



**New Watermain South of Williams Parkway: Schedule B Class
Environmental Assessment**

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Executive Summary

The City of Brampton (City) is projected to grow significantly; with the 2020 Region of Peel Water and Wastewater Master Plan for the Lake-based Systems (Master Plan) forecasting residential and employment populations to increase more than 30 percent by 2041. The Master Plan was developed by the Region as part of its growth management strategy in 2020 for growth up to 2041. As noted in the Master Plan, Brampton's downtown core is identified as one of the major areas for residential and employment growth. This will generate an increase in average day water demand by more than 30%.

To meet the additional water demand near City of Brampton's downtown core, the Master Plan has identified the need for a 750- millimetre (mm) feedermain to provide water supply for the growth in downtown core. The feedermain is proposed to connect into a planned 900-mm transmission main along Williams Parkway in north and to an existing 600-mm-diameter watermain along Wellington and John Street in south. The Region of Peel (Region) has initiated this Schedule B Municipal Class Environmental Assessment (Class EA) study to identify a preferred route for this proposed 750-mm feedermain.

The Notice of Study Commencement was issued on February 20, 2020 to announce the commencement of the Class EA and to briefly describe the study area.

Baseline features and servicing conditions were gathered during Phase 1 stage. This includes planning and servicing conditions, provincial policy statement, existing and future land uses, existing utilities review, existing transportation network, geotechnical analysis, and natural cultural and social environment inventory. Phase 1 of the Class EA study established the Problem/Opportunity Statement.

The Downtown Brampton area in the City of Brampton is projected to grow by more than 30% in population and employment by 2041. This will generate an increase in the average day water demand by more than 30%. The existing water supply system is limited and does not have sufficient capacity to accommodate the additional water demand for the ultimate growth envisioned by the City. As a result, a new 750-mm feedermain is required to meet water demand. The purpose of this study is therefore to develop and evaluate alternative solutions and recommend a preferred solution for routing of the new 750-mm feedermain.

Phase 2 involved the development of alternatives to address the problem or opportunity statement considering the existing environment, as well as public, stakeholders, First Nations, and review agencies input.

Alternative solutions have been guided by the following key principles:

- Design alignment that accommodates required interconnections and provides appropriate solutions to the noted access and operational challenges;
- Minimize impacts on First Nations and key stakeholders, including the City, Toronto and Region Conservation Authority (TRCA), and Downtown Brampton Business Improvement Association (BIA);
- Where possible, allow for long-term flexibility with managing demand and pressure in the system.

Long-list of alternatives were developed to meet the problem statement using a pass/fail criteria. The pass/fail criteria assessed were: "meets problem/opportunity statement", "alignment with Master Plan", and "feasible to construct". A "do nothing" alternative to provide a baseline for evaluation was also included in the long-list.

The long-list of alternatives included routing along Main Street, Centre Street, the Etobicoke Creek Valley, and local roads through the west neighbourhood of the study area. The long-list alternatives were evaluated using a high-level screening process against comparison criteria. These criteria included: "services long-term growth",

“impacts and coordination with other major capital projects”, “operations and maintenance requirements including access-operational flexibility”, “impacts to natural environment”, “local business”, “traffic”, and “relative cost”. The long-list evaluation did not carry forward alignments along the Etobicoke Creek Valley and a direct route along Main Street due to the significant anticipated environmental and socio-cultural impacts.

Six alternatives carried forward from the long-list evaluation also called short-listed alternatives, were evaluated using natural environment, socio-cultural environment, economic and technical criteria. Supplemental studies to support development of short-listed alternatives like environmental desktop review, natural features impact assessment, geotechnical analysis, cultural heritage resource assessment, stage 1 archaeological assessment, hydraulic analysis and traffic and transport assessment were undertaken.

Based on the information from supplemental studies, a detailed evaluation of all six alternatives was undertaken. The preferred alignment selected for the proposed 750mm feedermain is routed directly along Centre Street from Williams Parkway to John Street. Open cut method and microtunnel method for construction of proposed watermain along Centre Street were considered and reviewed. Based on the review, the feedermain is proposed to be microtunnelled using a 1500 mm steel casing with the 750 mm CPP feedermain installed within the casing to meet Region of Peel standards.

The public and agencies were invited to take part in an Online Engagement through Notices posted on November 04, 2021 and November 11, 2021, in the Brampton Guardian newspaper and sent to stakeholders in the stakeholder contact list on December 22, 2021. The online engagement provided an opportunity for feedback on the preferred alternative. The feedback provided during the online engagement included responses from Nation Huronne-Wendat, Hydro One and Bell. Nation Huronne-Wendat is currently reviewing the stage 1 archaeology report and feedback is pending.

The preferred alternative requires mitigation measures to reduce environmental and socio-cultural impacts during construction of the watermain. Vibration analysis will be required prior to construction to assess the impact of microtunnelling on nearby houses. Construction work will follow local noise bylaws, with work performed during daytime hours. Additional plans and studies are to be performed where required including traffic management plans, erosion sedimentation and control plans, geotechnical and contaminated land studies.

This EA is classified as a Schedule B project, with submission of a Project File to meet the requirements of the Ontario Municipal Engineers’ Association’s Municipal Class Environmental Assessment and the *Environmental Assessment Act*. The Project File is prepared and filed for review by the public and the Ministry of the Environment, Conservation and Parks (MECP). The file will be available for public comment for a minimum of 30 days after the report is filed. If there are no outstanding concerns raised by the public, stakeholders, First Nations or review agencies, the proponent may proceed to project implementation.

Acronyms and Abbreviations

| | |
|-------------|--|
| 2040 Vision | Brampton 2040 Vision: Living the Mosaic |
| APEC | Areas of Potential Environmental Concern |
| ASI | Archaeological Services Inc. |
| Brampton | City of Brampton |
| BIA | Downtown Brampton Business Improvement Association |
| BRT | Bus Rapid Transit |
| CHR | cultural heritage resource |
| City | City of Brampton |
| CN | Canadian National |
| CNR | Canadian National Railway |
| COPC | Contaminants of potential concern |
| CPP | Concrete Pressure Pipe |
| CTC | Credit-Valley, Toronto and Region and Central Lake Ontario |
| CWA | Clean Water Act |
| DBFP | Downtown Brampton Flood Protection |
| DFO | Fisheries and Oceans Canada |
| EA | Environmental Assessment |
| EAA | Environmental Assessment Act |
| EIS | Environmental Impact Study |
| ELC | Ecological Land Classification |
| ERIS | Environmental Risk Information Services |
| Enbridge | Enbridge Gas Distribution Inc. and Enbridge Pipelines Inc. |
| GGH | Greater Golden Horseshoe |
| GIS | geographic information system |
| HST | Harmonized Sales Tax |
| HVA | Highly Vulnerable Aquifers |
| LRT | Light Rail Transit |
| m | metre(s) |

| | |
|-------------|---|
| Master Plan | Region of Peel 2020 Water and Wastewater Master Plan for the Lake-based Systems |
| mbgs | metres below ground surface |
| MHSTCI | Ministry of Heritage, Sport, Tourism and Culture Industries |
| ML/d | megalitre(s) per day |
| mm | millimetre(s) |
| MEA | Municipal Engineers Association |
| MECP | Ministry of Environment, Conservation and Parks |
| MMAH | Ministry of Municipal Affairs and Housing |
| MP | Master Plan |
| O&M | Operations and Maintenance |
| OMB | Ontario Municipal Board |
| OMEA | Ontario Municipal Engineers Association |
| PAH | polycyclic aromatic hydrocarbons |
| PHC | petroleum hydrocarbons |
| PPS | Provincial Policy Statement |
| Region | The Region of Peel |
| SAR | Species at Risk |
| SPA | Special Policy Area |
| TRCA | Toronto and Region Conservation Authority |
| VOC | volatile organic compounds |
| WM | watermain |

1. Introduction

The City of Brampton (City) is projected to grow significantly; with the 2020 Region of Peel Water and Wastewater Master Plan for the Lake-based Systems (Master Plan) forecasting residential and employment populations to increase more than 30 percent by 2041. The Master Plan was developed by the Region as part of its growth management strategy in 2020 for growth up to 2041. As noted in the Master Plan, Brampton's downtown core is identified as one of the major areas for residential and employment growth. This will generate an increase in average day water demand by more than 30%.

To meet the additional water demand near City of Brampton's downtown core, the Master Plan has identified the need for a 750-mm feedermain to provide water supply for the growth in downtown core. The feedermain is proposed to connect into a planned 900-mm transmission main along Williams Parkway in north and to an existing 600-mm-diameter watermain along Wellington and John Street in south. The 900-mm water transmission main to be constructed along Williams Parkway connects the East Brampton and West Brampton pumping stations. This planned 900-mm transmission main is in detail design stage with construction scheduled in 2023.

The Region of Peel (Region) has initiated this Schedule B Municipal Class Environmental Assessment (Class EA) study to identify a preferred route for this proposed 750-mm feedermain.

The study area for this EA encompasses area surrounding the downtown core as shown on Figure 1-1 and generally extends from Williams Parkway south to Centre Street at Ardglen Drive with the Orangeville Railway line forming the west boundary and Beech Street, the east boundary. Figure 1-1 also shows the location of the existing 600-mm existing watermain along John Street and Wellington Street in south and the planned 900-mm transmission main along Williams Parkway in north.

Etobicoke Creek, which is within the Toronto and Region Conservation Authority (TRCA) watershed boundaries, flows through the study area.

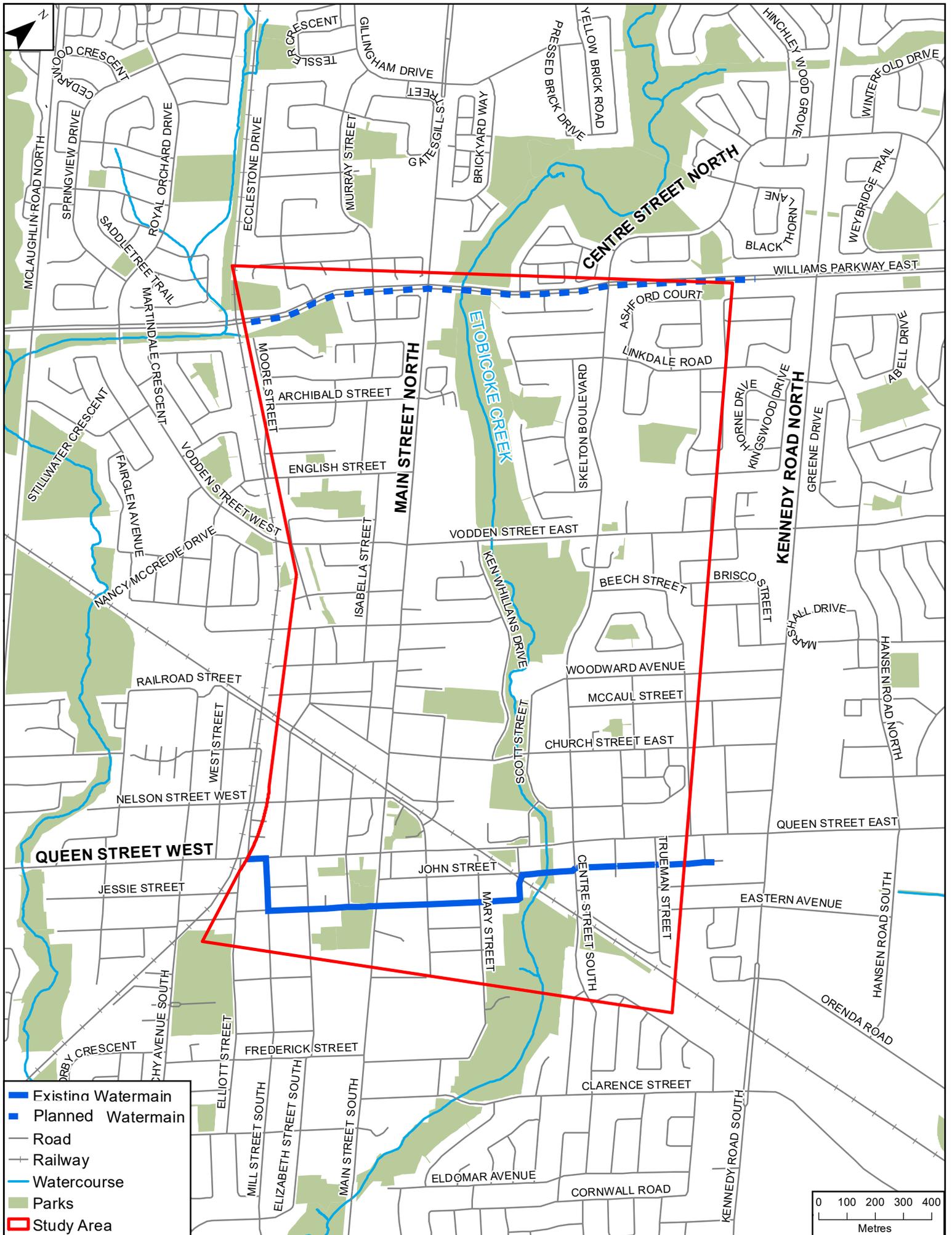


Figure 1-1. study area

1.1 Purpose and Objectives of Report

The purpose of this Project File report is to provide a roadmap for Phase 1 and Phase 2 of the project, following the Class EA process (OMEA 2015), and selection of a preferred route alignment for the proposed 750-mm feedermain, incorporating public and stakeholder, First Nations, and review agency feedback.

The primary objectives of this Class EA are as follows:

- Review and understand existing infrastructure to develop feasible alternatives that can appropriately address and solve existing and anticipated needs.
- Undertake the Class EA process in a transparent and defensible manner, including study documentation preparation.
- Engage with public, stakeholders, First Nations, and review agencies at appropriate times and gather meaningful input that will help develop alternatives, determine evaluation criteria, and select the preferred solution.
- Identify other ongoing and planned work in the study area to coordinate at an early stage such that unnecessary construction delays and disruption within the study area are avoided.
- Assess potential impacts that alternatives may have on environment, including natural, social, cultural, built, and economic environments.
- Select a preferred alternative that can be easily transferred to capital delivery.
- Improve overall system operation to support future growth servicing.

1.2 Municipal Class Environmental Assessment Process

1.2.1 Environmental Assessment Act

Ontario's Environmental Assessment Act, R.S.O. 1990, c. E.18, s. 2. (EAA) is the governing legislation that prescribes the planning and decision-making process to confirm that potential environmental effects and impacts are considered before a project begins. The purpose of this act is "...the betterment of the people of the whole or any part of Ontario by providing for the protection, conservation and wise management in Ontario of the environment" (Ontario 2019). The definition of environment encompasses the natural, social, cultural, built, and economic environments.

The EAA identifies two types of environmental assessments: Individual EA and Class EA. An Individual EA is carried out and submitted for review and approval by the Minister of the Environment, Conservation and Parks. A Class EA must follow and comply with an approved Class EA process for a particular class of undertakings; the process is explained further in Section 1.2.3 below.

1.2.2 Environmental Planning Principles

Ontario municipalities are subject to provisions in the EAA and its requirements to prepare a Class EA for applicable public works projects. The Ontario Municipal Engineers Association's (OMEA's) Municipal Class EA document provides municipalities with a five-phase planning procedure approved under the EAA to plan and undertake 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 (OMEA 2015). Key components of the Class EA planning process include the following:

- Consultation early and throughout the process

- Reasonable range of alternatives;
- Consideration of effects on environment and ways to avoid or reduce impacts;
- Systematic evaluation of alternatives;
- Clear documentation;
- Traceable decision making.

1.2.3 Class Environmental Assessment Process and Schedules

Municipal projects affect the environment to varying degrees; as such, projects are classified in terms of Municipal Class EA schedules. Based on the OMEA's Municipal Class EA document and subsequent amendments, projects are classified as Schedule A, A+, B, or C projects and are summarized herein. Each classification requires a different level of review and public and stakeholder engagement to complete the Municipal Class EA requirements, as seen on Figure 1-2, and described as follows:

- Schedule A projects are limited in scale, have minimal adverse effects, and include most of the municipal sewage, stormwater management, and water operations and maintenance activities. These projects are preapproved and may be implemented without following further phases in the Class EA planning process. Schedule A projects typically include normal or emergency operational maintenance activities, with typically minimal environmental effects.
- Schedule A+ projects are preapproved but require public notification because of their potential to affect local landowners during construction.
- Schedule B projects have the potential for some adverse environmental effects. The proponent is required to undertake a screening process involving mandatory contact with directly affected public and relevant review agencies to make them aware of the project and address their concerns. Schedule B projects require that Phases 1 and 2 of the Class EA be followed and that a Project File report be prepared and filed for review by the public and the Ministry of Environment, Conservation and Parks (MECP). If there are no outstanding concerns raised by the public, stakeholders, Indigenous communities or review agencies, the proponent may proceed to project implementation. Alternatively, the proponent may voluntarily elect to elevate the project to a Schedule C undertaking.
- Schedule C projects have the potential for greater environmental impacts and must proceed under the full planning and documentation procedures covered in Phases 1 to 4 specified in the Municipal Class EA document. Schedule C projects require that an Environmental Study Report be prepared and filed for review by the public, stakeholders, Indigenous communities, and review agencies. As with Schedule B projects, provided no significant impacts are identified, the project may then proceed to implementation.

Recent Environmental Assessment Act amendments, through the Covid-19 Economic Recovery Act, 2020, focused on changes to the Part II Order request process. At the completion of a Schedule B or Schedule C Class EA, project documentation is placed on public record for a 30-day review period and a Notice of Completion is issued. If any interested party has significant outstanding environmental issues that have not been addressed through the Class EA process, concerns are to be addressed to the proponent during the 30-day review period. It is noted that if concerns pertain to aboriginal or treaty rights, a request can be made to the MECP directly for an order requiring a higher level of study or that conditions be imposed.

For all projects, an additional 30-day review period is available for the MECP's Minister to decide if the project

should be elevated to an individual environmental assessment process by granting a Part II Order Request, or if the project can be approved with conditions. If the Minister does not respond within the additional 30-day period, the project may proceed. However, if the Minister advises that the project is approved with conditions within the additional 30-day period, the Minister has more time to provide the conditions. Given the nature of this project's study area and proximity to Etobicoke Creek, the Region has decided to undertake this Class EA as a Schedule B study for enhanced consultation to guide the development of alternatives and selection of the preferred solution.

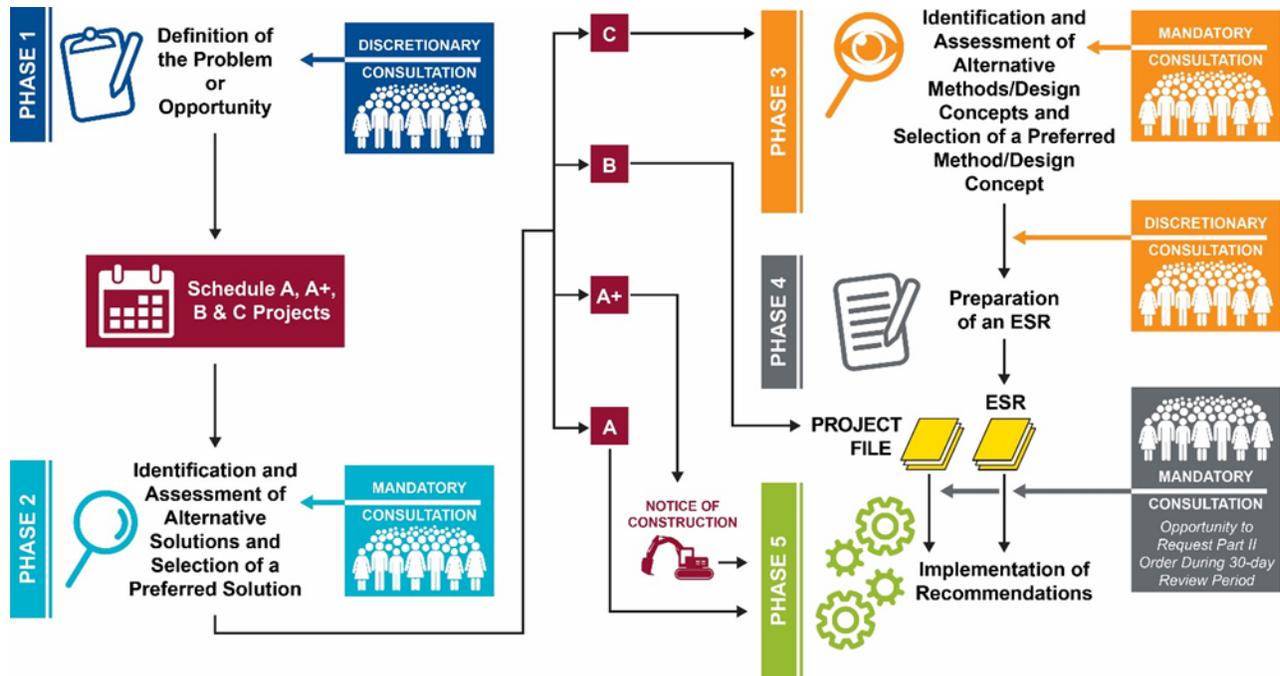


Figure 1-2. Environmental Assessment Process

2. Phase 1: Definition of the Problem or Opportunity

2.1 2020 Water and Wastewater Master Plan for the Lake-based System: Preferred Strategy

The 2020 Water and Wastewater Master Plan for the Lake-based System (Master Plan) was developed by the Region as part of its growth management strategy in 2020. The Master Plan defines the preferred water and wastewater servicing strategies to meet the servicing needs of existing and future development to 2041. The preferred water servicing strategy identified in the Master Plan based on continued use of the lake-based water treatment facilities with planned transmission and distribution infrastructure expansion is as follows:

- Maximize use of the existing water transmission mains and treatment infrastructure as it builds off existing and planned transmission and distribution infrastructure;
- Minimize environmental crossings for west-to-east transfers as well as reduced transmission costs with no west-to-east transfers;
- Does not require construction of new water treatment facilities within the 2031 horizon; and
- To include opportunities to leverage existing water servicing strategy with optimization of system hydraulics.

The preferred strategy identified in the Master Plan provided basis for this EA. As detailed in the preferred Master Plan strategy, the City of Brampton is provided with water supply from the Region of Peel's two water treatment facilities, Lorne Park Water Treatment Plant and Arthur P. Kennedy (formerly Lakeview) Water Treatment Plant, both located on Lake Ontario. From each plant, distribution is achieved by a series of pumping stations feeding the increasing pressure zones moving from south to north.

