Regional Municipality of Halton

Project File Report:
Municipal Class Environmental Study for Capacity Increase of the Oakville Water Purification Plant

Type of Document
FINAL

Project Name
Oakville WPP Class EA

Project Number
Halton reference: PR-2989A
exp reference: BRM-00605015-A0
GHD reference: 8811884
Hatch reference: H-136091

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Date Submitted
August 31, 2016 (rev. November 2016)

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Executive Summary

Overview

In 2011, Halton Region (the Region) completed the Sustainable Halton Water and Wastewater Master Plan (Master Plan). The Master Plan recommended that the existing capacity of the Oakville Water Purification Plant (WPP) be increased from 109 million litres per day (ML/d) to 130 ML/d to ensure that the growing demand for drinking water within the Region for the 2031 planning horizon is met. The Master Plan also identified an intake extension as a potential requirement.

In May 2014, the Region embarked on a Municipal Class Environmental Assessment study (Class EA) to increase the capacity of the Oakville WPP to 130 ML/d and to identify a preferred solution to managing occasional high raw water turbidity. The Class EA has been carried out following the Schedule 'B' planning process of the Municipal Class EA (as amended), as approved under the Environmental Assessment Act (EA Act) R.S.O. 1990, Chapter E.18. This Project File Report documents the process undertaken and its conclusions.

Problem Statement

The purpose of this Class EA study is included in its Problem Statement, which reads:

> *The purpose of the Class Environmental Assessment study is to identify a preferred solution to meet the water servicing objectives for the South Halton area in accordance with the Sustainable Halton Water and Wastewater Master Plan, 2011. The study is also investigating potential risks to security of supply including occasional raw water quality issues as the result of Sixteen Mile Creek influences.*

The intent of the above Problem Statement was operationalized through the following twofold objectives:

- To meet the servicing objectives in accordance with the Sustainable Halton Water and Wastewater Master Plan, 2011, through a capacity increase of the Oakville WPP from 109 up to 130 ML/d; and
- To investigate risks associated with security of supply related to raw water turbidity influences from Sixteen Mile Creek

The project is being conducted as a Schedule B Municipal Class EA. However, if the preferred alternative were to modify or upgrade the raw water intake, then the project schedule would be increased to Schedule C, which would require completion of Phases 3 and 4 of the Municipal Class EA process.

Identification and Evaluation of Alternative Solutions

The identification of alternative solutions to address the problem statement was conducted in two stages:

- First, alternative solutions to address increasing the capacity of the Oakville WPP from 109 ML/d up to 130 ML/d with a consideration toward managing raw water turbidity episodes were identified and screened;
- Second, detailed descriptions of the alternative solutions were developed and carried forward.

The following three alternative solutions were identified based on the problem statement and on discussions between the Region and the project team. Sub-alternatives have also been

identified as applicable. All viable alternatives and sub-alternatives that pass the initial screening were carried forward for detailed description and comparative evaluation:

1. **Do Nothing** - this alternative solution consists of operating the Oakville WPP using its existing equipment, which includes all plant upgrades made until completion of the Region's Phase 2 Upgrade project in December 2014. No further changes or additions would be made to the Oakville WPP to either meet the growing demand for drinking water within the Region for the 2031 planning horizon or address the occasional high raw water turbidity issues. The Do Nothing alternative establishes the baseline for comparison purposes.
2. **Rerate the Existing WPP** - this alternative would involve re-rating the WPP up to 130 ML/d with minor capital in-plant upgrades to optimize plant performance to achieve the re-rated production capacity. This alternative has three sub-alternatives for addressing risks associated with the security of supply related to raw water turbidity influences from Sixteen Mile Creek, as follows:
    A. Implement a plant-based solution to address security of supply risks associated with raw water turbidity episodes;
    B. Extend the existing intake to address security of supply risks associated with raw water turbidity episodes;
    C. Build a new intake to address security of supply risks associated with raw water turbidity episodes.
3. **Expand the Existing WPP** - this alternative would involve the physical expansion of the WPP by constructing additional process modules as required capable of the additional net 21 ML/d production required to increase the plant's total net capacity from 109 ML/d to 130 ML/d. Similar to alternative solution 2, This alternative has three sub-alternatives for addressing risks associated with the security of supply related to raw water turbidity influences from Sixteen Mile Creek, as follows:
    A. Implement a plant-based solution to address security of supply risks associated with raw water turbidity episodes;
    B. Extend the existing intake to address security of supply risks associated with raw water turbidity episodes;
    C. Build a new intake to address security of supply risks associated with raw water turbidity episodes.

Alternatives 1 and 3 were screened out based on technical feasibility. Alternative 2: Re-rating the existing WPP and its sub-alternatives were carried forward for further evaluation. The three sub-alternatives (referred to as the screened alternative solutions) were defined as follows:

- **Screened Alternative 2A: Rerate with in-plant solution**
    - Perform minor upgrades to optimize plant performance to achieve up to 130 ML/d production capacity;
    - Implement a plant-based solution to address security of supply risks associated with raw water turbidity episodes;

- **Screened Alternative 2B: Rerate with intake extension**
  - Perform minor upgrades to optimize plant performance to achieve up to 130 ML/d production capacity;
  - Extend the existing intake to address security of supply risks associated with raw water turbidity episodes;
- **Screened Alternative 2C: Rerate with new intake**
  - Perform minor upgrades to optimize plant performance to achieve up to 130 ML/d production capacity;
  - Build a new intake to address security of supply risks associated with raw water turbidity episodes;

The preferred solution was identified amongst the three screened alternative solutions using a set of evaluation criteria that was developed through in consultation with the Stakeholder Advisory Committee and Halton Region's Halton Water staff including plant operators. A comprehensive set of evaluation criteria were developed to facilitate evaluation of the proposed screened alternatives. The criteria are divided in five categories, namely:

- Natural Environment;
- Social Environment;
- Cultural Environment
- Technical; and
- Economic.

The evaluation process included a three step assessment and comparative evaluation process, which included:

- Step 1: Complete comparative evaluation of the proposed screened alternatives against evaluation criteria under each category;
- Step 2: Identify a preliminary preferred solution based on reviewing the advantages and disadvantages determined through Step 1.
- Step 3: Establish the preferred solution following consultations with the Stakeholder Advisory Committee, Halton Region's Halton Water staff including plant operators, and public.

Preferred Alternative Solution

Based on the evaluation, Alternative 2A was identified as the most preferred because it would have the lowest impacts with respect to the natural and social environment while at the same time adequately addressing security of supply risks associated with raw water turbidity. It also has the lowest cost.

Abbreviations and Acronyms

AA	archeological assessment
c.	circa
Class EA	Class Environmental Assessment
DFO	Department of Fisheries and Oceans
EAA	Environmental Assessment Act, R.S.O 1990
km	kilometers
LLPS	low lift pumping station
m	meters
MEA	Municipal Engineers Association [Ontario]
mg/L	milligrams per litre
ML/d	million litres per day
mm	millimeters
MNO	Métis Nation of Ontario
MNRF	Ontario Ministry of Natural Resources and Forestry
MOECC	Ontario Ministry of Environment and Climate Change
MW	megawatt
NTU	Nephelometric Turbidity Unit
OWPP	Oakville Water Purification Plant
PIC	Public Information Centre
R.S.O.	Revised Statute of Ontario
SAC	Stakeholder Advisory Committee
SAR	Species at Risk
SCADA	supervisory control and data acquisition
WPP	water purification plant

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1 Introduction

1.1 Overview

In 2011, Halton Region (the Region) completed the Sustainable Halton Water and Wastewater Master Plan (Master Plan). The Master Plan recommended that the existing capacity of the Oakville Water Purification Plant (WPP) be increased from 109 million litres per day (ML/d) to 130 ML/d to ensure that the growing demand for drinking water within the Region for the 2031 planning horizon is met. The Master Plan also identified an intake extension as a potential requirement for the capacity increase.

In May 2014, the Region embarked on a Municipal Class Environmental Assessment study (Class EA) to increase the capacity of the Oakville WPP to 130 ML/d and to identify a preferred solution to managing occasional turbidity. The Class EA has been carried out following the Schedule 'B' planning process of the Municipal Class EA (as amended), as approved under the Environmental Assessment Act (EAA) R.S.O. 1990, Chapter E.18. This Project File Report documents the process undertaken and its conclusions.

The report is organized into the following sections:

- Section 2: Project Background;
- Section 3: Problem Statement;
- Section 4: Project Study Area;
- Section 5: Alternative Solutions;
- Section 6: Evaluation of Alternative Solutions;
- Section 7: Stakeholder Consultation; and
- Section 8: Commitments and Monitoring.

1.2 Class Environmental Assessment Process Overview

All Municipalities in Ontario are subject to the provisions of the Ontario Environmental Assessment Act (EAA) and its requirements to prepare a Class EA for applicable public works projects. These requirements can be met by following the Municipal Class EA Process as described by the Ontario Municipal Engineers Association (MEA) Municipal Class Environmental Assessment document (2000, amended 2007, 2011, & 2015). The Municipal Class EA applies to a group or class of municipal water, wastewater and road projects that occur relatively frequently and have relatively minor and predictable impacts.

Class EA projects fall into four schedules (i.e. categories) of undertakings depending on the extent of their potential impact. These include:

- Schedule A: Includes normal or emergency operational and maintenance activities; projects have minimal environmental effects and are pre-approved;
- Schedule A+: Projects are pre-approved, but public is to be advised of project before implementation;
- Schedule B: Includes improvements and minor expansions to existing facilities; projects may have potential for some adverse environmental impacts, therefore requires a screening process including consultation with potentially affected stakeholders;

- Schedule C: Includes construction of new facilities or major expansions to existing facilities; project may have potential for significant environmental effects and must proceed through full Class EA planning process.

Rerating of an existing water treatment facility is classified as a Schedule B project. Therefore, this Class EA is designated as a Schedule B Class EA.

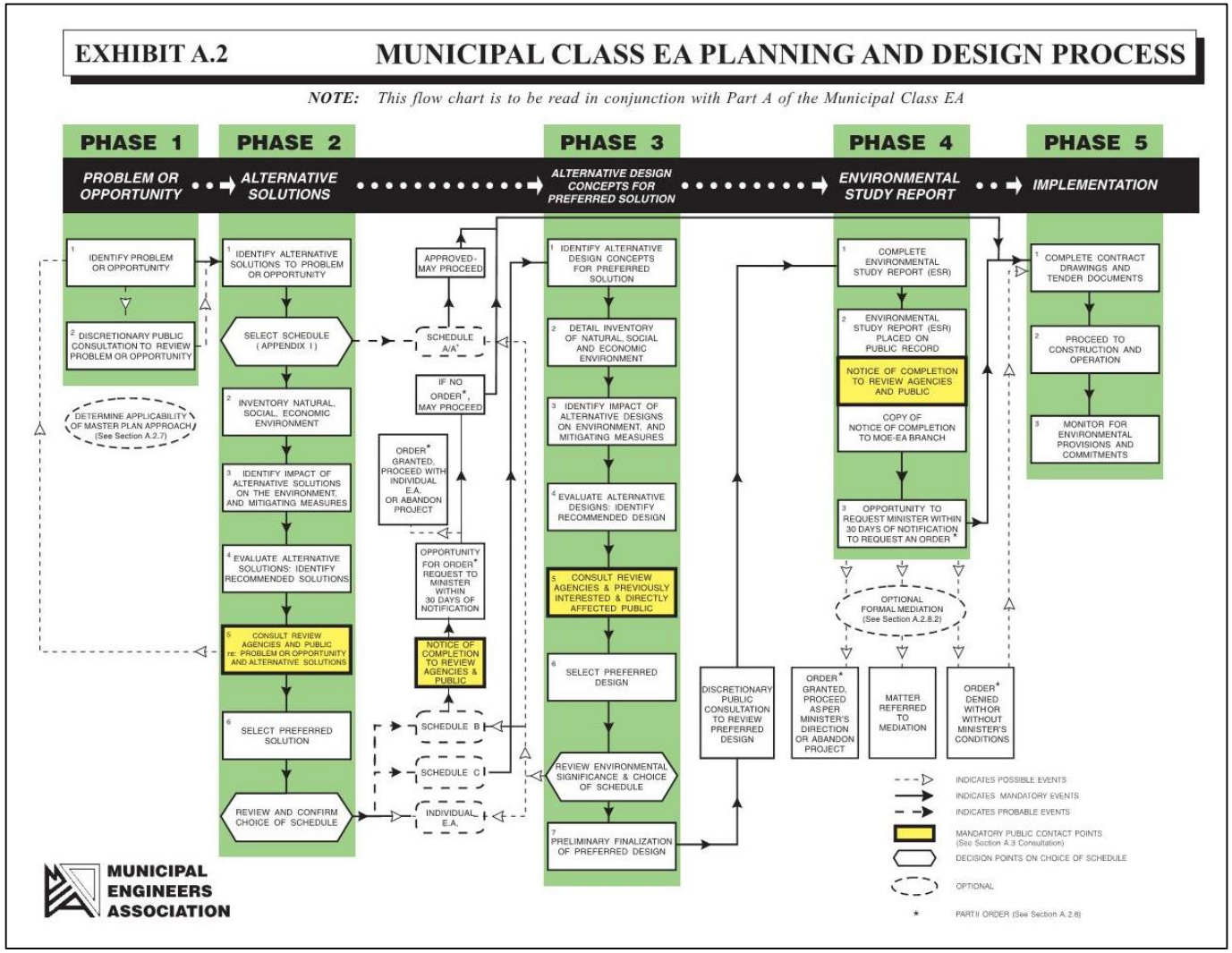
There are three phases to a Schedule B Class EA process. These include:

- **Phase 1 - Identify the Problem (deficiency) or Opportunity**: Identify the problem or the opportunity that the Class EA is intended to address.
- **Phase 2 - Identify and Evaluate Alternative Solutions**: Identify alternative solutions to the problem or opportunity by taking into consideration the existing environment and establish the preferred solution accounting for public and agency review and input. Document the planning process in a Municipal Class EA project file and make such documentation available for scrutiny by review agencies and the public.
- **Phase 5 - Implementation**: Complete contract drawings and documents, proceed to construction and operation and monitor construction for adherence to environmental provisions and commitments. Where special conditions dictate, also monitor the operation of the completed facilities.

