Region of Peel

East Brampton Watermains
Municipal Class Environmental Assessment Study

ENVIRONMENTAL STUDY REPORT

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Revision Log

Revision #	Revised By	Date	Issue / Revision Description
1	J. Whittard	December 17, 2013	Minor edits - V2 issued for Peel Region review, including Executive Summary
2	J. Whittard	January 16, 2014	Minor edits - V3 issued for review agencies (MTO, TRCA, MOE, Brampton)
3	J. Whittard	May 20, 2014	Final draft incorporating Peel Region and review agency comments
4	J. Whittard	June 2, 2014	Final

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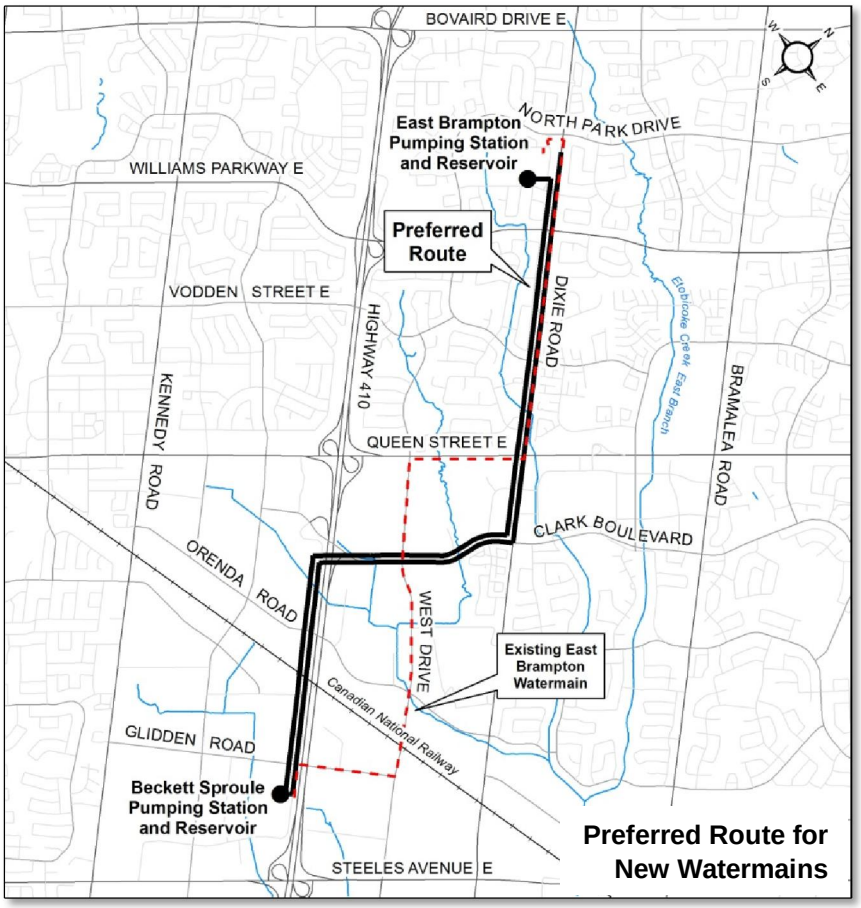
List of Acronyms

AADT	Average Annual Daily Traffic
ANSI	Area of Natural or Scientific Interest
BRT	Bus Rapid Transit
CAV	Combination Air Valve
CEAA	*Canadian Environmental Assessment Act*
Class EA	Municipal Class Environmental Assessment
CN	Canadian National Railway
dB	decibels
dBA	A-weighted decibels
DPCDSB	Dufferin-Peel Catholic District School Board
DWWP	Drinking Water Works Permit
EA	Environmental Assessment
EAA	*Environmental Assessment Act*
EPBM	Earth Pressure Balancing Machine
ESA	Environmentally Sensitive Area
ESA	Environmental Site Assessment
ESR	Environmental Study Report
GBR	Geotechnical Baseline Report
GTA	Greater Toronto Area
HOV	High Occupancy Vehicle
IO	Infrastructure Ontario (formerly Ontario Realty Corporation)
ISA	International Society of Arboriculture
MEA	Ontario Municipal Engineers Association
ML	Megalitre
MNR	Ontario Ministry of Natural Resources
MOE	Ontario Ministry of the Environment
MOI	Ontario Ministry of Infrastructure
MTO	Ontario Ministry of Transportation
NHIC	Natural Heritage Information Centre
OALA	Ontario Association of Landscape *Architects*
OPSD	Ontario Provincial Standards Specifications Document
PCBs	Polychlorinated biphenyls
PDSB	Peel District School Board
Province	Province of Ontario
PSW	Provincially Significant Wetland
PTTW	Permit to Take Water
Region	Region of Peel
SAR	Species at Risk
SPL	Sound Pressure Level
TBM	Tunnel Boring Machine
TIA	Traffic Impact Assessment
TMP	Traffic Management Plan
TRCA	Toronto and Region Conservation Authority
VC	Valve Chamber
Z4	Region of Peel Zone 4 pressure zone
Z5	Region of Peel Zone 5 pressure zone

Executive Summary



The Region of Peel (the Region), through their consultant AECOM, has completed a Municipal Class Environmental Assessment (EA) study to select the preferred route for two new large diameter municipal watermains in the City of Brampton.

The proposed works involve construction of a new 1.5-metre (5-foot) diameter transmission main that will extend approximately six kilometres (3.7 miles) from the existing Beckett Sproule Pumping Station and Reservoir to the existing East Brampton Pumping Station and Reservoir (see map at right). In addition, a second new sub-transmission main, varying from 0.9 metres to 1.2 metres (3 to 4 feet) in diameter, will also be constructed in the same trench or tunnel to connect the Beckett Sproule Pumping Station to the existing water distribution system and the future West Brampton watermain that was planned along Williams Parkway through the completion of a separate Class EA study.

As documented in the Region's 2013 Water and Wastewater Master Plan, these new watermains are planned to be in service by 2020 in order to meet the Region's future water supply needs and to provide operational flexibility, back-up service and additional capacity within the local distribution system. Construction is currently scheduled to start in 2016 at the earliest. The total construction cost for both watermains is currently estimated at approximately $167 million dollars.

This Municipal Class EA Environmental Study Report (ESR) has been prepared to document the planning and consultation process followed, including evaluation of alternative solutions and identification of the preferred route and design concepts for the two new East Brampton watermains. Placement of this ESR for a 30-day public review and comment period completes the planning stages of this project. If no Part II Order requests are received, the Region may proceed with detailed design and construction of the recommended works as presented in this report.

Alternative Solutions to the Problem

Hydraulic analysis has confirmed that the Region's existing infrastructure cannot provide sufficient capacity to efficiently deliver the water required for future urban growth and intensification in eastern Peel. Alternative

solutions to this problem were identified and evaluated as part of the Region's 2013 Water and Wastewater Master Plan[1], including:

1. Do nothing;
2. Limit community growth;
3. Expand the existing water supply system by building off the planned 2031 infrastructure as per the Region's previous 2007 Water and Wastewater Master Plan;
4. Expand the existing water supply system by modifying and building off the planned 2031 infrastructure identified in the Region's 2007 Master Plan, and also constructing a new stream- or groundwater-based Water Treatment Plant;
5. Expand the existing water supply system by building off the planned 2031 infrastructure as per the Region's 2007 Master Plan, and also constructing a new lake-based Water Treatment Plant; and
6. Continue to implement a water conservation and efficiency program.

Based on the results of the evaluation, Alternatives 3 through 6 were carried forward for the development of more detailed water servicing strategies and further evaluation of each strategy. Ultimately, *Alternative 3: Expand the Existing Water Supply System* in combination with *Alternative 6: Water Conservation and Efficiency* was identified as the preferred solution, with construction of the East Brampton Watermains forming part of the preferred servicing strategy. Specifically, the "East Brampton Transmission Main Twinning" (referred to in this report as the East Brampton Z4 Watermain) and "extension of the distribution system in northwest Brampton"[2] were identified as key projects within the preferred servicing strategy.

As part of this Municipal Class EA study, the evaluation of alternative solutions was reviewed considering current conditions, including recent approved population projects, growth areas and water system modeling. This review confirmed that Alternative 3 (in combination with Alternative 6) continues to be the preferred solution. Alternative 6 is being addressed by the Region's water conservation program, Water Smart Peel[3]. As such, this study carries forward with a portion of Alternative 3, including the identification and evaluation of alternative Z4 and Z5 watermain routes in support of implementing the preferred solution.

Alternative Watermain Routes

Alternative watermain routes were generated by first identifying a long list of potential alternative routes within the study area, and then screening those routes to identify the most appropriate short list for comparative evaluation. As a result, four alternative routes were identified for either the transmission main, the smaller sub-transmission main, or for both watermains together in one trench or tunnel. As shown in **Figure 1**, these four alternative watermain routes included:

- Alternative Route 1: Kennedy Road;
- Alternative Route 2: Rutherford Road, including the Vodden Street sub-option;

1 The Region of Peel's 2013 Water and Wastewater Master Plan is available for review from the Region's website at www.peelregion.ca/pw/water/environ-assess/lakebase-masterplan.htm.

2 The East Brampton Z5 Watermain referred to in this report is one of several key projects which form part of the distribution system extension recommended by the 2013 Master Plan in northwest Brampton.

3 More information about the Region's Water Smart Peel program is available at www.watersmartpeel.ca.

East Brampton Pumping Station and Reservoir

Beckett Sproule Pumping Station and Reservoir

Centre St N
Williams Py E
Kennedy Rd N
Vodden St E
Rutherford Rd N
Rutherford Rd S
Kennedy Rd S
Halsen Rd S
Bovaird Dr
Harden St N
North Park Dr
Hickey St S
Dixie Rd
Bramalea Rd
Howden By
Queen St E
West Dr
Clark By
Orenda Rd
Canadian National Railway
Clarence St
Selby Rd
Glidden Rd
Thorp Ct
Balmoral Dr
Wyndale By
Birchbank Rd
Dearbourne By
East Dr

Legend

- Study Area Boundary
- Arterial/Collector Road
- Watercourse
- Existing East Brampton Watermain
- Other Existing Large Diameter Infrastructure

1.5 m Zone 4 Transmission Main and 0.9 m to 1.2 m Zone 5 Sub-Transmission Main Alternative Routes

- Alternative Route 1 (Kennedy Rd)
- Alternative Route 2 (Rutherford Rd)
- Alternative Route 2a (Vodden St)
- Alternative Route 3 (Dixie Rd)
- Alternative Route 3a (Tilbury Ct)
- Alternative Route 4 (Kennedy Rd)
- Alternative Zone 4 Interconnection
- Alternative Zone 5 Interconnection

Basemapping: Region of Peel/City of Brampton, 2012
Orthophotography: Region of Peel, 2009/2012

N
W E
S

0 250 500 1,000 Meters

UTM Zone 17N, NAD 83

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East Brampton Watermains Municipal Class Environmental Assessment

Alternative Watermain Routes

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Figure 1

Map Document: Fig 4-6 AlternativeRoutesV4.mxd

- Alternative Route 3: Dixie Road, including the Tilbury Court sub-option; and
- Alternative Route 4: Bramalea Road.

These four alternative watermain routes were then comparatively evaluated based on a number of natural, social, cultural, technical, legal-jurisdictional, and economic-financial evaluation criteria that were developed to address the broad definition of the environment as per the Ontario *Environmental Assessment Act (EAA)*. Alternative watermain routes were then ranked based on objective evaluations, and the preliminary recommended watermain route was presented for public and agency comment. Following confirmation of the recommended route, design options and potential construction-related impacts were then further defined and again presented for public and agency comment.

Preferred Watermain Route

As shown in **Figure 2**, the preferred route for both East Brampton watermains is **Route 3: Dixie Road**. This route includes a combination of open cut and trenchless construction, extending approximately six kilometres (3.7 miles) along the west side of Heart Lake Road, the north side of Clark Boulevard and the west side of Dixie Road. The two watermains will be constructed predominantly within these existing road right-of-ways and in the same trench or tunnel.

The advantages provided by the preferred route include:

- Shortest and most direct route with the fewest directional changes required, resulting in construction cost savings and operational efficiencies;
- Provides opportunity to coordinate watermain construction with the widening of Clark Boulevard and/or Dixie Road;
- Allows a connection to be made to the East Brampton Pumping Station and Reservoir from Dixie Road, rather than through Northampton Park and the adjacent school property;
- The larger transmission main can be constructed below the top water level at the East Brampton Reservoir without the need for a long, deep tunnel;
- The smaller sub-transmission main will be more utilized east of Highway 410, resulting in greater operational efficiency;
- Minimizes social disruption by avoiding construction along residential streets, as opposed to the Kennedy Road and Rutherford Road alternatives;
- Crosses the fewest intersecting roads and private entrances;
- No crossings of Etobicoke Creek East Branch (Spring Creek) are required;
- No adjacent schools; and
- Heart Lake Road, Clark Boulevard and Dixie Road are all designated truck routes with no truck timing restrictions.

In addition, following one route for both watermains will result in cost savings, especially when co-ordinated with the widening of Clark Boulevard and/or the widening of Dixie Road, and will confine construction impacts to one corridor, thereby reducing overall public impact and potential environmental effects.

East Brampton Pumping Station and Reservoir

Beckett Sproule Pumping Station and Reservoir

0.9

1.05

1.2

Centre St N
Williams Pkwy E
Kennedy Rd N
Vodden St
Rutherford Rd N
Hwy 410
Queen St E
Jansen Rd
Rutherford Rd S
Orenda Rd
Canadian National Railway
Clarence St
Selby Rd
Glidden Rd
Kennedy Rd S
Heart Lake Rd S
Tilbury Ct
Twist Dr
Clark Blvd
Howden Blvd
Dixie Rd
North Park Dr
Mackay St S
Williams Pkwy E
Bramalea Rd
Vodden Blvd
Balmoral Dr
Birchbank Rd
Dearbourne Blvd
Orenda Rd

Legend

- Study Area Boundary
- Arterial/Collector Road
- Watercourse
- Existing East Brampton Watermain
- Other Existing Large Diameter Infrastructure
- TRCA Regulation Limit

Recommended Route for 1.5 m Zone 4 Transmission Main and 0.9 m to1.2 m Zone 5 Sub-Transmission Main

- Proposed Tunnel Construction
- Proposed Open Cut Construction
- 0.9 — Proposed Zone 5 Sub-Transmission Main Sizing (metres in diameter)
- Proposed Z4 Interconnection
- Proposed Z5 Interconnection

Basemapping: Region of Peel/City of Brampton, 2012
Orthophotography: Region of Peel, 2009/2012

N
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0 250 500 1,000 Meters

UTM Zone 17N, NAD 83

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East Brampton Watermains Municipal Class Environmental Assessment

Preferred Watermain Route

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Figure 2

Map Document: Fig 6-1 PreferredRoutev5.mxd

Proposed Construction Methods

Both open cut construction and trenchless construction are proposed along the preferred route, at a ratio of approximately 60 per cent open cut construction to 40 per cent tunnel construction. Open cut construction will require temporary lane closures that advance as the watermains are installed. Tunnel construction will require the construction of tunnel shaft compounds at both ends of each tunnelled section.

Where the tunnel shaft construction compounds, East Brampton watermains and or interconnections to the existing water distribution system are proposed outside of an existing road right-of-way, permanent and/or temporary easements will be required from either public agencies (i.e., MTO and City of Brampton) or private landowners. All parties from whom easements are required have already been contacted as part of the Municipal Class EA planning process.

Mitigation Measures

Impacts related to construction of the East Brampton watermains will be limited to the duration and location of construction. Impacts will be minimized by incorporating proper best management practices and construction techniques and controls, including specific measures such as traffic management, dust control and erosion and sediment control. It is expected that construction will cause temporary traffic disruptions, including lane restrictions along the preferred route. As part of detailed design, specific traffic management plans will be developed to mitigate impacts to traffic and pedestrians and to maintain access to properties. The Region will continue to inform the public of construction plans as this project proceeds. It is recommended that the mitigating measures further described in **Section 7** of this report be further confirmed and defined during detailed design, and employed during construction to reduce the potential impacts of the proposed works.

Remaining Approvals

During detailed design and prior to construction, approvals will be required from several review agencies including the Ministry of the Environment (MOE), Toronto and Region Conservation Authority (TRCA), Ministry of Transportation (MTO), Ministry of Tourism, Culture and Sport (MTCS), City of Brampton and various utility companies as further described below:

- A MOE Drinking Water Works Permit (DWWP) will be required as part of the Municipal Water Licensing Program;
- The need for MOE Permits to Take Water (PTTW) will be confirmed as part of the Stage 2 hydrogeological investigations that are currently underway;
- Dependent on the groundwater discharge type and location, MOE approval under Section 53 of the *Ontario Water Resources Act* may also be required;
- Development Interference Permits will be required from the TRCA prior to construction within or near the four watercourse crossings, including works within floodplains, wetlands and/or valleys;
- Encroachment permits for crossing of Highway 410 and the Clark Boulevard ramps will be required from MTO;
- MTO will also require detailed survey monitoring of its Highway 410 bridge structures to demonstrate that there are no adverse effects either during or after construction;

- MTCS clearance will be required prior to construction, including completion of the Stage 2 archaeological investigations currently underway as part of preliminary design;
- Further correspondence with MNR during detailed design, including completion of MNR's Information Gathering Form, will be required in order to determine if authorization under the *Endangered Species Act* is required.
- Although an MNR permit under the *Lakes and Rivers Improvement Act* is not anticipated since there are no proposed open cut watercourse crossings, the MNR will be contacted during detailed design to determine if authorization under the *Endangered Species Act* is required;
- Road Occupancy Permits will be required from the City of Brampton for construction of both the watermains and interconnection chambers within the road right-of-way along Heart Lake Road and Clark Boulevard;
- Utility crossing approval will be required from CN Railway for the tunnel crossing just north of Selby Road; and
- Various utilities will have to review and approve some utility relocations in order to accommodate the watermains along some sections of the alignment.

In addition, following approval of this Municipal Class EA, the Region of Peel will proceed to negotiations with property owners for the permanent and temporary easements, as required.

Communications and Consultation Program

A variety of communications were undertaken with numerous stakeholders to facilitate meaningful consultation so that they could have input in the decision-making process and thereby contribute to the study outcome. These stakeholders included the City of Brampton, external government review agencies, property owners and other interested members of the public. This was accomplished throughout the study, beginning with the notification of study commencement and continuing through two rounds of Public Open Houses to gauge interest in the study and approximately 30 individual meetings. Other activities included a project-specific website (http://www.peel.ca/pw/water/environ-assess/east-brampton.htm), Councillor briefings and a business community outreach.

Through preliminary and detailed design it is expected that further comments will be received from those having a direct interest in the project, and if necessary, meetings will be convened to discuss stakeholder comments and resolve any remaining issues, if applicable. It is not anticipated that any concerns will be raised that the Region cannot further address during detailed design.

Recommendations

Following approval of this Municipal Class EA, it is recommended that:

- The preferred watermain route as described in **Section 6** of this report should proceed to detailed design and remaining approvals;
- Based on the property requirements identified in **Section 6.2** of this report, the Region begin to negotiate all required permanent and temporary easements, including those required along Clark Boulevard in co-ordination with City of Brampton Real Estate staff;

- The Region of Peel continue to coordinate with the City of Brampton regarding construction timing co-ordination along Clark Boulevard; and
- The mitigation measures identified in **Section 7** of this report should be confirmed and further elaborated upon during detailed design, and implemented as part of the construction process.

Summary

This Municipal Class EA Environmental Study Report (ESR) has been prepared to confirm that the proposed East Brampton Watermains project meets the requirements of the *EAA*. An evaluation of potential impacts was included in the evaluation of alternative watermain routes and indicates that generally, minor and predictable impacts are expected, all of which can be addressed by the recommended mitigation measures. Public and agency notification was provided and no comments were received that cannot be adequately addressed as the project proceeds through detailed design.

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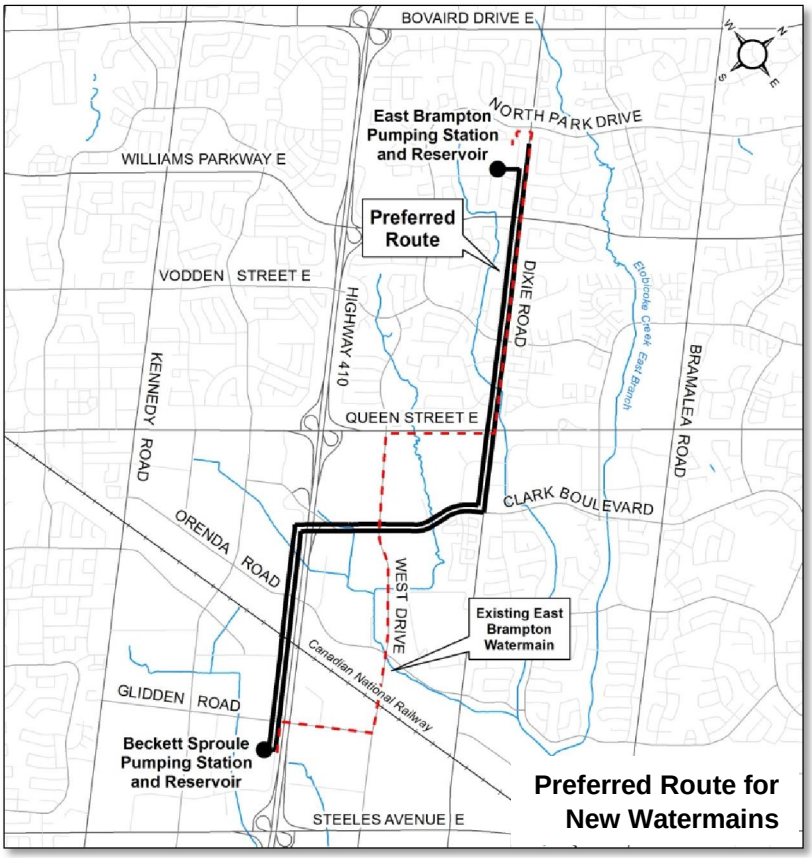
1. Introduction and Study Background



The Region of Peel (the Region), through their consultant AECOM, has completed a Municipal Class Environmental Assessment (EA) study to select the preferred route for two new large diameter municipal watermains in the City of Brampton. The proposed works involve construction of a new 1.5-metre (5-foot) diameter Zone 4 (Z4) transmission main that will extend approximately six kilometres (3.7 miles) from the existing Beckett Sproule Pumping Station and Reservoir to the existing East Brampton Pumping Station and Reservoir (see map at right). In addition, a second new sub-transmission main[4] varying from 0.9 metres to 1.2 metres (3 to 4 feet) in diameter will also be required to connect the Beckett Sproule Pumping Station to the existing Zone 5 (Z5) water distribution system and the future West Brampton watermain that was planned through the completion of a separate Class EA study.

The new Z4 watermain is required to be in service by approximately 2020 in order to meet the Region's future water supply needs to support future approved and planned growth. Once in service, it will also provide operational flexibility, allowing sections of the existing East Brampton watermain to be shut down for inspection or maintenance. In addition, the new watermain will also help to provide back-up service in the event of a disruption to the existing East Brampton watermain. The new Z5 watermain will also provide the Region with additional capacity within the local distribution system.

1.1 Region of Peel Municipal Water Supply System

The Region of Peel's lake-based municipal water supply system is serviced with water from Lake Ontario through two water purification plants: the Lakeview Water Treatment Plant and the Lorne Park Water Treatment Plant. From these two plants, a network of approximately 4800 kilometres (3000 miles) of watermains, ranging in diameter from approximately 50 millimetres to 2.4 metres (2 inches to 8 feet), transfers the water north to residents and businesses in the City of Mississauga, City of Brampton and parts

4 Planning and routing analysis for the new Z5 East Brampton sub-transmission main followed the same Class EA planning and consultation process as the new Z4 East Brampton transmission main due to overlapping, common study areas.

of the Town of Caledon and York Region[5]. Ten major pumping stations transfer the water supply north to seven pressure zones located north of Lake Ontario at progressively higher elevations. Water supply storage is provided by in-ground reservoirs at each pumping station and four elevated tanks. In general, each major pumping station provides a dedicated supply to the local distribution systems through localized pumping, as well as transfer to the subsequent pressure zone via high lift pumping.

Figure 1-1 illustrates the Region of Peel's existing water supply system and pressure zones, including the approximate service areas of the two new watermains proposed through this Class EA study.

1.2 East Brampton Watermains Feasibility Assessment

In June 2011, the Region of Peel completed a hydraulic analysis of their existing water distribution system in Pressure Zones 4 (Z4) and 5 (Z5) in the City of Brampton[6]. The focus of the analysis was to determine if the existing Z4 and Z5 infrastructure could efficiently service future growth by meeting the Region's water transfer requirements to 2031. Specifically, the feasibility assessment reviewed the ultimate 2031 transfer requirements as documented in the Region's 2007 Water and Wastewater Master Plan as follows:

- From the Beckett Sproule Pumping Station to the East Brampton Reservoir via the existing 1.05-metre (3.4-foot) diameter Z4 East Brampton transmission main; and

- From the Beckett Sproule Pumping Station to the existing distribution system via three existing Z5 sub-transmission mains, sized at approximately 0.6 metres (2 feet), 0.75 metres (2.5 feet) and 0.9 metres (3 feet) in diameter respectively.

In summary, the analysis confirmed that these existing Z4 and Z5 watermains cannot provide sufficient capacity to efficiently deliver the required water. As a result, three new watermains were recommended, two of which are the subject of this Class EA study. Further details are provided in the sub-sections below.

1.2.1 New Zone 4 East Brampton Transmission Main

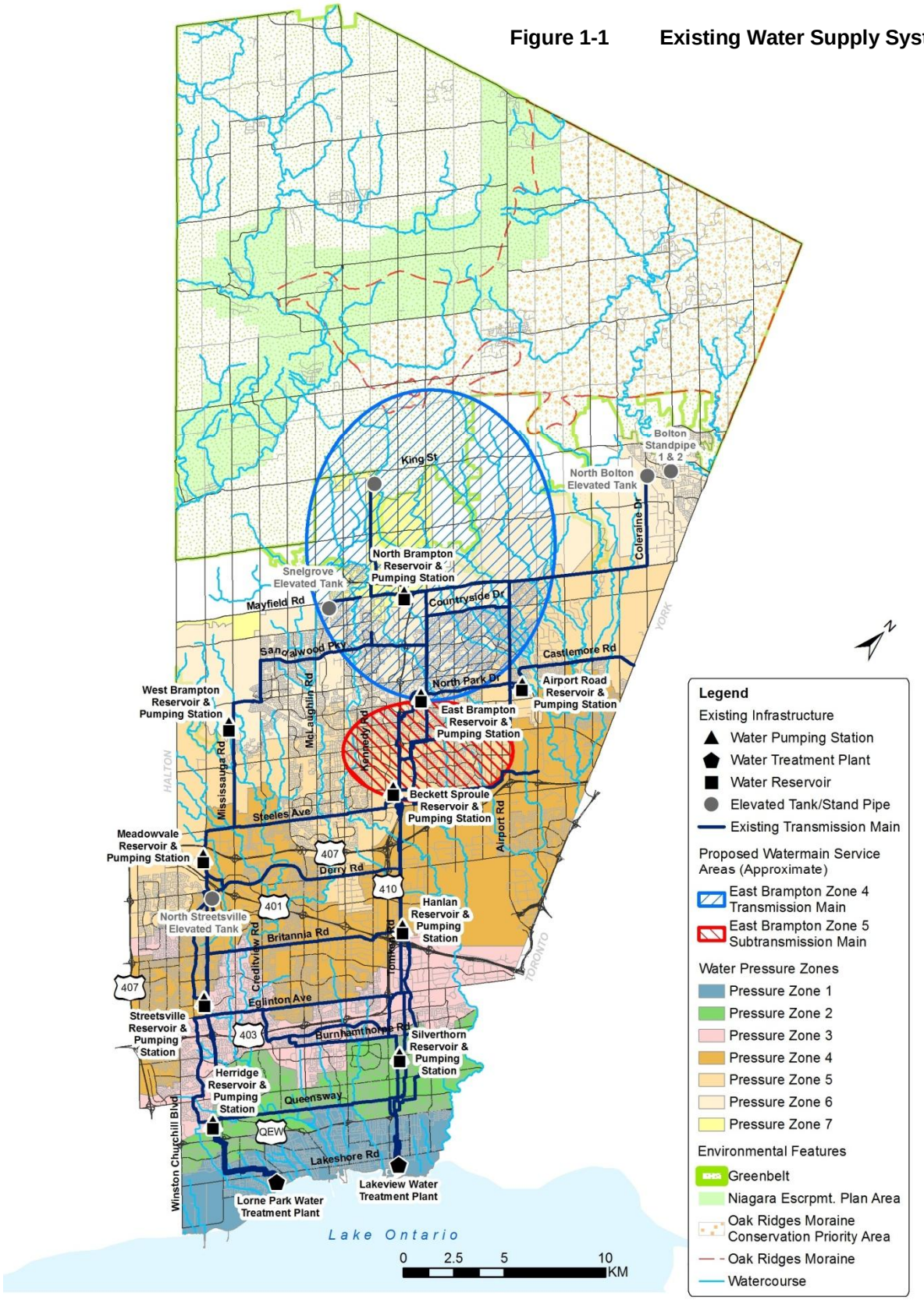
Hydraulic modelling of the existing Z4 system over a 5-day extended period simulation showed that even with maximized pumping from Beckett Sproule, the tank at the East Brampton Reservoir would empty below the critical 25% threshold during peak hour demand periods. However, when twinning[7] of the existing Z4 watermain with a new 1.5-metre (5-foot) diameter transmission main was modelled, twinning was shown to effectively transfer sufficient flow to replenish the reservoir and maintain the tank level above 40% during peak periods without altering the pumping at Beckett Sproule. In addition, the new transmission main was shown to lower the overall discharge pressure at Beckett Sproule, which implies that the operating point of

*5 York Region purchases municipal drinking water from the Region of Peel as per Schedule C of the York-Peel Water Servicing Agreement (February 2002). Water supplied to York Region is treated at the Lakeview Water Treatment Plant, pumped north to the Beckett Sproule Pumping Station, and then transferred to the East Transmission System where it is ultimately pumped to York Region via the Airport Road Pumping Station (see **Figure 1-1**). As per the Region's 2013 Water and Wastewater Master Plan, the 2031 water supply requirement for York Region is 388 ML/day.*

6 Region of Peel, Feasibility Assessment of Zone 5 Sub-Transmission Main and East Brampton (Zone 4) Transmission Main Twinning. AECOM, June 2011.

7 Twinning refers to the construction of a new transmission main within either a new corridor or the same corridor as the existing watermain.

Figure 1-1 Existing Water Supply System



the pumps would be closer to the maximum efficiency. As a result, the feasibility assessment recommended the addition of new 1.5-metre (5-foot) diameter Z4 transmission main to increase the water transfer capability from the Beckett Sproule Pumping Station. This new Z4 transmission main is one of the two new watermains proposed through this Class EA study.

With respect to watermain sizing, subsequent hydraulic modelling of the existing Region of Peel water distribution system (AECOM, 2012) confirmed that the new Z4 East Brampton transmission main should be sized to 1.5 metres (5 feet) in diameter. Although a 1.35-metre (3.4-foot) diameter pipe would be sufficient to meet the 2013 Master Plan flow requirements to 2031, this up-sized pipe size is recommended in order to meet the Region's flow requirements to 2051 and beyond. In addition, a new Z4 transmission main sized at 1.5 metres (5 feet) in diameter will allow the existing pumps at the East Brampton pumping station to work most efficiently, and will provide for full system security (i.e., will prevent the East Brampton reservoir tank from emptying after 16 hours in an emergency situation).

With respect to the location of the new watermain, the routing applied in the hydraulic modelling assessment only represented a conceptual pathway for water supply conveyance. The recommended route has been proposed through this Class EA study (see **Section 6**).

1.2.2 New Zone 5 East Brampton Sub-Transmission Main

The feasibility assessment also noted that the required transfer capacity from Beckett Sproule to Pressure Z5 as per the Master Plan was 193 ML/day, but the conveyance capacity of the existing watermains was only 181 ML/day. To address this shortfall and provide additional capacity from Beckett Sproule, the assessment identified the need for two new Z5 watermains as follows:

- Addition of a new north/south Z5 sub-transmission main, ranging in size from 0.75 to 1.2 metres (2.5 to 4 feet) in diameter, to maximize utilization of both the existing system and future infrastructure; and

- Addition of a new east/west Z5 sub-transmission main, ranging in size from 0.75 to 0.9 metres (2.5 to 3 feet) in diameter to connect the new north/south Z5 sub-transmission main to the West Brampton Reservoir.

The new north/south Z5 sub-transmission main is the second of the two new watermains proposed through this Class EA study. It is referred to as the Z5 East Brampton sub-transmission main. The new east/west Z5 sub-transmission main, referred to as the West Brampton watermain, has been approved as part of a separate Class EA study (see **Section 2.5.4**).

With respect to watermain sizing[8], subsequent hydraulic modelling confirmed that variable pipe sizing along the route is recommended, ranging from 0.9 metres (3 feet) in diameter north of Queen Street East to 1.2 metres (4 feet) in diameter south of Orenda Road (see **Figure 4-5**). Again, this pipe sizing is recommended in order to meet the Region's flow requirements to 2051 and beyond, and will maximize utilization of both the existing system and future infrastructure.

8 Progressively smaller pipes are required further away from the Beckett Sproule Pumping Station since some of the water will have already been transferred to the existing distribution system at each interconnection along the route.

1.3 Region of Peel Water and Wastewater Master Plan

The Region of Peel's Water and Wastewater Master Plan provides a planning framework for the development of water and wastewater servicing infrastructure to accommodate approved future growth as documented in the Region's Official Plan. In 2011, the Region initiated an update of its 2007 Water and Wastewater Master Plan. This update was recently completed in 2013 and brings the water and wastewater infrastructure proposed in the Region's 2007 Master Plan in line with recently proposed residential and employment growth targets set by the Province and area municipalities. It identifies a number of strategically phased water and wastewater projects based on the Region's 2031 growth target of 1.64 million people, which has been accordingly allocated among the area municipalities of Mississauga, Brampton and Caledon. The 2013 Master Plan also considers the impact of potential intensification and greenfield growth post 2031.

The Region's 2013 Master Plan was carried out in accordance with the master planning provisions of the MEA Municipal Class EA document (October 2000, as amended in 2007 & 2011) and similar to this Class EA study, included public and agency consultation throughout the planning process. The proposed East Brampton Z4 transmission main and Z5 sub-transmission main (referred to here as the East Brampton watermains) were included as part of the 2013 Master Plan.

1.4 Format of this Report

This report was prepared to meet the requirements of the Ontario Municipal Engineers Association (MEA) Municipal Class EA planning process. The report combines all phases of the planning process under one cover and incorporates steps considered essential for compliance with the requirements of the *Environmental Assessment Act* (*EAA*) in the following sections:

- **Section 1** provides background information about the initiation of this study, outlines the format of this report, and describes the study purpose and team organization. This section also provides an overview of the Municipal Class EA planning process, including the project planning schedule followed, public review procedures and next steps;

- **Section 2** describes the study area and its features, including the existing water distribution system and existing and future land uses and infrastructure projects. This section also summarizes the socio-economic, physical and natural environments and social/cultural features, as well as other servicing and planning considerations;

- **Section 3** identifies and describes the problems/opportunities addressed by this Class EA study;

- **Section 4** presents the alternative solutions to the problems/opportunities, including how the alternative watermain routes were identified, provides a comparative evaluation of the alternative watermain routes, and identifies the preferred route;

- **Section 5** presents the alternative design concepts that were considered for each route segment, including an overview of open cut versus trenchless construction methods, the rationale for the recommended construction method, tunnel shaft locations and the watermain location within the road right-of-way. In addition, alternative interconnection locations with the existing water distribution system are also reviewed, as well as alternative connection points at both the Beckett Sproule and East Brampton Pumping Station and Reservoir;

- **Section 6** presents an overview of the preferred design, including an overview of property requirements, transportation, hydrogeological and geotechnical considerations and implementation schedule. This section also discusses co-ordination with other approved projects and construction costs and funding;

- **Section 7** describes the mitigative measures recommended to ensure that any disturbances are managed by the best available methods, including traffic management and co-ordination with other approved projects;

- **Section 8** outlines future review agency approvals required during detailed design and as the project proceeds through construction and post-construction;

- **Section 9** summarizes the communications and consultation program activities undertaken as part of this Municipal Class EA study; and

- **Section 10** presents the final study conclusions and recommendations.

1.5 Study Purpose and Objectives

The purpose of this Municipal Class EA study is to provide a comprehensive and environmentally sound planning process, which is open to public participation, to select the preferred routes for two new large diameter water supply pipes known as the East Brampton watermains. Study objectives include:

- Protection of the environment, as defined in the *Environmental Assessment Act* (*EAA*), through the wise management of resources;
- Extensive consultation with all affected and interested parties, including participation of a broad range of stakeholders to allow for the sharing of ideas, education, testing of creative solutions and developing alternatives;
- Facilitating dialogue between those with different or contrasting interests;
- Documentation of the study process in compliance with all phases of the Municipal Class EA planning process;
- Selection of an optimal solution which is both technically viable and cost effective; and
- Documentation of mitigation and monitoring requirements which will ensure minimal disruption during construction to residents, businesses and the natural environment and fulfillment of commitments, as required.

By completing the Class EA planning process, the preferred watermain routes should address environmental, social and technical concerns and be acceptable to the majority of residents, stakeholders and review agencies.

1.6 Study Team Organization

This Municipal Class EA study was undertaken as a collaborative effort between the Region of Peel and their consultant, AECOM. General direction was provided by Region representatives with many project team meetings held at key points throughout the planning process. Key team members from the Region's Public Works department and AECOM are included in **Table 1-1** below.

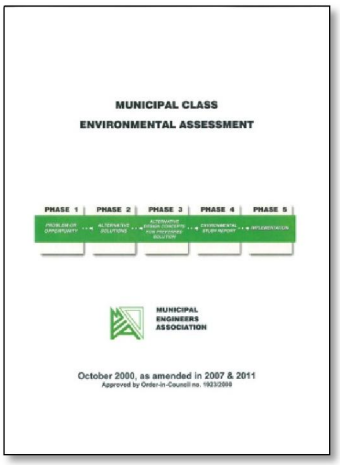
Table 1-1 Key Study Team Members

Region of Peel		AECOM	
• Syeda Banuri • Imran Motala • Lyle LeDrew • Joe Gallagher	• Lynne Germaine • Martin Pendlebury • Anthony Parente • Rick Nelson Stroud	• Dave Beattie • Karl Grueneis • Benny Wan • Jillian deMan	• J. Neil Harvey • Jennifer Whittard • William Van Ruyven • Sheri Harmsworth

Additional subject-specific expertise was provided by SPL Consultants (hydrogeology and geotechnical), Archeoworks (archaeology) and Unterman McPhail and Associates (cultural built heritage). In addition, City of Brampton, TRCA and MTO staff were consulted regularly throughout the planning process and will continue to be involved as the project proceeds through detailed design and construction.

1.7 Municipal Class Environmental Assessment Planning Process

1.7.1 Overview



All municipalities in Ontario, including the Region of Peel, are subject to the provisions of the *Environmental Assessment Act* (EAA) and its requirements to conduct an Environmental Assessment for applicable public works projects. The Municipal Engineers Association's (MEA) "Municipal Class Environmental Assessment" document (October 2000, as amended in 2007 & 2011) provides municipalities with a five-phase planning procedure, approved under the *EAA*, to plan and undertake all municipal sewage, water, stormwater management and transportation projects that occur frequently, are usually limited in scale and have a predictable range of environmental impacts and applicable mitigation measures.

In Ontario, infrastructure projects such as the proposed East Brampton watermains are subject to the Municipal Class EA process and must follow a series of mandatory steps as outlined in the Municipal Class EA document. The Class EA consists of five phases as summarized below:

- ***Phase 1 – Problem or Opportunity:*** Identify the problems or opportunities to be addressed and the needs and justification;
- ***Phase 2 – Alternative Solutions:*** Identify alternative solutions to the problems or opportunities by taking into consideration the existing environment, and establish the preferred solution taking into account public and agency review and input;
- ***Phase 3 – Alternative Design Concepts for the Preferred Solution:*** Examine alternative methods of implementing the preferred solution based upon the existing environment, public and agency input, anticipated environmental effects and methods of minimizing negative effects and maximizing positive effects;
- ***Phase 4 – Environmental Study Report:*** Document in an Environmental Study Report (ESR), a summary of the rationale, planning, design and consultation process for the project as established

through Class EA Phases 1 to 3 above and make such documentation available for scrutiny by review agencies and the public; and

- ***Phase 5 – Implementation:*** Complete contract drawings and documents, proceed to construction and operation, and monitor construction for adherence to environmental provisions and commitments. Also, where special conditions dictate, monitor the operation of the completed facilities.

The Class EA process ensures that all projects are carried out with effectiveness, efficiency and fairness. This process serves as a mechanism for understanding economic, social and environmental concerns while implementing improvements to municipal infrastructure.

1.7.2 Mandatory Principles

The planning process followed not only adheres to the guidelines outlined by the Municipal Class EA document but reflects the following five mandatory principles of Class EA planning under the *EAA*:

1. *Consultation with affected parties early on, such that the planning process is a co-operative venture;*
2. *Consideration of a reasonable range of alternatives;*
3. *Identification and consideration of the impacts of each alternative on all aspects of the environment;*
4. *Systematic evaluation of alternatives in terms of their advantages and disadvantages to determine the net environmental effects; and*
5. *Provision of clear and complete documentation of the planning process, to allow traceability of decision-making with respect to the project.*

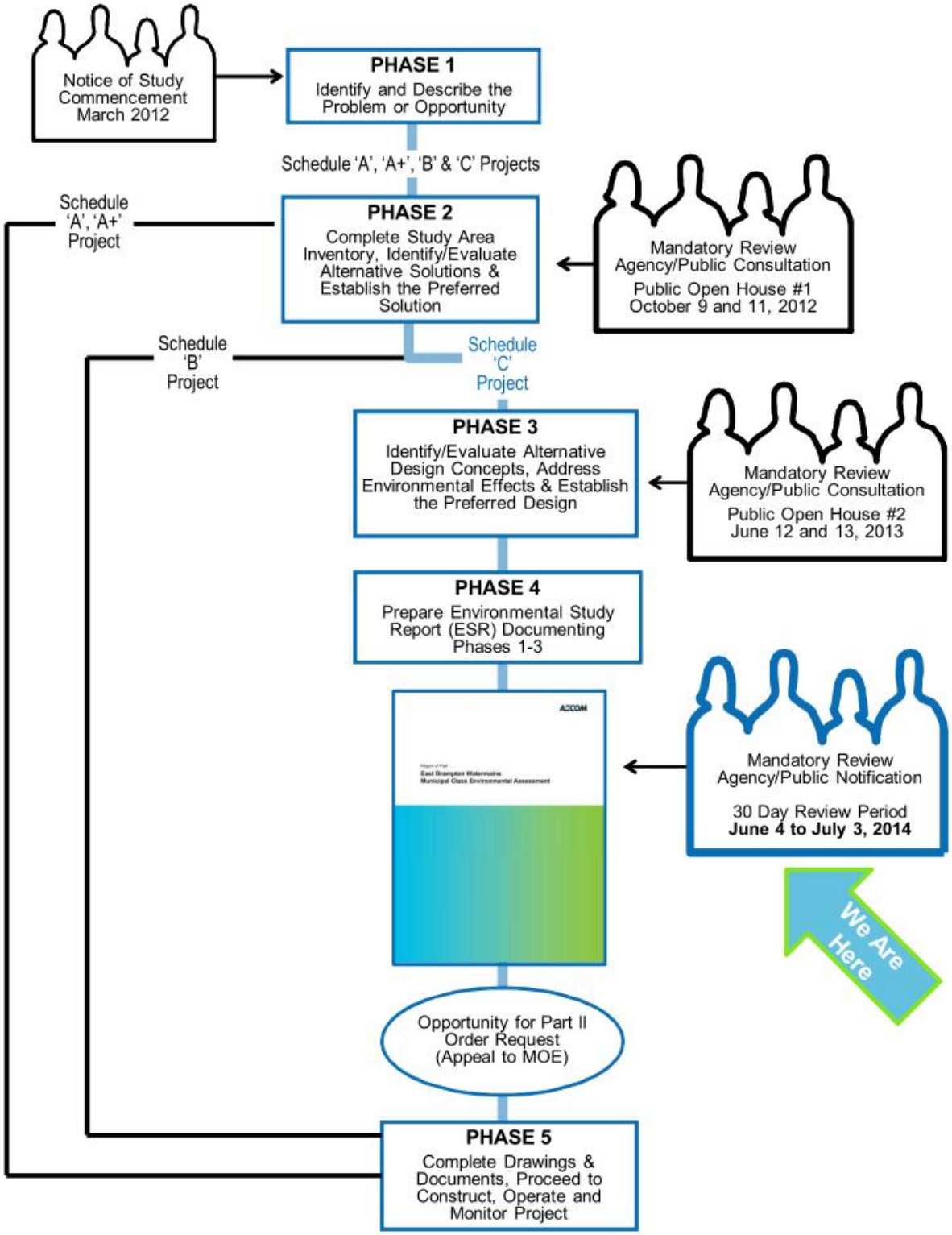
Following these five principles ensures that the Class EA process is devoted to the prevention of problems and environmental damage through planning and decision-making, recognizing that research and evaluation of possible impacts have been taken into account prior to implementation of the project.

Figure 1-2 illustrates the process followed in the planning and design of projects covered by a Municipal Class EA, including the East Brampton Watermains Municipal Class EA study.

1.7.3 Project Classifications

This project was completed under the Municipal Class EA **Schedule C** planning process. A Schedule C project is one of the four types of projects (or “schedules”) defined by the Municipal Class EA document. The selection of the appropriate project planning schedule is dependent on the anticipated level of environmental and social impact and, for some projects, the anticipated construction costs. Projects are categorized according to their environmental significance and their effects on the surrounding environment. Planning methodologies are described within the Municipal Class EA document and are grouped according to Class type, described as follows:

Figure 1-2 Municipal Class Environmental Assessment Planning Process



- **Schedule A:** These projects are limited in scale, have minimal adverse environmental effects and include a number of municipal maintenance and operational activities. Schedule A projects generally include normal or emergency operational maintenance activities where the environmental effects of these activities are usually minimal. Examples of Schedule A projects include watermain repairs and/or reconstruction and installation of new service connections or hydrants on existing watermains. As such, these projects are pre-approved and consequently do not require any further planning and public consultation.

- **Schedule A+:** The purpose of the Schedule A+ process is to ensure some type of public notification for certain projects that are pre-approved under the Municipal Class EA. The proponent (owner) is required to inform the affected public of municipal infrastructure projects prior to being constructed or implemented. However, there is no ability for the public to request a Part II Order[9]. Examples of Schedule A+ projects include watermain or sewer extensions where all such facilities are located within an existing municipal road allowance or utility corridor, or where there are pipe water crossings based on the use of trenchless technology.

- **Schedule B:** These projects have the potential for some adverse environmental effects. The proponent is required to undertake a screening process involving mandatory contact with the directly affected public and with relevant government agencies to ensure that they are aware of the project and that their concerns are addressed. If there are no outstanding concerns, the project may proceed to implementation. Schedule B projects generally include improvements and minor expansions to existing facilities. Examples include watermain extensions where such facilities are located outside of an existing municipal road allowance or utility corridor or involve water crossings by non-trenchless methods (i.e., open cut). As a result, the proponent is required to proceed through a screening process (Phases 1 and 2 of the Municipal Class EA process), including consultation with those who may be affected.

  At the end of Phase 2, a Project File documenting the planning process followed through Phases 1 and 2 is finalized and made available for public and agency review. If the screening process raises a concern which cannot be resolved, a Part II Order may be requested and considered by the Minister of the Environment. Alternatively, the proponent may elect to voluntarily plan the project as a Schedule C undertaking.

- **Schedule C:** These projects have the potential for significant adverse environmental effects and must proceed under the full planning and documentation procedures (Phases 1 to 4) specified in the Municipal Class EA document. Schedule C projects require that an Environmental Study Report (ESR) be prepared and filed for review by the public and review agencies. If concerns are raised that cannot be resolved, a Part II Order may be requested. Schedule C projects typically include the siting and construction of new facilities and major expansions to existing facilities, such as water or wastewater treatment plants.

9 Part II Order refers to a request to the Minister of the Environment for a project to comply with Part II of the Environmental Assessment Act (addresses Individual Environmental Assessments). The need for an Individual EA is based on the conclusion that based on predicted project impacts, the MEA Class EA planning process is not sufficient and a more comprehensive EA planning process is required. The requirement to prepare an Individual EA involves the preparation of a Terms of Reference and EA report(s) that are submitted to the Ministry of the Environment (MOE), other government agencies and the public for review.

1.7.3.1 East Brampton Watermains Municipal Class EA Planning Schedule

As the project described in this report involves potential land acquisition for the establishment of a new watermain outside of an existing road or utility corridor (Schedule B trigger), Phases 1 and 2 of the Class EA planning process as described above apply to this study. However, recognizing the study area characteristics and potential impacts on the environment, the Region has elevated the project from a Schedule B to a Schedule C. By planning the project as a Schedule C, the Region is ensuring the maximum detail of study, including examination of alternative watermain routes, in addition to public and agency consultation and review.

Appendix A further expands on the steps required to complete the Municipal Class EA planning process.

1.7.4 Ministry of Infrastructure Class EA Triggers

The requirement for real estate activities such as ownership transfer or easement acquisitions transacted by Infrastructure Ontario (formerly the Ontario Realty Corporation) triggers the Ministry of Infrastructure (MOI) Class EA process[10]. However, through this Municipal Class EA planning process, no MOI Class EA triggers were identified.

1.7.5 Canadian Environmental Assessment Act Triggers

Under the 2012 *Canadian Environmental Assessment Act* (CEAA), a proposal to construct a new watermain is not a "designated project". As such, no CEAA triggers were identified.

1.8 Communications and Consultation Program Overview

As part of the Municipal Class EA Schedule C planning process, several steps have been undertaken to inform government agencies, affected landowners, the local community and the general public of the project and to solicit comments.

The MEA Municipal Class EA document outlines specific mandatory public and agency consultation contact points and methods. In order to properly communicate the project and to solicit feedback throughout the planning process, the following activities were undertaken:

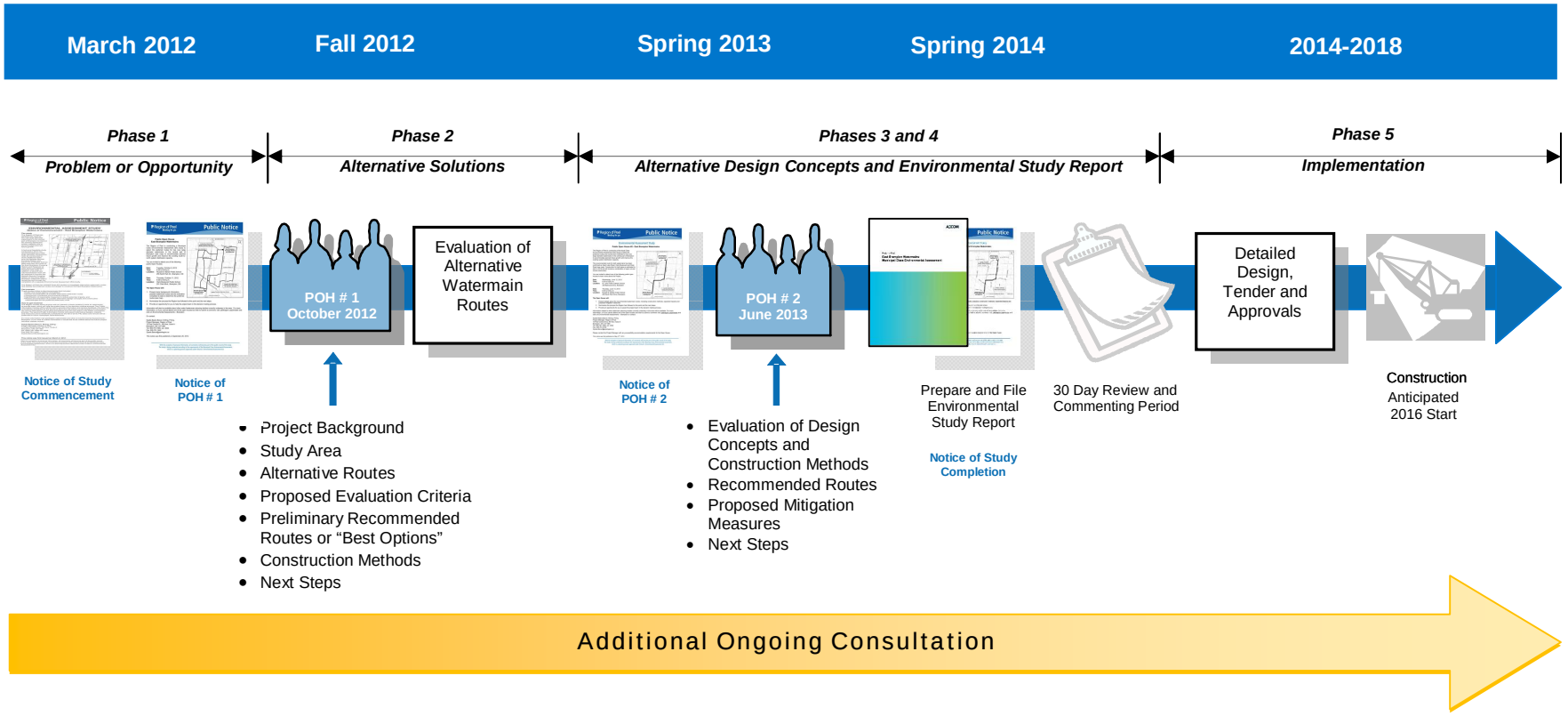
- Publication of newspaper notices for all project milestones, including Notices of Study Commencement, Public Open House #1, Public Open House #2 and Study Completion;
- Direct mailing of project milestone notices to stakeholders, affected land owners and review agencies;
- Advertising project milestones on the Region's project-specific website (http://www.peelregion.ca/pw/water/ environ-assess/east-brampton.htm), including making the materials presented at the public open houses available for download;
- Two rounds of public open houses (each round included a north and south venue within the study area) to engage and obtain input from the public, review agencies and stakeholders;

10 Ministry of Infrastructure Public Work Class Environmental Assessment (2012 Office Consolidation).

- Distributing project notices to local community facilities and businesses along the recommended watermain routes; and
- Holding individual meetings with key affected stakeholders (e.g., property owners from who easements are required) and review agencies as required or as opportunities arose.

Figure 1-3 illustrates the planning and consultation process followed for this project. The communications and consultation program outputs are further described in **Section 9**.

Figure 1-3 Planning and Consultation Process



1.9 Public Review of this Report and Next Steps

This Environmental Study Report (ESR) comprises the documentation for this Schedule C Municipal Class EA study. Placement of the ESR for public review completes the conceptual planning stages of the project.

This ESR is available for public review and comment for a period of 30 calendar days starting on June 4, 2014 and ending on July 3, 2014. A public notice (Notice of Study Completion) was published to announce commencement of the review period (see **Section 9.1.1**). To facilitate public review of this document, copies are available at the following locations during regular business hours:

Region of Peel Clerk's Department
10 Peel Centre Drive, 5th Floor, Suite A
Brampton, ON L6T 4B9
Phone: 905-791-7800

City of Brampton Clerk's Department
2 Wellington Street West
Brampton, ON L6Y 4R2
Phone: 905-874-2100

Four Corners Branch Library
65 Queen Street East
Brampton, ON L6W 3L6
Phone: 905-793-4636

Chinguacousy Branch Library
(inside Bramalea Civic Centre)
150 Central Park Drive
Brampton, ON L6T 1B4
Phone: 905-793-4636

A copy of this document is also available online at http://www.peelregion.ca/pw/water/ environ-assess/east-brampton.htm.