The study area is within Region of Peel's Zone 5 with a year 2020 population of 514,744 serviced from the Beckett Sproule and East Brampton Pumping Stations through a network of distribution mains ranging from 300-mm to 600-mm and is projected to experience significant growth between 2020 and 2041. In particular, the Brampton Queen Street Corridor that extends through the study area from McLaughlin Road, east to Highway 50 is anticipated to experience an equivalent population growth of more than 175,000 people.

As identified in the Master Plan, a 900-mm transmission main along Williams Parkway, connecting the East Brampton and West Brampton pumping stations to support anticipated growth is currently being designed. The connection would optimize east-west transfers with distribution and pumping for improved level of service and security of supply.

A 750-mm Centre Street feedermain as identified in the Master Plan is proposed to provide water supply to the downtown core. The feedermain is proposed to connect into the planned 900-mm transmission main along Williams Parkway in the North and to the existing 600-mm-diameter watermain along Wellington and John Street in the South. Region's standards also require interconnections with watermains 400-mm in diameter and greater to improve connectivity of large watermains in the existing system.

2.1.1 Future Capacity Forecasts

The following population forecast was obtained from the Region's 2020 Water and Wastewater Master Plan. Table 2-1 and Table 2-2 identify the expected population growth and water demand for Zone 5 from 2020 to 2041.

Table 2-1. Population Forecasts for the Region of Peel Zone 5

| | 2020 | 2031 | 2036 | 2041 |
|--------------------|---------|---------|---------|---------|
| Residential | 351,696 | 431,841 | 451,481 | 467,022 |
| Employment | 163,048 | 203,627 | 213,127 | 223,247 |
| Total | 514,744 | 635,442 | 664,609 | 690,270 |

Table 2-2. Water Demand for Total Equivalent Population in Region of Peel Zone 5

| | 2020 | 2031 | 2036 | 2041 |
|---|-------|-------|-------|-------|
| Average Day Demand (ML/d) | 123.2 | 154.9 | 162.6 | 169.4 |
| Maximum Day Demand (ML/d) | 184.1 | 237.2 | 250.1 | 261.2 |
| Peak Hour Demand (ML/d) | 369.5 | 464.8 | 487.9 | 508.1 |
| Note: ML/d = megalitre(s) per day | | | | |

2.2 Problem/Opportunity Statement

To address the recommendations for additional water transmission infrastructure to meet the forecasted growth, as put forward in the 2020 Master Plan, this current New Watermain South of Williams Parkway: Schedule B Class Environmental Assessment has established the following Problem/Opportunity statement:

The Downtown Brampton area in Brampton is projected to grow by more than 30% in population and employment by 2041. This will generate an increase in the average day water demand by more than 30%. The existing water supply system is limited and does not have sufficient capacity to accommodate the additional water demand for the ultimate growth envisioned by the City. As a result, a new 750-mm feedermain is required to meet water demand. The purpose of this study is therefore to develop and evaluate alternative solutions and recommend a preferred solution for routing of the new 750-mm feedermain.

Alternative solutions to the new 750-mm feedermain have been guided by the following key principles:

- Design alignment that accommodates required interconnections and provides appropriate solutions to the noted access and operational challenges;
- Minimize impacts on First Nations and key stakeholders, including the City, TRCA, and Downtown Brampton Business Improvement Association (BIA);
- Where possible, allow for long-term flexibility with managing demand and pressure in the system.

3. Baseline Features and Servicing Conditions

3.1 Planning and Servicing Considerations

3.1.1 City of Brampton Official Plan

The City's 2006 Official Plan, approved in part by the Ontario Municipal Board (OMB) in October 2008, includes modifications and deferrals that the Region had made in its Notice of Decision and Appeals to the OMB. The current document was consolidated in September 2015 with resolutions of appeals that were made to the OMB, conformance with the *Places to Grow: Growth Plan for the Greater Golden Horseshoe*, and amendments made to reflect council-approved Official Plan amendments. A new Official Plan began development in late 2019 and includes a five-phase work plan that extends over the next 2 years. The new Official Plan is expected to be published in 2022. Key aspects of the Official Plan that are relevant to this Class EA study are summarized as follows (Brampton 2006):

- The Central Area at the Main Street and Queen Street intersection is to be further promoted as the premier location for business, shopping, living, entertainment, and cultural activities in the City (Schedule 1).
- Main Street and Queen Street West are considered primary street corridors (Schedule 2).
- The City's bus rapid transit (BRT) corridor along Main Street and Queen Street East is within the study area. The City's primary and secondary transit corridor (Schedule C) crosses through the study area along Williams Parkway and Vodden Street East.
- City's Citywide Pathway Network (Schedule C1) crosses through the study area along the Etobicoke Creek Valley.
- There are pockets of areas designated as Valley Land/Watercourse Corridor and Woodland through the study area along the Etobicoke Creek Valley (Schedule D).
- Major recreational open spaces in the area include a cemetery and community parks (Schedule E).
- A former waste disposal area and existing sanitary trunk sewer are located within the study area (Schedule F).

3.1.2 City of Brampton 2040 Vision

The City completed a citywide visioning exercise in 2018, culminating in an inspirational document designed to guide Brampton's changes over the next 25 years. *Brampton 2040 Vision: Living the Mosaic* (2040 Vision) focuses on the environment, employment, urban centres, neighbourhoods, transportation, social matters, health, and arts and culture. The concepts from this document will be subject to full planning or co-design programs with citizens.

The following areas identified in the 2040 Vision were taken into consideration during this study (Brampton 2018):

- General: Downtown Brampton is regarded as a major area for residential and business growth.
- Sustainability and the Environment: Riverwalk and enhanced pedestrian zones are proposed within study area.

- Transit: Rapid transit line along Queen Street East, along the railroad tracks, and south is proposed.
- Street Network: Main Street and Queen Street are designated for traffic calming/pedestrian zones.

3.1.3 Region of Peel Official Plan

The Region's Official Plan was adopted by Regional Council on July 11, 1996. Each phase of the hearings pertaining to Appeals of the Plan have been concluded. The December 2018 Office Consolidation of the Official Plan includes MECP and OMB approvals as well as other approved amendments.

The Region's objective for water and wastewater services through the Official Plan is as follows:

"To provide water supply and sanitary sewer services to appropriate areas of the Region in an adequate, efficient, planned and cost-effective manner consistent with public needs and financial realities."

The policies from the Official Plan applicable to this study are as follows (Region 2018):

Policy 6.4.2.1: Require and provide full municipal sewage and water services to accommodate growth in the Urban System to the year 2031 and the three Rural Service Centres to the year 2021. The provision of full municipal sewage and water services in the Urban System and the three Rural Service Centres will be subject to the Regional financial and physical capabilities.

Policy 6.4.2.2: Verify that no development requiring additional or new water supply or sanitary sewer services proceeds prior to the finalization of a Servicing Agreement with the Region, confirming the responsibility for, and ability to provide, appropriate facilities for water supply and sewage disposal. In the case of plans of subdivision, confirmation will be required prior to draft approval, that servicing is, or will be available.

Policy 6.4.2.7: Confirm that the planning, construction, expansion, extension, and operation and maintenance of water and sanitary sewer services protects the environmental systems and natural resources of Peel in a manner consistent with the objectives and policies in this Plan, the Niagara Escarpment Plan, the Oak Ridges Moraine Conservation Plan, and the Greenbelt Plan.

This study incorporates the following aspects of the Region's Official Plan:

- Urban growth centres proposed in Downtown Brampton at the Main Street and Queen Street East intersection will be within the study area;
- Etobicoke Creek's valley is designated as a Core Area of the Greenlands System (Schedule A);
- Entire study area is considered an Urban System (Schedule D) and Built-up Area (Schedule D4);
- Study area is predominantly classified as Settlement Areas Outside the Greenbelt, with the exception of Etobicoke Creek, which is classified as River Valley Connections Outside the Greenbelt (Schedule D3) and a Selected Area of Provincial Interest;
- Study area falls within the Etobicoke Creek watershed, regulated by TRCA (Region of Peel Official Plan Figure 3 – Watershed Boundaries);
- Queen Street and Main Street are classified as Major Roads (Schedule E);

3.1.4 Growth Plan for the Greater Golden Horseshoe

Under the *Places to Grow Act, 2005*, the Ministry of Municipal Affairs and Housing (MMAH) developed *A Place to Grow: Growth Plan for the Greater Golden Horseshoe* (GGH) (2019). This document is a provincial growth plan

and guides government investments and municipalities on their own long-term growth plans. The following principles are relevant to this study:

- Prioritize intensification and higher densities to make efficient use of land and infrastructure and support transit viability;
- Provide flexibility to capitalize on new economic and employment opportunities as they emerge while providing certainty for traditional industries, including resource-based sectors;
- Improve the integration of land use planning with planning and investment in infrastructure and public service facilities, including integrated service delivery through community hubs, by every level of government;
- Protect and enhance natural heritage, hydrologic, and landform systems, features, and functions;
- Integrate climate change considerations into planning and managing growth such as planning for more resilient communities and infrastructure—that are adaptive to the impacts of a changing climate—and moving towards low-carbon communities, with the long-term goal of achieving net-zero communities, by incorporating approaches to reduce greenhouse gas emissions.

Key points from the document that are relevant to this study are as follows:

- The GGH is a dynamic and diverse area, and one of the fastest growing regions in North America. By 2041, this area is forecast to grow to 13.5 million people and 6.3 million jobs.

3.2 Provincial Policy Statement

Ontario's MMAH issues the Provincial Policy Statement (PPS) under Section 3 of the *Planning Act*, which states the provincial government's policies and provides guidance on land use planning. The PPS enables municipalities to develop their official plans and make planning-related decisions. The latest PPS update was released in 2014 and includes the following relevant policies on infrastructure (MMAH 2014):

Policy 1.6.1: Infrastructure, electricity generation facilities and transmission and distribution systems, and public service facilities will be provided in a coordinated, efficient, and cost-effective manner that considers impacts from climate change while accommodating projected needs.

Planning for infrastructure, electricity generation facilities, transmission and distribution systems, and public service facilities will 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;
- b. available to meet current and projected needs.

Policy 1.6.3: Before consideration is given to developing new infrastructure and public service facilities:

- a. the use of existing infrastructure and public service facilities should be optimized;
- b. opportunities for adaptive re-use should be considered, wherever feasible.

Policy 1.6.6.1: Planning for sewage and water services will:

- a. direct and accommodate expected growth or development in a manner that promotes the efficient use and optimization of the following:

1. existing municipal sewage services and municipal water services;
 2. existing private communal sewage services and private communal water services, where municipal sewage services and municipal water services are not available.
- b. verify that these systems are provided in a manner that:
1. can be sustained by the water resources upon which such services rely;
 2. is feasible, financially viable, and complies with regulatory requirements;
 3. protects human health and the natural environment.
- c. promote water conservation and water use efficiency;
- d. integrate servicing and land use considerations at each stage of the planning process;
- e. be in accordance with the servicing hierarchy outlined through policies 1.6.6.2, 1.6.6.3, 1.6.6.4 and 1.6.6.5.

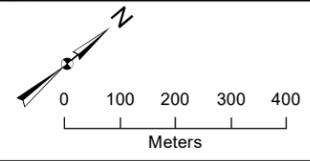
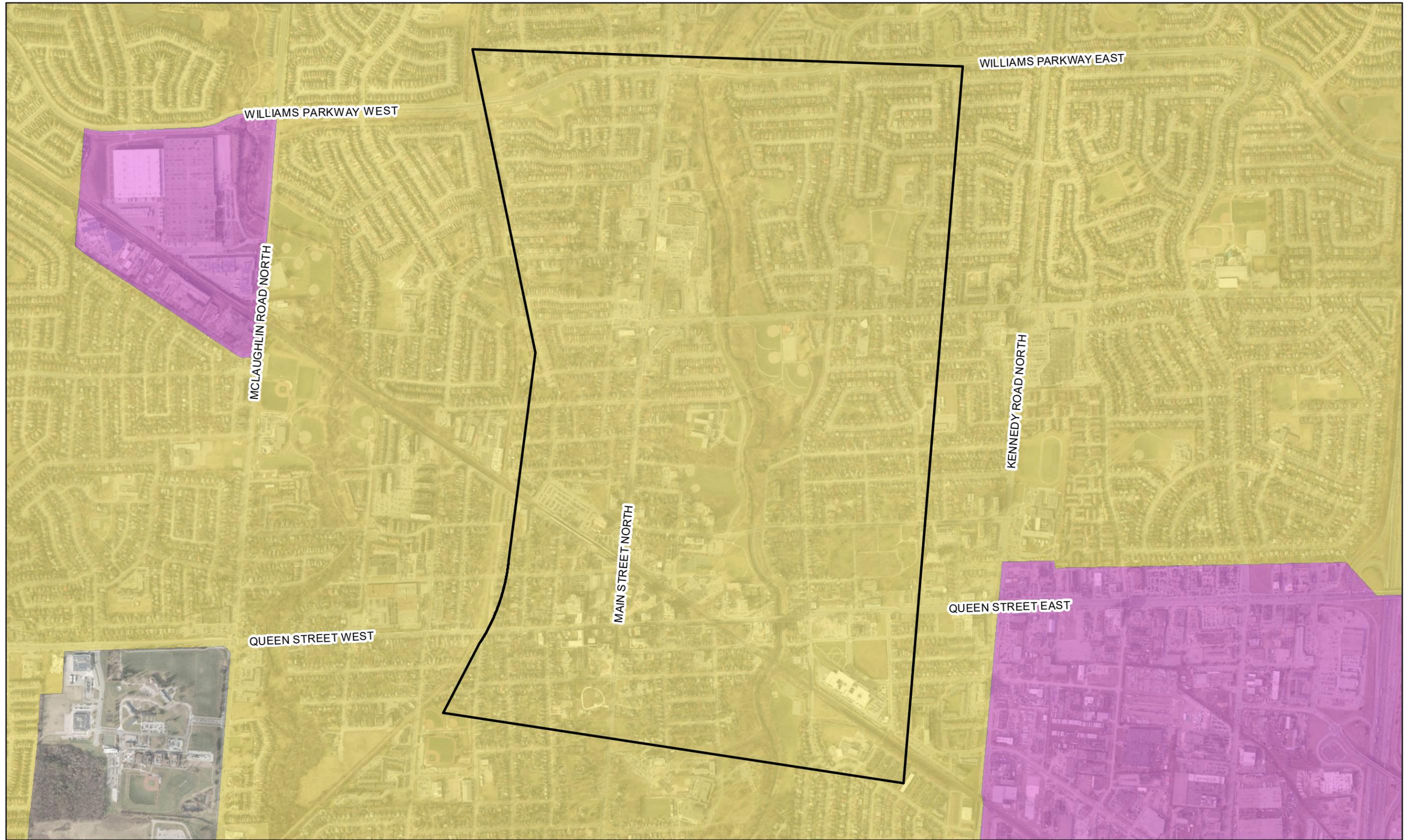
3.3 Existing and Future Land Uses

In accordance with the Clean Water Act, 2006 (CWA), the study area was assessed for Source Water Protection. The study area falls within the Toronto and Region Source Protection Authority and complies to the Credit Valley-Toronto and Region-Central Lake Ontario (CTC) Source Protection Plan. All vulnerable areas as delineated around surface water intakes and wellheads for municipal residential drinking water system located within this Source Protection Area (SPA) were assessed for the given study area. The study area falls within highly Vulnerable Aquifers (HVAs).

3.3.1 Existing Land Uses

Region of Peel

As shown on Figure 3-1, the entire study area is currently designated as residential, per information from the geographic information system from the Region's Open Data site, Generalized Land Use Shapefile.



Study Area
Land Use
 Employment
 Residential

Notes:
 1. Aerial Source: City of Brampton, 2018.

Source: Region of Peel



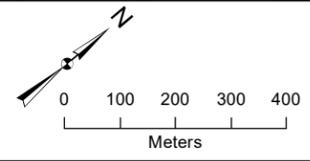
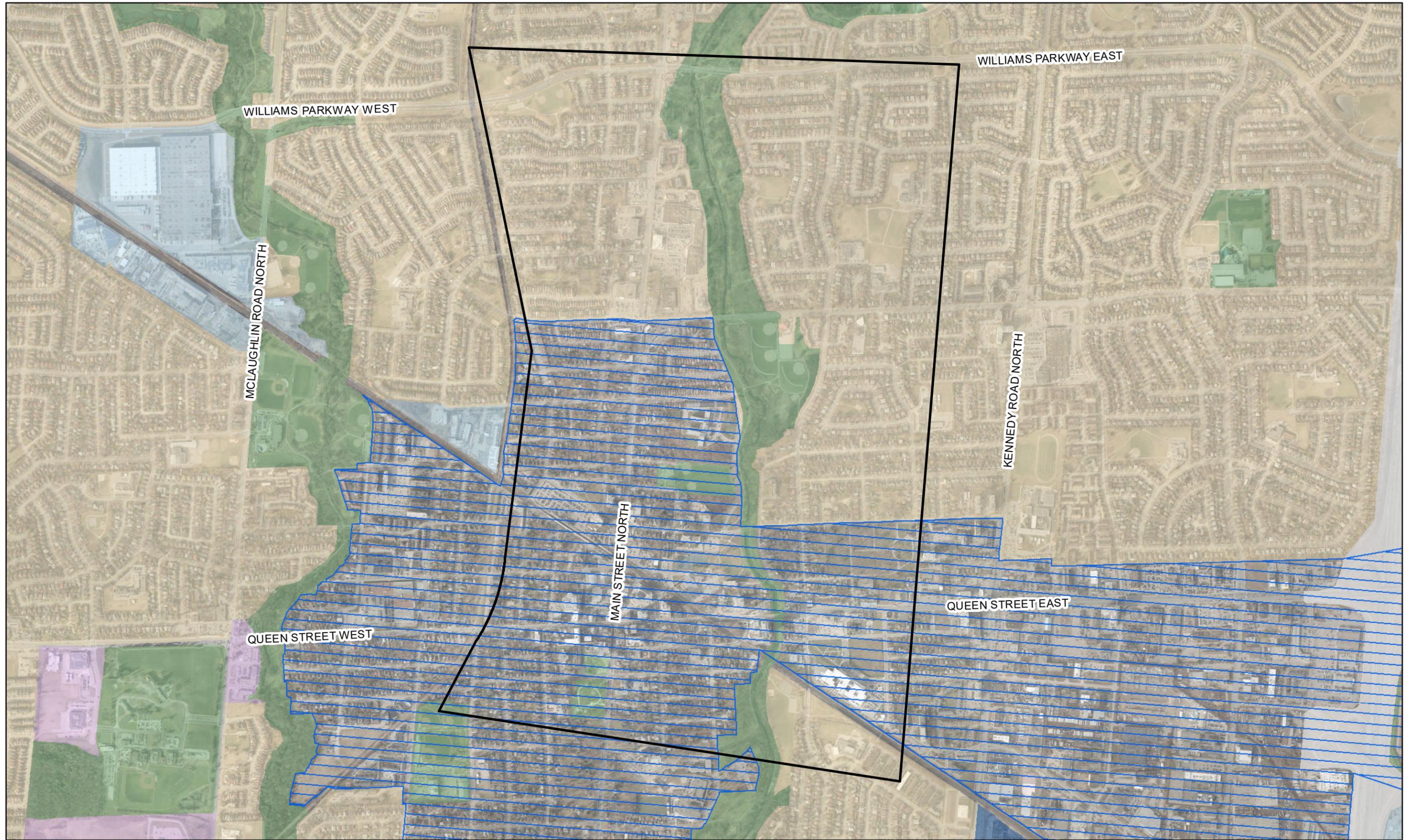
Figure 3-1. Existing Land Use
 New Watermain South of Williams Parkway: Schedule B Class

Region of Peel
 Brampton, Ontario

City of Brampton

As shown on Figure 3-2 and the City's Official Plan (Schedule A – General Land Use Designations), the study area that falls within City limits is composed of lands designated as follows:

- Central Area;
- Residential;
- Open Space.



- Study Area**
- City of Brampton (Official Plan Land Use)**
- Business Corridor
 - Industrial
 - Major Institutional
 - Open Space
 - Residential
 - Provincial Highway
 - Central Area

Notes:
 1. Aerial Source: City of Brampton, 2018.
 Source: City of Brampton



Figure 3-2. Existing Land Use Brampton
 New Watermain South of Williams Parkway: Schedule B Class
 Region of Peel
 Brampton, Ontario

3.3.2 Future Land Uses

Region of Peel

Based on the broad category land use designations in the Region's Official Plan (Region of Peel 2018), future land use designations for the study area include Urban System (Schedule D) and Built-up Area (Schedule D4).

City of Brampton

Based on acceptance of the 2040 Vision, land uses within the downtown core would be re-designated from the Official Plan to include the following:

- Several pockets of Mixed-Use area along Queen Street East;
- Entertainment and Culture near the Rose Theatre, located at Main Street and Queen Street.

Currently, Downtown Brampton is located within a flood-risk area and is designated as a Special Policy Area (SPA) by the Province of Ontario. This designation limits any development in the floodplain and cannot be removed until flood risks for extreme flood events are managed. The City of Brampton has initiated the Downtown Brampton Flood Protection project, with the environmental assessment completed in summer 2020. With the potential lifting of the SPA designation, the City of Brampton intends to proceed with Riverwalk, an initiative to revitalize the downtown core.

3.4 Existing Utilities Review

The existing utilities that occur within the study area include:

- Rogers Communications;
- Bell Canada;
- Alectra Utilities;
- Enbridge Gas Distribution Inc. (Enbridge).

Several large stormwater sewers are also located within the study area including a 600-mm stormwater sewer on Centre Street and a 300-mm stormwater sewer on Isabella Street.

3.4.1 Municipal Infrastructure

3.4.1.1 Region of Peel – Watermains

The Region owns the following water infrastructure within the study area:

- 300-mm-diameter watermain (WM) along Centre Street (from Wellington Road to Williams Parkway East), with a very small section of 200-mm- and 150-mm-diameter WM on Centre Street north of Williams Parkway;
- 300-mm-diameter WM along Williams Parkway East (from Centre Street to Main Street North) and 400-mm-diameter WM along Williams Parkway East from Main Street North to Vodden Street West;
- 300-mm-diameter WM along Main Street North from Archibald Street to Queen Street West, with a small portion of 150-mm-diameter WM from Archibald Street to Williams Parkway West;

- 600-mm-diameter WM along Queen Street West from McMurchy Avenue to Mill Street South, a 300-mm-diameter WM along Queen Street West from Mill Street to Main Street, and a 300-mm-diameter WM along Queen Street East from James Street to Centre Street;
- A small portion of a 400-mm-diameter WM along Woodward Avenue from Scott Street to Centre Street and an abandoned 400-mm-diameter WM along Woodward Avenue east of Centre Street;
- 300-mm-diameter WM along Beech Street from Vodden Street to Woodward Avenue;
- 600-mm-diameter WM on Vodden Street from Kennedy Street to Main Street and a 400-mm-diameter WM from Main Street to Mill Street North.

