington East Trunk

Alternative 1 – Status Quo

- retain all 8 pumping stations

Alternative 2 – Partial Deep Gravity Sewer / Tunnel

- eliminate 4 out of 8 pumping stations / construct new deep tunnel and connecting sewers

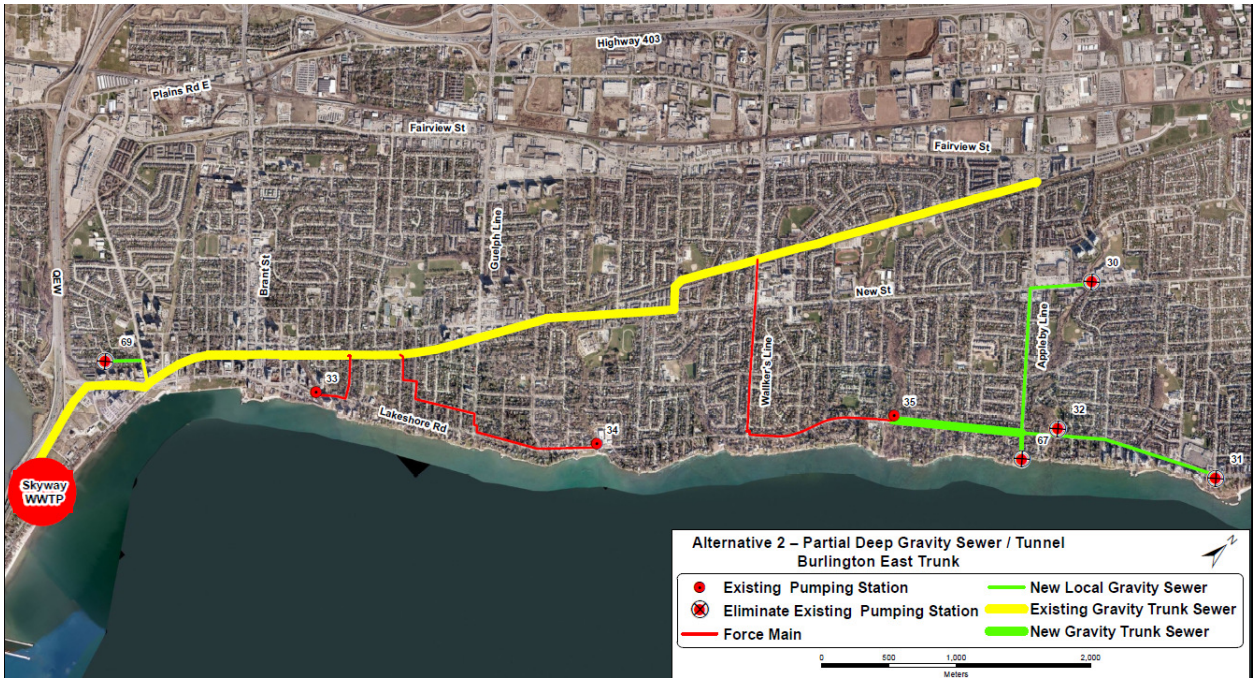


Figure 4.2 – Burlington East Trunk (cont'd)

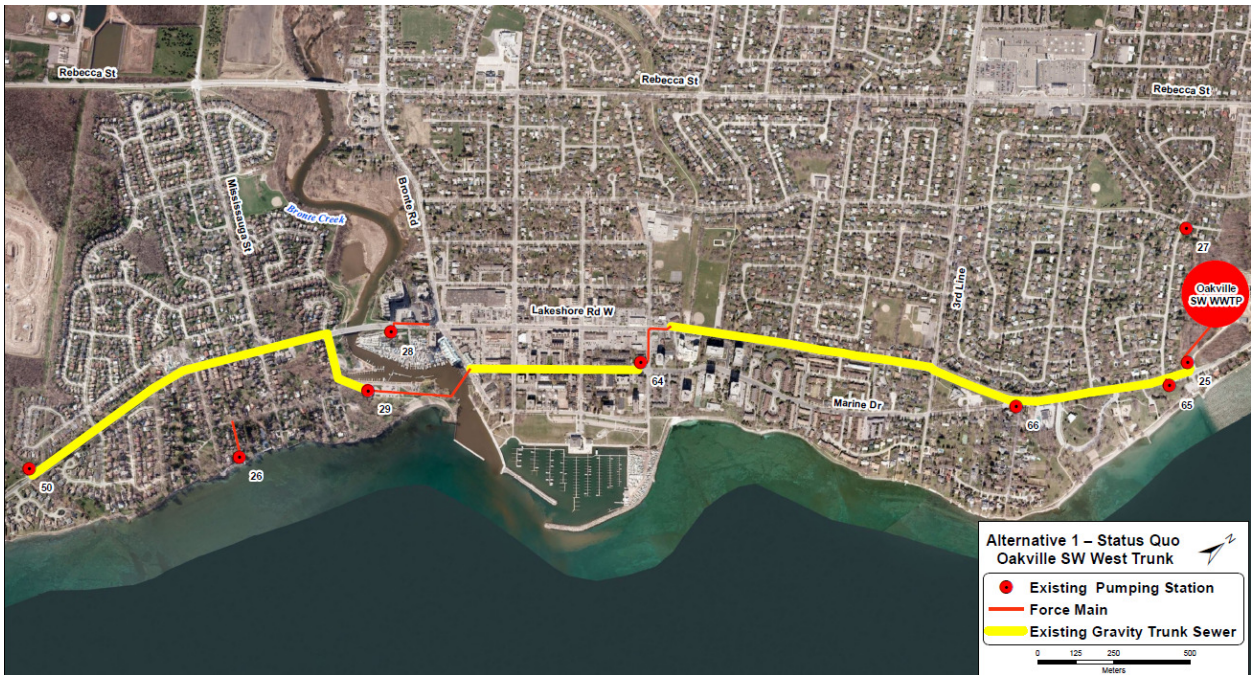
Alternative 3 – Deep Gravity Sewer / Tunnel

- eliminate all 8 pumping stations / construct new deep tunnel and connecting sewers

Figure 4.3 – Oakville SW West Trunk

Alternative 1 – Status Quo

- retain all 9 pumping stations



Alternative 2 – Partial Deep Gravity Sewer / Tunnel

- eliminate 5 out of 9 pumping stations / construct new deep tunnel and connecting sewers

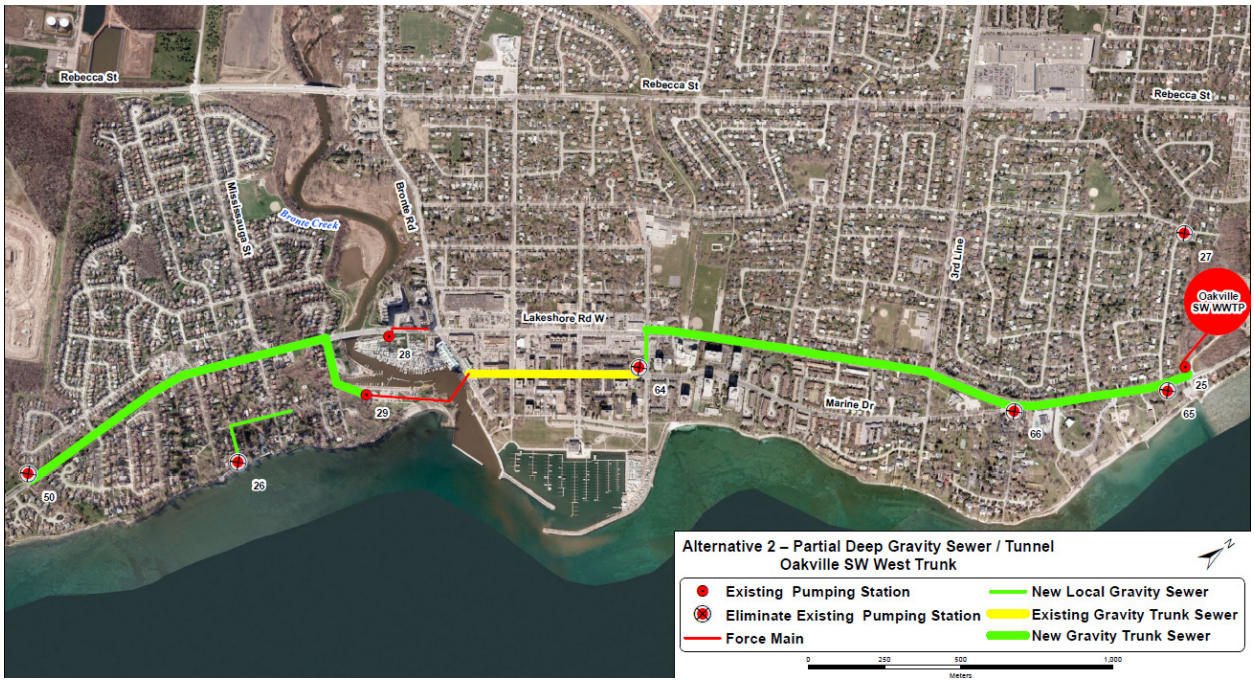


Figure 4.3 – Oakville SW West Trunk (cont'd)