If, after reviewing this report, you have questions or concerns, please follow this procedure:

1. Contact Ms. Syeda Banuri at the address below to discuss your questions or concerns:

   Syeda Basira Banuri, M.Eng., P.Eng.
   Project Manager
   Region of Peel
   10 Peel Centre Drive, 4th Floor, Suite A
   Brampton, ON L6T 4B9
   Phone: 905-791-7800 ext. 4052
   Fax: 905-791-0728
   E-mail: syeda.banuri@peelregion.ca

2. Arrange a meeting with Ms. Banuri if you have significant concerns that may require more detailed explanations;

3. If you have major concerns, the Region will attempt to negotiate a resolution of the issue(s). A mutually acceptable time period for this negotiation will be set. If the issue remains unresolved, you may request the Minister of the Environment, by order, to require the Region to comply with Part II of the *EAA* before proceeding with the project. This is called a Part II Order or "bump-up" request. After reviewing the Part II Order request and the project documents in detail, the Minister may make one of the following decisions:

   - Deny the request, with or without conditions;

- Refer the matter to mediation; or
- Require that the Region comply with Part II of the *EAA* by undertaking one of the following:
  - Set out directions with respect to the Terms of Reference and preparing an Individual EA for the undertaking;
  - Declare that the Region has satisfied requirements for the preparation of the Class EA, as are specified in the order; or
  - Impose additional conditions, in addition to those implied upon approval of the Class EA.

Requests must be submitted in writing to the Minister of the Environment at the following address within the 30-day review period:

Minister's Office
Ministry of the Environment
77 Wellesley Street West
11th Floor, Ferguson Block
Toronto, ON M7A 2T5

A copy of the request should also be forwarded to the attention of Ms. Syeda Banuri at the Region of Peel at the address provided above.

If no Part II Order requests are received, the Region may proceed with detailed design and construction of the recommended works as presented in this report.

Information will be collected in accordance with the *Municipal Freedom of Information and Protection of Privacy Act*. All comments, with the exception of personal information, will become part of the public record.

2. Study Area Features and Considerations

The following section describes the project study area, including its location, current water supply system, and existing and future land uses. Also discussed are future infrastructure projects, the socio-economic, physical and natural environments and social/cultural features. Servicing and planning considerations are also presented. The information described in this section was considered when reviewing potential effects of the alternative watermain routes.

2.1 Study Area Location

The project study area encompasses approximately 27 square kilometres (6670 acres) within the south central part of the City of Brampton, extending from just north of Steeles Avenue East (Regional Road 15) to approximately 500 metres (550 yards) south of Bovaird Drive East (Regional Road 10). From west to east, the study area extends from just west of Kennedy Road (Regional Road 16) to just east of Bramalea Road (City jurisdiction). The study area includes portions of the City of Brampton Wards 1, 3, 7 and 8.

Since the study area represents a relatively large geographical area, it was subdivided into the following sections or quadrants for discussion purposes:

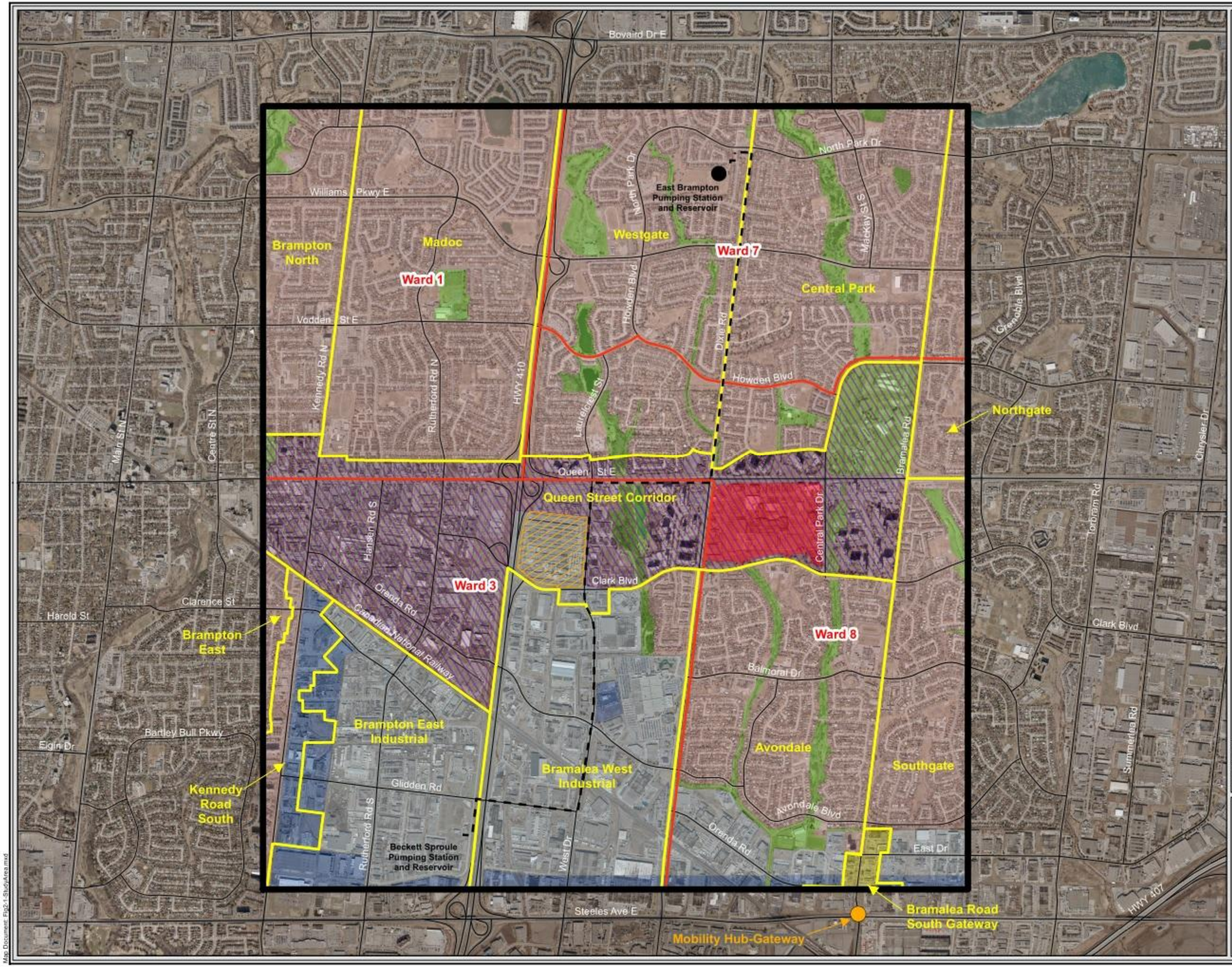
- **Northwest Quadrant:** The northwest quadrant extends north from Queen Street East (Regional Road 107) to approximately 500 metres (550 yards) south of Bovaird Drive East. The western limit is just west of Kennedy Road and the eastern limit is Highway 410. Within this quadrant, Rutherford Road (City jurisdiction) is a major north-to-south corridor and Williams Parkway (City jurisdiction) is a major east-to-west corridor, with an interchange at Highway 410. There is also an interchange at Queen Street East and Highway 410.

- **Northeast Quadrant:** The northeast quadrant extends north from Queen Street East to approximately 500 metres (550 yards) south of Bovaird Drive East. The western limit is Highway 410 and the eastern limit is just east of Bramalea Road. Dixie Road (Regional Road 4) and Bramalea Road (City jurisdiction) are the major north-to-south corridors through this quadrant, while Williams Parkway (City jurisdiction) and Howden Boulevard are the major east-to-west corridors.

- **Southwest Quadrant:** The southwest quadrant extends from just north of Steeles Avenue East to Queen Street East and is bounded by Kennedy Road to the west and Highway 410 to the east. Similar to the northwest quadrant, Rutherford Road is a major north-to-south corridor, while Glidden Road and Orenda Road are the major east-to-west corridors. The Canadian National (CN) railway line also traverses this quadrant.

- **Southeast Quadrant:** The southeast quadrant extends from just north of Steeles Avenue East to Queen Street East and is bounded by Highway 410 to the west and approximately Bramalea Road to the east. Dixie Road and Bramalea Road are the major north-to-south corridors in this quadrant, while Clark Boulevard and Balmoral Drive are the major east-to-west corridors. The CN railway line also traverses this quadrant.

Figure 2-1 illustrates the study area limits and ward boundaries, as well as the existing transportation network, existing East Brampton transmission main, planning areas and the general land use classifications, all of which are further discussed below.



Legend

- Study Area Boundary
- Existing East Brampton Transmission Main
- Secondary Plan Boundary
- Ward Boundary
- Arterial/Collector Road
- Special Land Use Policy Area 10

General Land Use Classification

- Central Area
- Residential
- Open Space
- Business Corridor
- Industrial
- Regional Retail
- Office

Basemapping: Region of Peel/City of Brampton, 2012
Orthophotography: Region of Peel, 2009

N W E S

0 0.25 0.5 1 KM

UTM Zone 17N, NAD 83

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East Brampton Watermains Municipal Class Environmental Assessment Study

Study Area, General Land Use Classifications and Planning Areas

AECOM

Region of Peel
Working for you

Figure 2-1

Map Document: Fig2-1-StudyArea.mxd

2.2 Existing Transportation Network

The most significant transportation corridor within the project study area is Highway 410, a provincial series, controlled access highway under the jurisdiction of the Ontario Ministry of Transportation (MTO). Near and within the project study area, MTO's jurisdiction includes the interchanges at Bovaird Drive East, Williams Parkway, Queen Street East, Clark Boulevard and Steeles Avenue East. Other major north-to-south road corridors include Kennedy Road, Rutherford Road, Dixie Road and Bramalea Road. Major east-to-west corridors include Williams Parkway, Queen Street East and Clark Boulevard. In addition, the CN railway Georgetown Line extends northwesterly through the study area.

An overview of the existing primary transportation road network within the study area is provided in **Table 2-1** below. Future right-of-way requirements have been developed through the Region of Peel's Long Range Transportation Plan (Update 2012) and the City of Brampton's Transportation and Transit Master Plan 2009.

Table 2-1 Primary Transportation Road Network Characteristics

Primary North-South Corridors													
Road	**Road Type**				**Primary Transit Corridor**	**Secondary Transit Corridor**	**Road Right-of-Way Width (as per Brampton Official Plan)**						**Brampton 2031 Road Network Capacity (# of lanes)**
	Major Arterial (Regional)	Major Arterial (City)	Minor Arterial	Collector			23-26m	26-30m	30m	36m	40-45m	45m	
Kennedy Road	✓				✓				✓	✓			4
Rutherford Road			✓	✓				✓					4
Dixie Road	✓				✓						✓	✓	6
Bramalea Road*		✓	✓		✓					✓			4 and 6

* The Regional Official Plan identifies Bramalea Road as "other potential Rapid Transit Corridor" and also identifies a "Mobility Hub-Gateway" located at Steeles Avenue East.

Primary East-West Corridors													
Road	**Road Type**				**Primary Transit Corridor**	**Secondary Transit Corridor**	**Road Right-of-Way Width (as per Brampton Official Plan)**						**Brampton 2031 Road Network Capacity (# of lanes)**
	Major Arterial (Regional)	Major Arterial (City)	Minor Arterial	Collector			23-26m	26-30m	30m	36m	40-45m	45m	
Clark Boulevard					✓ (east of Dixie Road)		✓	✓		✓			4
Queen Street East**	✓	✓									✓	✓	6
Vodden Street				✓		✓	✓			✓			4
Williams Parkway			✓		✓					✓			4 and 6

** The City of Brampton Official Plan also identifies Queen Street East as a Bus Rapid Transit (BRT) corridor.

2.3 Existing East Brampton Transmission Main

The existing East Brampton transmission main (see **Figures 1-1 and 2-1**) is an essential component of the Region's Lake Ontario-based South Peel Water Supply System that supplies municipal water (potable drinking water) to Mississauga, Brampton and some areas within Caledon. This transmission main measures 1.05 metres (3.4 feet) in diameter and was constructed in the early 1970's. The existing transmission main extends from the Beckett Sproule Pumping Station and Reservoir in the south, to the East Brampton Pumping Station and Reservoir in the north, following Glidden Road, West Drive, Queen Street East and Dixie Road. As previously mentioned in **Section 1.2** above, the existing East Brampton transmission main does not have sufficient capacity to accommodate future approved planned growth, nor does it provide the Region with any redundancy in case of a shutdown of the existing watermain.

2.4 Existing Land Uses

General land uses within the study area include predominantly residential, industrial, business/commercial/retail and park/open space. Specific land uses within the study area (e.g., high density residential, institutional, general commercial, etc.) are designated according to the various City of Brampton Secondary Plans as outlined in **Table 2-2** below (see **Appendix B**). Table 2-2 also lists the dominant study area land uses by quadrant.

Table 2-2 Land Use Considerations by Quadrant

Quadrant/Limits	Applicable Brampton Secondary Plan Planning Areas	Dominant Land Uses
Northwest Quadrant Limits • Kennedy Road • Approximately 500 metres south of Bovaird Drive East • Highway 410 • Queen Street East	• Brampton North • Madoc • Queen Street Corridor	• Residential (primarily medium density and single family with higher density on Kennedy Road) • Parks (3) • Commercial/Retail – 1 Shopping Centre – 1 Post Office • Institutional – 10 Schools – 3 Places of Worship – 1 Daycare – 1 Healthcare/Medical Centre • Community/Recreational (1) • Cultural Land Use – 1 Cemetery

Quadrant/Limits	Applicable Brampton Secondary Plan Planning Areas	Dominant Land Uses
Northeast Quadrant Limits • Highway 410 • Approximately 500 metres south of Bovaird Drive East • Bramalea Road • Queen Street East	• Westgate • Northgate • Central Park • Queen Street Corridor	• Residential (primarily medium density and single family with high density on Queen Street East) • Parks (33) including bicycle paths • Institutional – 14 Schools – 10 Places of Worship – 1 Daycare • Commercial • Community/Recreational (1) • Cultural Land Use – 1 Cemetery • Government Facility – 1 Post Office
Southwest Quadrant Limits • Kennedy Road • Queen Street East • Highway 410 • Just north of Steeles Avenue East	• Queen Street Corridor • Brampton East • Kennedy Road South • Brampton East Industrial	• Residential (limited to high and medium density on west side of Kennedy Road) • Parks (21) • Institutional – 1 Place of Worship – 1 Healthcare/Medical Centre • Emergency Services (2) • Industrial • Commercial – 2 Shopping Centres • Community/Recreation Facilities (3) • Government Facilities (2)
Southeast Quadrant Limits • Highway 410 • Queen Street East • Bramalea Road • Just north of Steeles Avenue East	• Queen Street Corridor • Bramalea West Industrial • Avondale • Southgate • Bramalea Road South Gateway	• Residential (predominately single family and medium density with high density along Queen Street East and Clark Boulevard) • Commercial – 2 Shopping Centres • Industrial • Bicycle Paths • Institutional – 13 Schools – 4 Childcare Centres/Early Years Support Sites – 6 Places of Worship – 8 Healthcare/Medical Centre • Community/Recreation Facilities (7) • Government Facilities – 2 Post Offices

Figure 2-2 illustrates the land uses within the north section of the study area and **Figure 2-3** illustrates the land uses within the southern section. **Table 2-3** provides an index of the numbered study area land use features shown in Figures 2-2 and 2-3. Note that the park ID #s in Table 2-3 correspond to the non-circled numbers shown within the green-shaded park areas on Figures 2-2 and 2-3. Similarly, the school ID #s are yellow-circled on Figures 2-2 and 2-3. All the other land use feature ID #s are white-circled on Table 2-3.

2.5 Future Land Uses and Infrastructure Projects

The City's 2006 Official Plan[11] established a city structure which directs growth to key areas within the City of Brampton, specifically the Central Area (see **Figure 2-1**), intensification corridors and transit supportive nodes, including an intensification corridor along Hurontario Street/Main Street and a transit node around Steeles Avenue East and Hurontario Street. The recent recommended policies contained within the City's Growth Plan Official Plan Amendment (prepared to implement the provincial Growth Plan) resulted in revisions to the city structure by creating a framework for focusing growth within the Urban Growth Centre/Central Area, primary and secondary intensification corridors, mobility hubs and major transit station areas. Specific to the study area, future growth is envisioned to develop as follows:

- Higher density development will be directed to the designated Central Area (see **Figure 2-1**) which includes the Queen Street Corridor from Kennedy Road to Bramalea Road. The southerly limits of the Central Area include the CN railway corridor and Clark Boulevard. Lands at the northwest corner of Clark Boulevard and West Drive (currently occupied by Owens-Illinois glass factory, a heavy industry use) are proposed to be added to the Central Area through the Growth Plan Official Plan Amendment (see Special Land Use Policy Area 10 below);
- Special Land Use Policy Area 10 (see **Figure 2-1**) identifies an area in the vicinity of Clark Boulevard and West Drive as an area with long-term potential for high density residential development;
- Special Land Use Policy Area 1 (as identified in the Avondale Secondary Plan Area 20) has been identified by the Toronto and Region Conservation Authority (TRCA) as being below the regulated floodline that necessitates certain restrictions on development or redevelopment in accordance with provincial floodplain management policies. This area is located at the corner of Dixie Road and Steeles Avenue East;
- The Queen Street corridor from Highway 410 westerly to Kennedy Road is also part of the City of Brampton Growth Centre which centres around downtown Brampton and is expected to accommodate significant growth;
- The Growth Plan Official Plan Amendment also identifies the intersection of Bramalea Road and Steeles Avenue East as a Mobility Hub-Gateway which is also expected to attract future development; and
- Other development applications will be based on individual requests for redevelopment and intensification.

These future growth areas were considered in the development and evaluation of watermain routing options. Other major infrastructure projects currently being planned within the project study area and considered by this study are also described below.

11 August 2012 Official Plan Consolidation, City of Brampton (2006 Official Plan, approved October 2008, including amendments since 2006).

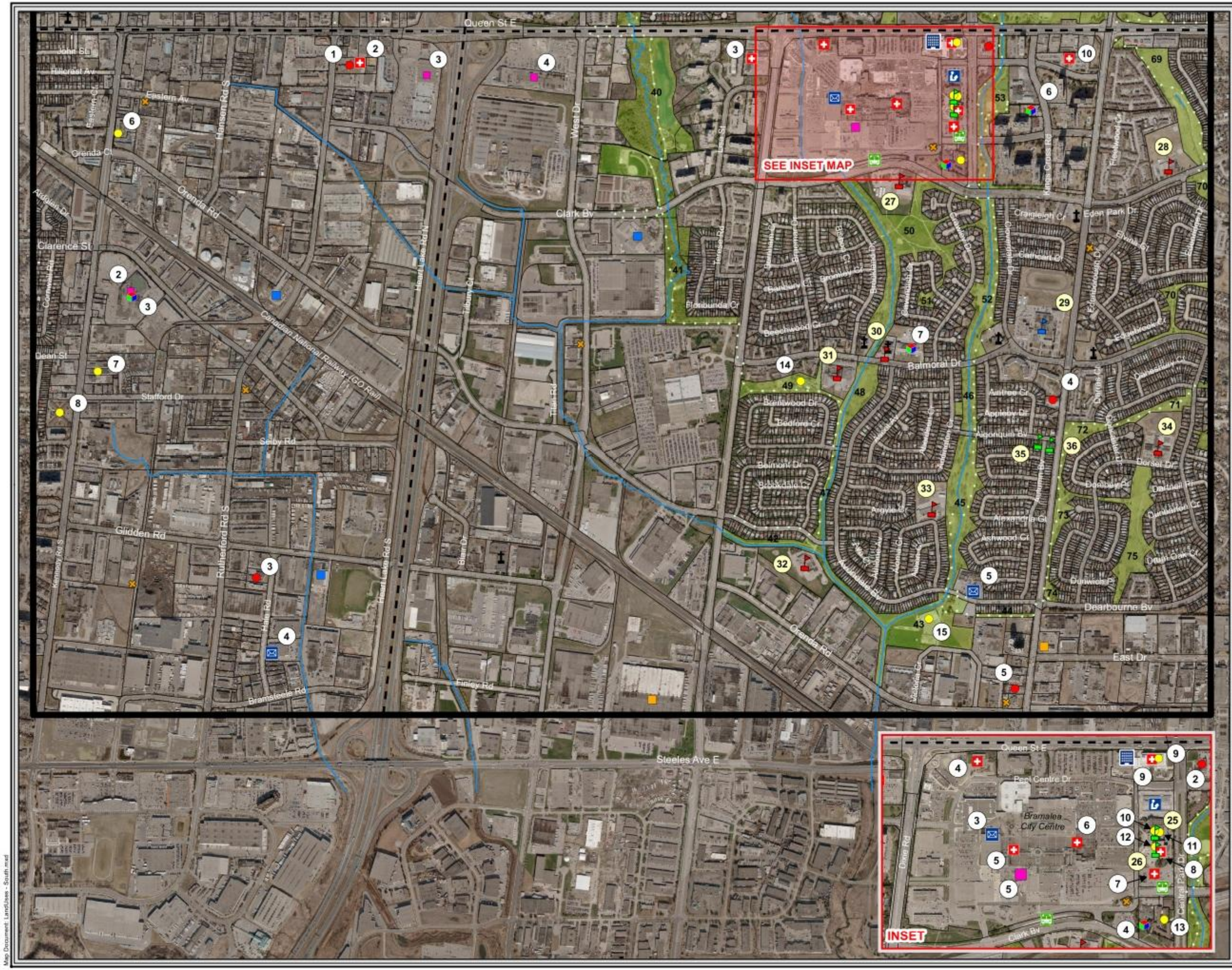
East Brampton Watermains Municipal Class Environmental Assessment

Study Area Land Uses: North Section

AECOM

Region of Peel
Working for you

Figure 2-2



Legend

- Elementary/Secondary/Other School
- Regional Headquarters
- Library (Chinguacousy Branch)
- Post Office
- Bramalea Bus Terminal
- Healthcare/Medical Centre
- Childcare/Early Years Centre
- Place of Worship
- Municipal Transformer Station
- Emergency Services
- Community/Recreation Facility
- Heritage Resource
- Cemetery
- City of Brampton Facility
- Shopping Centre
- Study Area/Quadrant Boundary
- Trail
- Watercourse
- Property Boundary
- (1) School ID# (see Table 2-3)
- (1) Other Features ID# (see Table 2-3)
- 53 Park

Basemapping: Region of Peel/City of Brampton, 2012
Orthophotography: Region of Peel, 2009/2012

N W E S

0 125 250 500 Meters

UTM Zone 17N, NAD 83

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East Brampton Watermains Municipal Class Environmental Assessment

Study Area Land Uses: South Section

AECOM Region of Peel Working for you

Figure 2-3

Map Document: LandUses - South.mxd

Table 2-3 Index of Study Area Land Use Features

ID#	Name	ID#	Name	ID#	Name
Parks				**Schools**	
1	Vallybrook Park	39	Hazelwood Park South	1	Carrefour Des Jeunes
2	Blackthorn Parkette	40	Norton Place Park	2	Arnott Charlton K-5
3	Foxacre Parkette	41	Carleton Park	3	St. Joachim K-8
4	Claypine Park	42	Birchbank Park	4	Kingswood Drive K-5
5	Hollowtree Park	43	Victoria Park	5	Gordon Graydon Sr 6-8
6	Kingswood Park	44	Victoria Park (East Pathway)	6	Agnes Taylor K-5
7	Madoc Park	45	Aloma Park	7	Central Peel 9-12
8	Seaborn Park	46	Addington Park	8	Madoc Drive K-5
9	Robwill Parkette	47	Belmont Park	9	Father C.W. Sullivan K-8
10	Charters Road Park	48	Balmoral Park	10	Harold F Loughin K-5
11	Century Gardens	49	Ernest Majury Park	11	Sainte-Jeanne-D'Arc
12	Century Parkette	50	Clark Park	12	Hanover K-5
13	Bruce Beer Park	51	Cavendish Park	13	Lester B. Pearson K-8
14	Ivy Bridge Parkette	52	Crawley Park	14	Goldcrest K-5
15	Royal Salisbury Parkette	53	Knightsbridge Park	15	Hilldale K-5
16	Major Oaks Park	54	Hanover Park	16	Judith Nyman 9-12
17	Hansen Parkette	55	Howden Park	17	Williams Parkway Sr 6-8
18	Weybridge Parkette	56	Crescent Hill Park	18	Living Fountain Education Centre
19	Weybridge Park	57	Hilldale Park North	19	North Park 9-12
20	Ashurst Park	58	Hilldale Park South	20	Russell D Barber K-5
21	Lundy Park	59	Donald M. Gordon Chinguacousy	21	Maranatha Christian Academy
22	Nuffield Park	60	Maitland Park South	22	St. Marguerite Bourgeoys K-8
23	Bramalea Ltd Community	61	Maitland Park North	23	St. Anthony K-8
24	Northampton Park	62	Manorcrest Park	24	Mother Mary Ward K-8
25	Lundy Parkette	63	Manitou Park	25	Adult Education Centre (North)
26	Newcastle Park	64	Massey Park	26	Genesis Ii North
27	Lascelles Park North	65	Manuel Jose Cardoso Parkette	27	Clark Boulevard K-5
28	Leander Park	66	Glenforest Park South	28	Fallingdale K-5
29	Lascelles Park Central	67	Goldcrest Park	29	Bramalea 9-12
30	Lascelles Park South	68	Northgate Parkette	30	St. John Fisher K-8
31	La France Park	69	Fallingdale Park	31	Balmoral Drive Sr 6-8
32	Parr Lake North Park	70	Edgebrooke Park	32	Birchbank K-5
33	Lynch-Petroni Parkette	71	Dorset Park	33	Aloma Crescent K-5
34	Parr Lake South Park	72	Durham Park	34	Dorset Drive K-5
35	Laurelcrest Park North	73	Dalton Park	35	Al-Manara Education Centre
36	Laurelcrest Park South	74	Bramalea Parkette	36	Rowntree Montessori School
37	Hazelwood Park North	75	Dearbourne Park	37	Peel District School Board North Field
38	Hazelwood Parkette				

ID#	Name	ID#	Name
Community/Recreation Facilities		**Childcare Centres/Early Years Support**	
1	Century Gardens Recreation Centre	1	Mini-Skool
2	Ellen Mitchell Recreation Centre	2	Howden Child Care Centre
3	Terry Miller Recreation Centre	3	Brampton Neighbourhood Resource Centre
4	Howden Recreation Centre	4	Chinguacousy Child Care Centre
5	Chinguacousy Curling & Tennis/Ski & Optimist Community Centre	5	Bramalea-Gore-Malton-Springdale Neighbourhood Services
6	Brampton Neighbourhood Resource Centre	6	Mini-Skool
7	Knights Table	7	St. John Fisher Neighbourhood Learning Place
8	Leisureworld Care Given Centre Tullamore	**Cemeteries**	
9	Ontario Works In Peel - Brampton (ROP)	1	Lundy's/Mount Olivet Cemetery
10	LDA North Peel Chapter	2	Brampton Cemetery
11	Civic Centre/Brampton Multicultural Community Centre	**Emergency Services**	
12	Organizational Development & Learning Centre (ROP)	1	Fire Station 201 Brampton
13	Knightsbridge Community & Senior Citizen	2	Peel Regional Police 21 Division
14	Balmoral Recreation Centre	3	Peel Region EMS Hale Paramedic Station
15	James F. McCurry Victoria Park Arena	4	Fire Station 202 Brampton
Shopping Centres		5	Peel Region EMS Bramalea Paramedic Station
1	Centennial Mall	**Post Offices**	
2	Kennedy Square	1	Centennial Post Office
3	Bramrose Square	2	Mackay Plaza Post Office
4	410@7 Centre	3	City Centre Post Office
5	Bramalea City Centre	4	Brampton Stn Main
Health Care/Medical Centres		5	Avondale Post Office
1	Family Care Walk-In Medical Centre	**Government Facilities**	
2	St. John Ambulance	1	Brampton Parks Operations Centre
3	The Doctor's Office	2	Brampton Parks Service Centre
4	Administration and Environmental Health (ROP)	3	Bramalea Bus Terminals (GO)
5	Med Care Bramalea	4	Region of Peel Headquarters
6	Peel Health: Bramalea Clinic/New Baby Clinic	5	Library (Chinguacousy Resource Brach)
7	Brampton/Caledon Healthy Sexuality Clinic	6	Brampton Transit Garage (Clark Facility)
8	Brampton/Caledon Public Health Clinic (ROP)		
9	Central Peel Health Office		
10	Kensington Medical Clinic/Bramalea Group		

2.5.1 Dixie Road Widening

In 2011, the Region of Peel completed a Municipal Class EA for the widening of Dixie Road from Queen Street East in the City of Brampton to two kilometres (1.2 miles) north of Mayfield Road in the Town of Caledon. The preferred design concept is based on widening Dixie Road from four to six lanes between Queen Street East and Countryside Drive, and from two to four lanes between Countryside Drive and two kilometres (1.2 miles) north of Mayfield Road (Regional Road 14). Provision is also made for the future widening of Dixie Road north of Countryside Drive to six lanes. Construction is currently anticipated to commence in 2016.

2.5.2 Clark Boulevard Widening

In March 2012, the City of Brampton completed a Municipal Class EA for the widening of Clark Boulevard from Rutherford Road to approximately 500 metres (550 yards) east of Dixie Road. Key elements of the preferred design concept include:

- Widening of Clark Boulevard from four lanes to five through-lanes plus turning lanes, from Rutherford Road to the Highway 410 east ramp, and widening to six through-lanes plus turning lanes, from the Highway 410 east ramp to the easterly project limit;
- Dedicated turn lanes at intersections, where feasible;
- Expansion of the existing bridge structure crossing Highway 410;
- Maintaining the urban cross-section (curb and gutter) on both sides of the road;
- Constructing a 3-metre (10-foot) wide multi-use trail on the north side of Clark Boulevard and a 1.5-metre (5-foot) wide sidewalk on the south side of Clark Boulevard; and
- Provision of streetscape and landscape enhancements.

The Clark Boulevard Class EA recommended that the improvements be implemented sometime between 2016 and 2021. The City's Transportation and Transit Master Plan (revised February 2010) recommends that Clark Boulevard be widened by 2016. However, construction is currently scheduled for 2021 according to the City of Brampton's Ten Year Capital Program.

2.5.3 Williams Parkway Widening

In 2011, the City of Brampton completed a Municipal Class EA for the widening of Williams Parkway from McLaughlin Road to North Park Drive/Howden Boulevard. The preferred design concept is to widen Williams Parkway to six lanes while maintaining an urban cross-section (curb and gutter) and raised median between McLaughlin Road and North Park Drive, including exclusive right and left turning lanes at several intersections. According to the City of Brampton's 2014-2023 Roads Capital Program, noise walls on Williams Parkway will be constructed in 2017 and the road reconstructed in 2018 and 2020.

2.5.4 West Brampton Watermain

The West Brampton Watermain Municipal Class EA was initiated by the Region of Peel in early 2012. The preferred route for the West Brampton watermain, extending west-to-east along Williams Parkway, was

approved in December 2013 through the Class EA process. The Zone 5 (Z5) sub-transmission main being planned as part of this East Brampton Watermains project will connect to the new West Brampton watermain. Phased construction of the West Brampton watermain is expected to begin in 2015 and be completed in the vicinity of Dixie Road by 2017. Additional information can be found on the Region's project website at: http://www.peel.ca/pw/water/environ-assess/west-brampton.htm

2.5.5 Highway 410 Widening

Plans are underway by MTO for the widening of Highway 410 from south of Highway 401 to Queen Street East. In addition to the existing six lanes, the widening will add two new lanes in each direction, one high occupancy vehicle (HOV) lane and one general purpose lane. All three bridges south of Clark Boulevard – at Orenda Road, the CN railway and Glidden Road – will also be widened to accommodate the Highway 410 expansion. Within the project study area, the planned widening will be accommodated within the existing highway median and no new property related to the Highway 410 corridor is being acquired by MTO. As part of the highway expansion, MTO is also looking at developing roundabouts at the Clark Boulevard ramp terminals and a carpool lot at Highway 410 and Clark Boulevard. Currently, construction is expected to start sometime in late 2014 and finish by 2019.

2.5.6 Other Planned Infrastructure Projects

Other planned infrastructure improvements within the study area include:

- The City plans to reconstruct and widen the intersection at Kennedy Road and Williams Parkway in 2018/2020;
- The City's Transportation and Transit Master Plan identifies the future extension of Clark Boulevard westerly from Rutherford Road to Kennedy Road. A Class EA study has yet to be initiated; and
- The Region plans to widen Bramalea Road to six lanes from Highway 407 north to Bovaird Drive East. A Class EA study has yet to be initiated.

2.6 Socio-Economic Environment

The City of Brampton is located within Ontario's Greater Toronto Area (GTA) and provides significant employment and recreational opportunities as well as housing types. The study area is served by Highway 410, a major provincial transportation highway, as well as the CN railway, located in the southern part of the study area, which provides for GO Train service from the Bramalea GO Station located at Bramalea Road and Steeles Avenue East. In addition, interregional service is also provided via links with Mississauga Transit and Züm Bus Rapid Transit (BRT) Service. Within the project study area limits, there are also numerous industrial and commercial businesses. Most notably, near the centre of the study area, the Bramalea City Centre is a large, regional indoor shopping mall with over 300 outlets. Other notable businesses/industries include the Region of Peel offices near Bramalea City Centre, Rogers Communications located near Dixie Road and Orenda Road, Owens-Illinois (formerly Consumers Glass) located at Clark Boulevard and West Drive, and several large trucking firms located in the vicinity of Heart Lake Road, including Blue Giant Equipment. In addition, residential high rise developments and busy commercial shopping plazas are common.

2.7 Physical Environment

The following section is adapted from the Preliminary Hydrogeological and Geological Routing Assessment undertaken as part of this Class EA study by SPL Consultants in July 2012. The full report is found in **Appendix C.**

2.7.1 Topography, Physiography and Geology

Within the study area, topographic elevations generally slope from the north to the south towards Lake Ontario. Elevations range from approximately 240 metres above sea level (masl) north of Queen Street East to about 190 masl in the river valleys around Steeles Avenue East. As well, in the area of the geologic feature known as the Brampton Esker, excavation of sand and gravel deposits have created depressions to about 215 masl in the area of Bovaird Drive East and Highway 410.

The majority of the study area lies within the Peel Plain physiographic region, while a portion in the northeastern part of the study area lies within the South Slope physiographic region. The area is mainly composed of Halton Till that can be described as fine-grained till (clay to silt textured) with localized sand lenses that in some areas feed groundwater discharge to local creeks and streams. The most significant geologic feature in the area is the Brampton Esker. This feature is an eight kilometre (five mile) long sand and gravel ridge stretching from Heart Lake Road North (north of the study area) in a southeasterly direction into the study area in the vicinity of Highway 410. It extends to just south of Queen Street East and east of Highway 410. In general, overburden thickness over the bedrock ranges from less than 5 metres (16 feet) within the stream valleys in the south to over 25 metres (82 feet) in the north; however, in the vicinity of the Brampton Esker and the bedrock valley, the depth to bedrock can be up to 50 metres (164 feet).

The majority of the area is underlain at depth by Queenston Formation bedrock. The Queenston Formation bedrock is red coloured, thinly bedded, fissile shale containing seams and bands of green shale. A small eastern portion of study area is mapped as being underlain by the Georgian Bay Formation, which is a grey to olive coloured shale and siltstone.

2.7.2 Groundwater Conditions

Regional groundwater flow is from the northwest to the southeast towards Lake Ontario. Shallow groundwater flow is influenced by local topography with recharge occurring in the upland areas, especially in the north, and discharge occurring within the river valleys and low lying areas. Based on MOE water well record review, 185 wells were identified within the study area, with additional wells not on record known to exist. Many of the wells in the north obtain their water supply from the sand and gravel deposits within the Lake Iroquois shoreline deposits. Most of the wells in the south tap the bedrock aquifer. The MOE water well record inventory shows that a majority of the wells are or were used for domestic water supply.

Well depths in overburden range between 0.3 and 39 metres (1 and 128 feet) with an average depth of 8 metres (26 feet). Bedrock wells vary in depth from about 2.4 to 35.8 metres (8 to 117 feet) with an average of 20.2 metres (66 feet). Water levels reportedly varied from 0.9 to 22.9 metres (3 to 75 feet) below ground surface in overburden wells (average of about 5.3 metres or 17 feet) to a range of 0.6 to 17.4 metres (2 to 57 feet) below grade in bedrock wells (average of 4.6 metres or 15 feet). Although the area is municipally serviced, it is anticipated that a number of the water wells in the study area could still be in use.

2.7.3 Areas of Potential Environmental Concern

A Limited Phase One Environmental Site Assessment (ESA) was completed by SPL Consultants in April 2012 as part of this Class EA study. The purpose of the Phase One ESA was to identify areas of potential environmental concern, such as properties with possible soils contamination, by determining where potentially contaminating activities have, or may have, occurred in the past. Given its mostly industrial nature south of Queen Street and the mix of commercially developed areas, particularly along the Queen Street corridor, the Phase One ESA identified many potentially contaminating activities within the study area. The potentially contaminating activities identified included:

- Potential use of fill material with unknown environmental quality;
- Generation or receiving of hazardous waste and/or waste disposal sites;
- Processing, storage and handling of hazardous materials such as asbestos, polychlorinated biphenyls (PCBs) and/or other designated substances identified in the *Occupational Health and Safety Act*;
- Gasoline storage in a fix tank associated with a gas service station;
- Use of chemicals and/or pesticides as per the Chemical Register;
- Release of pollutants as per the National Pollutant Release Inventory;
- Use of pole-mounted transformers which may contain PCBs (i.e., those constructed prior to 1980);
- Accidental spills or releases of pollutants;
- Manufacturing;
- Commercial auto body, repair and wrecking;
- Operation of dry cleaning equipment; and/or
- Salt/de-icing methods used on roadways and parking areas, which could result in electrical conductivity and sodium adsorption ratio impacts in the sub-surface soils.

The Phase One ESA concluded that a Phase Two ESA should be conducted along the preferred watermain routes for select industrial or commercially developed areas. This recommendation was based on the relatively large number of industrial and commercial properties within the study area where potentially contaminating activities may have occurred in the past or are currently occurring (e.g., gas stations). The Phase Two ESA will consist of soil and groundwater sampling and chemical analysis to understand the soil and groundwater conditions at any properties of concern. Refer to **Appendix D** for the Phase One ESA Report.

2.8 Natural Environment

The following sections provide a brief overview of the study area natural features based on a background review of available information from the City of Brampton[12], Ministry of Natural Resources (MNR)[13] and Toronto and Region Conservation Authority (TRCA)[14]. Existing natural environment conditions as they relate to the alternative watermain routes are further expanded upon in **Section 4.3.2** and **Appendix E** of this report. **Figure 2-4** illustrates the location of significant natural features in the study area.

2.8.1 Aquatic Ecosystems

The study area predominantly lies within the Etobicoke Creek watershed, while relatively small areas east of Bramalea Road fall within the Mimico Creek watershed. TRCA has jurisdiction over both of these watersheds, particularly within their regulation limits surrounding each watercourse. The most notable aquatic feature within the study area is the Etobicoke Creek East Branch (historically named Spring Creek) which bisects the study area in an approximate north-south direction between Dixie Road and Bramalea Road. This watercourse and its tributaries, which are sometimes referred to as the Bramalea Tributaries[15], are warmwater creeks that have been altered, channelized or piped in many sections to accommodate urbanization. Sections that remain in a fairly natural state are associated with park or linear trail systems. There are no provincially significant wetlands (PSWs) within or immediately adjacent to the study area.

2.8.2 Terrestrial Conditions

There are no Environmentally Sensitive Areas (ESAs) or Areas of Natural or Scientific Interest (ANSIs) within or immediately adjacent to the study area. Given the highly urbanized land uses, planted roadside trees are common, but natural areas are generally limited to Norton Place Park at Clark Boulevard and riparian areas along the Etobicoke Creek East Branch tributaries. Terrestrial features within Norton Place Park are identified as "Valley Land/Watercourse Corridor" as well as a Woodland and Other Wetlands area (not provincially significant) on Schedule D of the City of Brampton's Official Plan. Official Plan Section 4.6.1.2 states that this designation is recognized as having city-wide, regional and/or provincial significance and should be protected.

2.8.3 Wildlife and Wildlife Habitat

The study area is located within an urbanized area, previously disturbed by a lengthy period of agricultural development. As such, much of the original plant and wildlife habitat has been lost or altered. Of most significance in terms of wildlife is the previously described Norton Place Park located just north of Clark Boulevard. It includes a heavily wooded area and a small lake (former quarry) which represents good wildlife habitat and is an important stopover during the spring and fall bird migrations.

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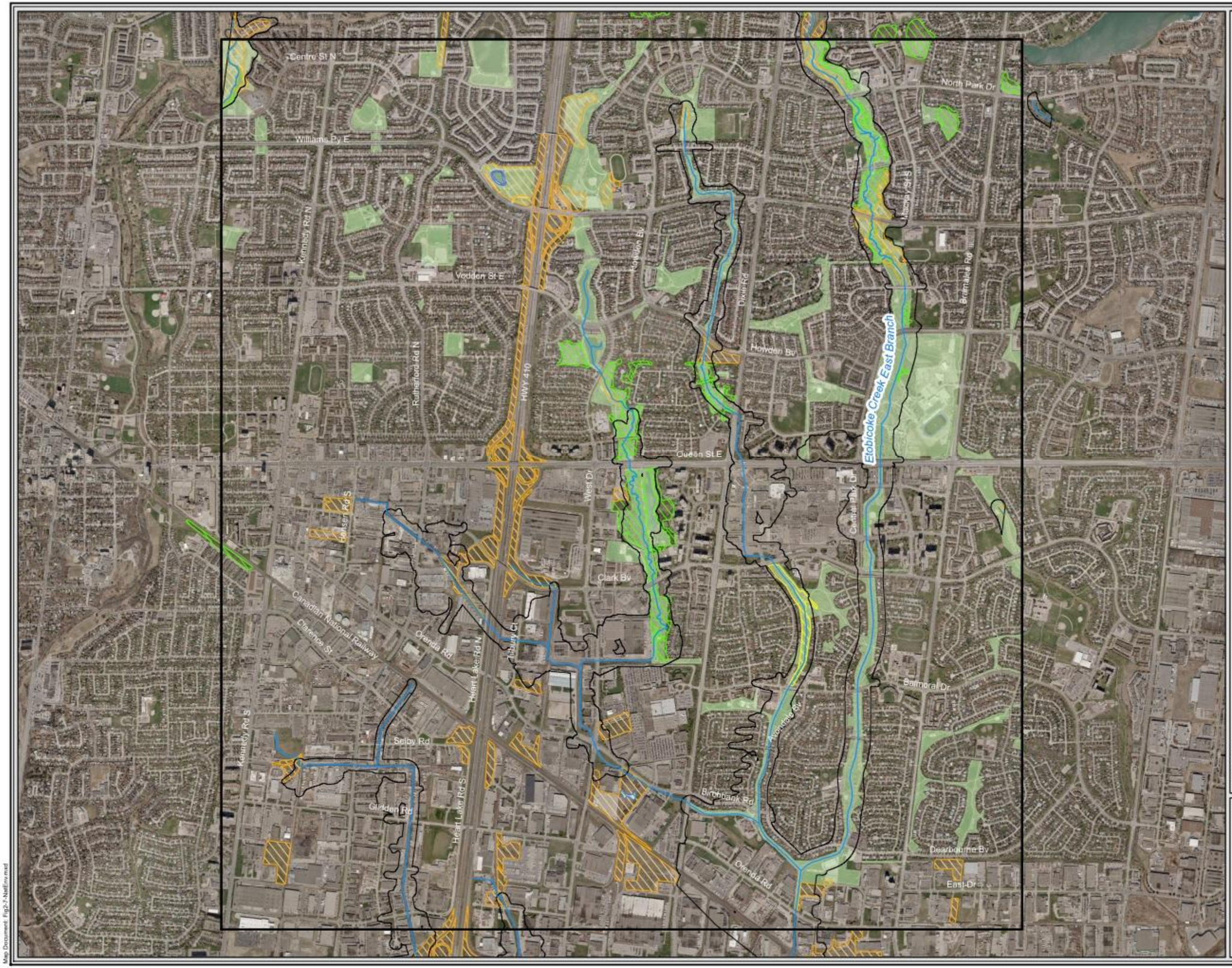
12 City of Brampton Official Plan, Schedule D, Natural Heritage Features and Areas. November 2010.

13 Ontario Ministry of Natural Resources Natural Heritage Information Centre (NHIC) database, http://nhic.mnr.gov.on.ca/nhic_.cfm*, and the Atlas of the Breeding Birds of Ontario,* http://www.birdsontario.org/atlas/index.jsp.

14 Etobicoke and Mimico Creeks Watersheds Technical Update Report, Toronto and Region Conservation Authority, 2010; Etobicoke Creek Watershed Report Card, Toronto and Region Conservation Authority, 2013; and TRCA natural cover, species of conservation concern, floodlines and regulation limits mapping, May 2012.

15 Etobicoke and Mimico Creeks Watersheds Technical Update Report, Toronto and Region Conservation Authority, 2010.



Legend

- Study Area Boundary
- TRCA Regulation Limit
- Watercourse
- Parks

Natural Cover

- Forest
- Meadow
- Successional
- Wetland

Basemapping: Region of Peel/City of Brampton, 2012
Orthophotography: Region of Peel, 2009/2012

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UTM Zone 17N, NAD 83

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East Brampton Watermains Municipal Class Environmental Assessment

Natural Environmental Features

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Figure 2-4

Map Document: Fig2-7-NatEnv.mxd

2.8.4 Species at Risk

A list of Species at Risk (SAR) known to occur within the Region of Peel was obtained from the MNR's Species at Risk in Peel Region database, and then supplemented with records obtained from the Atlas of Breeding Birds of Ontario to create a full list of potential SAR located within the study area. Based on the background information compiled, a total of 24 SAR were determined to potentially occur within the Region of Peel. However, through background review, field investigations and habitat assessment, it was determined that suitable habitat is only present within the immediate project limits for one threatened[16] species, the barn swallow (*Hirundo rustica*). Barn swallow nests are found in man-made structures such as barns, garages, sheds, boat houses, bridges, road culverts, eaves and wharfs. During field investigations, the barn swallow was not observed foraging or nesting; however, roadside culverts provide potential nesting opportunities.

Redside Dace (*Clinostomus elongatus)*, an endangered[17] fish, was noted historically in Etobicoke Creek in 1946, however it has not since been observed in the creek. This timing falls beyond the 20 year timeframe for which the MNR would require an assessment under the *Endangered Species Act*. Furthermore, TRCA has confirmed that Redside Dace is not located in the project study area and as such, will not be an issue for routing of the East Brampton watermains.

2.9 Archaeological and Built/Cultural Heritage Resources

A Stage 1 Archaeological Assessment was completed by Archeoworks Inc. in July 2012 to evaluate the study area archaeological potential. The Stage 1 Archaeological Assessment concluded that existing roads within the study area are considered to have had their archaeological potential removed due to deep and extensive disturbance associated with their construction. As such, it was recommended that these areas be exempted from further archaeological assessment. However, areas lying outside of the paved roadway are provisionally determined to still contain archaeological potential. Therefore, in order to minimize impacts to archaeological resources, a Stage 2 Archaeological Assessment (test-pitting) will be conducted on any lands to be impacted by construction activities relating to this project. Refer to **Appendix F** for the Stage 1 Archaeological Assessment Report.

An Existing Conditions Report for built heritage resources and cultural heritage landscapes was completed by Unterman McPhail Associates in September 2012 (revised July 2013). The report concluded that there are no properties identified within the study area that are included on the City's *Municipal Register of Cultural Heritage Resources, Listed Heritage Properties or its Municipal Register of Cultural Heritage Resources, Designated Under the Ontario Heritage Act*. As a result, construction activities relating to this project will not impact built/cultural heritage resources. Refer to **Appendix G** for the Existing Conditions Built and Cultural Heritage Report.

16 The Species at Risk Act (SARA) recognizes threatened species as those wildlife species that are likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction (SARA Registry, 2012).

17 The Species at Risk Act (SARA) recognizes endangered species as those wildlife species facing imminent extirpation or extinction (SARA Registry, 2012).

2.10 Planning and Servicing Considerations

The following sections discuss the planning and servicing considerations that were taken into account to ensure that this project helps accommodate the anticipated growth within the Region of Peel, while also protecting the natural environment and public health. Relevant planning information as described below is included in **Appendix B.**

2.10.1 Liveable Peel

Liveable Peel is a sustainability strategy to consider the long-term (to 2051) economic, environmental, social and cultural impacts of demographic and socio-economic changes on the programs and services delivered by the Region of Peel. The objectives of the Liveable Peel initiative are as follows:

- To manage the impacts of growth and affect change;
- To achieve a sustainable land use and transportation system;
- To balance the demands of social, economic, environmental and cultural interests;
- To increase recognition and support of long-term planning; and
- To capitalize on community capacity and stakeholder involvement.

Flowing from these objectives are a number of actions and key tasks that fall within the four pillars of sustainability: environmental, social, economic and cultural. Accommodating growth while safeguarding the environment, especially water, air and land, will be the main focus of the environmental pillar and is also reflected in this Municipal Class EA study.

2.10.2 Region of Peel Official Plan

The Regional Official Plan provides policy direction to guide future land use and growth in the Region. New population, employment and household forecasts for the Greater Golden Horseshoe were released as part of *Places to Grow* – the proposed growth plan for the Greater Golden Horseshoe – in January 2005. The Region developed projections based on Places to Grow, used for Regional Official Plan Amendment 24 and adopted by Council, giving a total 2031 population of approximately 1.64 million. This represents an approximate 26 percent increase from the 2011 census population of approximately 1.30 million. The 2031 population forecast has been addressed in the Region's 2103 Water and Wastewater Master Plan (see **Section 1.3**).

2.10.3 City of Brampton Official Plan

The 2006 City of Brampton Official Plan sets out the course for future land use decision-making within the City. The Plan is used to guide many development and infrastructure decisions on issues such as land use, built form, transportation and the environment. The purpose of the Official Plan is to give clear direction as to how physical development and land use decisions should take place in Brampton to meet the current and future needs of its residents. It is also intended to assist in the delivery of municipal services and responsibilities. City Council adopted the current Official Plan in October 2006, and the Ontario Municipal Board approved it in October 2008.

The City of Brampton Official Plan was reviewed in context of the proposed project study area. A review of Official Plan Schedule 1 (City Concept) indicates that the study area is primarily made up of residential and employment areas, including industrial, business corridor and regional retail, and limited major open spaces. Stretching across the study area from west to east is the Central Area of Brampton (Secondary Plan Area SP 7 and SP 36) which is approximately six kilometres (3.7 miles) in length and is composed of three distinct precincts – the historic downtown, Queen Street corridor and Bramalea Centre – each of them with special characteristics and distinct redevelopment models. Both the Queen Street corridor and Bramalea Centre corridor fall within the project study area between Kennedy Road and Bramalea Road.

The Central Area is a major designated growth area in the Greater Toronto Area (GTA). It is an important Regional node with significant civic, institutional, cultural and entertainment facilities as well as important commercial, employment and residential areas. The City's Central Area Planning and Design group is responsible for the long-range planning, implementation and co-ordination of City efforts towards the revitalization and redevelopment of the Central Area into a vibrant mixed use, pedestrian friendly area that acts as the "heart" of the City of Brampton.

As per Official Plan Schedule G, and as described in Section 2.4, the Official Plan divides the City into several Secondary Plan planning areas, each of which has its own land use schedule (see **Appendix B**). In addition, Schedule D (Natural Heritage Features and Areas) identifies several valleyland/watercourse corridors which are related to the previously described tributaries of the Etobicoke Creek East Branch, as well as a Special Policy Area at Dixie Road and Orenda Road. Lands designated as valleylands/ watercourse corridors on Official Plan Schedule D are intended primarily for the preservation and conservation of the natural features, functions and linkages. This information was considered in the evaluation of alternative watermain routes (see **Section 4.3**).

2.10.4 Places to Grow Plan

As part of its membership in the GTA, the Region of Peel is part of the Greater Golden Horseshoe growth plan area, the fastest growing urban area in Canada. In 2006, the Province approved its "Growth Plan for the Greater Golden Horseshoe" which sets specific population and employment forecasts for upper tier municipalities and also prescribes density targets for intensification and greenfield development. According to Schedule 3 of the Growth Plan, the 2031 population forecast for the Region of Peel is 1.64 million, a 59 per cent increase from 2001, while the employment forecast is 870,000, a 64 per cent increase[18]. With respect to the Provincial Places to Grow growth plan forecasts, the Region of Peel's Official Plan Amendment 24 addressed how the provincial growth plan target will be met.

Relevant excerpts of Policy 3.2.5, Water and Wastewater Systems, states that new expansion of existing municipal water systems should only be considered where:

- Strategies for water conservation and other water demand management initiatives are being implemented in the existing service area; and
- Plans for expansion or for new services are to serve growth in a manner that supports achievement of the intensification target and density targets.

18 According to "Amendment 2 (2013) to the Growth Plan for the Greater Golden Horseshoe 2006", by 2041, population and employment in the Region of Peel are expected to grow by approximately 670,000 and 294,000 people respectively.

These requirements are being addressed by the Region's water conservation program (Water Smart Peel) and Regional Official Plan Amendment 24.

2.10.5 Provincial Policy Statement

The 2014 Provincial Policy Statement[19] came into effect on April 30, 2014 and replaces the 2005 Provincial Policy Statement. It provides policy direction on matters of provincial interest related to land use planning and development. As a key part of Ontario's policy-led planning system, the Provincial Policy Statement sets the policy foundation for regulating the development and use of land. It provides for appropriate development while protecting resources of provincial interest, public health and safety, and the quality of the natural environment. Key policies relevant to water (and wastewater) services include the following:

- Infrastructure...and public service facilities shall be provided in a coordinated, efficient and cost-effective manner that considers impacts from climate change while accommodating projected needs. Planning for infrastructure...and public service facilities shall be coordinated and integrated with land use planning so that they are a) financially viable over their life cycle, which may be demonstrated through asset management planning; and b) available to meet current and projected needs (Policy 1.6.1);
- The use of existing infrastructure and public service facilities should be optimized and opportunities for adaptive re-use should be considered, wherever feasible, before consideration is given to developing new infrastructure and public service facilities. (Policy 1.6.3);
- Infrastructure and public service facilities should be strategically located to support the effective and efficient delivery of emergency management services (Policy 1.6.4);
- Planning for sewage and water services shall:
  - Direct and accommodate expected growth or development in a manner that promotes the efficient use and optimization of existing:
    - Municipal sewage services and municipal water services; and
    - Private communal sewage services and private communal water services, where municipal sewage services and municipal water services are not available.
  - Ensure that these systems are provided in a manner that:
    - Can be sustained by the water resources upon which such services rely;
    - Is feasible, financially viable and complies with all regulatory requirements; and
    - Protects human health and the natural environment.
  - Promote water conservation and water use efficiency; and
  - Integrate servicing and land use considerations at all stages of the planning process (Policy 1.6.6.1); and
- Municipal sewage services and municipal water services are the preferred form of servicing for settlement areas. Intensification and redevelopment within settlement areas on existing municipal sewage services and municipal water services should be promoted, wherever feasible (Policy 1.6.6.2).

19 Provincial Policy Statement. Ontario Ministry of Municipal Affairs and Housing, 2014.

2.10.6 Greenbelt Planning Area

The Greenbelt is a broad band of permanently protected land which supports agriculture as the predominant land use, gives permanent protection to the natural heritage and water resource systems, and provides for a diverse range of economic and social activities. It includes lands within, and builds upon the ecological protections provided by, the Niagara Escarpment Plan and the Oak Ridges Moraine Conservation Plan. The Greenbelt Plan identifies where urbanization should not occur in order to provide permanent protection to the agricultural land base and the ecological features and functions occurring on this landscape.

The East Brampton Watermains study area is located outside of the Greenbelt Planning Area; therefore, policies contained in the Greenbelt Plan (Ministry of Municipal Affairs and Housing, 2005) do not apply to this study. However, it should be noted that the Etobicoke Creek Valley which is adjacent to the study area, is identified as an external connection in the Greenbelt Plan. The Greenbelt Plan states that “in recognition of the function of the urban river valleys, municipalities and conservation authorities should maintain…and to the extent possible, enhance the ecological features and functions found within these valley systems”. A review and update of the Greenbelt Plan is planned for 2015.

3. Phase 1: Problems and Opportunities to be Addressed

Phase 1 of the five-phase Municipal Class EA planning process requires the proponent of an undertaking (i.e., the Region) to first document factors leading to the conclusion that the improvement is needed, and to develop a clear statement of the identified problems or opportunities to be addressed. As such, the Problem/ Opportunity Statement is the principle starting point in the undertaking of a Municipal Class EA and becomes the central theme and integrating element of the project. It also assists in setting the scope of the project.