3.4.1.2 Region of Peel Sanitary Sewer Network

- 675-mm-diameter sanitary sewer along Williams Parkway from the railway line to Etobicoke Creek.
- 1200-mm-diameter sanitary sewer running south along Etobicoke Creek to Queen Street East, with a small portion of a 1,500-mm immediately north of Queen Street East;
- 375-mm-diameter sanitary sewer along Queen Street East from James Street to the Orangeville rail line;
- 375-mm-diameter sanitary sewer along Queen Street East from Centre Street to Truman Street.

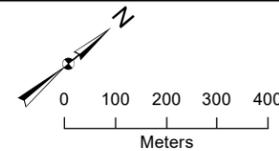
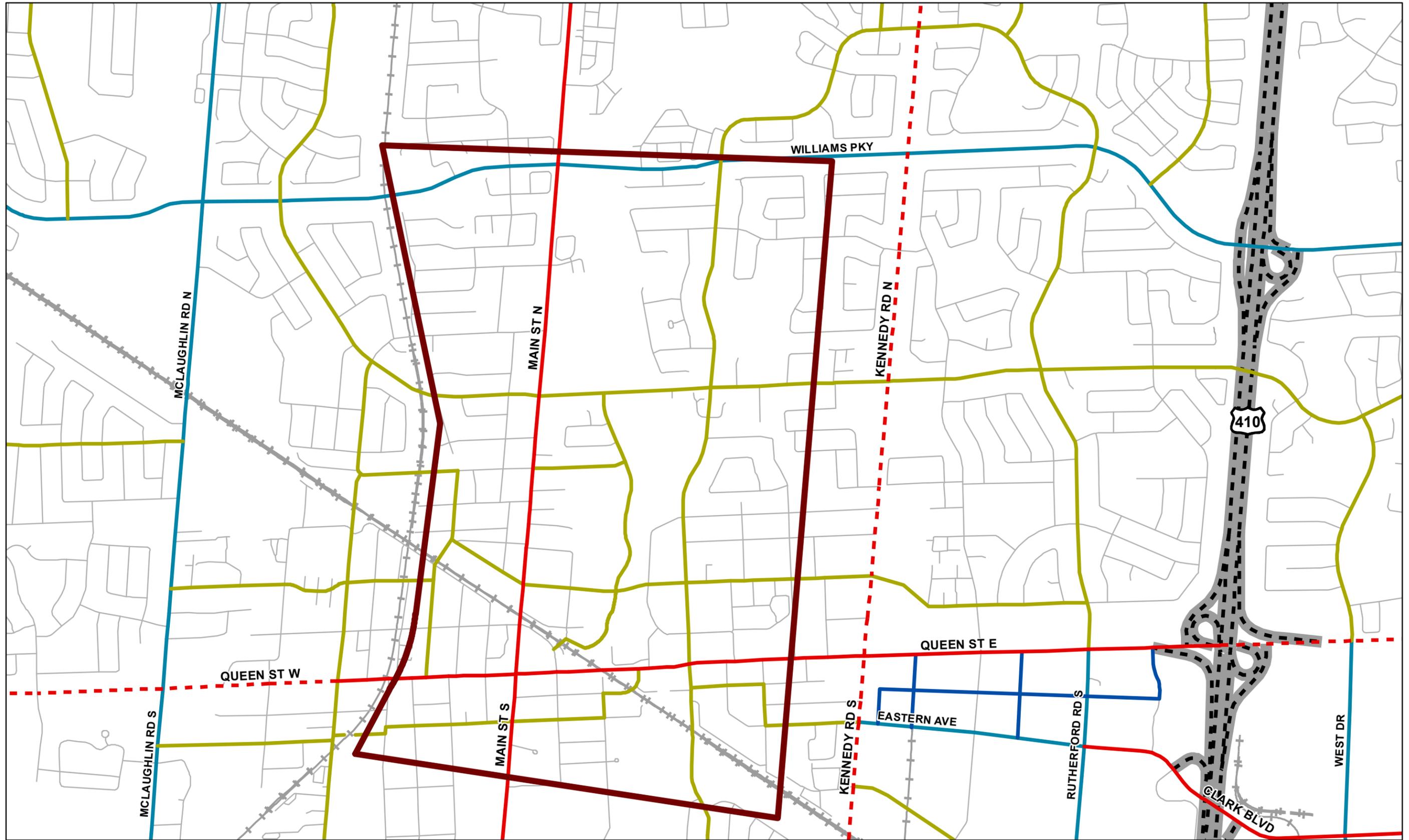
3.5 Existing Transportation Network

3.5.1 Road Network

The road network (Figure 3-3) within the study area is composed of the following key roads under jurisdiction of the City of Brampton:

- Queen Street East (Major Arterial - City);
- Main Street (Major Arterial - City);
- Centre Street (Collector - City);
- Vodden Street (Collector - City);
- Williams Parkway (Minor Arterial - City).

While Queen Street East is a regional road through the majority of Brampton, the section that traverses the study area is under the jurisdiction of the City of Brampton.



- Major Arterial (City)
- - - Major Arterial (Regional)
- Minor Arterial
- Urban Collector
- Collector
- Local Road
- - - Proposed Local Road
- Railway
- Provincial Highway
- Study Area

Notes:
 1. Basemap Source: Official Plan Schedule B City Road Hierarchy, City of Brampton, 2019.
 Source: City of Brampton



Figure 3-3. Road Network
 New Watermain South of Williams Parkway: Schedule B Class

Region of Peel
 Brampton, Ontario

3.5.2 Public Transit

The study area contains transit routes operated by both the City and Züm. The routes are summarized as follows:

City-operated transit routes within the study area:

- Route 29 and 29A along Williams Parkway;
- Route 8 along Centre Street;
- Route 9 along Vodden Street;
- Route 24 along Main Street;
- Route 1/1A along Queen Street.

Züm Routes 5011/501A along Queen Street are within the study area.

Based on Brampton's Official Plans, the following roads are considered important for transit services and form the study boundary limits:

- Main Street is a major BRT corridor;
- Williams Parkways is a Primary Transit corridor;
- Queen Street is a BRT corridor.

It is also important to note that the Brampton GO station is within the study area limits.

3.5.3 Cycling Routes

There are several cycling routes within the City. Majority of designated cycling routes are part of the City's recreational trails along Etobicoke Creek.

The following are City of Brampton Designated Cycling Paths:

- Union Street from Church Street to Wellington;
- Recreational paths along Etobicoke Creek.

3.6 Geotechnical Analysis

A Geotechnical Desktop Study was performed on July 3, 2020 for this study area. The study area is situated in the physiographic region identified as the Peel Plain, which generally consists of glacial till soils and is characterized as a level to undulating tract of clayey soils. The overburden soils consist of Halton Till. Fill was encountered below the topsoil in most of the referenced historical boreholes in the study area. Fill thickness ranged from about 1.0 metres (m) to 7.0 m.

Isolated glaciolacustrine deposits are also identified near Etobicoke Creek located within the study area. These deposits consist of massive to laminated silt and clay and may contain poorly sorted diamicton.

Bedrock underlying the Region is identified as Queenston Formation, which consists of reddish shale with limestone interbedding. However, according to some historical borehole logs, both Georgian Bay formation, which is a grey shale bedrock, and Queenston Formation rock have been recorded.

The hydrogeology study suggests that low gradients on thick, muddy Halton Till sediment promote direct run-off to streams rather than infiltration to groundwater.

3.7 Natural, Cultural, and Social Environment Inventory

3.7.1 Natural Features Assessment

A desktop review was undertaken as part of this Class EA to identify environmentally sensitive features that may affect the study area and potential alternatives. The work involved a records review and a preliminary site visit.

The study area contains natural features and sensitive ecological communities such as riparian and forested areas that may provide for significant wildlife habitat, including Etobicoke Creek. Based on information from the Natural Heritage Information Centre, Toronto Regional Conservation Authority (TRCA), Ontario Breeding Birds Atlas, Ontario Reptile and Amphibian Atlas, Department of Fisheries and Oceans (DFO) and Species at Risk Screening (via MECP), the study area may provide suitable habitat for the following species: Acadian flycatcher, barn swallow, Canada warbler, common nighthawk, eastern wood-pewee, golden-winged warbler, Louisiana waterthrush, peregrine falcon, red-headed woodpecker, yellow-breasted chat, snapping turtle, and butternut. MECP also indicated that at-risk bat species may occur.

Field surveys were conducted to identify natural features within the study area and identified the following: fish habitat (Etobicoke Creek); potentially sensitive wildlife habitat – vegetative communities; potential habitat for at-risk bats; and habitats for special concern species, including the Canada warbler, monarch, and black-crowned night-heron.

3.7.2 Cultural Heritage Resource Assessment: Built Heritage Resources and Cultural Heritage Landscapes

A desktop cultural heritage resource assessment was undertaken by ASI to identify areas of cultural significance. The assessment was undertaken in accordance with the requirements of Ministry of Heritage, Sport, Tourism and Culture and included reviews of background historical research and historical mapping. At present, Brampton's Municipal Heritage Register lists 257 cultural heritage resources (CHRs) within the study area with the possibility of more that have yet to be recognized. The historical research also revealed that the study area has urban land use history dating back to the nineteenth century.

The assessment noted that there is potential for additional CHRs within the study area, especially given the historical structures and features that are found depicted on late 19th century and early 20th century mapping of the area.

Based on the desktop study, ASI recommended that once the preferred alternatives or detailed designs for the proposed scope of works is available, field studies will be conducted to identify additional potential cultural

heritage resources and the report will be updated with a confirmation of impacts on the cultural heritage adjacent to the study area. At this point, specific mitigation measures will be presented, which could include completing a heritage impact assessment, or employing suitable measures such as landscaping, buffering or other forms of mitigation.

3.7.3 Archaeological Assessment

A desktop archaeological assessment was conducted to identify areas of archaeological significance within the study area. Six archaeological sites have previously been registered within 1 kilometre of the study area. One of these sites is within the study area but is not considered to have further archaeological value or interest.

The study area meets the following criteria indicative of archaeological potential:

- Previously identified archaeological sites;
- Water sources: primary, secondary, or past water source (Etobicoke Creek);
- Early historical transportation routes (Main Street, Grand Trunk Railway, Credit Valley Railway);
- Proximity to early settlements (Brampton).

Three cemeteries are noted within the study area:

- 354 Main Street North, Brampton Pioneer (Main Street North) Cemetery;
- 10 Wilson Avenue, Brampton Cemetery;
- 39 Centre Street South, Street Mary's Roman Catholic Cemetery.

Impacts within 10 m of the cemetery properties may require Stage 3 Cemetery Investigation prior to construction activities.

A Stage 1 archaeological assessment, including a property inspection was recommended once preferred alternatives were determined to further assess archaeological potential, as per the Standards and Guidelines for Consultant Archaeologists. This has since been performed, see Section 6.5 or Appendix I for the full report.

4. Consultation with Public and Stakeholders

4.1 Public and Agency Consultation Plan

A Public and Agency Consultation Plan, available in Appendix A, was created in accordance with the requirements of the MEA Class EA to facilitate timely, effective, and consistent communication with stakeholders during the study. The plan has been used throughout the study as guidance on the communications strategy to engage internal stakeholders, external stakeholders, general public and First Nations. It was updated as required throughout the process. Consultation points and the methodology to be used during these points are also identified in this document to provide clarity on the timing and transfer of information to and from interested parties.

The Consultation Plan includes a stakeholder contact list created for this study. The contact list was developed at the study's outset and updated as comments or requests were made from the public and stakeholders. The list includes:

1. External Stakeholders: Municipalities, Conservation Authorities, Provincial Ministries/Agencies, Federal Ministries/Agencies, Utilities, Rail and Transit Companies, Local Businesses, Institutions and Property Owners, Councilors, local school boards, local interest groups and general public.
2. Internal Stakeholders: Project sponsors and advisors, infrastructure planning and asset management, water and wastewater hydraulic modelling program, water capital, design and construction, real estate and information management and technology teams.
3. First Nations: Mississaugas of the Credit First Nation, Six Nations of the Grand River, Haudenosaunee Confederacy Chiefs Council and Huron-Wendat Nation.

4.2 Consultation Activities

4.2.1 Notice of Commencement

The Region published a formal Notice of Commencement on February 20, 2020 and February 27, 2020, in the Brampton Guardian newspaper and sent to stakeholders in the stakeholder contact list on February 20, 2020. It was also posted on the Region's project webpage <https://www.peelregion.ca/pw/water/environ-assess/watermain-service-downtown-brampton.asp>. Responses to the Notice of Commencement is summarized in Appendix B. MECP was also provided a completed Project Information Form during the mail-out. Refer to Table 4-1 for a list of responses regarding the Notice of Commencement.

Table 4-1. Notice of Commencement Responses

| Stakeholder | Response | Date |
|--|---|-------------------|
| Enbridge Gas | Enbridge pipelines confirmed that there are no pipelines present in the study area. | February 21, 2020 |
| Ministry of Heritage, Sport, Tourism and Culture Industries | The Ministry of Heritage, Tourism, Culture and Sport responded to the Notice of Commencement expressing interest in the archaeological resources, built heritage resources, cultural heritage landscapes | March 4, 2020 |
| Ministry of Environment Conservation and Parks | The MECP recommended First Nation groups to be included in the pre-consultation as well as the stage and methods of consultation with the MECP required. These contacts had previously received the Notice of Commencement via registered mail in February. | April 30, 2020 |

4.2.2 Engagement with First Nations

The MECP in their letter dated April 30, 2020 advised to consult the following communities:

- Mississaugas of the Credit First Nation;
- Six Nations of the Grand River;
- Haudenosaunee Confederacy Chiefs Council;
- Huron-Wendat Nation.

Notice of Commencement and notice of PIC were issued to all the above listed First Nations on 20th February 2020 in registered mail.

Huron-Wendat Nation

A response was received on 3rd March 2020 from Huron-Wendat Nation following the receipt of Notice of Commencement. Huron-Wendat Nation queried if any archaeological assessment was to be undertaken as part of the EA. Jacobs responded to the email and advised that a stage 1 archaeological assessment is proposed and will be available once complete.

A notice for PIC was emailed to Huron-Wendat Nation along with other First Nations. Following the notice of PIC, Jacobs issued the stage 1 archaeological report to Huron-Wendat Nation. As agreed with Huron-Wendat Nation, Region has recently emailed a copy of the funding agreement. Huron-Wendat Nation is currently reviewing the funding agreement and the stage 1 archaeology report. At this time, no other First Nation communities have responded. All communications with the Huron-Wendat Nation are included in Appendix B.

4.2.3 Pre-consultation with Key Stakeholders

Given the study area's location, the following were identified as key stakeholders for pre-consultation in the Public and Agency Consultation Plan.

City of Brampton

A meeting was held with City of Brampton on March 23, 2020 to introduce the project and to discuss the various City of Brampton initiatives and projects underway in the study area. The list as discussed is summarized in Section 6.8

On January 27, 2021, a subsequent meeting was held with the City to present the evaluation of alternatives and identification of the preferred alternative for input prior to undertaking agency and public consultation. The City of Brampton expressed no reservations with the preferred alternative and acknowledged that it avoided conflict with key City initiatives.

Toronto Regional Conservation Authority

Etobicoke Creek watershed falls within TRCA jurisdiction for regulation of development. A meeting was held with TRCA on March 10, 2020, to introduce the project team and gather preliminary areas of concern that the project team would need to be aware of prior to developing alternatives.

A subsequent meeting was held on March 25, 2020 to discuss the Downtown Brampton Flood Protection Environmental Assessment initiated by the City of Brampton and TRCA in 2013.

A follow-up meeting was held on February 5, 2021 to present the evaluation of alternatives and identification of the preferred alternative for input prior to undertaking agency and public consultation. TRCA expressed support for alternatives that avoided construction in the creek valley and noted preference to minimize location of shaft within TRCA-regulated areas as more information becomes available for supporting those decisions.

4.2.4 Public Information Centre

The public and agencies were invited to take part in an online engagement through notices posted on November 4, 2021 and November 11, 2021, in the Brampton Guardian newspaper and sent to stakeholders in the stakeholder contact list on December 22, 2021. Material was provided as an online presentation to provide a review of project information, the identification and evaluation of alternatives and the recommended alternative between November 11, 2021 and 21 January 2022 This online presentation is located at [New watermain south of Williams Parkway - Region of Peel \(peelregion.ca\)](#) and a copy is included in Appendix C.

Table 4-2 summarizes responses from the online engagement with public and agencies during this study. At this moment, two utility groups have provided responses to the project information (Bell, HydroOne). Refer to Appendix C for copies of consultation material and original PIC comments.

Table 4-2. Responses following Public Information Centre

| Date | Stakeholder | Response |
|-----------------|-------------|---|
| 4 January 2022 | HydroOne | Hydro One advised that there are no existing hydro one transmission assets in the study area. |
| 26 January 2022 | Bell | Bell provided infrastructure markups for their assets in the study area. |

4.2.5 Notice of Completion

The public and agencies will be advised of the completion of the Class EA and invited to review the Project File through Notices during May 2022.

5. Phase 2 - Alternative Solutions

The Phase 2 identification and assessment of alternative solutions and Selection of a Preferred Solution to meet the increased system capacity of the Downtown Brampton area was developed using a four-step process outlined on Figure 5-1.

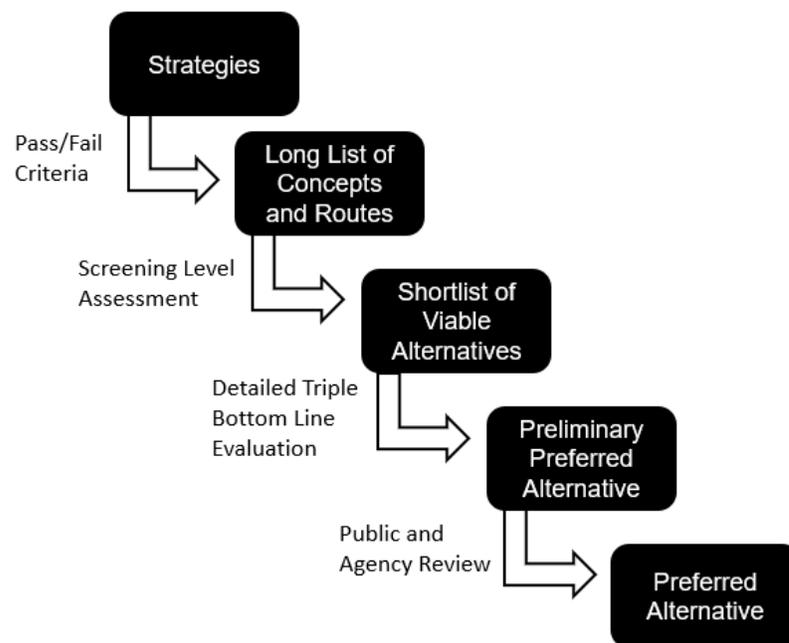


Figure 5-1. Process for the Development of a Preferred Alternative

Strategies to meet the problem/opportunity statement were evaluated using pass/fail criteria to develop a long-list of alternatives. The long-list of alternatives was then evaluated using a screening level assessment to identify a short-list of alternatives. Once the viability had been assessed in the short-list of alternatives through a triple bottom line evaluation, a preliminary preferred alternative was selected. The preferred alternative was then presented to key stakeholders, public, First Nations and necessary agencies for comment. Section 5 outlines the strategies and long-list alternative development process.

5.1 Strategies

Five strategies were identified to provide a solution which was used to develop the long-list of alternatives. The following strategies were evaluated:

1. Do nothing;
2. Limit growth;
3. Supply from an alternative source;

4. Upsize/upgrade existing infrastructure;
5. Provide new infrastructure.

A pass/fail score was assigned for each strategy based on the following criteria outlined in Table 5-1.

Table 5-1. Pass/Fail Criteria

| Criteria | Description | Pass | Fail | N/A |
|-----------------------------------|---|------|------|-----|
| Meets Problem Statement | Provides additional system capacity to meet the increased water demand anticipated through the future growth of the Downtown Brampton area. | | | |
| Alignment with Master Plan | Aligns with the preferred strategies identified in the Region of Peel's Master Plan. | ✓ | × | - |
| Feasible to Construct | Avoids easements and land acquisition and maximizes use of right-of-way or existing easements. | | | |

N/A = not applicable

The evaluation of strategies using the pass/fail criteria is summarized in Table 5-2.

Table 5-2. Evaluation of Strategies

| Strategy | Meets Problem Statement | Alignment with Master Plan | Feasible to Construct | Conclusion |
|---|-------------------------|----------------------------|-----------------------|---|
| Do Nothing | × | × | - | Does not meet the problem statement |
| Limit Growth | × | × | - | Does not meet the problem statement |
| Supply from Alternative Source | ✓ | × | - ¹ | Does not align with the Master Plan |
| Upsize/Upgrade existing infrastructure | ✓ | × | × | Very difficult to construct as existing infrastructure are live distribution mains with service connections |
| Provide New Infrastructure | ✓ | ✓ | ✓ | Meets all three criteria |

¹ unknown feasibility to construct, assigned a N/A score

Based on the evaluation, the only strategy that meets all three criteria is “Provide New Infrastructure”. The do nothing strategy will also be brought forward as an alternative to provide a baseline for comparison with the other alternatives.

5.2 Developing the Long List of Alternatives

For implementation of “Provide New Infrastructure” strategy, a new feedermain is proposed for construction to connect in to the planned 900-mm transmission main along Williams Parkway in the North and the existing 600-mm-diameter watermain along Wellington Street/John Street towards the South, with interconnections of existing watermain greater than 400 mm along the route as identified in the Master Plan.