Alternative 3 – Deep Gravity Sewer / Tunnel

- eliminate all 9 pumping stations / construct new deep tunnel and connecting sewers

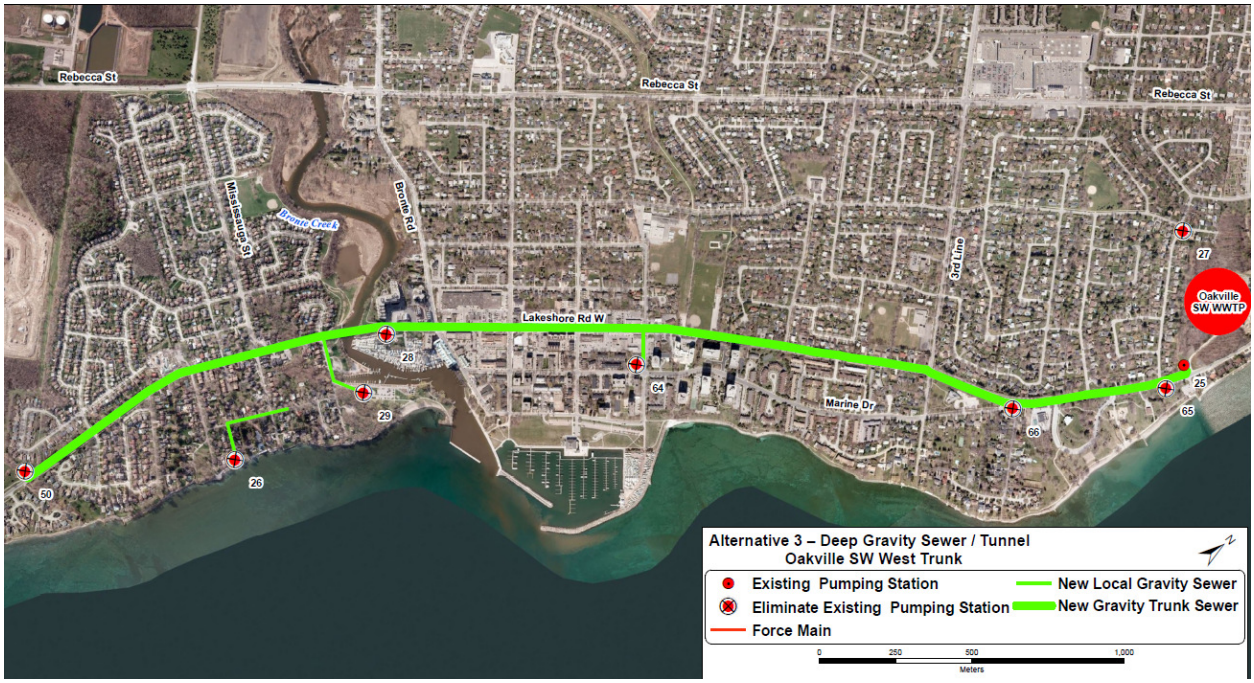
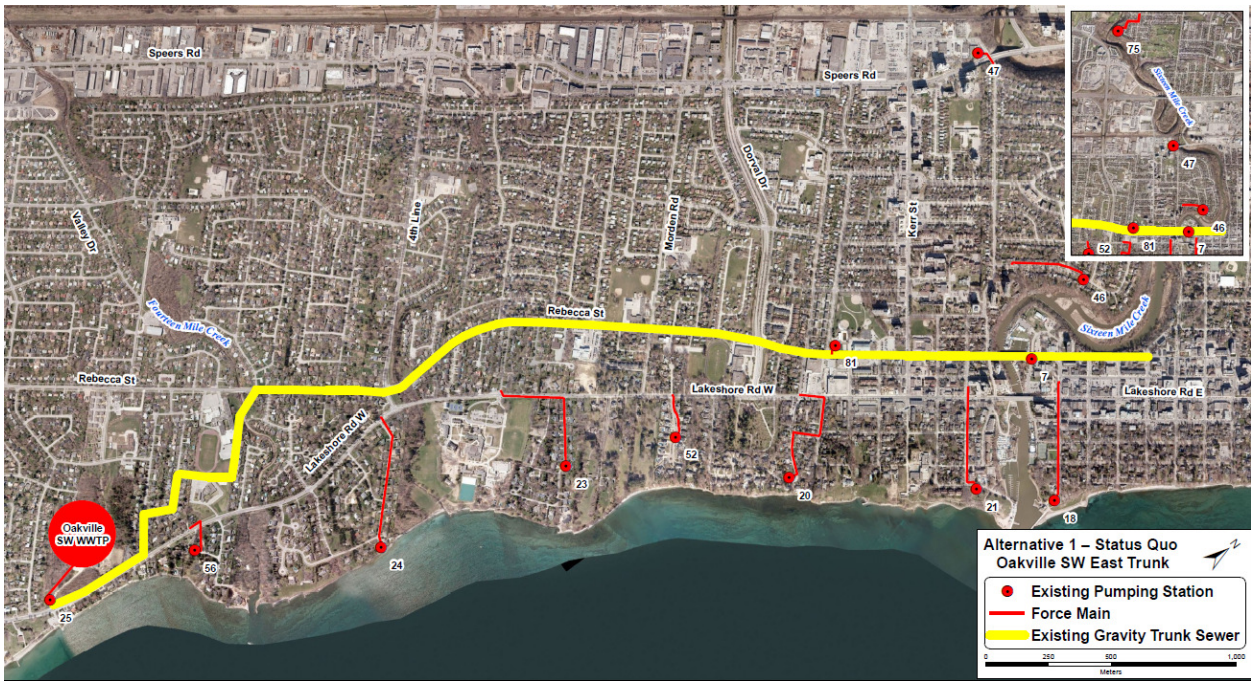


Figure 4.4 – Oakville SW East Trunk

Alternative 1 – Status Quo

- retain all 13 pumping stations



Alternative 2 – Partial Deep Gravity Sewer / Tunnel

- eliminate 11 out of 13 pumping stations / construct new deep tunnel and connecting sewers

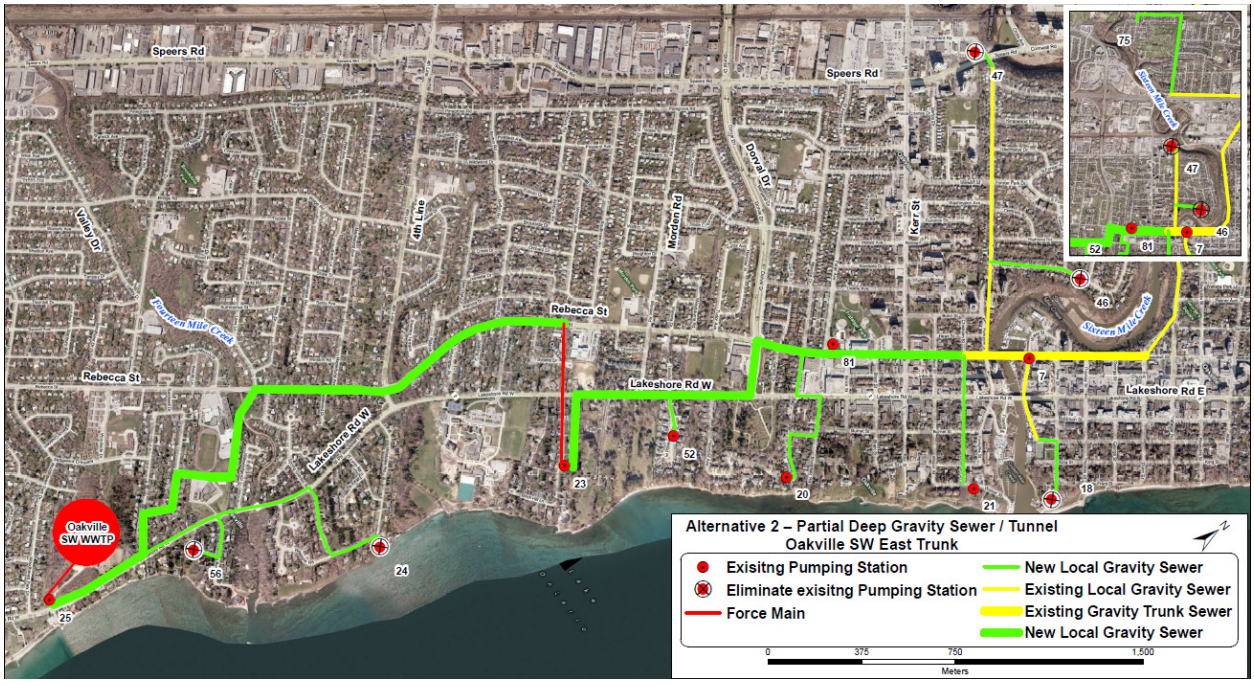


Figure 4.4 – Oakville SW East Trunk (cont'd)

Alternative 3 – Deep Gravity Sewer / Tunnel

- eliminate all 13 pumping stations / construct new deep tunnel and connecting sewers