Phases 3 (Evaluation of Alternative Design Concepts) and 4 (Environmental Study Report) are completed in Schedule C Class EA projects but are not required for Schedule B Class EA projects.

Figure 1 illustrates the Municipal Class EA process.

Figure 1: Municipal Class EA Process



2 Project Background

2.1 Sustainable Halton Water and Wastewater Master Plan

Halton Region is situated around the south-western end of Lake Ontario and is one of the fastest growing regions in North America. The large majority of the Region's residents in the City of Burlington, Town of Oakville, and parts of Town of Milton are serviced by the South Halton Lake-based System which includes the three water purification plant (WPP) facilities (Burlington WPP, Oakville WPP and Burloak WPP). In 2011, Halton Region completed the Sustainable Halton Water and Wastewater Master Plan (Master Plan). The Master Plan recommended that the existing capacity of the Oakville WPP (located at 21 Kerr Street, Oakville) be increased from 109 million litres per day (ML/d) to 130 ML/d to ensure that the growing demand for drinking water within the Region for the 2031 planning horizon is met. Also, Appendix 1-10 of the Master Plan identifies the intake extension as a required project in the Water Capital Program (project #'s 6680 and 6681). It is understood that the context behind the recommendation was to address occasional high raw water turbidity episodes at the intake, though this is not explicitly stated in the Master Plan.

The projects that are the focus of this Class EA (rerating the Oakville WPP and the potential intake extension to address raw water turbidity) were identified through the completed Schedule B, 2011 Sustainable Halton Water/Wastewater Master Plan and is consistent with the target figures of the population and employment growth in the catchment area.

2.2 The Oakville Water Purification Plant

2.2.1 Treatment Process and Recent Upgrades

The property occupied by the Oakville Water Purification Plant (WPP) is located at 21 Kerr Street, Town of Oakville (see Figure 2). The WPP was originally constructed in several stages beginning in 1908 to meet the needs of a growing community. The lands are generally located within an existing residential area of South Oakville, south of Lakeshore Road East, west of the Sixteen Mile Creek and separated from the Lake Ontario waterfront by an open space.

The Oakville WPP represents conventional filtration facility that treats water from Lake Ontario and services the majority of the urban area of Oakville. Water from the Oakville WPP is combined with water from the Burlington system and is distributed to the lake-based pressure zones.

The plant has undergone numerous upgrades and expansions since it was first constructed in 1908. A preliminary design for facility upgrades and expansion of the site was prepared in 1993. Additional site area was available to expand the existing treatment plant to up to a nominal rated capacity of 218 ML/d. However, existing lands available for this expansion were used as recreational park land.

The most recent upgrades started in 2007 under a 2-phase program. Phase 1 upgrades were completed in 2008 and included pre- chlorination for zebra mussel control, pre-treatment using Actiflo®, taste and odour control and primary disinfection through intermediate ozonation, dual media filtration, air scour backwash system (two new blowers), secondary disinfection by gaseous chlorination, and process residuals treatment by gravity thickening/clarification.

Phase 2 upgrades and state of good repair works were completed in December 2014 and included the replacement of the four vertical turbine low lift pumps, filter underdrain replacement, filter backwash pump replacement, a new high lift pumping station, modifications to the waste holding tank, and other miscellaneous upgrades.

The current arrangement of the raw water intake piping for the Oakville WPP allows for two intake pipes. Figure 3 presents 'As-Built' drawing information from the construction of the 2130 mm diameter water intake extension. The original 750 mm diameter Intake No. 1, which is now out of service, was built in 1947 and extends approximately 725 m from shore (shown in brown in Figure 3). This intake is approximately 4.7 m underwater at present average lake levels.

Intake No. 2 is currently in operation and provides the raw water supply from Lake Ontario to the Oakville WPP. It was constructed to replace Intake No. 1 and extends approximately 880 m from the low lift pumping station. The construction work was undertaken in two stages. Stage 1 pipe (the 449 m +/- length shown in green in Figure 3) was constructed in 1977 and is 1,800 mm in diameter. The Stage 2 extension added 430 m of intake pipe (shown in blue in Figure 3) and has a diameter of 2,130 mm. The average water depth at the end of the Stage 2 extension is about 9.7 m. The rated capacity of Intake No. 2 is 315 ML/d.

2.2.2 Raw Water Turbidity

At present, the occasional high raw water turbidity issues occur 1 to 4 times per year, generally during the warmer months, and are the result of large post-storm sediment plumes from the nearby discharge location of Sixteen Mile Creek to Lake Ontario, as well as strong winds that cause turbulent waters. Historically, operational protocol was to shut down the WPP during a sediment plume event. Therefore, a key component of this Class EA study was to address the higher turbidity at the raw water intake through plant based modifications or through modifications to the intake.

Figure 2: Location of the Oakville WPP

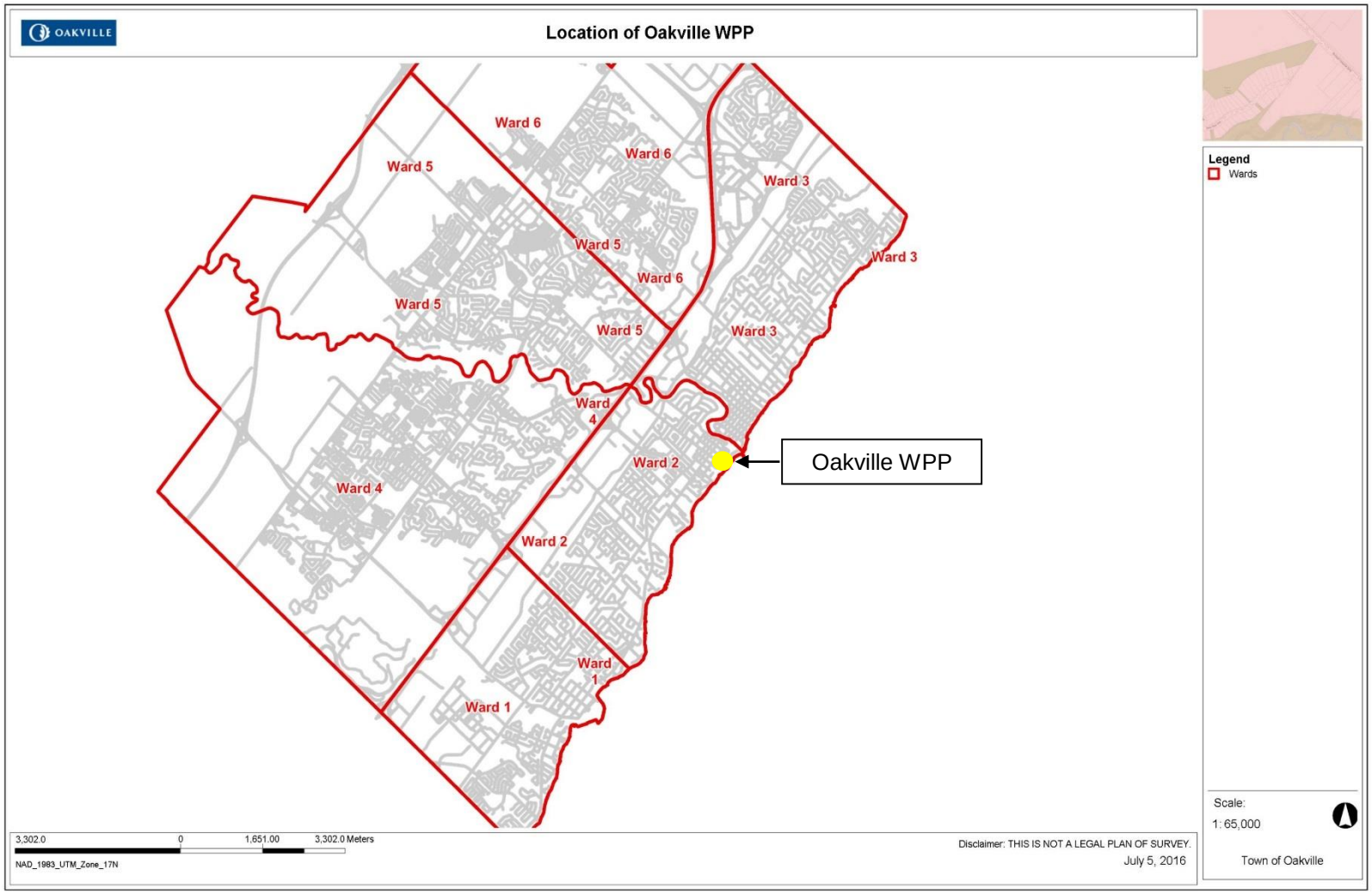
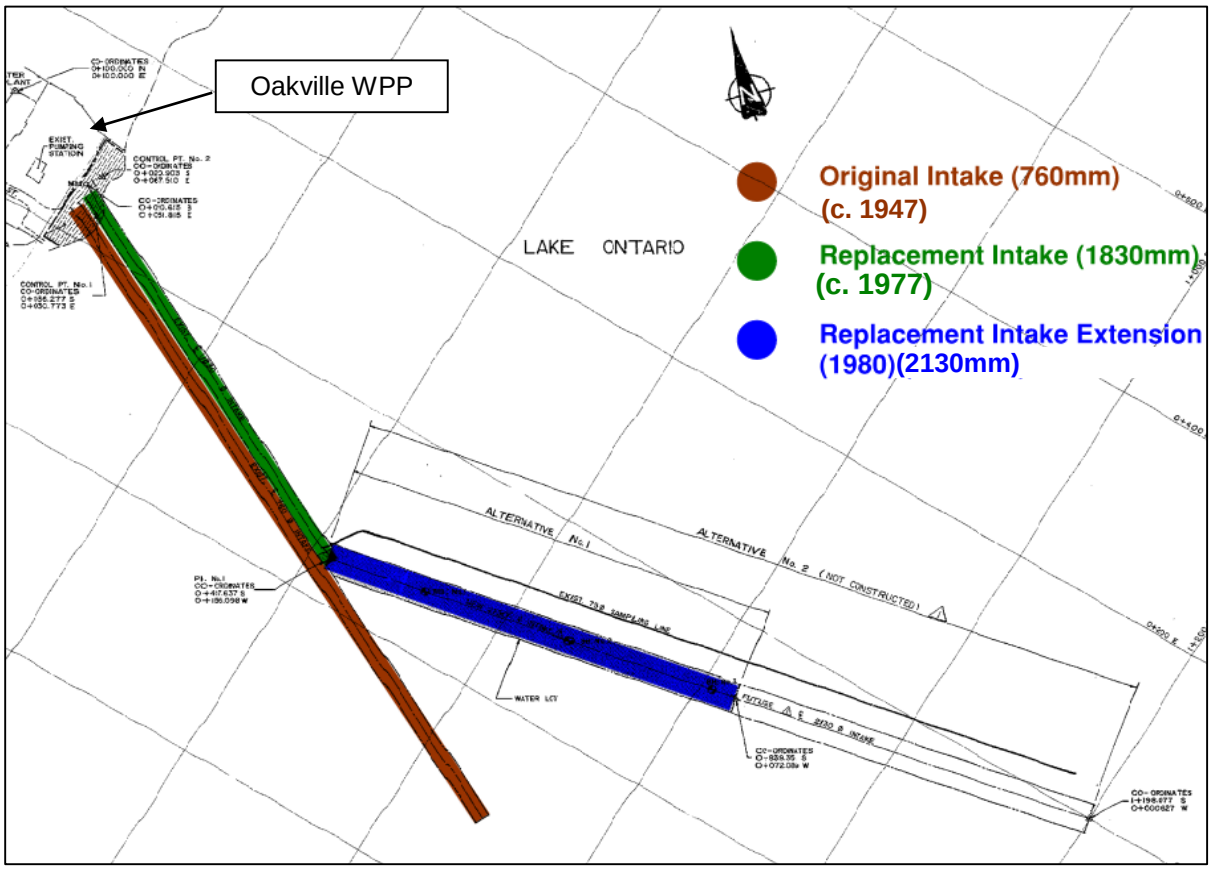


Figure 3: Existing Intake Alignments



3 Supporting Background Studies

A number of background studies were prepared to support the Class EA and the identification and evaluation of alternative solutions. The results of these studies are documented under separate cover and are provided in the Appendices. A summary description of each is provided in the subsections below.