In developing the Problem/Opportunity Statement for this Municipal Class EA, the following points were considered:

- The Region of Peel currently operates a Lake Ontario-based water system that supplies municipal water (potable drinking water) to all of Mississauga, most of Brampton and specific areas within Caledon;

- A technical feasibility study[20] conducted in 2011 has recommended that a new large diameter Zone 4 (Z4) transmission main be constructed to move additional water from the Beckett Sproule Pumping Station and Reservoir near Steeles Avenue East and Highway 410 north to the East Brampton Pumping Station and Reservoir near Dixie Road and Williams Parkway (see **Section 1.2**);

- In 2006, the Province approved its "Growth Plan for the Greater Golden Horseshoe". This Growth Plan sets out the planning framework under which municipalities (including the Region) are expected to manage their local growth and development. The Growth Plan sets specific population and employment forecasts for upper tier municipalities and also prescribes density targets for intensification and greenfield development. Municipalities are expected to review their current plans with respect to established growth projections and planning policies;

- The Provincial Policy Statement requires that municipalities promote "efficient development and land use patterns which sustain the financial well being of the Province and municipalities over the long term and promote cost effective development standards to minimize land consumption and servicing costs"[21]. In order that these objectives may reasonably be achieved, the Provincial Policy Statement encourages municipalities to focus growth into defined settlement areas where a full level of water and sewer services are or can reasonably be made available;

- The Provincial Policy Statement promotes the expansion of any service in a coordinated, efficient and cost effective manner to accommodate projected needs, and requires that planning for infrastructure and public services facilities "be integrated with the planning for growth so that these are available to meet current and projected needs";

- Section 1.1.2 of the Provincial Policy Statement states: "Sufficient land shall be made available through intensification and redevelopment and, if necessary, designated growth areas, to accommodate an appropriate range and mix of employment opportunities, housing and other land use to meet projected needs for a time horizon of up to 20 years";

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20 Feasibility Assessment of Zone 5 Sub Transmission Main and East Brampton (Zone 4) Transmission Main Twinning Study, AECOM 2011.

21 The Provincial Policy Statement is issued under the authority of Section 3 of the Planning Act. It provides direction on matters of provincial interest related to land use planning and development, and promotes the provincial policy-led planning system (Source: Ministry of Municipal Affairs and Housing, 2005).

- The existing East Brampton transmission main extends from the Beckett Sproule Pumping Station and Reservoir to the East Brampton Pumping Station and Reservoir and provides a significant amount of transmission capacity to the Peel water distribution system. Analysis of the Zone 4 (Z4) conveyance capacity has confirmed that the existing system cannot deliver the required amount of water to support future and approved growth. Recognizing the importance of this transmission main, it is also prudent to build system redundancy and address security of supply[22] to support future and approved growth;

- The existing East Brampton transmission main was constructed in 1972 and is approaching the age where inspection and possibly maintenance is required; and

- Additional hydraulic analysis of the Zone 5 (Z5) distribution system has identified the need for additional south-to-north transmission capacity that will maximize the use of existing and future infrastructure; and

- The Region recently completed its 2013 Water and Wastewater Master Plan that will address water and wastewater infrastructure requirements to 2031 and beyond.

3.1 Problem/Opportunity Statement

Considering the points listed in the section above, the Problem/Opportunity Statement for the East Brampton Watermains Municipal Class EA is defined as follows:

> *Analysis of the East Brampton Z4 and Z5 transmission system has confirmed that based on projected demand, there is insufficient transmission capacity in the eastern part of the Peel water distribution system to meet planned growth, including intensification. Failure to have this infrastructure in place by approximately 2020 will impact the Region's ability to service urban growth in Peel, but should not impact service to existing customers.*

In order to address the Problem/Opportunity Statement, the Region has initiated this Municipal Class EA planning process which evaluates alternative solutions and design concepts and accordingly addresses the above statement. This Environmental Study Report (ESR) has been prepared to document how to best site, design, construct and operate the proposed East Brampton watermains.

22 Security of supply refers to the provision of a back-up water supply for the existing transmission main (i.e., addresses potential disruption to existing supply).

4. Phase 2: Alternative Solutions to the Problem

The Municipal Class EA process recognizes that there are different ways of solving a particular problem and requires that various alternative solutions be considered. The following sections identify, describe and evaluate a list of alternative planning solutions for this project.

4.1 Alternative Planning Concepts

The 2013 Region of Peel Water and Wastewater Master Plan[23] identified and evaluated the following alternative planning concepts for the Region of Peel Lake Ontario-based water supply system:

1. Do nothing;
2. Limit community growth;
3. Expand the existing water supply system by building off the planned 2031 infrastructure as per the Region's previous 2007 Water and Wastewater Master Plan;
4. Expand the existing water supply system by modifying and building off the planned 2031 infrastructure identified in the Region's 2007 Master Plan, and also constructing a new stream-based or groundwater-based Water Treatment Plant;
5. Expand the existing water supply system by building off the planned 2031 infrastructure as per the Region's 2007 Master Plan, and also constructing a new lake-based Water Treatment Plant; and
6. Continue to implement a water conservation and efficiency program.

Based on the results of the evaluation, Concepts 3 through 6 were carried forward for the development of more detailed water servicing strategies and further evaluation of each strategy. Ultimately, *Concept 3: Expand the Existing Water Supply System* in combination with *Concept 6: Water Conservation and Efficiency* was identified as the preferred solution, with construction of the East Brampton Watermains identified as two key projects forming part of the preferred servicing strategy[24].

As part of this Municipal Class EA study, the evaluation of alternative solutions was reviewed considering current conditions, including recent approved population projects, growth areas and water system modeling. This review confirmed that Alternative Concept 3 (in combination with Alternative Concept 6) continues to be the preferred solution. Concept 6 is being addressed by the Region's water conservation program, Water Smart Peel[25]. As such, this study carries forward with a portion of Alternative Concept 3, including the identification and evaluation of alternative Z4 and Z5 watermain routes.

23 The Region of Peel's 2013 Water and Wastewater Master Plan is available for review from the Region's website at www.peelregion.ca/pw/water/environ-assess/lakebase-masterplan.htm.

24 The East Brampton Z4 Watermain referred to in this report is the "East Brampton Transmission Main Twinning" referred to in the Region's 2013 Master Plan. Similarly, the East Brampton Z5 Watermain referred to in this report is one of several key projects that form part of the "distribution system extension" recommended by the 2013 Master Plan in northwest Brampton.

25 More information about the Region's Water Smart Peel program is available at www.watersmartpeel.ca.

4.2 Identification of Alternative Watermain Routes

With such a large study area, there are a number of possible alternative routes that the proposed watermains could follow. As such, it was first necessary to identify a list of alternative watermain routes that could reasonably be expected to be constructed. Alternative watermain routes were generated by first identifying a "long list" of potential alternative routes, and then screening those routes to identify the most appropriate "short list" for comparative evaluation. This approach, which is briefly described below and summarized in **Table 4-1,** resulted in the identification of four alternative watermain routes for comparative evaluation, each of which could be used for routing of either the Z4 transmission main, the Z5 sub-transmission main or both watermains.

4.2.1 Methodology

A six step routing identification and evaluation methodology was developed as follows:

- **Step 1:** Establish a grid of existing road right-of-way and public utility segments.

  Figure 4-1 shows the existing roadway network and grid of potential routing segment options following the application of Step 1.

- **Step 2:** Identify the long-listed routes by assembling the grid segments into continuous south-to-north and east-to-west runs connecting the Beckett Sproule Pumping Station and Reservoir to the East Brampton Pumping Station and Reservoir (Z4 connection) and Williams Parkway (Z5 connection).

- **Step 3:** Screen the long-listed routes by avoiding route segments with significant constraints and identifying the most direct routes and those that may provide an opportunity to be co-ordinated with other planned infrastructure improvements.

  Figure 4-2 shows the long list of potential routing segments following the application of Steps 2 and 3.

- **Step 4:** Identify the short-listed routes.

  Figure 4-3 shows a compilation of Figures 4-1 and 4-2 along with the short-listed routing options following the application of Step 4. **Figure 4-4** presents the Z4 watermain short-listed routing options following the application of Step 4. The Z4 watermain routing options are based on the new transmission main exiting the Beckett Sproule Pumping Station and Reservoir, crossing Highway 410 and the CN railway and connecting to the East Brampton Pumping Station and Reservoir. **Figure 4-5** shows the Z5 sub-transmission main alternative routes following the application of Step 4. These routing options are based on the new sub-transmission main exiting the Beckett Sproule Pumping Station and Reservoir and connecting to the new east-to-west West Brampton watermain planned for Williams Parkway (see **Section 2.5.4)**. Note that these short-listed routing options can be used for either watermain (i.e., the Z4 transmission main and Z5 sub-transmission main alternatives follow the same routes, except that the sub-transmission main terminates with a connection at Williams Parkway west of North Park Drive).

Table 4-1 further expands on and summarizes the process used to identify the long-listed and short-listed routing options. **Step 5:** Evaluate Short-Listed Routes and **Step 6:** Identify and Confirm Recommended Routes are further described in **Sections 4.3 and 4.4** of this report.

Table 4-1 Identification of Alternative Watermain Routing Methodology

Step	Criteria/Considerations	Rationale	Results
Step 1: Establish grid of existing road right-of-way and public utility corridor segments (see **Figure 4-1**).	• Focus on south-to-north routes leaving the Beckett Sproule Pumping Station & Reservoir (PS&R) and heading north towards the East Brampton PS&R (Z4 connection) and Williams Parkway (Z5 connection).	• Optimize hydraulic performance and avoid back-tracking/convoluted routes, inefficient designs and increased pumping requirements and energy use.	• Steeles Avenue E removed from consideration due to extended distance / hydraulics (i.e., back-tracking/pumping in wrong direction). • Study area boundary delineated.
	• Use existing arterial and collector road ROWs which have a minimum ROW width of 23 m.	• Existing ROWs generally avoid or minimize sensitive surface environmental features and the need for private property taking. • Arterial and collector roads are preferred over local roads because their greater ROW widths facilitate good access for watermain construction and maintenance, while maintaining at least some vehicular traffic flow and minimizing effects on local residents.	• Existing roadway network reviewed and all arterial/collector roads identified. • Future Clark Boulevard extension (west of Rutherford Road to Kennedy Road) removed from consideration due to uncertainty (yet to initiate Class EA and expected approval challenges).
	• Consider existing south-to-north or east-to-west public utility easements that provide connectivity between arterial/collector roads.	• Existing easements generally avoid or minimize sensitive surface environmental features and the need for private property taking.	• Existing watermain easement added immediately west of Highway 410 and north of Heart Lake Road S. • Existing rail spur easement added between Orenda Road and Clark Boulevard, just west of West Drive.
	• Avoid routes within or immediately adjacent to Highway 410 corridor or CNR, if possible, due to MTO and CNR guidelines/requirements.	• Compliance with MTO and CNR corridor management policies and ease of approvals.	• Highway 410 and CNR corridors removed from consideration.
	• Avoid valley trail systems due to TRCA guidelines/requirements and sensitive natural environmental features.	• Compliance with TRCA valley corridor management policies and ease of approvals. • Optimize ease of access for watermain construction and maintenance.	• Etobicoke Creek valley system and Norton Place Park trail system (between Clark Boulevard and Queen Street East) removed from consideration.

Step	Criteria/Considerations	Rationale	Results
Step 2: Identify long-listed routes by assembling grid segments into continuous south-to-north and east-to-west runs connecting the Beckett Sproule Pumping Station and Reservoir to the East Brampton Pumping Station and Reservoir (Z4 connection) and Williams Parkway (Z5 connection).	• Maximize the length of continuous south-to-north run with options for east-to-west crossings of Highway 410.	• Optimize hydraulic performance and avoid back-tracking/convoluted routes, inefficient designs and increased pumping requirements and energy use. • Generally reduces construction costs and increases the pace of construction.	• Arterial/collector roads removed from consideration west of Highway 410: – Clarence Street; – Orenda Road; and – Hansen Road S. • Arterial/collector roads removed from consideration east of Highway 410: – Orenda Road west of Dixie Road; – Central Park Drive; – Howden Boulevard (east of Vodden Street); and – Mackay Street S.
	• Consider local roads and new easement options that provide connectivity between arterial/collector roads and/or PS&Rs.	• Facilitates strategic linkages between more preferred routing segments.	• Tilbury Court (local road) and new easement through Ryder Truck Rental and Iron Mountain added (facilitates good Highway 410 crossing and direct link to Clark Boulevard). • Northampton Road (local road) added for connection option to East Brampton PS&R.
Step 3: Screen long-listed routes (see **Figure 4-2**).	• Identify and avoid route segments with significant constraints, including: – Higher order transit corridors; – High traffic volumes; – Recent road improvements; and – Congested right-of-way with utilities that are difficult to relocate.	• Avoid having to dig up recently reconstructed or improved roads. • Ensure minimum clear zone to accommodate construction requirements of new pipe.	• Queen Street East removed from consideration (i.e., recently upgraded, Bus Rapid Transit service (Zum) conflicts, congested utilities). • Glidden Road and West Drive (east of Highway 410) removed from consideration due to conflicts with existing East Brampton watermain and insufficient ROW. Laurelcrest Street removed as a result. • Williams Parkway east of Howden Boulevard/North Park Drive removed from consideration (i.e., primary transit corridor and location of future West Brampton watermain). • Existing rail spur easement between Orenda Road and Clark Boulevard just west of West Drive removed from consideration (i.e., active spur line, insufficient ROW). • Clark Boulevard and existing watermain easement west of Tilbury Court removed from consideration due to congested utilities.

Step	Criteria/Considerations	Rationale	Results
	• Identify most direct routes (i.e., minimize number and degree of bends, identify shortest distances) with preference for long, straight alignments at constant grade, with minimal low and high points along alignment.	• Optimize operations and reduce construction costs.	• Tilbury Court routing, including existing easement along Heart Lake Road S and new easement north of Tilbury Court, retained for most direct connection to Clark Boulevard. • Vodden Street E west of Rutherford Rd removed from consideration.
	• Identify routes that provide opportunities to be coordinated with other planned infrastructure improvements such as future road widening, infrastructure replacement and/or road reconstruction.	• Opportunity to complete both projects in one construction window. • Minimize the frequency of disruptions to road users (i.e., only inconvenience once at one location).	• Future Clark Boulevard widening east of Dixie Road and future Dixie Road widening north of Queen Street East acknowledged as opportunity.
Step 4: Identify short-listed routes (see **Figure 4-3**).	• Eliminate parallel south-to-north and east-to-west routing segments that have more disadvantages than another similar routing segment (i.e., there is an adjacent routing alignment that is shorter, more direct or less disruptive). • Avoid poor soil and groundwater conditions, if possible. • Avoid significant topography and hydraulic/transient constraints.	• Eliminates the need to consider/ evaluate less preferred route segments that provide the same function as similar adjacent segments (i.e., avoids redundancy in the evaluation). • Less preferred but similar routes can be considered as another alternative in the future, if necessary.	• Clark Boulevard east of Dixie Road removed from consideration due to high traffic volumes (i.e., Bramalea City Centre) and minimal opportunities to coordinate with future Clark Boulevard widening (i.e., majority of Clark Boulevard widening is west of Dixie Road). • Dixie Road between Balmoral Drive and Clark Boulevard removed from consideration based on impacts to residences and business (i.e., disruption to access for Rogers Communications-significant employer/traffic generation). • Birchbank Road/Avondale Boulevard/ Dearbourne Boulevard removed from consideration (i.e., social disruption and more difficult operation and higher construction costs due to increased length). • Short-listed alternative routes identified (refer to **Figures 4-4** and **4-5**): - Alternative Route 1 (Bramalea Road); - Alternative Route 2 (Dixie Road); - Alternative Route 3 (Rutherford Road); - Alternative Route 3a (Rutherford Road-Vodden Street); and - Alternative Route 4 (Kennedy Road). • North Park Drive and Balmoral Drive retained as part of Alternative Route 4.

Step	Criteria/Considerations	Rationale	Results
	• City requirement to avoid crossing existing culverts.	• City culvert crossings may require property. Possible that City will consider casing pipe under culverts.	• Minimize number of culvert crossings or consider pipe alignments beyond culvert limits and corridor property requirements.
	• Constructability considerations.	• Routes should avoid or minimize need for unusual or complex construction and inherent risks.	• Complex construction and/or risks avoided where possible.
	• Minimize number of water crossings.	• Desire to avoid or minimize impacts to water resources and meet TRCA objectives.	• Bramalea Road retained for comparison purposes as route necessitates multiple Etobicoke Creek crossings.
Step 5: Evaluate short-listed routes.	• Evaluation factor groups and criteria that meet the definition of the environment as per the Environmental Assessment Act (EAA) (refer to Table 4-3 and 4-4).	• Compliance with the MEA Class EA document and EAA.	• Senior staff review and acceptance of the advantages/disadvantages associated with each short-listed route.
Step 6: Identify and confirm recommended routes.	• Review agency (e.g., TRCA, MOE, etc.) and public comments received from PIC# 2. • Senior staff review and acceptance of recommendations.	• Wide acceptance of preferred routes.	• Preferred routes form the basis for ESR and preliminary/detailed design.

Legend

- Study Area Boundary
- Arterial/Collector Road
- Local Road
- Grid of Routing Segment Options
- Existing East Brampton Watermain
- Other Existing Large Diameter Watermain
- Watercourse

Basemapping: Region of Peel/City of Brampton, 2012
Orthophotography: Region of Peel, 2009/2012

N
W E
S

0 255 510 1,020 Meters

UTM Zone 17N, NAD 83

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East Brampton Watermains Municipal Class Environmental Assessment

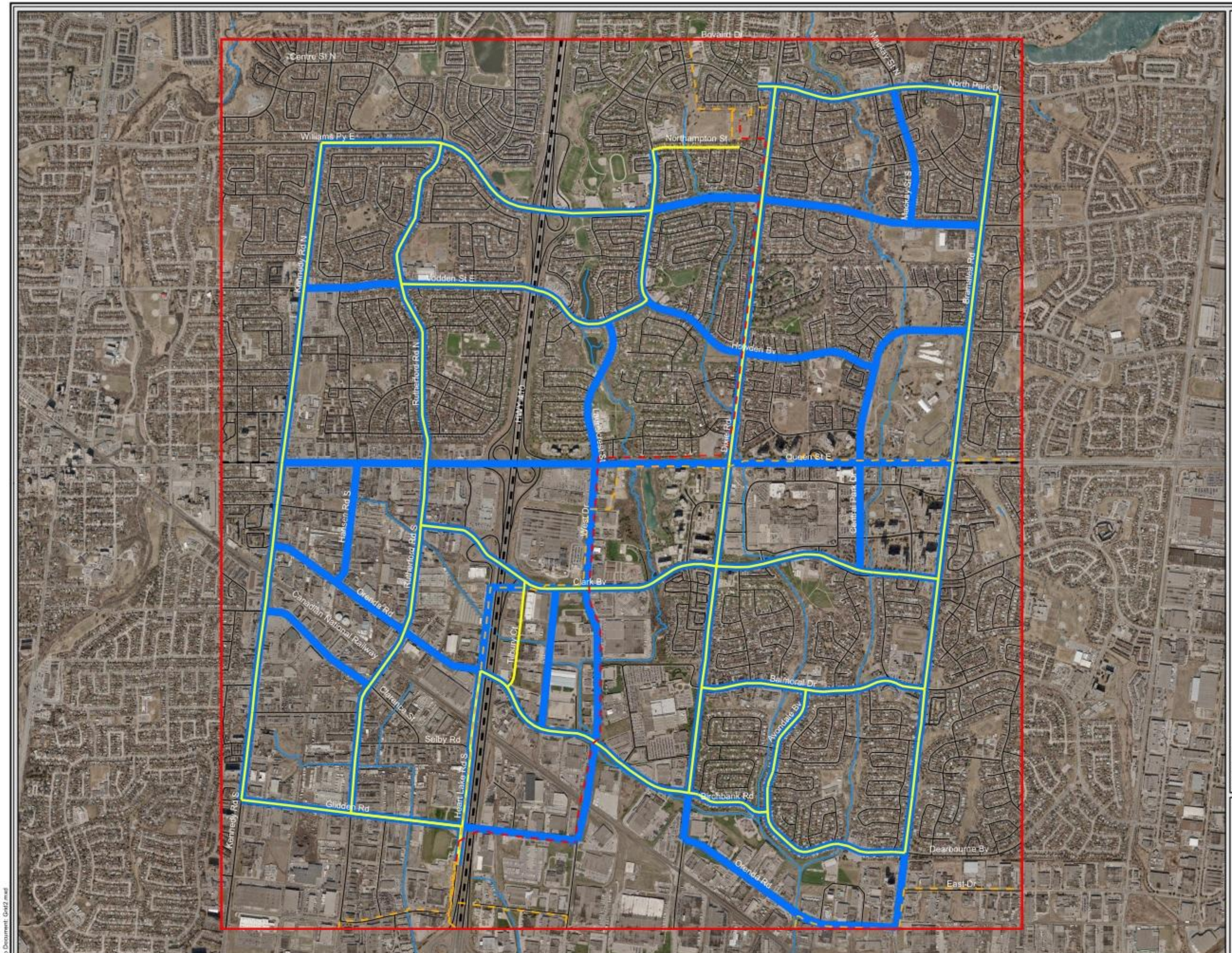
Step 1: Existing Roadway Network and Routing Options Grid

AECOM

Region of Peel
Working for you

Figure 4-1

Map Document: Grid.mxd



Legend

- Study Area Boundary
- Existing Road
- Grid of Routing Segment Options from Step 1
- Long-Listed Routes from Steps 2 and 3
- Existing East Brampton Watermain
- Other Existing Large Diameter Watermain
- Watermain

Basemapping: Region of Peel/City of Brampton, 2012
Orthophotography: Region of Peel, 2009/2012

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East Brampton Watermains Municipal Class Environmental Assessment

Step 2 and Step 3: Routing Options Grid and Long-Listed Routes

AECOM

Region of Peel
Working for you

Figure 4-2

Map Document: Grid2.mxd

Legend

- Study Area Boundary
- Arterial/Collector Road
- Local Road
- Grid of Routing Segment Options from Step 1
- Long-Listed Routes from Steps 2 and 3
- Short-Listed Routes from Step 4
- Existing East Brampton Watermain
- Other Existing Large Diameter Watermain
- Watercourse

Basemapping: Region of Peel/City of Brampton, 2012
Orthophotography: Region of Peel, 2009/2012

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UTM Zone 17N, NAD 83

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East Brampton Watermains Municipal Class Environmental Assessment

Steps 1 through 4: Existing Roadway Network, Routing Options Grid and Both Long- and Short-Listed Routes

AECOM

Region of Peel
Working for you

Figure 4-3

Map Document: Grid3.mxd

East Brampton Pumping Station and Reservoir

Beckett Sproule Pumping Station and Reservoir

Centre St N
Williams Py E
Bovaird Dr
Harden St N
North Park Dr
Hickey St S
Kennedy Rd N
Vodden St E
Rutherford Rd N
HWY 410
Dixie Rd
Bramalea Rd
Howden Blv
Queen St E
Gentle Park Dr
Wilson Rd S
Rutherford Rd S
West Dr
Clark Blv
Orenda Rd
Canadian National Railway
Thorp Ct
Clarence St
Selby Rd
Glidden Rd
Kennedy Rd S
Balmoral Dr
Wondale Blv
Birchbank Rd
Dearbourne Blv
East Dr

Legend

- Study Area Boundary
- Arterial/Collector Road
- Watercourse
- Existing East Brampton Watermain
- Other Existing Large Diameter Infrastructure

1.5 m Zone 4 Transmission Main Alternative Routes

- Alternative Route 1 (Kennedy Rd)
- Alternative Route 2 (Rutherford Rd)
- Alternative Route 2a (Vodden St)
- Alternative Route 3 (Dixie Rd)
- Alternative Route 3a (Tilbury Ct)
- Alternative Route 4 (Kennedy Rd)
- Alternative Zone 4 Interconnection

Basemapping: Region of Peel/City of Brampton, 2012
Orthophotography: Region of Peel, 2009/2012

N
W E
S

0 250 500 1,000 Meters

UTM Zone 17N, NAD 83

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East Brampton Watermains Municipal Class Environmental Assessment

Zone 4 Transmission Main Alternative Routes

AECOM

Region of Peel
Working for you

Figure 4-4

Map Document: Fig 4-4 AlternativeRoutesV4.mxd

East Brampton Pumping Station and Reservoir

Beckett Sproule Pumping Station and Reservoir

0.75
0.9
1.05
1.2

Centre St N
Williams Pky E
Kennedy Rd N
Vodden St E
Rutherford Rd N
Bovaird Dr
North Park Dr
Hurontario St
Mickay St S
Dixie Rd
Bramalea Rd
Howden Blv
Queen St E
Clark Blv
Tilbury Ct
Balmoral Dr
Wyndale Blv
Birchbank Rd
Dearbourne Blv
East Dr
Orenda Rd
Canadian National Railway
Clarence St
Selby Rd
Glidden Rd
Heart Lake Rd S
Kennedy Rd S
Rutherford Rd S
Hasken Rd
West Dr
Central Park Dr
Sewage Pipeline
HWY 410

Legend

- Study Area Boundary
- Arterial/Collector Road
- Watercourse
- Existing East Brampton Watermain
- Other Existing Large Diameter Infrastructure

0.9 m to 1.2 m Zone 5 Sub-Transmission Main Alternative Routes

- Alternative Route 1 (Kennedy Rd)
- Alternative Route 2 (Rutherford Rd)
- Alternative Route 2a (Vodden St)
- Alternative Route 3 (Dixie Rd)
- Alternative Route 3a (Tilbury Ct)
- Alternative Route 4 (Kennedy Rd)
- 0.9 Proposed Sizing (metres in diameter)
- Alternative Zone 5 Interconnection
- End Point Interconnection

Basemapping: Region of Peel/City of Brampton, 2012
Orthophotography: Region of Peel, 2009/2012

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UTM Zone 17N, NAD 83

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East Brampton Watermains Municipal Class Environmental Assessment

Zone 5 Transmission Main Alternative Routes

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Figure 4-5

Map Document: Fig 4-5 AlternativeRoutesV4.mxd

4.2.2 Alternative Watermain Routes

Based on the methodology and considerations described above, four alternative watermain routes for each transmission main (Z4 and Z5), including various sub-options, were identified as:

- Alternative Route 1: Kennedy Road;
- Alternative Route 2: Rutherford Road;
- Alternative Route 3: Dixie Road; and
- Alternative Route 4: Bramalea Road.

Table 4-2 provides a description of each alternative route, including its location, sub-options and a listing of significant features and/or considerations. **Figure 4-6** shows the alternative watermain routes for both transmission mains.

Table 4-2 Description of Alternative Watermain Routes

Z4/Z5 Alternative Watermain Route Description	Feature/Consideration
Alternative Route 1 (Kennedy Road): • Connection at Beckett Sproule Pumping Station & Reservoir (PS&R); • West on Glidden Road to Kennedy Road; • North on Kennedy Road to Williams Parkway; • East on Williams Parkway to North Park Drive; • North on North Park Drive to Northampton Street; and • East through Northampton Park, connection at East Brampton PS&R.	• Primarily based on using Regional and City arterial roads; • Congested right-of-way along Kennedy Road; • No Highway 410 crossing for Z5 sub-transmission main as connection point would be at Williams Parkway; • Invert elevation for Z4 watermain above reservoir level at some locations, requires deep tunnel; • Difficult CNR crossing; • Low to moderate traffic volumes; • Two water crossings; • Difficult Highway 410 crossing for Z4 watermain in tunnel; and • Potential for difficult soil and groundwater conditions on Kennedy Road north of CNR.
Alternative Route 2 (Rutherford Road): • Connection at Beckett Sproule PS&R; • West on Glidden Road to Rutherford Road; • North on Rutherford Road to Williams Parkway; • East on Williams Parkway to North Park Drive; • North on North Park Drive to Northampton Street; and • East through Northampton Park, connecting at East Brampton PS&R.	• Based on using City arterial roads; • No Highway 410 crossing for Z5 sub-transmission main as connection point would be at Williams Parkway; • Invert elevation for Z4 watermain above reservoir level at some locations, requires deep tunnel; • Low to moderate traffic volumes; • Four water crossings; • Difficult Highway 410 crossing for Z4 watermain in tunnel; • Potential for difficult soil and groundwater conditions on Rutherford Road north of CNR; and • Route travels through sensitive residential areas.

Z4/Z5 Alternative Watermain Route Description	Feature/Consideration
Alternative Route 2a (Rutherford Road-Vodden Street): • Connection at Beckett Sproule PS&R; • West on Glidden Road to Rutherford Road; • North on Rutherford Road to Vodden Street; • East on Vodden Street to Howden Boulevard; • North on Howden Boulevard to Northampton Street; and • East through Northampton Park, connecting at East Brampton PS&R.	• Based on using City arterial roads; • No Highway 410 crossing for Z5 sub-transmission main as connection point would be at Williams Parkway; • Difficult CNR crossing; • Low to moderate traffic volumes; • Five water crossings; • Less difficult crossing of Highway 410 in tunnel; • Potential for difficult soil and groundwater conditions on Rutherford Road north of CNR; and • Route travels through sensitive residential areas.
Alternative Route 3 (Dixie Road): • Connection at Beckett Sproule PS&R; • North on Heart Lake Road to Selby Road; • North on easement from old Heart Lake Road allowance to Clark Boulevard; • East on Clark Boulevard to Dixie Road; and • North on Dixie Road to just south of North Park Drive, connecting at the East Brampton PS&R.	• Primarily relies on Regional roads and City arterial roads; • Potential to coordinate with future Clark Boulevard and Dixie Road widening; • Requires easement from City (old Heart Lake Road S); • Four water crossings; • Potential for difficult soil and groundwater conditions at Clark Boulevard and Dixie Road; • Less difficult crossing of Highway 410 in tunnel; • Moderate to high traffic volumes; and • Passes by Bramalea City Centre (major employer-large traffic generator).
Alternative Route 3a (Dixie Road-Tilbury Court): • Connection at Beckett Sproule PS&R; • North on Heart Lake Road to Selby Road; • North on easement from old Heart Lake Road allowance to Orenda Road; • East on Orenda Road to Tilbury Court; • North on Tilbury Court and easement to Clark Boulevard; • East on Clark Boulevard to Dixie Road; and • North on Dixie Road to just south of North Park Drive, connecting at the East Brampton PS&R.	• Primarily relies on Regional roads and City arterial roads; • Cross Highway 410 via Orenda Road; • Potential to coordinate with future Clark Boulevard and Dixie Road widening; • Requires easements from City (old Heart Lake Road S) and private property owners (Tilbury Ct extension); • Four water crossings; • Potential for difficult soil and groundwater conditions at Clark Boulevard and Dixie Road; • Moderate to high traffic volumes; and • Passes by Bramalea City Centre (major employer-large traffic generator).
Alternative Route 4 (Bramalea Road): • Connection at Beckett Sproule PS&R; • North on Heart Lake Road to Selby Road; • Easement from old Heart Lake Road allowance to Orenda Road; • East on Orenda Road to Dixie Road; • North on Dixie Road to Balmoral Drive; • East on Balmoral Drive to Bramalea Road; and • North on Bramalea Road to North Park Drive, connecting at the East Brampton PS&R.	• Largely based on using City arterial roads; • Cross Highway 410 via Orenda Road; • Potential to coordinate with future Bramalea Road improvements; • Four water crossings (two Etobicoke Creek crossings); • Moderate traffic volumes; • Longest route and some backtracking to get to the connection points; and • Route passes by Rogers Communications (major employer-large traffic generator).

East Brampton Pumping Station and Reservoir

Beckett Sproule Pumping Station and Reservoir

Centre St N
Williams Py E
Kennedy Rd N
Vodden St E
Rutherford Rd N
Rutherford Rd S
Kennedy Rd S
Halsen Rd S
Canadian National Railway
Orenda Rd
Clarence St
Selby Rd
Glidden Rd
Bovaird Dr
Harden St N
North Park Dr
Hickey St S
Dixie Rd
Bramalea Rd
Howden By
Queen St E
West Dr
Clark By
Thorp Ct
Balmoral Dr
Wondale By
Birchbank Rd
Dearbourne By
East Dr
Orenda Rd
HWY 410

Legend

- Study Area Boundary
- Arterial/Collector Road
- Watercourse
- Existing East Brampton Watermain
- Other Existing Large Diameter Infrastructure

1.5 m Zone 4 Transmission Main and 0.9 m to 1.2 m Zone 5 Sub-Transmission Main Alternative Routes

- Alternative Route 1 (Kennedy Rd)
- Alternative Route 2 (Rutherford Rd)
- Alternative Route 2a (Vodden St)
- Alternative Route 3 (Dixie Rd)
- Alternative Route 3a (Tilbury Ct)
- Alternative Route 4 (Kennedy Rd)
- Alternative Zone 4 Interconnection
- Alternative Zone 5 Interconnection

Basemapping: Region of Peel/City of Brampton, 2012
Orthophotography: Region of Peel, 2009/2012

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UTM Zone 17N, NAD 83

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East Brampton Watermains Municipal Class Environmental Assessment

Alternative Watermain Routes

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Figure 4-6

Map Document: Fig 4-6 AlternativeRoutesV4.mxd

4.3 Comparative Evaluation of Alternative Watermain Routes

The following sub-sections describe the evaluation process that was used to gather and review all of the information to select the preferred route for each watermain. Also included is an overview of how each alternative route was evaluated, including a summary of the advantages, disadvantages or key considerations for each alternative route. **Table 4-5** at the end of this chapter provides a summary of the evaluation of alternative routes and identifies **Alternative Route 3: Dixie Road** as the overall recommended route.

4.3.1 Evaluation Methodology

An evaluation framework was developed as presented in **Table 4-3** below based on five environmental components that together address the broad definition of the environment as described in the *Environmental Assessment Act* (EAA)[26].

Table 4-3 Evaluation Framework Components

Component	Description
Natural Environmental	• Component having regard for protecting the natural and physical components of the environment (i.e., air, land, water and biota), including natural heritage and environmentally sensitive areas.
Social/Cultural	• Component that evaluates potential effects on residents, neighbourhoods, businesses, community character, social cohesion, community features and historical/archaeological and heritage components.
Legal/Jurisdictional	• Component that considers potential land requirements and compliance with planning policies.
Technical	• Component that considers the technical suitability and other engineering aspects of the water system.
Economic/Financial	• Component that compares the potential financial costs.

Based on the above-listed components, **Table 4-4** presents the proposed evaluation criteria that were presented at Public Open House #1 for review and comment by review agencies, stakeholders and members of the general public.

Each alternative watermain route, including sub-options, was then evaluated from least preferred to most preferred based on the evaluation criteria presented in Table 4-4 below. One route with the lowest possible adverse effects was then identified as the preferred route. This evaluation was not based on a numerical ranking system but rather the professional expertise of the project team. To ensure statistical validity, such an approach would have to strictly adhere to statistical methods that are often difficult to apply in a multi-faceted project such as a Municipal Class EA. Instead, a descriptive or qualitative evaluation was used to consider the suitability and feasibility of each alternative route. In this respect, trade-offs were made considering the advantages or disadvantages of each alternative to address the problem and opportunity statement, with the least environmental effects and the most technical benefits resulting in a higher priority and forming the rationale for the preferred route.

26 The Environmental Assessment Act (Section 1. (c) (i) to (vi)) defines the "environment" as: "air, land, water, plant and animal life including humans; the social and cultural conditions that influence the life of humans or a community; any building, structure, machine or other device or thing made by humans; any solid, liquid, gas, odour, heat, sound, vibration or radiation resulting directly or indirectly from human activities, or; any part or combination of the foregoing and the interrelationships between any two or more of them, in or of Ontario." This definition of the environment is used and is reflected in the environmental components used in the evaluation of alternative feedermain routes.

Table 4-4 Criteria for Evaluating Alternative Watermain Routes

Evaluation Criteria	Indicator/Consideration
Natural Environment	
Potential effects on water resources	• Disruption to fish including spawning periods and physical changes to aquatic habitat (e.g., number and type of watercourse crossings, potential changes to water levels/base flow contribution, soil disturbance/sedimentation)
	• Groundwater management complexity (e.g., potential short-term water taking, including the need for Ministry of the Environment (MOE) Permits to Take Water)
Potential effects on terrestrial features	• Loss of vegetation (e.g., number and significance of trees removed and/or disturbed)
	• Loss of or disruption to sensitive species habitat (e.g., proximity to vulnerable/threatened/endangered or locally/regionally rare amphibians, birds or wildlife)
Social Environment	
Potential for temporary disruption to residences, institutions and businesses during construction	• Increase in dust, noise and/or vibrations, reduced property access and ability to maintain existing services
Traffic impacts during construction, including expected lane closures	• Expected number/direction/duration of open lanes during construction and resultant reduction in levels of service, including number of intersecting roads
Cultural Environment	
Potential for loss and/or disruption to archaeological and built heritage resources	• Significance of cultural/heritage resource and ability to mitigate
Legal/Jurisdictional	
Compliance with applicable planning policies	• Potential conflicts with Region of Peel and City of Brampton Official Plan policies, including Secondary Plans, Master Servicing Plans and Toronto and Region Conservation Authority (TRCA) regulations
Potential land requirements	• Number of temporary and/or permanent easements and crossing permits (e.g., MTO/CNR permits)
Technical	
Constructability	• Right-of-way width, length of pipe, number of bends, rock excavation, trench support and soils condition, water table depth significant major infrastructure crossings/ease of approvals and City culvert crossing requirements
Construction method	• Open cut or tunneling and permitting agency buffer requirements (e.g., TRCA/MTO)
Operability	• Number of required chambers, pressure losses, hydraulic and transient issues and interconnection opportunities
Maintainability	• Accessibility to maintenance chambers (e.g., shallow construction versus deep tunnel)
Conflicts with existing utilities	• Significance of existing utilities and infrastructure and ability to maintain existing services or relocate existing utilities
Conflicts with recent or planned improvements	• Road resurfacing or co-ordination opportunities with planned infrastructure improvements
Truck traffic management issues during construction	• Haul routes and access to 400 series Highways
Economic/Financial	
Estimated construction costs	• Relative construction costs compared to other routes

4.3.2 Natural Environment Evaluation

As part of the natural environment component of this Municipal Class EA study, an evaluation of the aquatic and terrestrial natural heritage features and functions associated with the alternative watermain routes was completed. In preparation for field investigations and to identify the potential natural environment constraints associated with each alternative route, AECOM staff reviewed a variety of existing background documents to provide context and supporting data. Studies and information sources relevant to the study area that were reviewed included the following:

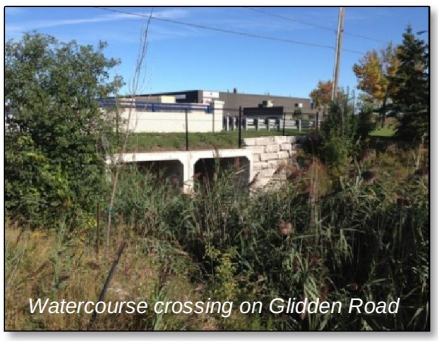
- Ontario Ministry of Natural Resources (MNR)/Natural Heritage Information Centre (NHIC) database, available via internet at: http://nhic.mnr.gov.on.ca/nhic_.cfm;
- City of Brampton Official Plan, Schedule D, Natural Heritage Features and Areas (November 2010);
- Toronto and Region Conservation Authority (TRCA) natural cover, TRCA species of conservation concern, floodlines and regulation limits mapping (May 2012);
- Class Environmental Assessment Study for Dixie Road (Regional Road 4) from Mayfield Road Southerly to Queen Street, Brampton, Region of Peel, Natural Environmental Review (warmé engineering and biological services, Revised August 2011);
- Clark Boulevard Widening Municipal Class Environmental Assessment Natural Environmental Conditions Report (AECOM, September 2011); and the
- Preliminary Hydrogeological and Geotechnical Routing Assessment, East Brampton Watermains, Regional Municipality of Peel (SPL Consultants Limited, July 2012).

In addition to the ecological field investigations noted above that were previously completed as part of the Dixie Road Class EA (August 2011) and the Clark Boulevard Widening Class EA (September 2011), additional field work to supplement the information already available was conducted in August and September 2013. The findings of the ecological field investigations are presented in **Appendix E,** including photographs of representative terrestrial and aquatic features.

In conjunction with a review of the natural environment secondary sources outlined above and the findings of the ecological field investigations, the alternative watermain routes were comparatively evaluated based on both the potential effects on water resources and terrestrial features. Effects on provincially significant wetlands (PSWs), Environmentally Sensitive Areas (ESAs) and Areas of Natural and Scientific Interest (ANSIs) are not specifically mentioned because none of these features are located within proximity to any of the alternative routes. Other key considerations of the natural environment evaluation for each alternative route are outlined below and summarized in **Table 4-5** (end of this chapter).

4.3.2.1 Alternative Route 1: Kennedy Road

There are two minor watercourse crossings along Route 1. The first is located at Glidden Road between Heart Lake Road and Rutherford Road, while the second is located at Northampton Street east of North Park Drive (see **Figure 4-6**). Both crossings are TRCA-regulated, warmwater tributaries to Etobicoke Creek with the potential for fish habitat. As such, the recommended method of crossing at both of these locations is via tunnel. Route 1 is also



Watercourse crossing on Glidden Road

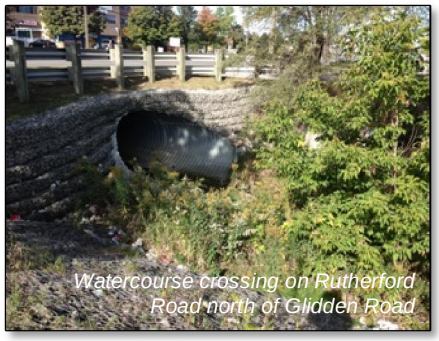
advantageous because a major crossing of the Etobicoke Creek East Branch is not required, and regarding potential effects on terrestrial features, there are no significant natural environment features or sensitive species habitat adjacent to the route. Only minimal vegetation removal (street trees) is expected for open cut construction along the route and potentially for tunnel shaft compound construction.

Based on the Stage 1 hydrogeological and geotechnical investigations completed as part of this study (see **Appendix C**), one disadvantage of Route 1 is that groundwater control (i.e., water-taking during construction) will likely be required for open cut construction south of Queen Street East to south of the CN railway tracks due to shallow sand and gravel deposits in the area. In addition, considering the above, the most significant concern with respect to Route 1 is the high groundwater table and difficult soil conditions expected along Williams Parkway in the vicinity of Highway 410. Construction in this area will require groundwater control, and the perched water found within the peat deposits in this area may cause construction/dewatering issues.

4.3.2.2 Alternative Route 2: Rutherford Road

There are four minor watercourse crossings along Route 2, while the Vodden Street option has five. Similar to Route 1, the first watercourse crossing is located at Glidden Road between Heart Lake Road and Rutherford Road (see **Figure 4-6**). The second is located on Rutherford Road just north of Glidden Road, while the third is located between Orenda Road and Queen Street East. Along Vodden Street east of Highway 410, there is a fourth watercourse crossing between the Parr Lake North and Parr Lake South stormwater management ponds, and the final crossing is located at Northampton Street east of North Park Drive. All of these Route 2 crossings are TRCA-regulated, warmwater tributaries to Etobicoke Creek with the potential for fish habitat. As such, the recommended method of crossing at all of these locations is via tunnel. Similar to Route 1, a major crossing of the Etobicoke Creek East Branch is avoided, and there are no significant natural environment features or sensitive species habitat adjacent to the route. Only minimal vegetation removal (street trees) is expected for open cut construction along the route and potentially for tunnel shaft compound construction.

Groundwater control may be required along Rutherford Road between Williams Parkway and Vodden Street due to isolated sand and gravel deposits found within the till. However, the most significant concern with respect to Route 2 is again the high groundwater table and difficult soil conditions expected along Williams Parkway in the vicinity of Highway 410. Similar difficult conditions requiring groundwater control and possibly causing construction/dewatering issues also occur along Vodden Street east of Highway 410. In addition, other saturated conditions requiring groundwater control are expected at the CN railway crossing due to sand and gravel deposits at surface to the bedrock contact.



Watercourse crossing on Rutherford Road north of Glidden Road

4.3.2.3 Alternative Route 3: Dixie Road

There are four minor watercourse crossings along Route 3. The first is located at Heart Lake Road between Orenda Road and Clark Boulevard, while the same watercourse is crossed by the Tilbury Court sub-option (see **Figure 4-6**). There are two additional watercourse crossings on Clark Boulevard and one on Dixie Road just north of Queen Street East. These four crossings are TRCA-regulated, warmwater tributaries to

Etobicoke Creek with the potential for fish habitat. As such, the recommended method of crossing at all of these locations is via tunnel. Similar to Routes 1 and 2, it is advantageous that Route 3 does not require a major crossing of the Etobicoke Creek East Branch. In addition, there are no significant natural environment features or sensitive species habitat immediately adjacent to the route; however, the Clark Boulevard corridor is in proximity to North Place Park, an important stopover for spring and fall bird migration. Only minimal vegetation removal (street trees) is expected for open cut construction along the route and potentially for tunnel shaft compound construction.

Watercourse crossing on Heart Lake Road

Unlike Routes 1 and 2, Route 3 is advantageous because it avoids the high groundwater table and difficult soil conditions associated with crossing of Highway 410 in the vicinity of Williams Parkway. However, saturated groundwater conditions requiring groundwater control are expected along Heart Lake Road south of Orenda Road in the vicinity of the CN railway line crossing. This is due to surface sand deposits logged to a depth of at least 8 metres (26 feet). In addition, sand and gravel deposits representing the southern extent of the Brampton Esker deposit have been found in well logs along Clark Boulevard in the vicinity of West Road and at Dixie Road. It is expected that groundwater control will be required at these locations.

4.3.2.4 Alternative Route 4: Bramalea Road


Watercourse crossing on Balmoral Drive

There are four TRCA-regulated watercourse crossings with the potential for fish habitat located along Route 4. As such, the recommended method of crossing at these four locations is via tunnel. Two of the watercourse crossings are located at Orenda Road and West Drive and at Balmoral Drive just east of Dixie Road at Balmoral Park. However, the other two watercourse crossings along Route 4 cross the Etobicoke Creek East Branch, a significant warmwater system. There is one major crossing on Balmoral Drive west of Bramalea Road between Addington Crescent and Appleby Drive, and another on North Park Drive between Dixie Road and MacKay Street (see **Figure 4-6**). At the two Balmoral Drive crossings, groundwater control could be required due to granular deposits within the shallow till overburden in the vicinity of the streams. Furthermore, if water-taking is required, this could affect shallow groundwater discharge to the streams. At the North Park Drive crossing of the Etobicoke Creek East Branch, well logs indicate only a thin layer of clay over sand deposits and water levels are within 1 to 2 metres (3 to 6.5 feet) of the ground surface. As such, dewatering will be required at this crossing and groundwater discharge to the stream could be affected.

Regarding potential effects on terrestrial features, aside from the Etobicoke Creek East Branch riparian communities, there are no significant natural environmental features or sensitive species habitat adjacent to the route. Only minimal vegetation removal (street trees) is expected for open cut construction along the route and potentially for tunnel shaft compound construction.

4.3.2.5 Natural Environmental Evaluation Summary

As shown in **Table 4-5** (end of this chapter), Dixie Road is the most preferred route from a natural environment impact perspective. Although this alternative requires four minor TRCA-regulated watercourse crossings, it is advantageous in that no Etobicoke Creek East Branch crossings are required. In addition, although the requirement for groundwater control is expected near the CN railway crossing and there is the potential for difficult soil and groundwater conditions in the vicinity of Clark Boulevard and Dixie Road, this route avoids the high groundwater table and difficult soil conditions associated with crossing of Highway 410 near Williams Parkway (i.e., Routes 1 and 2). Stage 2 hydrogeological investigations will determine if and how much water-taking may be required and if a Permit to Take Water (PTTW) is needed. Mitigation measures (see **Section 7**) will also be developed to ensure that any adverse effects will be minimized or eliminated, if possible. Finally, although the Clark Boulevard corridor is in proximity to Norton Place Park, no impacts to sensitive species habitat or migrating birds are expected based on the location of construction.

4.3.3 Social/Cultural Evaluation

As part of this Municipal Class EA study, an evaluation of the social/cultural aspects associated with each of the alternative watermain routes was completed. To identify key social/cultural considerations and potential constraints associated with each alternative route, AECOM staff reviewed a variety of existing background documents and information sources, including:

- GIS mapping and study area aerial photos provided by the Region of Peel and City of Brampton;
- Brampton Interactive Maps, available at http://maps.brampton.ca/maps/default.aspx;
- Average Annual Daily Traffic (AADT) volumes, 24-hour volumes, turning movement counts and signal timing provided by the Region of Peel and City of Brampton;
- East Brampton Watermains Stage 1 Archaeological Assessment (Archeoworks Inc., July 2012);
- East Brampton Watermains Built Heritage Resources and Cultural Heritage Landscapes Existing Conditions Report (Unterman McPhail Associates, Revised July 2013);
- City of Brampton Official Plan Cultural Heritage Map (August 2010);
- City of Brampton Official Plan, Schedule A, General Land Use Designations (August 2013);
- City of Brampton Official Plan, Schedule C, Transit Network (August 2010);
- City of Brampton Parks Map (June 2010);
- City of Brampton Recreation and Wellness Centres Map (April 10, 2013); and
- City of Brampton Secondary Plans, as applicable (see **Figure 2-1**).

In addition, a land use survey and other study area observations were undertaken along each of the alternative watermain routes. Multiple site visits were made throughout the course of this study and at various times of the year. **Appendix H** includes a photo log of key land use features along the alternative routes.

In conjunction with a review of the secondary sources outlined above and multiple site visits, the alternative watermain routes were comparatively evaluated from a social/cultural perspective based on the potential for

temporary disruption to residences, institutions and businesses during construction, expected traffic impacts during construction, including lane closures, and the potential for loss and/or disruption to archaeological and built heritage resources. Other key considerations of the social/cultural and legal/jurisdictional evaluation for each alternative route are outlined below and summarized in **Table 4-5** (end of this chapter).

4.3.3.1 Alternative Route 1: Kennedy Road

Route 1 is moderately preferred from a temporary disruption perspective. Route 1 includes a mix of industrial, commercial and residential areas along Glidden Road, Kennedy Road, Williams Parkway, North Park Drive and Northampton Street. Glidden Road between Highway 410 and Kennedy Road is part of the Brampton East Industrial Secondary Plan Area (SPA) 18 (se **Figure 2-1**). Mixed commercial/light industrial development occurs along this section of Glidden Road, with multiple businesses directly fronting onto the route, although some have alternate access off of Hale Road, Rutherford Road or Kennedy Road. In addition to the Beckett Sproule Pumping Station and Reservoir, noteworthy features that could be impacted along this route include the adjacent City of Brampton Parks Operations Centre and the Peel Region Paramedic Station off of Hale Road.

Kennedy Road from Glidden Road north to Williams Parkway includes a mix of residential, commercial and industrial areas, with the predominate use being residential lands which provide for a range of multiple housing types (e.g., high-rise apartments, townhouses and single-family residences). South of the CN railway corridor the area is known as the Kennedy Road South Revitalization Area (SPA 54). This area includes predominately residential and institutional uses to the west and both industrial uses and a mix of retail and service commercial uses to the east. Noteworthy features along this section of the route include a long term care facility (Leisureworld Caregiving Centre Tullamore), a food bank (Knights Table), an Ontario Early Years Centre, and Kennedy Square, an older shopping centre with access off both Kennedy Road and Clarence Street. North of the CN railway corridor to Queen Street East, this central area accommodates mixed residential, retail and office uses, with multiple properties directing fronting onto the route. North of Queen Street East, land uses along the route are predominately residential with relatively few private entrances directly fronting onto the route. Notable exceptions include Central Peel Secondary School just north of Queen Street East, Centennial Mall at Vodden Street (alternate access available off Vodden Street), automobile service stations at Vodden Street, and Kennedy Road Tabernacle just north of Vodden Street.

As construction progresses, the properties directly fronting or backing onto either Glidden Road or Kennedy Road may be temporarily subjected to dust, noise and/or vibrations, while those directly fronting onto the route may be temporarily subjected to reduced property access.

Along Williams Parkway from Kennedy Road to North Park Drive, and along North Park Drive from Williams Parkway to Northampton Street, many single family residences back onto the route. Notable exceptions include Major Oakes Park and Bramalea Ltd Community Park at Highway 410, and North Park Secondary School on North Park Drive. Although the adjacent residential property access will not be affected, temporary impacts due to dust, noise and/or vibration could occur, largely depending on which side of the roadway the watermains are constructed.


Route along the fence line through Northampton Park

From North Park Drive to the connection at the East Brampton Pumping Station and Reservoir, the route travels east through the

Russell D. Barber Public School property and along the south side of Northampton Park, just beyond the backyard fence line of the residential properties along Northampton Street[27]. Temporary disruptions to both school and park users could be expected, as well as temporary disruptions due to dust, noise and/or vibration.

From a traffic disruption perspective, Route 1 is least preferred. Although Kennedy Road is currently under capacity, open cut construction along the route will require moving lane restrictions in 100- to 200-metre (110- to 220-yard) sections. Within this work zone, at least one lane of traffic in each direction will be maintained along Kennedy Road and Williams Parkway, controlled by temporary traffic signals. However, given existing traffic volumes, over capacity conditions are expected with even one or two lane closures, causing temporary traffic back-ups. This is especially disadvantageous in that there are many intersecting roads and Kennedy Road is a primary transit corridor. In addition, Williams Parkway is already currently over capacity and through the work zone on Glidden Road and North Park Drive, only one lane of traffic can be maintained.

With respect to the significance of archaeological and built heritage resources, there is no difference between the alternative routes. Based on the Stage 1 Archaeological Assessment completed as part of this study (see **Appendix F**), no archaeological potential exists along the roadways due to the deep and extensive disturbance associated with road construction. Therefore, there is limited potential for loss and/or disruption to archaeological resources given that most work is proposed within the existing road right-of-ways and/or previously disturbed areas. However, there is high archaeological potential for most undisturbed areas along the route outside of the paved roadways. Stage 2 archaeological investigations will be required to clear any previously undisturbed areas of archaeological concern (e.g., new easements and/or tunnel shaft construction compounds). Furthermore, no designated built heritage resources or cultural heritage landscapes were identified along any of the alternative routes[28] based on the Built Heritage Resources and Cultural Heritage Landscapes Existing Conditions Report completed as part of this study (see **Appendix G**).

4.3.3.2 Alternative Route 2: Rutherford Road

Route 2 includes a mix of industrial, commercial and residential areas along Glidden Road, Rutherford Road, Williams Parkway, North Park Drive and Northampton Street. In addition, Alternative Route 2 also includes the option of a connection to North Park Drive via Vodden Street rather than Williams Parkway. Routing of the watermain(s) along Glidden Road between Highway 410 and Rutherford Road involves the same considerations as noted above for Route 1, the only difference being that relatively fewer businesses on Glidden Road would be temporarily affected due to the shorter distance traversed by the proposed watermain construction. Again however, most of these light industrial developments already have alternate access off of Hale Road or Rutherford Road.

Rutherford Road from Glidden Road north to Williams Parkway includes a mix of residential, commercial and industrial areas, with the predominate use being mixed commercial/light industrial development south of

27 Routing through Northampton Park is preferred over routing along Northampton Street due to the relatively narrow road right-of-way and residential area. Open cut construction along Northampton Street would require complete closure in 100- to 200-metre (110- to 220-yard) sections as construction proceeds (local traffic only) and existing services would be temporarily disrupted (e.g., phone, water, sewer).

*28 Other properties considered to be of some heritage value or interest were identified in the Built Heritage Resources and Cultural Heritage Landscapes Existing Conditions Report (see **Appendix G**); however, they are not listed on the City's Municipal Register of Cultural Heritage Resources, Listed Heritage Properties (April 2013) or the Municipal Register of Cultural Heritage Resources, Designated Under the Ontario Heritage Act (April 2013).*


Rutherford Road north of Queen Street East

Queen Street East and single-family residential lands north of Queen Street East. South of Queen Street East, multiple businesses directly front onto the route, although some have alternate access off of intersecting roads including Glidden Road, Selby Road, Stafford Drive, Clarence Street, Orenda Road and Clark Boulevard. Noteworthy features along this south section of the route include the City of Brampton Parks Service Centre just south of Orenda Road, and just south of Queen Street East, the City of Brampton Fire Station 201, St. John's Ambulance and Comfort Inn. As construction progresses, these properties may be temporarily subjected to reduced property access, dust, noise and/or vibrations. Further discussions would be required with Brampton Emergency Management Services to ensure that construction does not impede fire or ambulance services. In addition, temporary construction-related impacts on Rutherford Road are even more concerning north of Queen Street East, where there is on-street parking, approximately 140 private residential driveways, and Gordon Graydon Senior Public School, directly fronting onto Rutherford Road. Similarly, approximately 60 private residential driveways directly front onto Vodden Street, in addition to the City of Brampton Century Gardens Recreation Centre at Rutherford Road, and Lakeridge Plaza, a neighbourhood shopping centre at Highway 410. Additional considerations of the Vodden Street option include the Howden Medical Clinic and Living Fountain Education Centre on Howden Boulevard at Vodden Street.