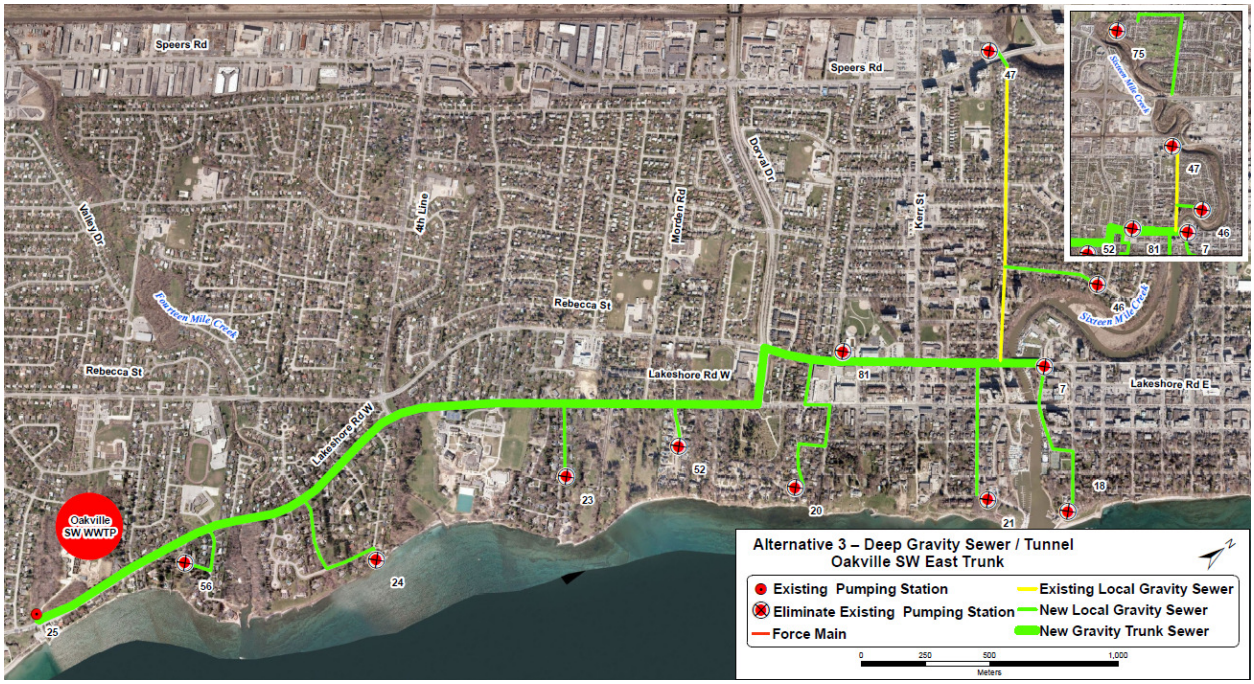
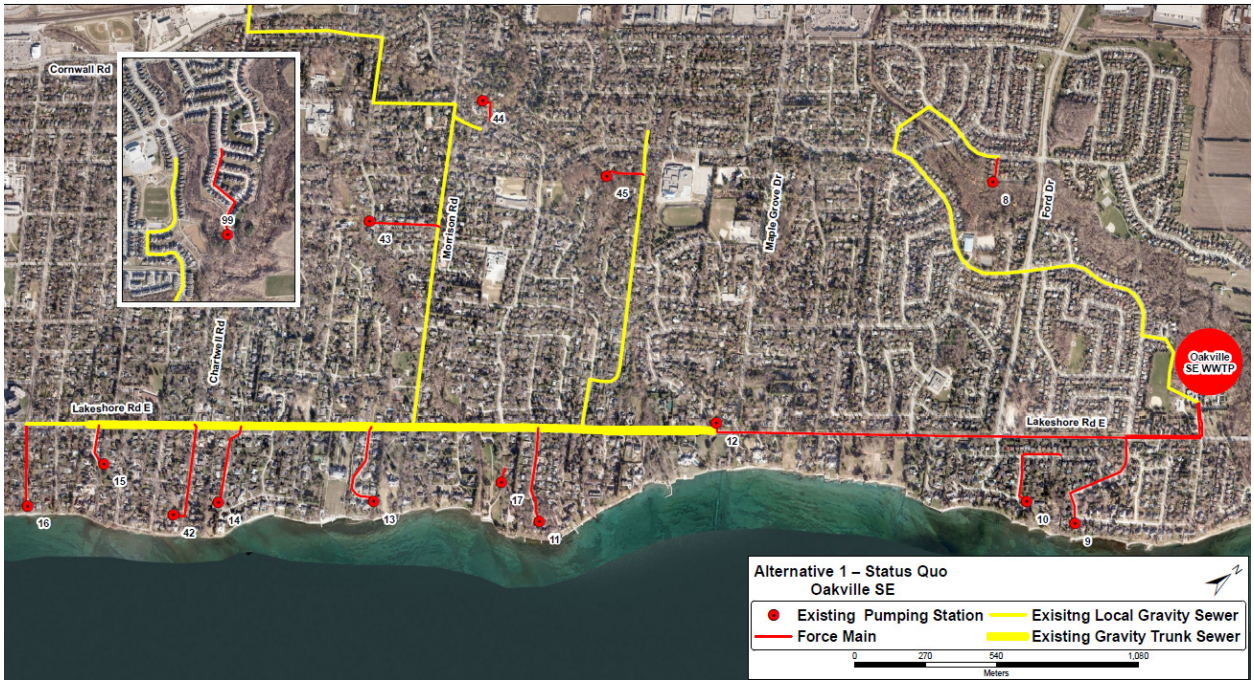


Figure 4.5 – Oakville SE Trunk

Alternative 1 – Status Quo

- retain all 14 pumping stations



Alternative 2 – Partial Deep Gravity Sewer / Tunnel

- eliminate 12 out of 14 pumping stations / construct new deep tunnel and connecting sewers

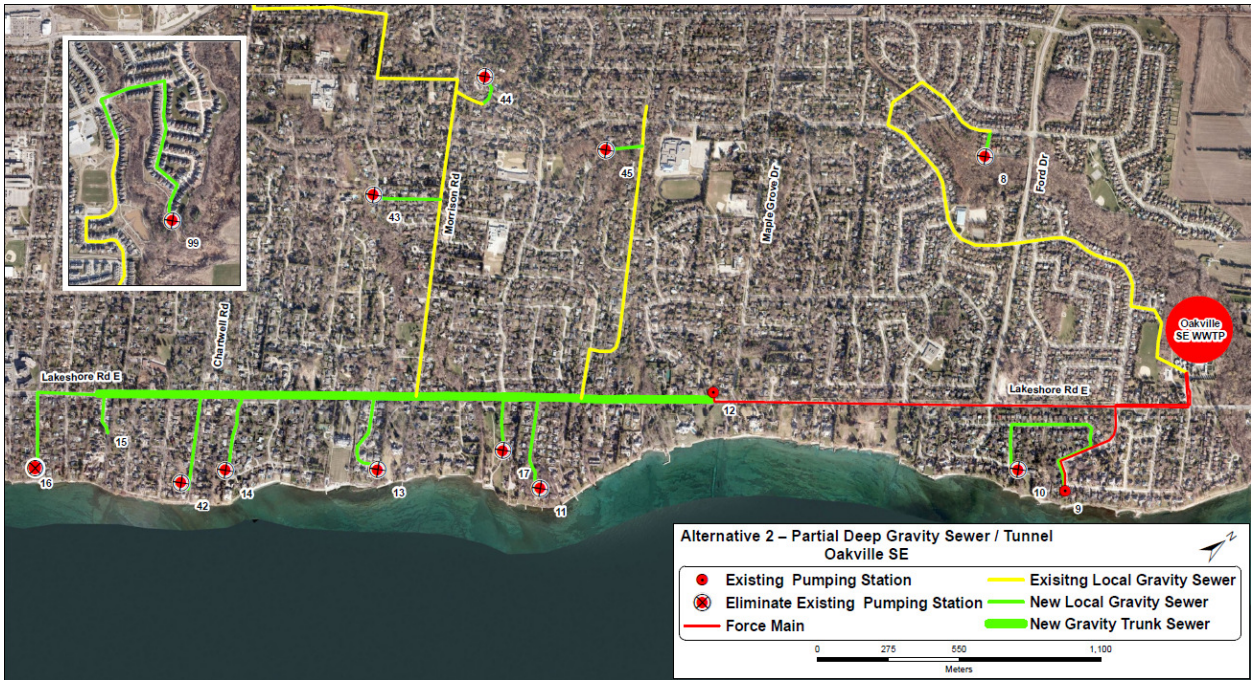
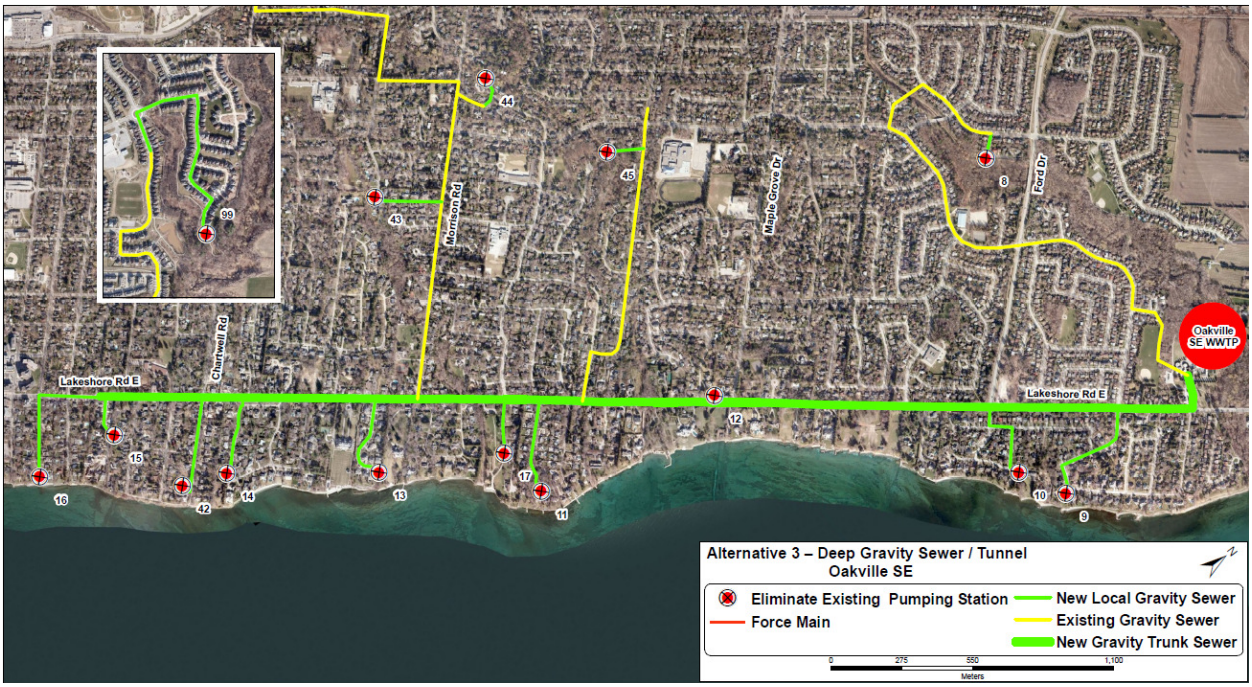