3.1 Baseline Plant Capacity Review

A Baseline Plant Capacity Review was conducted to assess the baseline status of the existing processes at the Oakville WPP and document information obtained during a site visit and interviews with WPP operations staff. The review document presented:

- An overview of the Oakville WPP process, operation and hydraulic parameters;
- Existing equipment capacity calculations; and
- Information obtained during the site visit and interviews with WPP operations staff.

The review noted that, when the raw water turbidity would exceed 100 NTU (high turbidity events), the past procedure of the WPP was to shut it down as it was challenging to operate the Actiflo© units and keep settled water turbidities below 1 NTU, thus affecting performance of the downstream units. However, since June 2014, the WPP has remained online during high turbidity conditions.

The Baseline Plant Capacity Review is provided in see Appendix A.

3.2 Full-scale 130 ML/d Plant Test

This report documents the full scale hydraulic and performance limitations assessment test of the Oakville WPP that was conducted to assess the WPP's performance at a production rate of 130 ML/d. The report identifies the WPP's hydraulic and performance limitations and provides recommendations to improve the WPP's performance and support a capacity increase to the targeted net production rate of 130 ML/d. The report is provided in Appendix B.

3.3 Environmental and Geomorphological Baseline Summary Report

A desktop review of conditions within the project site and up to 3 km offshore into Lake Ontario to characterize the natural environment. The purpose is to describe existing conditions to provide a general inventory of natural heritage features and identify constraints for consideration in the development and evaluation of alternatives for the project. Additionally, an assessment of the sediment plume dispersion from Sixteen Mile Creek was provided for the same purpose.

Through this desktop review it was determined that the most sensitive natural features in the vicinity of the project area are associated with the mouth of Sixteen Mile Creek and the contiguous aquatic habitat of Lake Ontario. Information relating to substrate and bathymetry of the lake was included where available; however, data pertaining to available fish habitat in the lake within 3 km of the shoreline was limited. As a result, it was recommended that if project works are identified to include construction of a new or extended intake pipe, further survey of the area should be completed to assess substrates and bottom features as they relate to fish habitat. In addition, recommendations were made to collect additional field data to further define the extent of the Sixteen Mile Creek plume to allow for further consideration

of how the problem of high turbidity within the existing intake might be addressed. These were addressed in the Sixteen Mile Creek Plume Assessment (see next section).

Records of Species at Risk were found to include the study area such that further consultation with Ministry of Natural Resources and Forestry (MNRF) would be required if the study recommended works in Lake Ontario (i.e., a new intake or an intake extension). As well, a Department of Fisheries and Oceans (DFO) screening would be required for any proposed construction within regulated flood lines to determine whether impacts to fish and/or fish habitat can be avoided.

The full report is available in Appendix C.

3.4 Sixteen Mile Creek Plume Assessment

A geomorphic assessment of the sediment plume emanating from Sixteen Mile Creek was conducted to aid in the development of options to mitigate the high turbidity periodically found within the Oakville WPP intake. The assessment analyzed sediment plume characteristics under a number of differing wind speed and current scenarios to determine the sediment plume extent and concentration for typical events that cause high levels of turbidity within the WPP intake. The results were used to determine potential benefits of relocating the intake with respect to suspended sediment contamination. The study only focused on suspended sediment and did not consider other existing or emerging containments. Key findings of the assessment included:

- The largest peaks in turbidity in the plant generally correspond to high flows in the spring. The high turbidity was likely due to entrainment of sediment by the freshet after most of the snow and ice has melted and before vegetation had established.
- Relocating the intake 1 km further offshore would reduce the impacts of the more frequent flows below the 1-yr return period. Larger less frequent flows could still result in high suspended sediment concentrations at the relocated intake depending on the prevailing current.
- Knowledge of potential climate change and their impact on the sediment plume processes is limited. Given the limited information available at this time, it would not be possible to quantify the difference in climate change impacts on the intake turbidity at the existing intake location and a potential new location 1 km further offshore.

The full report is available in Appendix D.

3.5 Stage 1 Archaeological Assessment

A Stage 1 archaeological assessment (AA) was conducted for the Oakville WPP property as part of the Class EA for proposed updates to existing infrastructure. The Stage 1 AA study area was approximately 3.4 hectares in size and located on part of Lot 15, Broken Front Concession, Geographic Township of Trafalgar South, Halton County, which is now known as the Town of Oakville, Ontario. The objective of the Stage 1 AA was to compile all available information about the known and potential archaeological resources within the study area, to determine if a field survey (i.e. Stage 2 AA) is required, and to provide direction for the protection, management and/or recovery of these resources, consistent with Ministry of Tourism, Culture and Sport (MTCS) requirements set out in the *Standards and Guidelines for Consultant Archeologists* (MTCS, 2011).

Based on several features or characteristics of the site, the Stage 1 AA found archeological potential to exist within portions of the study area for the recovery of pre- and post-contact

Aboriginal and historical Euro-Canadian archaeological resources (see Map 7 in the full report available in Appendix E).

Accordingly, the following recommendations were made:

1. Portions of the study area that were identified as sloped or previously disturbed, as illustrated in Map 7 (see Appendix E), do not exhibit archaeological potential and no further archaeological assessment of these areas is required.
2. All remaining portions of the study area that archaeological potential, as illustrated in Map 7 (see Appendix E), are recommended for Stage 2 AA (test pit survey) prior to ground disturbance associated with any future development.

Specific restrictions and details regarding these recommendations are noted within the full report which is available in Appendix E.

3.6 Desktop Maritime Archaeological Assessment

A desktop maritime archaeological assessment was conducted as part of the Class Environmental Assessment in anticipation of proposed upgrades to the existing infrastructure at the Oakville WPP. The maritime archaeological study area encompasses a 3 km radius from the existing Oakville WPP facility and includes property along the Lake Ontario shoreline from Lots 8 to 22, Broken Front Concession, Trafalgar Township, City of Oakville, Regional Municipality of Halton.

The principal objectives of the investigation were (i) to identify known archaeological sites and resources on and within the vicinity of the study area, (ii) to assess the archaeological potential of the project location, and (iii) to recommend appropriate strategies for additional maritime investigations.

The desktop study found four known wreck sites located within the maritime archaeology project study area, three of which are registered as protected archaeological sites with the Ontario Ministry of Tourism, Culture and Sport. Research also indicates that several vessels may have wrecked in the Oakville area, many of which have not been located or identified.

Furthermore, a significant amount of the shoreline has remained primarily undisturbed and has retained archaeological integrity.

Therefore, the following recommendations were made:

1. All areas to be potentially disturbed or impacted by construction should be subjected to additional maritime archaeological investigations, consisting of geophysical surveys encompassing side scan sonar to identify anomalies which may represent historically significant features;
2. All areas up to a depth of 5 m from shore that will be potentially disturbed or impacted by construction associated with this project should be assessed by a shoreline snorkel survey by qualified maritime archaeologists to visually inspect this area for historically significant artifacts and/or features; and,
3. All three registered archaeological sites should be avoided and that no disturbance or construction activities occur with a 50 m buffer of each site location. If any of these three sites cannot be avoided, additional archaeological investigations will be required to mitigate the heritage resources known to be located within the study area.

The full report is available in Appendix F.

4 Problem Statement

The purpose of this Class EA study is included in its Problem Statement, which reads:

> *The purpose of the Class Environmental Assessment study is to identify a preferred solution to meet the water servicing objectives for the South Halton area in accordance with the Sustainable Halton Water and Wastewater Master Plan, 2011. The study is also investigating potential risks to security of supply including occasional raw water quality issues as the result of Sixteen Mile Creek influences.*

The intent of the above Problem Statement was operationalized through the following twofold objectives:

- To meet the servicing objectives in accordance with the Sustainable Halton Water and Wastewater Master Plan, 2011, through a capacity increase of the Oakville WPP from 109 up to 130 ML/d; and
- To investigate risks associated with security of supply related to raw water turbidity influences from Sixteen Mile Creek

The project is being conducted as a Schedule B Municipal Class EA. However, if the preferred alternative were to modify or upgrade the raw water intake, then the project schedule would be increased to Schedule C, which would require completion of Phases 3 and 4 of the Municipal Class EA process.

5 Project Study Area

5.1 Study Area Boundary

The study area for this project included on-land and marine areas. The on-land portion of the study area included the site of the Oakville WPP and the portion of the Waterworks Park between the WPP and the waterfront. The marine portion of the project study area included a 3 km radius extending out into the Lake Ontario from the Oakville WPP. The project study area is depicted in Figure 4.

5.2 Surrounding Land Uses

5.2.1 Overview

A review of the land use features around the Oakville WPP was undertaken by the project team and the following was noted:

- North: Burnet Park bounded by Burnet Street to the north, beyond which is an existing low density, single-detached family home Residential area.
- South: Open Space, beyond which is the Lake Ontario waterfront. Water Works Park is located between the Plant and the shoreline, with a visitor parking lot and vehicle access provided via Kerr St. to the West. The Park also provides access to the Waterfront Trail system, which runs along the waterfront south of the Plant and beyond to the East along the waterfront.
- East: Wilson Street, beyond which is existing low density, single-detached family home Residential area. The corner of Wilson St. and Walker St. has an access point to Water Works Park and the Waterfront Trail. Wilson St. also provides vehicle access to the Plant.
- West: Kerr Street, beyond which is existing low density, single-detached family home Residential area. Kerr St. also provides a vehicle access point to the Plant as well as to residents along Bath St. and further west.

5.2.2 Town of Oakville Official Plan Designations

The Oakville WPP is located within the South East Land Use Area of the Town of Oakville and is designated “Utility” on Schedule G, South East Land Use of the Livable Oakville Plan. Lands designated “Utility” allow for larger above-ground physical services and reservoirs.

Specific Official Plan policies that apply to “Utility” designated lands include:

- 18.1.1 - Uses permitted within the Utility designation may include pumping stations, water and sewage treatment plants, electrical transformer and distributing stations, reservoirs, cogeneration facilities less than 25 MW and other power generation facilities less than 5 MW.
- 18.1.2 - New cogeneration facilities less than 25 MW and new other power generation facilities less than 5 MW, as well as any changes to existing power generation facilities will require review by the Town through rezoning to determine appropriate land use compatibility. An Official Plan amendment shall be required for cogeneration facilities greater than or equal to 25 MW and other power generation facilities greater than or equal to 5 MW in accordance with the provisions of this Plan.

- 18.1.3 - Development on lands designated Utility shall be in accordance with Provincial and Regional requirements and approvals.
- 18.1.4 - Development on lands designated Utility shall incorporate appropriate buffers and setbacks.

No Official Plan Amendment is required in order to accommodate the work proposed in this study.

5.2.3 Town of Oakville Zoning

Town of Oakville Zoning By-law 1984-63 is the town's main comprehensive zoning by-law that provides zoning provisions for the subject lands. The lands are zoned “Utility” by Zoning By-law 1984-63, as amended.

Figure 5 depicts the land uses surrounding the Oakville WPP site.