Routing of the watermain(s) along Williams Parkway, North Park Drive and through Northampton Park to the connection at the East Brampton Pumping Station and Reservoir involves the same considerations as noted above for Route 1, including the fronting entrances of North Park Secondary School and Russell D. Barber Public School on North Park Drive. Although some construction-related disruptions can be mitigated by noise by-law compliance and advanced notification and scheduling, it is expected that watermain construction along either Rutherford Road or the Vodden Street sub-option will result in the most significant social disruption due to the considerations outlined above.

From a traffic disruption perspective, Route 2 is moderately preferred. Rutherford Road has relatively low to moderate traffic volumes and is currently under capacity. It is not considered a primary transit corridor, but rather a community transit route. However, open cut construction along the route will require moving lane restrictions in 100- to 200-metre (110- to 220-yard) sections, resulting in over capacity with even one or two lane closures. In addition, there are many intersecting roads and the dedicated bike lanes and on-street parking on Rutherford Road would also be temporarily impacted. The Vodden Street option is even less preferred from a traffic perspective, as it is already currently over capacity and a secondary transit corridor. In addition, Williams Parkway is already currently over capacity and through the work zone on Glidden Road and North Park Drive, only one lane of traffic can be maintained.

With respect to the significance of archaeological and built heritage resources, as mentioned for Route 1 above, there is no difference between the alternative routes. Based on the Stage 1 Archaeological Assessment completed as part of this study (see **Appendix F**), no archaeological potential exists along the roadways due to the deep and extensive disturbance associated with road construction. Therefore, there is limited potential for loss and/or disruption to archaeological resources given that most work is proposed within the existing road right-of-ways and/or previously disturbed areas. However, there is high archaeological potential for most undisturbed areas along the route outside of the paved roadways. Stage 2 archaeological investigations will be required to clear any previously undisturbed areas of archaeological concern (e.g., new easements and/or tunnel shaft construction compounds). Furthermore, no designated built heritage resources or cultural heritage landscapes were identified along any of the alternative routes

based on the Built Heritage Resources and Cultural Heritage Landscapes Existing Conditions Report completed as part of this study (see **Appendix G**).

4.3.3.3 Alternative Route 3: Dixie Road

Heart Lake Road at the Beckett Sproule Pumping Station and Reservoir

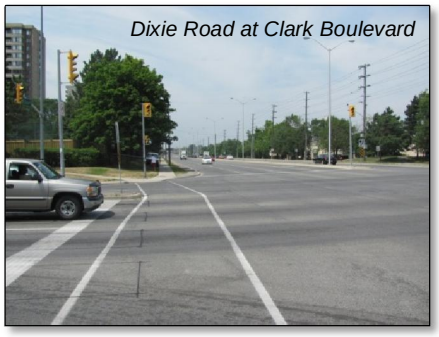
Route 3 is most preferred from a temporary disruption perspective. It includes a mix of industrial, commercial and residential areas along Heart Lake Road, Clark Boulevard and Dixie Road. In addition, Alternative Route 3 also includes the Tilbury Court option which involves crossing of Highway 410 at Orenda Road rather than Clark Boulevard. Heart Lake Road between the Beckett Sproule Pumping Station and Reservoir, located just south of Glidden Road, and the CN railway corridor is part of the Brampton East Industrial Secondary Plan Area (SPA) 18 (see **Figure 2-1**). Industrial development occurs along this section of Heart Lake Road, with only two businesses directly fronting onto the route and the notable trucking firms of Travellers Transportation Services and Wasteco. North of the CN railway corridor, Heart Lake Road falls within the Queen Street Corridor SPA 36. This plan defines the properties immediately adjacent to Heart Lake Road as mixed commercial uses, with the lands designated for future high density office development[29]. This includes the seven existing businesses with direct access to Heart Lake Road north of Orenda Road.

For the Tilbury Court option, the same two industrial businesses fronting Heart Lake Road south of Selby Road will be temporarily impacted, plus the 12 businesses located along Tilbury Court and at the Tilbury Court-Orenda Road intersection. Therefore, from a temporary disruption perspective, Heart Lake Road is preferred over the Tilbury Court option.

Clark Boulevard from Heart Lake Road to Dixie Road includes a mix of industrial, highway commercial, public open space and medium-to-high density residential lands. Residential lands include the three existing high-rise apartment buildings north of Clark Boulevard just west of Dixie Road[30], and the multiple townhouse units which back onto Clark Boulevard to the south and have alternative access of off Dixie Road. The industrial and highway commercial lands are located to the west, separated from the residential lands by the open space area associated with the Etobicoke Creek tributary. South of Clark Boulevard, industrial and highway commercial properties includes the Brampton Transit Facility located just east of West Drive, and three other properties fronting onto Clark Boulevard, although two have alternate access off of West Drive. North of Clark Boulevard, industrial uses west of the open space include the Owens-Illinois glass factory, W. Ralston (Canada) Inc. and Zoom Zoom Storage. As construction progresses, the properties directly fronting or backing onto Clark Boulevard may be temporarily subjected to dust, noise and/or vibrations, while those directly fronting onto the route may be temporarily subjected to reduced property access.

29 The "Primary Office Node" lands in the area of Highway 410 and Queen Street, south to Clark Boulevard and west to Rutherford Road, are designated for office development, containing the potentially highest density and concentration within a City-wide context (City of Brampton Queen Street Corridor SPA 36, Section 4.0).

30 A new condominium building is currently being constructed at 190 Clark Boulevard, the only residential property with direct access onto Clark Boulevard. Access for the two other existing high-rise apartment buildings along Clark Boulevard is off of Lisa Street.


Dixie Road at Clark Boulevard

Along Dixie Road from Clark Boulevard north to the East Brampton Pumping Station and Reservoir connection, primary land uses include Bramalea City Centre and high density residential development south of Queen Street East, and low to medium density residential development north of Queen Street East. Four existing single-family residences directly access onto the east side of Dixie Road along Route 3, near Crescent Hill Drive north of Howden Boulevard. Other residential developments along the route, and the Bramalea Baptist Church at Queen Street East, only back onto Dixie Road and have access via local roads or one of the relatively few intersecting roads. In addition, there are no schools directly adjacent to Route 3. Most notably however, the Bramalea City Centre, located at the southeast corner of Dixie Road and Queen Street East, is a large regional indoor shopping mall with a variety of additional detached shops and restaurants on-site. Although the main entrances are located off of Dixie Road, additional access is available off of Queen Street East, Central Park Drive and Clark Boulevard east of Dixie Road. Although most adjacent property access will not be affected, temporary impacts due to dust, noise and/or vibration could occur, largely depending on which side of the roadway the watermains are constructed.

From Dixie Road to the connection at the East Brampton Pumping Station and Reservoir, the route travels west through an existing property easement between two single-family homes just north of Mansion Street. Temporary disruptions due to dust, noise and/or vibration are only expected if open cut construction is proposed along this easement. Given the above considerations, Route 3 is the most preferred from a temporary disruption perspective.

From a traffic disruption perspective, Route 3 is moderately preferred. Although Dixie Road has relatively high traffic volumes, is currently over capacity, and is a primary transit corridor, during construction two lanes of traffic can be maintained in each direction in most locations due to the wide road right-of-way width. Although it is expected that traffic-delays will result from any moving lane restriction during open cut construction, impacts can be minimized by co-ordination with the future widening of Dixie Road (see **Section 2.5.1**). In addition, Route 3 has the fewest intersecting roads and no dedicated bike lanes or on-street parking. Traffic impacts along Clark Boulevard, including potential disruption to bus movements at the Brampton Transit Garage, can also be minimized with selection of the appropriate design concept (see **Section 6**) and by co-ordination with the future widening of Clark Boulevard. Through the work zone on Heart Lake Road, only one lane of traffic can be maintained, although the option of complete road closure may be viable due to alternate access options for the affected businesses.

With respect to the significance of archaeological and built heritage resources, as mentioned for Routes 1 and 2 above, there is no difference between the alternative routes. Based on the Stage 1 Archaeological Assessment completed as part of this study (see **Appendix F**), no archaeological potential exists along the roadways due to the deep and extensive disturbance associated with road construction. Therefore, there is limited potential for loss and/or disruption to archaeological resources given that most work is proposed within the existing road right-of-ways and/or previously disturbed areas. However, there is high archaeological potential for most undisturbed areas along the route outside of the paved roadways. Stage 2 archaeological investigations will be required to clear any previously undisturbed areas of archaeological concern (e.g., new easements and/or tunnel shaft construction compounds). Furthermore, no designated built heritage resources or cultural heritage landscapes were identified along any of the alternative routes

based on the Built Heritage Resources and Cultural Heritage Landscapes Existing Conditions Report completed as part of this study (see **Appendix G**).

4.3.3.4 Alternative Route 4: Bramalea Road


Bramalea Road at Queen Street East

Similar to Alternative Route 2, Route 4 is also least preferred from a temporary disruption perspective. Alternative Route 4 includes industrial and commercial uses along Heart Lake Road and Orenda Road, and business, industrial and residential uses along Dixie Road. The remainder of the route is mostly residential, including Balmoral Drive, Bramalea Road, North Park Drive and a relatively short section along Dixie Road just south of North Park Drive. Routing of the watermain(s) along Heart Lake Road between the Beckett Sproule Pumping Station and Reservoir and Orenda Road involves the same considerations as noted above for Route 3, the only difference being that seven fewer businesses on Heart Lake Road north of Orenda Road would be temporarily affected. However, approximately 15 industrial or service commercial properties with direct access along Orenda Road may be temporarily subjected to reduced property access, dust, noise and/or vibrations. Furthermore, Roger's Communications, a major employer/traffic generator with access along both Orenda Road and Dixie Road, is located on the east side of Dixie Road at Balmoral Drive, although alternate access for Roger's is available off of West Drive.

Residential lands which provide for a range of housing types (e.g., high-rise apartments, townhouses and single-family residences) predominate along the rest of Route 4. Notable exceptions along Balmoral Drive include:

- Balmoral Recreation Centre;
- Balmoral Park;
- Addington Park;
- St. John Fisher Elementary School;
- Balmoral Drive Senior Public School;
- St. John Fisher Neighbourhood Learning Place;
- Bramalea Secondary School; and
- Three places of worship.

In addition to Bramalea Secondary School at the northwest corner of Balmoral Drive and Bramalea Road, other non-residential uses along Bramalea Road include:

- Donald M. Gordon Chinguacousy Park (including the Chinguacousy Curling Club, Tennis Centre and Chinguacousy Optimist Community Centre/Ski Chalet);
- Judith Nyman Secondary School (entrance on Williams Parkway);
- St. Anthony Elementary School;
- MacKay Plaza;
- Ellen Mitchell Recreation Centre;
- Maitland Park North;
- Manitou Park;
- North Dixie Centre; and
- Four places of worship.


North Park Drive

As construction progresses, these properties may be temporarily subjected to reduced property access, dust, noise and/or vibrations. It is expected that watermain construction along either Balmoral Drive, Bramalea Road or North Park Drive will result in significant social disruption due to the land uses outlined above.

From a traffic disruption perspective, Alternative Route 4 is moderately preferred as are Routes 2 and 3. Watermain construction along Bramalea Road is advantageous because it has relatively low to moderate traffic volumes, is currently under capacity, and two lanes of traffic can be maintained in each direction in most locations along Bramalea Road and Dixie Road due to the wide right-of-way width. However, Route 4 has the most intersecting roads, on-street parking on Balmoral Drive and Bramalea Road is a primary transit corridor. Furthermore, only one lane of traffic in each direction can be maintained through the work zone on Orenda Road and North Park Drive, while only one lane can be maintained through the work zone on Heart Lake Road and Balmoral Drive.

With respect to the significance of archaeological and built heritage resources, as mentioned for Routes 1, 2 and 3 above, there is no difference between the alternative routes. Based on the Stage 1 Archaeological Assessment completed as part of this study (see **Appendix F**), no archaeological potential exists along the roadways due to the deep and extensive disturbance associated with road construction. Therefore, there is limited potential for loss and/or disruption to archaeological resources given that most work is proposed within the existing road right-of-ways and/or previously disturbed areas. However, there is high archaeological potential for most undisturbed areas along the route outside of the paved roadways. Stage 2 archaeological investigations will be required to clear any previously undisturbed areas of archaeological concern (e.g., new easements and/or tunnel shaft construction compounds). Furthermore, no designated built heritage resources or cultural heritage landscapes were identified along any of the alternative routes based on the Built Heritage Resources and Cultural Heritage Landscapes Existing Conditions Report completed as part of this study (see **Appendix G**).

4.3.3.5 Social/Cultural Evaluation Summary

As shown in **Table 4-5** (end of this chapter), Alternative Route 3: Dixie Road is the most preferred route from a social/cultural impact perspective. Route 4: Bramalea Road is least preferred, while Routes 1 and 2 rank second and third respectively. Although watermain construction along Route 3 will likely result in some temporary disruptions to fronting businesses, it is advantageous in that there are no adjacent schools, only a few residential entrances, relatively few intersecting roads, and due to the wide right-of-way width of Dixie Road, two lanes of traffic can be maintained in each direction in most locations. It avoids potential construction access through the Russell D. Barber Public School property, avoids Brampton emergency facilities and the many residential entrances along Rutherford Road/Vodden Street and Balmoral Drive, and avoids Roger's Communications, a major employer and traffic generator. Furthermore, typical construction-related impacts can be minimized using appropriate construction techniques and mitigation measures (see **Section 7**). For example, access to businesses and key facilities, including the Brampton Transit Garage (Clark Facility) and Bramalea City Centre, will be maintained, and noise by-law compliance and advanced notification and scheduling will help minimize impacts. Finally, archaeological clearance will be obtained via future Stage 2 archaeological investigations to clear any previously undisturbed areas (e.g., new easements

and/or tunnel shaft construction compounds), and there are no designated built heritage resources or cultural heritage landscapes along any of the routes.

4.3.4 Legal/Jurisdictional Evaluation

As part of this Municipal Class EA study, an evaluation of the legal/jurisdictional aspects associated with each of the alternative watermain routes was completed. To identify key legal/jurisdictional considerations and potential constraints associated with each alternative route, AECOM staff reviewed a variety of existing background documents and information sources, including:

- GIS mapping and study area aerial photos, including property boundaries provided by the Region of Peel and City of Brampton;
- Region of Peel Official Plan (Office Consolidation November 2008);
- Region of Peel Public Works Design, Specifications & Procedures Manual (June 2010);
- City of Brampton Official Plan (Office Consolidation August 2012);
- City of Brampton Secondary Plans, as applicable (see **Figure 2-1**);
- Toronto and Region Conservation Authority (TRCA) regulation limits mapping (May 2012); and the
- Public Transportation and Highways Improvement Act (2008).

In conjunction with a review of the secondary sources outlined above, the alternative watermain routes were comparatively evaluated from a legal/jurisdictional perspective based on their compliance with applicable planning policies and guidelines (i.e., Region of Peel and City of Brampton planning and infrastructure guidelines and TRCA regulations) and potential land requirements based on the need for permanent and/or temporary easements. Key considerations of the legal/jurisdictional evaluation for each alternative route are outlined below and summarized in **Table 4-5** (end of this chapter).

4.3.4.1 Alternative Route 1: Kennedy Road

Route 1 is moderately preferred from a planning compliance perspective. It complies with both City Official Plan (e.g., Natural Heritage) and Regional Official Plan (e.g., Greenlands) policies, while TRCA policy considerations (e.g., Interference with Wetlands[31]) include only two minor crossings of TRCA-regulated watercourses. However, for the section through Northampton Park, it does not comply with Regional guidelines to locate transmission mains along major arterial roads[32].

Regarding potential land requirements, the watermain(s) will be located predominantly within the road right-of-way. However, it is expected that both permanent and temporary easements and/or MTO encroachment permits will be required for at least five tunnelled sections for crossing of the CN railway corridor, Highway 410, Queen Street East and the two minor watercourses. In addition, an easement will be required from both

31 Toronto and Region Conservation Authority: Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses, Ontario Reg. 166/06 (May 2006).

32 Region of Peel Design, Specification & Procedures Manual, Section 2.2 states: "Transmission mains are larger diameter pipes dedicated to the transfer of water between pressure zones, from downstream pumping stations to upstream reservoirs. These mains should be located, where possible, along major arterial roads and avoid local residential streets."

the Peel District School Board and the City of Brampton for the Zone 4 (Z4) reservoir connection through Northampton Park. Therefore, Route 1 is least preferred from a land requirements perspective.

4.3.4.2 Alternative Route 2: Rutherford Road

Contrary to Route 1, Route 2 is the least preferred alternative from a planning compliance perspective. Although it complies with City Official Plan, Regional Official Plan and TRCA policies (two TRCA-regulated crossings), it does not comply with Regional guidelines to locate transmission mains along major arterial roads and avoid local residential streets[18]. For example, in addition to the Z4 reservoir connection through Northampton Park, Route 2 includes both Rutherford Road and Vodden Street which are not arterial streets.

Similar to Route 1, the watermain(s) will be located predominantly within the road right-of-way. However, this route also requires easements for the Z4 reservoir connection through Northampton Park from the Peel District School Board and the City of Brampton. In addition, it is expected that both permanent and temporary easements and/or MTO encroachment permits will be required for at least seven tunnelled sections for crossings similar to those listed above for Route 1, plus two additional watercourse crossings. Therefore, Route 2 is also least preferred from a land requirements perspective.

4.3.4.3 Alternative Route 3: Dixie Road

From a planning compliance perspective, Route 3 is only moderately preferred. Unlike Route 2, Route 3 maximizes the use of major arterial roads and avoids local residential streets[18]. While Route 3 also complies with City Official Plan, Regional Official Plan and TRCA policies (four TRCA-regulated crossings), some short sections along Heart Lake Road are non-compliant with MTO guidelines requiring a 14 metre (46 foot) setback from the Highway 410 right-of-way. However, in light of existing infrastructure within MTO's right-of-way along Heart Lake Road, MTO has indicated that the proposed alignment is acceptable (see **Section 9.2.3**). In addition, one advantage of Route 3 over all of the other alternatives is that it provides capacity for potential future high-density residential development in the Highway 410-Queen Street area[33].

Route 3 is also moderately preferred from a land requirements perspective. Like Routes 1 and 2, the watermain(s) will be located predominantly within the road right-of-way, but unlike Routes 1 and 2, easements through Northampton Park are not required. Rather, an existing easement from Dixie Road to the East Brampton reservoir can be used for the Z4 connection. However, for the Tilbury Court option only, an easement is required on private property north of Tilbury Court for extension of the watermain(s) to Clark Boulevard. In addition, it is expected that both permanent and temporary easements and/or MTO encroachment permits will be required for at least seven tunnelled sections for crossing of the CN railway corridor, Highway 410, Queen Street East and the Spring Creek tributary crossing north of Queen Street East, three other minor watercourse crossings and the East Brampton reservoir connection.

4.3.4.4 Alternative Route 4: Bramalea Road

From both a planning compliance and land requirements perspective, Route 4, similar to Route 3, is also moderately preferred. Like Route 3, Route 4 generally complies with Regional guidelines to locate

33 Sections 5.0 and 5.7.2.1 of the City of Brampton Queen Street Corridor Secondary Plan (SPA 36, April 2013) note that approximately 21 hectares (52 acres) of existing industrial land on the west side of West Drive, north of Clark Boulevard has long-term potential for residential apartments subject to the glass facility ceasing or relocating their operations.

transmission mains along major arterial roads and avoid local residential streets[18]. Route 4 also complies with City Official Plan, Regional Official Plan and TRCA policies (four TRCA-regulated crossings), and MTO permissions have been received for locating some short sections of watermain within MTO's 14 metre (46 foot) setback limit along Heart Lake Road.

Like Route 3, the watermain(s) will be located predominantly within the road right-of-way, and easements through Northampton Park are not required. However, it is expected that both permanent and temporary easements and/or MTO encroachment permits will be required for at least eight tunnelled sections for crossing of the CN railway corridor, Highway 410, the existing East Brampton watermain, Queen Street East, four minor watercourses and the East Brampton reservoir connection.

4.3.4.5 Legal/Jurisdictional Evaluation Summary

As shown in **Table 4-5** (end of this chapter), there is no clear preference between Routes 3 and 4 from either a planning compliance or land requirements perspective – both are ranked as the best option when compared to Route 1 (second-best option) and Route 2 (least preferred). Although the watermain(s) will be located predominantly within the road right-of-way, Routes 3 and 4 are particularly advantageous because they do not require easements through Northampton Park for the Z4 reservoir connection. Temporary and/or permanent easements will be required for most of the tunnel shaft construction compounds, and a new easement on private property is required for the Route 3a: Dixie Road-Tilbury Court option. This disadvantage is offset however, by the ability to better service future potential high-density residential development in the Highway 410-Queen Street area[19].

4.3.5 Technical and Economic/Financial Evaluation

As part of the engineering preliminary design component of this Municipal Class EA study, an evaluation of the technical requirements for each of the alternative watermain routes was completed. To identify the key considerations and potential constraints associated with each alternative route, AECOM staff reviewed a variety of existing background documents and information sources, including:

- CAD/GIS mapping and study area orthophotography provided by the Region of Peel and City of Brampton;
- City of Brampton Official Plan, Schedule B, City Road Hierarchy (June 2013);
- City of Brampton Official Plan, Schedule B1, City Road Right-of-Way Widths (June 2013);
- City of Brampton Official Plan, Schedule F, Infrastructure, Utilities and Resources (August 2010);
- City of Brampton 2013-2022 Roads Capital Program (December 2012);
- Clark Boulevard Widening Preliminary Design Drawings (AECOM, September 2011);
- Dixie Road (Regional Road 4) from Mayfield Road Southerly to Queen Street, Brampton, Region of Peel, Preliminary Design Drawings (AECOM, Revised August 2011);
- East Brampton Watermains Hydraulic Analysis (AECOM, November 2012);
- East Brampton Watermains Transient Analysis (AECOM, October 2013);
- Feasibility Assessment of Zone 5 Sub-Transmission Main and East Brampton (Zone 4) Transmission Main Twinning (AECOM, June 2011);

- MTO drawings and database on existing structures crossing Highway 410 in Brampton;
- Preliminary Hydrogeological and Geotechnical Routing Assessment, East Brampton Watermains, Regional Municipality of Peel (SPL Consultants Limited, July 2012);
- Region of Peel Public Works Design, Specification and Procedures Manual for Linear Infrastructure (June 2010);
- Toronto and Region Conservation Authority (TRCA) floodlines and regulation limits mapping (May 2012);
- Transport Canada Standards Respecting Pipeline Crossings Under Railways (June 2000);
- Various as-constructed drawings of water and sewer works within the study area provided by both the Region of Peel and City of Brampton; and
- Various reference drawings received from utility companies (i.e., Hydro One Brampton, Enbridge Gas, Bell Canada, Rogers Communications and Telus Communications).

Following review of the secondary sources listed above and multiple site visits, the alternative watermain routes were comparatively evaluated from a technical perspective based on their relative ease and efficiency of construction as well as operations and maintenance. This includes consideration of the proposed construction methods (e.g., open cut verses tunnelling as further described in **Section 5.1**) and the potential for encountering major problems during construction (e.g., poor soil conditions, significant infrastructure crossings/conflicts, etc.). Other technical factors taken into consideration include pipe length and the number of directional changes required along each alternative route, road right-of-way widths, hydraulic and transient issues (e.g., pressure losses), interconnection opportunities with the existing distribution system, conflicts with existing utilities or recently resurfaced roads, co-ordination opportunities with other planned infrastructure improvements, and truck traffic management issues during construction.

In combination with the technical evaluation, a comparison of estimated construction and operations costs was also completed because these costs are most directly related to technical requirements (e.g., route length, construction methods, etc.). The key considerations of both the technical and cost evaluation for each alternative route are discussed below and summarized in **Table 4-5** (end of this chapter).

4.3.5.1 Alternative Route 1: Kennedy Road

Open cut construction is recommended for approximately 85 per cent of this route, while the remaining 15 per cent would be constructed by trenchless methods. Only five tunnelled sections are required: for crossing of the grade-separated CN railway line[34]; Queen Street East; Highway 410 at-grade[35]; and the two watercourses located on Glidden Road and through Northampton Park (within park watercourse is piped), both of which would require construction compounds within the TRCA-regulated areas. In addition to the

34 Although open cut construction is possible under the CN railway overpass, tunnelling is recommended due to elevation changes at the surface (i.e., a drain chamber would otherwise be required in the middle of Kennedy Road under the CNR bridge structure).

35 For all Highway 410 crossings, the MTO requires that tunnel depths be a minimum of 5 metres (16 feet) from pipe obvert to road centreline. In addition, a steel liner of minimum 10-mm thickness is required from right-of-way to right-of-way. Surface monitoring at Highway 410 will also be required during tunnel construction to ensure settlement does not occur. The MTO has also indicated that construction within the Highway 410 interchanges should be avoided due to the restrictions MTO would impose on time and duration of the movement of construction traffic (i.e., to reduce the potential for construction vehicles to cause traffic back-ups on the highway on- and off-ramps).

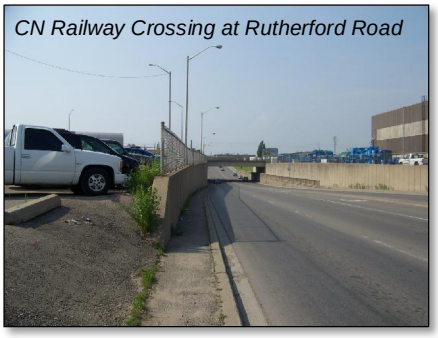
relatively few tunnelled sections required, other key advantages of Alternative Route 1 include relatively wide road right-of-way widths (30 to 36 metre widths or 98 to 118 foot widths) along Kennedy Road and Williams Parkway, no required crossings of any existing large diameter watermains or trunk sewers, and the potential to coordinate construction with the future Williams Parkway widening and West Brampton Watermain installation along approximately 20 per cent of the route (see **Sections 2.5.3 and 2.5.4**). In addition, Route 1 is seemingly advantageous when considering that the Z5 sub-transmission main could be connected to the future West Brampton Watermain at Williams Parkway and no Highway 410 crossing would be required.

From an engineering perspective, there are two significant disadvantages for the Z4 transmission main with this option. The first is that the watermain would be approximately 1.3 kilometres (0.8 miles) longer than required due to the need to go west to Kennedy Road and then backtrack east to the reservoir site. The second and most significant disadvantage of this route is that tunnelling of the Z4 transmission main more than 20 metres (65 feet) below ground would be required so that the watermain is installed below the top water level of the East Brampton Reservoir (facilitates better operation). In addition to cost and engineering complexity, long tunnel runs this deep are not desirable from a maintenance perspective. Furthermore, Route 1 is relatively long (i.e., approximately 8.7 kilometres or 5.4 miles) with five directional changes required. It also requires a difficult Highway 410 crossing due to variable surface topography and poor soil/groundwater conditions, and is least preferred for the connection through Northampton Park to the East Brampton Pumping Station and Reservoir (see **Section 5.3.3.2**). In addition, Williams Parkway is not a designated truck route and Kennedy Road is an emergency detour route for Highway 410.

From a cost perspective, Route 1 is also disadvantageous due to the relatively high capital costs for construction and long route length. In addition, the requirement for deep tunneling of the Z4 transmission main (described above) adds to both the construction costs and operating/maintenance costs. Furthermore, high contingency costs may be expected due to the poor soils/groundwater issues in the vicinity of Williams Parkway.

4.3.5.2 Alternative Route 2: Rutherford Road

Similar to Alternative Route 1, open cut construction is recommended for approximately 85 per cent of Alternative Route 2, while the remaining 15 per cent would constructed via trenchless methods. Route 2 measures approximately 7.6 kilometres (4.7 miles) and is almost one kilometre shorter than Route 1. This shorter route length results in lower construction costs, impacts and ease of operations. Still, five major directional changes are required, as well as the same five tunnel crossings listed above for Route 1, plus two additional tunnels for the watercourse crossings on Rutherford Road: one south of Clarence Street and one north of Orenda Road. On the other hand, Alternative Route 2 does not require any crossings of existing large diameter watermains or trunk sewers, and does not cross the at-grade rail spur line on Glidden Road between Kennedy Road and Rutherford Road. It also includes the potential to coordinate construction with the future Williams Parkway widening and West Brampton Watermain installation, albeit only along about 15 per cent of the route (see **Sections 2.5.3** and **2.5.4**). Alternative Route 2 is also seemingly advantageous when considering that the Z5 sub-transmission main could be connected to the future West Brampton Watermain at Williams Parkway and no Highway 410 crossing would be required.


CN Railway Crossing at Rutherford Road

Route 2 is not preferred overall due to a number of technical disadvantages. For example, the right-of-way width along Rutherford Road (i.e., the majority of the route) is comparatively narrow at 26 to 30 metres (85 to 98 feet) south of Queen Street East, and only 23 to 26 metres (75 to 85 feet) north of Queen Street East. Given the relatively narrow road right-of-way and built-up residential nature of the route north of Queen Street East, there are limited clear zones (i.e., areas free of existing utilities) which will require relocation of all existing utilities prior to watermain installation (e.g., watermains, sanitary sewers, storm sewers, etc.). To undertake this scale of construction would slow the rate of watermain installation and substantially increase the overall disturbed area. In addition, the same tunnelling issues as described above for Route 1 also apply to Route 2. Route 2 also requires a difficult Highway 410 crossing at Williams Parkway due to variable surface topography and poor soil/groundwater conditions, and is least preferred for the connection through Northampton Park to the East Brampton Pumping Station and Reservoir (see **Section 5.3.3.2**). Regarding the Vodden Street option, crossing of Highway 410[36] would be preferred over the difficult tunnel crossing at Williams Parkway, but the right-of-way width along Vodden Street is only 23 to 26 metres (75 to 85 feet) which would increase the construction complexity and the area of disturbance due to the relocation of existing utilities. Finally, Williams Parkway is not a designated truck route, and based on the residential setting along most of the route, construction truck traffic would be relatively difficult to manage.

From a cost perspective, Route 2 is also preferred over Route 1, but is not preferred overall. Relatively moderate capital costs for construction are expected due to the shorter route length, and like Route 1, there is potential for some construction cost savings by coordination with the planned projects along Williams Parkway. However, as described above, the requirement for deep tunneling of the Z4 transmission main adds to both the construction and operating costs, and high contingency costs are still expected due to the poor soils/groundwater issues in the vicinity of Williams Parkway and Highway 410.

4.3.5.3 Alternative Route 3: Dixie Road

Open cut construction is recommended for approximately 70 per cent of this route, while the remaining 30 per cent would be installed via trenchless methods. Nine tunnelled sections are necessary for the following crossings:

- CN railway line at-grade[36];
- Watercourse on Heart Lake Road (or Tilbury Court);
- Highway 410[37];

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36 Although not owned by CNR, there is also an at-grade spur line crossing on Clark Boulevard west of West Drive. However, according to discussions with the property owner, Owens-Illinois, the spur line is not in use any more. As such, crossing can be accomplished either via open cut or in combination with the tunnel for the adjacent watercourse crossing.

*37 During initial meeting discussions in April 2012, MTO indicated their preference for tunnel crossing of Highway 410 at Orenda Road, where there are no ramps and the crossing is grade-separated (see **Appendix M-3**). However, during subsequent discussions in January 2013, MTO indicated acceptance of the proposed Highway 410 crossing at Clark Boulevard, and noted that co-ordination will be required due to MTO's planned widening of Highway 410 and future improvements in the Clark Boulevard area (see **Section 2.5.5** and **Appendix M-3**)*

- Two watercourses along Clark Boulevard;
- Existing East Brampton feedermain at West Drive;
- Existing Airport Road feedermain at the intersection of Queen Street East;
- Tributary of Etobicoke Creek just north of Queen Street East; and for the
- Connection to the East Brampton Reservoir.

However, only seven tunnel sections are actually required given the opportunity to extend the tunnel on Dixie Road under the Etobicoke Creek tributary further south to accommodate tunnelling under Queen Street East and the existing large diameter Airport Road feedermain that runs along Queen Street East.

Although Route 3 requires potentially more tunnelled sections than the other route alternatives (additional cost), the total length of Route 3, at about six kilometres (3.7 miles), is more than 2.5 kilometres shorter than Route 1 and 1.5 kilometres shorter than Route 2 and is the shortest, most direct route overall. Only three major directional changes are required (five for the Tilbury Court option). In addition, the relatively long, straight south-to-north runs along both Heart Lake Road and Dixie Road optimize hydraulic performance and will contribute to an increased pace of construction. Furthermore, Dixie Road is a major arterial roadway with the widest overall right-of-way width (i.e., 45 metres or 148 feet). Open cut construction can be accommodated along the west side of Dixie Road (and adjacent traffic lanes) where there are generally large infrastructure clear zones. Construction can be co-ordinated with the Region's planned widening of Dixie Road north of Queen Street East (see **Section 2.5.1**). This available space along Dixie Road, combined with the opportunity to co-ordinate with the road widening, is considered a significant advantage of this route. Only minimal utility relocations and/or temporary service interruptions will be required (i.e., at intersection crossings or where the watermain extends outside the road right-of-way to a tunnel shaft).

Other advantages of Alternative Route 3 include the use of Dixie Road as the preferred tie-in location for the East Brampton Pumping Station and Reservoir connection (see **Section 5.3.3.2**). There is also an opportunity to coordinate construction with the City's planned widening of Clark Boulevard (see **Section 2.5.2**). Furthermore, Route 3 does not require long stretches of deep tunnel as do Routes 1 and 2, and hydraulic analyses show that the Z5 sub-transmission main is more utilized east of Highway 410 (i.e., can provide an additional 10 to 20 ML/day). Lastly, construction truck traffic will be relatively easy to manage as Clark Boulevard and Dixie Road are designated for truck traffic with no truck timing restrictions and trucks are already common on Heart Lake Road.

The main disadvantage of Alternative Route 3 is the requirement to construct the watermain(s) in close proximity to the Region's existing large diameter feedermains along Heart Lake Road and Dixie Road. Typically, crossing of or paralleling existing feedermains is undesirable from a security of supply perspective and both complicates and slows construction progress. However, an adequate separate distance (i.e., at least two pipe diameters) can be achieved by routing of the watermains along the west side of Heart Lake Road, and an adequate vertical separation can be achieved along Dixie Road. At any pinch points where the new watermain(s) would come within approximately five metres (16 feet) of the existing feedermains, additional mitigation measures will need to be put in place to protect the existing feedermain.

From a cost perspective, Route 3 is preferred overall. Relatively low capital costs for construction are expected due to the shortest, most direct route length. In addition, significant potential cost savings could be realized by co-ordination with both the City's Clark Boulevard widening and the Region's Dixie Road widening. Furthermore, even greater cost savings could be realized by constructing both watermains in one

common trench or tunnel. Lastly, relative low operating costs are expected due to a lack of transient concerns and maintenance issues.

4.3.5.4 Alternative Route 4: Bramalea Road

Open cut construction is recommended for approximately 85 per cent of Alternative Route 4, while the remaining 15 per cent would be installed via trenchless methods. Advantages of Alternative Route 4 include Dixie Road as the preferred tie-in location for the East Brampton Pumping Station and Reservoir connection (see **Section 5.3.3.2**), and there is also a potential opportunity to coordinate construction with the City's planned widening of Bramalea Road[38]. Furthermore, there are no deep tunnelling issues as with Routes 1 and 2, and hydraulic analyses show that the Z5 sub-transmission main is more utilized east of Highway 410.

However, at a total route length of approximately 10.3 kilometres (6.4 miles), the length of Route 4 is more than four kilometres longer than Route 3 (the shortest route) and more than 1.5 kilometres longer than Route 1 (the next longest route). This excessive route length is disadvantageous from both a construction cost and impacts and operations perspective. Furthermore, due to the disjointed nature of the route, numerous directional changes are required (i.e., watermain bends), which reduces hydraulic performance, increases the requirements for special pipe fittings, and further slows the pace of construction. As proposed, eight tunnelled sections are necessary for the following crossings:

- CN railway line at-grade (same as Route 3);
- Grade-separated Highway 410 crossing at Orenda Road;
- Existing East Brampton feedermain at West Drive;
- Two watercourses along Balmoral Drive, one of which is part of the Etobicoke Creek East Branch;
- Existing Airport Road feedermain at the intersection of Queen Street East;
- Etobicoke Creek East Branch on North Park Drive; and the
- Connection to the East Brampton Reservoir.

In addition to being the longest route with the most directional changes and the most tunnelled sections, Route 4 is also disadvantageous because poor groundwater conditions are expected at the Etobicoke Creek East Branch on North Park Drive, which makes for a difficult crossing. Compounding this issue is the existing large diameter trunk sewer that runs along the Etobicoke Creek East Branch valley through the entire study area. As such, crossing of the trunk sewer by tunnel would be required not only at North Park Drive but also at Balmoral Drive. In addition, crossing of the existing East Brampton feedermain as mentioned above is considered a disadvantage from a security of supply perspective. Crossing of the existing rail spur line on Orenda Road would also be required, as would approvals from the MTO for construction within their setback limits along Heart Lake Route. Lastly, Balmoral Drive and North Park Drive are not designated truck routes, and the City of Brampton has truck time of use restrictions on Bramalea Road. Given these trucking restrictions and the mostly residential route setting, construction truck traffic would be relatively difficult to manage.

From a cost perspective, Route 4 is moderately preferred. Relatively high capital costs are expected because it is the longest route with the most directional changes and tunnelled sections. However, relatively

*38 As noted in **Section 2.5.6**, the City of Brampton has yet to initiate the Class EA study for the widening of Bramalea Road.*

low operating costs are expected due to a lack of transient concerns and maintenance issues, and cost savings could potentially be realized by co-ordination with the City's proposed widening of Bramalea Road. Additional cost savings could be realized by constructing both watermains in one common trench or tunnel, albeit any savings would likely be offset by the higher construction costs associated with the longer tunnel length.

4.3.5.5 Technical and Economic/Financial Evaluation Summary

As shown in **Table 4-5** (end of this chapter), there is a clear preference for Alternative Route 3: Dixie Road from both a technical/engineering and cost perspective. From both a technical and cost perspective, Route 1 (Kennedy Road) is least preferred, while Route 4 (Bramalea Road) and Route 2 (Rutherford Road) respectively rank second and third from a technical perspective and are both ranked second from a cost perspective. Although Alternative Routes 1 and 2 are seemingly advantageous in that no Highway 410 crossing would be required for the Z5 sub-transmission main, the technical disadvantages described above for each of these routes preclude them as the preferred route for the Z4 transmission main. In addition, when considering the opportunity to co-ordinate construction of both watermains in one trench or tunnel, the reduced construction and restoration costs in combination with confining construction impacts to one corridor, outweigh the advantage of not having to cross Highway 410 with one of the watermains.

Route 3 is the shortest, most direct route which is advantageous from a construction cost and impacts, operations and maintenance perspective. Furthermore, Dixie Road is a major arterial roadway with the widest overall right-of-way width which can accommodate open cut construction along the west side where there are generally large infrastructure clear zones. This available space, combined with the opportunity to co-ordinate with the Region's planned widening of Dixie Road, is a significant advantage. An adequate separation distance between the Region's existing large diameter feedermains along Heart Lake Road and Dixie Road can be achieved in order to maintain security of supply and reduce the risk of construction mishaps which could undermine the existing feedermain. Furthermore, Route 3 avoids the need for long, deep tunnel sections, and hydraulic analyses show that the Z5 sub-transmission main is more utilized east of Highway 410. Routes 3 and 4 are particularly advantageous because they do not require easements through Northampton Park for the Z4 reservoir connection.

4.4 Evaluation Summary and Description of the Preferred Watermain Route

As shown in **Table 4-5** (end of this chapter), there is a clear preference for Alternative Route 3: Dixie Road for routing of both the new 1.5-metre (5-foot) diameter Zone 4 (Z4) East Brampton transmission main and the 0.9- to 1.2-metre (3- to 4-foot) diameter Zone 5 (Z5) East Brampton sub-transmission main. Route 3 includes the following roadways:

- Heart Lake Road, from the Beckett Sproule Pumping Station and Reservoir located just south of Glidden Road to just south of Clark Boulevard;
- Clark Boulevard, from Highway 410 to Dixie Road; and
- Dixie Road, from Clark Boulevard to just south of North Park Drive.

Extending north from the Beckett Sproule Pumping Station and Reservoir to the East Brampton Pumping Station and Reservoir, the preferred East Brampton Watermains route measures approximately six kilometres (3.7 miles) in length and will be constructed predominantly within the existing road right-of-ways

listed above. Route 3 is the shortest, most direct route which is advantageous from a construction cost, impacts, operations and hydraulic performance perspective. Potential cost savings could also be realized by co-ordination with both the City's Clark Boulevard widening and the Region's Dixie Road widening. Furthermore, even greater cost savings could be realized by constructing both watermains in one common trench or tunnel, due to reduced construction and restoration costs, combined with the confining of construction impacts to one corridor.

Route 3 is also advantageous in that there are no adjacent schools, only a few residential entrances, relatively few intersecting roads, and a wide right-of-way width along Dixie Road which allows two lanes of traffic to be maintained in each direction in most locations. It avoids potential construction access through the Russell D. Barber Public School property, avoids Brampton emergency service facilities, and largely avoids the reservoir elevation/hydraulic issues associated with routing of the Z4 transmission main on the west side of Highway 410[39]. Furthermore, Route 3 does not require a major crossing of the Etobicoke Creek East Branch, and it avoids the high groundwater table and difficult soil conditions associated with crossing of Highway 410 in the vicinity of Williams Parkway. Stage 2 hydrogeological investigations will determine if and how much water-taking may be required in other areas and if a Permit to Take Water (PTTW) is needed[40]. Mitigation measures (see **Section 7**) will also be further developed and confirmed during detailed design to ensure that any adverse effects will be minimized or eliminated, if possible.

Although watermain construction along Route 3 will likely result in some temporary disruptions to fronting businesses, access to businesses and key facilities will be maintained, including the Brampton Transit Garage (Clark Facility) and Bramalea City Centre. Noise by-law compliance and advanced notification and scheduling will also help minimize impacts. Temporary and/or permanent easements and MTO encroachment permits will also be negotiated during detailed design for most of the tunnel shaft construction compounds (see **Appendix I** and **Section 6.2**). Finally, archaeological clearance will be obtained via future Stage 2 archaeological investigations to clear any previously undisturbed areas (e.g., new easements and/or tunnel shaft construction compounds), and there are no designated built heritage resources or cultural heritage landscapes along the route.

Figure 4-7 presents the preferred watermain route for both East Brampton Watermains as it was presented at Public Open House #1. Following the Public Open House and consultation with review agencies (see **Section 9.2**), *Alternative Route 3: Dixie Road* was confirmed as the preferred route for further review and evaluation of alternative design concepts as part of Phase 3 of the Class EA process. A further discussion of the alternative design concepts is provided in **Section 5**, including construction methods, watermain location within the road right-of-way and potential interconnections with the existing distribution system.

*39 Due to existing surface elevations, tunnelling of the Z4 transmission main from just north of Williams Parkway to the East Brampton Reservoir connection is required so that the watermain is installed below the top water level of the East Brampton Reservoir (facilitates better operation). See **Section 5.2.3**.*

40 It is expected that the Region of Peel will apply for a Permit to Take Water (PTTW) as part of detailed design, regardless of the findings of the Stage 2 hydrogeological investigations. Having a PTTW will reduce the Region's risk of schedule delays if unexpected groundwater conditions are encountered during construction.

Legend

- Study Area Boundary
- Arterial/Collector Road
- Watercourse
- Existing East Brampton Watermain
- Other Existing Large Diameter Infrastructure
- TRCA Regulation Limit

Preliminary Preferred Route for 1.5 m Zone 4 Transmission Main and 0.9 m to1.2 m Zone 5 Sub-Transmission Main

- Proposed Z4 Tunnel Construction
- Proposed Z4 Open Cut Construction
- Proposed Z5 Tunnel Construction
- Proposed Z5 Open Cut Construction

Basemapping: Region of Peel/City of Brampton, 2012
Orthophotography: Region of Peel, 2009/2012

N
W E
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0 250 500 1,000 Meters

UTM Zone 17N, NAD 83

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East Brampton Watermains Municipal Class Environmental Assessment

Preliminary Preferred Watermain Route

AECOM

Region of Peel
Working for you

Figure 4-7

Map Document: Fig 6-1 PreferredRoutev5.mxd

Table 4-5 Evaluation Summary of Alternative Watermain Routes

Category	Criteria	Indicator	Alternative Route 1: Kennedy Road	Alternative Route 2: Rutherford Road	Alternative Route 3: Dixie Road	Alternative Route 4: Bramalea Road
Natural Environment	Potential effects on water resources	Disruption to fish including spawning periods and physical changes to aquatic habitat (e.g., number and type of watercourse crossings)	• Two minor watercourse crossings – both unnamed, warmwater tributaries to Etobicoke Creek • No Etobicoke Creek East Branch crossings	• Four minor watercourse crossings (Vodden Street option has five) – all unnamed, warmwater tributaries to Etobicoke Creek • No Etobicoke Creek East Branch crossings	• Four minor watercourse crossings – all unnamed, warmwater tributaries to Etobicoke Creek • No Etobicoke Creek East Branch crossings	• Two major watercourse crossings – both the warmwater Etobicoke Creek East Branch • Two minor watercourse crossings – both unnamed, warmwater tributaries to Etobicoke Creek
		Groundwater management complexity (e.g., potential short-term water taking, including the need for Ministry of the Environment (MOE) Permit to Take Water)	• Groundwater control possibly required from south of Queen Street East to south of CNR • Difficult soil and groundwater conditions and high groundwater table in vicinity of Highway 410 – groundwater control required	• Saturated groundwater conditions expected at CNR crossing – groundwater control required • Difficult soil and groundwater conditions and high groundwater table in vicinity of Highway 410 – groundwater control required • Groundwater control possibly required between Williams Parkway and Vodden Street	• Saturated groundwater conditions expected at CNR crossing – groundwater control required • Potential for difficult soil and groundwater conditions along Clark Boulevard	• Saturated groundwater conditions expected at CNR crossing – groundwater control required • Groundwater control possibly required at Birchbank Road, Balmoral Drive and North Park Drive • Possible groundwater flow contributions to Etobicoke Creek East Branch
	Potential effects on terrestrial features	Loss of vegetation (e.g., number and significance of trees removed and/or disturbed)	• Minimal vegetation removal required (street trees)	• Minimal vegetation removal required (street trees)	• Minimal vegetation removal required (street trees)	• Minimal vegetation removal required (street trees)
		Loss of or disruption to sensitive species habitat (e.g., proximity to designated Species at Risk habitat or locally/regionally rare amphibians, birds or wildlife)	• No sensitive species habitat	• No sensitive species habitat	• No sensitive species habitat along Clark Boulevard corridor; however, proximity to Norton Place Park, an important stopover for spring and fall bird migration	• No sensitive species habitat
NATURAL ENVIRONMENT RANKING			**2**	**3**	**1**	**4**
Social-Cultural Environment	Potential for temporary disruption to residences, institutions and businesses during construction	Increase in dust, noise and/or vibrations and reduced property access	• Three adjacent schools • Potential construction access through school property for reservoir connection • Mix of residential, commercial and industrial areas (~ 65/20/15% split) – relatively few private entrances • Temporary disruptions to private entrances as construction passes	• Three adjacent schools to Rutherford route – four adjacent schools to Vodden route • Potential construction access through school property for reservoir connection • Adjacent to Brampton Fire Station 201 • Mix of residential, commercial and industrial areas (~ 60/20/20% split) – many residential entrances along Rutherford Road and Vodden Street, including on-street parking north of Queen Street East • Temporary disruptions to private entrances as construction passes	• No adjacent schools • Mix of residential, commercial and industrial areas (~ 40/30/30% split) – few residential entrances • Adjacent Bramalea City Centre – major retail/commercial centre/large traffic generator • Temporary disruptions to private entrances as construction passes	• Five adjacent schools • Mostly residential with some commercial and industrial areas (~ 70/5/25% split) – private entrances along Balmoral Drive • Adjacent Rogers Communications – major employer/large traffic generator • Temporary disruptions to private entrances as construction passes
	Traffic impacts during construction, including expected lane closures	Expected number of lane closures during construction and resultant reduction in levels of service, including number of intersecting roads	• High traffic volumes • Kennedy Road currently under capacity; Williams Parkway currently over capacity – over capacity expected with one or two lane closures • Many intersecting roads (25) • Primary transit corridor • Possible to maintain two lanes of traffic in each direction in most locations – excludes Glidden Road and North Park Drive	• Low to moderate traffic volumes • Rutherford Road currently under capacity; Vodden Street currently over capacity – over capacity expected with one or two lane closures • Many intersecting roads (23) • Community transit route on Rutherford Road • Vodden Street is a secondary transit corridor • Dedicated bike lanes and on-street parking, e.g., Rutherford Road North • Possible to maintain one lane of traffic in each direction in most locations – two lanes not possible	• Moderate to high traffic volumes • Dixie Road currently over capacity – over capacity expected with one or two lane closures • Fewest intersecting roads (15) • Primary transit corridor (Dixie Road) • Passes by Brampton Transit Garage – potential disruption to bus movements • Possible to maintain two lanes of traffic in each direction in most locations – excludes Heart Lake Road and Clark Boulevard	• Low to moderate traffic volumes • Bramalea Road currently under capacity – under capacity expected with one lane closure – over capacity expected with two lane closures • Most intersecting roads (29) • Primary transit corridor • On-street parking on Balmoral Drive • Possible to maintain two lanes of traffic in each direction in most locations – excludes Heart Lake Road
	Potential for loss and/or disruption to archaeological and built heritage resources	Significance of cultural/heritage resource and ability to mitigate	• No archaeological potential along existing roads. High archaeological potential for most areas outside the paved roadway. Stage 2 archaeological investigations required for new easements and/or tunnel shaft construction compounds proposed on undisturbed areas. • No designated built heritage resources or cultural heritage landscapes.	• No archaeological potential along existing roads. High archaeological potential for most areas outside the paved roadway. Stage 2 archaeological investigations required for new easements and/or tunnel shaft construction compounds proposed on undisturbed areas. • No designated built heritage resources or cultural heritage landscapes.	• No archaeological potential along existing roads. High archaeological potential for most areas outside the paved roadway. Stage 2 archaeological investigations required for new easements and/or tunnel shaft construction compounds proposed on undisturbed areas. • No designated built heritage resources or cultural heritage landscapes.	• No archaeological potential along existing roads. High archaeological potential for most areas outside the paved roadway. Stage 2 archaeological investigations required for new easements and/or tunnel shaft construction compounds proposed on undisturbed areas. • No designated built heritage resources or cultural heritage landscapes.
SOCIAL-CULTURAL ENVIRONMENT RANKING			**2**	**3**	**1**	**4**

MOST PREFERRED	MODERATELY PREFERRED	LEAST PREFERRED	NO DIFFERENCE

Category	Criteria	Indicator	Alternative Route 1: Kennedy Road	Alternative Route 2: Rutherford Road	Alternative Route 3: Dixie Road	Alternative Route 4: Bramalea Road
Legal-Jurisdictional	Compliance with applicable planning policies	Potential conflicts with Region of Peel and City of Brampton planning and infrastructure policies and Toronto and Region Conservation Authority (TRCA) regulations	• Compliant/no issues. • Two crossings of TRCA regulated areas	• Does not comply with Regional Public Works policy to locate transmission mains along major arterial roads where possible (i.e., Rutherford Road/Vodden Street) • Two crossings of TRCA regulated areas	• Slight non-compliance with MTO policy requiring 14 m setback from Highway 410 right-of-way – MTO permissions received • Three crossings of TRCA regulated areas • Provides capacity for potential high density residential development in the Clark Boulevard area	• Slight non-compliance with MTO policy requiring 14 m setback from Highway 410 right-of-way – MTO permissions received • Four crossings of TRCA regulated areas
	Potential land requirements	Number of temporary and/or permanent easements	• Five tunnel sections – permanent/temporary easements required • Easement required from school board and City of Brampton for reservoir connection through Northampton Park	• Seven tunnel sections – permanent/temporary easements required • Easement required from school board and City of Brampton for reservoir connection through Northampton Park	• Seven tunnel sections – permanent/temporary easements required • Uses existing easement for reservoir connection from Dixie Road • Easement required on private property north of Tilbury Court (Tilbury Court option only)	• Eight tunnel sections – permanent/temporary easements required • Uses existing easement for reservoir connection from Dixie Road
LEGAL/JURISDICTIONAL RANKING			**2**	**2**	**1**	**1**
Technical	Constructability	Length of pipe, number of bends, right-of-way (ROW) width, potential for encountering problems (e.g., rock excavation, trench support and soils condition, significant major infrastructure crossings/ease of approvals)	• Relatively long route – approximately 8.7 km • Moderate number of directional changes required (5) • Uses both City of Brampton and Region of Peel roads (i.e., ~ 4 km on Kennedy Road, 30-36 m ROW width) • Uses only arterial/collector roads – no local roads • Difficult Highway 410 crossing for transmission main at Williams Parkway – variable surface topography/poor soil and groundwater conditions • No Highway 410 crossing required for sub-transmission main • Difficult CNR crossing – grade separated • Spur line crossing at-grade between Kennedy Road and Rutherford Road • No crossings of existing large diameter watermains/trunk sewers	• Moderate route length – approximately 7.6 km • Moderate number of directional changes required (5) • Uses City of Brampton roads (23-36 m ROW width) • Uses only arterial/collector roads – no local roads • Difficult Highway 410 crossing for transmission main at Williams Parkway – variable surface topography/poor soil and groundwater conditions (Vodden Street preferred – no ramps/grade-separated) • No Highway 410 crossing required for sub-transmission main • Difficult CNR crossing – grade separated, saturated soil conditions • No spur line crossings • No crossings of existing large diameter watermains/trunk sewers	• Shortest route and most direct route – approximately 6.0 km • Fewest directional changes required (3-Heart Lake; 5-Tilbury Ct) • Uses both City of Brampton and Region of Peel roads (i.e., ~ 2.6 km on Dixie Road, 45 m ROW width) • Requires use of two local roads (i.e., Heart Lake Road S and Tilbury Court, <23 m ROW width) • Preferred Highway 410 crossing at Orenda Road (no ramps/grade separated) – alternative Highway 410 crossing at Clark Boulevard (more difficult crossing-ramps/future improvements) • CNR crossing at-grade • Spur line crossing at-grade on Clark Blvd • Parallels existing large diameter watermains along Heart Lake Road and Dixie Road – maintain adequate separation distance • One crossing of existing large diameter watermain at West Drive	• Longest route and least direct route – approximately 10.3 km • Most directional changes required (7) • Primarily uses City of Brampton roads (23-36 m ROW width), with ~ 975 m along Regional roads (i.e., Dixie Road, 45 m ROW width) • Requires use of one local road (i.e., Heart Lake Road S, <23 m ROW width) • Preferred Highway 410 crossing at Orenda Road (no ramps/grade separated) • Potential poor groundwater conditions at Etobicoke Creek East Branch • CNR crossing at-grade • Spur line crossing at-grade on Orenda Road • One crossing of existing large diameter watermain at West Drive • Two crossings of existing large diameter trunk sewer
	Construction method	Percentage open cut or tunneling and permitting agency requirements (e.g., TRCA/MTO)	• Approximately 85% open cut construction • Proposed tunnelled sections: – Watercourse on Glidden Road – CNR – Highway 410 – Queen Street East – Watercourse through Northampton Park • Highway 410 at-grade • CNR-required monitoring of bridge overpass structures • Two crossings of TRCA-regulated areas – construction compounds required inside regulation limits	• Approximately 85% open cut construction • Proposed tunnelled sections: – Watercourse on Glidden Road – Watercourse south of Clarence Street – Watercourse north of Orenda Road – CNR – Highway 410 – Queen Street East – Watercourse through Northampton Park • MTO-required monitoring of Highway 410 bridge overpass structures at Vodden Street • CNR-required monitoring of bridge overpass structures • Four crossings of TRCA-regulated areas – construction compounds required inside regulation limits	• Approximately 70% open cut construction • Proposed tunnelled sections: – CNR – Highway 410 – Watercourse on Heart Lake Road or Tilbury Court – Watercourse on Clark Boulevard west of West Drive – Etobicoke Creek tributary at Clark Boulevard – Queen Street East and tributary of Etobicoke Creek – East Brampton Reservoir connection • MTO setback required on Heart Lake Road – 14 m from property line • MTO-required monitoring of Highway 410 bridge overpass structures • CNR-required monitoring of at-grade rail line • Four crossings of TRCA-regulated areas – construction compounds required inside regulation limits	• Approximately 85% open cut construction • Proposed tunnelled sections: – CNR – Highway 410 – Existing East Brampton watermain – Etobicoke Creek tributary at Balmoral Drive – Etobicoke Creek East Branch at Balmoral Drive – Queen Street East – Etobicoke Creek at North Park Drive – East Brampton Reservoir connection • MTO setback required on Heart Lake Road – 14 m from property line • MTO-required monitoring of Highway 410 bridge overpass structures • CNR-required monitoring of at-grade rail line • Four crossings of TRCA-regulated areas – construction compounds required inside regulation limits

MOST PREFERRED	MODERATELY PREFERRED	LEAST PREFERRED	NO DIFFERENCE

Category	Criteria	Indicator	Alternative Route 1: Kennedy Road	Alternative Route 2: Rutherford Road	Alternative Route 3: Dixie Road	Alternative Route 4: Bramalea Road
Technical	Operability	Number of required chambers, hydraulic and transient issues/pressure losses and interconnection opportunities	• Least preferred connection to East Brampton PS&R through Northampton Park • Deep tunnel required – reservoir elevation/hydraulic issues	• Least preferred connection to East Brampton PS&R through Northampton Park • Deep tunnel required – reservoir elevation/hydraulic issues	• Preferred connection to East Brampton PS&R from Dixie Road • Typical open cut installation depths – no reservoir elevation/hydraulic issues • Sub-transmission main more utilized (+10 to 20ML/d)	• Preferred connection to East Brampton PS&R from Dixie Road • Typical open cut installation depths – no reservoir elevation/hydraulic issues • Sub-transmission main more utilized (+10 to 20ML/d)
	Maintainability	Accessibility to maintenance chambers (e.g., shallow construction versus deep tunnel)	• Typical open cut installation depths – typical maintenance access • Deep tunnel depths – very deep tunnel required north of Queen Street East to avoid elevation/hydraulic issues	• Typical open cut installation depths – typical maintenance access • Deep tunnel depths – very deep tunnel required north of Queen Street East to avoid elevation/hydraulic issues	• Typical open cut installation depths – typical maintenance access • Moderate tunnel depths – deep tunnel required at Queen Street East crossing	• Typical open cut installation depths – typical maintenance access • Moderate tunnel depths – deep tunnel required at Queen Street East crossing
	Conflicts with existing utilities	Significance of existing utilities and infrastructure and ability to maintain existing services or relocate existing utilities	• Moderate number of conflicts with existing utilities – some relocation required • No crossings of existing large diameter watermains/trunk sewers • Potential for temporary interruption to existing services during relocation	• Moderate number of conflicts with existing utilities – some relocation required • No crossings of existing large diameter watermains/trunk sewers • Potential for temporary interruption to existing services during relocation	• Moderate number of conflicts with existing utilities – some relocation required • One crossing of existing large diameter watermain • Potential for temporary interruption to existing services during relocation	• Moderate number of conflicts with existing utilities – some relocation required • One crossing of existing large diameter watermain and two crossings of existing large diameter trunk sewer • Potential for temporary interruption to existing services during relocation
	Conflicts with recent or planned improvements	Road resurfacing or co-ordination opportunities with planned infrastructure improvements	• Potential to coordinate with future Williams Parkway widening and West Brampton Watermain construction (~ 20% of route)	• Potential to coordinate with future Williams Parkway widening and West Brampton watermain construction (~ 15% of route)	• Potential to coordinate with future Clark Boulevard and Dixie Road widening (~ 65% of route)	• Potential to coordinate with future Bramalea and Dixie Road widening (~ 40% of route)
	Truck traffic management issues during construction	Truck movement restrictions	• Williams Parkway is not a designated truck route • No truck timing restrictions • Kennedy Road is a detour route for Highway 410	• Williams Parkway is not a designated truck route • No truck timing restrictions	• All designated truck routes • No truck timing restrictions • Truck traffic is already common on Heart Lake Road	• Balmoral Drive and North Park Drive are not designated truck routes • Truck timing restrictions on Bramalea Road
TECHNICAL RANKING			**4**	**3**	**1**	**2**
Cost	Estimated construction costs	Relative construction costs compared to other routes considering route length and construction methods	• Relatively high capital costs due to route length • Relatively high operating costs – maintenance issues and transient concerns due to existing elevations • Slightly reduced capital costs associated with coordination of Williams Parkway widening and West Brampton watermain construction • High contingency costs due to groundwater issues at Williams Parkway	• Moderate capital costs due to route length • Relatively high operating costs – maintenance issues and transient concerns due to existing elevations • Slightly reduced capital costs associated with coordination of Williams Parkway widening and West Brampton watermain construction • High contingency costs due to groundwater issues at Williams Parkway	• Relatively low capital costs due to shortest route and coordination with both Clark Boulevard and Dixie Road widenings • Relatively low operating costs – no maintenance issues or transient concerns	• Relatively high capital costs due to route length • Relatively low operating costs – no maintenance issues or transient concerns • Reduced capital costs associated with coordination of Bramalea Road and Dixie Road widenings
COST RANKING			**3**	**2**	**1**	**2**
OVERALL RANKING RECOMMENDATION			**2**	**3**	**1**	**4**

MOST PREFERRED	MODERATELY PREFERRED	LEAST PREFERRED	NO DIFFERENCE

5. Phase 3: Alternative Design Concepts

The Class EA planning process recognizes that there are usually multiple ways in which the preferred solution can be designed and implemented. As such, alternative design concepts were identified and evaluated based on their potential impact. For this project, design alternatives included installation of the East Brampton watermains via either:

- Open cut construction; or
- Trenchless (tunnel) construction; or
- A combination of both open cut and trenchless construction.