Figure 4.5 – Oakville SE Trunk (cont'd)

Alternative 3 – Deep Gravity Sewer / Tunnel

- eliminate all 14 pumping stations / construct new deep tunnel and connecting sewers



5.0 EVALUATION OF ALTERNATIVE SERVICING STRATEGIES

5.1 Overview of Evaluation Process

The evaluations of the alternative servicing strategies were performed separately for each sub-drainage area using a structured methodology based on the Kepner-Tregoe® rational model. This model is suited for environmental assessment analysis as a means to make decisions with a process that limits conscious and unconscious biases. It is designed to find the best possible solution that addresses the problem / opportunity statement with minimal negative impacts.

The process is comprised of five basic steps:

1. Identification of the evaluation criteria to compare each alternative - four categories were identified and specific criterion were identified with each category.
2. Identification of a weighting to be assigned to each category and then to each criteria within a category.
3. Preparation of an “alternatives / criteria” matrix with impact information for each alternative relative to the criterion as a basis for the analysis.
4. Completion of consensus-based rating of the alternatives as measured against each criteria providing relative scores based on the impact information.
5. The final step in the process was to select a preferred servicing strategy based on an interpretation of the results of the evaluation and to present a discussion of an approach for an implementation plan to transition from the current servicing strategy.

The final selection of the evaluation categories and criteria and their respective weighting were made within a formal consultation plan for public input throughout the various stages of the process. In addition the alternatives / criteria matrix information and results of the evaluation process were part of this public consultation process. This included presenting the information to the public at four (4) public information centres (PIC), documenting this information on the publicly accessible project website and reviewing the information at a number of External Technical Advisory Committee meetings with multiple approval and public agency representatives. The final evaluation process was carried out as a consensus approach in a workshop format involving the project team with representatives from various departments in Halton Region and the consultant representatives, including sub-consultant specialists.

5.2 Evaluation Categories / Criteria and Weighting

Four categories for evaluation were identified based on typical EA considerations. The final version of the category weightings and the specific criterion selected for each category are summarized in Table 5.1 including the relative weighting selected for each.

Table 5.1 - Categories, Criteria and Weightings

Category		Criteria	
Description	**Weighting**	**Description**	**Weighting**
Financial	**40%**	O&M Cost	10%
		Financing Flexibility	15%
		Total LCC Cost	75%
		TOTAL	**100%**
Environmental	**25%**	Terrestrial environment impact during construction	5%
		Terrestrial environment long term impact	20%
		Aquatic environment impact during construction	15%
		Aquatic environment long term impact	40%
		Ability to meet regulatory constraints	20%
		TOTAL	**100%**
Social	**20%**	Visual/Aesthetic Impact during construction	5%
		Visual/Aesthetic Impact – Long Term	15%
		Odour/Noise	20%
		Impact on Adjacent Land (New Land Requirements)	10%
		Archaeological Impact (including First Nation sites)	10%
		Heritage Impact	10%
		Reduction of Risk of Basement Flooding	30%
		TOTAL	**100%**
Operations / Technical	**15%**	Operations issues	30%
		Ease of maintenance (Health and Safety)	30%
		Constructability	30%
		Approvals (design compliance, C of A)	10%
		TOTAL	**100%**
TOTAL	**100%**		

The following commentary with respect to the evaluation categories / criterion is noted:

1. ***Financial*** – the premise of the Master Plan was to identify the most efficient and effective servicing strategy. Life cycle costing is a primary consideration and this was therefore assigned a higher weighting in comparison to other categories. An additional consideration was the feasibility of implementation by rating a factor identified as

'financing flexibility'. This considered the general timing of investment needs for a particular strategy (e.g. front-end loaded vs. evenly spread costs over a lifecycle). The Finance Department staff provided some additional analysis of the costing information in this regard that aided in understanding the sensitivity of different options with respect to overall financial impacts.

2. ***Environmental*** – the natural environmental factors were critical in terms of the impacting characteristics of a pumping strategy vs. a gravity pipe strategy on the environment. These factors generally favoured the decommissioning of pumping station options. Analyses of alternatives were carried out with a variety of environmental inventories and information (regulatory and otherwise) provided by the environmental sub-consultant, LGL Limited. The data collection and evaluation report that provided the information for the scoring workshop is included as Appendix C.
3. ***Social*** – the social environment was reviewed with a combination of land use and cultural (archaeological) / heritage resources that were impacted by the pumping station facilities, whether they were being decommissioned or retained for long term service. The review and documentation of the heritage resources are summarized in a report prepared by Archaeological Services Inc included as Appendix D.
4. ***Operations and Technical*** – these relate to issues associated with the operation of the existing pumping stations and considered operability, maintenance costs and related factors that concerned Regional staff. Of general concern was the large number of facilities, many of them very small, that need to be managed relative to the area being serviced. Many of the facilities are small and, in relative terms considered somewhat inefficient to manage.

5.3 Information Matrix for Rating of Alternatives Servicing Strategies

A basis for the actual evaluation of alternative servicing strategies required information on which to make an assessment. A significant effort was undertaken to collect, assemble and document environmental information related to each of the evaluation categories / criteria. This includes not only the natural and heritage aspects of the environment but also the social, financial and technical environment.

The summary of the information collected to support the evaluation process was documented in an Decision Matrix for each of the three (3) options associated with each drainage area as

represented in Figures 4.1 to 4.5. The Decision Matrix is documented in Appendix A in a series of five tables listed below. The list includes a reference to the drainage area figures detailed in Section 4 of this report.

- ***Appendix A***:
  - Table A1 – Burlington West (Figure 4.1)
  - Table A2 – Burlington East (Figure 4.2)
  - Table A3 – Oakville SW West (Figure 4.3)
  - Table A4 – Oakville SW East (Figure 4.4)
  - Table A5 – Oakville SE (Figure 4.5)

Background information supporting the details / impact statements documented in these Decision Matrix tables was collected and prepared by the project team. This includes computed information for the financial evaluation, investigative studies conducted as desk top and field visit exercises to understand the natural / cultural / social features associated with the pumping station locations and data extractions from operating records, operations staff commentary and site visit inspections for the operations / technical criteria. The following information / assessment reports are documented in the referenced appendices:

- ***Appendix C*** - natural heritage assessment report
- ***Appendix D*** - cultural heritage and archaeological assessment reports.

Each Decision Matrix table includes a listing of the individual pumping stations associated with the specific drainage areas. Impact statements and rating comments are provided for each criterion by pumping station. As appropriate, a summary or overall rating statement for each criterion is then provided to represent the combined pumping network for the drainage area.

Included in each Decision Matrix table is a summary representation of the results of the condition assessment and the hydraulic assessment completed by RVA and reported separately for each of the pumping stations. These results are documented in the form of a good, fair and poor rating using a simple colour coding (green, yellow, red) as represented in the matrix. In addition, the same colour coding is used to represent the results of the operational status of each pumping station, based on comments received from the system operators as well as a review of operational reports for the pumping stations.