Figure 4: Project Study Area

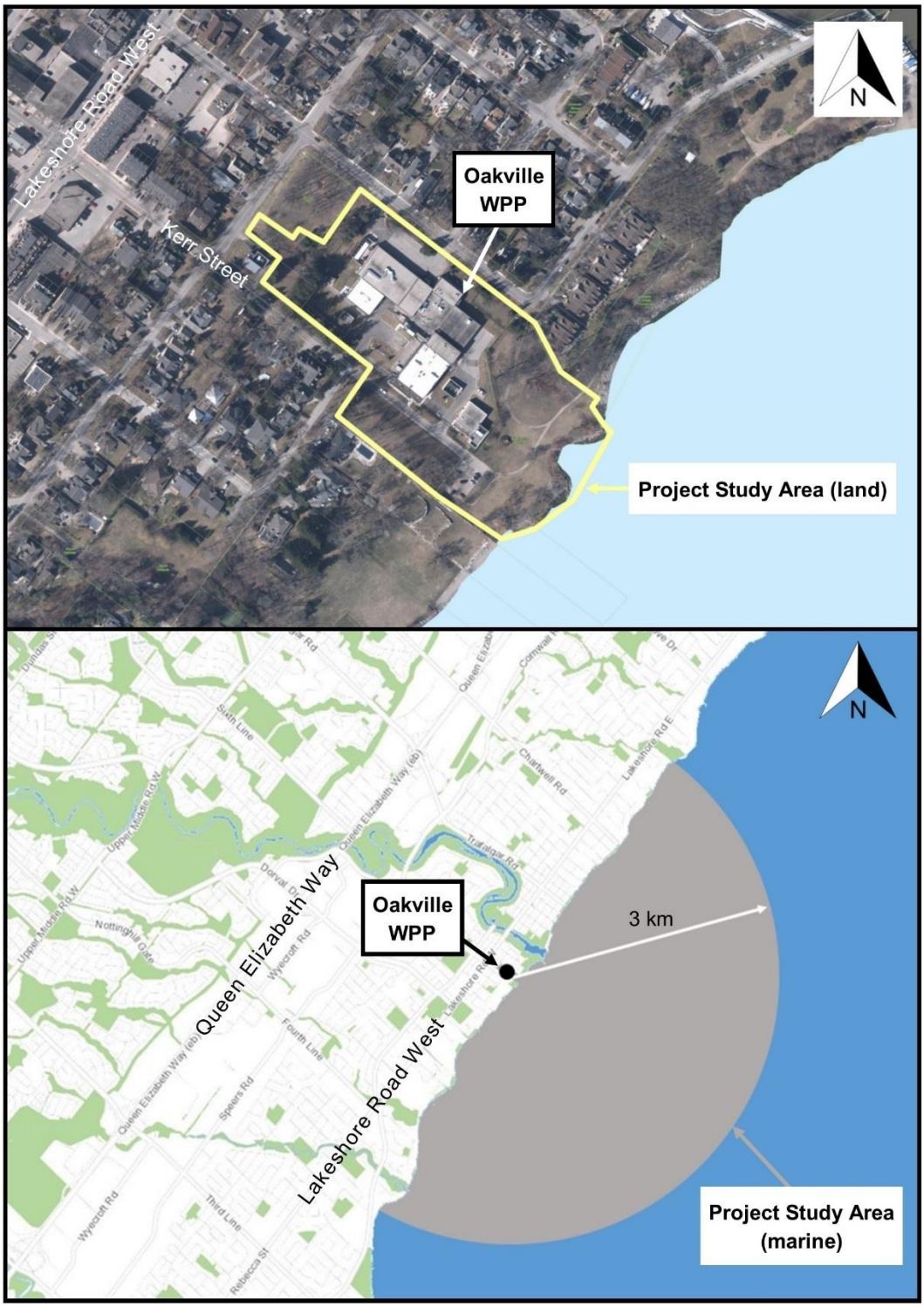
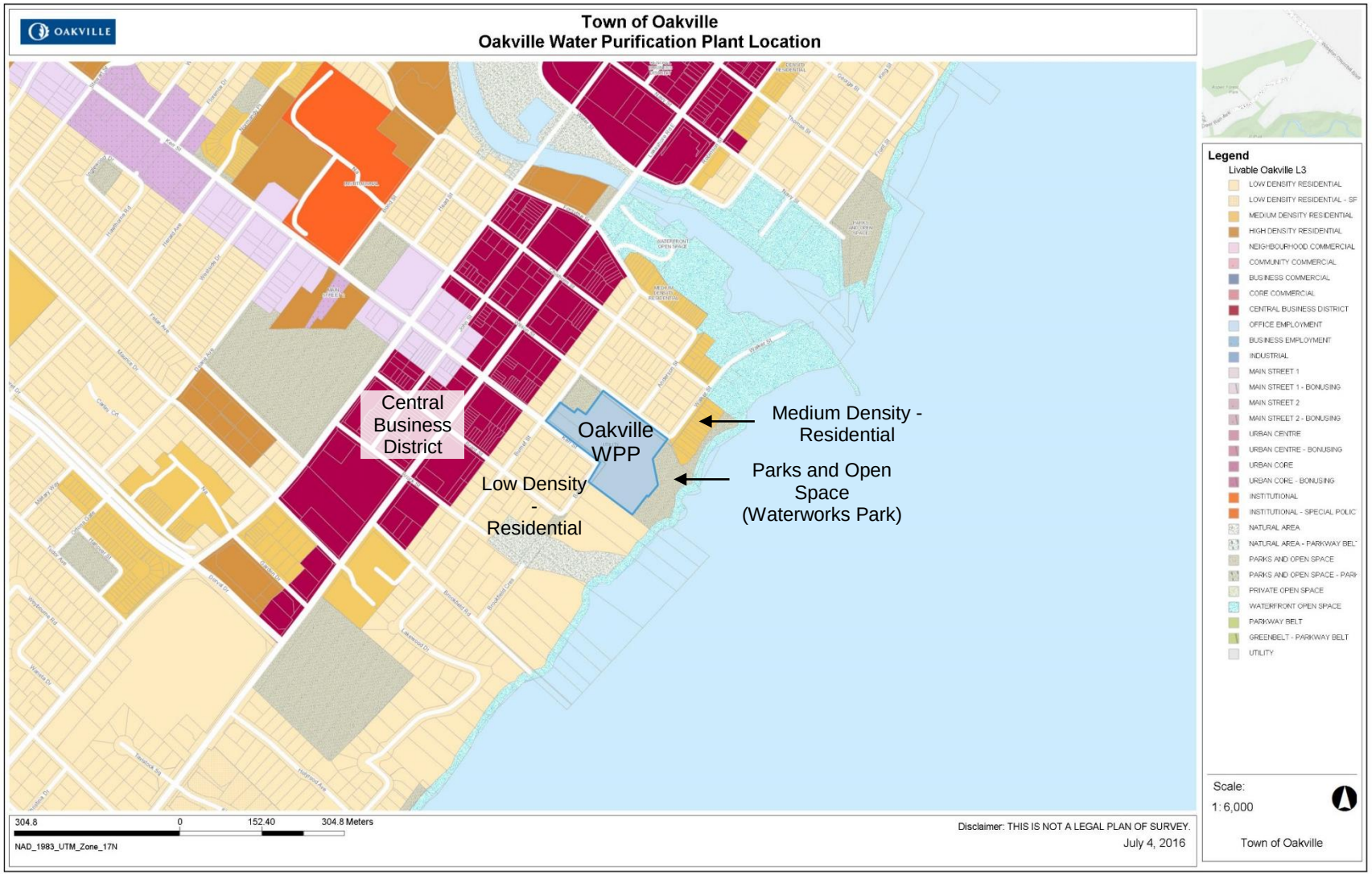


Figure 5: Oakville WPP Surrounding Lands Uses



5.3 Natural Environment

A desktop review of available data for the area including the Oakville WPP, adjacent parkland, and Lake Ontario shoreline and nearshore areas was completed. Through this desktop review, it was determined that the most sensitive natural features in the vicinity of the project area are associated with the mouth of Sixteen Mile Creek and the contiguous aquatic habitat of Lake Ontario. Information relating to substrate and bathymetry of the lake and fish habitat in the lake within 3 km of the shoreline is considered limited.

A copy of the desktop review is provided in Appendix C.

5.4 Ontario Provincial Policy Statement and the Growth Plan for the Greater Golden Horseshoe

This project is subject to policies found in the Provincial Policy Statement (PPS) 2014 and the Growth Plan for the Greater Golden Horseshoe (GPGGH).

The applicable PPS policies for this project include:

- Policy 1.2.1, which requires a coordinated, integrated and comprehensive approach should be used when dealing with planning matters - including infrastructure - within municipalities, across lower, single and/or upper tier municipal boundaries, and with other orders of government, agencies and boards.

  This Class EA included comprehensive consultation with the Town of Oakville and various provincial, federal and other agencies (i.e., Conservation Halton); therefore, this project was consistent with this PPS policy.

- Policy 1.6.6.1, which requires that planning for water services:
  - Ensure that these systems are provided in a manner that:
    1. Can be sustained by the water resources upon which such services rely;
    2. Is feasible, financially viable and complies with all regulatory requirements; and
    3. Protects human health and the natural environment
  - Promote water conservation and water use efficiency;
  - Integrate servicing and land use considerations at all stages of the planning process; and
  - Be in accordance with the servicing hierarchy outlined through policies 1.6.6.2 to 1.6.6.5, whereby Policy 1.6.6.2 notes that municipal water services are the preferred form of servicing for settlement areas[1].

  The evaluation process for this Class EA considered factors relating to the natural, social and cultural environment as well as technical and economic factors, including local land uses, permits and approvals. Further, the preferred solution does not discourage water conservation or water use efficiency, nor does it change the delivery of municipal water services. As such, this project is consistent with Policy 1.6.6.1.

[1] Please note that this an abbreviated summary of 1.6.6.1 and does not include policy elements not relevant to this project, i.e., aspects related to sewage and stormwater management or growth planning.

The applicable GPGGH policies for this project fall under Section 3.2.5 (Water and Wastewater Systems). The specific policy relating to this project includes:

- Policy 3.2.5.4, which requires expansions of existing municipal water systems should only be considered where the following conditions are met:
  - Strategies for water conservation and other water demand management initiatives are being implemented in the existing service area;
  - Plans for expansion or for new services are to serve growth in a manner that supports achievement of the intensification target and density targets; and
  - Plans have been considered in the context of applicable inter-provincial, national-national, or state-provincial Great Lakes Basin agreements.

Given that Halton Region has a water conservation program in place and that this Class EA project was identified within the Region's approved 2011 Sustainable Halton Water and Wastewater Master Plan, this Class EA project is consistent with Policy 3.2.5.4 of the GPGGH.

6 Alternative Solutions

The review of alternative solutions to address the problem statement was conducted in two stages:

- First, alternative solutions to address increasing the capacity of the Oakville WPP from 109 ML/d up to 130 ML/d with a consideration toward managing raw water turbidity episodes were identified and screened;
- Second, a more detailed description of the alternative solutions carried forward was provided.

The review of alternative solutions is provided in Sections 5.1 and 5.2 below.

6.1 Description of Alternative Solutions for Screening

The following three alternative solutions were identified based on the problem statement and on discussions between the Region and the project team. Sub-alternatives have also been identified as applicable. All viable alternatives and sub-alternatives that pass the initial screening were carried forward for detailed description and comparative evaluation:

4. **Do Nothing** - this alternative solution consists of operating the Oakville WPP using its existing equipment, which includes all plant upgrades made until completion of the Region's Phase 2 Upgrade project in December 2014. No further changes or additions would be made to the Oakville WPP to either meet the growing demand for drinking water within the Region for the 2031 planning horizon or address the occasional high raw water turbidity issues. The Do Nothing alternative establishes the baseline comparison purposes.
5. **Rerate the Existing WPP** - this alternative would involve re-rating the WPP up to 130 ML/d with minor capital in-plant upgrades to optimize plant performance to achieve the re-rated production capacity. This alternative has three sub-alternatives for addressing risks associated with the security of supply related to raw water turbidity influences from Sixteen Mile Creek, as follows:
    A. Implement a plant-based solution to address security of supply risks associated with raw water turbidity episodes;
    B. Extend the existing intake to address security of supply risks associated with raw water turbidity episodes;
    C. Build a new intake to address security of supply risks associated with raw water turbidity episodes.
6. **Expand the Existing WPP** - this alternative would involve the physical expansion of the WPP by constructing additional process modules as required capable of the additional net 21 ML/d production required to increase the plant's total net capacity from 109 ML/d to 130 ML/d. Similar to alternative solution 2, This alternative has three sub-alternatives for addressing risks associated with the security of supply related to raw water turbidity influences from Sixteen Mile Creek, as follows:
    A. Implement a plant-based solution to address security of supply risks associated with raw water turbidity episodes;
    B. Extend the existing intake to address security of supply risks associated with raw water turbidity episodes;

C. Build a new intake to address security of supply risks associated with raw water turbidity episodes.

6.2 Initial Screening of the Alternative Solutions

The three alternative solutions above were screened based on the technical feasibility of the alternative solution. The results of this consideration were as follows:

1. **Do nothing** - As per the Municipal Class EA, the "Do Nothing" alternative has been included in the Class EA Study for increasing capacity of the Oakville WPP because it provides a benchmark against which the benefits/ consequences of the other alternatives can be measured. If this option were adopted, the Oakville WPP would lack the operational capacity to achieve a net production of 130 ML/d. It therefore would be unable to achieve these flows and be unable to obtain regulatory approvals for a 130 ML/d rating as well as satisfy the requirements of the problem statement. Therefore, the Do Nothing alternative was **screened out** and was not considered further.
2. **Rerating of the WPP** - Assessment of the Oakville WPP and its operations have concluded that it is technically feasible to achieve up to 130 ML/d flow based on minor capital upgrades to the facility. Therefore, the rerating alternative solution was **carried forward**, along with its sub-alternatives, for further consideration.
3. **Expansion of the WPP** - Expansion of the WPP would involve the building of new facilities or structures to enable the plant to achieve 130 ML/d. A review of the existing structures and property limits indicate that it would be impractical to accommodate such an expansion due to space limitations. Additional challenges such as constructability and social impacts relative to working within the existing plant footprint also make this option impractical. It is therefore found to be a technically inferior option. Therefore, the expansion alternative was screened out and was not considered further.