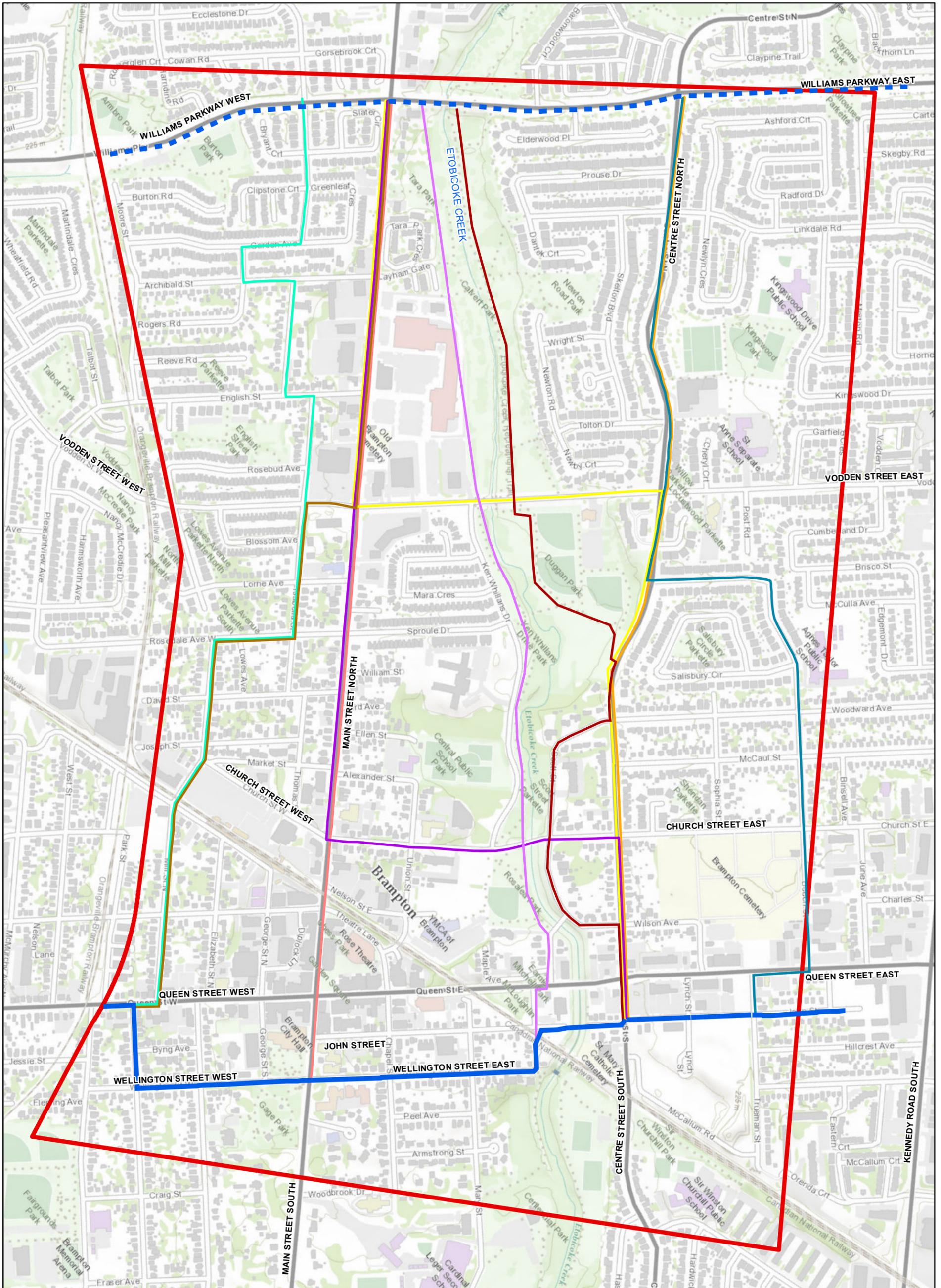
Prominent north-south streets considered within the study area include:

- Main Street (classified as a Major Arterial);
- Centre Street (classified as a Collector).

The remainder of streets travelling north-south are classified as local roads and it is noted that there are no direct north-south routes on the local streets within the study area. While typically, local streets are not preferred for the location of major distribution feeder mains due to the narrower right-of-way, routes along local streets in the west portion of the study area were considered in this study due to limited major arterial and collector roads available.

Routing along the Etobicoke Creek Valley was also considered as it runs continuously throughout the study area.

These alignments provided a basis for development of a long-list of alternatives as described below and shown on Figure 5-2.



Long List of Route Alternatives

- 2A (Yellow line)
- 2B (Blue line)
- 2C (Green line)
- 2D (Cyan line)
- 3A (Red line)
- 3B (Purple line)
- 3C (Brown line)
- 3D (Orange line)
- 4A (Light Blue line)
- 4B (Light Green line)
- 4C (Light Purple line)
- 4D (Light Orange line)
- 5 (Cyan line)

Study Area

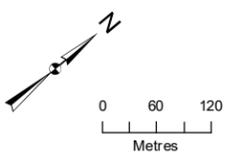
- Existing Watermain (Blue solid line)
- Proposed Watermain (Blue dashed line)

Notes:

1. Basemap Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Figure 5-2. Long-List Alternatives
New Watermain South of Williams Parkway:
Schedule B Class

Region of Peel
Brampton, Ontario



5.2.1 Alternative 1: Do Nothing

The existing infrastructure will continue to supply the Downtown Brampton area and its anticipated population growth. This alternative relies on an additional assessment of the growth projections. No new infrastructure is implemented to address the anticipated water demand increase. This alternative was brought forward as a baseline solution to assess the advantages and disadvantages of each proposed alternative.

5.2.2 Alternatives 2A and 2B: Centre Street Alignment

A new 750-mm-diameter feedermain on Centre Street is proposed to connect to the proposed 900-mm-diameter feedermain on William's Parkway at the intersection of Centre Street and Williams Parkway in the North, in addition to the existing 600-mm-diameter watermain at the intersection of Centre Street and John Street in the South. Two sub-alternatives have been identified for this alignment and are discussed in the two subsequent sections.

5.2.2.1 Alternative 2A: Centre Street

The feedermain alignment for this alternative is routed along Centre Street and connects directly to the proposed William's Parkway Feedermain and the John Street watermain.

This alternative is a direct north-south route, approximately 2,100 m in length and installed within the road right-of-way of a residential street with existing utilities. The Centre Street serves as a collector road. There are limited commercial properties or businesses along the route. The alignment provides for interconnection with existing infrastructure at Vodden Street and Woodward Street.

5.2.2.2 Alternative 2B: Centre Street and Beech Street

The feedermain alignment for this alternative connects to the proposed William's Parkway Feedermain at Centre Street and then is routed on Beech Street south to Queen Street where it continues east to Trueman Street to connect into John Street watermain.

The route along Centre Street and Beech Street is approximately 2,400 m long. The right-of-way width on Beech Street is narrow with existing utilities. The alignment also provides for interconnection with existing infrastructure at Vodden Street.

5.2.3 Alternatives 3A and 3B: Etobicoke Creek Alignment

The Etobicoke Creek alternative is routed in the Etobicoke Creek Valley from Williams Parkway to John Street. Two sub-alternatives to this alignment have been identified and are discussed in the subsequent sections.

5.2.3.1 Alternative 3A: East of Etobicoke Creek and Scott Street

The feedermain alignment for this alternative is routed along the eastern bank of Etobicoke Creek with a small portion travelling on Centre Street and Scott Street. The watermain connects to the existing 600-mm watermain at John Street and Centre Street with an approximate length of 2,250 m. The alignment also provides for interconnection with existing infrastructure at Vodden Street and Scott Street. Due to the presence of a 1,200-mm sanitary sewer in proximity in the valley, the feedermain alignment is required to maintain a 3 m horizontal and 0.5 m vertical separation from the sewer.

While crossing of Etobicoke Creek is avoided, construction will be in proximity to the creek. This alignment will be in proximity to the DBFP project and the City of Brampton's Riverwalk project.

5.2.3.2 Alternative 3B: West of Etobicoke Creek

The feedermain alignment for this alternative is routed along the west side of Etobicoke Creek. The feedermain is approximately 2,000-m in length and connects at Williams Parkway, east of Main Street and to the existing 600-mm watermain where it is routed along Wellington Street on the west side of Etobicoke Creek. The alignment also provides for interconnection with existing infrastructure at Vodden Street.

This alternative is routed entirely in the creek valley. This route avoids crossing of Etobicoke Creek. Construction for the alignment will be in close proximity to the creek and is located within a SPA. The alignment is also located close to DBFP project and the realignment of Ken Whillans Drive.

5.2.4 Alternatives 4A, 4B, 4C and 4D: Main Street Alignment

The Main Street alignment alternative is routed along Main Street and there are four sub-alternatives to this alignment as discussed in the four subsequent sections.

5.2.4.1 Alternative 4A: Main Street

The feedermain alignment for this alternative is routed direct along Main Street, connecting at Williams Parkway and Wellington Street. The alignment also provides for interconnection with existing infrastructure at Vodden Street.

This alternative is approximately 2,000 m in length along a major arterial road and is expected to have significant impacts on the commercial interests along Main Street. This alignment requires detailed coordination with existing infrastructure occupying the right-of-way, as well as future capital improvements, including Downtown Reimagined, the "Centre for Innovation" project and a potential rapid transit project. The alignment also requires crossing underneath a railway bridge.

5.2.4.2 Alternative 4B: Main Street, Vodden Street and Centre Street

The feedermain alignment for this alternative is routed along Main Street, south to Vodden Street, and east to Centre Street where it continues south to connect to the existing Wellington/John Street watermain at John Street.

This alternative is approximately 2,780 m in length routed along major arterial road and collector road, and crosses Etobicoke Creek on Vodden Street. The alignment also provides for interconnection with existing infrastructure at Vodden Street.

5.2.4.3 Alternative 4C: Main Street and Mill Street

The feedermain alignment for this alternative is routed west at Vodden Street and runs along multiple local streets: Isabella Street, Rosedale Street, and Mill Street to Queen Street for connection to the existing Wellington/John Street watermain.

The feedermain is not a direct route and is approximately 2,380 m in length along major arterial road and local road. The alignment crosses CNR track along Mill Street. The alignment provides for interconnection with existing infrastructure at Vodden Street.

5.2.4.4 Alternative 4D: Main Street, Church Street, and Centre Street

The feedermain alignment for this alternative is routed along Main Street, south to Church Street, and east to Centre Street where it continues south to connect to the existing Wellington/John Street watermain at John Street. The alignment provides for interconnection with existing infrastructure at Vodden Street.

This alternative is approximately 2,710 m in length along major arterial road and collector roads. The alignment crosses Etobicoke Creek on Church Street. The construction work for this alignment will be within the DBFP project area.

5.2.5 Alternative 5: West Neighbourhood Alignment

The West Neighbourhood alternative alignment connects to the proposed 900-mm William's Parkway Feedermain at the intersection of Murray Street and Williams Parkway and is routed through local streets: Murray Street, Garden Street, Bagshot Street, Archibald Street, English Street, Isabella Street, Rosedale Street, and Mill Street to connect to the existing Wellington/John Street watermain at Queen Street. The alignment provides for interconnection with existing infrastructure at Vodden Street.

This alternative is approximately 2,600 m long along local residential roads and requires crossing of the CNR tracks.

5.3 Long-list Alternatives Evaluation

Based on consultation with the Region, the long-list alternatives were evaluated using a high-level screening process against the following comparison criteria:

- **Services Long-term Growth** – ability to meet the 2041 forecasted water demand for Downtown Brampton.
- **Impacts and Coordination with other Major Capital Projects** – coordination and interference with planned capital projects as listed in Section 6.8 based on route alignment.
- **Operations and Maintenance (O&M) Requirements including Access and Operational Flexibility** – ease of maintenance and accessibility to chambers.
- **Impacts to Natural Environment** – level of disturbance to natural features, wildlife, or aquatic habitats.
- **Impacts to Local Businesses** -level of disturbance to access for local businesses during and after construction.
- **Traffic Impacts** – degree of road closures causing traffic congestion during construction.
- **Relative Cost** – magnitude of capital cost for construction and commissioning based on preliminary alignment.

The comparison was used to identify a series of alternatives with the greatest benefits to carry forward for further evaluation. Each alternative was assigned a score based on a three-point scale as shown in Table 5-3.

Table 5-3. Comparison of Long List of Alternatives

| Route Option | Services Long Term Growth | Impacts and Coordination | O&M Requirements | Natural Features Impact | Impacts to Local Businesses | Traffic Impacts | Relative Cost | Outcome |
|--|---------------------------|--------------------------|------------------|-------------------------|-----------------------------|-----------------|---------------|---------------------|
| Alternative 1 – Do Nothing | | | | | | | | Not carried forward |
| Alternative 2A– Centre Street. | | | | | | | | Carried forward |
| Alternative 2B– Centre and Beech Street. | | | | | | | | Carried forward |
| Alternative 3A - E. Etobicoke Creek and Scott Street | | | | | | | | Not carried forward |
| Alternative 3B– W. Etobicoke Creek | | | | | | | | Not carried forward |
| Alternative 4A– Main Street. | | | | | | | | Not carried forward |
| Alternative 4B– Main and Centre Street | | | | | | | | Carried forward |
| Alternative 4C – Main and Mill Street | | | | | | | | Carried forward |
| Alternative 4D – Main, Church, and Centre Street | | | | | | | | Carried forward |
| Alternative 5 –W. Neighbourhood | | | | | | | | Carried forward |

Most Preferred (3)

Moderately Preferred (2)

Least Preferred (1)

Based on a workshop with the Region on 24 April 2020, it was determined that alternatives in the Etobicoke Creek Valley (Alternatives 3A and 3B) would not be carried forward due to the potential for significant impact on the natural environment. Long-list evaluation workshop presentation and details are available in Appendix D. It was also determined that Alternative 4A would not be carried forward due to the significant community impact of construction at Main and Queen Street, compounded by the complexity of coordination with ongoing capital initiatives. The do nothing alternative was also screened out as it does not offer a viable solution to the problem statement. The following alternatives were therefore carried forward for further evaluation:

- **Alternative 2A-** Centre Street.
- **Alternative 2B-** Centre Street and Beech Street.
- **Alternative 4B-** Main Street., Vodden Street. and Centre Street.
- **Alternative 4C-** Main Street. and Mill Street.
- **Alternative 4D-** Main Street., Church Street. and Centre Street.
- **Alternative 5D-** West Neighbourhood.

6. Supplemental Studies to Support Development of Short-Listed Alternatives

6.1 Environmental Desktop Review

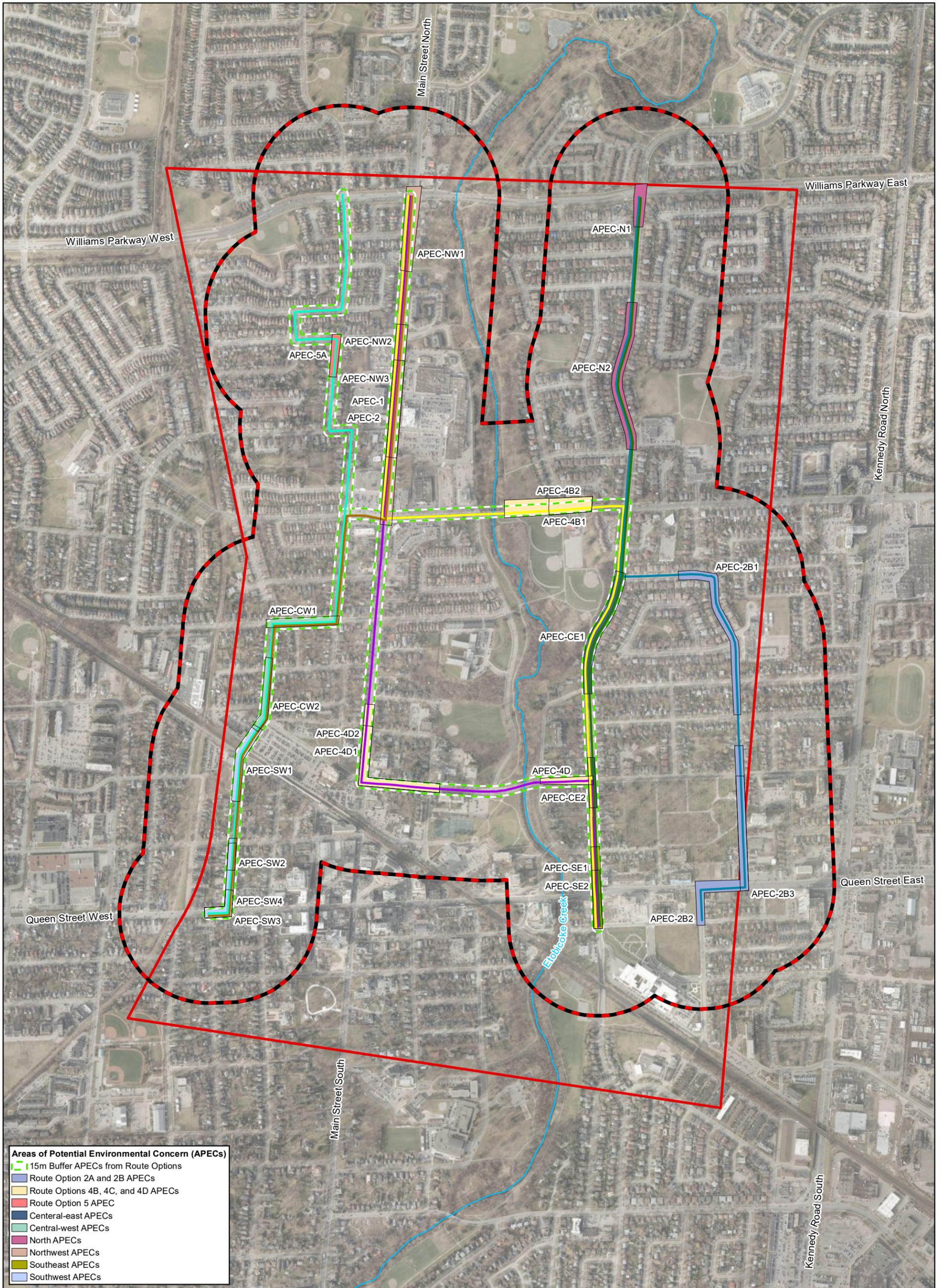
A desktop review was performed by Jacobs using readily available historical records to identify areas of potential environmental concern. Information sources included Environmental Risk Information Services data, aerial photographs, existing environmental reports, mapping, current or historical operating records, and information regarding water wells.

The records review indicates the study area has been significantly developed from agricultural land to residential, commercial, community (roadways), and industrial land use. Contaminants of potential concern include metals, inorganics, polycyclic aromatic hydrocarbons, petroleum hydrocarbons, and volatile organic compounds.

There are 26 areas of potential environmental concern (APECs) that were identified from this study. A summary of the route alternative APECs are as follows:

- **Alternative 2A** – 6 APECs
- **Alternative 2B** – 5 APECs
- **Alternative 4B** – 9 APECs
- **Alternative 4C** – 9 APECs
- **Alternative 4D** – 8 APECs
- **Alternative 5** – 7 APECs

Figure 6-1 shows the locations of all the APECs identified, while the desktop review report is located in Appendix E.



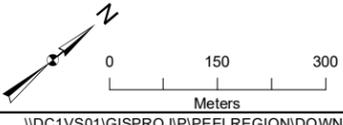
- Areas of Potential Environmental Concern (APECs)**
- 15m Buffer APECs from Route Options
 - Route Option 2A and 2B APECs
 - Route Options 4B, 4C, and 4D APECs
 - Route Option 5 APEC
 - Central-east APECs
 - Central-west APECs
 - North APECs
 - Northwest APECs
 - Southeast APECs
 - Southwest APECs

- Shortlist of Alternatives**
- Route Option 2A
 - Route Option 2B
 - Route Option 4B
 - Route Option 4C
 - Route Option 4D
 - Route Option 5

Notes:
 1. Aerial Source: City of Brampton, 2018.
 2. Watercourse Source: Land Information Ontario.

Figure 6-1. Areas of Potential Environmental Concern
 New Watermain South of Williams Parkway: Schedule B Class

Region of Peel
 Brampton, Ontario



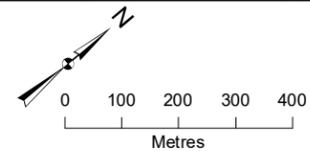
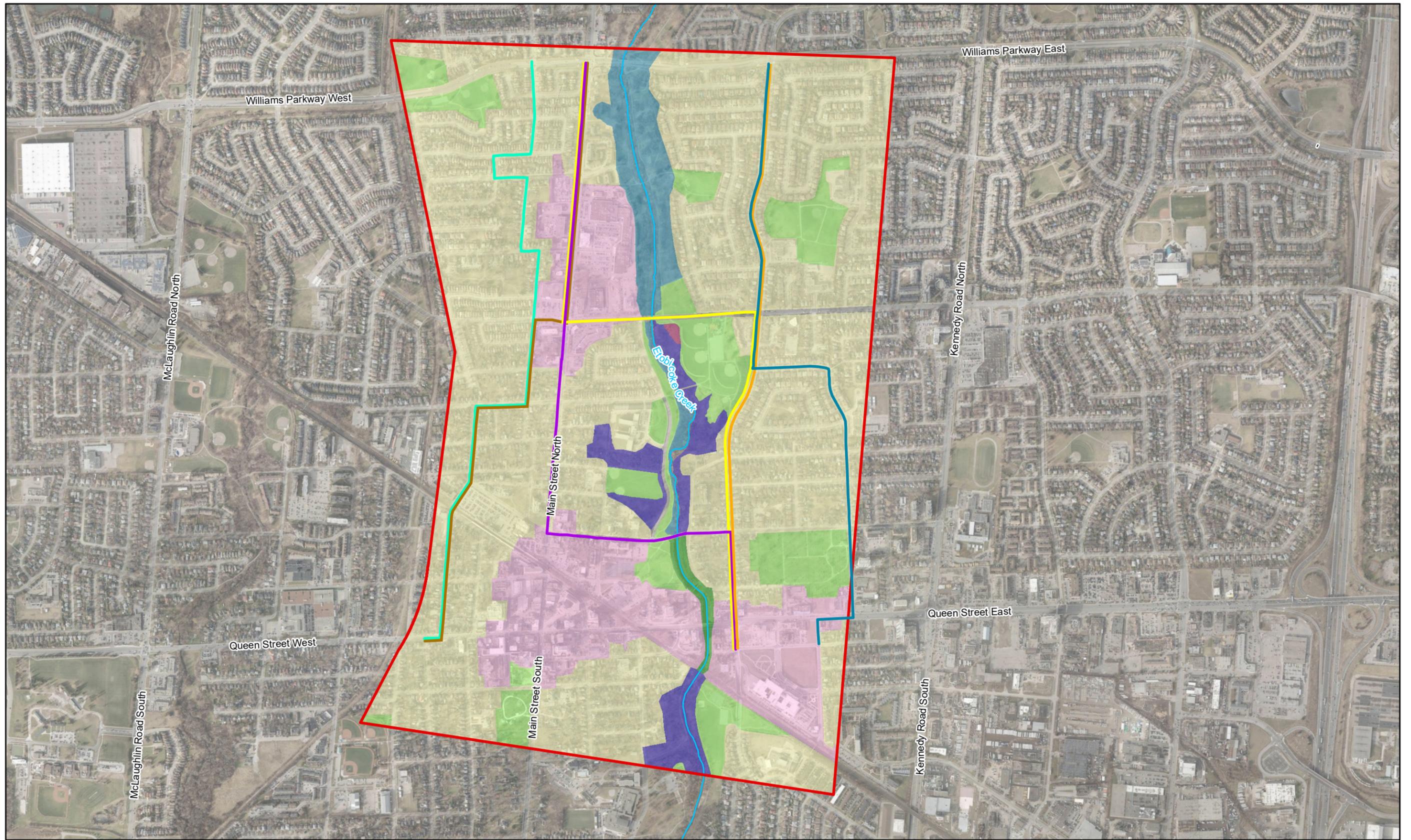
6.2 Natural Features Impact Assessment

A natural features assessment was undertaken by Jacobs as part of this Class EA to identify environmentally sensitive features that may be impacted by route alternatives (see Section 3.7.1). The work involved a records review, a preliminary site visit, and preparation of a Natural Features Impact Assessment Report that summarizes the findings, identifies potential impacts to the environment for each route alternative and makes mitigation recommendations to protect sensitive features. A summary of the natural features impact assessment can be found in the following sections. The full report is located in Appendix F.