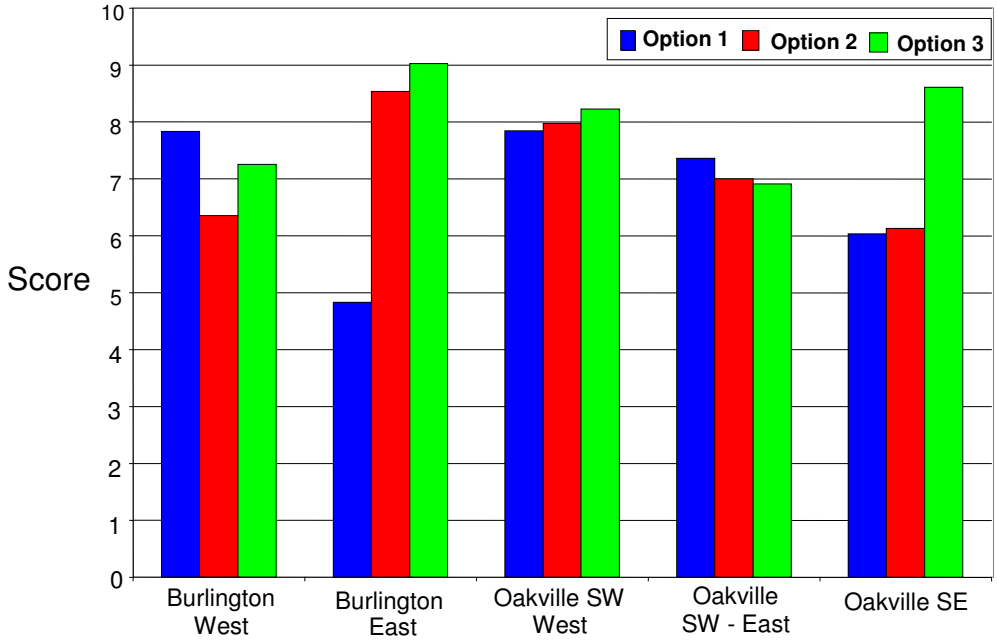
5.4 Rating of Alternatives

The Design Matrix tables discussed above were the primary input source to evaluate the alternative servicing concepts for each sub-drainage area *(Appendix A - Tables A.1 to A.5).* The alternatives were evaluated based on the impacts to each of the criteria and sub-criteria that were selected during the assessment process.

For each criterion the assessed rating / scoring for each of the three alternatives, relative to each other, was agreed upon in a consensus workshop involving the entire study team. The highest rated alternative was assigned a score of 10, and each alternative was then scored relative to the best. This process was repeated for each criterion. The individual scores were then multiplied by the weightings that were assigned to each criteria and sub-criteria and totaled in order to determine an overall score out of 10 for the three alternatives. An alternative with a higher score would be preferable to the one with a lower score.

The rating process was completed in a facilitated workshop involving the project team, including representatives of the consulting team / sub-consultants who had completed the data collection processes and Regional staff familiar with the individual facilities. The consolidated results of the evaluation are represented by drainage area in Figure 5.1. The full details of the evaluation workshop are included in *Appendix B*.

Figure 5.1 – Scoring Summary



5.5 Interpretation of Results to Select a Servicing Strategy Alternative

The evaluation process described in Section 5.1 was performed on all five sub-drainage areas and summarized in Figure 5.1. The interpretation of the results was reviewed with the project team in order to make a final Master Plan recommendation for a servicing strategy for the rationalization of the 59 pumping stations in the study area.

The following observations and comments are noted as relevant to the interpretation of the results of the evaluation process in determining a final recommendation from this EA process:

1. Each drainage area is unique. As observed in *Figure 5.1 – Scoring Summary*, there is no one alternative that consistently scored the best in each of five separate drainage areas. This is largely indicative of the variability of factors and features that characterize each drainage area.
2. Some of the key factors that impacted the scoring as it relates to the unique characteristics of each drainage area include:
    - The orientation (i.e. proximity and number) of pumping stations in the drainage area impacted the length and therefore cost of a trunk sewer that would be

required to eliminate the pumping stations. This factor impacted significantly on the financial criteria.

- The size of a pumping station also impacted the financial analysis. The elimination of larger pumping stations had a better return period on the capital investment required for a trunk sewer installation based on the savings associated with operating and maintaining the PS (i.e. energy costs, etc).

3. The original decisions that resulted in the establishment and orientation of the existing network of pumping stations would be expected to be different under current circumstances. This includes consideration of the proximity of trunk sewers available as discharge points, where some may not have existed at the time some of the stations were first constructed. The availability of cost effective and proven trenchless construction methodologies today would have been cost prohibitive or technologically not advanced to construct sewers at the time some of the stations were first constructed as well.
4. Environmental factors generally favoured the elimination of pumping stations, both from terrestrial and aquatic biological considerations.
5. Social factors generally favoured the elimination of pumping stations, however, issues related to potential impacts on heritage and archaeological features would require mitigation measures during construction of connecting sewers.
6. Financing flexibility generally favoured sustaining the existing pumping stations, primarily because the costs of rehabilitation and replacement, from a lifecycle perspective, would be spread more evenly over a long timeline, given the staggered timing if when major renewal investments would occur over 59 pumping stations. The low rating of the financing flexibility with Option 3 (i.e. construct a trunk sewer / tunnel system) was influenced by the assumption in the evaluation that the trunk sewer works would occur all at once at the beginning of the program.
7. In all cases, the operations and maintenance factors favoured the elimination of the pumping stations and the operational simplicity of a gravity sewer system. The vulnerability of future rising energy costs in operating a system of pumping stations factored into the technical / financial considerations.

Preferred Servicing Strategy Alternative

The analysis resulted in some drainage areas favouring the retention of the existing system of pumping stations and other drainage areas favoured elimination of the existing system of

pumping stations. This result, in the analysis, is driven by the inherent variability of drainage area characteristics and features. In consideration of this picture that "one size does not fit all" the preferred solution or concept for the Region's long term servicing strategy associated with the network of 59 pumping stations in the study area is to adopt **alternative 2** – eliminate as many sewage pumping stations as is technically and financially viable by providing gravity conveyance in certain areas by way of strategic timing and location of trunk sewer tunnel installations.

The implementation strategy, by the nature of the variability of the influencing factors, will need to be a guidance document that will aid management decisions for individual pumping stations based on the overall understanding of the status of those stations in the Master Plan – i.e. retain or eliminate in the long term. The strategy should also recognize that some of the factors may change over time and could potentially change the status of a pumping station in the Master Plan. This is discussed further in the *Section 7 – Pumping Station Master Plan*.

6.0 PUBLIC CONSULTATION

6.1 Overall Approach

This section provides an overview of the public consultation that was carried out. It also identifies the major issues raised in the Study. Detailed information on the consultation program is included in Appendix E.

This includes:

- communications materials sent;
- comprehensive list of issues raised and how they were addressed; and
- meeting notes from Public Information Sessions held.

6.1.1 Communications and Consultation Plan

As a first step in developing a Communications and Consultation Plan for the Wastewater Pumping Station Master Plan, Kidd Consulting carried out a Stakeholder Scan to gather information on preferences for communication and consultation, level of interest in the project and preliminary issues. Six stakeholders were interviewed by phone – three regional environmental agencies/groups (Conservation Halton, Oakville Green and Burlington Green) and three residents associations (one from Burlington and two from Oakville). Feedback was also obtained from the Halton Developers Liaison Committee. The feedback from the Stakeholder Scan, along with input from Regional staff and the Region's Guiding Principles for Public Consultation were used to shape the Communication and Consultation Plan which identified:

- the objectives of the Plan;
- the nature and timing of communication and consultation mechanisms to be used;
- preliminary issues;
- key messages to be used;
- roles and responsibilities; and
- how issue tracking would be carried out.

6.1.2 Communication and Consultation (Regional Staff and Councilors)

Consultation with Regional Staff primarily took place through the Internal Technical Advisory Committee (In-TAC). The In-TAC met twice at key points in the Master Plan, in advance of Public Information Centres – on Feb. 1 and May 28, 2010. Many members of the In-TAC also took part in a Scoring Workshop on May 14, 2010. Membership on the In-TAC included staff from the following Regional Departments: WW Design & Construction, W/WW Planning, WW Collection and Treatment (Maintenance & Operations), Finance, Current Planning, Business & Technical Services and Transportation.

Regional Councilors were provided with a Study Backgrounder in advance of the first PIC. E-mails and memos were sent to Council to provide notice of upcoming PICs.

6.1.3 Communication and Consultation (Agencies and Utilities)

Agencies and utilities were notified of the commencement of the Master Plan and the timing of Public Information Centres (PICs) by letter on Feb. 19, 2010 and May 27, 2010. Core agencies and utilities were invited to participate in the Master Plan External Advisory Committee (Ex-TAC). Not all core agencies chose to take part in the meetings. The core agencies that were invited included:

- City of Burlington (Planning and Engineering);
- Town of Oakville (Planning and Engineering);
- Conservation Halton;
- Halton Ecological and Environmental Advisory Committee;
- Halton Agricultural Advisory Committee;
- Niagara Escarpment Commission;
- Ministry of the Environment;
- Ministry of Natural Resources;
- Ministry of Transportation;
- Ministry of Public Infrastructure Renewal;
- Railways (CN/CP);
- Oakville Green; and
- Burlington Green.