6.3 Description of Screened Alternative Solutions

Of the three alternatives, only Alternative 2: Re-rating the existing WPP was carried forward. As noted above, Alternative 2: Re-rating the existing WPP consists of three sub-alternatives (hereafter referred to as the screened alternative solutions) and are defined as follows:

- **Screened Alternative 2A: Rerate with in-plant solution**
  - Perform minor upgrades to optimize plant performance to achieve up to 130 ML/d production capacity;
  - Implement a plant-based solution to address security of supply risks associated with raw water turbidity episodes;
- **Screened Alternative 2B: Rerate with intake extension**
  - Perform minor upgrades to optimize plant performance to achieve up to 130 ML/d production capacity;
  - Extend the existing intake to address security of supply risks associated with raw water turbidity episodes;

- **Screened Alternative 2C: Rerate with new intake**
  - Perform minor upgrades to optimize plant performance to achieve up to 130 ML/d production capacity;
  - Build a new intake to address security of supply risks associated with raw water turbidity episodes;

The screened alternatives are described in more detail below.

6.3.1 Screened Alternative 2A

Minor upgrades to optimize plant performance to achieve up to 130 ML/d + plant-based solution to address raw water turbidity episodes

Screened Alternative 2A comprises both process optimization (e.g. SCADA, chemical dosing), maintenance activities, and minor in-plant upgrades to the Oakville WPP to address identified hydraulic challenges and redundancy requirements, to ensure that the plant is capable of addressing raw water turbidity episodes to enable a net production rate of up to 130 ML/d.

The specific details of the recommended in-plant works are documented in the 130 ML/d Test Report (see Appendix B), which identified the following hydraulic bottlenecks during the full scale 130 ML/d test:

- Ozone-to-filter conduits 1 and 2: The tops of the conduits are not sealed, and thus must operate below the 100% level in order to avoid leaking. The level transmitters for these conduits control the low lift pump station (LLPS) flowrate. Further, Region operations have determined that 60% channel flow is the optimum value. The net result is that at high flows, these channels surge which then decreases LLPS flows until the conduit levels subside to 60% or less.
- Filter 1 inflows – due to the placement and configuration of Filter 1, water does not flow into this filter sufficiently at high flows to maintain its filter rate without draining. Presently this is controlled by reducing filtration rate of Filter 1.
- Flow conveyance from clearwell to reservoir during a filter backwash was noted to be limited, and resulted in the depletion of the reservoir level (while the clearwell level was able to be sustained). Preliminary analysis indicates that this could have resulted from hydraulic losses in the interconnected hard piping (which has several twists and turns), and/or that the dual-cell reservoir was operating as a single-cell reservoir (one of the two inlet/outlet combinations was closed) likely resulting in hydraulic losses.
- Installation of a fourth high lift pump.

6.3.2 Screened Alternative 2B

Minor upgrades to optimize plant performance to achieve up to 130 ML/d + extend existing intake to address to address raw water turbidity episodes

Screened Alternative 2B would be comprised of the in-plant maintenance, optimization, and upgrades identified in Screened Alternative 2A, plus extending the existing intake by approximately beyond the area impacted by the Sixteen Mile Creek sediment plume. This would allow the Oakville WPP to draw raw water that is less likely in the immediate term to experience high turbidity episodes. The alternative designs could include various alignments to find the preferred location for the new portion of the intake structure.

The preferred location for the extended intake crib would need to be determined following additional investigations and more detailed assessment, with considerations to the bathymetry of the lake bottom. If selected as the preferred solution, then the project would be upgraded to a Schedule C Class EA and this work would be completed as part of Phase 3.

Two alternative construction methods for extending the existing intake beyond the end of the current intake crib location are being considered, as follows:

a) Construction by cut & cover (e.g., blasting of the bedrock along lake bottom or dredging and backfill of a trench along the lake bottom by means of marine construction from a barge) to install new intake piping; and

b) Extension by means of tunnel construction methods, whereby tunnel construction would commence from a watertight shaft at the end of existing crib location to the new intake crib location, using watertight coffer dams at both ends. The watertight coffer dams could be constructed through the water column to provide for a working platform/barge at water surface. Excavated materials would be removed via barge transfer.

According to the October 28, 2014 report *Internal Inspection of Raw Water Intake for the Oakville Water Treatment Plant*, the existing intake pipe was observed to be in good condition with a minimal accumulation of sediment and debris. The hydraulic capacity of the intake pipe is reported to be 315 ML/d, which is more than adequate to address the plant production requirement of 130 ML/d. The good condition of the intake pipe means that it would be technically feasible to connect an extension to the existing pipe.

The *Sixteen Mile Creek Plume Assessment Report - Final* (August 25, 2015) was prepared as part of this Class EA to map the location of the sediment plume discharged from Sixteen Mile Creek, relative to the existing raw water intake. The report observed that extending the existing intake an additional 1,000 m would reduce the turbidity related concerns. This would allow Oakville WPP to draw raw water that is less likely to experience the same high turbidity raw water episodes that it presently experiences about 1-4 times per year. Figure 6 depicts the plume boundary, the intake location envelope, and an illustrative example of the intake extension. It is noted that the location of the intake crib and alignment of the extension would require additional work to confirm (in Phase 3), and that the location and alignment depicted in the figure are to illustrate the concept only.

6.3.3 Screened Alternative 2C

Minor upgrades to optimize plant performance to achieve up to 130 ML/d + build new intake to address to address raw water turbidity episodes

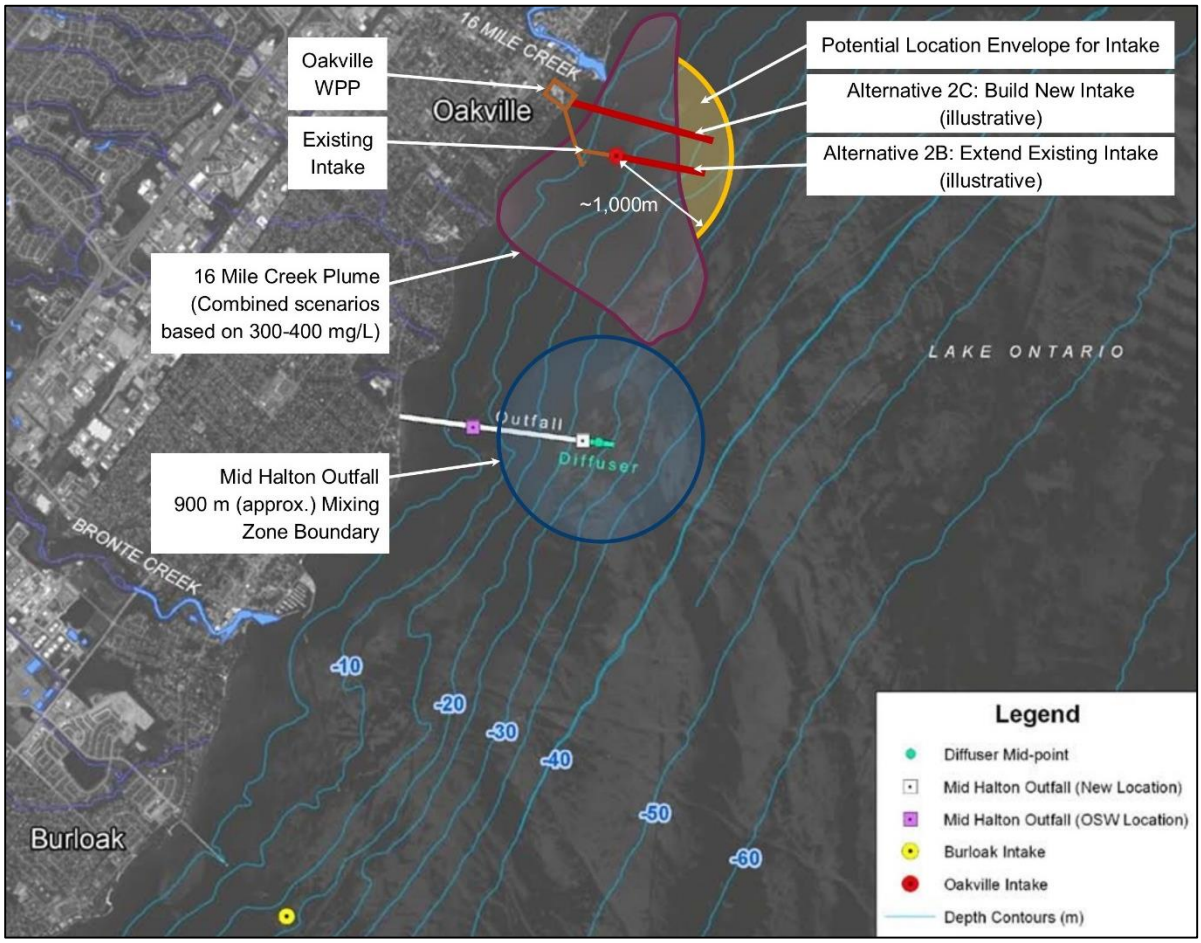
Screened Alternative 2C would be comprised of the in-plant maintenance, optimization, and upgrades identified in Screened Alternative 2A, plus the construction of an entirely new raw water intake pipe for the Oakville WPP.

The new intake would begin at the Oakville WPP, with the end of the intake (i.e., the crib) extending beyond the area impacted by the Sixteen Mile Creek sediment plume. This would allow the Oakville WPP to draw raw water that is less likely to experience high turbidity episodes. While the alternative designs could include various alignments, a new intake could potentially be aligned east of the existing intake as shown in Figure 6, with the intake crib situated within the intake location envelope.

Similar to Screened Alternative 2B, building a new raw water intake could be completed by cut and cover or by tunnel construction methods. The final alignment of the new intake would

consider the results of Geophysical Surveys and/or Bathymetry Studies, which would be completed as part of Phase 3 should this alternative be selected as the preferred solution.

Figure 6: Intake Alternatives



7 Evaluation of Alternative Solutions

The preferred solution was identified amongst the three screened alternative solutions using a set of evaluation criteria that was developed through in consultation with the Stakeholder Advisory Committee and Halton Region water operations staff. The evaluation process, criteria, results and preferred solution are discussed below.

7.1 Evaluation Process

7.1.1 Process Overview

The preferred solution was arrived at via a three step assessment and comparative evaluation process. The Municipal Class EA requires a proponent to establish a preferred solution based on a traceable, replicable, and understandable decision-making process taking into account inputs from review agencies, aboriginal communities, and the public. The process steps included:

- Step 1: Complete comparative evaluation of the proposed screened alternatives against evaluation criteria under each category;
- Step 2: Identify a preliminary preferred solution based on reviewing the advantages and disadvantages determined through Step 1.
- Step 3: Establish the preferred solution following consultations with the Stakeholder Advisory Committee and Halton Region water operations staff.

Step 1: Comparative Evaluation

The screened alternatives were evaluated against the proposed evaluation criteria listed in Section 6.2 below. The evaluation followed a relative rating system, which rated the proposed alternatives as having High (●), Medium (◐) or Low (○) preference against each criterion. This rating was based on the indicators proposed for each criterion. The ratings of High (●), Medium (◐) and Low (○) correspond to most, somewhat, and least favourable, respectively.

The completed evaluation documents the findings for each screened alternative against all criteria and explains why a relative rating of high, medium or low was achieved. Aggregated ratings were then prepared for each category of criteria, namely: natural environmental; social environment; cultural environment; technical; and economic. For aggregation purposes, the same High (●), Medium (◐) and Low (○) preference ratings were used. The high, medium and low ratings for each category of evaluation criteria were used to help summarize the net benefit (or advantages and disadvantages) of each screened alternative for each of the five categories.

Step 2: Identification of Preliminary Preferred Alternative

Once each screened alternative was evaluated against the evaluation criteria, the advantages and disadvantages of each screened alternative were compared for each of the five criteria categories to identify a preliminary preferred alternative. The following process was used.

1. For each of the five criteria categories, the ratings for each criterion (Based on the advantages and disadvantages of the alternatives as determined in Step 1) were aggregated to determine the category rating for each of the screened alternative solutions.

2. Using the aggregated category ratings, preferred alternatives and supporting rationale were identified for each of the five criteria categories.
3. Finally, a preliminary preferred alternative was selected and a supporting rationale prepared. The selection was based on both the final aggregate rating of each Alternative Solution and the associated overall advantages and disadvantages.

Step 3: Establish Preferred Solution

The preliminary preferred solution was presented to the Stakeholder Advisory Committee (SAC) followed by presentation at the Public Information Centre (PIC). Agency, First Nations / Aboriginal groups and other stakeholders were advised of the preferred solution through the notification of PIC and through the PIC materials (available as a download from the Region's website for those stakeholders unable to attend the PIC).