Design alternatives also included consideration of the watermain location within the road right-of-way, including on either:

- The west side or the east side of Heart Lake Road;
- The north side or the south side of Clark Boulevard; and
- The west side, the east side or the median of Dixie Road.

This section provides an overview of the alternative design concepts that were considered for each route segment, including an overview of open cut versus trenchless construction methods, the rationale for the recommended construction method, tunnel shaft locations and the watermain location within the road right-of-way. In addition, alternative interconnection locations with the existing water distribution system are also reviewed, as well as alternative connection points at both the Beckett Sproule and East Brampton Pumping Station and Reservoir. **Section 6** provides further details regarding the preferred design concept, which includes a combination of both open cut and tunnel construction along the west side of Heart Lake Road, the north side of Clark Boulevard and the west side of Dixie Road.

5.1 Alternative Watermain Construction Methods

The following sections provide an overview of both the open cut and tunnel construction methods that were considered during the technical evaluation of the alternative watermain routes, and again in more detail following confirmation of *Route 3: Dixie Road* as the preferred route.

5.1.1 Open Cut Construction

Open cut construction typically uses large excavators to dig a trench which is wide enough to allow the watermain and bedding material to be laid down by cranes as the work proceeds along the route. To minimize the width of excavation and to provide a safe working environment for construction workers, the trench is protected with temporary shoring such as a trench box. As the watermain sections are installed, the trench can be backfilled to ground level so that open excavation and pipe installation continually moves along the route. Typically, the entire working zone for watermains of this size would be approximately 100 to 200 metres (110 to 220 yards) in


Open Cut Trench


Typical Backhoe

length.

Construction by open cut results in relatively short term, localized activity in the immediate area of excavation where the watermain is being installed. For example, as the trench advances along the street, open cut construction will require temporary lane closures and/or traffic detours that advance as the watermains are installed. For a 1.5-metre (5-foot) diameter pipe as proposed for the Z4 transmission main, or a 0.9- to 1.2-metre diameter pipe as proposed for the Z5 sub-transmission main, the rate of progress for the excavation, pipe placement and backfilling procedure could be up to 15 to 25 metres (50 to 80 feet) per day, depending on a significant number of construction variables. For both pipes laid side-by-side in the same trench, the rate of progress would typically be somewhat slower, perhaps up to 10 to 15 metres (30 to 50 feet) per day, again depending on a number of construction variables (e.g., soil conditions, the need for prior utility relocation, weather conditions, etc.).

In an urban setting such as the City of Brampton, excavated material typically requires haulage off-site and suitable material (typically granular backfill) needs to be imported to backfill the trench up to the road base. Designated haul routes are required for this transport and should avoid residential streets where possible and utilize Regional or City arterial or collector roads such as Clark Boulevard, Dixie Road and/or Queen Street East. As sufficient backfilled trench is made available, the surface roadway can be restored on a temporary basis, allowing for its return to use. For temporary restoration, base asphalt or short-term granular base is typically used. Permanent restoration that involves placement of the asphalt road surface typically occurs once sufficient segments of the watermain are complete.

For open cut areas, special care will be taken to locate the watermains to minimize or avoid existing significant features. Where existing trees and/or vegetation are disturbed or lost due to watermain construction, the area will be replanted with suitable native species to be specified during detailed design. Where required, relocation of existing utilities to allow for installation of the watermains would be done in accordance with the respective utility company, Region of Peel and City of Brampton standards and construction procedures.

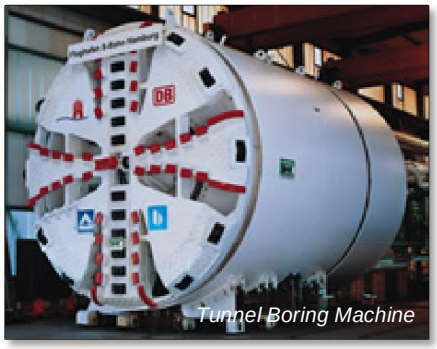
5.1.1.1 Open Cut Design Assumptions

The following open cut construction design assumptions/recommendations have been made and are subject to change during detailed design and/or construction:

- For proposed watermains of this size (0.9 to 1.5 metres or 3 to 4 feet in diameter), the total affected area, including use of the boulevard where applicable, would be approximately 13 to 18 metres (40 to 60 feet) in width for both watermains laid in a common trench. This includes a minimum 4.5 metre (15 foot) wide trench and 9 to 14 metres (30 to 46 feet) for truck and crane movements;
- Minimum trench depth should be 4.1 metres (13 feet) to allow a minimum of 2.1 metres (7 feet) of cover material;
- The requirement to relocate existing services should be minimized;
- Existing utilities and infrastructure left in place will need to be supported and protected during construction;

- There should be a minimum separation distance of at least one pipe diameter, either vertically or horizontally, from existing major pipeline infrastructure or as mandated by the utility;
- There should be adequate overhead clearance to allow for cranes and heavy equipment usage (e.g., from high voltage wires, bridges etc.); and
- Traffic disruption during construction should be minimized as much as practically possible.

5.1.2 Trenchless Construction


Tunnel Boring Machine

For large diameter pipes such as the East Brampton watermains, trenchless installation typically warrants the use of a tunnel boring machine (TBM) or microtunneling machine. Generally speaking, a TBM is a large, self-contained mechanized boring machine that rotates against the undisturbed soil or rock face of the tunnel underground, removing the excavated material and allowing for pipe installation. Access to the tunnel is achieved through the use of vertical shafts which come to the surface. Shafts are setup at both the beginning (launch) and end (exit) of the tunnel length. In some cases, the length of the tunnel run may require the need for smaller, intermediate shafts along the tunnel. Other trenchless methods such as pipe jacking, horizontal directional drilling or hand mining could also be used during construction if short tunnel lengths or soil conditions dictate this need.

Surface Works: Tunnel Shafts

Typically, the only surface works involved with tunnelling are access and exit shafts. An access shaft is part of a construction compound which is an area set aside for the tunnel shaft itself, construction equipment and storage space. The majority of activity occurs adjacent to the access or launch shaft, compared to the exit or receiving shaft. The access shaft is used for machinery and materials entry and to remove excavated material. As the TBM moves ahead, the excavated material is carried to the back end of the machine and deposited into small rail cars (muck cars). These cars then convey the excavated material back to the tunnel access shaft where it is removed by crane to the ground surface for removal to disposal sites. When the tunnel segment is completed, the TBM is removed through the exit shaft at the outlet end of the tunnel segment. The area around the exit shaft can generally be smaller than the access shaft since watermain and equipment storage is usually not required. In some cases however, this second shaft may become the launch shaft for the next tunnel segment. In this case, the original launch shaft can be restored to its original condition once the actual watermain installation for that section has been completed.


Tunnel Shafts

Although ultimate tunnel shaft design will be determined during the future detailed design phase of this project, all tunnel shafts will likely be relatively short-term in nature, vary in size and shape (dependent on land use and TBM application) and will be fenced off during construction to provide for safety and security. For this project, it is estimated that shaft construction compounds could typically be in place for as long as 12 to 18 months,

depending on the length of the tunnel between shafts and the tunnel shaft type (i.e., less time for exit shafts). Every effort will be made to minimize the duration required for tunnel shaft compounds. Considerations for each of the shaft sites will include maintaining safe access to existing properties, temporary relocation of existing utilities, providing temporary parking for cars and in some cases, temporary access routes for emergency vehicles. Each shaft site must also be protected to provide for public safety.

The tunnel shaft location may also, upon completion of construction, be the location for permanent facilities such as valve chambers and access shafts for maintenance purposes, but these have a smaller surface footprint when compared to the entire construction compound requirements. Since most permanent maintenance facilities will likely be adjacent to or within existing road allowances, restoration will include re-grading and resurfacing of the site to match existing conditions. Shaft site selection will minimize the potential effects on adjacent properties and the traveling public. Therefore, potential shaft sites may also include lower intensity use lands (e.g., open spaces) in addition to side streets off main thoroughfares.

Below Ground: Works in Tunnel

Depending on the soil conditions (see **Section 6.5**) and the project requirements which will be confirmed during detailed design, as the TBM moves ahead below ground, typically a primary liner is first installed to maintain the tunnel shape and structural integrity. After tunnelling for each segment has been completed, pipe installation can then proceed. Alternatively, precast tunnel segments can be used. These are installed by the TBM, providing a finished, lined tunnel as the machine progresses. The use of precast segments is generally more expensive, but is sometimes required to provide a more watertight system.

For the East Brampton watermains project, it is currently expected that the tunnel will be constructed and the primary liner installed before the watermain is inserted into the tunnel (to be confirmed during detailed design). This may be necessary because materials will be removed behind the machine and tunnel construction materials will be supplied from the original launch shaft location. Therefore, there is no way to install the watermains and the liner in the same space. Once the tunnel is complete and the TBM is moved to start the next tunnel section, installation of watermain can commence. However, it is important to note that the tunnel construction methodology will be confirmed during detailed design.

5.1.2.1 Tunnel Design Assumptions

The following tunnel construction design assumptions assumptions/recommendations have been made and are subject to change during detailed design and/or construction:

- The requirement for tunnelling should be minimized but, where necessary, the effectiveness must be maximized (i.e., avoid sensitive surface features but also minimize excavation depth and water-taking requirements, or optimize the number of structures/features crossed by one tunnel run). The requirement for tunnelling is expected for the following crossings:
  - Highway 410;
  - CN railway and spur lines;
  - Etobicoke Creek East Branch and other watercourse crossings;
  - Existing large diameter transmission mains, including the existing East Brampton Watermain connection to the East Brampton Reservoir from Dixie Road;

  - Locations where the depth would be greater than eight metres (26 feet) to ensure that the watermain remains below the required reservoir elevations; and
  - Major intersections such as Queen Street East where traffic disruptions due to open cut construction would be too great.

- Tunnel shaft compounds would be required at both the start and end of each tunnelled section and may be required where there are bends to allow for TBM access/exit, removal of excavated material and storage of construction equipment and materials;
- Tunnel shaft compound dimensions vary; however, for this project it is anticipated that an average compound would measure approximately 30 metres by 30 metres (100 feet by 100 feet), with an anticipated shaft diameter of approximately 12 metres (40 feet);
- The tunnel should maintain a single diameter regardless of any changes in pipe diameter;
- There should be a minimum separation distance of at least one tunnel diameter (4.3 metres or 14 feet), either vertically or horizontally, from existing major pipeline infrastructure;
- A minimum clearance of one tunnel diameter (4.3 metres or 14 feet) should be kept between the tunnel obvert and the bottom of creek crossings;
- Shaft and tunnel locations should minimize effects on the natural environment (e.g., surface or groundwater);
- Shaft locations should be appropriately setback from watercourses and consideration given to contingencies in the event of a large rainfall event; and
- Depth of tunnel will vary depending on soil conditions and clearance requirements from various government review agencies and pipeline authorities.

5.2 Alternative Watermain Design Concepts

The following sub-sections describe the alternative design concepts considered for each route segment and provide a rationale for the recommended construction method, watermain location within the road right-of-way and tunnel shaft locations. **Table 5-1** provides a summary of the recommended design concept, rationale and consideration of impacts.

Table 5-1 Design Concepts Rationale

	Original Construction Method (as shown at Public Open House #1)	Recommended Construction Method (as shown at Public Open House #2)	Rationale/Comment
Heart Lake Road	• Open cut construction on Heart Lake Road, from the Beckett Sproule Pumping Station & Reservoir (PS&R) to just south of the CNR crossing	• Open cut construction on the west side of Heart Lake Road, from the Beckett Sproule PS&R to just south of the CNR crossing • East side ruled out due to MTO setback requirements and existing 2100-mm diameter watermain	• The watermains are installed in a linear fashion so that excavation and backfill continually moves along the route • Accessibility along Heart Lake Road from both the north and south provides good flexibility for property access • Two narrow lanes or one wider lane with alternating one-way traffic can accommodate existing traffic
	• Tunnel construction within the unopened road allowance for crossing under the CNR tracks	• Tunnel construction within private property just west of the unopened road allowance for crossing under the CNR tracks • Exit shaft to be located on MTO-property along the west side of Heart Lake Road just south of Selby Road (Option 1A) • Access shaft to be located on private property immediately north of CNR tracks	• CNR requires tunnel crossing to eliminate temporary track closure • Private property required for watermain alignment due to setback requirements from the existing 2100-mm diameter watermain located within the unopened road allowance
	• Open cut construction within the unopened road allowance and continuing north along Heart Lake Road to just south of the culvert crossing	• Open cut construction within the unopened road allowance and continuing north along the west side of Heart Lake Road to just south of the culvert crossing	• The watermains are installed in a linear fashion so that excavation and backfill continually moves along the route • Accessibility along Heart Lake Road from both the north and south provides good flexibility for property access • Two narrow lanes or one wider lane with alternating one-way traffic can accommodate existing traffic
	• Tunnel construction under the existing culvert and open cut construction along the remainder of Heart Lake Road to just south of Clark Boulevard	• Tunnel construction under the existing culvert and continuing along the west side of Heart Lake Road to just south of Clark Boulevard	• Tunnel crossing of the watercourse is required by TRCA • Increased costs associated with increased tunnel length offset by reduced number of tunnel shafts and construction compounds
Clark Boulevard	• Tunnel construction under Highway 410 to just west of Clark Boulevard ramps • Open cut construction along Clark Boulevard with trenchless crossings of the two watercourses	• Tunnel construction under Highway 410 and continuing along the north side of Clark Boulevard to just east of the watercourse near Lisa Street • Optimal location for tunnel shafts is on north side (signalized intersection, good road access and centralized construction access) • South side of Clark Boulevard ruled out due to possible conflicts with Brampton Transit Garage • Avoids crossing Clark Boulevard-Dixie Road intersection • Interconnection required at West Drive	• Tunnel crossing of Highway 410 is required • Tunnel crossing of the watercourses is required by TRCA • Increased costs associated with increased tunnel length offset by reduced number of tunnel shaft construction compounds • Reduced impacts to Brampton Transit • Reduced impacts to vehicular traffic

	Original Construction Method (as shown at Public Open House #1)	Recommended Construction Method (as shown at Public Open House #2)	Rationale/Comment
Dixie Road	• Open cut construction along Dixie Road to Lisa Street	• Open cut construction along the west side of Dixie Road to just south of Lisa Street • Tunnel construction of the Dixie Road-Lisa Street intersection • West side avoids conflicts with entrances to Bramalea City Centre	• Reduces traffic impacts at Lisa Street by tunneling the intersection • Reduces impacts to Bramalea City Centre traffic flows
	• Tunnel construction of Queen Street East intersection and watercourse north of Queen Street East	• Tunnel construction of the Queen Street East intersection along the west side of Dixie Road to just north of the watercourse • Tunnel extended to south of Lisa Street	• Optimal locations for tunnel shafts are on the west side • Avoids significant aerial hydro infrastructure along the east side of Dixie Road • Avoids construction immediately adjacent to watercourse paralleling Dixie Road • Reduces traffic impacts at Lisa Street by tunneling the intersection • Reduces impacts to Bramalea City Centre traffic flows
	• Open cut construction along Dixie Road from north of watercourse to East Brampton PS&R connection	• Open cut construction along the west side of Dixie Road from north of watercourse to East Brampton PS&R connection • Interconnection to future 0.90-m diameter West Brampton watermain required at Williams Parkway • Tunnel extended approximately 200 m south of the East Brampton Reservoir connection after Public Open House #2	• Avoids significant hydro infrastructure along the east side of Dixie Road • Can be coordinated with the widening of Dixie Road • Adequate room in west boulevard • Additional tunnelled section required so that the Z4 watermain is installed below the top water level of the East Brampton Reservoir (facilitates better operation)
	• Tunnel construction from Dixie Road to connect to the East Brampton PS&R	• Tunnel construction along an existing Region of Peel easement from Dixie Road to connect to the East Brampton PS&R	• No private property requirements • Minimizes impacts to nearby residents

5.2.1 Heart Lake Road

The proposed watermains will extend approximately 1.7 kilometres (1 mile) north along the west side Heart Lake Road from the Beckett Sproule Pumping Station and Reservoir to the Highway 410 crossing just south of Clark Boulevard. Although construction along the east side of Heart Lake Road may seem preferential because it avoids the business entrances located along the west side, watermain construction along the east side was ruled out due to MTO setback requirements (see **Section 9.2.3**) and the need to maintain sufficient clearance from the Region's existing 2.1-metre (7 foot) diameter watermain that runs along the east side adjacent to the Highway 410 fence line (i.e., the Airport Road feedermain).

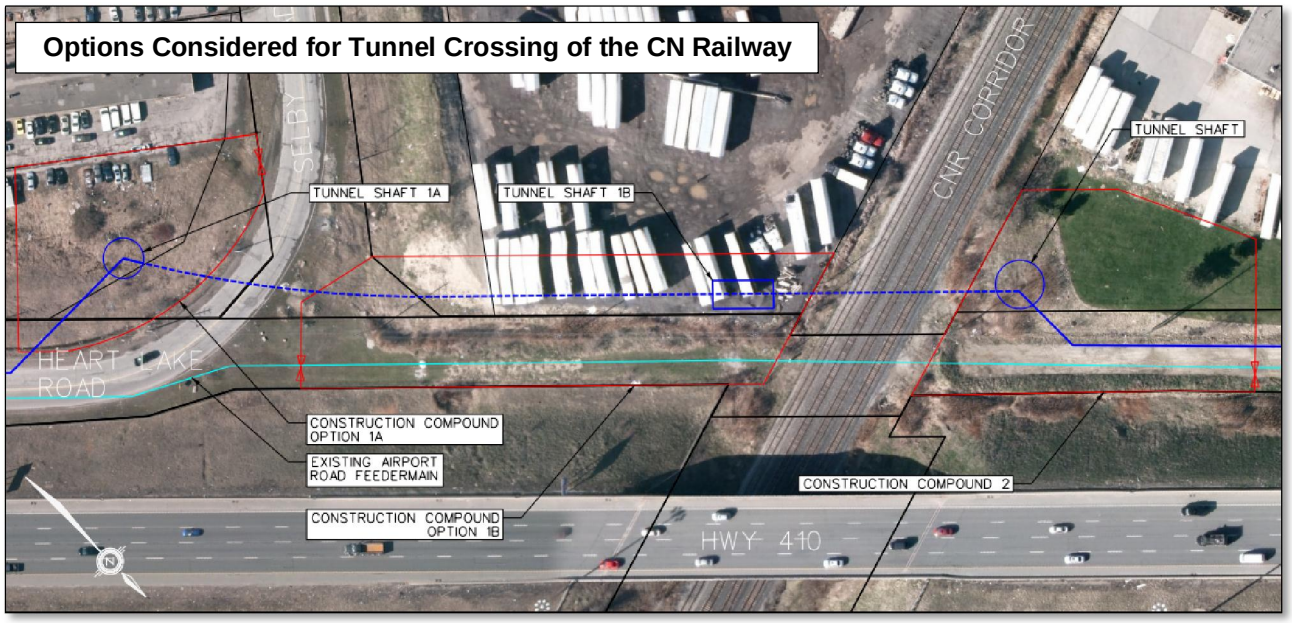
It is proposed that the majority of the watermains will be constructed by open cut methods along Heart Lake Road given that open cut construction is generally more cost effective and typically results in a faster installation rate when compared with tunnelling. Open cut construction along the west side of Heart Lake Road will require moving closures of one lane of traffic through the construction work zone. As a result, either two narrow lanes or one wider lane with alternating one-way traffic will be maintained. In the case of alternating one-way traffic, it is expected that traffic will be controlled by temporary signals or flag persons during construction, and that at least one vehicle entryway will remain open at all times for each business property located along Heart Lake Road[41]. Flexibility for property access is also provided by good accessibility along Heart Lake Road from either the north or the south.

Tunnel construction will be required for trenchless crossing of the CN railway corridor, the watercourse located beside Access Self Storage (a six metre by three metre (20 foot by 10 foot) concrete culvert) and Highway 410. As such, it was necessary to identify a suitable location for the tunnel access shafts and the tunnel exit shafts. Details regarding the alternative tunnel shaft locations are provided below.

5.2.1.1 Tunnel Shaft Locations Considered

Given the potential for cost differentials between open cut and tunnel construction (i.e., tunnelling is more expensive than open cut construction) and the increased construction complexities associated with tunnelling, the objective was to minimize the length of the tunnel drive under the CN railway and watercourse crossing. For the first tunnelled section on Heart Lake Road, two construction compound options were identified south of the CN railway corridor and one was identified immediately north of the corridor in order to reduce the tunnel length. As shown in the aerial image below, construction Compound Options 1A and 1B were first identified as a suitable location for a tunnel shaft south of the CN railway. However, the property owner of Compound Option 1B (i.e., SpeedX Transport), located immediately south of the CNR, noted that they had just recently invested in additional on-site tractor trailer parking by removing a rail spur line and grading the site where the tunnel shaft was proposed. Furthermore, he noted that surface impacts from the proposed tunnel shaft on his property would significantly impact business operations by reducing the availability of this newly created on-site tractor trailer parking (see meeting minutes, **Appendix L-8**). As a result, the Option 1A property was formally requested from MTO, which would eliminate surface impacts at SpeedX Transport and largely avoid conflicts with existing utilities (see **Appendix I, Compound Figure 2**). MTO has since approved the Region's easement request for Compound Option 1A (see **Appendix M-3**, MTO correspondence dated December 5, 2013). Further discussions with MTO will be required during

*41 Based on meeting discussions with a representative of Crosby Canada (see Meeting Minutes, **Appendix L-8**), the use of flag persons during open cut construction on Heart Lake Road should be considered rather than temporary traffic signals. Concern was expressed by the property representative that temporary traffic signals could cause confusion for employees when exiting the property.*



detailed design to resolve any potential issues with both MTO and Region of Peel contractors working in the same area at the same time.

Regarding Construction Compound 2, located immediately north of the CN railway corridor, Sigma Asset Management noted that their property at 165 Orenda Road could be used for the tunnel access shaft, provided that there is no interference with tenant operations or loading docks, that potential for vibration damage is minimized, and that the City's unused road allowance behind the property is used for construction compound access (see meeting minutes, **Appendix L-8**).

For the second tunnelled section on Heart Lake Road, two construction compounds were identified for crossing of the watercourse located beside Access Self Storage. The tunnel access shaft is proposed on Crosby Canada's property at 145 Heart Lake Road (**see Appendix I, Compound Figure 4**). This is the first available site south of the watercourse outside of the TRCA-regulation limits. The second tunnel shaft compound is proposed on the former United Rentals site at 89 Heart Lake Road, and will serve as the exit shaft for both tunnelling under the watercourse and under Highway 410 (**see Appendix I, Compound Figure 5**). No significant concerns with either of these two sites were noted by the property owners (see meeting minutes, **Appendix L-8**).

5.2.2 Clark Boulevard

The proposed watermains will extend approximately 1.5 kilometres (0.9 miles) along the north side of Clark Boulevard from Heart Lake Road, under Highway 410 to Dixie Road. Construction along the south side of Clark Boulevard was ruled out early in the planning process due to possible conflicts with the Brampton Transit Garage and the Clark West Business Centre. The north side of Clark Boulevard is also advantageous for watermain construction because it avoids crossing of the Clark Boulevard-Dixie Road intersection. In addition, the optimal location for tunnel shafts is on the north side of Clark Boulevard where there is more open space and suitable construction access.

Although open cut construction along Clark Boulevard may seem preferential because it could be co-ordinated with the City's planned widening of Clark Boulevard, tunnel construction is recommended along the majority of this roadway due to the number of significant crossings required. Trenchless crossings are required under Highway 410 and the Clark Boulevard off-ramp, the rail spur crossing, two watercourse crossings and the two existing large diameter feedermains. Combining and extending these tunnel runs is proposed as the increased cost associated with a longer tunnel length is offset by the reduced number of tunnel shaft construction compounds. In addition, tunneling reduces impacts to vehicular traffic and the Brampton Transit Garage, especially since the tunnel shafts are proposed outside of the paved roadway. However, tunnelling of the watermains all the way to Dixie Road was ruled out due to insufficient space for a tunnel shaft at the northwest corner of the Clark Boulevard-Dixie Road intersection (see **Section 5.2.2.1** below).

5.2.2.1 Tunnel Shaft Locations Considered

For the tunnelled section along Clark Boulevard, the proposed tunnel access shaft is located on the Owens-Illinois glass factory property at the northwest corner of Clark Boulevard and West Drive (see **Appendix I, Compound Figure 6**). It is proposed that this access shaft compound will be used for tunneling of the watermains west under the railway spur, channelized watercourse crossing and finally under Highway 410. It will also be used for tunnelling east under the existing 1.05-metre (3.4-foot) diameter East Brampton feedermain, the existing 2.1-metre (7-foot) diameter Airport Road feedermain, and the watercourse adjacent to 190 Clark Boulevard. A tunnel shaft was considered immediately west of the railway spur just outside of MTO jurisdiction; however, the corner of the Owens-Illinois property at West Drive provides a large, accessible site off the roadway. Furthermore, it allows trenchless crossing of the railway spur and adjacent channelized watercourse, and no significant concerns were noted by the property owner (see meeting minutes, **Appendix L-8**).

As previously mentioned, the exit shaft for the Highway 410 tunnel crossing is proposed on the former United Rentals site at 89 Heart Lake Road (see **Section 5.2.1.1**). The tunnel exit shaft compound for tunnelling east under the watercourse is proposed at 190 Clark Boulevard, adjacent to the creek at the top-of-bank (see **Appendix I, Compound Figure 7**). This is within the TRCA-regulation limits and will require site grading (floodplain mapping in the area is currently being updated by TRCA). The compound was originally proposed further east on the property at 190 Clark Boulevard, but due to timing issues with the condominium development currently being constructed on-site, the property owner requested that the compound be shifted west towards the creek (see meeting minutes, **Appendix L-8**).

One additional tunnel shaft was also considered immediately west of the watercourse crossing on the Zoom Zoom storage property. However, due to the efficiencies associated with a reduced number of tunnel shaft construction compounds, this site was removed from consideration when the tunnel runs along Clark Boulevard were combined.

A tunnel shaft was also considered at the northeast corner of Clark Boulevard and Dixie Road in the City of Brampton landscaped area. However, since open cut construction is proposed along the west side of Dixie Road, there is no need to cross to the east side and then back again. This would also be the case if tunnelling were proposed along the entire length of Clark Boulevard, as the City of Brampton property would be the only available space outside of the Clark Boulevard-Dixie Road intersection.

5.2.3 Dixie Road

The proposed watermains will extend approximately 2.8 kilometres (1.7 miles) north along the west side of Dixie Road from Clark Boulevard to vicinity of the East Brampton Pumping Station and Reservoir. The larger Z4 transmission main will connect to the reservoir via a westerly tunnel approximately 100 metres (110 yards) north of Northampton Street, while the slightly smaller Z5 sub-transmission main will connect to the existing distribution system approximately 200 metres (220 yards) further north on the west side of Dixie Road.

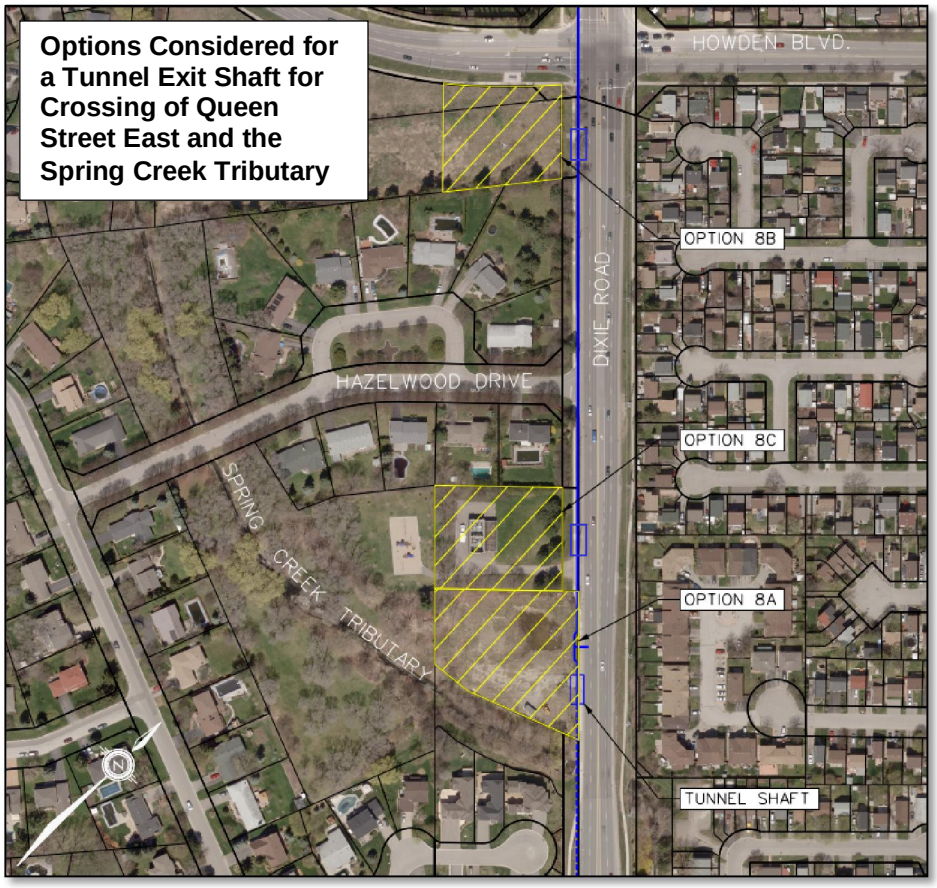
Watermain construction along the west side of Dixie Road is preferred over both the east side and the road centre/median, most notably because there is already adequate room in the west boulevard. This is because the Region of Peel is planning to widen Dixie Road from four to six lanes on the west side north of Queen Street East (see **Section 2.5.1**). In most areas, the Region already owns this boulevard area and the road widening can be co-ordinated with watermain construction. This is also why open cut construction is proposed along the majority of the route north of Queen Street East (i.e., the watermains can first be installed and then the additional lanes can be constructed on top of the watermains during restoration). In addition, construction along the west side avoids the need to relocate significant aerial hydro infrastructure along the east side of Dixie Road. It also avoids construction immediately adjacent to the Spring Creek tributary which parallels Dixie Road on the east side for approximately 300 metres (330 yards) north of Queen Street East. Furthermore, construction on the west side avoids conflicts with entrances to Bramalea City Centre on the east side of Dixie Road, and thereby reduces traffic impacts to the mall. It should be noted that the Region's existing 1.05-metre (3.4-foot) diameter East Brampton feedermain generally runs along the west curb lane of Dixie Road. However, sufficient clearance from this watermain can be maintained through the use of supported open cut construction.

Tunnel construction will be required for trenchless crossing of Queen Street East and the Spring Creek tributary, and for the westerly connection to the East Brampton Reservoir from Dixie Road. In addition, trenchless construction of the Z4 transmission main from the East Brampton Reservoir connection to just south of Northampton Street is also required so that the watermain is installed below the top water level of the East Brampton Reservoir (facilitates better operation). As such, it was necessary to identify a suitable location for the tunnel access and exit shafts. Details regarding the alternative tunnel shaft locations are provided below.

5.2.3.1 Tunnel Shaft Locations Considered

For the trenchless crossing of Queen Street East and the Spring Creek tributary, two alterative locations for each of the tunnel shaft compounds (access and exit shafts) were identified on the west side of Dixie Road based on sufficient available space and the need to minimize both property owner and user impacts. No potential construction compound sites were identified on the east side as there is insufficient space for a tunnel shaft due to the homes backing onto Dixie Road. Furthermore, siting a tunnel shaft on the east side of Dixie Road is not desirable since the watermains would then have to criss-cross Dixie Road, which is unnecessarily complicated and makes it difficult for future infrastructure installation within the road right-of-way.

As shown on the preliminary compound site plans (see **Appendix I, Compound Figure 8**), construction Compound Options 7A and 7B were identified as potentially suitable locations for a tunnel shaft south of Queen Street East. The property owner representatives of these sites were both agreeable to the proposed construction compound on their property (i.e., East West Management and Vertica Resident Services, see



meeting minutes, **Appendix L-8**). As a result, it was decided that Compound 7A, located south of Lisa Street, is preferable for an access shaft since tunnelling of the Lisa Street intersection will reduce traffic impacts at both Lisa Street and the main Bramalea City Centre entrance. Property access to 11 Lisa Street will not be impacted. Compound 7B, located immediately north of Lisa Street, will also be further investigated during detailed design as a potential construction equipment storage area.

North of Queen Street East, construction Compound Options 8A, 8B and 8C were first identified as potentially suitable locations for a tunnel exit shaft compound (see aerial image this page). These sites on the west side of Dixie Road were identified based on the objective to minimize the length of tunnel drive under Queen Street East and the Spring Creek tributary. However, Option 8C was ruled out due to its use as a Hydro One transformer station and the associated high voltage underground infrastructure on site. Construction Compound Option 8B, located at Dixie Road and Howden Boulevard, was ruled out after meeting discussions with the property owner, Your Home Developments. The owner/developer indicated that site plan approval was received and sales of the future stacked townhouse development were already well underway, with full occupancy expected by 2014/2015. A meeting was then held with the owner of Compound Option 8A, located at 9121 Dixie Road immediately north of the Spring Creek tributary and partially within TRCA's regulation limits. Arlington Homes, the property owner/developer, indicated that they are still negotiating the draft site plan approval with TRCA. It was agreed that it may make sense for Arlington Homes to freeze development of the townhouse block fronting on Dixie Road, while continuing with the rest of the site construction (see meeting minutes, **Appendix L-8**).

Although Compound Option 8A is not ideal for a tunnel shaft given that townhouses may be constructed on the site, the only other open space large enough for a tunnel shaft along the west side of Dixie Road is located at the southwest corner of the Dixie Road-Williams Parkway intersection. This would require an extension of the tunnel by approximately 1.2 kilometres (0.7 miles), resulting in an estimated cost increase of approximately $7.2 million. Furthermore, a gas station is located at that location, and in addition to environmental concerns, would cause traffic impacts at the intersection for an extended period of time. Also, in accordance with Region of Peel design standards, the watermain requires placement of valve chambers

approximately every kilometre. Therefore, even if the tunnel run was extended, a chamber would still be required immediately north of the Spring Creek tributary so that section of the watermain could be isolated for maintenance purposes. As the overall elevation of the watermains increase as they progress north along Dixie Road, this area also makes an ideal location for a drain chamber (i.e., for draining of the watermain upstream when required). In addition, an interconnection to the existing East Brampton watermain is proposed at this location to provide operational flexibility (see **Section 5.3.2**). Therefore, given the above considerations, the site at 9124 Dixie Road is still considered the best location for the temporary tunnel exit shaft and the permanent drain and valve chamber (see **Appendix I, Compound Figure 10**).
For the westerly Z4 connection to the East Brampton Reservoir from Dixie Road, the tunnel shaft will be located within the Dixie Road right-of-way (Compound 10A), while the tunnel will be located within the Region's existing easement (see **Appendix I, Compound Figures 13 and 14**). This existing easement is located approximately 100 metres (110 yards) north of Northampton Street between residential homes. Given that the Region already owns this easement, no additional tunnel shaft locations were considered.

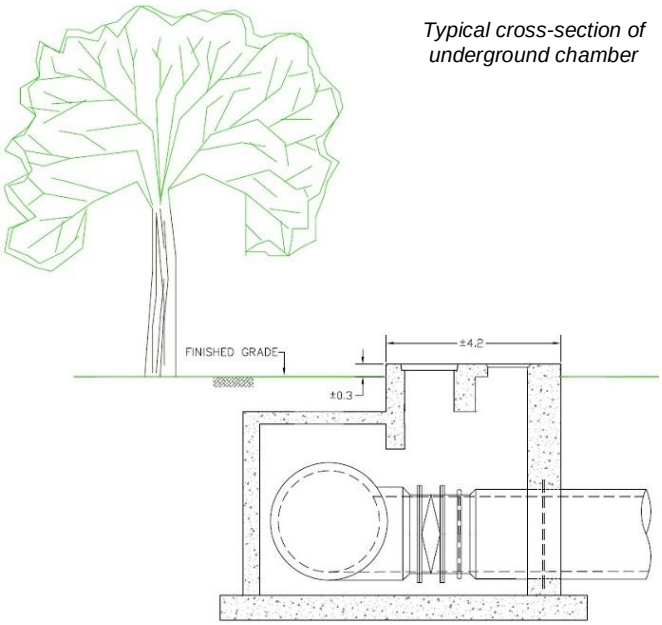
Trenchless construction of the Z4 transmission main along Dixie Road is also required for approximately 200 metres (220 yards) south of the East Brampton Reservoir connection (Compound 10A). This is necessary so that the watermain can be installed deep enough to be below the top water level of the East Brampton Reservoir (facilitates better operation). It is proposed that Compound 10A within the Dixie Road right-of-way (see **Appendix I, Compound Figure 13**) will be used as the access shaft for both the westerly Z4 connection to the East Brampton Reservoir and the southerly tunnel run along Dixie Road. The exit shaft for the southerly tunnel run (Compound 9B) is proposed approximately 100 metres (110 yards) south of Northampton Street within the Dixie Road right-of-way (see **Appendix I, Compound Figure 12**). This location was chosen based on the objective to minimize the length of the southerly tunnel run and to avoid extra work within the Dixie Road-Williams Parkway intersection. Although extension of the tunnel to the proposed compound at Williams Parkway was considered (Compound 9), it was ruled out because a larger compound would be required for construction of both the tunnel shaft and the Z5 interconnection (see **Section 5.3.2.2** below). Given the limited space at the intersection, a larger compound would require the use of additional lanes of traffic for an extended period of time. Therefore, it is preferable to construct the exit shaft within the Dixie Road right-of-way as shown on **Compound Figure 12**.

5.3 Alternative Watermain Interconnections and Connection Points

Permanent operating and maintenance facilities such as underground valve and drain chambers will be required along the preferred East Brampton watermains route, regardless of whether open cut or trenchless construction methods are used. In addition, construction of below-ground interconnection chambers will be required in order to interconnect the Region's existing water distribution system with the new East Brampton watermains.

As part of this Municipal Class EA study, alternative interconnection locations with the existing water distribution system were reviewed, as well as the alternative connection points at both the Beckett Sproule and East Brampton Pumping Station and Reservoir. The following sub-sections describe the design assumptions made, the proposed interconnection and connection locations, and provide the rationale for their recommendation.

5.3.1 Underground Chamber Design Assumptions



Typical cross-section of underground chamber

The following underground chamber design assumptions/recommendations have been made and are subject to change during detailed design and/or construction:

- All chambers (i.e., air release, valve chambers, drain chambers, etc.) are to be designed to Regional standards;
- Chambers must be located to allow for easy access for operations and maintenance crews, including access roads where required;
- Isolation valves will be required at cross-connection locations with the existing East Brampton transmission main, and at intervals of approximately one kilometre (0.6 miles) along the proposed route;
- Chambers must be adequately sized to allow sufficient space to house equipment and for operations and maintenance personnel to freely move about when inside (e.g., isolation valve chambers typically measure approximately 5 metres by 4 metres or 16 feet by 13 feet);
- Any confined space issues and lock-out requirements when servicing equipment must be accounted for;
- Portable pumps and drain piping should be sized to drain isolated sections of the watermain within approximately 24 hours;
- Air valve chambers will be placed directly on the feedermain or incorporated within control chambers;
- Drain chambers will use off-road chamber placement for the pump chamber portion and should use a double chamber design (suitable discharge locations to be selected); and
- Pre-cast structures will be used when possible to minimize cast-in-place structures.

5.3.2 Interconnections with the Existing Water Distribution System

Construction of below-ground interconnection chambers will be required in order to interconnect the Region's existing water distribution system with the new East Brampton watermains. Specifically, Z4 transmission main interconnections are required to:

- Supply additional flow to the East Brampton Pumping Station and Reservoir, allowing efficient transport of water when both the existing and future East Brampton transmission main are operated in parallel (e.g., improved hydraulics and energy efficiencies);
- Provide security of supply by allowing the transfer of water between the existing transmission main and the new East Brampton transmission main;
- Allow the Region to shut down the existing East Brampton transmission main in sections to complete inspection and maintenance work; and

- Provide critical surge protection to the East Brampton Pumping Station in the event of a power failure (e.g., reduces the risk of water column separation and potential pressure fluctuations which could cause significant damage to the pipeline and pumping equipment).

In addition, interconnections to the existing system will also be required for the proposed Z5 sub-transmission main in order to control water distribution to the rest of the system.

Typically, each underground interconnection chamber will measure approximately 10 metres by 10 metres (or 33 feet by 33 feet, to be refined during detailed design). Once completed, the only remaining surface feature will be a slightly raised box/manhole (see typical cross-section above). Following construction, the area will be restored to existing conditions or better in consultation with the landowner, City of Brampton and TRCA, as appropriate.

The sub-sections below describe the alternative interconnection locations and provide the rationale for their recommendation.

5.3.2.1 Alternative Zone 4 Transmission Main Interconnections

To interconnect the new Z4 East Brampton transmission main with the existing East Brampton transmission main that runs along Glidden Road, West Drive, Queen Street East and Dixie Road, construction of below-ground interconnection chambers are required. As shown in **Figure 4-7**, two possible interconnection alternatives were identified based on hydraulic modelling of the Region's existing and future water distribution system:

1) At Clark Boulevard and West Drive; and
2) At Dixie Road and Queen Street East.

Four potential emergency conditions were modelled at each of these interconnection locations to determine which would provide for greater overall hydraulic benefits to the system. Results of the hydraulic modelling analysis indicate that both locations provide similar hydraulic benefits. However, operations staff will have the most flexibility under emergency conditions if both interconnections are constructed, despite the additional construction cost. Therefore, construction of both interconnection chambers is recommended.

Construction of the first Z4 interconnection chamber is proposed on private property at the northeast corner of Clark Boulevard and West Drive (see **Appendix I, Compound Figure 7**, Compound 6A and photo at right). Here the chamber is proposed within the future Clark Boulevard right-of-way but outside of the travelled portion of the road. The northwest corner of the Clark Boulevard-West Drive intersection was ruled out because the existing East Brampton transmission main runs along the east side of West Drive. Similarly, the southwest corner of the intersection was also ruled out because the new watermains are proposed along the north side of Clark Boulevard.


View of Proposed Interconnection Site at Clark Boulevard and West Drive

Although it is possible to construct the connection chamber within the intersection and thereby avoid the need for private property taking, it is not preferred from both a traffic and operations perspective. For example, the Clark Boulevard-West Drive intersection would have to be closed or severely restricted for up to 12 months while existing utilities are relocated and the chamber and interconnection are constructed. In addition, depending upon Regional maintenance procedures, access to the connection chamber will be required approximately once every six months for periodic valve maintenance. In order to accomplish this, workers would need to block traffic in the intersection to gain access. By constructing the chamber outside of the future traveled portion of the roadway, impacts to the travelling public can be avoided.


View of Proposed Interconnection and Tunnel Shaft Site at Dixie Road south of Hazelwood Drive

Construction of the second Z4 interconnection chamber was considered at the Dixie Road-Queen Street East intersection. However, it was ruled out due to the difficulty of constructing the interconnection in the deep tunnel at this location. In addition, a Z4 interconnection at Queen Street East would require a larger compound, further impacting traffic at this already busy intersection. Rather, the Z4 interconnection is currently proposed on private property located on the west side of Dixie Road north of Queen Street East and just south of Hazelwood Drive (see **Appendix I, Compound Figure 10**, Compound 8A and photo at left). This is the same location as the proposed tunnel exit shaft for tunnelling of Queen Street East and the Spring Creek tributary. The connection chamber would be constructed within the tunnel shaft after tunnel construction completion. Therefore, there would be no additional impacts beyond the construction time required to make the interconnection. Construction at this location will require a TRCA permit[42] for construction within their regulated area (part of the watercourse crossing permit).

If during detailed design it is determined that construction of the second Z4 interconnection chamber is better suited further north along Dixie Road, it is recommended that an alternative interconnection chamber at the northwest corner of Dixie Road and Howden Boulevard be carried forward for approval as part of this Class EA (see **Appendix I, Compound Figure 11** and photo at right). An interconnection with the existing East Brampton transmission main in this area would allow for the isolation of a longer section of watermain and may thereby provide better operational


View of Proposed Alternate Z4 Interconnection Site at Dixie Road and Howden Boulevard

42 TRCA: Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses, Ontario Reg. 166/06 (May 2006).

flexibility. It may also reduce the length of construction in front of 9124 Dixie Road and provide additional working room given that space is limited at Compound 8A (see **Section 5.2.3.1**). As previously mentioned, the southwest corner of the Dixie Road-Howden Boulevard intersection was ruled out because of space restrictions due to development already underway on-site (see **Section 5.2.3.1**).

5.3.2.2 Alternative Zone 5 Sub-Transmission Main Interconnections

To interconnect the new East Brampton Z5 sub-transmission main with the Region's existing water distribution system, four possible interconnection alternatives were identified based on the criteria of a minimum 0.5-metre (1.6 foot) diameter existing pipe size: at Heart Lake Road and Orenda Road; at Clark Boulevard and West Drive; at Dixie Road and Queen Street East; and at Dixie Road and Williams Parkway.

Based on analysis of hydraulic performance under both normal and emergency operating conditions, three of these four Z5 interconnections are recommended:

1) At Heart Lake Road and Orenda Road;
2) At Dixie Road and Queen Street East; and
3) At Dixie Road and Williams Parkway.

An interconnection at Clark Boulevard and West Drive was ruled out based on hydraulic modelling which showed no system benefits with this interconnection. The other three interconnection alternatives were deemed beneficial and are therefore carried forward for approval as part of this Class EA.

View of Proposed Z5 Interconnection Site at Heart Lake Road and Orenda Road

The first interconnection chamber at Heart Lake Road and Orenda Road is proposed within the City of Brampton's old Heart Lake Road allowance outside of the travelled portion of Orenda Road (see **Appendix I, Compound Figure 3** and photo at left). This interconnection will help supply water to the west of the study area where future intensification is planned (see **Section 2.5**).

View of Proposed Alternate Z5 Interconnection Site at Dixie Road and Queen Street East

The second interconnection at Dixie Road and Queen Street East is required for future intensification planned along the Queen Street corridor in the vicinity of Bramalea Road. For this interconnection, two alternative sites were considered and are carried forward for approval as part of this Class EA. The first would require construction of a deep, vertical drop shaft at the northwest corner of Dixie Road and Queen Street East in front of the Bramalea Baptist Church (see photo at left). Although construction is proposed only within the boulevard and southbound right-turn lane (see **Appendix I, Compound Figure 9**), removal of the existing planter, significant temporary re-grading of the hill, installation of a temporary retaining wall and temporary relocation of the existing overhead hydro lines will be required. Rechanneling of the right-turn lane and use of the centre lane/painted area will also be required in order to avoid significant traffic impacts. It is also possible that the existing bus stop on Queen Street East just outside of the proposed compound will have to be temporarily relocated in order to allow safe construction access to the compound.

The second Queen Street East Z5 interconnection alternative is proposed at the same site as the second Z4 transmission main interconnection described above in **Section 5.3.2**. This would require construction of a separate interconnection main doubling-back to Queen Street East (see **Appendix I, Compound Figure 10**). This would be required to connect to the existing Z5 distribution system which runs along Queen Street East but not Dixie Road. Although construction of a separate, third watermain is not recommended, it may be preferable to excavation of a deep drop shaft, depending on the soil conditions at Queen Street East and a number of other factors. This will be determined during detailed design.

The third and final Z5 interconnection is proposed at the northwest corner of Dixie Road and Williams Parkway for an interconnection with the future 0.9-metre (3-foot) diameter West Brampton watermain (see **Appendix I**, **Compound Figure 12** and photo at right). Construction of this interconnection will require use of the boulevard and the southbound right-turn lane. It is expected that this work will be co-ordinated with the proposed widening of Williams Parkway (see **Section 6.8.3**).

View of Proposed Z5 Interconnection Site at Dixie Road and Williams Parkway

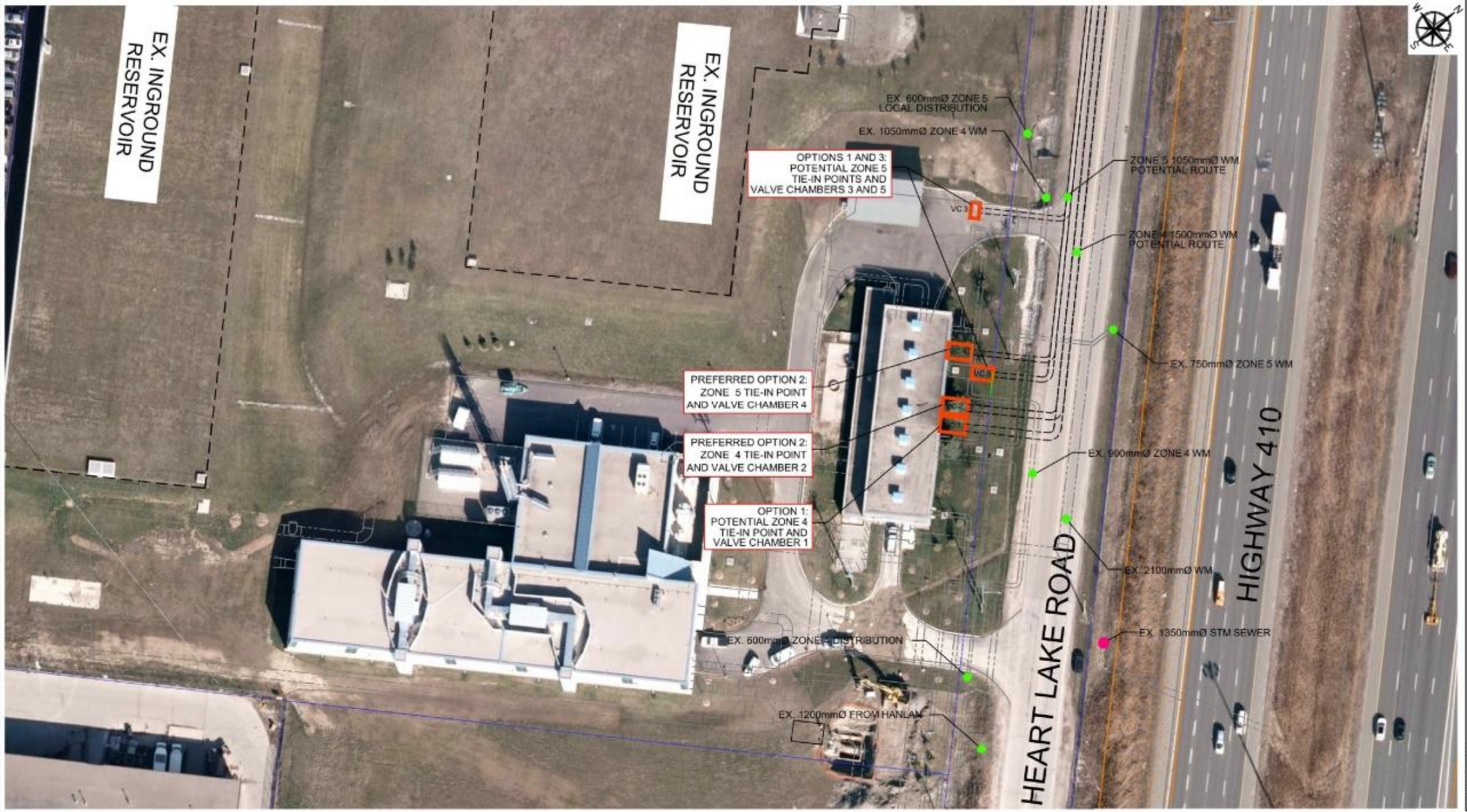
5.3.3 Pumping Station and Reservoir Connections

The following sub-sections describe the proposed connection locations at both the Beckett Sproule and East Brampton Pumping Station and Reservoir, and provide the rationale for their recommendation.