The Ex-TAC met twice, on Feb. 1 and May 28, 2010, in advance of the PICs, to review the progress of the Study and provide comments.

6.1.4 Communication and Consultation (Public and Interest Groups)

Communication Materials

The following communication materials were used for the public and interest groups:

- *Ads* in local newspapers that provided information on the Notice of Commencement and the timing of PICs;
- *Backgrounders* and *Study Updates* that were posted to the Region's website, and sent to Residents Associations, Regional Environmental Groups, Councillors, the Halton Developers Liaison Committee and other interested parties;
- *Letters* mailed to residents living within 50 m of the pumping stations that provided information on the Notice of Commencement and the timing of PICs;
- *Background materials* and *PIC Meeting Reports* that were posted on the Region's website; and
- *Displays, presentations* and *handouts* that were used at PICs.

Consultation Mechanisms

The following consultation mechanisms were used for the public and interest groups:

- PICs were held at two stages in the process. PIC #1 was held on March 9, 2010 in Burlington and March 11, 2010 in Oakville. It focused on the Problem/Opportunity Statement, Conceptual Solutions and Evaluation Criteria. PIC #2 was held on June 15, 2010 in Oakville and June 16, 2010 in Burlington. It reviewed the Preferred Solution. The PICs were interactive: in addition to displays and handouts, the Study Team gave a presentation that was followed by a facilitated discussion. Feedback was obtained though verbal comments and written Comment Forms. PIC Meeting Notes were prepared and posted on the Region's website.
- Comments were also received by *e-mail.*

6.1.5 Communication and Consultation (First Nations and Aboriginal Groups)

Kidd Consulting and R.V. Anderson Associates undertook early identification of First Nations and aboriginal communities with potential interest in this undertaking through contacts at Indian

and Northern Affairs Canada (INAC) and Ontario's Ministry of Aboriginal Affairs. Initial letters sent on Feb. 19, 2010 were followed by phone calls.

6.2 Issues Raised

The list of issues raised and how they were addressed is provided in Table 1 of Appendix E. In general, there were relatively few concerns raised by the public. There was general support for the study itself, and the overall approach (which was to reduce the number of pumping stations). When provided with information, the general feeling was that reducing the number of pumping stations made sense from an economic, social and environmental point of view.

Key issues included:

- the usefulness of considering future needs beyond the 2031 timeline;
- the importance of careful staging;
- concern about the length of time the changeover to the new servicing concept would take;
- the need to quickly address some of the pumping stations where there are issues now;
- the need to consider the social impacts of pumping stations;
- the need to consider long-term (life cycle) costs in evaluating options; and
- the need to attribute a fair proportion of costs to development, where it will take place.

6.3 Consultation with Conservation Halton

The majority of pumping stations in the scope of this project are within or adjacent to lands regulated by Conservation Halton (CH). Therefore, specific consultation with CH was undertaken at strategic points throughout the Master Plan project. CH noted that some of the servicing strategies identified in the Master Plan recommended activities are contrary to CH policies, such as the expansion of a facility within a regulated area as proposed in the Burlington East drainage area (Appendix E).

A more detailed review of the Burlington East drainage area was undertaken to evaluate other servicing strategies. As a result, the Burlington East servicing strategy has been revised and is shown in Table 7.2. It should be noted that further study is still needed to satisfy the requirements of the Municipal Class EA for the revised Burlington East servicing strategy.

The following comments were provided by Conservation Halton after reviewing of a draft version of this Master Plan (refer to letters dated February 1, 2012 and July 10, 2012 in Appendix E) and these comments will be considered when further studies will be undertaken to satisfy the requirements of the Municipal Class EA for each of the drainage areas:

- Manicured portions of pumping stations that will be eliminated should be naturalized
- Potential impacts to species at risk should be re-evaluated closer to the time of construction
- Potential impacts of construction activities on overhanging trees should be re-evaluated closer to the time of construction
- Additional information beyond that provided in the Master Plan will be required at the time of detailed design, such as sewer depths, impacts to water courses, geological and hydrogeological information and dewatering requirements
- The proximity of any works to the shoreline of Lake Ontario should take into account the ongoing revisions and potential expansion of the CH regulated limits
- A component of the Schedule B EA activities should include a risk evaluation to determine whether the proposed servicing strategies decrease the wastewater system's exposure to flooding and erosion

7.0 PUMPING STATION MASTER PLAN

7.1 Preferred Pumping Station Management Strategy

The preferred pumping station management strategy is *"… to eliminate as many pumping stations as possible where there are net positive benefits (either financial, social, environmental or operational) while also noting that the timing for replacement or elimination of each pumping station will be dependent on a number of factors –e.g. sequencing of the installation of proposed trunk sewer tunnels, age / condition, capacity, financial viability and other factors"*.

A Master Plan has been developed based on a strategic combination of trunk sewer tunnel installations, decommissioning of pumping stations in conjunction with local gravity sewer connections to the trunk sewers, and pumping station upgrades to increase hydraulic capacity or lower influent grades as required. This Master Plan is a servicing strategy that will be refined and adjusted as the condition of the existing infrastructure changes and other opportunities arise to reconstruct existing infrastructure.

It is anticipated that projects resulting from the preferred servicing strategy will be subject to either a Schedule A+ or B type projects of the Municipal Class EA. This Master Plan will support more detailed studies to confirm servicing strategies and specific projects for each drainage area in order to satisfy the Municipal Class EA requirements.

Measures to mitigate the financial, environmental and social impacts will be taken into consideration when implementing the proposed works at each of the pumping stations. Environmental and heritage/archaeological mitigation measures are identified in Appendices C and D, respectively. Actual costs, timing and specific mitigation measures will be confirmed as part of further Class EA studies that will be undertaken for each drainage area to confirm the servicing strategies identified in this Master Plan.

7.2 Master Plan Implementation Strategy

This Master Plan addresses the management of the 59 pumping stations in the study area. It is intended to be a guide that will provide direction for implementing investment activities based on the overall preferred strategy recommended in this study. Individual plans are defined for each sub-drainage area. The ability and financial viability to eliminate pumping stations is impacted

by the unique characteristics of each area such as the distances between pumping stations, influent elevations relative to trunk sewer designs, and the condition and hydraulic capacity of each pumping station. As noted above, further EA studies will be undertaken for each drainage area to confirm the servicing scenarios identified in this Master Plan.

The Master Plan document is intended to be a guiding document for the Region's future capital planning associated with these pumping stations. By its nature, the plan needs to be flexible. A variety of factors could influence the actual decisions as to the work being implemented. The following are noted as simple examples:

- New construction techniques and technologies could make some currently unfeasible and expensive works possible and affordable. If such developments open the door to consider some adjustments to the plan as currently proposed, the plan should be sufficiently flexible to allow for some implementation changes.
- Dramatic rises in energy costs could change the lifecycle analysis results where it would be financially beneficial to eliminate more pumping stations by expending additional capital to construct deeper sewer tunnels.
- Implementation of other Master Plan or design projects that could potentially impact the alignment, profile or size of the existing gravity sewers (i.e. if an existing trunk sewer needs to be replaced it could be installed at a lower elevation, which will impact the servicing strategies in this Master Plan by making the elimination of additional pumping stations preferable).

Tables 7.1 to 7.5 and Figures 7.1 to 7.5 present the preferred servicing strategy for each of the five sub-drainage areas. The strategies show the combination of capital projects, including a proposed timing and/or sequencing of the works considering issues such as the observed condition of each pumping station relative to its lifecycle and any proposed hydraulic capacity deficiencies required to service current and future flows.

The capital investments are identified in timelines noted as short term, medium term and long term. While these periods can vary, in general they reflect activities within 10 years, 10 to 20 years and greater than 20 years respectively. The actual timing of activities will be determined through the Region's capital planning processes each year based on system priorities and financial position. In some instances certain activities depend on completion of related works. These dependencies are noted in the plan. The following tables summarize the Master Plan

activities based on the assessment of information collected during the course of the study. It should also be noted that the capital investments identified in the Implementation plan are in 2012 dollars and do not include other costs for items such as design, additional environmental assessments, contingencies, etc.

7.2.1 Burlington West Servicing Strategy

The Burlington West servicing strategy is summarized in Table 7.1 below. The strategy identifies the elimination of 3 of the 15 pumping stations in this sub-drainage area.

Table 7.1 - Burlington West Servicing Strategy

Station Name	PS #	Capital Project Activities (EA Schedule)	Dependent Activities	Master Plan Capital Investment $(000) and Suggested Timeline		
				Short Term	Medium Term	Long Term
Cardinal Dr	48	• Decommission PS (A+) • Install local connecting sewer (A+)	-	-	1,300	-
Spring Garden	38	• Decommission PS (A+) • Install local connecting sewer (A+)	-	-	1,100	-
Lasalle Park	54	• Reconstruct PS (B)	-			1,100
Oakland Park	40	• Decommission PS (A+) • Install local connecting sewer (A+)	Upgrade PS 54			400
Northshore Blvd	57	-	-			
Grandview Ave	74	-	-			
Unsworth Ave	71	-	-			
Bayshore Blvd	73	-	-			
Budgeview St	77	-	-			
Garden Trails	92	-	-	-	-	-
Northshore Blvd	72	-	-	-	-	-
Indian Road	68	-	-	-	-	-
Stillwater Cres	70	-	-	-	-	-
Edgewater Cres	37	-	-	-	-	-
Danforth Pl	41	-	-	-	-	-
TOTAL CAPITAL ESTIMATES ($000)				**-**	**$2,400**	**$1,500**

The Burlington West sub-drainage area is the least conducive to implementing the strategy of eliminating pumping stations. The reason for this is the small size and long distances between many of the pumping stations whose lifecycle cost savings fall short of the lifecycle costs estimated for installing and managing a trunk sewer tunnel.