7.1.2 Assumptions

The assumptions used in identifying the alternatives and in the evaluation process are as follows:

- Alternative of combined open-cut and trenchless methods is not considered because it is anticipated that this would be a higher cost than either option on its own, as well as adding to the complexity of construction coordination.
- Sensitivity analysis will not be conducted because it is typically required when a large number of alternatives are involved.

7.2 Evaluation Criteria

A comprehensive set of evaluation criteria were developed to facilitate evaluation of the proposed screened alternatives. The criteria are divided in five categories, namely:

- Natural Environment
- Social Environment
- Cultural Environment
- Technical
- Economic

The details of the evaluation criteria are presented in Table 1. All criteria have been defined as indicated in the Criteria Considerations column in the table. Certain indicators for each criterion have also been defined in the table to assist in completion of the evaluation.

The evaluation criteria were developed in consultation with the SAC members and Region water operations staff.

Table 1: Evaluation Criteria

Criteria	Criteria Considerations	Indicators
1. Natural Environmental Criteria		
1a. Fisheries and aquatic systems	The alternative's potential negative impacts on fisheries and aquatic systems	a) Avoids disruption to aquatic habitat b) Avoids impact to fish spawning areas c) Avoids potential impact to aquatic species at risk
1b. Terrestrial systems	The alternative's potential impacts on land-based habitats or systems, including possible effects on the shoreline and wildlife and terrestrial features/functions	a) Avoids disruption to terrestrial habitat/shoreline b) Potential impact to plant and animal species is minimum or negligible
2. Social Environmental Criteria		
2a. Noise, vibration and other disruptions during construction	The potential of the alternative to increase noise, vibration or other disruptions during construction	a) No potential disruption to use of local park and shoreline path, parking area, docking bay. b) Not likely to generate noise or cause vibration impacts c) No potential disruption from increased construction traffic
2b Noise, vibration and other disruptions during operations	The potential of the alternative to increase noise, vibration or other disruptions during operations	a) No potential disruption to use of local park and shoreline path, parking area, docking bay. b) No potential noise and vibration impacts during operations c) No potential disruption from traffic in and out of WPP
3. Cultural Environmental Criteria		
3a. Archaeology	Archaeological impacts of the proposed alternative	a) Extent of archeological potential in the study area is minimum or negligible b) Potential of the alternative to have archaeological impacts is minimum or negligible

Criteria	Criteria Considerations	Indicators
4. Technical Criteria (implementation and operation)		
4a. Ability of the alternative to produce 130 ML/d of potable water for distribution	Reliability of the plant to produce 130 ML/d given security of supply risks (i.e., raw water turbidity episodes)	a) WPP is operable at 130 ML/d production during high turbidity events (100 NTU) (i.e., post-storm events or creek dredging) [2]
4b. Water treatment plant and distribution system operations	Impact of the alternative on operability and maintainability of the water treatment plant and distribution system during and post-construction	a) Potential improvement to plant hydraulics and chemical systems b) Extent of impact on Halton water distribution system c) Extent of impact on WPP maintenance and operations
4c. Constructability	The alternative can be easily implemented on a technical and constructability basis	a) Technical challenges involved in implementation / construction
4d. Regulatory requirements	Approval requirements for the alternative	a) Number of approvals required b) Complexity of approvals
5. Economic Criteria		
5a. Costs	Cost associated with implementing and maintaining the alternative	a) Initial capital cost b) Overall lifecycle cost (over minimum 50 year period)

7.3 Evaluation Results

Table 2, starting on the following page, contains the comparative evaluation of the proposed screened alternatives. Note that for alternatives 2B and 2C, the evaluation assumed construction of any new intake works by open cut. If either of these alternatives were to become the final preferred solution, then the method of construction (open cut vs. tunnelling) would be subsequently evaluated in Phase 3 of the Schedule C Class EA.

[2] The 100 NTU value was selected as a benchmark because the previous long-standing protocol at the Oakville WPP required the facility to pause operations during/after storm events where raw water turbidity was observed at 100 NTU or higher.

Table 2: Comparative Evaluation of the Proposed Screened Alternatives

Criteria & Indicators	Alternative 2A – Minor upgrades / In-plant solution	Alternative 2B – Minor upgrades / Extend existing intake	Alternative 2C – Minor upgrades / Construct new intake
1. Natural Environmental Criteria			
1a. Fisheries and aquatic systems a) Avoids disruption to aquatic habitat b) Avoids impact to fish spawning areas c) Avoids potential impact to aquatic Species at Risk (SAR)	● a) In-plant solutions results in no disruption to aquatic habitat. b) In-plant solutions results in no disruption to fish spawning areas. c) Avoiding habitat disruption minimizes impact to SAR	◐ a) Disruption of aquatic habitat along length of pipe extension (assuming open cut). b) Some potential impacts to fish spawning areas. c) Ministry of Natural Resources and Forestry (MNRF) records identify potential for SAR (i.e., Silver Shiner, Black Tern, Northern Map Turtle, Snapping Turtle) within and proximate to the study area. Further investigation would be required in Phase 3 to confirm and identify mitigation.	○ a) Disruption of aquatic habitat along entire length of new intake (assuming open cut). b) Potential impacts to fish spawning areas. c) Same as Alternative 2B.

Criteria & Indicators	Alternative 2A – Minor upgrades / In-plant solution	Alternative 2B – Minor upgrades / Extend existing intake	Alternative 2C – Minor upgrades / Construct new intake
1b. Terrestrial systems a) Avoids disruption to terrestrial habitat/shoreline b) Potential impact to plant and animal species is minimum or negligible	● a) In-plant solutions results in no disruption to terrestrial habitat or shoreline. b) Lack of works outside of the plant's existing property boundary means there will be no potential impact to plant and animal species.	◐ a) Works to be completed offshore, therefore no disruption to terrestrial habitat or shoreline, and no potential impact to terrestrial plant or animal species. b) Staging will likely take place from an area already disturbed (i.e., a dock), so there would be minimal impact to terrestrial systems from staging.	○ a) Installing a new intake would may require some disruption of the shoreline. MNRF records identify potential for SAR (i.e., Black Tern, Northern Map Turtle, Snapping Turtle) within and proximate to the study area. Further investigation would be required in Phase 3 to confirm presence of SAR and identify potential impacts and mitigation options. b) Same as Alternative 2B
Natural Environment Summary	● Because the in-plant solutions would require no works outside of the plant's existing property boundary, it would have no impact on aquatic or terrestrial systems.	◐ While the extension of the intake pipe would have some disturbance on aquatic habitat, this alternative would have minimal impact on terrestrial systems. The potential for aquatic SAR disturbance and aquatic spawning grounds would require additional assessment in Phase 3.	○ Installing a completely new intake would have the greatest disturbance on aquatic and terrestrial systems. The potential for disturbance of terrestrial and aquatic SAR and aquatic spawning grounds would require additional assessment and mitigation identification in Phase 3.

Criteria & Indicators	Alternative 2A – Minor upgrades / In-plant solution	Alternative 2B – Minor upgrades / Extend existing intake	Alternative 2C – Minor upgrades / Construct new intake
2. Social Environmental Criteria			
2a. Noise, vibration and other disruptions during construction a) No potential disruption for public use of local park and shoreline path, parking area, docking bay. b) Not likely to generate noise or cause vibration impacts c) No potential disruption from increased construction traffic	● a) Installation of in-plant solutions would not disrupt public use of the local park and surrounding area or other public facilities. b) Installation of in-plant solutions not likely to generate noise or cause vibration impacts. c) Minimal increase in construction traffic is anticipated on a temporary basis.	◐ a) Works related to the installation of the intake would take place off-shore; therefore, noise and vibration impacts from the construction are not anticipated. b) Because works will take place off-shore, public use of the local park and shoreline path will not be disrupted. c) A staging area will be required on-shore for storage of construction materials and for launching the barge. This location would not likely be at the Waterworks Park, but at an area suitable for loading/unloading the barge.	○ a) Works related to construction of a new intake would be required at the shoreline. This could include excavation. This work would cause potential disruption of the local park, shoreline path, and possibly the parking area. b) Noise and construction impacts may be expected from the excavation work taking place in the vicinity of the plant and shoreline. c) Some construction traffic would be required for heavy equipment required onsite.

Criteria & Indicators	Alternative 2A – Minor upgrades / In-plant solution	Alternative 2B – Minor upgrades / Extend existing intake	Alternative 2C – Minor upgrades / Construct new intake
2b Noise, vibration, and other disruptions during operations a) No potential disruption to use of local park and shoreline path, parking area, docking bay. b) No potential noise or vibration impacts during operations c) No potential disruption from traffic in and out of WPP	◐ a) No disruption to public use of the local park and shoreline path, parking area or docking bay is anticipated after completion of construction. b) The completed upgrades are not likely to cause potential noise and vibration impacts during operations. c) No potential disruption from traffic in and out of the WPP is anticipated during operations.	◐ Same as alternative 2A	◐ Same as alternative 2A
Social Environment Summary	● Of the three alternatives, installation of in-plant solutions would have the least disruptions to the public during construction. The in-plant solutions are not anticipated to cause any disturbances during operations.	◐ Because construction activities will be focused off-shore, there would be less construction/staging disturbance compared with Alternative 2C, but more than Alternative 2A. On-shore staging for the construction and barging activities may result in some disruption and elevated activity at the staging location. The alternative is not anticipated to cause any disturbances during operations.	○ Building a new intake would likely require construction activities in the vicinity of the WPP. This would likely disrupt public use of the local park and pathway and create local noise and vibration disturbances. It would also require increased traffic from construction. The alternative is not anticipated to cause any disturbances during operations.

Criteria & Indicators	Alternative 2A – Minor upgrades / In-plant solution	Alternative 2B – Minor upgrades / Extend existing intake	Alternative 2C – Minor upgrades / Construct new intake
3. Cultural Environmental Criteria			
3a. Archaeology a) Extent of archaeological potential in the study area is minimum or negligible b) Potential of the alternative to have archaeological impacts is minimum or negligible	● a) Work from in-plant solution not anticipated to disturb areas identified as having archaeological potential. b) No stage 2 archaeological assessments (AA) for marine is anticipated. If archaeological resources are discovered during the construction, work will be stopped and mitigation will take place.	◐ a) Same as alternative 2A. b) Stage 2 marine AA will allow for design to avoid discovered archaeological resources. If archaeological resources are discovered during the construction, work will be stopped and mitigation will take place.	○ a) Potential for archaeological resources in study area. Would be confirmed by Stage 2 AA (terrestrial). b) Same as Alternative 2B.
Cultural Environment Summary	● Alternative 2a would have the least potential impact on archaeological resources.	◐ Stage 2 marine AA required in Phase 3 to confirm presence of archaeological resources and mitigation/avoidance opportunities. The Stage 2 marine AA would cover a smaller area compared to Alternative 2C.	○ Stage 2 AA for marine and on-land areas required in Phase 3 to confirm presence of archaeological resources and mitigation/avoidance opportunities. The Stage 2 AA for marine and on-land areas for Alternative 2C would include a larger area compared to the other alternatives.

Criteria & Indicators	Alternative 2A – Minor upgrades / In-plant solution	Alternative 2B – Minor upgrades / Extend existing intake	Alternative 2C – Minor upgrades / Construct new intake
4. Technical Criteria (implementation and operation)			
4a. Ability of the alternative to produce 130 ML/d of potable water for distribution a) WPP is operable at 130 ML/d production during high turbidity events (100 NTU) (i.e., post-storm events or creek dredging)	◐ a) The in-plant solutions will allow the facility to operate at 130 ML/d during high turbidity events.	● a) A combination of the in-plant upgrades for achieving 130 ML/d and the extension of the intake will allow the WPP to function at 130 ML/d. The extension of the intake may reduce the number of high-turbidity events experienced by the plant.	● Same as alternative 2B.
4b. Water treatment plant and distribution system operations a) Potential improvement to plant hydraulics and chemical systems b) Extent of impact on Halton water distribution system c) Extent of impact on WPP maintenance and operations	◐ a) The alternative would improve plant hydraulics and chemical systems operations. b) No negative impacts on Halton Region's water distribution system is anticipated. c) The alternative would require increased operations and maintenance effort compared to alternatives 2B and 2C.	● a) Same as alternative 2A. b) Same as alternative 2A. c) The alternative may decrease operations and maintenance effort compared to alternative 2A due to a marginal improvement to raw water quality.	● Same as alternative 2B.