5.3.3.1 Alternative Beckett Sproule Pumping Station and Reservoir Connections

Two potential options were reviewed for a connection of the Z4 transmission main at the Beckett Sproule Pumping Station and Reservoir (see **Figure 5-1**). In both options, the Z4 transmission main would connect to the Beckett Sproule Pumping Station on the east side of the building at a new valve chamber (VC); however, Option 1 would tie-in to the existing discharge header at VC 1, while Option 2 would tie-in to the existing discharge header stub at VC 2. From a constructability perspective, Option 2 is more feasible and less costly simply because the space required for construction of the new VC 2 is not as confined as with VC 1. Therefore, Option 2 is the preferred Z4 connection point at the Beckett Sproule Pumping Station. For the Z5 sub-transmission main, three potential options were similarly reviewed for a connection at the Beckett Sproule Pumping Station and Reservoir (see **Figure 5-1**). In Option 1, the Z5 sub-transmission main would tie-in to the existing local distribution stub located just north of the pumping station, and an addition to the existing valve chamber would be constructed (VC 3). From a constructability perspective, this option would provide a clear zone for future expansion north of the station. From an operations and maintenance perspective, this option would also provide easy accessibility through additional access space. However, the increased distance to the main discharge header is not preferred.

In Option 2, the Z5 sub-transmission main would tie-in to the existing discharge header on the east side of the building at a new VC 4. In Option 3, the Z5 sub-transmission main would tie-in to the existing Z5 main and expand the existing chamber (VC 5). From a constructability perspective, Option 3 is more feasible and less costly because construction space is not as restricted as Option 2. However, from an operations and maintenance perspective, a new connection to the existing discharger header, including a new a flow meter,



Legend

- Property Boundary
- Potential Future Pipes
- Existing Pipes
- Future Highway 410 Widening
- Potential Tie-In Point and Valve Chamber

Basemapping: Region of Peel/City of Brampton, 2012
Orthophotography: Region of Peel, 2013

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East Brampton Watermains Municipal Class Environmental Assessment

Beckett Sproule Pumping Station and Reservoir Zone 4 and Zone 5 Connections

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Figure 5-1

Map Document: Fig 7-1 Beckett Sproule Connections.mxd


View of Z4 and Z5 Connection Points to the Beckett Sproule Pumping Station and Reservoir on Heart Lake Road

is preferred since a tie-in to the existing Z5 sub-transmission main will be difficult given the significant velocities in the existing main. Therefore, with sectional removal of the header to overcome the confined construction space, Option 2 is preferred for the Z5 connection at the Beckett Sproule Pumping Station.

Construction of both the preferred Z4 and Z5 connections at the Beckett Sproule Pumping Station and Reservoir will require use of approximately half of the Heart Lake Road right-of-way beside the station (see **Appendix I, Compound Figure 1** and photo this page). This will require the closure of one lane of traffic around the construction compound. As a result, either two narrow lanes or one wider lane with alternating one-way traffic will be maintained. In the case of alternating one-way traffic, it is expected that traffic will be controlled by temporary signals or flag persons during construction. This will be determined detailed design.

5.3.3.2 Alternative East Brampton Pumping Station and Reservoir Connections

Two potential options were reviewed for a connection of the larger Z4 transmission main at the East Brampton Pumping Station and Reservoir (see **Figure 5-2**). In both cases, the Z4 transmission main will connect to the reservoir via a westerly tunnel within the Region's existing easement, located approximately 100 metres (110 yards) north of Northampton Street. Both options require the removal and, where possible, reinstatement of vegetative park landscaping. In Option 1, the Z4 transmission main connects to the existing reservoir inlet valve chamber at the south end of the site (VC 3). This VC 3 is located very close to the homes that back on to the reservoir site. As such, there may be construction-related dust, noise and vibration impacts on those adjacent residents. Furthermore, from an operations and maintenance perspective, the Option 1 connection does not provide additional redundancy and flexibility. Therefore, Option 1 was ruled out as a potential Z4 connection.

In Option 2, construction of a new valve chamber would be required from which the transmission main would tie-in directly to the reservoir cells. From an operations and maintenance perspective, a new valve chamber and direct tie-in to the reservoir cells is preferred because it will provide both security of supply through a redundant transmission main and flexibility to perform maintenance on the existing system. Therefore, Option 2 is preferred for the Z4 connection at the East Brampton Pumping Station and Reservoir. However, two separate locations were reviewed for the new Option 2 valve chamber location: VC 1 is situated very close to the homes that back on to the reservoir site; and VC 2 is situated closer to the reservoir cells and farther from the adjacent homes. From a construction-related impacts perspective, VC 2 is preferred because potential construction-related dust, noise and vibration impacts on the adjacent residents will be reduced as compared with VC 1. Therefore, Option 2, including construction of VC 2, is the preferred option for the Z4 connection at the East Brampton Pumping Station and Reservoir.


Preferred Z4 Connection Point to the East Brampton Pumping Station and Reservoir near Northampton Park

For the slightly smaller Z5 sub-transmission main, two potential options were similarly reviewed for a connection at the East Brampton Pumping Station and Reservoir (see **Figure 5-2**). In Option 1, the Z5 sub-transmission main does not connect directly to the pumping station or reservoir but rather connects to the existing watermain on Dixie Road at new VC 4, located within the west boulevard of Dixie Road just south of North Park Drive. In Option 2,

Legend

- Property Boundary
- Potential Future Pipes
- Existing Pipes
- Potential Future Overflow Pond
- Potential Tie-In Point and Valve Chamber

Basemapping: Region of Peel/City of Brampton, 2012
Orthophotography: Region of Peel, 2013

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East Brampton Watermains Municipal Class Environmental Assessment

East Brampton Pumping Station and Reservoir Zone 4 and Zone 5 Connections

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Figure 5-2

Map Document: Fig 7-2 East Brampton Connections.mxd

the Z5 sub-transmission main follows the same alignment as the Z4 transmission main along the Region's existing easement from Dixie Road into the reservoir property, and then veers north to connect to the discharge header tee at the East Brampton Pumping Station at new VC 5. From an operations and maintenance perspective, Option 1 is preferred because a future overflow management facility is planned at the south end of the pumping station, so the area should not be encumbered with pipelines and/or chambers[43]. Furthermore, from a constructability perspective, construction of both the Z4 and Z5 mains through the Region's existing East Brampton transmission main easement would be difficult due to space restrictions and not ideal from an operations and maintenance perspective. Therefore, Option 1 – connection to the existing watermain on Dixie Road – is the preferred option for the Z5 connection at the East Brampton Pumping Station and Reservoir (see **Appendix I**, **Compound Figure 14**).

43 The overflow pond at the East Brampton Pumping Station and Reservoir is currently planned at the conceptual level to comply with Region of Peel standards to protect against inadvertent pressurization at the pump station (i.e., the pond will provide somewhere for water to overflow and thereby avoid pressurization).

6. Preferred Design Concept

The preferred design concept for routing of both the new 1.5-metre (5-foot) diameter Zone 4 (Z4) East Brampton transmission main and the 0.9- to 1.2-metre (3- to 4-foot) diameter Zone 5 (Z5) East Brampton sub-transmission main includes a combination of both open cut and tunnel construction along the west side of Heart Lake Road, the north side of Clark Boulevard and the west side of Dixie Road. It is currently expected that the watermains will be installed in the same trench or tunnel at a ratio of approximately 60 per cent open cut construction to 40 per cent tunnel construction. Open cut construction will require temporary lane closures that advance as the watermains are installed. Tunnel construction will require the construction of tunnel shaft compounds at both ends of each tunnelled section. The extent of open cut versus tunnelling will be reviewed further and confirmed during detailed design. In addition, it is expected that both the horizontal and vertical alignments of the watermains will be refined during detailed design.

Figure 6-1 presents the preferred watermain route, including watercourse crossings, proposed construction methods and interconnections with the existing distribution system as was presented at Public Open House #2. A detailed description of each route segment is provided in the sub-sections below. Where construction related impacts cannot be avoided, appropriate mitigation and monitoring measures were developed and are documented in **Section 7** of this report.

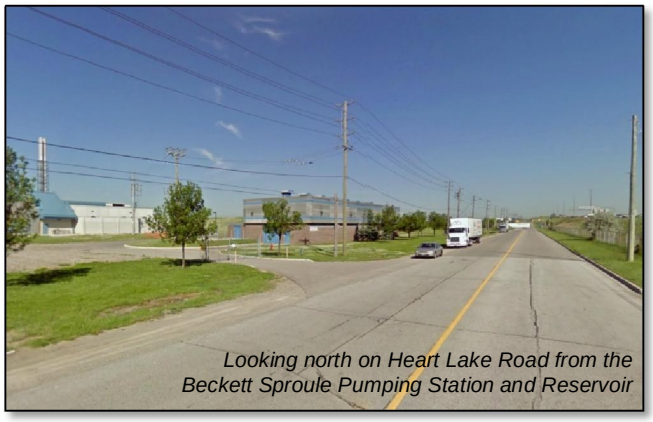
6.1 Overview of the Preferred Design Concept

Extending north from the Beckett Sproule Pumping Station and Reservoir to the East Brampton Pumping Station and Reservoir, the preferred East Brampton Watermains route measures approximately six kilometres (3.7 miles) in length and will be constructed predominantly within the existing road right-of-ways of Heart Lake Road, Clark Boulevard and Dixie Road. An overview of the preferred design concept for each of these three route segments is provided below.

6.1.1 Heart Lake Road

The proposed watermains will extend approximately 1.7 kilometres (1 mile) north along the west side of Heart Lake Road from the Beckett Sproule Pumping Station and Reservoir to the Highway 410 crossing just south of Clark Boulevard. This section of the alignment is shown in simplified plan and profile view on **Figures 6-2 and 6-3** and can be further described as follows:

- From the connection point at the Beckett Sproule Pumping Station and Reservoir located on Heart Lake Road approximately 200 metres (220 yards) south of Glidden Road (see **Appendix I, Compound Figure 1** and **Section 5.3.3.1**), the watermains will be installed via open cut construction in a common trench along the west side of Heart Lake Road. This section will extend north approximately 700 metres (0.4 miles) to just south of Selby Road.



Looking north on Heart Lake Road from the Beckett Sproule Pumping Station and Reservoir

East Brampton Pumping Station and Reservoir

Beckett Sproule Pumping Station and Reservoir

0.9

1.05

1.2

Centre St N
Williams Pkwy E
Kennedy Rd N
Vodden St
Rutherford Rd N
HWY 410
Queen St E
Hansen Rd S
Orenda Rd
Canadian National Railway
Clarence St
Selby Rd
Glidden Rd
Heart Lake Rd S
Clark Blvd
Tivoli Dr
Dixie Rd
Howden Blvd
Mackay St S
North Park Dr
Bramalea Rd
Balmoral Dr
Birchbank Rd
Deanbourne Blvd

Legend

- Study Area Boundary
- Arterial/Collector Road
- Watercourse
- Existing East Brampton Watermain
- Other Existing Large Diameter Infrastructure
- TRCA Regulation Limit

Recommended Route for 1.5 m Zone 4 Transmission Main and 0.9 m to1.2 m Zone 5 Sub-Transmission Main

- Proposed Tunnel Construction
- Proposed Open Cut Construction
- 0.9 — Proposed Zone 5 Sub-Transmission Main Sizing (metres in diameter)
- Proposed Z4 Interconnection
- Proposed Z5 Interconnection

Basemapping: Region of Peel/City of Brampton, 2012
Orthophotography: Region of Peel, 2009/2012

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East Brampton Watermains Municipal Class Environmental Assessment

Preferred Watermain Route

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Figure 6-1

Map Document: Fig 6-1 PreferredRoute.mxd

Figure 6-2 Simplified Heart Lake Road Plan and Profile: South of the CN Railway

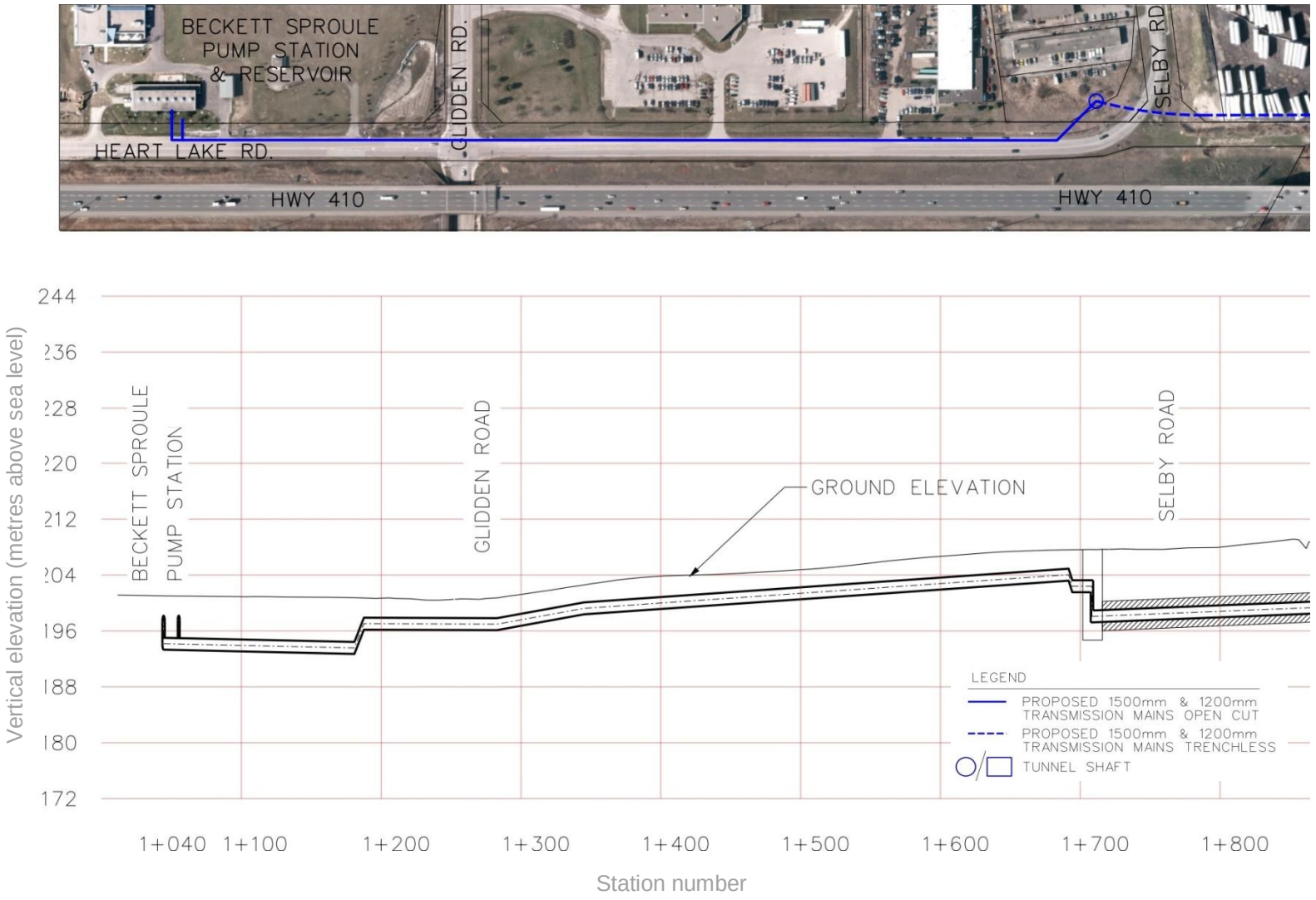
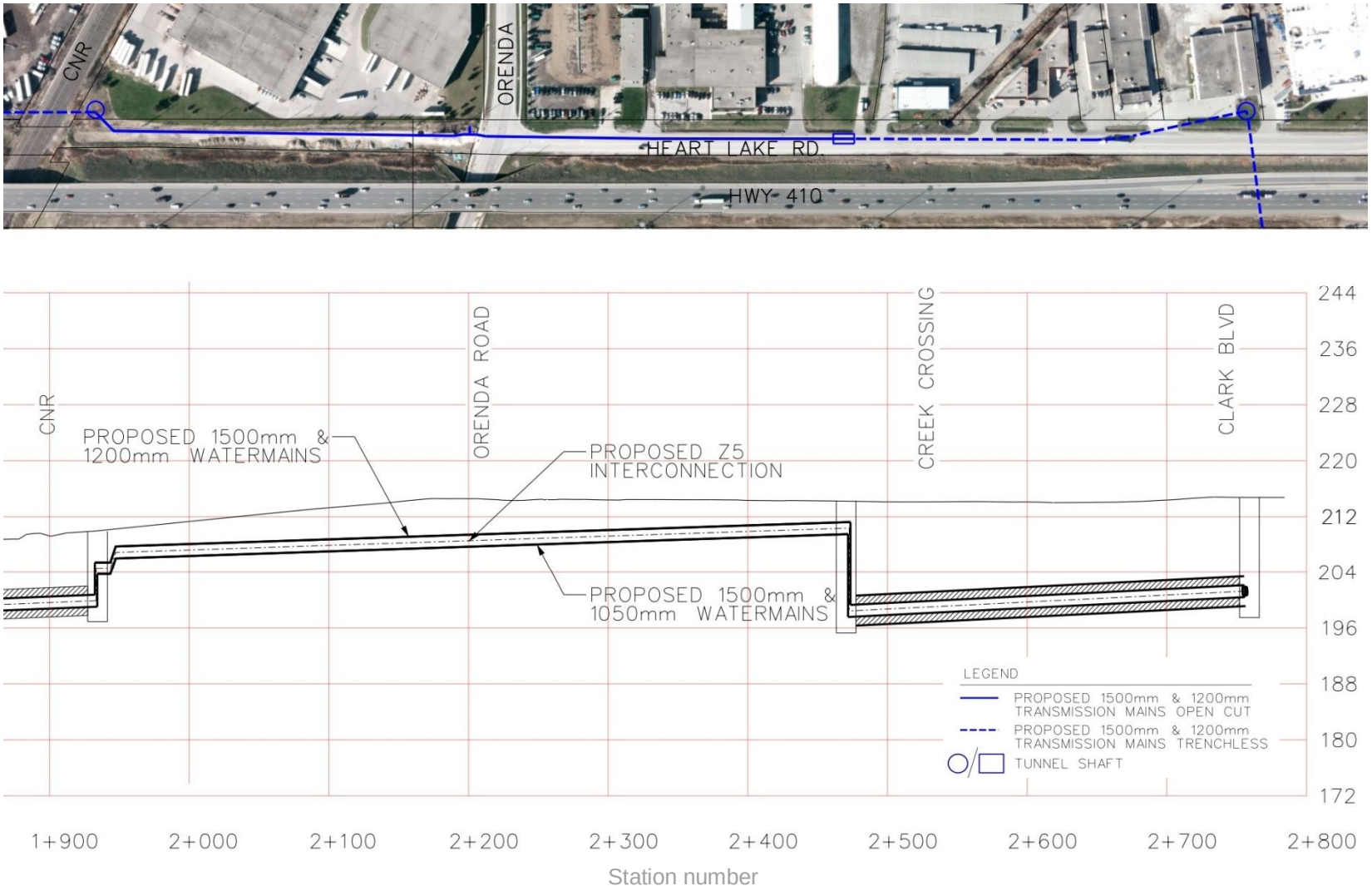
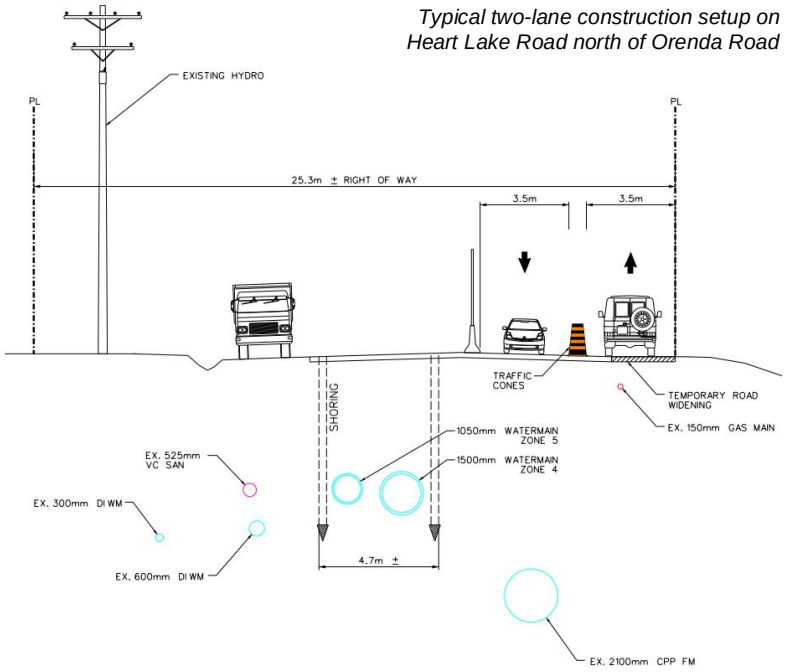


Figure 6-3 Simplified Heart Lake Road Plan and Profile: North of the CN Railway

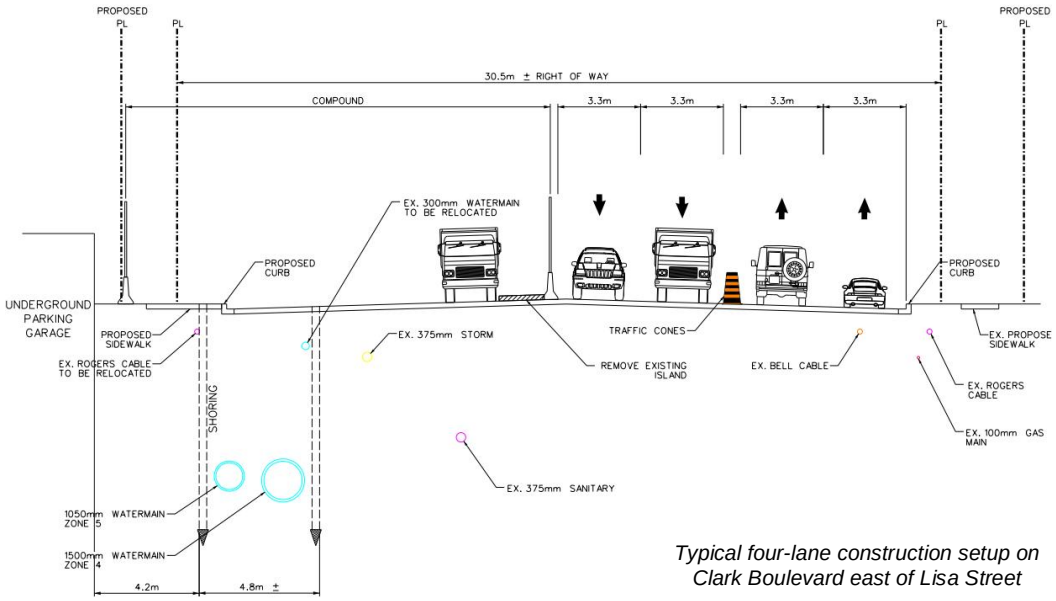


Typical two-lane construction setup on Heart Lake Road north of Orenda Road



- From a tunnel shaft compound (exit shaft) located just south of Selby Road (see **Appendix I, Compound Figure 2** and **Section 6.2** for further details regarding property requirements), the watermains will be constructed in a common 4.3-metre (14-foot) diameter tunnel for approximately 200 metres (220 yards) under an industrial property (i.e., SpeedX Transport, a trucking business located at 62 Selby Road) and the adjacent CN railway corridor. Here a slight westerly bend is required in the tunnel alignment under private property (SpeedX Transport) in order to provide an adequate separation distance from the Region's existing 2.1-metre (7-foot) diameter watermain, which also jogs west within the Heart Lake Road right-of-way just south of Selby Road. This proposed westerly bend also avoids an existing 0.53-metre (1.7-foot) diameter sanitary sewer, 0.6-metre (2-foot) diameter watermain and 0.15-metre (6-inch) diameter gas main.
- From a tunnel shaft compound (access shaft) proposed just north of the CN railway corridor at the back of 165 Orenda Road (see **Appendix I, Compound Figure 2**), the watermains will be installed via open cut construction within the old, closed Heart Lake Road roadway allowance for approximately 250 metres (275 yards) north to Orenda Road.
- The Z5 sub-transmission main will interconnect with the existing 0.6-metre (2-foot) diameter watermain on the south side of Orenda Road, outside of the paved roadway (see **Appendix I, Compound Figure 3** and **Section 5.3.2.2**). North of this location, the Z5 sub-transmission main reduces in size from 1.2 (4 feet) in diameter to 1.05 metres (3.4 feet) in diameter.
- North of Orenda Road, the watermains will continue for approximately 250 metres (275 yards) along the west side of Heart Lake Road via open cut construction.
- Tunnel construction is then required for crossing of the watercourse located beside Access Self Storage (a six metre by three metre (20 foot by 10 foot) concrete culvert). The tunnel shaft compound (access shaft) for this crossing is proposed on Crosby Canada's property at 145 Heart Lake Road, just outside of the TRCA-regulation limits (see **Appendix I, Compound Figure 4**). The watermains will then be constructed in a common tunnel for approximately 250 metres (275 yards) north along Heart Lake Road to the Highway 410 crossing tunnel shaft just south of Clark Boulevard (see **Appendix I, Compound Figure 5**). This tunnel shaft compound, proposed on the former United Rentals site at 89 Heart Lake Road, will serve as the exit shaft for both tunnelling under the culvert crossing on Heart Lake Road and for tunnelling under Highway 410.

For construction near the Beckett Sproule Pumping Station and Reservoir, it is expected that the construction compound will extend into the Heart Lake Road right-of-way. Similarly, it is expected that the



Typical four-lane construction setup on Clark Boulevard east of Lisa Street

tunnel shaft compound south of Orenda Road at Crosby Canada will extend into the Heart Lake Road right-of-way. It is expected that either one lane (3.5 metre or 11 foot width) will be maintained around each of these compounds, or the roadway will be completely closed around them during construction. Alternating one-way traffic will be controlled by temporary signals or flag persons during construction. Alternatively, if the roadway is closed at the compound sites, alternate access from either the north or south provides good flexibility for property access. For further information regarding traffic considerations, see **Section 6.3** below.

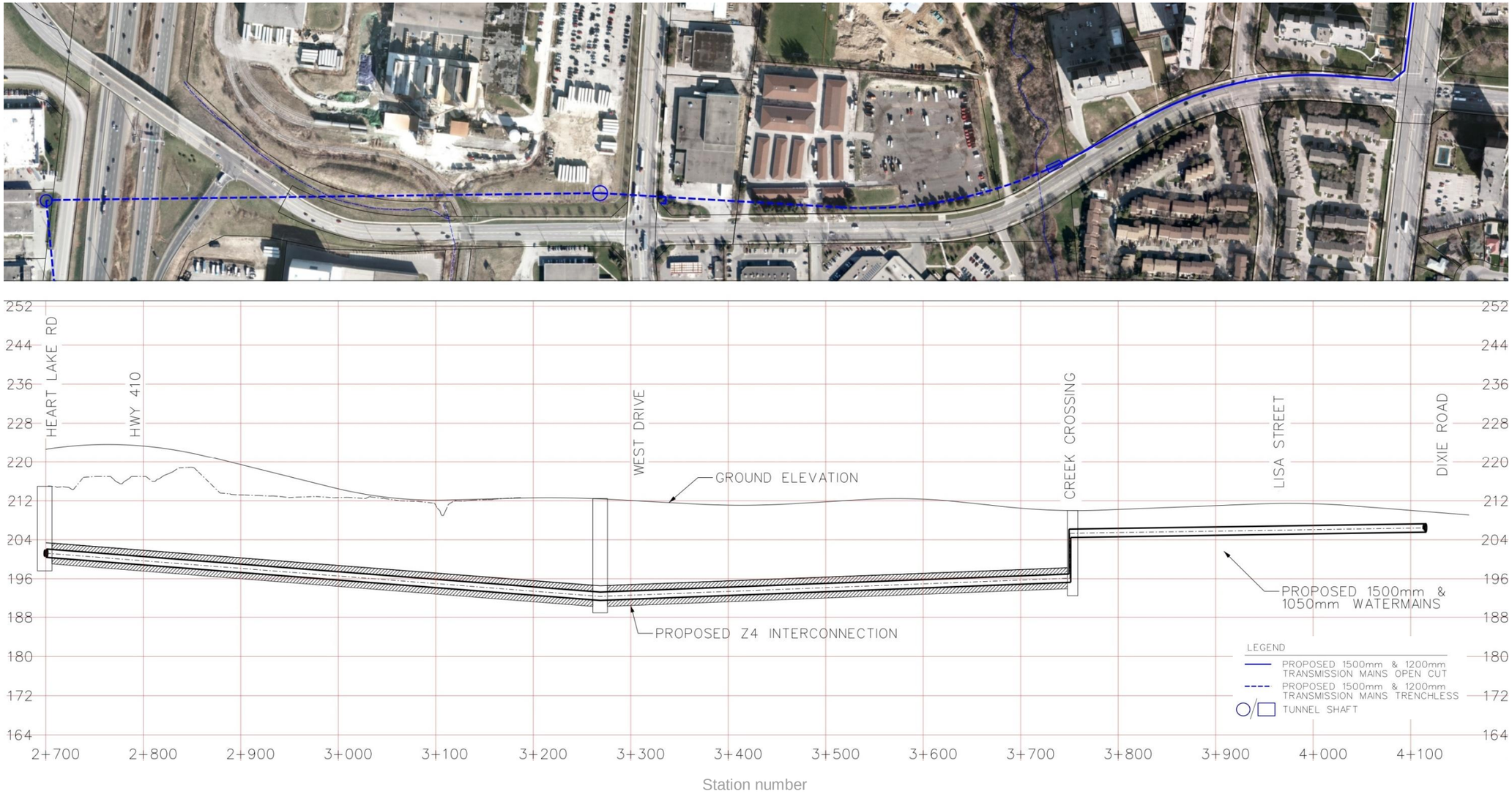
Some relocation of existing gas lines will be required along Heart Lake Road, as well as removal of an abandoned 1.05-metre (3.4-foot) diameter feedermain.

6.1.2 Clark Boulevard

The proposed watermains will extend approximately 1.5 kilometres (0.9 miles) along the north side of Clark Boulevard from Heart Lake Road, under Highway 410, to Dixie Road. This section of the alignment is shown in simplified plan and profile view on **Figure 6-4** and can be further described as follows:

- From a tunnel shaft compound (exit shaft) located at 89 Heart Lake Road (see **Appendix I, Compound Figure 5**), the watermains will be installed via tunnel construction in a common 4.3-metre (14-foot) diameter tunnel under Highway 410 and along the north side of Clark Boulevard to approximately 350 metres (380 yards) west of Dixie Road.
- From approximately 350 west of Dixie Road, the watermains will be installed via open cut construction in a common trench along the north side of Clark Boulevard. This will require relocation of an existing 0.3-metre (12-inch) diameter watermain.
- For the tunnelled section along Clark Boulevard, the proposed tunnel acess shaft is located on the Owens-Illinois glass factory property at the northwest corner of Clark Boulevard and West Drive (see **Appendix I, Compound Figure 6**). It is proposed that this acess shaft compound will be used for tunneling of the watermains west under a railway spur, a channelized watercourse crossing and finally

Figure 6-4 Simplified Clark Boulevard Plan and Profile



under Highway 410. It will also be used for tunnelling east under the existing 1.05-metre (3.4-foot) diameter East Brampton feedermain, the existing 2.1-metre (7-foot) diameter Airport Road feedermain, and the watercourse adjacent to 190 Clark Boulevard. The tunnel exit shaft compound for tunnelling under the watercourse is proposed at 190 Clark Boulevard, adjacent to the creek at the top-of-bank (see **Appendix I, Compound Figure 7**). This is within the TRCA-regulation limits and will require site grading (floodplain mapping in the area is currently being updated by TRCA).

- A Z4 interconnection with the existing East Brampton feedermain is proposed at 75 West Drive, located at the northeast corner of Clark Boulevard and West Drive (see **Appendix I, Compound Figure 7**).

It is expected that four lanes, each 3.5 metres (11 feet) in width, can be maintained through the open cut construction work zone along Clark Boulevard east of the creek crossing. Staged construction will be required across the Lisa Street intersection, including temporary relocation of the Brampton Transit stop at the north-east corner of Clark Boulevard and Lisa Street.

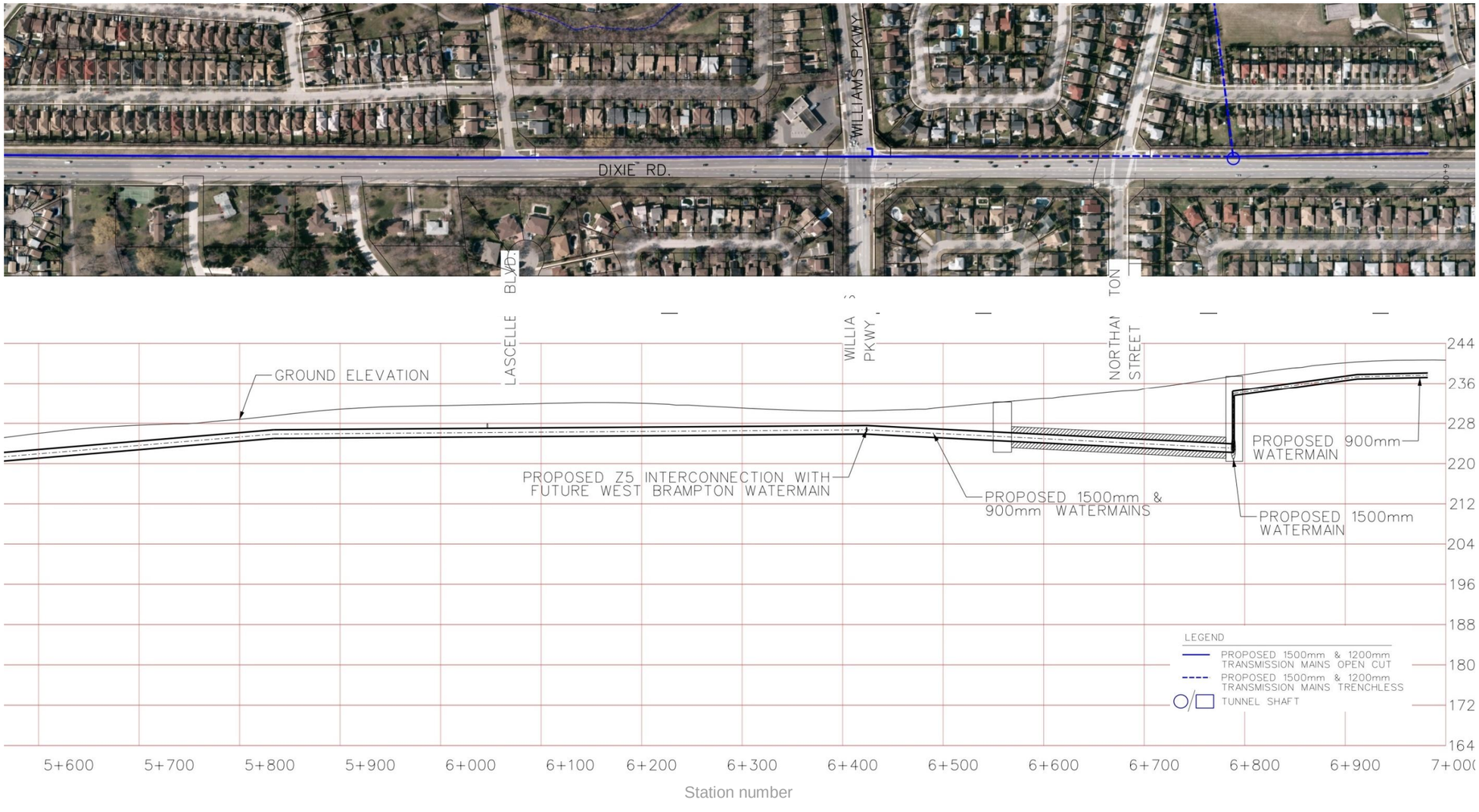
6.1.3 Dixie Road

The proposed watermains will extend approximately 2.8 kilometres (1.7 miles) north along the west side of Dixie Road from Clark Boulevard to the vicinity of the East Brampton Pumping Station and Reservoir. The larger Z4 transmission main will connect to the reservoir via a westerly tunnel approximately 100 metres (110 yards) north of Northampton Street, while the slightly smaller Z5 sub-transmission main will connect to the existing distribution system approximately 200 metres (220 yards) further north on the west side of Dixie Road. This section of the alignment is shown in simplified plan and profile view on **Figures 6-5 and 6-6** and can be further described as follows:

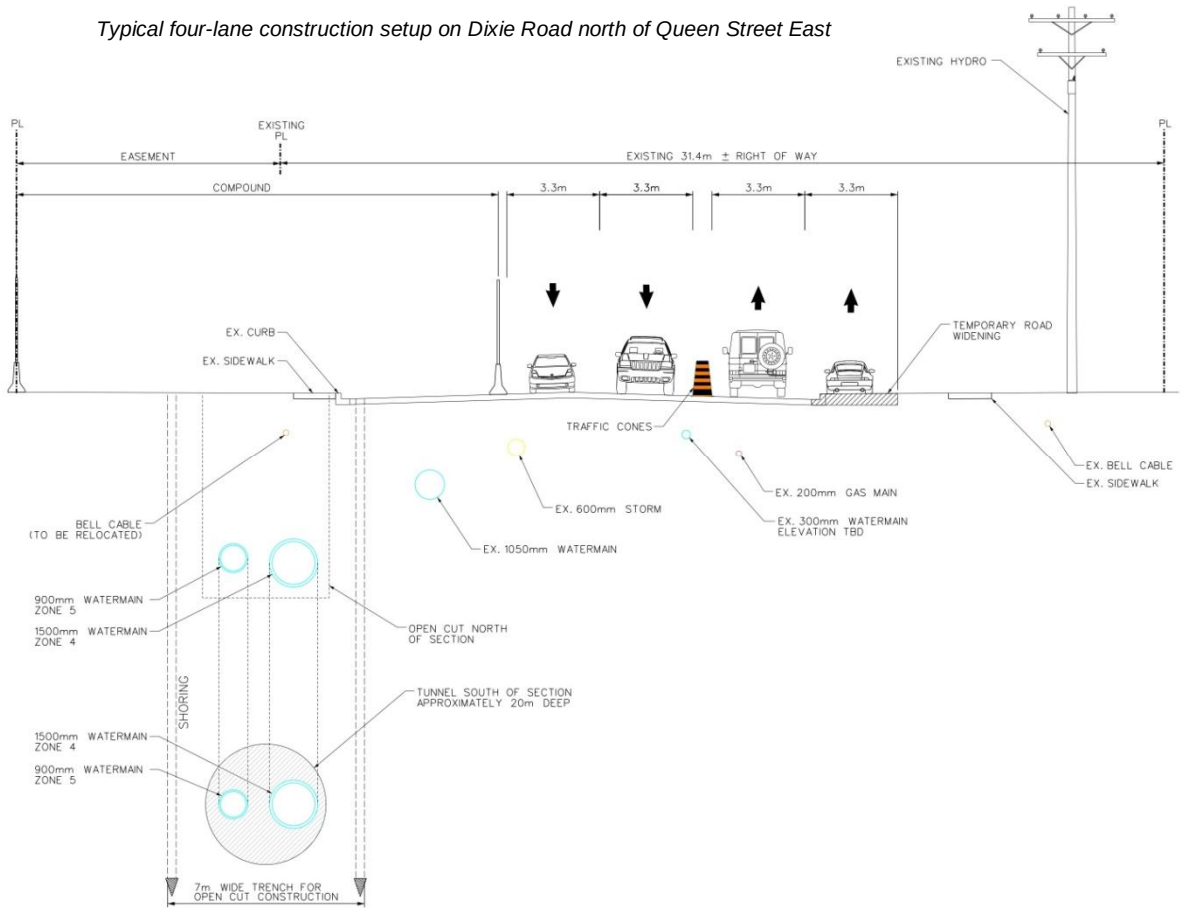
- From Clark Boulevard, the watermains will be installed via open cut construction in a common trench along the west side of Dixie Road. This section will extend north approximately 200 metres (220 yards) to south of Lisa Street.
- From a tunnel shaft compound (access shaft) located approximately 150 metres (165 yards) south of Lisa Street (see **Appendix I, Compound Figure 8** and **Section 6.2** for further details regarding property requirements), the watermains will be constructed in a common tunnel for approximately 800 metres (0.5 miles). This includes tunnel crossings of the Dixie Road-Lisa Street intersection, the Dixie Road-Queen Street East intersection, the existing Airport Road feedermain crossing at Queen Street East, and the Spring Creek tributary crossing north of Queen Street East.
- A vertical drop shaft is proposed at the northwest corner of the Dixie Road-Queen Street East intersection (see **Appendix I, Compound Figure 9** and **Section 5.3.2.2**). This is one site proposed for a Z5 interconnection to the existing Z5 water distribution system. Alternatively, the Z5 interconnection could be made within the tunnel shaft compound at 9124 Dixie Road described immediately below. However, this would require construction of a separate connection main between the shaft and the existing Z5 watermain at Queen Street East (see **Appendix I, Compound Figure 10**). Although construction of a separate, third watermain is not recommended, it may be preferable to excavation of a deep drop shaft, depending on the soil conditions at Queen Street East and a number of other factors. This will be determined during detailed design.

Figure 6-5 Simplified Dixie Road Plan and Profile: South of Howden Boulevard

Figure 6-6 Simplified Dixie Road Plan and Profile: North of Howden Boulevard



Typical four-lane construction setup on Dixie Road north of Queen Street East



- From the tunnel shaft compound located on the west side of Dixie Road midway between Queen Street East and Howden Boulevard, just north of the Spring Creek tributary (exit shaft, Z4 interconnection with the existing East Brampton feedermain and potential Z5 interconnection, see **Appendix I, CompoundFigure 10**), the watermains will then be installed via open cut construction in a common trench all the way north along the west side of Dixie Road to approximately 140 metres (150 yards) north of Williams Parkway (see **Appendix I, Compound Figure 12**);

- From the tunnel shaft located within the Dixie Road right-of-way approximately 140 metres (150 yards) north of Williams Parkway (see **Appendix I, Compound Figure 12**), the watermains will be installed in a common tunnel to the Region of Peel's existing easement which is located between two houses about 100 metres (110 yards) north of Northampton Street (see **Appendix I, Compound Figures 13** and **14**).
- The Z5 sub-transmission main will extend approximately 190 metres (210 yards) further north to an existing watermain located approximately 120 metres (130 yards) south of North Park Drive, also on the west side of Dixie Road (see **Appendix I, Compound Figure 13**). Along this section, an existing 0.2-metre (8-inch) diameter gas main (approximately 255 metres or 280 yards long), 0.2-metre (8-inch) diameter watermain (approximately 260 metres or 285 yards long) and various small diameter storm sewers may need to be relocated.
- As an alternative to the Z4 interconnection at 9124 Dixie Road, a potential Z4 interconnection compound is also proposed at the northwest corner of Dixie Road and Howden Boulevard (see **Appendix I,**

Compound Figure 11 and **Section 5.3.2.1**). The location of the interconnections will be determined during detailed design.

- A construction compound that extends into the southbound lanes of Dixie Road will also be required at the northwest corner of the Dixie Road-Williams Parkway intersection (see **Appendix I, Compound Figure 12**). This compound is required in order to make a Z5 interconnection with the future 0.9-metre (3-foot) diameter West Brampton watermain which will be constructed along the north side of Williams Parkway (see **Section 2.5.4**).

Open cut construction along the west side of Dixie Road will require moving closures of one existing southbound lane of traffic through the 100 to 200-metre (110 to 220-yard) work zone. However, as shown in the figure above, four traffic lanes can be maintained in most areas, allowing two lanes of traffic in each direction through the work zone.

In areas where tunnel shaft compounds extend into the Dixie Road right-of-way, a temporary loss of traffic lanes may be required for up to 12 to 18 months. For example, it is expected that the tunnel shaft compound south of Lisa Street (access shaft at 11 Lisa Street) will extend into one southbound lane of Dixie Road (see **Appendix I, Compound Figure 8**). However, two southbound lanes and a left-turn lane into Bramalea City Centre will be maintained.

North of Queen Street East at 9121 Dixie Road (see **Appendix I, Compound Figure 10**), the exit shaft for this tunnelled section will also extend into the southbound lanes of Dixie Road due to space restrictions on-site because of planned development. However, four lanes of traffic can be maintained in front of the compound during construction by paving a portion of the east boulevard for a temporary lane (see typical cross-section above).

For the Z5 interconnection compound that extends into the southbound lanes of Dixie Road at Williams Parkway (see **Appendix I, Compound Figure 12**), a temporary loss of one southbound traffic lane on Dixie Road will be required, possibly for as long as 12 to 18 months. This means that during construction at the Dixie Road-Williams Parkway intersection, there will be one dedicated southbound lane, a shared southbound and right-turn lane, and a dedicated left-turn lane. In addition, the proposed compound will also extend into the Williams Parkway right-of-way, requiring a temporary loss of one westbound traffic lane on Williams Parkway for the same duration.

For the construction compounds that extend into the southbound lanes of Dixie Road between Williams Parkway and North Park Drive (see **Appendix I, Compound Figures 12 and 13**), four narrow lanes of traffic (3.3 metres or 11 feet in width) can be maintained in front of the compounds during construction by paving a portion of the east boulevard for a temporary lane (see typical cross-section above).

During open cut construction along the west side of Dixie Road, some intersection operations may degrade as the work zone approaches and enters the intersection. For example, during staged construction within either the Dixie Road-Howden Boulevard intersection or the Dixie Road-Williams Parkway intersection, it is anticipated that significant delays could be expected during the morning and afternoon rush hours. However, the expected construction duration for the crossing of each intersection is only 10 to 15 days, and mitigation measures such as traffic diversion to alternate routes and optimized signal timing phasing splits will reduce traffic impacts. For further information regarding traffic considerations, see **Section 6.3** below.

6.2 Property Requirements

Where the East Brampton watermains and tunnel shaft construction compounds are proposed outside of an existing road right-of-way (see **Appendix I**), permanent easements from either public agencies (e.g., MTO or City of Brampton) or private landowners will be required. Permanent easements are registered on title and no development is permitted within the area. For example, construction of a parking lot on top of the watermains is permitted, whereas construction of a building is not. In addition, temporary easements to accommodate construction equipment access and storage will also be required at all tunnel shaft locations and where the existing road right-of-way width is insufficient to accommodate construction access. The Region will negotiate compensation for property owners where easements are required. If an agreement cannot be reached, the Region may proceed with the expropriation process[44].

As shown in **Appendix I**, both temporary and permanent easements are proposed at the following locations for tunnel shafts, where a manhole at the surface and an underground chamber would remain following construction completion:

- Compound 1A: Vacant MTO property known as 85 Selby Road, located just west of Highway 410 at Selby Road and Heart Lake Road (see **Compound Figure 2**);
- Compound 2: Summit REIT property known as 165 Orenda Road, located west of Highway 410 just north of the CN railway corridor (see **Compound Figure 2**);
- Compound 3: Crosby Canada property known as 145 Heart Lake Road, located on the west side of Heart Lake Road north of Orenda Road (see **Compound Figure 4**);
- Compound 4: Private property (numbered Ontario company and the former United Rentals site) known as 89 Heart Lake Road, located on the west side of Heart Lake Road south of Clark Boulevard (see **Compound Figure 5**);
- Compound 5: Owens-Illinois property known as 100 West Drive, located at the northwest corner of Clark Boulevard and West Drive (see **Compound Figure 6**);
- Compound 6A: W. Ralston Canada property known as 75 West Drive, located at the northeast corner of Clark Boulevard and West Drive (see **Compound Figure 7**);
- Compound 6B: City of Brampton property recently transferred from 190 Clark Boulevard, located immediately east of the watercourse on the north side of Clark Boulevard west of Lisa Street[45] (see **Compound Figure 7**);
- Compound 7A: East West Management property known as 11 Lisa Street, located on the west side of Dixie Road just south of Lisa Street (see **Compound Figure 8**);
- Compound 8A: Arlington Homes property known as 9124 Dixie Road, located on the west side of Dixie Road just south of Hazelwood Drive (see **Compound Figure 10**); and
- Compound 12: City of Brampton property at Heart Lake Road just south of Orenda Road (see **Compound Figure 2**).

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44 Expropriation refers to the process by which the Region may take property for municipal purposes without consent of the landowner. Payment of compensation is provided. Expropriation of provincially owned land is not permitted under the Expropriations Act.

*45 TRCA noted in their February 24, 2014 correspondence (see **Appendix M-2**) that Compound 6B should be restored to a naturalized system, post construction.*

Permanent easements are also proposed at the following locations where the watermains or interconnections to the existing distribution system will be located outside of an existing roadway:

- Easement 1A: Vacant MTO property located just west of Highway 410 between Selby Road and the CN railway corridor (see **Compound Figure 2**);
- Easement 1B: SpeedX Transport property known as 62 Selby Road, located west of Highway 410 just south of the CN railway corridor (see **Compound Figure 2**);
- Easement 2A: City of Brampton property known as the former Heart Lake Road right-of way located just west of Highway 410 between the CNR and Orenda Road (see **Compound Figure 3**);
- Easement 5B: Owens-Illinois property known as 100 West Drive, located on the north side of Clark Boulevard between Highway 410 and West Drive (see **Compound Figure 6**);
- Easement 6C: City of Brampton property on the north side of Clark Boulevard east of West Drive (see **Compound Figure 7**); and
- Easement 6D: Central Peel Holdings (1982) Limited property (Zoom Zoom Storage) known as 150 Clark Boulevard, located on the north side of Clark Boulevard east of West Drive (see **Compound Figure 7**).

6.2.1 Storage Compounds

It is expected that portions of several properties in the vicinity of the recommended route will be required for temporary storage of construction equipment and materials during construction. The owners of some potentially suitable properties have been contacted as part of this Municipal Class EA process (e.g., Compound 7B, see **Compound Figure 8**); however, the need for and location of these areas will be determined and confirmed during detailed design. All storage compounds will be located outside of the Regional floodplain.

6.3 Transportation Considerations

It is expected that construction of the East Brampton watermains will impact transporation operations along the recommended route and, to a lesser degree, at intersecting roadways. For example, open cut construction within the Heart Lake Road, Clark Boulevard and Dixie Road right-of-ways will cause temporary traffic disruptions, including lane reductions and optional detours. Similarly, tunnel shaft compound construction within the road right-of-way will also impact traffic and other roadway users[46]. Therefore, preliminary construction staging or traffic management plans (TMPs) were prepared to provide a visual reference as to how construction is proposed to proceed for key access configurations and intersection scenarios. Based on the preliminary TMPs, a traffic impact assessment was then prepared to identify the potential impacts to traffic operations (i.e., traffic congestion, delays and queuing) at major

*46 As shown in the proposed compound drawings in **Appendix I**, tunnel shaft compound construction is proposed within the roadway at the following locations: 1) Heart Lake Road beside the Beckett Sproule Pumping Station and Reservoir; 2) Heart Lake Road north of Orenda Road; 3) Heart Lake Road just south of Clark Boulevard; 4) Dixie Road just south of Lisa Street; 5) Dixie Road and Queen Street East; 6) Dixie Road just south of Hazelwood Drive; 7) Dixie Road and Howden Boulevard; 8) Dixie Road and Williams Parkway; 9) Dixie Road just north of Northampton Drive; and 10) Dixie Road just south of North Park Drive.*

intersections along the route. Key findings of the traffic impact assessment (see **Appendix J**) are presented in the following sub-sections.

6.3.1 Traffic

An analysis of potential impacts at key intersections and proposed construction compound locations was completed. The traffic impact assessment was not an exhaustive analysis of every location along the route, but rather it was an initial assessment of the magnitude of operational impact that the watermains installation could have on the roadway network. As outlined below, it is estimated that the average delay or wait time expected will range from less than one minute to more than 30 minutes (without specific mitigation) during peak periods, depending upon the location. However, with TMPs and mitigative measures, these delays should be considered as reasonable impacts. Examples of mitigative measures include traffic diversion to alternate routes (i.e., advanced notification using informational signage and variable message boards and/or the media) and construction scheduling restrictions (e.g., winter construction, weekend construction, night time construction where noise by-laws permit, etc.). Mitigative measures will be confirmed and refined as necessary during detailed design, and detailed traffic management plans will be prepared and implemented for the entire route.

Heart Lake Road

The Heart Lake Road-Glidden Road intersection is currently operating at an acceptable condition during both the weekday AM and PM peak periods. Traffic modelling shows that acceptable operations are expected to continue during staged open cut construction through the intersection. Along the remainder of Heart Lake Road, it is expected that single lane operations (i.e., alternating one-way traffic through the work zone) during open cut and/or tunnel shaft construction along the west side will result in traffic delays of approximately 30 seconds to one minute. This queue length is considered to be minimal, and should traffic volume increase dramatically during construction, traffic diversion may be further considered to reduce the traffic volume. Access to all businesses will be maintained by keeping at least one vehicle entryway open at all times. Where this may not be possible, access will be maintained by completing construction through one half of the entrance before proceeding to construction through the other half.

The closed lane option at Heart Lake Road north of Orenda Road was not modelled due to the low traffic turning volumes at the Heart Lake Road-Orenda Road intersection. However, access to Heart Lake Road south of the potential closure is available from Orenda Road, while access north of the potential closure is available from Clark Boulevard. Similarly, should Heart Lake Road be closed at Selby Road (see **Section 6.1.1**), property access is still available from Selby Road to the north and Heart Lake Road to the south.

Clark Boulevard and West Drive

The Clark Boulevard-West Drive intersection will be tunnelled as part of the Highway 410, existing East Brampton watermain and TRCA watercourse crossing along Clark Boulevard. Therefore, operational traffic impacts are not expected at this location. It should also be noted that the tunnel shaft compound proposed at the northwest corner of the Clark Boulevard-West Drive intersection will be confined to the Owens-Illinois glass factory property and will not impact traffic at the intersection. Similarly, the construction compound proposed at the northeast corner of the Clark Boulevard-West Drive intersection for an interconnection to the existing East Brampton watermain (see **Section 5.3.2.1**) will also be confined to the W. Ralson (Canada) Inc. property and will not impact traffic and the intersection. In addition, the construction compounds will be fully

fenced so as to limit visual distraction while also providing for site safety and security. Access to all businesses will be maintained.

Clark Boulevard and Lisa Street

The Clark Boulevard-Lisa Street intersection is currently operating at an acceptable condition during both the weekday AM and PM peak periods. Similarly, during staged open cut construction across the intersection, operational conditions are not expected to deteriorate significantly. As a result, with optimized signal timing phasing splits, this intersection is expected to operate under acceptable conditions during construction. The expected duration of construction through this intersection is 10 to 15 days.

Clark Boulevard and Dixie Road

The Clark Boulevard-Dixie Road intersection is currently operating over capacity, especially during the PM peak period. As a result, further degradation of intersection operations is expected during open cut construction staging. However, only the southbound right turn lane will be affected on Dixie Road and the expected duration of construction at this intersection is only 10 to 15 days. Furthermore, it is expected that traffic diversion to Lisa Street will be considered.