However, there is an opportunity for the future potential to eliminate 7 additional pumping stations in the most westerly upstream reach of this drainage area. A large drop in elevation of the existing trunk sewer along Plains Road was noted in the area of Railway Road. When this upper section of trunk sewer needs to be rehabilitated to sustain its service value there will be the potential to replace it with a deeper trunk sewer (tunnel) that drains by gravity into the lower elevation trunk sewer. This option should be evaluated during the preliminary planning process.

In summary, the servicing strategy for Burlington West includes an estimated capital investment of $3.9 million over the medium and long term time periods to eliminate 3 of the 15 pumping stations.

7.2.2 Burlington East Servicing Strategy

The Burlington East servicing strategy is summarized in Table 7.2 below. The strategy identifies the elimination of 5 of the 8 pumping stations in this sub-drainage area and the construction of several sections of trunk and local sewer. The primary project in this sub-drainage area is the consolidation of five pumping stations into one through the construction of a new deep sewage pumping station, a new force main, and new local sewers. It is noted that the sequencing of pumping stations that are proposed to be eliminated is highly dependent on completing particular sections of trunk sewer.

The pumping stations identified for elimination include several that have been proposed for renewal in the Region's recent capital program. The condition of these stations and the need to either rehabilitate them or eliminate them establishes this as the highest priority area.

Table 7.2 - Burlington East Servicing Strategy

Station Name	PS #	Capital Project Activities (EA Schedule)	Dependent Activities	Master Plan Capital Investment $(000) and Suggested Timeline		
				Short Term	Medium Term	Long Term
Elizabeth Gardens	31	• Trunk sewer PS35 to PS31 (A+) • Upgrade PS (B) • New forcemain (B)		55,000	-	-
Lakeshore Road	35	• Decommission PS 35 (A+)	PS31 Works	600	-	-
Lakeshore Road	32	• Decommission PS 32 (A+)	PS31 Works	600	-	-
Belleview St	69	• Local connecting sewer (A+) • Decommission PS 69 (A+)	-	-	700	-
Appleby Pl	67	• Local connecting sewer (A+) • Decommission PS 67 (A+)	PS31 Works		500	
Pinedale	30	• Local connecting sewer (A+) • Decommission PS 30 (A+)	PS31 Works			2,400
Lakeshore Rd	34	-	-			
Junction St	33	-	-			
TOTAL CAPITAL ESTIMATES ($000)				**56,200**	**$1,200**	**$2,400**

In summary, the Burlington East servicing strategy includes an estimated capital investment of $59.8 million with the majority in the short term time frame to eliminate 5 of the 8 pumping stations.

7.2.3 Oakville SW - West Servicing Strategy

The Oakville SW West servicing strategy is summarized in Table 7.3 below. The strategy identifies the elimination of 6 of the 9 pumping stations in this sub-drainage area.

Table 7.3 – Oakville SW-West Servicing Strategy

Station Name	PS #	Capital Project Activities (EA Schedule)	Dependent Activities	Master Plan Capital Investment $(000) and Suggested Timeline		
				Short Term	Medium Term	Long Term
Timber Lane	26		-	Project implemented in 2012 to eliminate this PS		
Sheldon Creek	50	• Local connecting sewer (A+) • Decommission PS 50 (A+)	-	-	3,200	-
Marine Drive	64	• Trunk sewer WWTP to PS64 (A+) • Decommission PS 31 (A+)	-	-	-	21,000
Coronation Park	65	• Local connecting sewer (A+) • Decommission PS 65 (A+)	Upgrade PS64	-	-	600
Belvedere	66	• Local connecting sewer (A+) • Decommission PS 66 (A+)	Upgrade PS64	-	-	600
Hixon St	27	• Local connecting sewer (A+) • Decommission PS 27 (A+)	-			100
Bronte Yacht Club	28	-	-	-	-	-
West River	29	-	-	-	-	-
West 18	25	-	-	-	-	-
TOTAL CAPITAL ESTIMATES ($000)				**-**	**$3,200**	**$22,300**

West 18 Pumping Station has recently been upgraded as part of the Oakville SW wastewater treatment expansion. The wet well elevation is the controlling grade with respect to any deep sewer tunnel that might be considered for this sub-drainage area.

Bronte Creek is a major natural feature that creates two distinctive areas within the sub-drainage area. The impact of this feature establishes the need to sustain the West River pumping station as it conveys sewage across the creek to a gravity system on the east side.

The majority of the servicing strategy is proposed to be implemented in the long term including projects to construct a trunk sewer tunnel along Lakeshore Road, running in a westerly direction from the Oakville SW wastewater treatment plant and the elimination of three existing pumping stations.

In summary, the Oakville SW West servicing strategy includes an estimated capital investment of $25.5 million with the majority in the long term time frame to eliminate 6 of the 9 pumping stations.

7.2.4 Oakville SW East Servicing Strategy

The Oakville SW East servicing strategy is summarized in Table 7.4. The strategy identifies the elimination of 4 of the 12 pumping stations in this sub-drainage area.

Similar to Burlington West, this sub-drainage area is not conducive to the elimination of pumping stations with a deep sewer tunnel installation. The existing pumping stations that can be eliminated are generally independent of any related activities and only require the installation of a local connecting sewer from the pumping station site to an existing sewer.

Table 7.4 – Oakville SW-East Servicing Strategy

Station Name	PS #	Capital Project Activities (EA Schedule)	Dependent Activities	Master Plan Capital Investment $(000) and Suggested Timeline		
				Short Term	Medium Term	Long Term
Water St	7	• Upgrade PS 7 (B) • New forcemain (A+)	-	-	450	-
Navy St	18	• Local connecting sewer (A+) • Decommission PS 18 (A+)	Upgrade PS 7	-	650	-
Sheppard Rd	47	• Local connecting sewer (A+) • Decommission PS 47 (A+)	-	-	-	Cost for these projects are included in the Sustainable Halton Master Plan
Stirling Dr	56	• Local connecting sewer (A+) • Decommission PS 56 (A+)	-	-	-	
Riverside Dr	46	• Local connecting sewer (A+) • Decommission PS 46 (A+)	-	-	2,000	-
Westdale Rd	24	-	-	-		-
Birch Hill Lane	23	-	-	-	-	-
Shorewood Pl	52	-	-	-	-	-
Lakewood Dr	20	-	-	-	-	-
Walker St	21	-	-	-	-	-
Overton Pl	75	-	-	-	-	-
Rebecca St	81	-	-	-	-	-
TOTAL CAPITAL ESTIMATES ($000)				**$0**	**$3,100**	**$0**

In summary, the Oakville SW East servicing strategy includes an estimated capital investment of $3.1 million in the medium term time frame to eliminate 2 of the 12 pumping stations.

7.2.5 Oakville SE Servicing Strategy

The Oakville SW East servicing strategy is summarized in Table 7.5. The plan identifies the elimination of 13 of the 15 pumping stations in this sub-drainage area.

The Oakville SW East servicing strategy recommends upgrading one of the pumping stations and lowering its inlet elevation to consolidate flows and accommodate the elimination of 7 pumping stations in the west half of the sub-drainage area. Other pumping stations can be eliminated with the construction of local gravity sewers that will connect to an existing gravity sewer.

Table 7.5 – Oakville SE Servicing Strategy

Station Name	PS #	Capital Project Activities (EA Schedule)	Dependent Activities	Master Plan Capital Investment $(000) and Suggested Timeline		
				Short Term	Medium Term	Long Term
Cedarberry	8	• Local connecting sewer (A+) • Decommission PS 8 (A+)	-	-	200	-
Carrington Pl	9	• Reconstruct PS at lower elev (B)	-	-	1,100	-
Chancery Lane	10	• Local connecting sewer (A+) • Decommission PS 10 (A+)	Upgrade PS 9	-	1,700	-
Ninth Line	12	• Reconstruct PS at lower elev (B)	-	-	8,500	-
Ennisclaire Dr	11	• Trunk sewer PS 12 to PS 13 (A+) • Local connecting sewers (A+) • Decommission PS 11, 17 & 13(A+)	Upgrade PS 12	-	19,000	-
Gairloch Gardens	17					
Belair Estates	13					
Argyle Dr	14	• Trunk sewer PS 13 to PS 16 (A+) • Local connecting sewers (A+) • Decommission PS 14, 42, 15 &16 (A+)	Trunk sewer to PS 13	-	20,000	-
Chartwell Rd	42					
Raymar Pl	15					
First St	16					
Weaver	45	• Local connecting sewer (A+) • Decommission PS 45 (A+)	-	-	-	300
Morrison Heights	43	• Local connecting sewer (A+) • Decommission PS 45 (A+)	-	-	-	800
Cumnock	44	• Local connecting sewer (A+) • Decommission PS 44 (A+)	-	-	-	200
Joshua Creek	99	• Local connecting sewer (A+) • Decommission PS 99 (A+)	-	-	-	400
TOTAL CAPITAL ESTIMATES ($000)				**$0**	**$50,500**	**$1,700**

In summary, the Oakville SE servicing strategy includes an estimated capital investment of $52.2 million in the medium and long time frames to eliminate 13 of the 15 pumping stations.