The main natural feature of interest in the study area is Etobicoke Creek, which flows southeasterly through the study area. The Etobicoke Creek Recreational Trail system is adjacent to Etobicoke Creek and within the study area.

6.2.1 Vegetation and Vegetation Communities

TRCA Ecological Land Classification (ELC) data were analyzed. Based on the desktop review and field investigation, there are five ELC communities within the study area as shown on Figure 6-2. No locally rare flora species were observed during the field investigations although it was noted by MECP that butternut may potentially occur near the study area. No species at risk (SAR), protected by the *Endangered Species Act*, or locally rare species were indicated by TRCA databases.



- | | | | | |
|-------------|---|-------------|----------------------------------|-----------------|
| Watercourse | Ecological Land Classification (ELC) | FOD7-3 | Shortlist of Alternatives | Route Option 4C |
| Study Area | Commercial | FOD7-5 | Route Option 2A | Route Option 4D |
| | FOD3-1 | Parkland | Route Option 2B | Route Option 5 |
| | FOD7 | Residential | Route Option 4B | |

Notes:
1. Aerial Source: City of Brampton, 2018.

Figure 6-2. Short Listed Alternatives and Natural Features
Watermain South of Williams Parkway: Schedule B Class

Region of Peel
Brampton, Ontario

Alternatives 4B and 4D, which cross Etobicoke Creek, are near forests which may provide habitats for SAR. These alternatives have a likelihood of street, ravine, woodland, and parkland tree injury/harm due to removals that may be required for shaft locations if microtunnelling of the watermain is performed for the creek crossing. The remaining routes have potential for parkland tree injury/harm. Alternatives 2A and 2B have work areas proximal to TRCA's regulated area and may cause impacts to natural features should construction shaft compounds be located in or near regulated areas. Impacts should be further analyzed during detailed design once shaft locations are finalized.

6.2.2 Wildlife and Wildlife Habitat

A desktop review of potential wildlife and wildlife habitat was conducted along with a field survey. Based on field survey results, the following natural features occur within the study area: potentially sensitive wildlife habitat, potential habitat for at-risk bats and special concern species including, Canada warbler, common nighthawk, monarch, and black crowned night-heron. These species were located or may have adequate habitat near Etobicoke Creek that may be impacted by construction works for Alternatives 4B and 4D. There is also the potential for noise to affect wildlife during preconstruction, construction, and post-construction activities.

6.2.3 Aquatic Habitat and Communities

The lower portion of the Upper Etobicoke Creek sub-watershed occurs within the study area and is classed as Intermediate Riverine Warmwater habitat (TRCA 2006). This sub-watershed is largely composed of tolerant, warmwater species. The fish sampling station owned by TRCA has historically confirmed the presence of: Blacknose Dace, Creek Chub, Johnny Darter, Longnose Dace, White Sucker, Bluntnose Minnow, Cyprinids, Central Stoneroller, and Common Shiner. No SAR were noted in the TRCA data or found during the field survey.

Alternative 4B and 4D have potential indirect effects on Etobicoke Creek and natural features due to shaft compound locations that may be required for construction, if microtunnelling is performed. The shaft compounds have potential to cause erosion and sedimentation resulting in potential indirect and direct effects to fish and fish habitats. Alternative 4B and 4D may also require permits including Fisheries and Oceans Canada (DFO), TRCA, and MECP.

6.3 Geotechnical Analysis

From the desktop review performed by Jacobs and as summarized in Section 3.6, the study area is identified to be in the physiographic region known as the Peel Plain. This area generally consists of glacial till soils and is characterized as a level to undulating tract of clayey soils with isolated glaciolacustrine deposits near Etobicoke Creek. A detailed geotechnical desktop including hydrogeology study is included in Appendix G.

A review of the borehole and monitoring well data was conducted from available sources such as MECP wells, Ontario Borehole database, and available Brampton projects reports. A comparison was then made from the data to the short-listed alternative routes. The following is a summary of notable findings and observations:

- The overburden thickness (or depth to bedrock) varies between 4- 15 mbgs (metres below ground surface) over the entire study area. More variation in the top of the bedrock leads to possible challenges in tunnelling. See below the depth to bedrock for each alternative:
 - **Alternative 2A:** 6 to 13 mbgs ;
 - **Alternative 2B:** 5 to 10 mbgs ;
 - **Alternative 4B:** 4 to 5 mbgs Main Street and greater than 8 mbgs on Vodden Street;
 - **Alternative 4C:** 6 mbgs;

- **Alternative 4D:** 4 to 5 mbgs Main Street, 6 to 13 mbgs on Centre Street and 8 to 9 mbgs on Church Street;
- **Alternative 5:** No historic information available.
- The nature of the bedrock is not known beyond the type (Red Shale) across the different routes;
- The general overburden was till material with combination of clay, silt, and sand. It was generally stiff to hard with no significant variations noted except for Alternative 2A where some boulders were documented.

6.4 Cultural Heritage Resource Assessment

A desktop cultural heritage resource assessment was performed by Archaeological Services Inc. (ASI) in accordance with the requirements of the Ministry of Heritage, Sport, Tourism and Culture as summarized in Section 3.7.2. At present, Brampton's Municipal Heritage Register lists 257 cultural heritage and cultural landscape resources within the study area with the possibility of more that have yet to be recognized given historical features depicted on mapping of the area. The CHRs include buildings, houses, church, castle, cemetery, etc. detailed cultural heritage resource assessment is included in Appendix H.

All short-listed alternatives were found to have potential to cause indirect impacts on CHR cultural heritage resources (CHR). The following is a summary of notable findings:

- **Alternative 2A:** adjacent to 1 CHR with no anticipated direct impacts;
- **Alternative 2B:** adjacent to 4 CHR with no anticipated direct impacts;
- **Alternative 4B:** adjacent to 4 CHR with no anticipated direct impacts;
- **Alternative 4C:** adjacent to 25 CHR with potential direct impacts to the CNR Station parking lot if shaft compounds are required;
- **Alternative 4D:** adjacent to 52 CHR with no anticipated direct impacts;
- **Alternative 5:** adjacent to 26 CHR with potential direct impacts to the CNR Station parking lot if shaft compounds are required.

6.5 Stage 1 Archaeological Assessment

A desktop review and field work were performed by ASI to determine the archaeological potential of the study area as summarized in Section 3.7.3. Following the identification of the route alternatives, potential impacts caused by route alternatives were determined.

The background review identified six previously registered archaeological sites located within 1 km from the study area but were not within 50 metres from any short-listed alternative. Three cemeteries were also noted within the study area.

Two cemeteries are located near various short-listed alternatives. One is adjacent to Alternative 2B (10 Wilson Ave., Brampton Cemetery) and one adjacent to Alternatives 4B and 4C (354 Main Street N., Brampton Pioneer [Main Street North] Cemetery). No additional cemetery investigation is required since the work is proposed in the roadway and past expansions and upgrades to both existing cemeteries do not exhibit potential for burials outside of the known limits.

Alternatives 4B and 4D may have some archaeological potential due to the proximity to Etobicoke Creek. If shaft compounds are required outside of the roadway, the alternatives would require a Stage 2 archaeological assessment before development.

Appendix I provides the detailed Stage 1 archaeological assessment for the study area.

6.6 Hydraulic Analysis

The Region retained AECOM to perform hydraulic modelling and analysis for the proposed 750-mm feedermain to determine the hydraulic implications to the Region's system with the inclusion of short-listed route alternatives including the analysis of:

- Hydraulic performance under the 2041 maximum day demand conditions outlined in the Master Plan. The 2041 maximum day demand with a fire flow scenario was also modelled.
- Water quality implications on volumetric turnover using a worst case scenario (2026 average day demand).
- Water age or residual chlorine within watermain using the 2026 average day demand.

Alternatives 2A, 4B, and 4D, were noted to have the highest benefit based on the above three hydraulic analysis for the future Downtown Brampton area developments. However, the differences in hydraulic performances in terms of pressures and velocity between the alternatives in the 2041 scenario versus the base scenarios (without the future watermain) were marginal. Alternative 4B provides sufficient capacity using the existing 600-mm watermain on Vodden Street. Alternative 4D installation would prevent the need for the future 600-mm watermain on Church Street. Several additional interconnection points for the short-list alternatives were also identified. These included a redundant connection to the watermain on Queen Street and connections to the future watermain along Church Street.

In addition, it was noted that a reduction of the feedermain diameter to 600-mm may minimize water quality implications due to extended water age when the watermain is commissioned; however, it was determined to proceed with the larger diameter watermain for long-term flexibility.

Refer to Appendix J for hydraulic analysis report.

6.7 Traffic and Transport Assessment

A desktop review of traffic impacts for the alternative routes was conducted by IBI Group. The assessment included analysis on required lane closures and the impacts of proposed construction on traffic, driveway, transit, cycling, and adjacent routes considering each alternative. Traffic modelling was also performed to estimate the impacts to arterial and collector lane reductions in comparison to a baseline do nothing scenario. Preliminary rankings by IBI Group had alternative 2A ranked as the ideal alignment due to low impacts on traffic, transit, and local access and cycling. Alternatives 2B and 5 were ranked second with moderate and low impacts. A summary of the assessment results is provided in Table 6-1. The traffic assessment report is located in Appendix K.

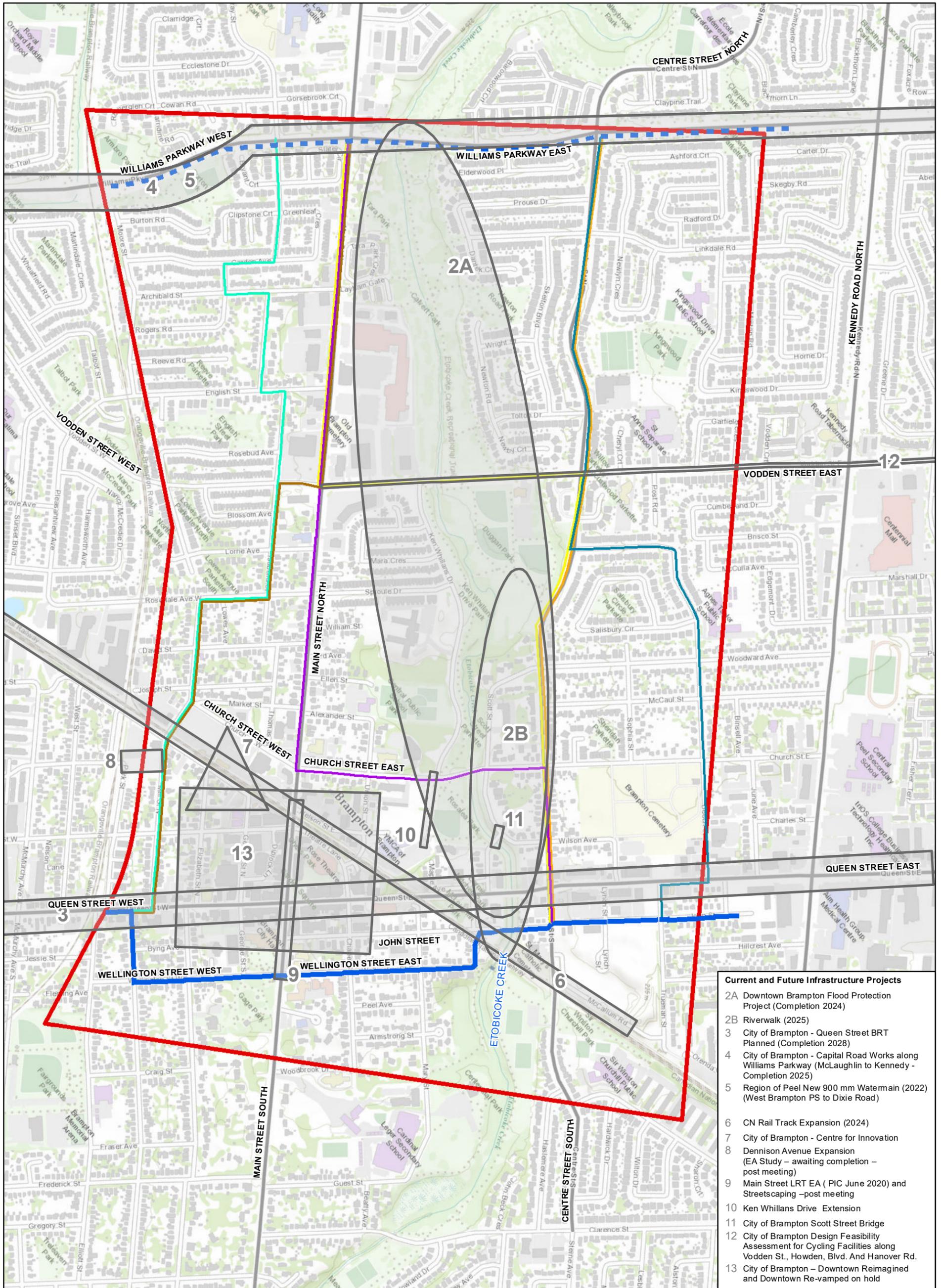
Table 6-1. Summary of Traffic Assessment of Alternatives

| Alternatives | Traffic Assessment Findings |
|-----------------------|--|
| Alternative 2A | <ul style="list-style-type: none"> ▪ Lane road closure may be required on Williams Parkway based on preliminary shaft locations ▪ Full road closure may be required on Centre Street between Linkdale Road and Tolton Drive, on McCaul Street between Centre Street and Sophia Street, and on John Street between Lynch Street and Centre Street based on preliminary shaft locations ▪ May affect some driveways adjacent to a preliminary shaft compounds for a duration of up to 8 weeks. ▪ May impact Brampton Transit Route 8, requiring short detours on local roads |
| Alternative 2B | <ul style="list-style-type: none"> ▪ Lane road closure may be required on Williams Parkway based on preliminary shaft locations ▪ Full road closure may be required between Linkdale Road and Tolton Drive based on preliminary shaft locations and Beech Street for open-cut construction ▪ May affect some driveways adjacent to a preliminary shaft compounds for a duration of up to 8 weeks. ▪ May impact Brampton Transit Route 8 and cause delays on bus routes along Queen Street. |
| Alternative 4B | <ul style="list-style-type: none"> ▪ Lane closure may be required on Main Street and Vodden Street for open-cut construction ▪ Full road closure may be required on McCaul Street between Centre Street and Sophia Street, and at John Street between Lynch Street and Centre Street based on preliminary shaft locations ▪ May affect some driveways adjacent to a preliminary shaft compounds for a duration of up to 8 weeks. ▪ May impact Brampton Transit Routes 9, 8 and 2 and Züm Route 502 |
| Alternative 4C | <ul style="list-style-type: none"> ▪ Lane closure may be required on Main St, Vodden Street, Isabella Street at Vodden, and Rosedale Street at Mill Street, and Queen Street based on preliminary shaft locations and open-cut construction ▪ Full road closure may be required on Isabella Street south of Rosedale and Mill Street at Rosedale based on preliminary shaft locations |

| Alternatives | Traffic Assessment Findings |
|-----------------------|---|
| | <ul style="list-style-type: none"> ▪ May affect multiple driveways due to local road closures and preliminary shaft compounds for a duration of up to 8 weeks. ▪ May impact Brampton Transit Routes 2 and 9, Züm Route 502 and cause delays on bus routes along Queen Street |
| Alternative 4D | <ul style="list-style-type: none"> ▪ Lane closure may be required on Main Street and Church Street based on open-cut construction ▪ Full road closure may be required on John Street between Lynch St and Centre St, Church Street at Scott Street, and Centre Street south of Church Street based on preliminary shaft locations ▪ May affect some driveways adjacent to a preliminary shaft compound for a duration of up to 8 weeks. ▪ May impact Brampton Transit Routes 2 and 8, and Züm Route 502 |
| Alternative 5 | <ul style="list-style-type: none"> ▪ Lane closure may be required on Rosedale Street based on preliminary shaft locations and open-cut construction ▪ Full road closure may be required on Isabella Street south of Rosedale and Mill Street at Rosedale based on preliminary shaft locations ▪ May affect multiple driveways due to local road closures and preliminary shaft compounds for a duration of up to 8 weeks. ▪ May impact Brampton Transit Routes 2 and 9, Züm Route 502 and cause delays on bus routes along Queen Street |

6.8 Current and Future Infrastructure Projects in the study area

The study area has multiple ongoing and future projects within its boundaries. These projects listed in Table 6-2 and Figure 6-3 demonstrates the location of the projects with respect to the alternative route alignments.



- Current and Future Infrastructure Projects**
- 2A Downtown Brampton Flood Protection Project (Completion 2024)
 - 2B Riverwalk (2025)
 - 3 City of Brampton - Queen Street BRT Planned (Completion 2028)
 - 4 City of Brampton - Capital Road Works along Williams Parkway (McLaughlin to Kennedy - Completion 2025)
 - 5 Region of Peel New 900 mm Watermain (2022) (West Brampton PS to Dixie Road)
 - 6 CN Rail Track Expansion (2024)
 - 7 City of Brampton - Centre for Innovation (EA Study - awaiting completion - post meeting)
 - 8 Dennison Avenue Expansion (EA Study - awaiting completion - post meeting)
 - 9 Main Street LRT EA (PIC June 2020) and Streetscaping -post meeting
 - 10 Ken Whillans Drive Extension
 - 11 City of Brampton Scott Street Bridge
 - 12 City of Brampton Design Feasibility Assessment for Cycling Facilities along Vodden St., Howden, Blvd. And Hanover Rd.
 - 13 City of Brampton - Downtown Reimagined and Downtown Re-vamped on hold

- Short List of Route Alternatives**
- 1 (Yellow)
 - 2 (Blue)
 - 3 (Purple)
 - 4 (Orange)
 - 5 (Green)
 - 6 (Cyan)
- Study Area**
- Red outline
- Current and Future Infrastructure Projects**
- Grey outline
- Existing Watermain**
- Blue line
- Proposed Watermain**
- Dark blue line

Notes:
 1. Basemap Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Figure 6-3. Infrastructure Projects
 New Watermain South of Williams Parkway:
 Schedule B Class

Region of Peel
 Brampton, Ontario

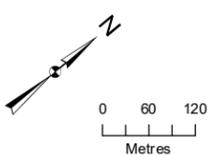


Table 6-2. Infrastructure Projects

| No. | Project | Details | Timeline |
|-----|---|---|---|
| 1 | Downtown Brampton Interim Phase 1 Watermain, Sanitary Sewer and Road Reconstruction | Downtown Brampton Interim Phase 1 Works project focuses on temporary roadworks and temporary water/wastewater works on Queen Street from George Street to Theatre Lane and Main Street from Wellington to Nelson Street West. | Estimated construction completion in 2024 |
| 2A | City of Brampton and TRCA Downtown Brampton Flood Protection (DBFP) Project | The DBFP aims to remove the SPA special policy area designation for downtown core of Brampton by reducing the flood risk | Estimated completion 2024 |
| 2B | City of Brampton Riverwalk Project | The Downtown Brampton Riverwalk is a project to transform and revitalize Brampton's downtown to make it healthy, sustainable, and resilient. | Estimated completion 2025 |
| 3 | City of Brampton – Queen Street to Highway 7 BRT Planning Study and Initial Business Case | As of June 2018, it was determined that the BRT in dedicated lanes should be the first step in implementing rapid transit in the Queen Street East Corridor. | The project timeline is 5 to 10 years for implementation. |
| 4 | City of Brampton – Capital Road Works along Williams Parkway | Capital Road works from McLaughlin to Kennedy along Williams Parkway | Estimated Completion 2025 |
| 5 | Region of Peel – West Brampton Watermain | A new 900-mm watermain along Williams Parkway from the West Brampton Pumping Station to Dixie Road. | Project is currently in design, completion date to be confirmed |
| 6 | Canadian National Rail (CNR) Rail Expansion | CNR has plans to expand the tracks within the downtown area by two, possibly three tracks. | Construction is planned for 2024. |
| 7 | City of Brampton – Centre for Innovation and Transit Hub Study | The Centre for Innovation is proposed as a new library, downtown transit terminal and office space. | There is no timeline currently available. |
| 8 | City of Brampton Dennison Avenue Expansion | The Dennison Avenue Expansion project involves a two-lane extension of Denison Avenue from Park Street to Mill Street with urban cross sections and a shared cycle lane. | No timeline available |

| No. | Project | Details | Timeline |
|-----|--|---|--|
| 9 | City of Brampton Light Rail Transit (LRT) Extension EA | The City of Brampton is in the process of developing a route for a new Light Rail Transit System between Steeles Avenue and the Brampton GO station via Main Street. | EA ongoing with PIC 2 completed in May 2021. |
| 10 | City of Brampton Ken Whillans Drive Extension | Proposed extension of Ken Whillans Drive from Church Street East to Nelson Street East currently under environmental assessment | EA completion date is expected in early 2022 |
| 11 | City of Brampton Capital Roads Program – Scott Street Bridge | The Scott Street Bridge was originally built in 1920 and requires replacement. The Bridge design is being coordinated with the DBFP study to ensure the bridge span will be sized for the future. | Estimated completion 2024 |
| 12 | City of Brampton Cycling Facilities along Vodden Street East, Howden Boulevard, and Hanover Street | Design feasibility study completed in 2020 to implement bike lanes or cycle track. | No timeline available |
| 13 | City of Brampton Downtown Reimagined | Downtown Reimagined is a streetscaping project focused on the area of Downtown Brampton specifically at Main and Queen Street. The street scaping work is proceeding under ongoing Downtown Brampton Phase 1 Construction (Refer no. 1) with plans for further revitalization | No timeline available |
| 14 | Downtown Brampton Phase 2 Watermain and Roadworks on Queen Street West | Downtown Brampton Watermain and Roadworks on Queen Street west installs a large new diameter watermain from McLaughlin Road to Mill Street South, with connections to all the side streets. | Estimated construction completion in 2024 |
| 15 | Region of Peel – Church Street Watermain | The Region identified in the Master Plan a 600-mm watermain on Church Street East to be installed (WM-D-277). | No timeline available |

7. Development of Short-listed Alternative Solutions

For the purposes of presentation, the short-list of alternative solutions has been renumbered sequentially, as follows:

- Alternative 1: Centre Street (formerly 2A);
- Alternative 2: Centre Street and Beech Street (formerly 2B);
- Alternative 3: Main Street, Vodden Street, and Centre Street (formerly 4B);
- Alternative 4: Main Street and Mill Street (formerly 4C);
 Street
- Alternative 5: Main Street, Church Street, and Centre Street (formerly 4D);
- Alternative 6: West Neighbourhood Route (formerly 5).