Dixie Road and Lisa Street

This Dixie Road-Lisa Street intersection currently operates over capacity during the weekday PM peak period. Therefore, tunnelling of this intersection as part of the Queen Street East/Spring Creek tributary tunnel section will help reduce additional traffic impacts as a result of this project. However, the proposed tunnel shaft construction compound just south of Lisa Street will result in the temporary loss of one southbound traffic lane for a duration of approximately 12 to 18 months. However, traffic modelling shows that with optimized signal timing phasing splits, the Dixie Road-Lisa Street intersection will continue to operate at an acceptable condition during the morning rush hours. During the afternoon rush hours, average traffic delays of approximately one minute may be expected.

Dixie Road and Queen Street East

The Dixie Road-Queen Street East intersection is currently operating at or above capacity during both the weekday AM and PM peak periods. Construction of the Z5 interconnection at the northwest corner of the intersection will require temporary removal of the existing southbound right-turn lane and conversion of the through-lane to a shared through-right lane in order to accomodate the work. However, traffic modelling shows only minimal impacts, with similar overall delays and volume-to-capacity ratios as expected during existing traffic conditions.

Dixie Road and Howden Boulevard

The Dixie Road-Howden Boulevard intersection is currently operating at an acceptable condition during both the weekday AM and PM peak periods, although some individual movements are experiencing long delays (i.e., the northbound lane during the morning rush hours and the southbound lane during the afternoon rush hours). During open cut construction across the intersection, operational conditions are expected to deteriorate, with average delays of approximately three minutes for west bound turns onto Dixie Road and average delays of approximately one to two minutes for all other turning movements. However, the expected construction duration through this intersection is only 10 to 15 days, and traffic diversion to alternate routes is

recommended. During construction of the alternative Z4 interconnection at the northwest corner of the intersection, maintaining a minimum of two lanes of southbound traffic is recommended, if possible. The one-lane scenario shown on **Compound Figure 11** (see **Appendix I**) is expected to deteriorate the southbound traffic, with delays of approximately six minutes during both the AM and PM peak periods.

Dixie Road and Williams Parkway

This Dixie Road-Williams Parkway intersection is currently operating at an acceptable condition during both the weekday AM and PM peak periods, although west bound turns onto Dixie Road are experiencing delays longer than one minute during the morning rush hours and east bound left turns onto Dixie Road are similarly experiencing delays during the afternoon rush hours. These delays will be lengthened during construction work within the intersection for the proposed interconnection to the West Brampton watermain (see **Section 6.8.3**). A construction compound is proposed at the northwest corner of the intersection, resulting in a loss of the dedicated southbound right turn lane onto Williams Parkway for a duration of approximately 6 to 12 months. As a result, traffic modelling shows that although the intersection will continue to operate at an acceptable condition during the AM peak period, average delays of approximately one and a half to three minutes may be expected during the PM peak period. Traffic modelling also shows that substantial and unacceptable traffic delays (on average more than 30 minutes during the PM peak) would result if the proposed construction compound in the Dixie Road-Williams Parkway intersection were operational during open cut construction across the intersection. Therefore, open cut construction across the intersection will be scheduled for completion before construction of the interconnection compound within the intersection. In addition, with traffic diversion to alternate routes and optimized signal timing phasing splits, traffic modelling shows that the Dixie Road-Williams Parkway intersection should continue to operate at acceptable conditions.

Dixie Road and Northampton Drive

This Dixie Road-Northampton Drive intersection is currently operating at an acceptable condition during both the weekday AM and PM peak periods. However, during open cut construction across the intersection, it is expected that the intersection will be closed (west side only) and traffic will be diverted along either North Park Drive or Williams Parkway to Dixie Road. Traffic modelling shows that after traffic diversion, the Williams Parkway-Dixie Road intersection will continue to operate at an acceptable condition, provided optimized signal timing phasing splits are used. The expected construction duration through this intersection is only 10 to 15 days.

6.3.2 Access

Access to business, institutional and residential properties will be maintained at all times. This will be accomplished by construction staging where at least one vehicular access location remains open to travel while the adjacent roadway section is under construction. In some situations, if this is not possible, temporary access will be constructed or alternate access points established off the watermain route. Alternatively, it may be necessary to schedule construction when businesses are closed (e.g., evenings or weekends). This will be determined during detailed design. All disruptions to property access will be communicated and planned in advanced of construction with affected property owners.

6.3.3 Transit

The Region is committed to helping the City ensure the most efficient transit service possible in conjunction with the watermain construction. Transit routing and any required temporary relocation of transit stops will be examined during detailed design in consultation with the City of Brampton Transit department. For example, some temporary relocation of transit stops may be required at tunnel shaft locations along the route (e.g., at the Clark Boulevard-Lisa Street intersection). These relocations will be reviewed with the City and plans to reduce their duration will be discussed. It should be noted that unless transit routes are re-assigned, transit vehicles will be subject to the same delays as the general traffic discussed above. Therefore, the Region may examine the potential for temporary transit priority lanes through any extremely congested areas along Dixie Road.

6.3.4 Pedestrians and Cyclists

The Region is committed to providing safe travel conditions for pedestrians and other vulnerable road users through the construction work zone. The Region will ensure that a sidewalk on at least one side of the road that is under construction will remain open, and that cyclists will be detoured to other parallel routes to bypass the construction areas. For example, should a sidewalk be closed, pedestrians will be instructed, though signage, to cross the roadway at the nearest safe crossing point adjacent to the construction area. These are typically adjacent intersections.

6.4 Noise and Vibration Considerations

A preliminary noise and vibration review was undertaken at four key locations along the recommended watermain routes as part of this Municipal Class EA study in order to characterize the existing ambient noise levels and provide recommendations to minimize the potential for construction noise and vibration. The results of the findings of this review are contained in a Technical Memorandum – Construction Noise Review (see **Appendix K**). Ambient background noise measurements were conducted in September 2013 at Northampton Park, Dixie Road, Lisa Street and Clark Boulevard. No measurements were taken along Heart Lake Road as this area is industrial and in close proximity to Highway 410. In summary, the background noise measurements recorded (ranging from 51 to 73 dBA) were typical of suburban areas next to arterial roadways and with the highest value recorded at Dixie Road[47].

During watermain construction, the severity of construction noise impact will be dependent on various factors such as land use sensitivity, time of operation, operational areas and size of equipment. Although these details will not be determined until detailed design, higher sound levels (generally above 80 dBA) may be expected without mitigation based on past construction experience. However, with mitigation such as temporary construction hoarding/fencing and minimizing concurrent high impact construction activities,

47 Noise, by definition, is any unwanted sound. In the context of this study, unwanted noise refers to the temporary noise expected during construction of the watermains. Noise is typically assessed based on sound pressure level (SPL) which is measured and reported in decibels (dB). Overall noise levels are often adjusted for the relative loudness of sounds as perceived by the human ear by using an A-weighted filter network (dBA). For example, the sound of a jet plane takeoff, which is deafening and at the threshold of pain, is typically about 130 dBA, whereas average street noise is about 70 dBA (loud) and a quiet home or office is about 30 dBA (faint).

construction noise levels can be reduced below the 80 dBA threshold which can warrant concern regarding hearing damage for those exposed for long durations of time. Additional mitigation measures recommended for the management of construction noise are summarized in **Section 7.5** and further described in **Appendix K**.

Regarding potential vibrations during construction, construction vibration[48] is highly dependent upon the machinery used and local soil conditions, which will not be confirmed until detailed design. However, based on the minimum separation distances calculated as part of the preliminary noise and vibration review and summarized in **Appendix K**, no buildings were identified at this stage of the project as extremely susceptible to vibration damage (i.e., damage to building structures in the form of cosmetic cracking). In addition, no specific land uses that could be highly sensitive to vibrations (e.g., hospitals, homes for the aged) were identified along the preferred route. However, many buildings along the construction route will likely fall within the expected threshold distance of annoyance (i.e., perceptible movement of structures such as resonant floor vibrations, rattling of windows, shaking of items on shelves or hangings on walls). As a result, a number of mitigation measures to minimize the potential for construction vibration annoyance complaints and damage are summarized in **Section 7.5** and further described in **Appendix K**.

6.5 Hydrogeological and Geotechnical Considerations

A Preliminary Hydrogeological and Geotechincal Routing Assessment (SPL Consultants Limited, July 2012) was completed as part of this Municipal Class EA study to assist in the evaluation of the alternative routes (see **Appendix C)**. Additional hydrogeological and geotechnical investigations are currently underway as part of the preliminary design for the preferred route. These Stage 2 investigations will verify the potential groundwater and surface water impacts and subsurface soil conditions discussed below. In addition, mapping of the groundwater discharge zones along the streambeds at the four watercourse crossings is also being completed to further identify any potential issues related to the proposed construction methods. A full Geotechnical Baseline Report (GBR) will also be prepared as part of detailed design.

6.5.1 Groundwater and Surface Water Considerations

In most areas along the preferred route, the need for construction dewatering[49] is not anticipated. However, the Preliminary Hydrogeological and Geotechincal Routing Assessment (see **Appendix C**) indicates that groundwater control will likely be required near the CN railway crossing near Heart Lake Road and along Clark Boulevard near West Drive and Dixie Road. This is due to the existing sand and gravel deposits logged near Heart Lake Road south of Orenda Road and the southern extent of the Brampton Esker deposits logged near Clark Boulevard. Stage 2 investigations currently underway will confirm where specifically groundwater control may be required, and if so, the magnitude of groundwater pumping and potential impacts. If the need for water-taking becomes an issue, well-designed mitigation methods can be implemented to reduce or eliminate any effects. For example, sealed shaft construction techniques or an

48 *The effect of construction vibrations on surrounding residences and infrastructure can be influenced by many factors, including proximity to the vibration source, the energy output of the equipment used, the frequency response of the affected structure, and local geological conditions. Specifically, soil conditions contribute to the level of vibration, where soft, loose soil typically produces lower vibration levels than stiff or dense soil for similar vibration sources.*

49 Dewatering, water-taking and/or groundwater control refers to the pumping or removal of ground or surface water from a construction site to allow for safe trench excavations or tunnel operations. A MOE Permit to Take Water (PTTW) is required prior to construction where water-taking of more than 50,000 litres per day is expected.

Earth Pressure Balancing Machine (EPBM) and sealed tunnel liner can be used to reduce water-taking requirements.

6.5.2 Private Groundwater Well Considerations

Although the study area has been serviced with municipal water for some time, it is possible that a number of water wells within the study area could still be in use. An inventory of private wells and other groundwater users within the zone of influence will be completed during the Stage 2 investigations to establish pre-construction conditions. Any water wells that are still in use and that may be impacted by the proposed construction activities will be indentified for further investigation during detailed design.

6.5.3 Subsurface Soil Condition Considerations

Borehole drilling is currently being conducted approximately every 150 metres (165 yards) along the preferred route to verify soil conditions for both preliminary and detailed design. The depth of these boreholes range from approximately 15 metres to 30 metres (50 feet to 100 feet), depending on the estimated depth of the proposed construction and depth to bedrock. For example, open cut construction will require trench excavation approximately five to six metres (16 to 20 feet) deep, while tunnel construction is generally expected to range from approximately 10 to 20 metres (32 to 65 feet) below ground. These Stage 2 geotechnical investigations will confirm where soft ground tunnelling (i.e., tunnelling in soil) is expected as opposed to tunnelling in rock. Currently, deep tunnelling through the shale bedrock is anticipated under the CN railway, Highway 410 and under the existing feedermains at Dixie Road and Queen Street East.

6.6 Transient Protection Considerations

A Preliminary Transient Analysis was completed as part of this study and is included as part of the separate preliminary design report. The transient analysis provides specific recommendations for protection of the new watermains against pressure transients. Pressure transients are also referred to as surge pressures or water hammer. Pressure transients occur whenever steady-state conditions are changed within a pipe system. Examples of such conditions include loss of power to the pumps in a pumping station or sudden closure of a valve. In these situations, pressure transients can occur, which can result in significant damage to the pipelines and associated infrastructure.

Both the Z4 and the Z5 systems were modelled using different combination air valve (CAV)[50] options in order to determine the type and amount of transient protection required for the proposed Z4 and Z5 watermains. CAV locations were selected based on one of three requirements: 1) for the purpose of reducing negative transient pressures to within the target range; 2) at locations where the air release function of a CAV will be required, such as localized high points; and 3) at interconnection chambers to provide transient protection in relation to the valve operation with these chambers. As summarized in **Table 6-1** below, the analysis recommended the installation of CAVs at ten locations along the preferred route.

50 Combination air valves (CAVs) contain both an air release and an air/vacuum component and will admit air (vacuum relief) into the pipeline when the pressure goes below atmospheric levels (i.e. negative pressure), thereby reducing negative transient pressures.

The proposed CAVs, as well as any additional protection requirements identified during detailed design, should be installed and maintained in accordance with the manufacturer's specifications to ensure that they function as intended. Configuration and sizing for the proposed CAV will be determined during detailed design.

Table 6-1 Preliminary Location of Proposed Combination Air Valves

Location of Proposed Combination Air Valve (CAV)	Ownership	Compound Figure # (see Appendix I)	Required For Transient Protection of	
			Z4 Transmission Main	Z5 Sub-Transmission Main
Beckett Sproule Pumping Station (Compound 13) and just north of the station on Heart Lake Road (no compound required)	Region of Peel	Figure 1	√	√
Tunnel shaft on Heart Lake Road at Selby Road (Compound 1A)	MTO	Figure 2	√	√
Tunnel shaft just north of CNR crossing (Compound 2)	Summit REIT	Figure 2	√	√
Interconnection at Heart Lake Road and Orenda Road (Compound 12)	City of Brampton	Figure 3	-	√
Tunnel shaft on Heart Lake Road north of Orenda Road (Compound 3)	Crosby Canada	Figure 4	√	√
Tunnel shaft/high point on Heart Lake Road at Highway 410 (Compound 4)	Numbered Ont. company	Figure 5	√	√
Interconnection on Clark Boulevard at West Drive (Compound 6A)	W. Ralston Canada	Figure 7	√	-
Tunnel shaft on Clark Boulevard just east of watercourse crossing (Compound 6B)	City of Brampton	Figure 7	√	√
Tunnel shaft on Dixie Road south of Lisa Street (Compound 7A)	East West Management	Figure 8	√	√
Interconnection at Dixie Road and Queen Street East (Compound 8B)	-	Figure 9	-	√
Tunnel shaft on Dixie Road south of Hazelwood Drive (Compound 8A)	Arlington Homes	Figure 10	√	√
Dixie Road at Crescent Hill Drive North	-	-	√	√
Dixie Road at Williams Parkway (Compound 9)	-	Figure 12	√	√
Dixie Road south of North Park Drive (Compounds 10A and 10B)	-	Figure 13	-	√

6.7 Construction Costs and Funding

As shown in **Table 6-2** below, the total estimated construction cost for the East Brampton watermains is approximately $167 million, including the cost savings associated with construction of the two watermains in the same trench or tunnel. If, during detailed design, it is decided that the watermains should be constructed in a separate trench or tunnel, it is expected that the installation costs would increase. .

The estimated construction costs are preliminary and should be considered within a +25% to -10% accuracy range. This does not include costs for property (i.e., permanent/temporary easements), operation or

maintenance. In addition, an approximate rate of 20% was applied to the total estimated capital costs to account for any future unanticipated additional expenses that may be incurred. Similarly, an approximate rate of 15% was applied to account for engineering fees which include detailed design, tendering and contract administration.

Table 6-2 Cost Estimate

Item	Estimated 2016 Cost
Open Cut Installation (approximately 3.6 km)	$ 27,398,000
Tunnel Installation (approximately 2.6 km)	$ 55,574,000
Tunnel Shafts (approximately 195 vertical metres)	$ 9,625,000
Underground Chambers, Flow Meters and Interconnections	$ 13,563,000
Other (e.g., Traffic Management, Utility Relocation & Restoration)	$ 17,608,000
Sub-Total	**$ 123,768,000**
20% Contingency	**$ 24,754,000**
15% Engineering	**$ 18,565,000**
TOTAL	**$ 167,087,000**

Construction of the East Brampton watermains will be funded by the Region's Development Charges. This project has already been identified in the Region's Capital Works budget and there will be no increases to water rates or property taxes as a result of this project.

6.8 Implementation Schedule

Construction is tentatively scheduled to start sometime in 2016 at the earliest. From start to finish, it is estimated that construction will take approximately two years to complete, even with multiple construction contracts. For example, it is anticipated that construction along Heart Lake Road could occur at the same time as construction along Dixie Road. However, to minimize construction impacts and traffic delays, it is expected that construction contracts will be staggered to avoid having two or more contractors working in close proximity to one another. For example, open cut construction along Dixie Road in the vicinity of Williams Parkway will not be scheduled at the same time as work in the Dixie Road-Williams Parkway intersection for the interconnection with the West Brampton watermain.

6.9 Co-ordination with Other Approved Projects

Co-ordinating construction of the East Brampton watermains with other municipal projects yields cost savings and in the long term minimizes construction impacts. By co-ordinating watermain construction with other City of Brampton projects, restoration costs can be shared between the Region and the City. By co-ordinating construction with other approved capital works projects (e.g., roadway widening and resurfacing), the Region can also save money on tendering, contractor management and restoration costs. In addition, by installing both the East Brampton watermains at the same time within the same trench or tunnel, long term impacts to the travelling public are reduced. For example, although the installation of two pipes within the same trench or tunnel will take longer than installation of just one pipe, installation of the second pipe should

be considerably faster than if it was being installed separately at a later date (i.e., the ground would have to be reopened and the roadway would again need to be resurfaced). Therefore, considering these advantages, construction of the projects described in the sub-sections below are planned at generally the same time as the East Brampton watermains.

6.9.1 Dixie Road Widening

The Region of Peel's widening of Dixie Road from four to six lanes from Queen Street East to North Park Drive will be co-ordinated with construction of the East Brampton watermains. It is proposed that the watermains will be installed first along the west side of Dixie Road and then the two additional lanes will be constructed on top of the pipes. **Section 2.5.1** of this report provides additional details regarding the widening of Dixie Road.

6.9.2 Clark Boulevard Widening

The City of Brampton's widening of Clark Boulevard from Rutherford Road to Dixie Road is tentatively scheduled for 2021 according to Brampton's Ten Year Capital Program. However, construction of the East Brampton watermains is currently scheduled for 2016 to 2018. It is recommended that if possible, acquisition of road widening requirements be co-ordinated at the same time as the watermain property requirements. **Section 2.5.2** of this report provides additional details regarding the widening of Clark Boulevard.

6.9.3 Williams Parkway Widening and West Brampton Watermain

The City of Brampton's widening of Williams Parkway from McLaughlin Road to North Park Drive/Howden Boulevard is currently scheduled for 2018 to 2020. It is anticipated that this will be co-ordinated with construction of the Region's proposed West Brampton watermain along Williams Parkway (approved under a separate Class EA study). However, co-ordination will only be required for construction of the interconnection between the two watermains (i.e., the West Brampton watermain and the smaller East Brampton watermain for Z5). This interconnection is proposed at the northwest corner of the Dixie Road-Williams Parkway intersection.

Additional details regarding the widening of Williams Parkway and the proposed West Brampton watermain are provided in **Sections 2.5.3** and **2.5.4** of this report.

6.9.4 Highway 410 Widening

MTO's widening of Highway 410 from south of Highway 401 to Queen Street East is currently scheduled for late 2014 to 2018. **Section 2.5.5** of this report provides additional details regarding this widening. Although construction of the East Brampton watermains will not be directly co-ordinated with the Highway 410 widening, it is recommended that discussions with MTO continue through detailed design regarding potential contactor co-ordination opportunities and any impacts to the planned carpool lot at Highway 410 and Clark Boulevard.

7. Mitigation Measures

Impacts related to construction of the East Brampton Watermains will be limited to the duration and location of construction. Based on the preferred watermain route and proposed construction techniques, construction is expected to have varying environmental effects. By incorporating proper best management practices and construction techniques, adverse construction related effects can be minimized. In order to address the effects, the following approach was taken:

- **Avoidance:** The first priority is to prevent the occurrence of negative or adverse environmental effects associated with construction of the new watermains;

- **Mitigation:** Where adverse environmental effects cannot be avoided, it will be necessary to develop appropriate measures to eliminate, or reduce to some degree, the negative effects associated with construction of the new watermains; and

- **Compensation:** In situations where appropriate mitigation measures are not available, or significant net adverse effects will remain following the application of mitigation measures, compensation measures may be required to counterbalance the negative effect through replacement in kind, or provision of a substitute or reimbursement.

Based on the conceptual design discussed in **Section 6**, avoidance measures were able to be applied in many cases (e.g., siting of tunnel shaft locations to avoid natural features), thereby reducing the extent and magnitude of potential adverse environmental effects requiring the application of mitigation measures. The mitigation measures summarized in **Table 7-1** below and described in the following sub-sections are recommended to ensure that any short-term disturbances are managed by the best available methods. These measures will be further confirmed and defined during detailed design.

Table 7-1 Potential Construction Related Impacts and Associated Mitigation Measures

Potential Impacts	Mitigation Measures
Aquatic Resources	
Watercourse Crossings	• The Stage 2 hydrogeological study, currently underway, will confirm potential effects. • During detailed design, TRCA, on behalf of the MNR, should confirm the applicability for a warmwater fisheries construction timing window for any in-water works (i.e., in-water works completed between July 1 and March 31). • During detailed design, TRCA should confirm clearance requirements for tunnel crossings of watercourses. • Develop a comprehensive erosion and sediment control plan that includes: - Shaft locations located outside of regulatory flood and fill lines, where possible, and away from river banks and existing vegetation where possible. - Watermain constructed in deep tunnel will avoid direct encounter with watercourses and scouring (a minimum 2 metre cover, i.e. pipe obvert to channel invert will be maintained). - Groundwater removed during construction will be channelled or piped through stabilization and sedimentation ponds or other appropriate methods, given expected pumping rates and site restrictions, to allow sediments to settle out before entering the storm sewer or watercourse. Requirement to meet appropriate surface water or storm sewer quality will be stated. - Outfall locations will be protected against erosion using splash pads, geotextiles and/or riprap, as appropriate. • During detailed design, prepare a contingency plan to address any issues within the watercourse during tunnel crossing (e.g., streambed collapse, frac out, etc.), including plans for controlling in-water sediment suspension. • Restore disturbed areas/habitat to natural or better conditions.
Floodplain Management	• Site tunnel shafts outside of floodplain, where possible. • If within floodplain, implement appropriate erosion and sediment controls (described below), monitor weather and ensure contingency plans are in place.
Groundwater Resource Management	• Where significant water-taking is anticipated (i.e. > 50,000 L/day), a Permit to Take Water (PTTW) will be required from the MOE prior to construction. • The extent of water-taking required will be confirmed through the completion of the Stage 2 hydrogeological investigations during detailed design. These investigations will determine if and how much water-taking may be required, if a MOE PTTW is needed, and potential impacts to the creeks, including potential draw-down impacts, impacts to baseflow, zones of influence at each dewatering location, if required, and mitigation measures (e.g., Earth Pressure Balance Machine, sealed shaft technology, proper water-taking techniques, etc.). • Detailed design will identify and consider various technologies to minimize water-taking. • Monitor any nearby wells and irrigation ponds before, during and after construction. • If any domestic water wells are determined to be in use, supplement affected water supplies as required, ensuring appropriate quality and adequate quantity. • Any work done on affected domestic wells or any replacement wells should be done pursuant to the *Ontario Water Resources Act*, O.Reg.903.

Potential Impacts	Mitigation Measures
Sediment Deposition	• Prepare an erosion and sediment control plan for all areas within the TRCA regulation limit. The plan will, at a minimum, be consistent with the OPSD standards as well as recommendations contained within the "Erosion and Sediment Control Guideline for Urban Construction" (available at www.sustainabletechnologies.ca) and the MOE "Guidelines for Evaluation Activities Impacting Water Resources." • Where construction occurs in proximity to watercourses, proper sedimentation/erosion controls will be employed to the satisfaction of all relevant agencies including, the MNR and TRCA. • Ensure proper on-site monitoring of erosion and sediment control, especially during any in-water works. • Provide and maintain sediment control fencing along alignment corridor and top-of-bank to the satisfaction of all applicable agencies. • Provide rock check-dams at points of overland flow that cross or drain the alignment area. • Any areas disturbed by construction will be restored and stabilized as soon as practically possible. • Where applicable, follow TRCA/MNR fisheries construction timing windows.
Surface Water Protection	• Implement construction mitigation to minimize groundwater taking as presented above. • Install barriers/silt fencing and/or other erosion control measures around the compound perimeter(s) to protect nearby watercourses as presented above. • Prior to dewatering effluent discharge, if required, periodically analyze the quality of the discharge water, including comparison to PWQO and local sewage by-laws. • Prior to dewatering effluent discharge derived from tunnelling operations, periodically sample the discharge water and monitor its temperature to ensure existing surface water features are not adversely impacted. • Based on the water sampling and temperature monitoring results outlined above, treat the construction and maintenance water on-site at the shaft compound(s) before discharge, as required (e.g., sediment pond, filtration fencing, temperature regulation, etc.). • Disperse pumped groundwater, treated construction water and/or compound runoff via existing vegetated drainage swales or storm sewers when it is periodically required.
Terrestrial Environment	
Vegetation and Loss of Tree Cover	• Removal of vegetation including large trees or large stands of trees has primarily been avoided by the preferred watermain route alignment. • All trees to be saved shall be clearly marked. • Trees/vegetation that must be removed should be replaced after construction. • Protect mature and mid-aged trees along the edge of the alignment; prepare tree preservation plan, as required. • Restore disturbed areas/habitat to existing or better conditions.
Removal/Pruning of Mature Tree Limbs	• Restrict the pruning and removal of tree limbs and branches to those that are required for construction, as required. • Prune roots within the alignment trench using proper root pruning equipment prior to excavation so as to minimize root tear of adjacent trees, as required.
Contaminated Soils	• Complete Phase 2 Environmental Site Assessment, currently underway. • Ensure proper soil disposal in accordance with applicable provincial regulations. • Ensure proper handling/maintenance of construction equipment. • Prepare and follow contingency plans for control and cleanup should a spill occur.

Potential Impacts	Mitigation Measures
Contamination of Soils Through Spills and Leaks	• Contamination of soils through spills and leaks can be avoided by ensuring that fuel storage, refueling and maintenance of construction equipment are handled properly and not allowed in or adjacent to watercourses. • Contingency plans will be prepared before construction begins for the control and clean up of a spill, should one occur. • The MOE Spills Action Centre must be contacted if a spill occurs.
Rock Removal	• Limited to hoe ram – no blasting. • See Noise, Vibration and Dust below.
Social/Cultural Environment	
Archaeology and Built Heritage	• As per the Stage 1 Archaeological study (see **Appendix F**) prior to any land-disturbing activities within the construction area limits, specified areas will be subject to a Stage 2 archaeological assessment in accordance with Ministry of Tourism, Culture and Sport (MTCS) technical guidelines. The Stage 2 assessment will be completed as part of preliminary design and recommendations will be implemented as required. • If any archaeological and/or historical resources are discovered during the performance of construction work, the performance of the work in the area of the discovery is to halt. The MTCS (Archaeological Unit) will be notified for an assessment of the discovery. Work in the area of the discovery would not resume until cleared to do so by the Ministry. First Nations should be notified and a licensed consultant archaeologist must be engaged to carry out fieldwork in compliance with the *Ontario Heritage Act*.
Short-Term Construction Related Impacts (Traffic and Access)	• During the course of construction, traffic will be temporarily disrupted along area roads. The following measures will be employed to ensure that impacts are eliminated or minimized: - Prepare and follow the Construction Traffic Management Plan and provide advanced notification signage, including detours. - Maintain access to properties at all times. Where property access may be difficult to maintain at all times, schedule construction for optimal times (e.g., weekends, evenings and/or winter). This will be determined during detailed design. - Temporary access will be made available to residents/businesses if the access is severed for an extended period of time. - Affected property owners will be individually notified in advance of the construction schedule/duration. - Regular community project updates, including construction project manager contact information.
Noise, Vibration and Dust	• Prepare construction noise and vibration mitigation plan at detailed design. • Construction operations will be restricted to the day shift (wherever possible). In addition, the contractor will be required to adhere to local noise by-laws. • To address construction related vibration impacts on nearby buildings, pre-construction surveys will be completed prior to construction. The surveys will document existing building conditions, as well as identify sensitive structures to be considered during construction. • Dust control by spraying water, street sweeping. • Install hoarding (fencing) around the perimeter of all tunnel shaft compounds. At the East Brampton Reservoir compound, install high aesthetic walls.

7.1 Traffic Management and Property Access

Building upon the conceptual design and preliminary Traffic Impact Assessment (TIA) and Traffic Management Plans (TMP) developed as part of this Class EA study, specific TMPs will be further refined during detailed design for the entire watermain route. The purpose of a TMP is to ensure that the impacts of

construction works on the public domain, particularly with respect to temporary interruptions to vehicular and pedestrian traffic, are considered by the Region and addressed. The final TMP will include:

- A description of the proposed works and lane/road closures;
- Identification and assessment of expected traffic impacts based on the proposed works;
- Detailed traffic management measures, including traffic signal design, to minimize the impacts of construction;
- An assessment of how public transit services may be affected;
- Details of provisions made for emergency service vehicles, heavy vehicles, cyclists and pedestrians;
- An assessment of the effect of proposed traffic management measures on traffic movements on adjoining streets; and
- The proposed public notification process.

With respect to property access, it is possible that as open cut construction progresses along the route, access to some properties may be temporarily disrupted. Where this may occur, an alternative means of accessing the property may be provided in addition to advanced notification. For some businesses and/or recreational facilities, it may make sense to schedule construction for low use periods (e.g., winter) or when operations are closed and access is not an issue (e.g., evenings and weekends). This will be determined during detailed design.

7.1.1 Pedestrians and Other Vulnerable Road Users

The Region is committed to providing safe travel conditions for pedestrians and other vulnerable road users during construction. Where there are existing sidewalks along the roadway that is under construction, the Region will ensure that at least one sidewalk on one side of the road will remain open. Cyclists will be detoured to other parallel routes to bypass the construction areas. For example, should a sidewalk be closed, pedestrians will be instructed via appropriate signage to cross the roadway at the nearest safe crossing point adjacent to the construction area (i.e., typically at an adjacent intersection).

7.2 Use of Privately or Publicly Owned Land

Private and/or public land owners (e.g., City of Brampton, Ministry of Transportation) will be compensated for the temporary use or permanent loss of land in accordance with standard Region of Peel procedures and policies. Compensation will be further discussed individually with each property owner during detailed design.

Following construction completion, all open cut areas, tunnel shaft compounds and temporary construction storage sites will be restored to their pre-construction condition or better. This will include temporary, progressive restoration and landscaping, fencing and/or driveway access as appropriate.

7.3 Watercourse Crossings and Floodplain Management

All watercourse crossings are proposed based on trenchless methods (i.e., tunnel crossing). Therefore, potential impacts to watercourses are limited to the potential for stream baseflow drawdown and impacts

from erosion and sedimentation, both of which are further described below. Nonetheless, a contingency plan will be developed during detailed design to address any issues within the watercourse during tunnel crossing (e.g., streambed collapse, frac out, etc.), including plans for controlling in-water sediment suspension.

7.3.1 Groundwater Management

There is potential for a loss of groundwater baseflow at watercourse crossings due to potential requirements for water-taking during tunnelling operations. The extent of water-taking required will be confirmed through the completion of the Stage 2 hydrogeological investigations currently underway. These investigations will determine if and how much water-taking may be required, if a MOE Permit to Take Water (PTTW) is needed, and potential impacts to the creeks. The investigations will also include potential drawdown impacts, impacts to baseflow, zones of influence at each dewatering location (if required) and mitigation measures (e.g., Earth Pressure Balance Machine, sealed shaft technology, etc.). If some water-taking is still required, water could be returned to replace stream baseflow once appropriate water quality monitoring and treatment is undertaken.

The Stage 2 hydrogeological investigations will also determine if any domestic water wells are still in use. If they area, any affected water supplies will be supplemented during construction, as required. Water supplies will be of appropriate quality and adequate quantity. Any work done on affected domestic wells or any replacement wells will be done pursuant to the *Ontario Water Resources Act*, O. Reg. 903.

7.3.2 Erosion and Sediment Control

As part of detailed design and the Conservation Authority permit applications[51], TRCA will review the proposed erosion and sedimentation control measures and dewatering options. Areas within the TRCA regulation limit (i.e., associated with locations where there is a high potential for sediment discharge to sensitive features such as watercourses) will be identified and investigated. In addition, siting and design of the proposed tunnel shafts within the Regional floodplain will be reviewed with TRCA, including the timing of construction as it relates to high water events and fisheries timing windows[52]. An understanding of the local site conditions will then be integrated with the following protection principles to develop an erosion and sediment control plan which includes both open cut and tunnel shaft construction sites:

- Apply timing restrictions for work;
- Minimize soil exposure duration;
- Retain existing vegetation, where feasible;
- Encourage re-vegetation;
- Divert runoff away from exposed soil;
- Keep runoff velocities low; and
- Trap sediment as close to the source as possible.

51 TRCA will require two permits – one for each watermain.

52 Where possible, all manholes (as required) should be located outside of the TRCA regulation limit, including meander bends.

The erosion and sediment control plan[53] will be developed in accordance with the Ontario Provincial Standards Specifications Document (OPSD), as well as recommendations contained within the "Erosion and Sediment Control Guideline for Urban Construction" (available at www.sustainabletechnologies.ca) and the MOE "Guidelines for Evaluation Activities Impacting Water Resources." The plan will ensure that grading, drainage and structural operations during construction prevent sedimentation of sensitive areas. Standard mitigation measures will include:

- Silt fencing should be provided adjacent to the construction areas to prevent runoff from migrating toward watercourses within the study area (i.e., according to OPSD 219.110 or OPSD 219.130 as appropriate);
- Rock checks (OPSD 219.210) or silt fence flow checks (OPSD 219.190) should be placed in all ditches flowing toward watercourses and immediately upstream of their discharge into a watercourse;
- All excavated materials requiring stockpiling should be placed in pre-determined locations. The perimeters of stockpiles should be encircled with silt fencing according to OPSD 219.110 or OPSD 219.130 as appropriate;
- All exposed surfaces susceptible to erosion should be re-vegetated through the placement of seeding, mulching or sodding immediately upon completion of construction activities;
- Excess silt fencing and rip-rap should be maintained on-site, prior to the commencement of grading operations, and throughout the duration of construction in case of an emergency (e.g., sediment spill, etc.); and
- The integrity of all sediment trapping devices should be monitored regularly (i.e., weekly and following rain events) and properly maintained. Such structures should be removed only after the construction area soils have been stabilized and then only after the trapped sediments have been removed.

Implementation of these standard mitigation measures should mitigate any reduction in surface water quality such that any minor changes would be well within the tolerance of nearby aquatic species.

7.3.3 Surface Water Protection

There is potential for a reduction in surface water quality due to discharge of water-takings (if required) to surface water receptors and overland flow from open cut trenches and tunnel shaft compounds (e.g., sediment and turbidity). With this in mind, the following mitigation measures will be applied:

- Implement construction mitigation to minimize groundwater-taking as noted above;
- Install barriers, silt fencing and/or other erosion control measures around the compound perimeter(s) to protect nearby watercourses as noted above;
- Prior to dewatering effluent discharge (if required), characterize the quality of the discharge water, including comparison to Provincial Water Quality Objectives (PWQO) and local sewage by-laws to ensure water quality is not adversely impacted;

53 The erosion and sediment control plan will include detailed drawings of the control/mitigation measures, including the location of all control measures and construction access, notes on construction procedures and phasing, and notes on maintenance of the control measures.

- Prior to dewatering effluent discharge derived from tunnelling operations, periodically sample the discharge water and monitor its temperature to ensure existing surface water features are not adversely impacted;
- Based on the water sampling and temperature monitoring results outlined above, treat the construction and maintenance water on-site at the tunnel shaft compound(s) before discharge, as required (e.g., sediment pond, filtration fencing, temperature regulation etc.); and
- Disperse pumped groundwater, treated construction water and/or compound runoff via existing vegetated drainage swales or storm sewers when it is periodically required.

Implementation of these mitigation measures should mitigate any reduction in surface water quality such that any minor changes would be well within the tolerance of nearby aquatic species.

7.4 Tree Removal and Excavation Adjacent to Retained Trees

The removal of existing trees and/or vegetation will be required at a number of tunnel shaft construction compounds. However, this loss will be offset through compensation plantings. Compensation plantings will be developed in consultation with the affected stakeholder (e.g., City of Brampton, TRCA or property owner) and will consider the final use of the land to ensure planting effort success.

Prior to installation of the East Brampton Watermains, various street trees will also have to be removed or pruned due to their proximity to the existing road and the need to allow sufficient room for construction equipment to operate. Since there are several planted trees along some sections of the preferred route, this impact will be difficult to avoid. However, a Tree Preservation/Replacement Plan for individual trees along the preferred route will be prepared by an ISA (International Society of Arboriculture) Certified Arborist, with streetscaping plans prepared by an approved OALA (Ontario Association of Landscape Architects) Landscape Architect. During detailed design, information on impacted individual trees will be confirmed. The tree preservation and replacement planting plan for street trees and other City-owned trees should be prepared in consultation with TRCA and the City of Brampton Park Planning and Development Section.

Those trees lost should be replaced at a minimum 1:1 ratio and in consultation with TRCA and the City of Brampton, as required. It is noted that dependant on the type and location of removed trees, TRCA and/or the City may request replacement at a 2:1 ratio (i.e., plant two trees for every one tree removed) or a 3:1 ratio. It is also noted that TRCA requires a net ecological gain through the permitting process.

Where trees are to be retained, protection fencing should be installed before work begins. A protection fence must be at least 1.2 metres (4 feet) in height, erected on or outside the drip line of the protected tree, and made of plastic snow fencing securely mounted on wooden posts, or wooden or chain link fencing mounted on wooden or metal posts. Trees inside the protection fence should be cared for throughout the construction process (e.g., tree roots should be watered sufficiently, particularly if a portion of the root system has been disturbed by excavation).

7.5 Dust, Noise and Vibration

There is the potential for short-term construction related dust and noise effects as a result of both open cut and tunnel shaft construction. As a result, the following mitigation measures are proposed for minimizing these temporary effects:

- Depending on weather and soil conditions, implement best management practices for dust control as necessary (e.g., application of non-chloride dust suppressants, water spraying/street sweeping, etc.);
- Install wood hoarding (fencing) around the perimeter of all tunnel shaft compounds, including high aesthetic walls at the East Brampton Pumping Station and Reservoir (see **Appendix I, Compound Figure 14**);
- Impose restrictions on equipment operating times in residential areas; and
- Impose duty cycle restrictions on equipment operation.

There is also the potential for short-term construction related vibration effects perceptible within an approximate 100-metre (110-yard) radius of the open cut construction areas and tunnel shaft compounds. As part of detailed design and prior to construction, the extent of construction vibration levels will be further assessed and documented as part of a Construction Noise and Vibration Mitigation Plan. With this in mind, proposed construction methods will be reviewed and where required, restricted at those tunnel shaft compounds where sensitive receptors (e.g., residences) are located within a 100-metre (110-yard) radius.

Prior to construction, the contractor will also be required to complete pre-construction surveys for all buildings or structures within approximately 100 metres (110 yards) of the construction area. At the start-up of construction, vibration monitoring at each construction site will be undertaken and where necessary, changes to construction methods may be implemented to control vibration effects. Consequently, short-term construction related vibration effects perceptible within a 100-metre (110-yard) radius of tunnel shaft compounds would be minimized, with no structural or cosmetic damage to buildings anticipated.

7.6 Contaminated Soil Disposal and Spills Prevention

Given the predominantly urban nature of the preferred route, it is possible that contaminated soils may be encountered during construction (e.g., near historic or operating gas stations). In order to address this, a Phase 2 Environmental Site Assessment (ESA) is currently being completed as recommended by the Phase 1 ESA (see **Appendix D**). The Phase 2 ESA will include a review of MOE databases and preliminary soils testing in areas of potential concern. If contaminated soils are identified, the MOE Halton-Peel District Office will be contacted during detailed design regarding next steps. Soil clean up strategies, if required, will then be developed during detailed design in accordance with *Part XV.1* of the *Environmental Protection Act* and the Records of Site Condition Regulation (O.Reg. 153/04).

Contamination of soils and/or watercourses during construction operations (e.g., accidental spills of diesel fuel, hydraulic fluid, coolants, etc.) can be avoided by ensuring that fuel storage, refuelling and maintenance of construction equipment are handled properly, not allowed in or adjacent to watercourses, and that proper erosion and sediment control plans are put in place. In addition to preparation of an erosion and sedimentation control plan as described in **Section 7.3.2** above, a spill prevention and contingency plan will also be prepared as part of detailed design. In addition to spill prevention and mitigation measures, the plan will also indicate that the MOE Spills Action Centre must also be contacted in the event of a spill.

7.7 Tender Documents and Field Review

Contract tender documents will address the mitigation measures in an explicit manner and ensure that compliance is maintained. Experienced field inspectors will also be on-site during construction to ensure that all contract specifications are followed and do not unnecessarily impact the environment.

7.8 Post-Construction Monitoring and Operations

Following construction, operation of the new watermains is not expected to result in any negative impacts. This is based on the Region's experience and other municipality experience with operating similar infrastructure. However, a post-construction monitoring plan will be developed and implemented to monitor ground settlement at both the Highway 410 and CN railway corridor crossing, as well as the hydrogeological conditions at the watercourse crossings. Post-construction monitoring during the contract maintenance period will also be required to ensure that all disturbances within the roadway corridor, including private property and trees/vegetation, have been properly restored. Post-construction monitoring details will be developed during detailed design.

8. Review Agency Approvals

During detailed design and prior to the onset of construction, approvals will be required from several government review agencies including the Ministry of the Environment (MOE), Toronto and Region Conservation Authority (TRCA), Ministry of Transportation (MTO), Ministry of Tourism, Culture and Sport (MTCS), City of Brampton and various utility companies. The necessary approvals are further described below.

8.1 Ministry of the Environment

A Drinking Water Works Permit (DWWP) will be required from the MOE as part of the Municipal Water Licensing Program. Other MOE approvals may include a Permit To Take Water (PTTW), should there be groundwater taking of more than 50,000 litres per day. This will be confirmed through completion of the Stage 2 hydrogeological study currently underway. It is also noted that, dependent on the groundwater discharge type and location, MOE approval under Section 53 of the *Ontario Water Resources Act* may also be required. As part of detailed design, MOE recommends that that the Region engage in pre-consultation with the MOE with respect to any potential Certificate of Approval requirements.

8.2 Toronto Region Conservation Authority

In accordance with Ontario Regulation 166/06 (Regulation Made under the Conservation Authorities Act – Development Interference with Wetlands and Alteration to Watercourse and Shoreline Regulation), a permit will be required from TRCA prior to construction within or near the four watercourse crossings, including works within floodplains, wetlands and valleys. An erosion and sediment control plan for all areas within the TRCA regulation limit will also be required as part of the TRCA permit application. In addition, TRCA requires a net ecological gain through the permitting process for any tree removal within the East Branch of Etobicoke Creek corridor. Lastly, the requirements for a future scour analysis by a qualified fluvial geomorphologist to confirm depth of watercourse scour may need to be determined as part of detailed design.

8.3 Ministry of Transportation

Encroachment permits for the crossing of Highway 410 and the Clark Boulevard ramps will be required from MTO. It is anticipated that the MTO will also require settlement monitoring in this vicinity and detailed survey monitoring of its Highway 410 bridge structures to demonstrate that there are no adverse effects either during or after construction.

8.4 Ministry of Tourism, Culture and Sport

As part of preliminary design, the Region is currently completing Stage 2 archaeological investigations in accordance with the findings of the Stage 1 Archaeological Assessment (see **Appendix F**). MTCS clearance will be required prior to construction of the proposed works.

8.5 Ministry of Natural Resources/Fisheries and Oceans Canada

As there are no proposed open cut watercourse crossings, the requirement for an MNR permit under the *Lakes and Rivers Improvement Act* is not anticipated. However, since the potential for barn swallow habitat may exist (see **Section 2.8.4**), it is anticipated that further correspondence with MNR during detailed design, including completion of MNR's Information Gathering Form, will be required in order to determine if authorization under the *Endangered Species Act* is required.

8.6 City of Brampton

Permanent and temporary easements will be required from the City of Brampton for the underground watermains near the watercourse crossing on Clark Boulevard just west of Lisa Street. Other City approvals include Road Occupancy Permits for construction of both the watermains and interconnection chambers within the road right-of-way along Heart Lake Road and Clark Boulevard.

8.7 Canadian National Railway

Crossing of the CN railway will require utility crossing approval. Preliminary plan and profile drawings of the preferred watermain alignment have been circulated to CNR (see **Appendix M-10**) and any conflicts will be addressed during the preliminary and detailed design phases.

8.8 Utilities

For some sections of the alignment, utilities will have to be relocated in order to accommodate the watermains. These include existing infrastructure owned by Hydro One Brampton, Enbridge Gas Distribution, Bell Canada, Rogers Cable, Telus and MTS Allstream (see **Section 9.2.13**). Preliminary plan and profile drawings of the preferred watermain alignment have been circulated to these utility companies and any utility conflicts will be addressed during the detailed design phase.

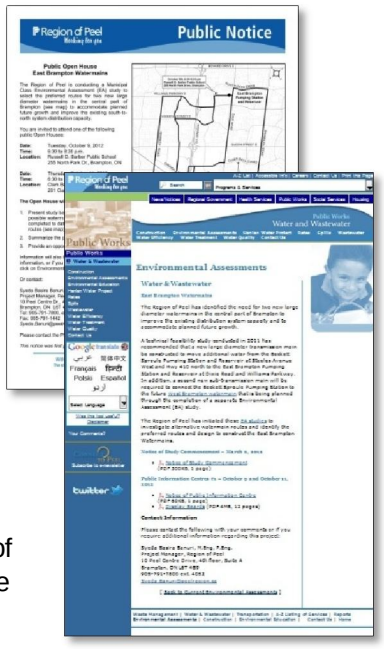
9. Communications and Consultation Program

A variety of communications were undertaken with numerous stakeholders to facilitate meaningful consultation so that they could have input in the decision-making process and thereby contribute to the study outcome. These stakeholders included the City of Brampton, external government review agencies, property owners and other interested members of the public. This was accomplished throughout the study, beginning with the notification of study commencement and continuing through two rounds of Public Open Houses and approximately 30 individual meetings. Other activities included a project-specific website, Councillor briefings and a business community outreach. The following sections expand upon these activities and conclude that no concerns were raised that the Region cannot further address during detailed design.

9.1 Public Communications and Consultation

Public communications and consultation efforts included multiple public notifications using various methods, four Public Open House nights (held in both the north and south parts of the study area), business community outreach efforts and numerous meetings with individual stakeholders. The following sub-sections provide further details regarding these public consultation activities and summarize the issues that were raised and how they were addressed by the study team. For further reference, a copy of the public communication materials and correspondence is included in **Appendix L**.

9.1.1 Public Notifications



In addition to the review agencies discussed in **Section 9.2** below, stakeholders such as local malls, condo corporations, special interest groups, community associations and facilities, and approximately 600 property owners within proximity to either the East Brampton or the Beckett Sproule Reservoir[54] received public notifications at all contact points. Interest in the project was considered to be any feedback received from a stakeholder indicating that they could be directly or indirectly affected during the planning, construction and/or operation of the proposed undertaking. Interested stakeholders were added to the project mailing list based on communications with the study team or from registration at one of the Open Houses.

Stakeholders on the mailing list (see **Appendix L-1**, personal information obscured) were issued either e-mail copies (where possible) or hard copies of the Notice of Study Commencement, Notice of Public Open House #1, Notice of Public Open House #2 and Notice of Study Completion. In addition, each notice was published twice in the community newspaper, The Brampton Guardian, as per Municipal Class EA consultation requirements. Notices were also published on the Region's project-specific website at http://www.peelregion.ca/pw/water/ environ-assess/east-brampton.htm

*54 Owner/occupant mailings (see figures in **Appendix L-1**) within proximity to the East Brampton Pumping Station and Reservoir included those properties bounded by North Park Drive to the north and west, Dixie Road to the east and Williams Parkway to the south. Owner/occupant mailings within proximity to the Beckett Sproule Pumping Station and Reservoir included those bounded by properties fronting on Glidden Road to the north, Hale Road to the west, Highway 410 to the east and Bramsteele Road to the south.*

and distributed to every household within the study area through Canada Post unaddressed ad mail. The method and timing of these notifications is summarized in **Table 9-1** below.

Table 9-1 Public Notification Activities and Timing

Project Milestone	Activity/Method	Timing
Notice of Study Commencement	Notice/project information update e-mailed to Councillors	February 16, 2012
	Publication in the Brampton Guardian	March 2 and 7, 2012
	Letter/notice sent to project mailing list contacts, including approx. 600 property owners/occupants near the reservoirs	March 2, 2012
Notice of Public Open House #1	Notice/project information update e-mailed to Councillors	September 18, 2012
	Notice distributed through Canada Post to over 33,000 properties within the study area, including those fronting or backing onto the alternative watermain routes	Week of September 24, 2012
	Publication in the Brampton Guardian	September 26 and October 3, 2012
	Letter/notice sent to project mailing list contacts, including approx. 600 property owners/occupants near the reservoirs	September 26, 2012
	Councillor briefing session	September 27, 2013
	Notice e-mailed to Region of Peel contacts, including police and emergency services	October 2, 2012
	Article published in Brampton Guardian: More Water Pipes Planned	October 16, 2012
Notice of Public Open House #2	Notice/project information update e-mailed to Councillors	May 9, 2013
	Notice distributed through Canada Post to over 9,000 properties within the study area, including those fronting or backing onto the preferred watermain route	Week of May 27, 2013
	Councillor briefing session	May 23, 2013
	Notice e-mailed to Region of Peel contacts, including police and emergency services	May 29, 2013
	Publication in the Brampton Guardian	May 31 and June 5, 2013
	Letter/notice mailed to project mailing list contacts, including approx. 600 property owners/occupants near the reservoirs	June 3, 2013
	Letter/notice e-mailed to project e-mailing list contacts, including affected property owners	June 5, 2013
	Notice hand-delivered to local businesses along Heart Lake Road and Glidden Road, near the Beckett Sproule Reservoir	June 11, 2013
Notice of Study Completion	Notice/project information update e-mailed to Councillors	May 21, 2014
	Letter/notice sent to project mailing list contacts, including affected property owners and approx. 600 additional owners/occupants near the reservoirs	Weeks of May 26 and June 2, 2014
	Notice distributed through Canada Post to over 9,000 properties within the study area, including those fronting or backing onto the preferred watermain route	Week of June 2, 2014
	Publication in the Brampton Guardian	June 4 and June 6, 2014

Copies of the project notices and samples of the letters distributed are included in **Appendix L-2**. Also included for interest, is a copy of a newspaper article which appeared in the Brampton Guardian on October 16, 2012 following Public Open House #1.

9.1.2 Councillor Communications

The Region's Project Managers informed Regional Chair Kolb, Mayor Fennell and local Councillors about the study through timely communiqués and follow-up answers to questions throughout the project. Prior to publication and distribution of each public notice, they received a project information update and were invited to attend a drop-in information session prior to each round of Public Open Houses. At these sessions, Region of Peel staff discussed the project with Councillors and received their feedback. Individual meetings were also held with some Councillors who were unable to attend the sessions.

Copies of the Councillor information updates are also provided in **Appendix L-2** and **Table 9-1** also includes the timing of these activities.

9.1.3 EA Phase 1 Public Involvement

Five members of the general public contacted the study team for further information following publication of the Notice of Study Commencement and its distribution to approximately 600 area property owners in March 2012. Of these, three simply requested to be added to the project mailing list, while one had questions about the location of the East Brampton Pumping Station and Reservoir and where construction would be occurring. Only one person voiced a concern, noting that no residential area parks should be removed or reduced in size. A copy of these communications is provided in **Appendix L-3**.

9.1.4 EA Phase 2 – Public Open House #1


Public Open House #1

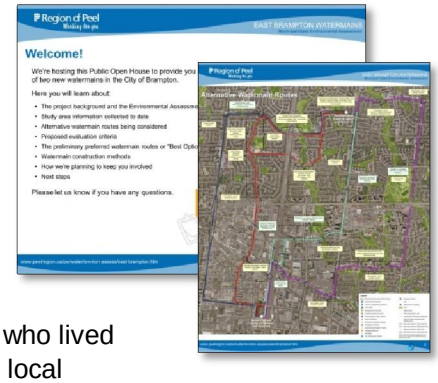
The Region of Peel hosted the first round of Public Open Houses in October 2012. Specifically, the purpose of Public Open House #1 was to:

- Introduce the study to the public;
- Outline the project background and EA process;
- Present the study area information collected to date;
- Present the alternative watermain routes, proposed evaluation criteria and the preliminary preferred routes or "best options" identified to date;
- Outline the next steps in the study; and
- Receive public input and answer any questions.

The first open house session was held on Tuesday, October 9, 2012, from 6:30 p.m. to 8:30 p.m. at Russell D. Barber Public School in Brampton, Ontario. This venue in the north section of the study area was chosen based on its proximity to the East Brampton Pumping Station and Reservoir, which is the end point connection for the Zone 4 (Z4) East Brampton transmission main. To engage those in the south section of the study area and anyone who could not attend the Tuesday night session, a similar session was also held

on Thursday, October 11, 2012, from 6:30 p.m. to 8:30 p.m. at Clark Boulevard Public School in Brampton, Ontario. This venue was chosen based on its relative proximity to the residential areas in the south section of the study area.

Both sessions followed an informal "drop-in" format with large display boards presenting key project information. A copy of the display boards is provided in **Appendix L-4** and was made available on the project website (http://www.peelregion.ca/pw/water/environ-assess/east-brampton.htm). Attendees were invited to sign the registration sheet and review the display boards arranged around the room. Project team members from both the Region of Peel and AECOM were in attendance to further explain the information and assist with answering any questions. No formal presentations were made.



The Public Open House was attended by approximately 35 members of the public, with 29 people signing in over the course of the two sessions. Those in attendance were typically neighbouring residents of the East Brampton Pumping Station and Reservoir or other residents who lived along one of the alternative watermain routes. Other attendees included local business owners, representatives from the Leacrest/Lascalle Street Association and a representative from the Dufferin- Peel Catholic District School Board. Copies of the sign-in sheets (personal information obscured) are provided in **Appendix L-4**.

In addition, Region of Peel project staff attended a third Public Open House held specifically for the West Brampton Watermain Class EA. This session was held on Thursday, October 18, 2012 from 6:30 p.m. to 8:30 p.m. at James Potter Public School in Brampton. Key project display boards were presented and Peel staff further discussed the project with any interested parties.

9.1.4.1 Summary of Feedback Received

The majority of Public Open House attendees openly discussed the project with Region of Peel and/or AECOM representatives. Attendees were also encouraged to submit written comments by completing a comment sheet. In total, eight comment sheets were submitted at the open house. A few attendees took comment forms home to fill out or to give to their neighbours; however, no additional comment sheets were received. However, leading up to Public Open House #1 and immediately following, five additional people contacted the study team with questions and/or comments.

Appendix L-5 provides a summary of the questions, comments and responses discussed either at the Public Open House sessions or leading up to or following them. For ease of understanding, comments/responses have been organized under the following themes:

- Project Overview – discusses the need and justification for the project, construction timing and costs, and provides an overview of the Region of Peel's existing water distribution system operations;
- Alternative Watermain Routes – discusses the watermain routing options, including suggestions to consider West Drive, Kennedy Road and/or greenspace areas/valleylands, and suggests that traffic disruption and residential areas be considered in the evaluation of alternative routes;

- Current Best Option for Both Watermains: Heart Lake Road, Clark Boulevard and Dixie Road – discusses the preliminary preferred route and proposed construction methods, including general support received for routing of the watermains along Dixie Road;
- Construction-Related Impacts – discusses the potential impacts of watermain construction at specific areas along the preliminary preferred route, including potential traffic disruptions, lane restrictions, noise and vibrations, and the importance of co-ordination with the future widening of Dixie Road and choosing a competent contractor;
- Operational Impacts – discusses potential disruptions to existing water services, the durability of the proposed watermains and their resistance to breaking, and confirms that no water rate increases will occur as a direct result of this project; and
- General and Miscellaneous Comments – summarizes the comments received specific to the Region's Water and Wastewater Master Plan and to the public open house displays, venue and notification process.

The summary in Appendix L-5 is not intended as a verbatim transcript of the discussions or comments received but rather to reflect the main points of discussion. A copy of the actual comment sheets received (personal information obscured) and other EA Phase 2 communications are provided in **Appendix L-4**.