Criteria & Indicators	Alternative 2A – Minor upgrades / In-plant solution	Alternative 2B – Minor upgrades / Extend existing intake	Alternative 2C – Minor upgrades / Construct new intake
4c. Constructability Technical challenges involved in implementation / construction: a) In-plant upgrades b) Intake	● a) The alternative would require minor capital upgrades and operational enhancements within the existing buildings. No technical challenges. b) Not applicable	◐ a) Same as alternative 2A. b) This alternative would have a moderate amount of technical challenges related to its implementation/construction of the intake. These include: • Establishing a barge worksite on the lake; • Excavation of the lakebed surface along the proposed pipe alignment (assumes open cut); • Placing the intake pipe extension along alignment and covering with overburden (assumes open cut); • Connecting the intake extension to the existing intake; • Staging materials at a shore location and ferrying them to the barge worksite.	○ a) Same as alternative 2A. b) This alternative would have a significant amount of technical challenges related to its implementation/construction. These include: • Establishing a barge worksite on the lake, as the intake extends further into the lake; • Excavation of the lakebed surface along the pipe alignment (assumes open cut); • Placing the intake pipe extension along alignment and covering with overburden (assumes open cut); • Connecting the new intake to the WPP; • Staging the materials.

Criteria & Indicators	Alternative 2A – Minor upgrades / In-plant solution	Alternative 2B – Minor upgrades / Extend existing intake	Alternative 2C – Minor upgrades / Construct new intake
4d. Regulatory requirements a) Number of approvals required b) Complexity of approvals	● a) This would require the least number of approvals. The required approvals would include: • Ministry of Environment and Climate Change (MOECC) permits (Permit to Take Water, Drinking Water Works Permit) • Building permit b) Low complexity, minimal schedule and cost risks	◐ a) This would require a moderate amount of approvals compared to the other alternatives. The required approvals would include: • MOECC permits (Permit to take Water, Drinking Water Works Permit) • Approvals: MNRF, Conservation Halton, Department of Fisheries and Oceans, Canadian Environmental Assessment Agency • Building permit b) High complexity, may cause schedule and cost risks	○ a) Same as alternative 2B, plus permit/approval from Town of Oakville for on-shore works. b) Same as alternative 2B.

Criteria & Indicators	Alternative 2A – Minor upgrades / In-plant solution	Alternative 2B – Minor upgrades / Extend existing intake	Alternative 2C – Minor upgrades / Construct new intake
Technical Summary	◐ (1) – (3) The alternative should be able to manage high turbidity events, but it would likely require operational increases to do so, such as increased use of chemicals and equipment. (4) Of all the alternatives, the in-plant solutions would pose the fewest technical challenges to implement. (5) The in-plant solutions would require the fewest number of approvals for implementation.	● (1) Alternatives 2B and 2C provide the greatest level of water supply security through the in-plant solutions plus relocation of the intake into deeper water. (2) Locating the intake crib beyond the boundary of turbid water and at a greater depth than existing will reduce the number of high turbidity events faced by the WPP. (3) Improved raw water quality should help reduce the WPP's demand on equipment and chemicals for water treatment. (4) The intake extension alternative would have more technical challenges than alternative 2A, but less than alternative 2C. (5) The number and complexity of approvals for this alternative would be more than alternative 2A, but less than alternative 2C. The increasing complexity of the approvals may increase the risk of scheduling delays and cost overruns.	◐ (1) – (3) Same as Alternative 2B. (4) This alternative would have the most technical challenges related to its implementation/construction. (5) This alternative would likely require the greatest number of approvals and be more complex compared to the other alternatives. The increasing complexity of the approvals may increase the risk of scheduling delays and cost overruns.

Criteria & Indicators	Alternative 2A – Minor upgrades / In-plant solution	Alternative 2B – Minor upgrades / Extend existing intake	Alternative 2C – Minor upgrades / Construct new intake
5. Economic Criteria			
5a. Initial capital cost (2016 dollars) a) In-plant solutions b) Raw water intake c) Total (a + b)	● a) $4.2 million b) $0 c) $4.2 million	◐ a) $4.2 million b) $16 million c) $20.2 million	○ a) $4.2 million b) $28 million c) $32.2 million
5b. Net Present Value of O&M and capital costs, represented in 2015 dollars a) 50 year span b) 80 year span c) 100 year span Note: service life of intake asset taken to be 90, 80, and 100 years for the 50, 80, and 100 year span.	● a) $90 million b) $114 million c) $119 million	◐ a) $102 million b) $128 million c) $132 million	○ a) $114 million b) $135 million c) $141 million
Economic Summary	● Alternative 2A has the lowest initial capital cost.	◐ Alternative 2B has an initial capital cost greater than Alternative 2A ($16 million more) and less than Alternative 2C ($12 million less).	○ Alternative 2C has the greatest initial capital costs.

Criteria & Indicators	Alternative 2A – Minor upgrades / In-plant solution	Alternative 2B – Minor upgrades / Extend existing intake	Alternative 2C – Minor upgrades / Construct new intake
Overall Evaluation Summary	●	◐	○
Rationale	Alternative 2A is **most preferred** because it would have the fewest impacts with respect to the natural and social environment while at the same time adequately addressing security of supply risks associated with raw water turbidity. It also has the lowest cost.	Alternative 2B is **moderately preferred**. It would provide greater security of supply with respect to risks associated with raw water turbidity than Alternative 2A and be easier and less costly to construct compared to Alternative 2C. However, compared to Alternative 2A, it would be more expensive and its construction more disruptive to the natural and social environment.	Alternative 2C is **least preferred** because, while it and Alternative 2B would provide the greatest security of supply with respect to risks associated with raw water turbidity, construction of the new intake would have the greatest impact on the natural and social environment. Alternative 2C would also be the most technically challenging and have the highest cost.

7.4 Preferred Solution

The preliminary preferred solution is Alternative 2A, which includes:

- Performing minor upgrades to optimize plant performance to achieve 130 ML/d production capacity; and
- Implementing a plant-based solution to address security of supply risks associated with raw water turbidity episodes.

8 Stakeholder and Public Consultation

8.1 Consultation Plan

Consultation early in and throughout the process is a key feature of environmental assessment planning.

Schedule B Municipal Class EA projects include two mandatory points of contact. The first mandatory point of contact with the public and review agencies is toward the end of Phase 2, whereby a notice is issued inviting public comment and input into the project, including the issues under consideration, the problem or opportunity statement, and to assist in the selection of the preferred alternative.

The secondary mandatory point of contact with the public and review agencies is the Notice of Completion and minimum 30-day review period. This is communicated through the Notice of Completion.

A discretionary point of contact may occur during Phase 1. This can be done to present or review the problem statement. Often, proponents will use this discretionary point of contact to issue a Notice of Commencement.

At the outset of this project, a Consultation Plan was developed to ensure that robust public and review agency consultation took place and that the regulatory consultation requirements were met. Key stakeholders targeted in the consultation plan included residents living near the Oakville WPP, Region water operations staff, the Town of Oakville, the MOECC, and First Nations / Aboriginal groups.

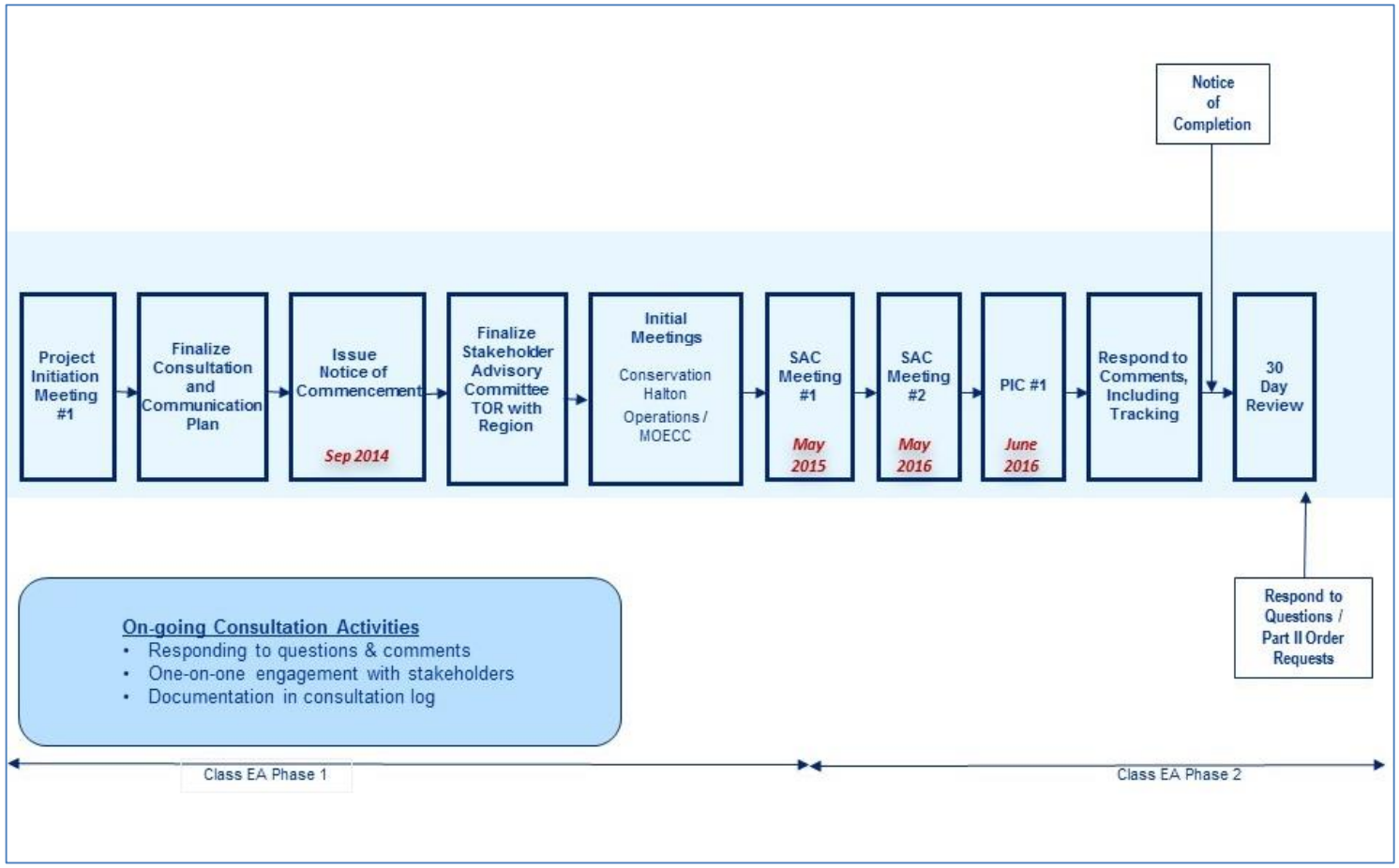
Figure 7 presents a schematic of the consultation plan, which shows the key steps on the consultative process. These included:

- Issuing a notice of commencement (September 2014);
- Establishing and meeting with a Stakeholder Advisory Committee (May 2015 and May 2016);
- Meetings and correspondence with key stakeholder agencies (in particular, MOECC and Conservation Halton);
- Hosting a Public Information Centre (PIC) (June 2016); and
- Issuing a notice of completion.

These and other key consultation tasks are discussed in the following sections.

A copy of the consultation plan is provided in Appendix G. The consultation plan includes Phase 3 consultation in the event that the project continued as a Schedule C (depending on the preferred alternative solution). The consultation schematic on the following page is limited to this Schedule B.

Figure 7: Oakville WPP Class EA Consultation Schematic (Schedule B)



8.2 Contact List

A contact list was developed in consultation with the Region, and updated throughout the process. The contact list was used primarily in the distribution of project notices such as the notice of commencement, notice of PIC, and notice of completion. The final contact list is provided in Appendix G. Organizations and groups included on the contact list include:

- **Federal Agencies**;
  - Environment Canada;
  - Aboriginal Affairs and Northern Development Canada;
  - Department of Fisheries and Oceans;
  - Transport Canada;
- **Provincial Agencies**;
  - Ministry of the Environment and Climate Change;
  - Ministry of Natural Resources and Forestry;
  - Ministry of Aboriginal Affairs;
  - Ministry of Tourism, Culture and Sport;
  - Ministry of Municipal Affairs and Housing;
  - Ministry of Infrastructure;
  - Ministry of Health and Long Term Care;
  - Conservation Halton;
- **Local Stakeholder Organizations**;
  - Halton District School Board;
  - Halton Catholic District School Board;
  - Halton Regional Police;
  - Oakville Fire Department;
  - Medical Officer of Health;
- **Town of Oakville / Halton Region**;
  - Town and Regional Councillors for Ward 2;
  - Office of the Mayor;
  - Capital Projects-Engineering and Construction;
- **First Nations / Aboriginal Groups**;
  - Chiefs of Ontario;
  - Six Nations of the Grand River;
  - Mississaugas of the New Credit First Nations;

- Mohawks of the Bay of Quinte;
- Métis Nation of Ontario (MNO);
- MNO Credit River Métis Council;

- **Utilities**;
  - Enbridge Gas Distribution Inc.;
  - Enbridge Pipelines Ltd.;
  - Trans Canada Pipelines;
  - Union Gas Limited;
- **Local Residents**;
- **Various local residents' associations and other community groups**.

A copy of all correspondence is provided in Appendix G.

8.3 First Nations and Aboriginal Groups

Project notices distributed to First Nations / Aboriginal groups included:

- Notice of Commencement (September 4, 2014); and
- Notice of PIC (June 3, 2016).