7.1 Alternative 1: Centre Street

Alternative 1 is approximately 2,100 linear metres with an alignment along Centre Street right-of-way. The proposed 750-mm concrete pressure pipe (CPP) feedermain will provide interconnections to the existing 600-mm watermain on Vodden Street, 400-mm watermain at Woodward Avenue and to the 600-mm watermain on Queen Street. An interconnection may also be provided if the Region moves forward with constructing a 600-mm watermain on Church Street. The route alternative affects a small section of Queen Street, which is a City owned major arterial road.

Centre Street is classified as a collector road and is 10 m to 12 m wide. Existing utilities in the right-of-way include a 250-mm sanitary sewer, 600-mm stormwater sewer and 300-mm watermain as shown on Figure 7-1.

Mature street trees also line both sides of the road. The presence of existing utilities and extent of tree protection zones limits the available space for open-cut construction, requiring that this alignment be installed through microtunnelling. A 1,500-mm casing will need to be installed for microtunnelling and the 750-mm CPP feedermain will be installed in the casing as per Region of Peel Standards.

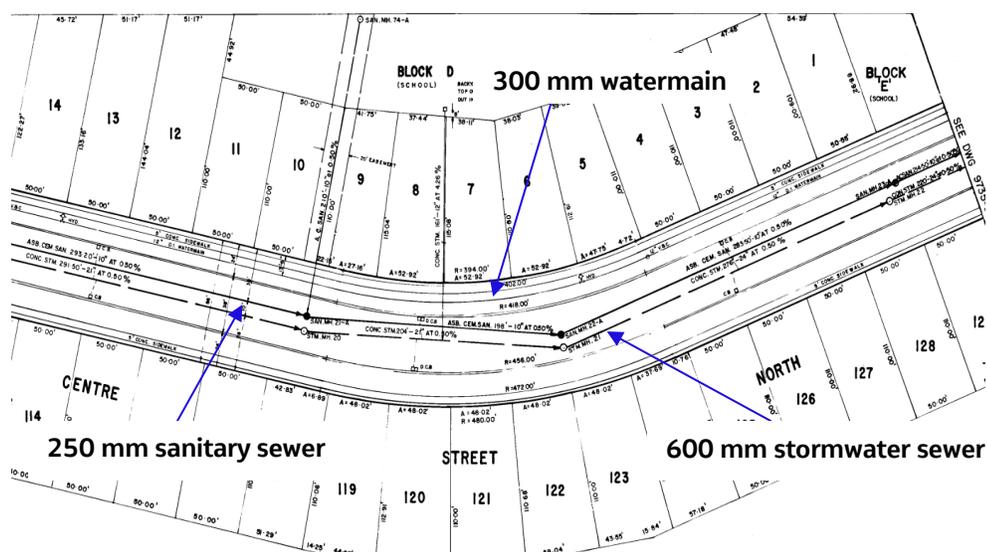
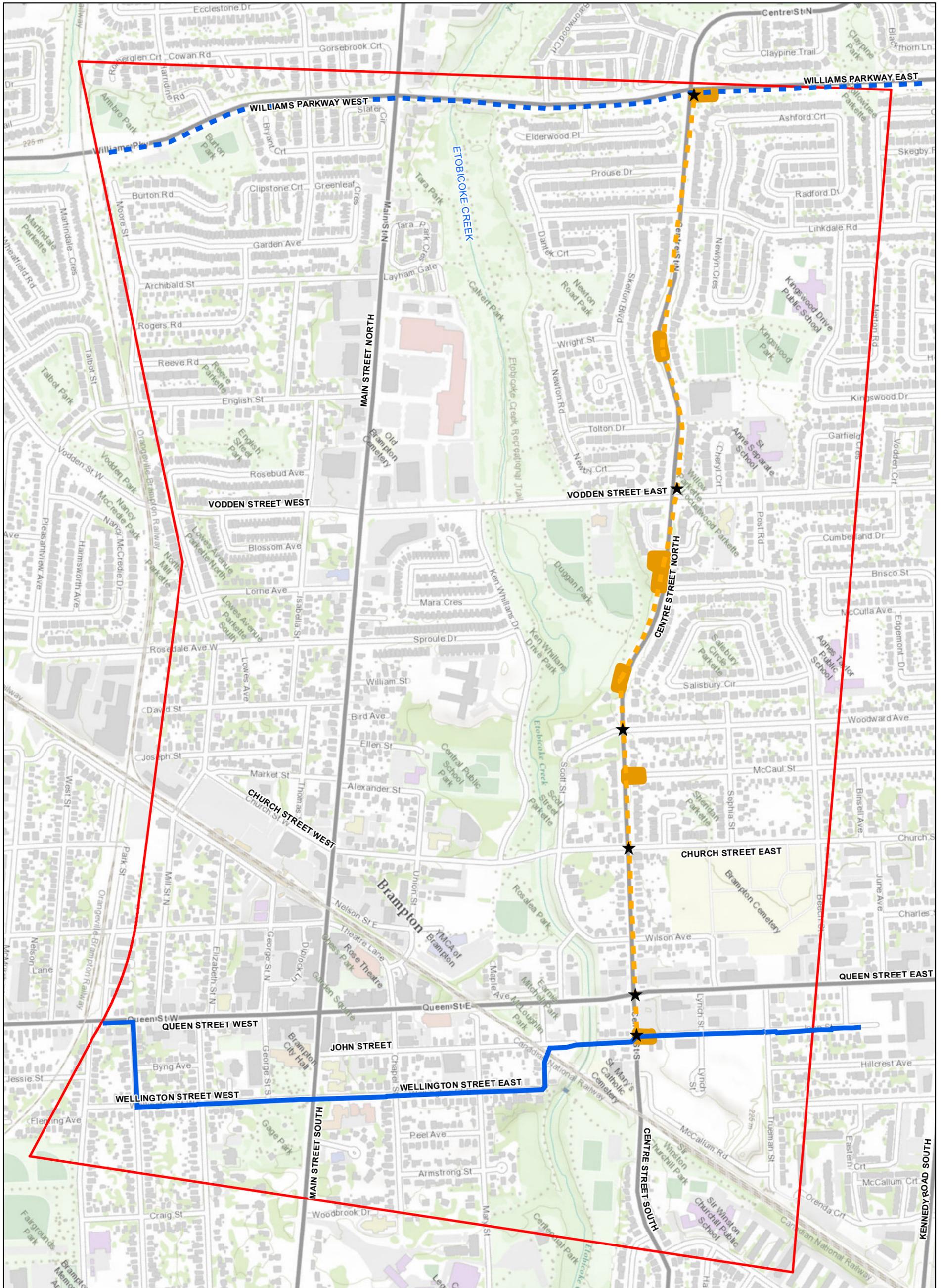


Figure 7-1. Centre Street Utilities (Source: Region of Peel As-Builts dated 1973)

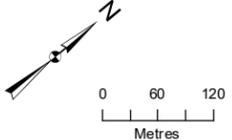
Six conceptual shaft compounds have been identified as shown on Figure 7-2 for evaluation purposes and will be further confirmed in latter design stages should the alternative be selected. The compounds can be located within the road right-of-way to minimize property requirements and have been selected to minimize traffic and residential property impacts; however, short term disruptions may be required.



Notes:
 1. Basemap Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Figure 7-2. Alternative 1
 New Watermain South of Williams Parkway: Schedule B Class

Region of Peel
 Brampton, Ontario

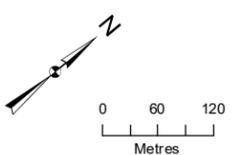
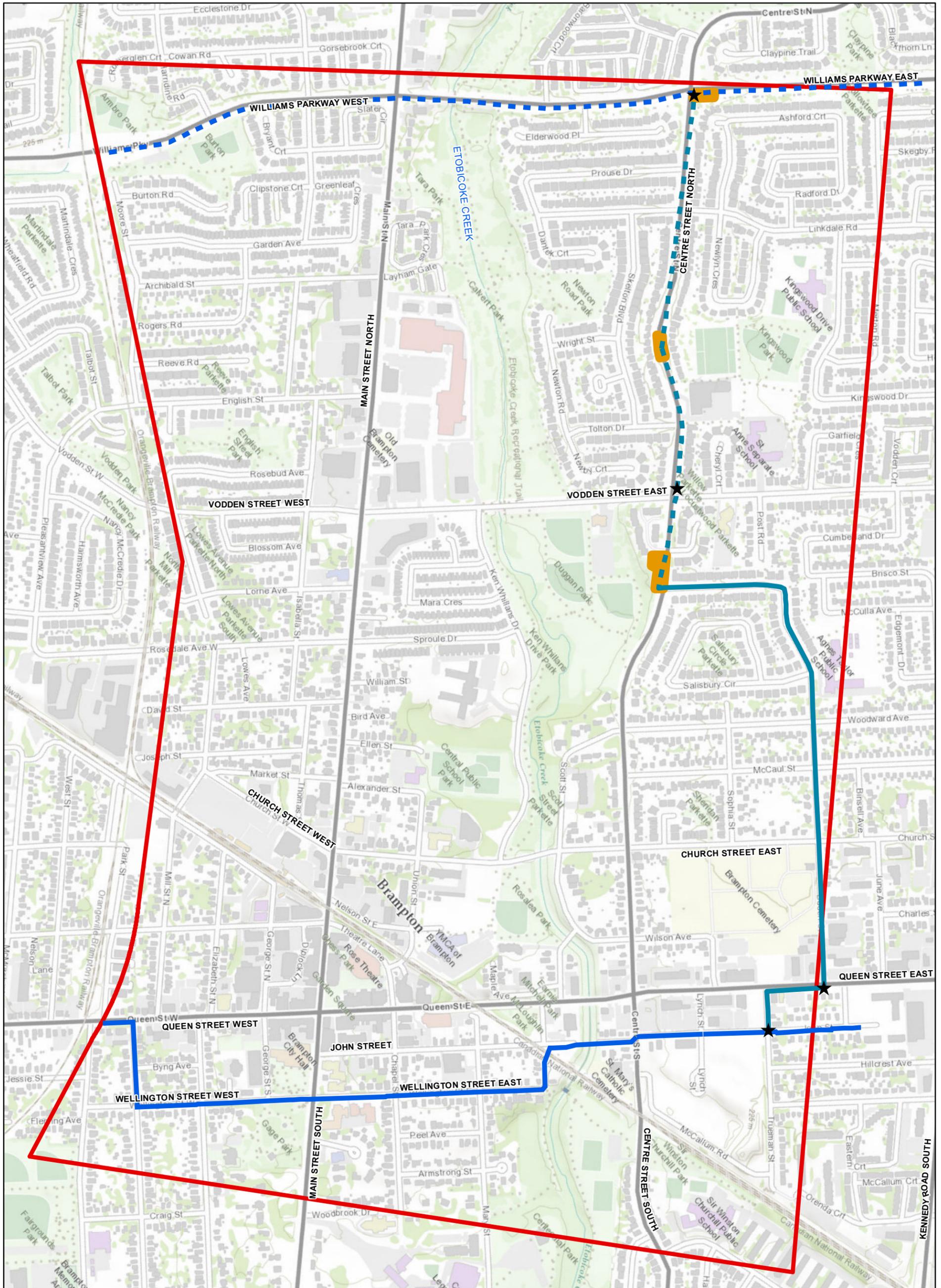


7.2 Alternative 2: Centre Street and Beech Street

Alternative 2 is approximately 2,400 linear metres with an alignment along Centre Street, Beech Street, Queen Street and Trueman Street right-of-way. The proposed 750-mm CPP feedermain will provide interconnections to existing watermains including the 600-mm watermain on Vodden Street and 600-mm watermain on Queen Street but not with the potential 600-mm watermain on Church Street.

Along Centre Street, the feedermain is proposed to be laid by microtunnelling as noted in Section 7.1, with Beech Street, Queen Street and Trueman Street proposed as open-cut construction. Beech Street is classified as a local road and is 8.0 to 8.3 m wide. Street trees are present on both sides of the road but there are less mature trees and smaller utilities than Centre Street, which likely will provide sufficient space for open-cut construction. Queen Street is classified as an 18 m wide major arterial road and will likely provide sufficient space for open-cut construction due to its large width. Trueman Street is 8.6 m wide with minimal street trees, also likely providing enough space for open-cut construction.

Three conceptual shaft compounds have been identified on Centre Street as shown on Figure 7-3 for evaluation purposes and will be further confirmed in future design stages should the alternative be selected.



Notes:
 1. Basemap Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Figure 7-3. Alternative 2
 New Watermain South of Williams Parkway: Schedule B Class

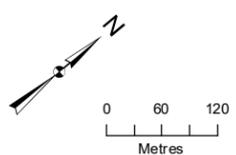
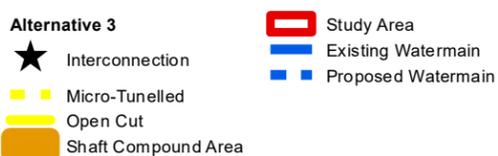
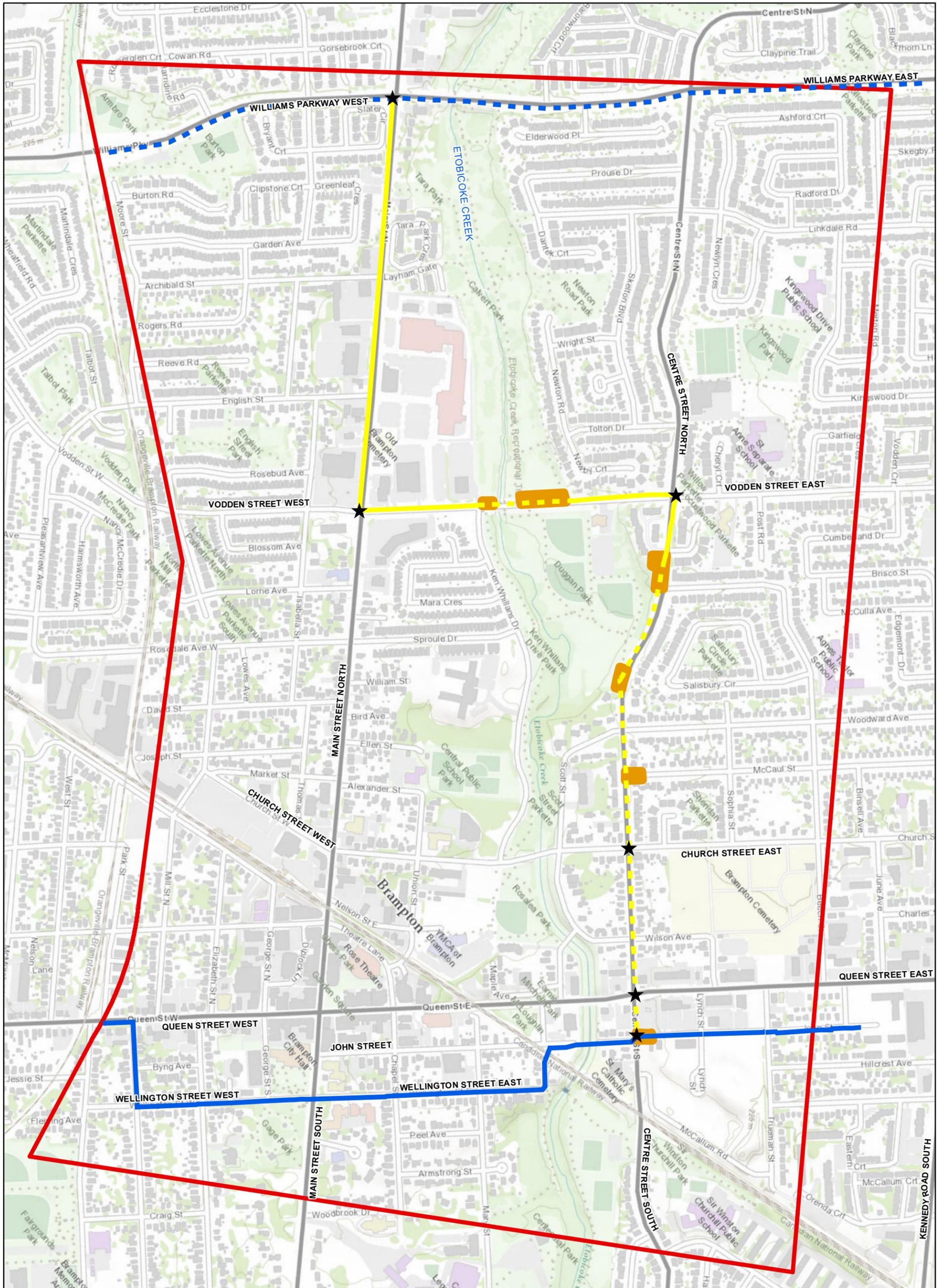
Region of Peel
 Brampton, Ontario

7.3 Alternative 3: Main Street, Vodden Street, and Centre Street

Alternative 3 is approximately 2,780 linear metres with an alignment along Main Street, Vodden Street, and Centre Street right-of-way. The proposed 750-mm CPP feedermain will provide interconnections to existing watermains including the 600-mm watermain on Vodden Street and 600-mm watermain on Queen Street. An interconnection may also be provided if the Region moves forward with constructing a 600-mm watermain on Church Street.

Main Street is classified as a major arterial road with a minimum road width of 13.5 m. Due to the large road width, the feedermain is proposed to be laid by open-cut construction on Main Street. Road closures for construction will be required with two-way traffic maintained. Vodden Street is classified as a collector road with four lanes of traffic and a minimum width of 13.7 m. The feedermain is proposed to be laid by open-cut construction due to the large road width, except for the Etobicoke Creek crossing. Construction on Vodden Street will require lane closures, but two-way traffic can be maintained. The feedermain crosses Etobicoke Creek on Vodden Street where it will be installed through microtunnelling to limit environmental impacts.

As with previous alternatives, the feedermain is proposed to be laid by microtunnelling on Centre Street due to the narrower right-of-way, existing utilities, and mature trees. Six conceptual shaft locations have been identified as shown on Figure 7-4 for evaluation purposes and will be further confirmed in latter design stages should the alternative be selected.



Notes:
 1. Basemap Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Figure 7-4. Alternative 3
 New Watermain South of Williams Parkway: Schedule B Class

Region of Peel
 Brampton, Ontario

7.4 Alternative 4: Main Street and Mill Street

Alternative 4 is approximately 2,380 linear metres with an alignment along Main Street, Vodden Street, Isabella Street, Rosedale Street, and Mill Street right-of-way. The proposed 750-mm CPP feedermain will provide an interconnection to the existing 600-mm watermain at Vodden Street.

Along Main Street, the feedermain is proposed to be laid by open-cut construction as noted in Section 7.3. The proposed feedermain is to be laid by microtunnelling on Rosedale Street, Isabella Street, and Mill Street north of the railway tracks due the narrow rights of way (7.5 m to 10.2 m), existing utilities and mature trees. The existing utilities present on these streets are provided on Figure 7-5 to Figure 7-7. The railway crossing on Mill Street is also proposed to be microtunnelled as required by permitting authorities to avoid disruption in rail operations. The feedermain is proposed to be laid by open-cut construction on Vodden Street, Mill Street south of the railway tracks, and Queen Street. Vodden Street and Queen Street have road widths of 13.4 m and 15.8 m respectively, providing sufficient space for open-cut construction. Mill Street south of the railway tracks has a road width of 8.0 to 10.2 m with some mature trees present but will likely provide sufficient space for open-cut construction.

Figure 7-8 shows the five conceptual shaft compound locations, method of construction, and route alignment of Alternative 4. The compounds can be located within the road right-of-way to minimize property requirements however due to narrow right-of-way road closures and diversions will be required causing disruptions during construction.