7.3 Master Plan Summary

The total estimate of capital works, in 2012 dollars, to implement the Master Plan across the full study area is summarized in Table 7.6 below.

Table 7.6 - Master Plan Summary

Sub-Drainage Area	Number of Pumping Stations	Number of Pumping Stations Eliminated	Master Plan Capital Investment $(000) and Suggested Timeline		
			Short Term	Medium Term	Long Term
Burlington West	15	3	-	$2,400	$1,500
Burlington East	8	5	56,200	$1,200	$2,400
Oakville SW West	9	6	0	$3,200	$22,300
Oakville SW East	12	4	0	3,100	0
Oakville SE	15	13	0	50,500	1,700
TOTALS	**59**	**31**	**$56,200**	**$60,400**	**$27,900**

Summary comments for the Master Plan for the strategic management of 59 pumping stations located in the Burlington and Oakville south drainage areas are noted as follows:

- A number of pumping stations may be eliminated with the full implementation of the Master Plan servicing strategy.
- Master plan projects identified in this report need to undergo additional environmental assessments and preliminary engineering reviews to confirm the feasibility, priorities, timing, costs and details of the implementation approach. The EA classification should be reviewed and confirmed as part of the preliminary engineering reviews. The reviews also need to confirm environmental mitigation measures.
- The implementation of the Master Plan would be managed through the Region's capital planning process.
- Timing of the various Master Plan projects within the short, medium and long term timeframes offers a significant degree of flexibility to plan the financing of the works.

- Factors that were considered in the Master Plan analysis can change over time (e.g. cost of energy) with the potential to change some of the results, including the identification of pumping stations that may be eliminated. These changes need to be monitored to determine if a re-evaluation is warranted at different times.
- Cost estimates for proposed works were developed to include decommissioning costs for PSs if they are to be eliminated. Costs for local sewers were generally developed using a unit rate of $2,000/m, for trunk tunneled sewers at $10,000/m, and for force mains and any pumping station upgrades (deepening, new pumps, etc.) estimates were based on comparative costs from recent similar works. In some cases the unit rate for the local sewers was modified based on the expected depth, construction method, or other factors specific to the individual project. The costs do not include allowances for environmental assessments, design, contingency, etc.

Figure 7.1 - Burlington West Trunk Servicing Strategy

Existing Pumping Station

Eliminate Existing Pumping Station

Exisiting Forcemain

New Gravity Sewer - Short Term

New Gravity Sewer - Medium Term

New Gravity Sewer - Long Term

Existing Gravity Trunk Sewer

0 250 500 1,000

Meters

Date: June, 2012

R.V. Anderson Associates Limited

engineering · environment · infrastructure

Figure 7.2 - Burlington East Trunk Servicing Strategy

Date: June, 2012

R.V. Anderson Associates Limited
engineering · environment · infrastructure

Rebecca St
Rebecca St
Rebecca St
Mississauga St
Bronte Creek
Bronte Rd
Lakeshore Rd W
3rd Line
Marine Dr
Oakville SW WWTP
27
28
29
64
25
65
66
26
50
PS# 26 is in the process of being eliminated.

New Gravity Sewer - Short Term
New Gravity Sewer - Medium Term
New Gravity Sewer - Long Term
Existing Gravity Trunk Sewer
New Gravity Trunk Sewer - Long Term
Existing Pumping Station
Eliminate Existing Pumping Station
Existing Forcemain

Figure 7.3 - Oakville SW West Trunk Servicing Strategy

0 125 250 500
Meters

Date: June, 2012

R.V. Anderson Associates Limited
engineering · environment · infrastructure

Speers Rd
Speers Rd
Valley Dr
4th Line
Morden Rd
Dorval Dr
Kerr St
Fourteen Mile Creek
Rebecca St
Rebecca St
Lakeshore Rd W
Lakeshore Rd W
Sixteen Mile Creek
Sixteen Mile Creek
Oakville
SW WWTP
47
75
47
46
52
81
7
46
81
7
52
23
20
21
18
24
56
25
Upgrade Existing PS
and Forcemain

New Gravity Sewer - Short Term
New Gravity Sewer - Medium Term
New Gravity Sewer - Long Term
Existing Local Gravity Sewer
Existing Gravity Trunk Sewer
New Gravity Trunk Sewer - Long Term
Existing Pumping Station
Eliminate Existing Pumping Station
Existing Forcemain
New Forcemain - Medium Term

Figure 7.4 - Oakville SW East Trunk Servicing Strategy

0 125 250 500
Meters

Date: June, 2012

R.V. Anderson Associates Limited
engineering · environment · infrastructure

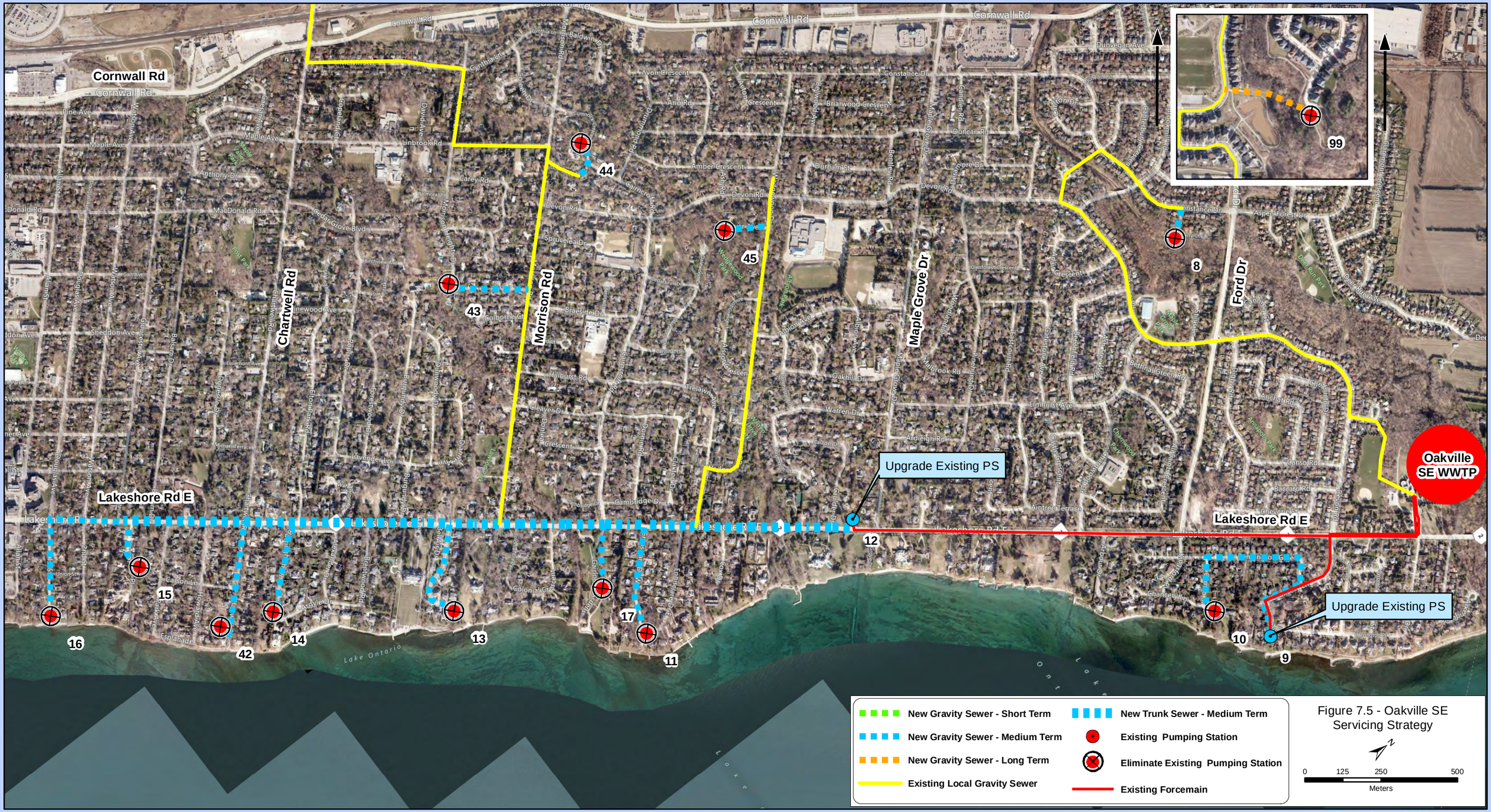


Figure 7.5 - Oakville SE Servicing Strategy

Date: June, 2012

R.V. Anderson Associates Limited
engineering · environment · infrastructure