Notices were sent via e-mail and hard copy.

No responses were received to the Notice of Commencement.

One response was received to the Notice of PIC. The response came from the Mohawks of the Bay of Quinte. While the letter noted that it was the organization's expectation that he project be carried out in an environmentally sensible manner that is consistent with the laws and regulations governing said project, no specific issues or concerns with the project were raised.

8.4 Agency Consultation

The primary points of contact for federal, provincial and regional agencies included:

- Distribution of Notice of Commencement (September 4, 2014)
  - Responses were received from Transport Canada, Environment Canada, MNRF, MOECC, and Conservation Halton. The responses primarily consisted of clarification of their interests or permitting process or updates to contact information.
- Meeting with Conservation Halton (November 3, 2014).
- Invitation to participate on the SAC sent to Conservation Halton, MOECC, MNRF, and Department of Fisheries and Oceans (DFO) (September 15, 2014).
  - Conservation Halton became a member of the SAC, while MOECC and MNRF declined but asked to be kept informed. No response from DFO on the SAC invitation.

- Follow-up communication with DFO (via voice-mails) indicated DFO's desired approach to engagement, which consisted of submitting any detailed documents DFO is required to review through their "Request for Review" online form.
- Distribution of the Notice of PIC (June 3, 2016).

In addition to engagement of agencies through the Class EA process, the Region and GHD met and corresponded with MOECC to discuss the Oakville WPP rerating testing and obtaining the Permit to Take Water required for the test.

8.5 Stakeholder Advisory Committee

A SAC was formed for this project to ensure that key community and agency stakeholders were consulted with and in a format that would allow for constructive and open dialogue. The purpose of the SAC was to assist the project team in the following areas:

- Identifying stakeholder and public issues that are pertinent to the Class EA study;
- Providing insight on potential approval requirements;
- Providing input into proposed alternatives and evaluation criteria;
- Providing input to the project team regarding the development of the preferred alternative, including potential impacts and mitigation opportunities.

The individuals and organizations invited to participate on the SAC included:

- Region of Halton Regional Councillor Cathy Duddeck (Ward 2);
- Town of Oakville local Councillor Pam Damoff;
- Town of Oakville (Capital Projects - Engineering and Construction);
- Conservation Halton;
- MOECC;
- MNRF; and
- DFO.

The Regional and local councillors agreed to participate, as did Conservation Halton and the Town of Oakville. As noted above, MOECC and MNRF declined to participate but asked to be kept informed, while no response to the invitation was received from DFO.

Table 3 summarizes the dates of the SAC meetings, attendees, and topics discussed. Appendix G includes the invitation letters, SAC Terms of Reference, and meeting agendas, presentations and minutes.

Table 3: SAC Meeting Summary

SAC Meeting Number and Date	SAC Attendees	Meeting Topics
SAC Meeting #1 **Tuesday, May 12, 2015**	Teodor Kochmar, Halton Region Magda Bielawski, Halton Region Paul Bond, Conservation Halton Teresa Labuda, Conservation Halton Rakesh Mistry, Town of Oakville Chris Hunter, GHD Mudassar Muhammad, HMM Arun Jain, exp Jean-Louis Gaudet, exp	• Overview of the Class EA Project • Review of EA Planning Process • Proposed Alternative Solutions • Proposed Evaluation Criteria • Other Relevant Studies • Next Steps
SAC Meeting #2 **Tuesday, May 25, 2016**	Dave Andrews, Halton Region Suzanne Boyd, Halton Region Michelle Gillespie, Halton Region Paul Bond, Conservation Halton Councillor Cathy Duddeck, Regional Councillor, Ward 2 (Halton Region) Councillor Ray Chisholm, local Councillor, Ward 2 (Town of Oakville) Rakesh Mistry, Town of Oakville Chris Hunter, GHD Arun Jain, exp Jean-Louis Gaudet, exp	• Project Overview • Update on Supporting Studies • Update on Standby Power Necessity Study • Recap of Alternative Solutions and Evaluation Process • Results of Evaluation and Preliminary Preferred Alternative • Project Timeline and Next Steps • Upcoming Public Information Centre

8.6 Public Information Centre

The PIC for this Class EA was held on June 9, 2016 from 6:30 p.m. to 8:30 p.m. in the gymnasium of St. James Elementary School, located at 255 Morden Road, Oakville. The objectives of the PIC were to:

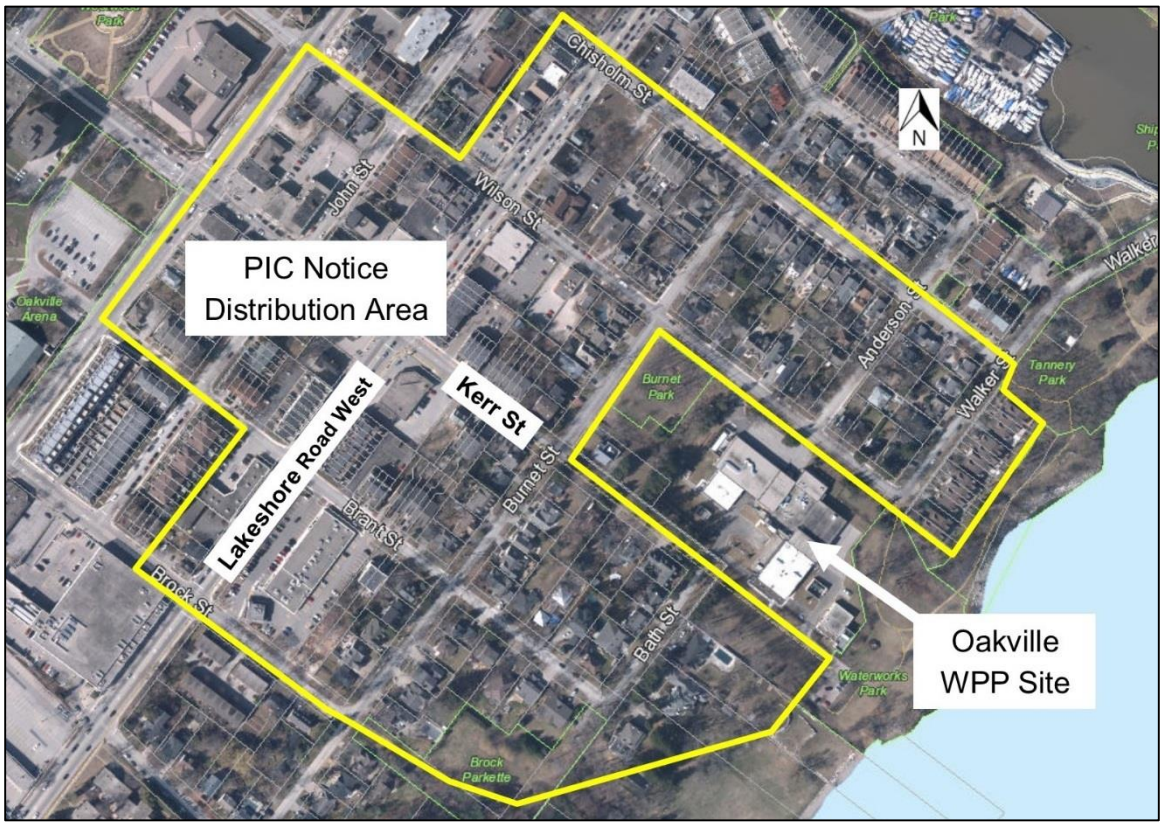
- Describe the project to the public and provide an update on its progress;
- Review the alternative solutions and evaluation process;
- Present the evaluation results and the Preliminary Preferred Solution; and
- Receive input and comments from PIC attendees.

SAC members were advised of the PIC's date, time and location at the May 25th, 2016 SAC meeting.

The PIC was advertised using the following measures:

- Notice of PIC and accompanying letter distributed via mail and/or e-mail to the following:
  - 11 federal agency contacts;
  - 24 provincial agency contacts;
  - 6 local agency contacts;
  - 5 Town of Oakville contacts;
  - 4 utilities;
  - 9 First Nations / Aboriginal / Metis contacts; and
  - 12 members of the local community that had either requested to be added to the distribution list or were identified by the project team as possibly having an interest in this project.
- Hand-delivery of the notice to households in the vicinity of the WPP (see Figure 8 for the distribution area).
- Advertised in the Oakville Beaver on June 2, 2016 and June 9, 2016.
- PIC notice and display boards made available for download on the Region's project website, which was communicated in the PIC notice.

Figure 8: PIC Notice Hand Delivery Area



The PIC used an open house-style format to provide attendees an opportunity to speak directly with Region staff and the consulting team. Three project team members from the Region and three from the consulting team were present at the PIC.

The PIC displayed a set of 16 display boards that described the process, work completed to date, the evaluation process, and the preferred solution. A copy of the display boards are provided in Appendix G.

Comment sheets were provided for attendees to complete and submit at the PIC or at a later date.

In addition to the display boards for this Class EA process, two additional display boards summarized the results of the separate Stand-by Power study.

Seven members of the general public and one Town of Oakville staff attended the PIC. Three comment forms were received. Table 4 presents a summary of the comments received (a copy of the comment forms received are included in Appendix G). The comments received through the comment forms mirror the comments received by the project team verbally from the PIC attendees. Table 4 notes an additional verbal comment received by the project team during the PIC.

Table 4: Summary of PIC Comments Received

Comment Summary	Project Team Action
• Complaint about yellow lights over the Wilson Parking Lot that had been changed with white lights, which now shine onto the resident's porch. Request made by resident to put yellow lights back in.	• Does not relate to this project. • Region is aware of complaint and will address separately.
• Resident lives in proximity to Oakville WPP and experienced the 2009 and 2015 construction activities. Is concerned about construction at the WPP, on-going noise, and security of the site.	• Issues discussed with attendee at PIC. • Attendee advised at PIC that disruption from construction would be minimum. • Region is aware of security concern and will address separately.
• New equipment needs to be noise tested to ensure noise levels do not increase, including during regular testing of standby power generators.	• Comment is related to noise from possible future standby power equipment. • As this is not part of this study, Region will address separately through Standby Power process.
• Recommendations made to improve security at Oakville WPP.	• Does not relate to this project. • Region is aware of security concern and will address separately.
• (Verbal comment) During previous construction, it was very disruptive when trucks would arrive early and idle close to the houses and/or reverse. The idling engines and the reverse indicator sounds (i.e., beeping) would wake the resident.	• Region could potentially provide temporary parking in one of their yards close to the Oakville WPP so that trucks could arrive just in time for delivery. • Region to consider tweaking daily construction schedule to start after 8 a.m. to avoid early disruption to residents.

8.7 Notice of Completion

The Notice of Completion and Public Review was distributed the week of September 19, 2016 to the same contact list as used for the PIC (with updates to account for feedback from the PIC notice mailout). The notice will also be advertised in the Oakville Beaver and on the project's website.

9 Commitments and Monitoring

Any potential impacts associated with the proposed undertaking are anticipated to be minor and easily managed through standard mitigation techniques. Commitments to ensure potential impacts are minimized include:

- Obtain all necessary permits.
- While no potential disruptions to traffic from construction-related activities are anticipated, any that are subsequently expected to occur will be communicated to local residents to minimize inconvenience.
- To minimize disruptions from truck-related traffic, the Region will consider providing temporary parking in one of their yards close to the Oakville WPP so that construction-related trucks could arrive just in time for delivery. This will avoid unnecessary waiting and idling of the trucks in residential areas.
- If construction trucks are required to wait on residential streets, then the trucks should turn off their engines and avoid idling when possible.
- Construction activities and delivery of materials should be limited until after 8 a.m. to the extent possible to avoid early disruption to residents.
- If archaeological resources are discovered during implementation, then work will be paused and the Ministry of Tourism, Culture and Sport will be advised.

Given that noise and vibration impacts are not expected from the construction activities, which will take place within the plant, noise and vibration nuisances will be monitored on a complaints-based process. The following measures will be used to ensure residents are able to identify issues as required:

- A 24-hour telephone number (i.e., 311) shall be available that residents can use to report noise, vibration or other issues related to the project;
- The project manager's e-mail address will be provided so that residents can use it to report noise, vibration or other issues related to the project, with an expectation that responses will be provided within two business days; and
- Contact information for the contract administrator or Region project manager that is clearly communicated to local residents (e.g., notice circulated to residents, and/or signage posted at the plant).

The Water treatment staff report that filter backwash Total Suspended Solids (TSS) is less than 25 mg/L and is free from residual chlorine. The Region's 2015 Annual Drinking Water Quality Report (February 2016) notes that the maximum allowable TSS permitted in discharge (as per the WPP's Certificate of Approval) is 25 mg/L and that the 2015 average was 19.0 mg/L[3]. The Region will continue to meet this TSS limit and ensure filter backwash is free from residual chlorine.

[3] Halton Region. *The 2015 Annual Drinking Water Quality Report: Burlington, Burloak and Oakville Water Purification Plants and the South Halton Water Distribution System*. February 2016.