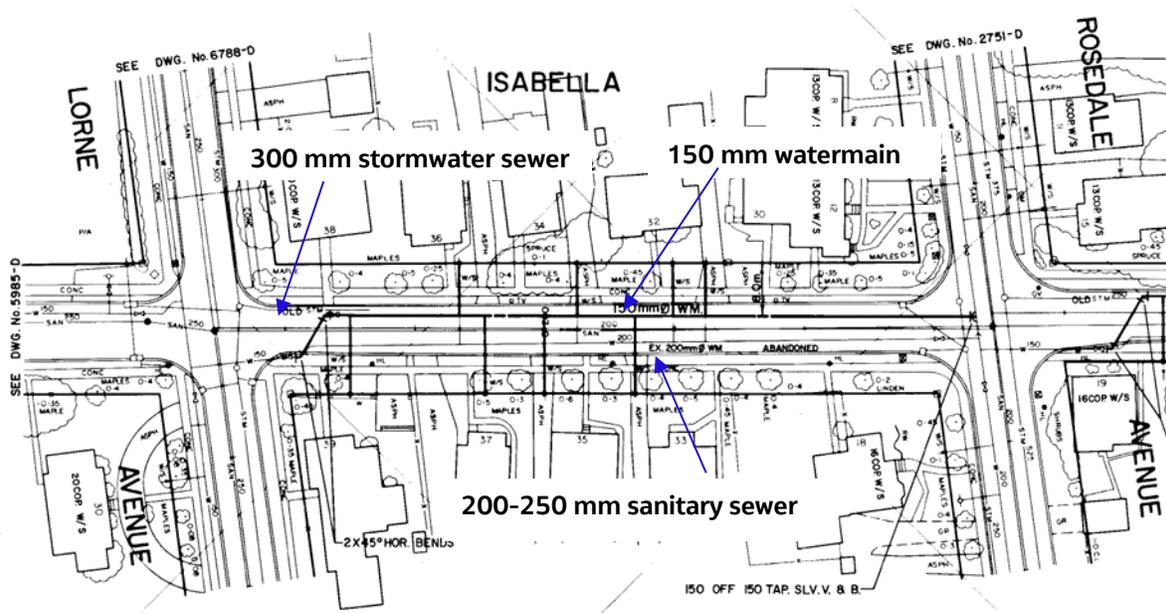
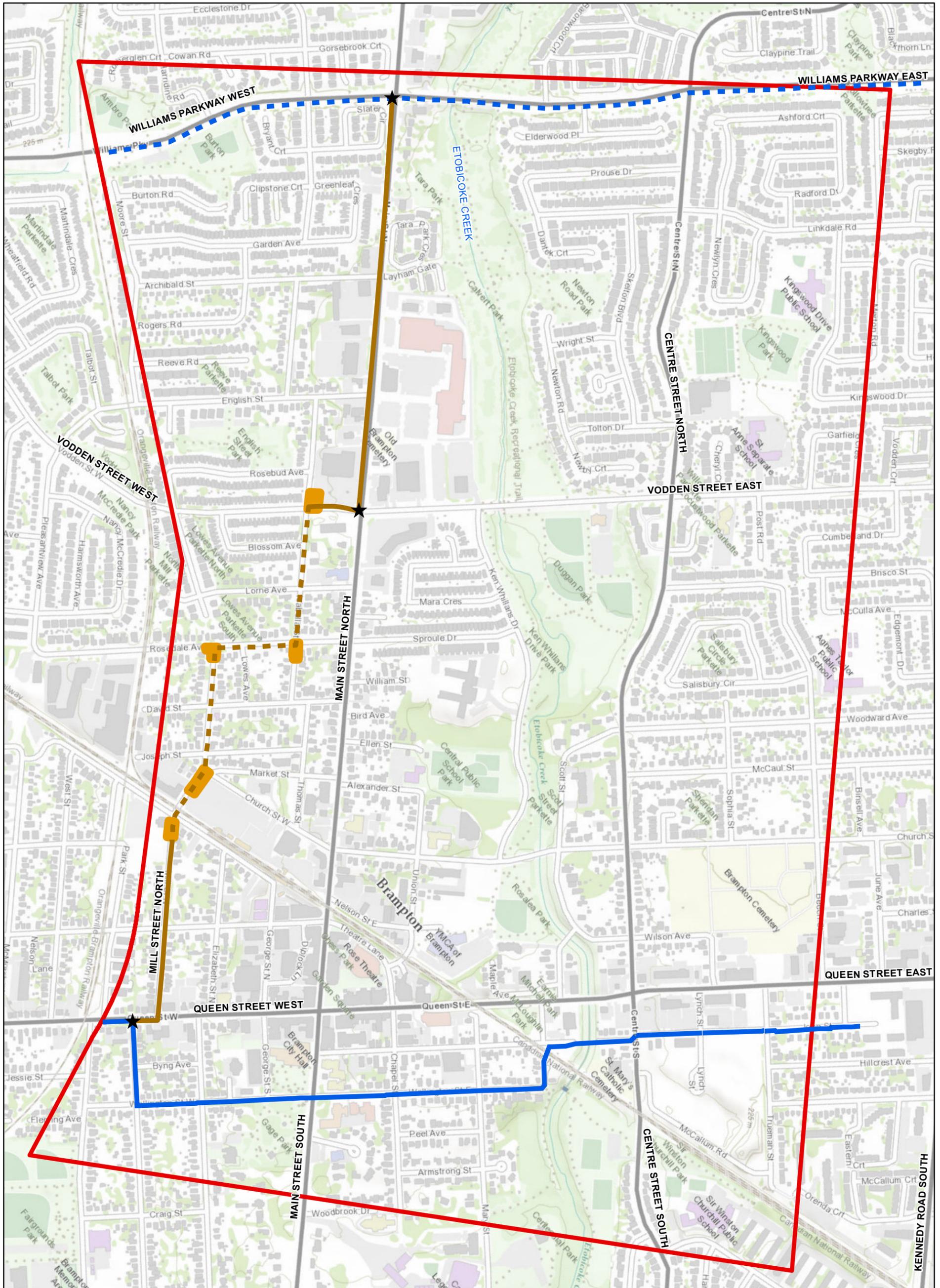


Figure 7-5. Isabella Street Utilities (Source: Region of Peel As-Builts dated 1991)

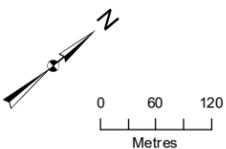


- Alternative 4**
- ★ Interconnection
 - Micro-Tunelled
 - Open Cut
 - Shaft Compound Area
- ▭ Study Area
 - Existing Watermain
 - Proposed Watermain

Notes:
 1. Basemap Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Figure 7-8. Alternative 4
 New Watermain South of Williams Parkway: Schedule B Class

Region of Peel
 Brampton, Ontario

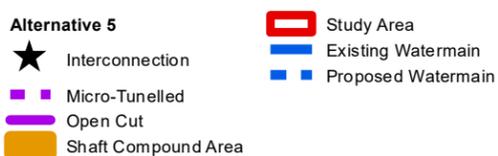
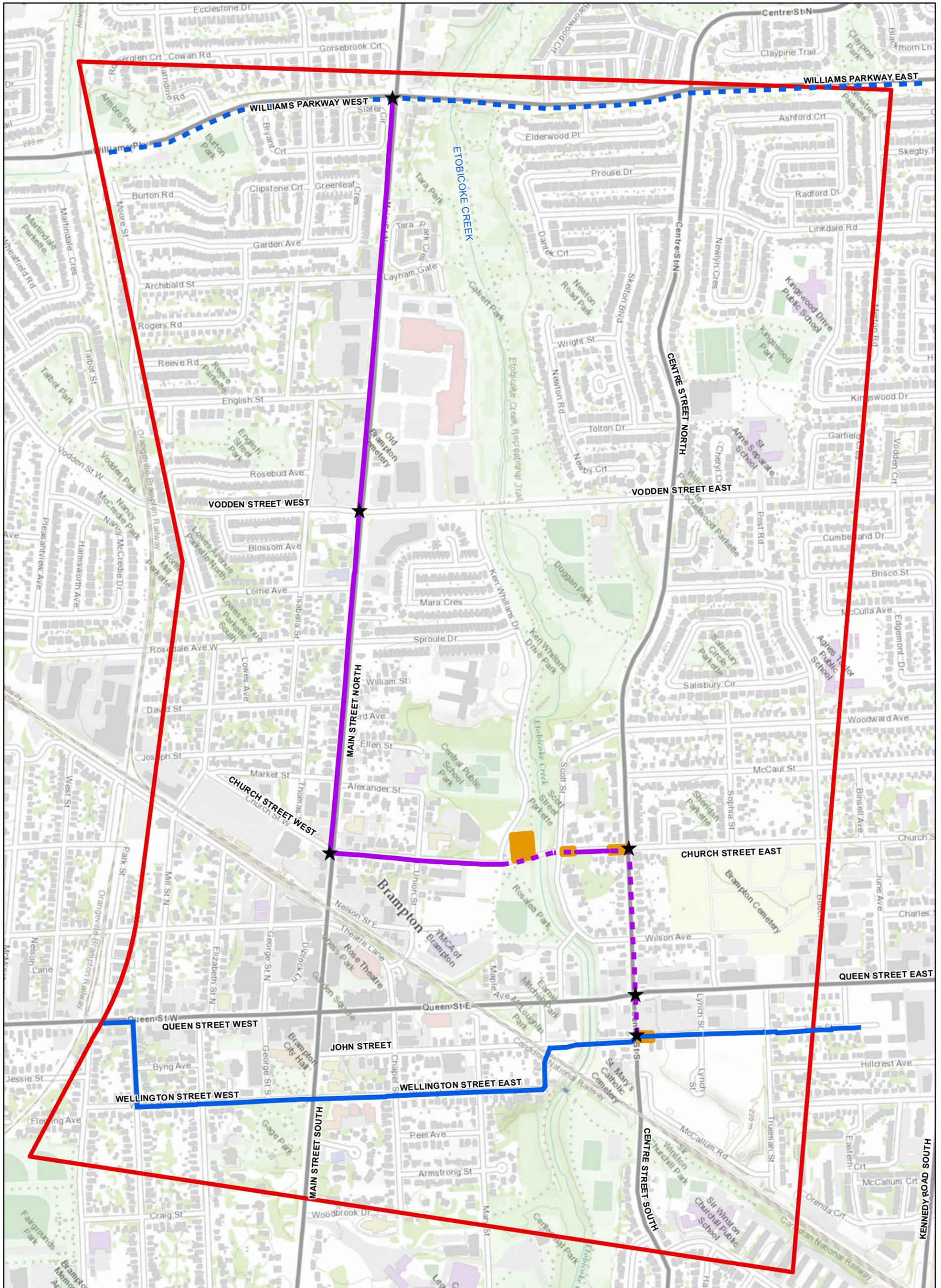


7.5 Alternative 5: Main Street, Church Street, and Centre Street

Alternative 5 is approximately 2,710 linear metres with an alignment along Main Street, Church Street, and Centre Street rights of way. The proposed 750-mm CPP feedermain will provide interconnections to existing watermains including the 600-mm watermain at Vodden Street and 600mm watermain at Queen Street. An interconnection may also be provided if the Region moves forward with constructing a 600-mm watermain on Church Street.

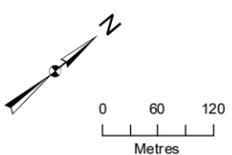
Along Main Street, the feedermain is proposed to be laid by open-cut construction as noted in Section 7.3. Church Street is a collector road with two lanes of traffic and a minimum width of 9.8 m. The feedermain is proposed to be laid by open-cut construction on Church Street. Due to narrow road width and existing utilities, construction on Church Street will require road closures but maintain local access. The feedermain crosses Etobicoke Creek on Church Street where it will be installed through microtunnelling to limit environmental impacts. A 1,500-mm casing will be required for microtunnelling the 750-mm feedermain.

Along Centre Street, the feedermain is proposed to be laid by microtunnelling as noted in Section 7.1. Figure 7-9 shows the four conceptual shaft locations, method of construction, and route alignment of Alternative 5.



Notes:
 1. Basemap Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

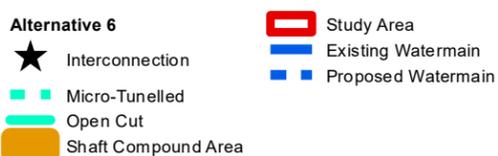
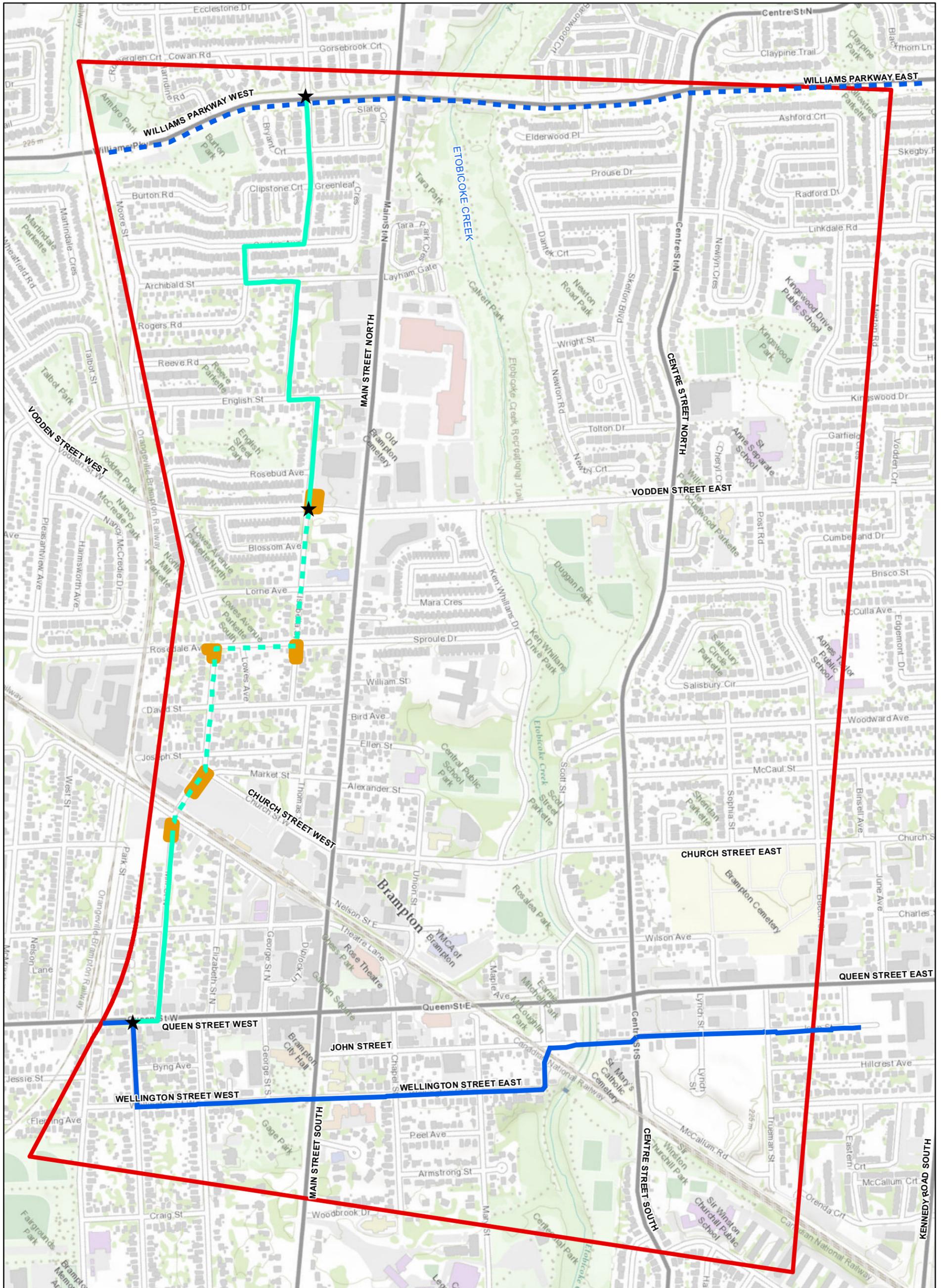
Figure 7-9. Alternative 5
 New Watermain South of Williams Parkway: Schedule B Class
 Region of Peel
 Brampton, Ontario



7.6 Alternative 6: West Neighbourhood Route

Alternative 6 is approximately 2,600 linear metres with an alignment on multiple smaller local streets west of Main Street including Murray Street, Garden Street, Bagshot Street, Archibald Street, Murray Street, English Street, Isabella Street, Rosedale Street, and Mill Street. The proposed 750-mm CPP feedermain will provide interconnections to the existing 600-mm watermain at Vodden Street.

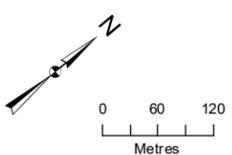
The proposed feedermain is to be laid by microtunnelling on Rosedale Street, Isabella Street, and part of Mill Street as these are narrow local roads with existing utilities and mature trees along the right-of-way as noted in Section 7.4. The railway crossing on Mill Street is also proposed to be laid by microtunnelling as required by permitting authorities. A 1500-mm casing will be required for microtunnelling the 750-mm feedermain. The remainder of local roads have a width between 8.5-m and 10.6-m with the feedermain proposed to be open-cut construction. The open-cut method of construction for these narrow local roads with existing utilities is identified due to less mature trees and will need to be further confirmed in the future design stages should the alternative be selected. Figure 7-10 shows the conceptual shaft locations, method of construction, and route alignment of Alternative 6.



Notes:
 1. Basemap Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Figure 7-10. Alternative 6
 New Watermain South of Williams Parkway: Schedule B Class

Region of Peel
 Brampton, Ontario



8. Cost Estimate

Capital cost estimates were developed for each short-list alternative based on typical unit rates for the following:

- Site preparation for shaft compound area;
- Supply and installation of 750-mm CPP watermain inside the steel liner by tunnelling;
- 1,500-mm tunnel steel liner including grout and installation by tunnelling;
- Shaft compound restoration;
- Shaft construction – excavation and support;
- Supply and installation of 750-mm feedermain by open-cut construction ;
- Connections to existing watermain;
- Installation of chambers;
- Trench pipe restoration.

Lump sum values were included to cover other construction and commissioning costs such as mobilization/demobilization, traffic management, dewatering, commissioning, monitoring, bonding, etc. The estimates include engineering, construction, commissioning and a 30% contingency.

The following design assumptions were made for completion of the estimate:

- Based on the Region of Peel standards, the proposed 750-mm CPP feedermain is to be installed within a 1,500-mm steel liner.
- Concrete thicknesses for valve chambers include base slab thickness of 1,000-mm, suspended slab thickness of 300-mm and wall thickness of 800-mm.
- Location, size, and number of shaft compounds used for cost estimate purpose were conceptual in nature and will be further defined in the preliminary design of the preferred alternative.
- Launch shaft compound size is: 20 m x 50 m and reception shaft compound size is: 25 m x 10 m.
- Launch shaft size is: 10 m x 5 m and reception shaft size is: 8 m x 4 m.
- Construction duration is assumed to be 1.5 years

Table 8-1 presents a summary of the cost estimate for each alternative.

Table 8-1. Cost Estimate Summary

| Alignment | Cost Estimate (Excluding HST) |
|--|-------------------------------|
| Alternative 1– Centre Street. | \$40,000,000 |
| Alternative 2– Centre and Beech Street. | \$30,000,000 |
| Alternative 3– Main and Centre Street. | \$33,000,000 |
| Alternative 4 – Main and Mill Street. | \$32,000,000 |
| Alternative 5 – Main, Church, and Centre Street. | \$25,000,000 |
| Alternative 6 – West Neighbourhood | \$33,000,000 |

HST = Harmonized Sales Tax

Refer to Appendix L for cost estimate calculations.

9. Evaluation Framework and Criteria

The short-list evaluation was performed using a triple bottom line approach consistent with the Class EA process and refined through respective Agencies and the Region of Peel. The criteria and corresponding descriptions are found in Table 9-1. The criteria were developed to be mutually exclusive/exhaustive, concise, operational, measurable, and understandable.

Table 9-1. Short-list Alternative Evaluation Criteria

| Evaluation Criteria | Description | Main Considerations |
|--|---|--|
| Technical Considerations | | |
| Implementation Feasibility and Constraints | Feasibility of implementation in terms of: <ul style="list-style-type: none"> ▪ Constructability (Method of construction) ▪ Construction accessibility ▪ Construction Constraints while working within proximity of critical infrastructure like utility corridors, major roads, employment areas, institutional areas, hydro corridors, railways, and watercourse including crossings. ▪ Construction compounds/Corridor ▪ Length of pipe | <ul style="list-style-type: none"> ▪ Open-cut method of construction preferred due to lower capital cost and risk. ▪ Preference is to locate watermain and chambers within road right-of-way to avoid requirement for temporary access road construction (compounds within TRCA lands and Railway lands require permits). ▪ Railway or watercourse crossing less preferred due to delays to obtain permits and approvals (Crossing is assumed to be installed by microtunnelling construction). ▪ Shorter length of watermain preferred to minimize capital cost and duration of potential traffic disruption. |
| Compatibility with Existing/Proposed Infrastructure | Potential impacts of existing/proposed infrastructure on functions or performance of proposed watermain | <ul style="list-style-type: none"> ▪ Preference for minimum conflicts with existing/planned infrastructure. |
| Future Maintenance and Operational Access | Technical viability to maintain operational access and servicing | <ul style="list-style-type: none"> ▪ Access to watermain and associated chambers via right-of-way. ▪ Preference to avoid easements when possible as easements incur significant costs |
| Effectiveness and Flexibility | Effectiveness and Flexibility in being able to meet current and future demands/variations/expansion requirements; flexibility in future regulatory requirements | <ul style="list-style-type: none"> ▪ Ability to reduce impacts and increase opportunities associated with future variations if regulatory requirements change |
| Permits and Approvals | Ease of receiving permits and approvals, including the necessary agency approvals and property acquisition | <ul style="list-style-type: none"> ▪ Minimum number of key stakeholders to obtain permits/approvals is preferred. ▪ Minimum extent of infrastructure within lands of concern to each of the key stakeholders preferred. ▪ Property acquisitions are avoided by keeping construction limits within right of way. |

| Evaluation Criteria | Description | Main Considerations |
|--|---|---|
| Socio-Cultural Environment | | |
| Recreational Land Uses and Visual Landscape | Potential to impact existing parks and open spaces or impact the character of the existing community (i.e., interfere with views) | <ul style="list-style-type: none"> ▪ Location of infrastructure in existing parks and open spaces, TRCA Property not preferred due to delays to obtain permits and approvals. ▪ Potential to impact character of the existing community, businesses or interfere with views less preferred. |
| Future Planning Policies/Initiatives | Compatibility with Master Plan and Region of Peel & City of Brampton growth initiatives | <ul style="list-style-type: none"> ▪ Complies with Master Plan. ▪ Incompatibility with Region of Peel and City of Brampton growth initiatives as identified in the Phase 1 report not preferred. |
| Disruption During Construction | Disruption to existing community during construction due to traffic management requirements. | <ul style="list-style-type: none"> ▪ Traffic impacts are rated based on amount of traffic diversions anticipated from the closure and the amount of capacity remaining on major parallel routes to accommodate these diversions. ▪ Transit impacts are rated based on the number and length of bus routes impacted with higher order transit (e.g., Züm routes) rated as being more severe. Proximity of road closures to GO station accesses also factored in the rating. ▪ Local access and cycling impacts were rated as combined category factoring adjacent land uses (schools, parking, businesses, emergency, and medical services, etc.), driveway impacts and required closure of bike routes or impacts to cycling friendly streets. |
| Archaeological and Cultural Resources | Potential impacts to known archaeological and cultural resources or ongoing operation | <ul style="list-style-type: none"> ▪ Route within or adjacent to archaeological resources not preferred. ▪ Route within or adjacent to cultural heritage resource not preferred. |

| Evaluation Criteria | Description | Main Considerations |
|---|---|---|
| Natural Environment | | |
| Terrestrial Vegetation and Wildlife | Proximity to and potential Impacts due to construction to: <ul style="list-style-type: none"> ▪ sensitive features and regulated lands ▪ local wildlife and their habitat ▪ vegetation and trees | <ul style="list-style-type: none"> ▪ Infrastructure located in areas identified with significant terrestrial species not preferred ▪ Potential for temporary or permanent loss of sensitive terrestrial feature not preferred |
| Aquatic Systems | Proximity to and potential impacts due to construction to: <ul style="list-style-type: none"> ▪ local aquatic species and habitat ▪ aquatic species at risk | <ul style="list-style-type: none"> ▪ Infrastructure located in areas identified with significant aquatic species not preferred ▪ Potential for temporary or permanent loss of aquatic feature not preferred |
| Hydrogeology, Surface water, and Groundwater | Hydrogeologic setting: <ul style="list-style-type: none"> ▪ Potential impact on the quantity and quality of surface water and groundwater | <ul style="list-style-type: none"> ▪ Temporary and/or permanent changes in quantity and quality of surface water bodies, such as creek not preferred ▪ Temporary and/or permanent changes in groundwater takings quantity and/or location not preferred |
| Soil, Bedrock, and Geology | Geology and geotechnical considerations | Bedrock depth and variability: <ul style="list-style-type: none"> ▪ More variation in the top of bedrock leads to possible challenges in tunnelling ▪ Tunnel depth also influenced by bedrock depth and variability ▪ Higher number of boulders within soil pose difficulties during tunnelling |
| Contamination | Considerations regarding contaminated areas. | <ul style="list-style-type: none"> ▪ The number of APEC that have the potential for contamination above MECP standard as identified in the Desktop Environmental Site Assessment. Lower number of APEC preferred. |
| Economic Evaluation | | |

| Evaluation Criteria | Description | Main Considerations |
|---------------------------------------|--|---|
| Capital Cost | Estimated Capital Costs (2020 cost estimate including 30% contingency) | <ul style="list-style-type: none"> ▪ Capital costs includes engineering, construction, and commissioning. Construction cost includes: Tunnelling, Shaft construction, CPP pipe, steel liner, shaft preparation, and restoration. Also includes open-cut excavation, re-instatement, mobilization/demobilization, traffic management, bonding, dewatering, etc. ▪ Lower capital cost alternative preferred |
| Operation and Maintenance Cost | Estimated Operational and Maintenance Costs | <ul style="list-style-type: none"> ▪ Operational expenditure incurred throughout the life of the asset, including labour, power, and consumables and asset monitoring. ▪ Potential difference in operational cost for each alternative was not considered significant for comparison due to the similarity in overall length. |

The short-listed alternatives were evaluated based on the criteria and assigned a score corresponding to the benefits and impacts using a 3-point scale as shown in Table 9-2. Each criterion is equally weighted, with the sum of scores used to provide an overall score that identifies the preferred alternative.