9.1.5 EA Phase 3 – Public Open House #2

A second round of Public Open Houses was held in June 2013 to present details about the recommended route and to formally provide another opportunity for interested parties to discuss any issues or concerns with study representatives. Specifically, the purpose of Public Open House #2 was to:

- Outline the project background and EA process;
- Present the alternative watermain routes considered and the recommended route for both watermains;
- Present the proposed watermain construction methods (open cut versus tunnel), including the proposed construction compound locations;
- Present the proposed mitigation measures; and
- Outline the next steps in the study.

Following distribution of the Notice of Public Open House #2 (see **Table 9-1**), the first of two second-round open houses was held on Wednesday, June 12, 2013, from 6:30 p.m. to 8:30 p.m. at St. John Fisher Catholic School in Brampton, Ontario. A similar session was also held on Thursday, June 13, 2013, from 6:30 p.m. to 8:30 p.m. at Russell D. Barber Public School in Brampton, Ontario. Similar to Public Open House #1, both Public Open House #2 sessions followed an informal "drop-in" format with large display boards presenting key project information. A copy of the display boards is provided in **Appendix L-6** and was made available on the project website (http://www.peelregion.ca/pw/water/environ-assess/east-brampton.htm).

The Public Open House was attended by at least 30 members of the public, with 17 people signing in over the course of the two sessions. Of the 17 people who did sign in, three were repeat visitors from Public Open House #1. The remaining first-time attendees were typically neighbouring residents who lived along the recommended route or in close proximity to the East Brampton Pumping Station and Reservoir/

Northampton Park. Two neighbourhood association representatives attended, as well as one self-identified local business owner. Copies of the sign-in sheets (personal information obscured) are provided in **Appendix L-6**.

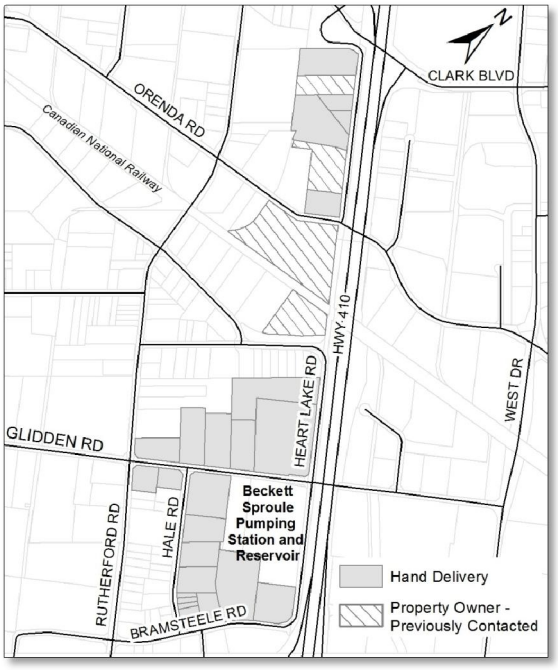
In addition, Region of Peel project staff attended a third Public Open House held specifically for the West Brampton Watermain Class EA. This session was held on Tuesday, June 4, 2013 from 6:30 p.m. to 8:30 p.m. at Arnott Charlton Public School in Brampton. Key project display boards were presented and Peel staff further discussed the project with any interested parties.

9.1.5.1 Summary of Feedback Received

The majority of Public Open House #2 attendees openly discussed the project with Region of Peel and/or AECOM representatives. Attendees were also encouraged to submit written comments by completing a comment sheet; however, only one comment sheet was submitted. No additional comment sheets were received following the open house. However, leading up to Public Open House #2 and immediately following, one additional person contacted the study team with questions and comments specifically related to the planned improvements on Dixie Road.

Appendix L-7 provides a summary of the questions, comments and responses discussed either at the Public Open House sessions or before and after. For ease of understanding, comments/responses have been organized under the following themes:

- Project Overview – discusses the size (diameter) and depth of the proposed watermains and construction timing and costs;
- Recommended Route for Both Watermains: Heart Lake Road, Clark Boulevard and Dixie Road – summarizes the support received for routing of the watermains along Dixie Road, recommends co-ordination, where possible, with the future widening of both Dixie Road and Clark Boulevard, and discusses the need for private property taking and what a typical construction setup would look like at key areas along the recommended route;
- Construction-Related Impacts – discusses the potential impacts of watermain construction at specific areas along the recommended route, including potential traffic disruptions, lane restrictions, noise and vibrations, and the importance of phased construction along the route, obtaining permission for work on private property, and choosing a competent contractor;
- Operational Impacts – discusses potential disruptions to existing water services and confirms that no service connections will be made to homes or businesses from the new watermains; and
- General and Miscellaneous Comments – summarizes the comments received related to the next steps in this study.



The summary is not intended as a verbatim transcript of the discussions or comments received but rather to reflect the main points of discussion. A copy of the actual comment sheet received and other EA Phase 2 communications (personal information obscured) are provided in **Appendix L-6**.

9.1.5.2 Business Community Outreach

In an effort to engage the local business community and further generate interest in the project, the Notice of Public Open House #2 was hand-delivered to the businesses fronting onto Heart Lake Road south of Clark Boulevard and the businesses fronting onto Glidden Road near the Beckett Sproule Pumping Station and Reservoir on June 11, 2013.

Businesses specifically targeted included those that generate large commercial truck traffic which may be inconvenienced by road or lane closures during construction on Heart Lake Road. Property owners who were previously contacted regarding potential temporary and/or permanent easements were not targeted as part of this outreach effort.

Hand-delivery included unscheduled visits to approximately 25 businesses during normal operating hours to provide a copy of the notice and extend a personal invitation to Public Open House #2. If an appropriate representative was available (e.g., owner, manager), the project was briefly introduced and a number of questions were asked in order to determine if there was high potential for the business to be impacted during watermain construction. If an appropriate owner representative was not available, the notice was left and contact information was obtained for follow-up, where possible. Based on the availability of an owner representative at the time of visit, interviews were held with two of the largest heavy trucking companies who are also expected to be sensitive to construction. **Table 9-2** below provides a summary of the contacts made, responses received and follow-up actions undertaken.

Table 9-2 Summary of Business Community Outreach Feedback

ID#	Contact Information	Feedback Summary
1	• Johnson Matthey Catalysts Chemicals & Refining Design, 130 Glidden Road	• Left notice and business card with security guard. • Another business owner noted that Johnson Matthey employs approximately 100 people and has little truck traffic, perhaps only 5 trucks in and out per day. • Dave Murray, Operations Manager, added to mailing list for the Notice of Study Completion.
2	• Travelers Transportation Services, 195 Heart Lake Road South	• Company President noted that they will be inconvenienced by construction, but that they have good access to Rutherford Road via either Glidden Road or Selby Road. Will try to attend Public Open House #2 and will work with the Region of Peel at detailed design. • Normal operations are 7:00 a.m. to 5:00 p.m., Monday to Friday. They have approximately 100 employees and typically see approximately 150 trucks in and out per day. Saturday may see 25 trucks in/out, while Sundays may see 50 trucks in/out. Local truckers pick up empty containers, load them and bring them back to the site; then they deliver the loaded containers to shipping ports (e.g., on east coast). They are the main container shipping yard for some steamship lines. Although they have no particular slow period (e.g., winter container traffic is predominately produce from Chile), business may be slightly slower in December/January and the summer months. • They were able to cope with construction of the 2100-mm diameter feedermain in 2002 when Heart Lake Road was completely shut down in sections, but the yard was not as busy then (i.e., no storage container activity at that time). If their crane breaks down, trucks have to line up on Heart Lake Road. • Added to mailing list for the Notice of Study Completion.

ID#	Contact Information	Feedback Summary
3	• Total Pallet Solutions, 150 Glidden Road	• Red Leaf Packaging, Ross Beverley, President, noted that they don't typically use Heart Lake Road and have no concerns.
4	• Forbes-Hewlett Transport Inc., 156 Glidden Road	• Vice President, Operations, noted no concerns as long as they can access Rutherford Road or Tomken/West Drive. • Added to the mailing list for the Notice of Study Completion.
5	• Valle Foam, 4 West Drive	• Closed/vacant (for lease).
6	• Reaction Packaging Inc., 77 Hale Road	• Left notice and business card. Does not appear to be a large truck generator.
7	• Purewood Inc., 39 Heart Lake Road	• Left notice and business card. Does not appear to be a large truck generator.
8	• Canada Post Retail Outlet and Depot, 26 Hale Road	• Left notice and business card with Clerk who will give to Delivery Manager. Does not appear to be a large truck generator.
9	• Speedy Transport Group Inc.	• Left notice and business card for Operations Manager. Large trucking operation located on Glidden Road, west of Rutherford Road. Likely not a major user of Heart Lake Road. • Added to the mailing list for the Notice of Study Completion.
10	• Wasteco, 147 Heart Lake Road	• Left notice and business card for Operations Manager. Commercial sanitation truck yard. Likely a major user of Heart Lake Road. • Added to the mailing list for the Notice of Study Completion.
11	• Access Storage, 143 Heart Lake Road	• Left notice and business card for Branch Manager. • Added to the mailing list for the Notice of Study Completion.
12	• Inzola Construction, 105 Heart Lake Road, Unit 1	• Left notice and business card for President. Likely not a major user of Heart Lake Road. • Added to the mailing list for the Notice of Study Completion.
13	• Brafasco, 105 Heart Lake Road South, Unit 2	• Left notice and business card for Branch Manager. Likely not a major user of Heart Lake Road. • Added to the mailing list for the Notice of Study Completion.
14	• McLean-Sherwood Party Rentals & Supplies, 93 Heart Lake Road	• Left notice and business card for General Manager. Likely not a major user of Heart Lake Road. • Added to the mailing list for the Notice of Study Completion.
15	• Blue Giant Equipment Corp, 85 Heart Lake Road South	• They have been at this location for over 50 years, manufacturing pallet lifts/lift trucks and loading docks. Typically trucks come from Clark Boulevard and enter at the loading dock south gate (beside the former United Rentals at 89 Heart Lake Road South). The truck loading dock is angled, requiring trucks to extend into Heart Lake Road and then back into the loading dock. With the proposed Compound No. 4 at United Rentals in operation, trucks may no longer be able to back in. Based on the site map and field observations, it appears that large trucks can access the loading dock by entering the site from the north entrance and traveling around the building to the south side where the loading docks are located. • Appreciates the advanced notice and wished the Region luck on the project. • Maintenance Supervisor and Vice President, Operations added to the mailing list for the Notice of Study Completion.

9.1.5.3 Stakeholder Meetings and Communications

Individual meetings were held with twelve public stakeholders, including Bramalea City Centre and potentially affected property owners from whom a permanent and/or temporary easement may be required. These face-to-face meetings generally included a discussion regarding the overall project and the details most relevant to the stakeholder's interests, such as proposed easements on their property or local traffic

mitigation plans. **Table 9-3** below lists the special meetings and communications with the various public stakeholder representatives, including a timeline of key correspondence. Meeting minutes and other key property owner correspondence is included in **Appendix L-8**.

Table 9-3 Summary of Public Stakeholder Communications

ID#	Organization/Property Owner – Key Communication	Date
1	Bramalea City Centre	
	• Notice of Study Commencement mailed	• March 2, 2012
	• Notice of Public Open House #1 mailed	• September 26, 2012
	• Meeting held on-site	• May 22, 2013
	• Meeting minutes issued and Notice of Public Open House #2 sent	• June 5, 2013
2	SpeedX Transport	
	• Introductory letter/meeting request mailed	• April 25, 2013
	• Follow-up phone conversation and e-mail sent	• May 9 and 10, 2013
	• Follow-up phone conversation to schedule meeting	• May 28, 2013
	• Meeting held on-site	• June 4, 2013
	• Notice of Public Open House #2 e-mailed	• June 5, 2013
	• Meeting minutes issued	• June 24, 2013
	• Follow-up request for comments e-mailed	• September 17, 2013
3	Sigma Asset Management Limited	
	• Introductory letter/meeting request mailed	• April 25, 2013
	• Notice of Public Open House #2 e-mailed	• June 5, 2013
	• Meeting held	• June 11, 2013
	• Meeting minutes issued and follow-up response received	• June 24, 2013
	• Permission to Enter signed for Stage 2 hydrogeological/geotechnical investigations	• February 20, 2014
4	Crosby Canada	
	• Introductory phone conversation and follow-up letter e-mailed	• May 8 and 10, 2013
	• Meeting held on-site	• May 22, 2013
	• Meeting minutes issued and Notice of Public Open House #2 sent	• June 5, 2013
	• E-mail response received and revised meeting minutes issued	• June 7 and 24, 2013
	• Permission to Enter signed for Stage 2 archaeological investigations	• October 20, 2013
5	1214446 Ontario Inc. (previously United Rentals)	
	• Introductory phone conversation and follow-up letter e-mailed	• April 24 and 25, 2013
	• Follow-up phone conversation to schedule meeting	• May 28, 2013
	• Notice of Public Open House #2 e-mailed	• June 5, 2013
	• Meeting held on-site	• June 11, 2013
	• Meeting minutes issued	• June 24, 2013
	• Follow-up request for comments e-mailed	• September 17, 2013
	• Multiple requests made for Permission to Enter	• Fall 2013 to June 2014

ID#	Organization/Property Owner – Key Communication	Date
6	Owens-Illinois	
	• Phone message left for Real Estate Division, Head Office (Ohio, USA)	• April 23, 2013
	• Second message left for different Real Estate contact, Head Office	• May 3, 2013
	• Site visit to obtain local contact information	• May 22, 2013
	• Introductory phone conversation and follow-up letter e-mailed	• May 31, 2013
	• Notice of Public Open House #2 e-mailed	• June 5, 2013
	• Meeting held on-site	• June 11, 2013
	• Meeting minutes issued	• July 3, 2013
	• Follow-up request for comments e-mailed	• September 17, 2013
	• Request for further information received	• October 9, 2013
	• Response to questions e-mailed and teleconference scheduled	• October 11, 2013
	• Teleconference cancelled – received verbal confirmation of approval in principal	• October 18, 2013
	• E-mail sent requesting written confirmation of approval in principal and response received	• October 29 and November 13, 2013
	• Permission to Enter signed for Stage 2 hydrogeological/geotechnical investigations	• February 10, 2014
7	W. Ralston (Canada) Inc.	
	• Phone messages left	• April 23 and May 3, 2013
	• Introductory phone conversation and follow-up e-mail sent	• May 15 and 28, 2013
	• Notice of Public Open House #2 e-mailed	• June 5, 2013
	• Meeting held on-site	• June 11, 2013
	• Meeting minutes issued and follow-up questions answered	• July 3 and 4, 2013
	• Meeting #2 held on-site	• September 25, 2013
	• Permission to Enter signed for Stage 2 hydrogeological/geotechnical investigations	• February 12, 2014
	• Sent PDF copy of ESR with Notice of Study Completion	• June 2, 2014
8	Central Peel Holdings (1982) Limited (Zoom Zoom Storage)	
	• Phone messages left with Peel Mini-Storage (listed number does not accept incoming calls)	• April 23, 2013
	• Provided contact information to on-site clerk who agreed to forward it to property owner	• May 3, 2013
	• Notice of Public Open House #2 e-mailed	• June 5, 2013
	• E-mail received asking for follow-up	• June 25, 2013
	• Follow-up phone calls and/or voicemails left at office number and/or at cell number	• June 28, July 12, 22 and 31, 2013
	• Voicemails left and follow-up information e-mailed	• September 19, 2013
	• Received voicemail from Property Manager, indicating that she had forwarded the letter to the property owner and the Region would soon be contacted	• September 25, 2013
	• E-mailed request for property owner contact information and response received indicating that she cannot give out that information but instead would again forward our request	• October 31, 2013
	• Permission to Enter signed for Stage 2 hydrogeological/geotechnical investigations	• February 11 and March 9, 2014
9	Preston Group	
	• Introductory letter/meeting request mailed	• April 25, 2013
	• Receptionist confirms letter was received	• May 10, 2013
	• Voicemail received and follow-up phone conversation held	• May 27 and 29, 2013
	• Meeting held on-site	• June 4, 2013
	• Notice of Public Open House #2 e-mailed	• June 5, 2013
	• Comments and site development drawings received via e-mail	• June 6, 2013
	• Meeting minutes issued	• June 24, 2013
	• Permission to Enter signed for Stage 2 archaeological investigations	• November 8, 2013

ID#	Organization/Property Owner – Key Communication	Date
10	Brampton Park Acquisition Corporation c/o East West Management	
	• Introductory phone conversation and follow-up letter e-mailed	• April 25 and 26, 2013
	• Follow-up voicemails left and e-mail sent	• May 8 and 28, 2013
	• Meeting held on-site	• June 4, 2013
	• Notice of Public Open House #2 e-mailed	• June 5, 2013
	• Meeting minutes issued	• June 24, 2013
	• Follow-up request for comments e-mailed and response received	• September 17 and 18, 2013
	• Permission to Enter signed for Stage 2 archaeological investigations	• October 25, 2013
11	BCIMC Realty Corporation c/o Vertica Resident Services	
	• Introductory phone conversation and follow-up letter e-mailed	• April 23 and 25, 2013
	• Meeting held	• May 24, 2013
	• Notice of Public Open House #2 e-mailed	• June 5, 2013
	• Follow-up request for comments e-mailed	• September 17, 2013
	• Permission to Enter signed for Stage 2 archaeological investigations	• November 18, 2013
12	Arlington Homes	
	• Initial discussions between owner and Region of Peel planning staff due to past history (i.e., site plan application in process). Phone conversations centred around the need for a meeting to discuss property requirements, timing and purpose.	• Early April 2013
	• Meeting held	• May 3, 2013
	• Notice of Public Open House #2 e-mailed (copied to owner's consultant)	• June 7, 2013
	• Meeting minutes issued	• June 24, 2013
	• Follow-up request for comments e-mailed	• September 17, 2013
	• Notification of drilling near owner's property within Dixie Road right-of-way e-mailed	• April 2, 2014
	• Sent PDF copy of ESR with Notice of Study Completion	• June 2, 2014
13	Your Home Developments	
	• Initial discussions between owner and Region of Peel planning staff due to past history (i.e., site plan approval). Phone conversations centred around the need for a meeting to discuss property requirements, timing and purpose.	• Early April 2013
	• Meeting held	• May 31, 2013
	• Notice of Public Open House #2 e-mailed (copied to owner's consultant)	• June 7, 2013
	• Meeting minutes issued and owner confirms that minutes are correct and requests to be kept informed of any changes with respect to his development.	• June 24 and 25, 2013

9.1.6 EA Phase 4 Consultation

All parties previously notified throughout the Class EA Phases 1 to 3, and those who requested to be notified following Public Open House #2, were sent a copy of the Notice of Study Completion on May 28, 2014. This included distribution of the notice to approximately 600 properties within proximity to either the Beckett Sproule or East Brampton Pumping Station and Reservoir, and over 9,000 properties within the study area via Canada Post unaddressed ad mail, including those fronting or backing onto the preferred watermain route. The Notice of Study Completion was also published in the Brampton Guardian on June 4, 2014 and June 6, 2014, and posted on the Region's project website (see **Table 9-1**).

The Notice of Study Completion explained that this ESR has been filed for public review and comment for a period of 30-calendar days. Recipients of the notice were asked to provide the Region of Peel's Project Manager with their written comments within the 30-day review period, starting on June 4, 2014 and ending on July 3, 2014. As per Municipal Class EA requirements, the notice also provided further details regarding

the public's right to request a Part II Order within the 30-day review period (see **Section 1.9**). If no Part II Order requests are received by July 3, 2014, the Region of Peel intends to proceed with detailed design and construction as outlined in this ESR.

9.2 Review Agency Communications and Consultation

In addition to the public consultation activities described above, meetings to explain the project and address specific issues related to engineering details, construction and property requirements were also held with various government regulatory and review agencies including the:

- City of Brampton;
- Toronto and Region Conservation Authority (TRCA);
- Ministry of Transportation (MTO); and the
- Ministry of Natural Resources (MNR).

In addition, where individual meetings were not warranted, correspondence with other government regulatory and review agencies and stakeholders included the:

- Ministry of the Environment (MOE);
- Infrastructure Ontario (IO);
- Ministry of Tourism, Culture and Sport (MTCS);
- Peel District School Board (PDSB);
- Dufferin-Peel Catholic District School Board (DPCDSB);
- Environment Canada;
- Transport Canada;
- Canadian National Railway (CNR); and
- Various other utility companies.

The outcome of these meetings and correspondence is summarized in the following sub-sections. A copy of all formal agency correspondence and the project contact list is included in **Appendix M**.

9.2.1 City of Brampton

Three meetings were held with various City of Brampton (the City) staff and follow-up correspondence was exchanged multiple times throughout the planning process (see **Appendix M-1**). Provided below is a summary of the communications and consultation undertaken with the City to date:

- The draft Notice of Study Commencement and an information bulletin were sent to Mayor Fennell and applicable City Councillors on February 16, 2012. The public Notice of Study Commencement was then sent to the City of Brampton on March 5, 2012, along with a meeting request and figure illustrating the preliminary alternative watermain routes. Follow-up e-mails were then sent to the City's lead contact on March 7 and 29, 2012, including a request for digital data.

- Digital data was received April 16, 2012, along with comments dated April 12th from Brampton Transit. Comments included a list of transit routes and Bus Rapid Transit (BRT) stations in the study area and a request for detailed drawings, when available. As-built reference drawings for significant crossings were also requested from the City on April 11 and received on April 18, 2012.
- An introductory meeting was held on April 17, 2013 to provide City staff with an overview of the project, review the preliminary alternative routes and solicit comments. The City staff in attendance provided comments primarily regarding the preliminary alternative routes, future plans at Highway 410 and Clark Boulevard, and other planned capital works in the area. Staff specified that arterial roads were preferred over secondary collector roads, and stressed that traffic disruptions should be minimized wherever possible. It was also noted that a tunnel shaft will be required in Northampton Park for construction of the connection to the East Brampton Reservoir. Additional comments received from the City are described in the meeting minutes (see **Appendix M-1**). The meeting minutes were sent to the City's lead contact for distribution on May 3, 2012.
- On September 18, 2012, the Notice of Public Open House #1 and an information update bulletin were sent to Mayor Fennell and applicable City Councillors. Councillors were also invited to attend a drop-in Councillor briefing session at Regional headquarters on September 27, 2012. On September 25, 2012, the Notice was then sent to the City's lead contact for distribution to City staff, along with a copy of the draft public open house display boards which presented the preliminary preferred route, i.e., Heart Lake Road, Clark Boulevard and Dixie Road. The Notice of Public Open House #1 was also sent to the City Clerk's office on October 1, 2012 for distribution to the Brampton Environmental Planning Advisory Committee.
- After progressing with the preliminary design for the preliminary preferred route, additional data was requested from the City on April 8th and received April 10, 2013.
- On May 9, 2013, the Notice of Public Open House #2 and a project/issue update bulletin were sent to Mayor Fennell and applicable City Councillors. Councillors were also invited to attend a drop-in Councillor briefing session at Regional headquarters on May 23, 2013. On June 5, 2013, the Notice of Public Open House #2 was also sent to the City's lead contact for distribution to City staff, along with a copy of the draft public open house display boards. The notice was also sent on June 5, 2013 to the City Clerk's office.
- A second meeting with City staff was held on May 27, 2013 to provide a project update in advance of Public Open House #2 and to further solicit Brampton comments. Details about the recommended route were discussed, including: the proposed construction methods along Heart Lake Road, Clark Boulevard and Dixie Road; proposed compound and interconnection locations; City of Brampton property requirements; traffic and transit considerations; the connection at the East Brampton reservoir; and, co-ordination with the Clark Boulevard and Dixie Road widenings. Additional details are described in the meeting minutes (see **Appendix M-1**) which were sent to the City's lead contact for distribution on June 4, 2013.
- Draft traffic management drawings were also sent to the City of Brampton on June 4, 2013. To date, no specific comments have been received.
- On June 12, 2013, comments were received from engineering staff specifically related to co-ordination with the City's planned improvements along Clark Boulevard. It was requested that the Region's design drawings incorporate the proposed design of Clark Boulevard improvements and identify any horizontal or vertical conflicts. The Region agreed to provide the City with the draft plan and profiles for review and

comment (to be submitted) and also requested that the City contact one of the impacted property owners along Clark Boulevard whom the Region recently met (contact made June 14, 2013, see **Appendix L-8**).

- A third meeting with City staff was held on November 15, 2013 to discuss co-ordination requirements between the Region of Peel and the City of Brampton. It was agreed that property requirements along Clark Boulevard and property owner negotiations should be co-ordinated between the Region and the City (see meeting minutes, **Appendix M-1**).
- Copies of the draft ESR were provided to the City for review and comment on January 16, 2014. Comments were received April 3, 2014 and a response letter to outline how the City's comments were addressed as part of the final ESR was issued June 2, 2014, along with a copy of the final report.

In summary, the City of Brampton has been an active participant in this Class EA study and the project team has made every effort possible to address the City's comments and concerns. Given that the City is a key stakeholder in the project, City staff and Councillors will continue to be consulted and kept up to date throughout the detailed design and construction phases.

9.2.2 Toronto and Region Conservation Authority

Three meetings were held with TRCA staff and both informal and formal follow-up correspondence was exchanged multiple times throughout the planning process. Provided below is a summary of the communications and consultation undertaken with TRCA to date:

- The Notice of Study Commencement was sent to TRCA on March 2, 2012, along with a meeting request and request for digital data. A meeting was then held on April 12, 2012 to introduce the project and solicit TRCA comments. Details regarding the first TRCA meeting are described in the meeting minutes (see **Appendix M-2**) which were sent to TRCA on May 3, 2012.
- Digital data was received from TRCA on May 24 and June 22, 2012 (i.e., watercourses, TRCA regulation limits, flood plain maps, natural cover and species of conservation concern).
- The Notice of Public Open House #1 and a copy of the draft display boards were issued to TRCA on September 25, 2012, along with a digital copy of the Preliminary Hydrogeological and Geotechnical Routing Assessment report (see **Appendix C**).
- A second meeting with TRCA staff was held on February 21, 2013 to provide a project update and to further solicit any TRCA comments. Details about the recommended route were discussed, including the proposed construction methods and compound locations, watercourse crossings and TRCA permit requirements. Additional details are described in the meeting minutes (see **Appendix M-2**) which were sent to TRCA on March 25, 2013. A response to the meeting requests regarding updated floodplain mapping and HRAS modelling was received from TRCA on May 7, 2013.
- The Notice of Public Open House #2 and a copy of the draft display boards were issued to TRCA on June 5, 2013.
- On July 31, 2013, a request for TRCA comments was made regarding the proposed tunnel shaft compound located within TRCA regulation limits at 190 Clark Boulevard. A meeting to discuss the proposed compound was held on September 24, 2013. TRCA staff noted a contingency plan and site safety plan will be required. Another request for formal comments was made October 18, 2013 along with submission of the meeting minutes. An e-mail response was received on November 6, 2013.

- Copies of the draft ESR were provided to TRCA for review and comment on January 16, 2014. Comments were received February 24, 2014 and a response letter to outline how TRCA's comments were addressed as part of the final ESR was issued June 2, 2014, along with a copy of the final report.

In summary, further meetings and communications with TRCA will be required during detailed design and TRCA approvals phases of the project. Specifically, once completed, TRCA will be provided with copies of the Stage 2 hydrogeological and geotechnical reports, the draft Erosion and Sediment Control Plan, and cross sections (plan and profile drawings) at the watercourse crossings. Further discussion will also be required regarding the proposed tunnel shaft near 190 Clark Boulevard.

9.2.3 Ministry of Transportation

Two meetings were held with MTO staff and both informal and formal follow-up correspondence was exchanged multiple times throughout the planning process. Provided below is a summary of the communications and consultation undertaken with MTO to date:

- The Notice of Study Commencement was sent to MTO on March 2, 2012, along with a meeting request and request for engineering drawings. A meeting was then held on April 12, 2012 to introduce the project and solicit MTO comments regarding the various Highway 410 crossing options. Key MTO comments are described in the meeting minutes (see **Appendix M-3**) which were sent to MTO on May 3, 2012 and subsequently revised based on minor comments received the same day from MTO.
- On May 3, 2012, AECOM staff visited MTO's offices to obtain relevant background reports and geotechnical information, including contract drawings and reports related to both the existing Highway 410 and its proposed widening. These reports were referenced for background information as part of the preliminary geotechnical assessment (see **Appendix C**).
- Further to our initial meeting discussions, MTO confirmed on May 31, 2013 that except for Highway 410, no other roadways within the study area fall under MTO's jurisdiction.
- The Notice of Public Open House #1 and a copy of the draft display boards which presented the preliminary preferred route were issued to MTO on September 26, 2012.
- On November 6, 2012, a request for MTO comments was made regarding the proposed watermain alignments along Heart Lake Road south of Clark Boulevard. The accompanying memorandum and typical cross-section drawings described the preliminary preferred alignments and justified why the two new watermains were proposed adjacent to Highway 410 and in some areas, within the 14 metre setback guideline. On November 13, 2012, MTO verbally confirmed receipt of the memorandum and suggested that the proposed alignment along Heart Lake Road would not be problematic.
- A second meeting was then convened on January 10, 2013 to further discuss the preliminary preferred alignments along Heart Lake Road and the proposed Highway 410 crossing at Clark Boulevard. MTO noted that they have no issue with constructing the watermains within MTO's 14-metre (46-foot) setback guideline along Heart Lake Road as long as the new watermains are located west of the existing 2.1-metre (7-foot) diameter feedermain. Additional key MTO comments are described in the meeting minutes (see **Appendix M-3**) which were sent to MTO on April 8, 2013.
- A request for MTO property was issued to MTO on April 25, 2013. On April 29th, MTO's lead contact verbally confirmed receipt of the property request and noted that there had been interest from another buyer in purchasing the requested lands at Selby Road. MTO then provided contact information for their property representative and sent MTO's property detail drawings dated April 2010 for reference.

- On May 13, 2013, the Region contacted MTO's real estate officer regarding the need for temporary and permanent easements on MTO-owned lands west of Heart Lake Road. The Region also requested that they be provided the opportunity to purchase any surplus lands prior to MTO disposal. MTO responded that reference plans will be required for any easement requests, and that Infrastructure Ontario will circulate other government bodies on MTO's behalf when MTO land is sold.
- The Notice of Public Open House #2 was issued to MTO on June 6, 2013. MTO responded on June 7th, specifically noting that the MTO has no issues with the crossing at Clark Boulevard.
- On August 12, 2013, revised property requirements were provided to the MTO and subsequently, reference plans were provided in hard copy.
- On October 1, 2013, MTO Real Estate noted that Highway Engineering refused the request for property as there would be a contract on Highway 410 beginning in 2014 and ending in 2019. MTO recommended that the requested lands not be released until after 2019.
- Follow-up discussions on October 28, 2013 with MTO Highway Engineering resulted in the Region's property request being re-circulated through MTO. An Approval for Transfer of Easement was received from MTO on December 5, 2013.
- A copy of the draft ESR was provided to MTO for review and comment on January 16, 2014. On March 4, 2014, MTO Highway Engineering noted that they had reviewed the draft and had no comments. The final ESR was issued to MTO on June 2, 2014.

In summary, further meetings and communications with MTO will be required during detailed design and the encroachment permitting process, particularly with respect to review of the Stage 2 geotechnical work program and the tunnel crossing of Highway 410 at Clark Boulevard. On-going discussions will also be required regarding the MTO property requirements west of Heart Lake Road. Close co-ordination will also be necessary between the MTO and the Region of Peel if watermain construction is planned at the same time as the Highway 410 widening.

9.2.4 Ministry of Natural Resources

MNR was provided with a brief project overview at a separate Region of Peel meeting on March 12, 2013 (see **Appendix M-4**). MNR noted that all of the watercourse crossings within the study area involve warm-water fish communities, none of which contain significant species. However, MNR also indicated that should any in-water works be required, a warmwater fisheries timing window would apply, i.e., all in-water works are to be completed between July 1st and March 31st. Additional communications with MNR included the Notice of Study Commencement and Notice of Public Open House #1 and #2, which were issued on March 2, 2012, September 26, 2012 and June 6, 2013 respectively.

As suggested at the MNR meeting, MNR should be copied on TRCA correspondence during the permitting process. In addition, completion of MNR's Information Gathering Form may be necessary to determine if authorization under the *Endangered Species Act* is required (see **Section 8.5**).

9.2.5 Ministry of the Environment

The Notice of Study Commencement was sent to the MOE on March 2, 2012 (see **Appendix M-5**). In addition to background information, the accompanying cover letter noted that the routing assessment for each new watermain would be combined under one Class EA planning process due to the efficiencies

associated with a common study area. On September 26, 2013, the Notice of Public Open House #1 was issued to MOE. MOE subsequently confirmed receipt of the notice and provided updated contact information. The Notice of Public Open House #2 was then issued to MOE's Regional EA Co-ordinator on June 6, 2013.

A draft of the ESR was provided to the MOE for review on January 16, 2014 and comments mostly related to air quality, contaminated soils and groundwater were received February 27, 2014. A response letter to outline how MOE's comments were addressed as part of the final ESR was issued June 2, 2014.

9.2.6 Infrastructure Ontario

The Notice of Study Commencement and Notice of Public Open House #1 and #2 were issued to IO on March 2, 2012, September 26, 2012 and June 6, 2013 respectively (see **Appendix M-6**). In the accompanying cover letter for each notice, a request was made for input regarding any IO-managed lands located within the study area. On June 12, 2013, comments were provided to assist the study team in identifying and avoiding potential negative impacts to IO lands (i.e., provincially owned or managed properties) and in identifying potential MOI Class EA triggers. Through subsequent discussion on January 15, 2014, it was confirmed that the proposed East Brampton Watermains construction does not trigger the MOI Category B Class EA process because MTO owns outright the easements required and no further IO involvement is necessary.

9.2.7 Ministry of Tourism, Culture and Sport

Correspondence from the MTCS dated November 16, 2012, noted that the Stage 1 Archaeological Assessment (see **Appendix F**) was entered into the Ontario Public Register of Archaeological Reports without technical review (see **Appendix M-7**). Additional communications with MTCS included the Notice of Study Commencement and Notice of Public Open House #1 and #2, which were issued on March 2, 2012, September 26, 2012 and June 6, 2013 respectively.

As recommended in the Stage 1 report, Stage 2 archaeological investigations are now being completed to confirm that the preferred watermain alignment and tunnel shaft sites are clear of archaeological concern. If during detailed design, it is determined that any previously undisturbed areas not included in the Stage 2 assessment will be disturbed as a result of construction, additional Stage 2 archaeological investigations will be required. The Ministry will continue to be kept informed of all investigations and results.

9.2.8 Peel District School Board

The Notice of Study Commencement was sent to the PDSB on March 2, 2012 (see **Appendix M-8**). The school board indicated their interest in this project on March 29, 2012, and a response letter was sent along with the Notice of Public Open House #1 on September 26, 2012. PDSB acknowledged receipt of the letter and requested that they continue to be kept informed of study progress. Along with the Notice of Public Open House #2, the school board was notified on June 6, 2013 that no schools operated by the PDSB are located directly along the recommended East Brampton Watermains route. However, it was noted that there will be construction adjacent to the East Brampton Pumping Station and Reservoir which is located in the vicinity of Russell D. Barber Public School. In their letter dated June 7, 2013, PDSB again requested that they continue to be kept informed of study progress.

In summary, no impacts to school operations are expected. However, the PDSB will continue to be consulted and kept informed as detailed design proceeds, particularly with respect to any safety precautions that may need to be undertaken during construction.

9.2.9 Dufferin-Peel Catholic District School Board

The Notice of Study Commencement was sent to the DPCDSB on March 2, 2012 (see **Appendix M-9**). The school board indicated their interest in this project on March 5, 2012, and also suggested that there is no need to circulate the notices to Trustees, principals or other Superintendents. A response letter was sent along with the Notice of Public Open House #1 on September 26, 2012. A DPCDSB representative attended the Public Open House and provided written comments on October 12, 2013. The school board was pleased that the preliminary preferred route will not impact existing DPCDSB schools and requested that they continue to be kept informed of study progress. It was also suggested that if alternate watermain routing along either North Park Drive or Balmoral Drive is instead pursued, construction should only occur during the summer months due to access-related safety concerns.

On June 6, 2013, the Notice of Public Open House #2 was issued to the DPCDSB, and on June 7th, the school board acknowledged that the recommended watermain route will not impact their existing schools. However, they requested that the school board continue to be kept informed of study progress. A response letter to confirm that the DPCDSB will continue to be kept informed as detailed design proceeds was issued June 2, 2014, along with a copy of the Notice of Study Completion.

9.2.10 Environment Canada

Communications with Environment Canada included the Notice of Study Commencement and Notice of Public Open House #1 and #2, which were issued on March 2, 2012, September 26, 2012 and June 6, 2013 respectively (see **Appendix M-10**). No comments have been received from Environment Canada to date. It is not anticipated that comments will be received since the new watermains are not designated projects under the CEAA, no federal properties will be impacted, and both TRCA and MNR have reviewed and commented on the Class EA from a natural environmental perspective.

9.2.11 Transport Canada

The Notice of Study Commencement was sent to Transport Canada on March 2, 2012 and the Notice of Public Open House #1 was subsequently sent on September 26, 2012 (see **Appendix M-11**). On October 19, 2012, Transport Canada provided updated contact information and noted that there is federal property in the vicinity of the study area. Transport Canada also noted that any works undertaken within navigable waters would first require approval under the *Navigable Waters Protection Act* (NWPA) and that the *Railway Safety Act* should be reviewed, including the *Notice of Railway Works Regulations*. A response letter was issued June 6, 2013, along with the Notice of Public Open House #2. The response indicated that no *Canadian Environmental Assessment Act* triggers have been identified for this project and that no potential impacts to the one federal property within the study area are expected. It was also noted that construction within navigable waters is not proposed as part of this project, and that tunnel crossing of the at-grade CNR line at Heart Lake Road will be co-ordinated with CNR.

Transport Canada received a copy of the Notice of Study Completion on June 2, 2014 and will continue to be kept informed as applicable, as detailed design proceeds.

9.2.12 Canadian National Railway

The Notice of Study Commencement and a meeting and information request was sent to CNR on March 2, 2012 (see **Appendix M-12**). CNR responded on March 29, 2012, noting that CNR does not typically distribute bridge structure drawings as requested, and that the Highway 410 overhead structure drawings could be obtained from MTO. On September 26, 2012, the Notice of Public Open House #1 was sent to CNR, along with a request for comments regarding a potential watermain crossing at-grade south of Orenda Road near Heart Lake Road and Highway 410. CNR acknowledged receipt of the letter on September 27, 2013 and noted that they would like to be kept informed and will provide comments as necessary. The Notice of Public Open House #2 was then sent to CNR on June 6, 2013. On July 31, 2013, CNR was provided with a draft plan and profile of the proposed CNR crossing at Heart Lake Road. Comments specific to the CNR crossing application were received September 19, 2013.

In summary, a work permit and crossing agreement will be required from CNR prior to construction. As such, CNR will be further consulted during detailed design regarding the proposed CNR tunnel crossing at Heart Lake Road.

9.2.13 Utilities

Various utility companies thought to possibly have services within the study area were contacted for information regarding their existing infrastructure along the alternative watermain routes. Companies who confirmed that they have infrastructure in the area included Hydro One Brampton, Enbridge Gas Distribution, Bell Canada, Rogers Cable, Telus and MTS Allstream. Companies who responded by noting that they do not have any infrastructure in the area included Hydro One Networks, Enersource Hydro, Trans Canada Pipeline, Sun Canadian Pipeline, Trans-Northern Pipelines, Imperial Oil, Union Gas and Praxair. The sub-sections below provide further details regarding the communications with these utility companies and which utilities may need to be relocated during construction. In summary, utility information and temporary and/or permanent relocation needs have been incorporated into the preliminary design drawings, as applicable. Relevant companies will continue to be consulted during detailed design. A copy of the utility correspondence referenced below has been included as part of the separate preliminary design report.

9.2.13.1 Hydro One Brampton

On March 22, 2012, a response was received from Hydro One Brampton with locate plates indicating that Hydro One Brampton has above and below ground cables within the study area. Furthermore, an underground plant and overhead hydro cables will be encountered along the preferred route. Field locates and further communications with Hydro One Brampton will be necessary prior to construction.

9.2.13.2 Hydro One Networks Inc.

A response email dated March 7, 2012 indicated that no Hydro One Network transmission facilities are located within the study area. As a result, no further communications were forwarded to Hydro One Networks.

9.2.13.3 Enersource Hydro

A response email was received on March 19, 2012, indicating that the study area falls outside of Enersource Hydro's boundaries (north of Derry Road). As a result, no further communications were forwarded to Hydro One Networks.

9.2.13.4 Trans Canada Pipeline

On March 6, 2012, a response was received from Trans Canada Pipeline indicating that no Trans Canada Pipelines are located in the study area (only between Bovaird Drive and Sandalwood Parkway). As a result, no further communications were forwarded to Trans Canada Pipelines.

9.2.13.5 Sun-Canadian Pipeline

A response email was received on March 19, 2012, indicating that no Sun-Canadian Pipelines are located within the study area. As a result, no further communications were forwarded to Sun-Canadian Pipelines.

9.2.13.6 Trans-Northern Pipelines Inc.

A response email was received on March 2, 2012, indicating that no Trans-Northern Pipelines are located within the study area. As a result, no further communications were forwarded to Trans-Northern Pipelines.

9.2.13.7 Imperial Oil

Imperial Oil responded via email on March 13, 2012, indicating that no Imperial Oil mains are located within the study area. As a result, no further communications were forwarded to Union Gas.

9.2.13.8 Enbridge Gas Distribution

On April 4, 2012, Enbridge Gas identified the presence of Enbridge gas mains in the study area and included atlas plate locates. Enbridge will offer more accurate/detailed markups upon completion of the preliminary design.

9.2.13.9 Union Gas

On February 9, 2012, Union Gas indicated that no Union Gas mains are located within the study area. As a result, no further communications were forwarded to Union Gas.

9.2.13.10 Bell Canada Inc.

An email response was received on April 25, 2012, from Netricom Inc. on behalf of Bell. The response included a drawing containing the location of Bell services within the study area. It is expected that temporary relocation of some Bell infrastructure will be required. This will be confirmed during detailed design.

9.2.13.11 Rogers Cable Communications Inc.

An email response was received on March 22, 2012, indicating that Rogers has services throughout the study area, including buried and aerial fiber/coaxial plant. Roger's provided an AutoCAD drawing showing their services, which has been incorporated on the preliminary design drawings. Field locates to confirm the location of Roger's infrastructure will be necessary prior to construction.

9.2.13.12 Telus Communications Inc.

On March 14, 2012, Netricom Inc. on behalf of Telus, provided plates containing the location of Telus services within the study area. These have been incorporated on the preliminary design drawings. Field locates to confirm the location of Telus' infrastructure will be necessary prior to construction.

9.2.13.13 MTS Allstream Inc.

On March 6, 2012, MTS Allstream indicated that the proposed watermain may encounter MTS Allstream infrastructure along Rutherford Road and Bramalea Road. However, the preferred watermain route will not impact the existing plant.

9.2.13.14 Praxair Canada Inc.

Praxair Canada Inc. (Praxair) confirmed on April 3rd, 2012 via telephone that there are no facilities within the study area (only located south of Steeles Avenue). Previous studies inquired about vibrations for work nearby and impacts to their equipment. No further communications were forwarded to Praxair.

9.2.13.15 Other Utilities

Notification of the alternative watermain routes was also sent to BLINK Communications Inc. (BLINK) and FCI Broadband Inc. (FCI). However, it was later discovered that both BLINK and FIC are now Rogers Cable Communications Inc.

The City of Brampton has indicated that there is underground street lighting equipment throughout the project area. Any potential conflicts will be determined during detailed design. Extreme care must be taken when crossing underground conductors.

The Region of Peel also maintains Peel Fibre (PSN) along the preferred watermain route. Again, any potential conflicts will be determined during detailed design.

9.3 First Nations and Métis Communications and Consultation

Although the study area is well-developed and not currently part of any known First Nations claims, First Nations consultation was completed in accordance with the Municipal Class EA First Nations Consultation Requirements. As part of this Class EA, communications with First Nations agencies and communities was undertaken in parallel with the other stakeholder communications and consultations described above. At key contact points, the following First Nations government review agencies were provided with notifications (i.e.,

Notice of Study Commencement, Notice of Public Open House #1, Notice of Public Open House #2 and Notice of Study Completion):

- Aboriginal Affairs and Northern Development Canada (AANDC); and the
- Ontario Ministry of Aboriginal Affairs.

Similarly, notices were issued to the following First Nation or Métis groups or representatives based on their relative proximity to the project study area:

- Alderville First Nation*;
- Association of Iroquois and Allied Indians[55];
- Beausoleil First Nation;
- Chippewas of Georgina Island First Nation;
- Chippewas of Mnjikaning (Rama) First Nation;
- Credit River Metis Council;
- Curve Lake First Nation*;
- Founding First Nation Circle;
- Hiawatha First Nation*;
- Metis Nation of Ontario, Consultation Unit;
- Mississaugas of Scugog Island First Nation*;
- Mississaugas of the New Credit First Nation;
- Mohawks of the Bay of Quinte[56];
- Nation Huronne Wendat;
- Union of Ontario Indians, Nipissing First Nation;
- Six Nations Haudensaunee Confederacy Council;
- Six Nations of the Grand River Territory; and the
- Coordinator for the Williams Treaties.

An example of the notifications is provided in **Appendix N**.

On March 15, 2012, the Ontario Ministry of Aboriginal Affairs responded to the Notice of Study Commencement, noting that the mailing list of Aboriginal groups was correct and that no further comments would be provided by the Ministry. However, on October 12, 2012, AANDC provided additional key contact information for all potentially affected Aboriginal communities within a 100 km radius of the project study area. As a result, the mailing list was updated and the additional information provided was reviewed,

[55] *Removed from mailing list as per December 7, 2012 comments.*

[56] *Added to the project mailing list further to comments received from AANDC, October 12, 2012.*

including Historic Treaties, Specific, Comprehensive and Special Claims, Litigation matters and other relevant information.

Contact with some of the First Nations groups was established prior to ESR filing (see **Appendix N**). Those groups noted with asterisks* in the list above expressed concern for the remains of their ancestors and requested to be immediately notified of any archaeological findings and/or provided with copies of any archeological reports (Stage 1 Archaeological Assessment provided May 12, 2014). Follow-up requests for comments will be made to all remaining First Nations groups with distribution of the Notice of Study Completion.

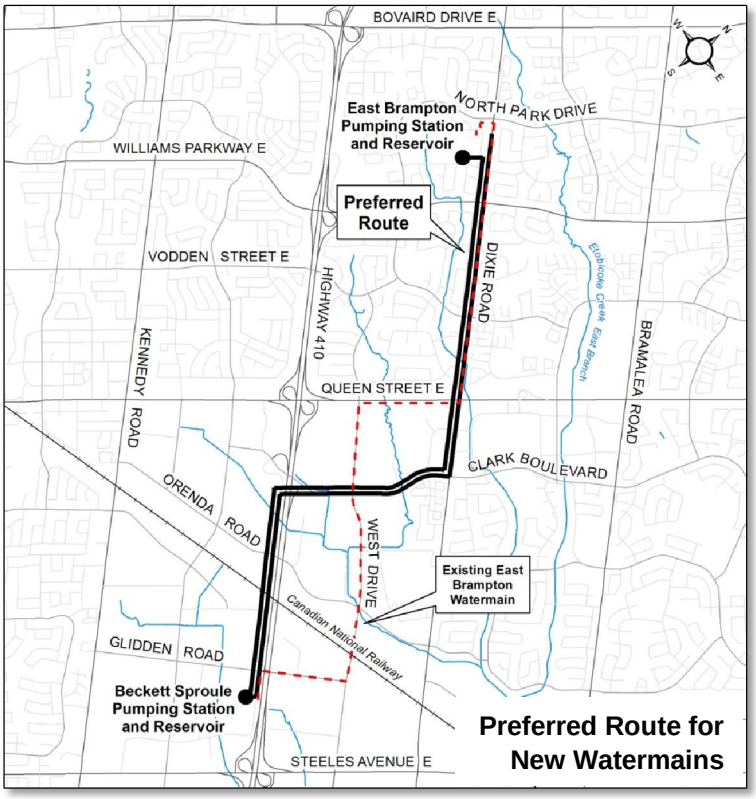
9.4 Summary

In summary, many steps were undertaken to proactively inform stakeholders about this Municipal Class EA study, obtain their input, and address their comments or concerns as much as possible as they arose. Through preliminary and detailed design, it is expected that further comments will be received from those having a direct interest in the project, and if necessary, meetings will be convened to discuss stakeholder comments and resolve any remaining issues, where possible. It is not anticipated that any concerns will be raised that the Region cannot further address during detailed design.

10. Conclusions and Recommendations

10.1 Conclusions

Through the completion of this Municipal Class EA study and supporting work, the preferred route for both the proposed 1.5-metre (5-foot) diameter East Brampton Zone 4 (Z4) transmission main and the 0.9- to 1.2-metre (3- to 4-foot) diameter Z5 sub-transmission main has been identified as Route 3 (Heart Lake Road, Clark Boulevard and Dixie Road), with interconnections at the Beckett Sproule Pumping Station and Reservoir, Orenda Road, West Drive, Queen Street East, Williams Parkway and just south of North Park Drive (see **Figure 6-1**). Specifically, this preferred route includes:



- Open cut construction along the west side of Heart Lake Road from the Beckett Sproule Pumping Station and Reservoir connection point north to Selby Road;
- Tunnel construction under the CN railway corridor from Selby Road to just north of the CN railway;
- Open cut construction along the old, closed Heart Lake Road right-of-way from the CN railway corridor north to a Z5 interconnection at Orenda Road, and continuing north along the west side of Heart Lake Road approximately 250 metres (275 yards) to the watercourse crossing;
- Tunnel construction north approximately 250 metres (275 yards) along Heart Lake Road from the watercourse crossing to the Highway 410 crossing just south of Clark Boulevard, and continuing east under Highway 410 and along the north side of Clark Boulevard to approximately 350 metres (380 yards) west of Lisa Street;
- Open cut construction along the north side of Clark Boulevard from the watercourse crossing to Dixie Road, continuing north approximately 200 metres (220 yards) along the west side of Dixie Road;
- Tunnel construction along the west side of Dixie Road from just south of Lisa Street, across Queen Street East, to just north of the Etobicoke Creek tributary crossing;
- Open cut construction north along the west side of Dixie Road to approximately 140 metres (150 yards) north of Williams Parkway;
- Tunnel construction approximately 200 metres (220 yards) north along the west side of Dixie Road to the Region's existing easement to the East Brampton Pumping Station and Reservoir;
- Tunnel construction of the Z4 transmission main west through the Region's existing easement to the East Brampton Pumping Station and Reservoir connection point;

- Open cut construction of the Z5 sub-transmission main approximately 190 metres (210 yards) further north along the west side of Dixie Road to an existing watermain located approximately 120 metres (130 yards) south of North Park Drive;
- Construction of a Z4 interconnection chamber is recommended at the northeast corner of Clark Boulevard and West Drive, and at the tunnel shaft just north of the watercourse crossing on Dixie Road. Alternatively, the second Z4 interconnection could be constructed at the northwest corner of Dixie Road and Howden Boulevard. This will be determined during detailed design; and
- Construction of a Z5 interconnection chamber is recommended at the northwest corner of Dixie Road and Williams Parkway, and at the northwest corner of Dixie Road and Queen Street East. Alternatively, the Dixie Road-Queen Street interconnection could be constructed at the tunnel shaft just north of the watercourse crossing on Dixie Road. This option would require construction of a third watermain doubling-back to connect to the existing Z5 distribution system along Queen Street East. This will be determined during detailed design.

Implementation of the above resolves the problem/opportunity statement identified in **Section 3** of this report. An evaluation of the potential impacts associated with construction of the proposed East Brampton watermains is included in **Section 5** of this report and further expanded upon in **Section 6**. Considering the natural environment, socio-economic and technical components considered, this preferred route is comprised of the best possible combination of segments with the lowest possible adverse impacts. In general, these impacts are considered predictable and can be addressed by the recommended mitigative measures as presented in **Section 7** of this report.

In addition, communications and consultation were undertaken throughout the duration of the study with numerous stakeholders, including the City of Brampton, government review agencies, conservation authority, property owners and other interested members of the public as summarized in **Section 9**. In summary, no concerns were raised that the Region cannot further address and resolve during detailed design.

Construction is currently scheduled for 2016 through 2018, although timing may change based on a number of variables (e.g., detailed design changes, co-ordination requirements with the future Clark Boulevard and Dixie Road widenings, etc.). Failure to have this infrastructure in place by 2020 may impact the Region's ability to service planned urban intensification and growth in Peel Region, but should not impact service to existing customers.

10.2 Recommendations and EA Commitments

This Municipal Class EA study was completed to ensure that the proposed East Brampton Watermains project meets the requirements of the *Environmental Assessment Act* (EAA). Following EA clearance, it is recommended that:

1) The preferred watermain route should proceed to detailed design and remaining approvals. As further described in **Section 8** of this report, required approvals include the:
    - Ministry of the Environment (MOE) Drinking Water Works Permit (DWWP) and MOE Permit(s) to Take Water (to be confirmed during detailed design);
    - Ministry of Transportation (MTO) encroachment permits;

- Ministry of Tourism, Culture and Sport (MTCS) archaeological clearance (to be confirmed during detailed design);
- Toronto Region Conservation Authority (TRCA) Development Interference Permits;
- Ministry of Natural Resources (MNR) authorization under the *Endangered Species Act*, if required;
- CNR utility crossing approval; and
- City of Brampton road occupancy permits.

2) Based on the property requirements identified in **Section 6.2** of this report, the Region should begin to negotiate all required permanent and temporary easements, including those required along Clark Boulevard in co-ordination with City of Brampton Realty Services staff.

3) During detailed design, the mitigation measures identified in **Section 7** of this report should be confirmed and further refined based on the results of the following supporting studies (soon be completed in 2014):

   - Stage 2 Geotechnical Investigations;
   - Stage 2 Hydrogeological Investigations;
   - Phase Two Environmental Site Assessment (ESA); and the
   - Stage 2 Archaeological Assessment.

   The mitigation measures should also be further elaborated upon and implemented during construction by completing the following plans during detailed design:

   - Traffic Management Plan (TMP);
   - Erosion and Sediment Control Plan;
   - Tree Preservation/Replacement Plan;
   - Construction Noise and Vibration Mitigation Plan, including pre-construction surveys of all buildings or structures within an approximate 100-metre (110-yard) radius of the open cut construction areas and tunnel shaft compounds;
   - Spill Prevention and Contingency Plan; and a
   - Post-Construction Monitoring Plan.

4) The Region of Peel should continue to coordinate with the City of Brampton though detailed design, including details regarding property acquisition, construction timing co-ordination along Clark Boulevard and the preparation of both the TMP and Tree Preservation/Replacement Plan.

5) The Region of Peel should continue to consult with review agencies though detailed design, including:

   - TRCA regarding the watercourse crossings, the tunnel shaft near 190 Clark Boulevard, and both the Erosion and Sediment Control Plan and the Tree Preservation/ Replacement Plan;
   - MOE regarding any potential Certificate of Approval or Drinking Water Works Permit (DWWP) requirements;

- MTO regarding tunnel crossing of Highway 410 at Clark Boulevard and property requirements west of Heart Lake Road;
- MNR regarding permitting under the *Endangered Species Act*, if required;
- MTCS regarding any follow-up work recommended through the Stage 2 archaeological investigations now being completed;
- CNR and Transport Canada regarding the CNR tunnel crossing at Heart Lake Road; and
- Various utility companies as outlined in **Section 9.2.13** regarding any potential utility conflicts with the proposed watermains construction and temporary and/or permanent utility relocation requirements.

6) The Region of Peel should continue to consult with both the Peel District School Board (PDSB) and the Dufferin-Peel Catholic District School Board (DPCDSB), particularly with respect to any safety precautions that may need to be undertaken during construction.

7) The Region of Peel should notify those First Nations noted with an asterisk* in **Section 9.3** of any archaeological findings and/or provide them with a copy of the Stage 2 Archaeological Assessment and any follow-up investigative reports.

8) The Region of Peel should continue to inform the public of construction plans as the project proceeds. It is recommended that this be undertaken by developing a community engagement and communications strategy as part of detailed design.

9) Following construction, all disturbed areas should be restored to their existing condition or better.