Table 9-2. Short-list Alternative Evaluation Legend

| Rating Symbol | Symbol Description | Natural Environment | Socio-Cultural | Technical | Economics |
|---|----------------------|---------------------|-----------------|--------------------------|---------------|
|  | Most Preferred | Low Impact | Low Impact | High Technical Merit | Low Cost |
|  | Moderately Preferred | Moderate Impact | Moderate Impact | Moderate Technical Merit | Moderate Cost |
|  | Least Preferred | High Impact | High Impact | Low Technical Merit | High Cost |

10. Comparative Evaluation of Short-listed Alternative Solutions

A summary of the evaluation of the short-listed alternatives is provided in Table 10-1 while details are provided in Appendix M. Based on this evaluation, Alternative 1 and 2 were most preferred. Alternative 1 was ultimately preferred over Alternative 2 since the microtunnelling along the length of Centre Street included in Alternative 1 reduces impacts to the natural and social-cultural environment and is also more technically preferred compared to Alternative 2. Alternative 1 provides the following benefits:

- Shorter overall length and direct connections to existing and future watermains;
- Microtunnelling will mitigate traffic disruption and impact to mature street trees; however limited duration impacts may occur during construction pending final locations of tunnelling shaft compounds;
- Minimal impact to Region of Peel and City of Brampton growth initiatives apart from the crossing of Queen Street to be coordinated with the requirements of the future Queen Street BRT project;
- No creek or rail crossings which reduce permitting requirements and impacts to the natural environment;
- Alignment is all within right-of-way supporting access for construction and long-term operation and minimizing impact to natural features and archaeological and CHR;
- Microtunnelling for the full length of the alignment results in the highest capital cost but is required to offset the community impacts.

Table 10-1. Short-list Alternative Evaluation

| Alignments | Technical Considerations | | Socio-Cultural Environment | | Natural Environment | | Economic Evaluation | | Overall |
|---|---|-------|--|-------|---|-------|---|-------|---------|
| | Summary of Impacts | Score | Summary of Impacts | Score | Summary of Impacts | Score | Summary of Impacts | Score | Score |
| Alternative 1– Centre Street | <ul style="list-style-type: none"> Microtunnel (750-mm watermain within 1,500-mm casing) for the alignment on Centre Street. Existing utilities and mature trees along narrower road right-of-way result in limited space for open-cut construction. Watermain and chambers within road right-of-way facilitates access during construction and long-term maintenance. Routing aligns with connections to existing and future watermains. Potential Permits from City of Brampton: Road Closure, Tree Removal (if required for shaft construction), TRCA permit (if shafts are in boulevard). | ● | <ul style="list-style-type: none"> Microtunnelling minimizes traffic transit and property access disruption. Detailed design decisions on shaft compound locations may impact residential property access and/or require short term road closure. Small section of watermain crossing Queen Street may be affected by Queen Street BRT project. No archaeological impacts. Least impact to CHRs. Detailed design decisions on shaft compounds may impact natural features due to proximity to TRCA's regulated area. | ● | <ul style="list-style-type: none"> No crossings required avoiding impact to fish and fish habitats and surface water quality Possible challenges to tunnelling expected due to potential for boulders and bedrock variability 6 APECs may require mitigation during construction (Microtunnelling may reduce mitigation requirements) Depending on shaft location, potential for street and parkland mature tree removal at shaft locations | ● | <ul style="list-style-type: none"> Capital cost of \$40M as a result of tunneling | ○ | ● |
| Alternative 2– Centre and Beech Street | <ul style="list-style-type: none"> Microtunnel (750-mm watermain within 1,500-mm casing) for the alignment on Centre Street. Existing utilities and mature trees along narrower road right-of-way result in limited space for open-cut construction. Although narrower road right-of-way on Beech Street, less mature trees and utilities allow for open-cut construction. Watermain and chambers within road right-of-way facilitates access during construction and long-term maintenance. Routing aligns with connections to existing and future watermains at all locations apart from the potential Church Street watermain. Potential Permits from City of Brampton: Road Closure, Tree Removal and TRCA permit (if shafts are in boulevard). | ◐ | <ul style="list-style-type: none"> Traffic impact anticipated on Beech Street, Queen Street, and Trueman Street due to open-cut construction, while traffic impact on Centre Street to be minimized through microtunnelling. Small section of watermain crossing Queen Street may be affected by Queen Street BRT project. No archaeological impacts. Less impact to CHRs. Detailed design decisions on shaft compounds on Centre Street may impact natural features due to proximity to TRCA's regulated area. impact natural features due to proximity to TRCA's regulated area | ● | <ul style="list-style-type: none"> No crossings required avoiding impact to fish and fish habitats and surface water quality Possible challenges to microtunnelling expected due to potential for boulders and bedrock variability 5 APECs may require mitigation during construction (Microtunnelling may reduce mitigation requirements) Depending on shaft location, potential for tree removals at shaft locations | ● | <ul style="list-style-type: none"> Capital cost of \$30M as a result of tunnelling on Centre Street. | ● | ● |
| Alternative 3– Main and Centre Street | <ul style="list-style-type: none"> Microtunnel (750-mm watermain within 1,500-mm casing) for the alignment on Centre Street due to limited space within road right-of-way and for the Etobicoke Creek crossing on Vodden Street. Potential for shafts required for Etobicoke crossing to be located on TRCA land. Potential Permits for Creek Crossing: TRCA, MECP (potential impact to habitats) and DFO (microtunnelling to avoid the impacts). | ◐ | <ul style="list-style-type: none"> Open-cut construction on Main Street, a Major Arterial Road, will require partial lane closures and significant traffic disruption during construction. Shaft compound proposed on TRCA land. Shaft location on Vodden Street at the creek requires Stage 2 archaeological assessment to assess archaeological impact. | ○ | <ul style="list-style-type: none"> Potential for tree removals required at shaft locations Potential direct and indirect adverse effects to fish and fish habitat during construction at shaft locations Potential impacts on surface water quality during construction at shaft compound close to Etobicoke Creek crossing | ○ | <ul style="list-style-type: none"> Capital Cost of \$33M as a result of microtunnelling at Creek crossing and Centre Street. | ◐ | ◐ |

| | Technical Considerations | | Socio-Cultural Environment | | Natural Environment | | Economic Evaluation | | Overall |
|---|--|---|---|---|--|---|--|---|---------|
| | <ul style="list-style-type: none"> Potential Permits from City of Brampton: Road Closure and Tree Removal. | | | | <ul style="list-style-type: none"> 9 APECs may require mitigation during construction | | | | |
| Alternative 4 – Main and Mill Street | <ul style="list-style-type: none"> Microtunnel (750-mm watermain within 1,500-mm casing) for the alignment on Isabella Street, Rosedale Street, and Mill Street North. Existing utilities and mature trees along narrower road right-of-way result in limited space for open-cut construction. Microtunnel for CNR Crossing to rail operations. Potential for chambers at CNR crossing to be located on CNR parking area. Allows for less interconnection to existing and future watermains than other alternatives and requires multiple chambers at intersections to support bends. Potential Permits for Railway Crossing: CNR Permit. Potential Permits from City of Brampton: Road Closure and Tree Removal. | ○ | <ul style="list-style-type: none"> Open-cut construction on Main Street, a Major Arterial Road, will require partial lane closures and significant traffic disruption during construction. Shaft compound locations will impact Go Station parking and a mechanics shop parking during construction. The route will be impacted by CN Rail track expansion project and Dennison Avenue Expansion Project. Direct impacts to one cultural heritage resource (CNR station). Potential indirect impacts to 25 CHRs. | ○ | <ul style="list-style-type: none"> No crossings required avoiding impact to fish and fish habitats and surface water quality 9 APECs may require mitigation during construction Potential for tree removals required at shaft locations | ◐ | <ul style="list-style-type: none"> Capital cost of \$32M as a result of tunnelling at Isabella Street, Rosedale Street, Mill Street. North and CNR crossing | ◐ | ○ |
| Alternative 5 – Main, Church, and Centre Street | <ul style="list-style-type: none"> Microtunnel (750-mm watermain within 1,500-mm casing) for the alignment on Centre Street and Etobicoke Creek crossing. Potential for shafts required for Etobicoke crossing to be located on TRCA land. Potential Permits for Creek Crossing: TRCA, MECP, and DFO. Potential Permits from City of Brampton: Road Closure and Tree Removal. | ◐ | <ul style="list-style-type: none"> Open-cut construction on Main Street, a Major Arterial Road, will require partial lane closures and significant traffic disruption during construction. Potential for shafts required for Etobicoke crossing to be located on TRCA land. Church Street shaft compound will temporarily impact walkway to Etobicoke Creek Trail during construction. The route will be impacted by DBFP Project and Riverwalk Project. Shaft location on Church Street. Creek Crossing requires Stage 2 archaeological assessment. | ○ | <ul style="list-style-type: none"> Potential for tree removals required at shaft locations Potential direct and indirect adverse effects to fish and fish habitat during construction at shaft locations Potential impacts on surface water quality during construction at shaft compounds close to Etobicoke Creek 7 APECs may require mitigation during construction | ○ | <ul style="list-style-type: none"> Capital Cost of \$25M | ◐ | ◐ |
| Alternative 6 –West Neighbourhood | <ul style="list-style-type: none"> Microtunnel (750-mm watermain within 1,500mm casing) for the alignment on Isabella Street, Rosedale Street, and Mill Street North and CNR crossing. Existing utilities and mature trees along narrower road right-of-way result in limited space for open-cut construction. Shaft compounds are located on CNR parking and road right-of-way. Potential for chambers at CNR crossing to be located on CNR parking area. | ○ | <ul style="list-style-type: none"> Shaft compound locations will impact Go Station parking and a mechanics shop parking during construction. The route will be impacted by CN Rail track expansion project and Dennison Avenue Expansion Project. Direct impacts to one cultural heritage resource (CNR station). | ○ | <ul style="list-style-type: none"> No crossings required avoiding impact to fish and fish habitats and surface water quality 7 APECs may require mitigation during construction Potential for tree removals required at shaft locations | ◐ | <ul style="list-style-type: none"> Capital cost of \$33M as a result of tunnelling at Isabella Street, Rosedale Street, Mill Street North, and CNR crossing | ○ | ○ |

| | Technical Considerations | Socio-Cultural Environment | Natural Environment | Economic Evaluation | Overall |
|--|--|----------------------------|---------------------|---------------------|---------|
| | <ul style="list-style-type: none"> ▪ Allows for less interconnection to existing and future watermains than other alternatives. ▪ Potential Permits for Railway Crossing: CNR Permit. ▪ Potential Permits from City of Brampton: Road Closure and Tree Removal. | | | | |

11. Project Description

11.1 Confirmation of Preferred Alternative

Based on the comparative evaluation of short-listed alternatives and as confirmed through feedback provided during stakeholder and public consultation, Alternative 1 was selected as the preferred alternative.

Alternative 1: Approximately 2,100 linear metres of new 750-mm-diameter feedermain on Centre Street to connect to the proposed 900-mm-diameter feedermain on William's Parkway at the intersection of Centre Street and Williams Parkway in the north and existing 600-mm-diameter watermain at the intersection of Centre Street and John Street in the south.

11.2 Conceptual Design of Preferred Alternative

The objective of this proposed 750-mm feedermain is to provide for additional water demand due to projected growth in the Downtown Brampton area. The proposed feedermain where possible will allow for long-term flexibility with managing demand and pressure in the system.

11.2.1 Feedermain Design

Due to existing utilities, narrow roads, and mature trees, the proposed 750-mm feedermain will be laid by microtunnelling method along Centre Street. The material selected for the feedermain is Concrete Pressure Pipe (CPP). Microtunnelling method will be used to install a 1,500-mm diameter steel casing. The 750-mm CPP feedermain will be installed within the 1,500-mm steel casing.

The horizontal alignment for the microtunnel is selected to be along Centre Street right-of-way to avoid property requirements. The vertical alignment is dependent on the depth of bedrock within the area and is estimated to be between 8-9m below ground level. The vertical alignment of proposed feedermain will be well below ground level and will avoid impacts to existing utilities and mature trees.

Figure 7-1 shows alignment of the 750-mm feedermain and shaft compound locations.

At a conceptual level, six shaft compounds were identified to be used for launch and reception pits for the microtunnel. Tunnelling will begin using a shaft compound at John Street and Centre Street in the south. The alignment will sit on the eastern side of the street, up until the shaft compound located at McCaul Street and Centre Street. The tunnel then heads toward the western side of the street to a shaft compound location just north of Woodward Avenue on Centre Street. Due to the curvature of the road, another shaft compound is located at Centre Street and Beech Street as well as Centre Street north of Tolton Drive. The tunnelling will end at the eastern side of Centre Street at Williams Parkway.

All shaft compounds are proposed to be within road right-of-way. The shaft compound locations are identified to avoid long-term road closures, major impact to trees or existing utilities. The shaft compounds may require some tree removal and vegetation removal. Geotechnical investigations and subsurface utility engineering investigations are recommended during detailed design to confirm the ground conditions and depth of microtunnel. Microtunnelling alignment and shaft compound locations may be altered during the design stages as more information becomes available. Vibration studies are also recommended since the tunnelling will be near residential properties. Table 11-1 and m² = square metre(s)

Table 11-2 provide conceptual design on microtunnel lengths and shaft compounds for the proposed 750-mm-diameter feedermain.

Table 11-1. Microtunnel shafts

| No. | Location | Shaft size (m ²) | Shaft compound size (m ²) | Shaft Type | Road closure requirements |
|-----|---|------------------------------|---------------------------------------|----------------------------|---|
| 1 | John Street and Centre Street South intersection | 50 | 700 | Launch shaft | John Street closure |
| 2 | McCaul Street and Centre Street intersection | 30 | 700 | Reception shaft | McCaul street closure |
| 3 | Near Woodward Avenue and Centre Street North intersection | 50 | 700 | Launch and Reception shaft | N/A |
| 4 | Near Baseball diamond | 50 | 1,700 | Launch shaft | N/A |
| 5 | Near Street John A Macdonald School | | 500 | Reception shaft | Both lane closure on Centre Street (shorter duration) |
| 6 | Williams Parkway and Centre Street North intersection | 50 | 600 | Launch shaft | One lane closure on Williams Parkway |

m² = square metre(s)

Table 11-2. Microtunnel Drives

| Drive | Launch Shaft | Receiving Shaft | Depth (m) | Length (m) | Curve Radius (m) |
|-------|---|---|-----------|------------|------------------|
| 1 | Williams Parkway and Centre Street North intersection | Near Street John A Macdonald School | 8 to 9 | 546 | |
| 2 | Near Street John A Macdonald School | Near Baseball diamond | 8 to 9 | 470 | 400 |
| 3 | Near Baseball diamond | Near Woodward Avenue and Centre Street North intersection | 8 to 9 | 275 | 400 |
| 4 | Near Woodward Avenue and Centre Street North intersection | McCaul Street and Centre Street intersection | 8 to 9 | 200 | |
| 5 | McCaul Street and Centre Street intersection | John Street and Centre Street South intersection | 8 to 9 | 570 | |

11.2.2 Interconnections

The proposed 750-mm-diameter feedermain will be connected in to the existing 600-mm watermain on Vodden Street, 400-mm watermain at Woodward Avenue and to the 600-mm watermain on Queen Street are proposed.

An interconnection may also be provided if the Region moves forward with constructing a 600-mm watermain on Church Street. Four valve chambers are proposed along the route.

11.3 Environmental and Socio-cultural Impacts and Mitigating Measures

Mitigation measures will be required to limit the amount of negative environmental and socio-cultural impacts of the preferred alternative. Table 11-3 provides an overview of the mitigation measures required during design, construction, and long-term operation. These mitigation measures will be reviewed and refined in further design stages.

Table 11-3. Mitigation Required for the Preferred Alternative

| Impact Type | Mitigation During Design, Construction and Operation |
|----------------------------------|---|
| Vegetation and Wildlife | <ul style="list-style-type: none"> ▪ Once shaft locations have been finalized in detailed design, re-assess the natural environment and wildlife impacts. If shafts are in forested TRCA regulated areas, complete an Environmental Impact Study, avoid vegetation removal where possible, perform Butternut targeted surveys and avoid removals of Common Milkweed and native wildflowers. ▪ Assess impacts to trees and prepare tree preservation and compensation plan if required to provide protection to mature trees along the road and near shaft compounds. ▪ After construction, restore the disturbed areas to existing or better condition using native species as soon as possible. |
| Surface Water | <ul style="list-style-type: none"> ▪ It is not anticipated that this alignment will require mitigation measures for surface water impacts as this route does not involve crossing Etobicoke Creek and is not in close proximity to the creek. |
| Groundwater | <ul style="list-style-type: none"> ▪ Assess groundwater depth at tunnelling locations and determine rate of extraction control. Control mixing of groundwater during construction to limit contamination from environmental areas of potential concerns. Consult CTC Source Protection Plan to review impacts if any on the HVA. |
| Climate Change | <ul style="list-style-type: none"> ▪ The construction of this project is not anticipated to contribute to long-term greenhouse gas emissions or long-term disruption to carbon sinks. |
| Erosion and Sedimentation | <ul style="list-style-type: none"> ▪ It is not anticipated that this alignment will require mitigation measures for erosion and sedimentation impacts as this route does not involve crossing Etobicoke Creek and is not in close proximity to the creek. Provide an Erosion and Sedimentation Control Plan if determined to be required in detailed design. |
| Excess Soil Management | <ul style="list-style-type: none"> ▪ Complete construction in accordance with O. Reg. 406/19: "On-Site and Excess Soil Management" ▪ Refer to and comply with "Management of Excess Soil – A Guide for Best Management Practices" (MECP, 2014) and dispose of waste in accordance with Ministry requirements |

| Impact Type | Mitigation During Design, Construction and Operation |
|---|--|
| Contaminated Soils and Waste, Spills and Leaks | <ul style="list-style-type: none"> ▪ Report any leaks that occur to the MECP Spills Action Centre. ▪ Create a contingency plan prior to construction for control and cleanup of spills. ▪ Dispose of soils and waste in accordance with provincial regulations and maintain proper fuel storage, re-fueling practices, and maintenance practices for construction equipment. |
| Cultural Features | <ul style="list-style-type: none"> ▪ Perform field review for any additional heritage resources, and assess heritage impact of route alternative and construction methodology for the one listed heritage site along the route |
| Traffic and Access | <ul style="list-style-type: none"> ▪ Provide a Construction Traffic Management plan |
| Archaeology | <ul style="list-style-type: none"> ▪ Avoid TRCA-regulated areas adjacent to Centre Street in selecting a shaft compound, where possible. If required to be relocated inside an area not already assessed during the archaeological review, a Stage 1 archaeological assessment to be performed. If identified through subsequent Stage 1 assessment, a Stage 2 assessment may be required. |
| Air Quality, Noise, Vibration, and Dust | <ul style="list-style-type: none"> ▪ Perform construction activities during daytime hours in adherence to the City of Brampton noise by-law. ▪ Prepare a Construction Noise and Vibration Mitigation plan during detailed design. ▪ Include dust and noise control measures in construction plans – dust prevention and control measures ▪ Conduct a sensitive structure survey and perform modelling to determine vibration impacts on nearby buildings. There is the potential to require structural monitoring for vibration on some buildings. |
| System Redundancy and Operational Flexibility | <ul style="list-style-type: none"> ▪ Include interconnection points to existing watermains greater than 400-mm and where future watermains will be installed. |

11.4 Permits and Approvals

The following permits and approvals are required prior to the construction of the preferred alternative:

- City of Brampton - Road Closure Permit;
- City of Brampton - Tree Removal Permit;
- TRCA Permit if any shaft compounds are in TRCA-regulated areas;
- Environmental Compliance Approval from the MECP.

11.5 Timing of Implementation

The construction of the preferred alternative will be implemented after completion of the 900-mm feedermain on Williams Parkway. The Williams Parkway feedermain is scheduled for construction in 2020 but has since been delayed due to possible re-design. At this time, it is estimated that the construction of the Williams Parkway feedermain will begin in 2022.

The Class EA was chosen to move forward with the analysis since selection of the preferred alternative at this stage will allow integration with the ongoing and future projects as they arise in the Downtown Brampton area. Since there are multiple interconnected parts to the development plan for the Downtown Brampton area, clarity on the proposed alignment is needed early on so that boundaries are established, and needs are known. Undertaking the EA in advance of construction schedule provides the Region the opportunity to develop an integrated solution to overall servicing of the downtown core that considers how any changes will impact other ongoing projects.

11.6 Implementation Recommendations

The following next steps are required prior to construction of the preferred alternative:

- Additional studies including topographic survey of the route to support and complete preliminary design – 3 months;
- Additional studies to support detailed design efforts including a subsurface utility engineering investigation, a detailed geotechnical baseline report, and hydrogeological investigation, soil analysis, environmental survey, excess soils management plan, tree survey and vibration analysis;
- Detailed design including additional studies – 12 months;
- Permitting and approvals and utility relocations – 3 months.

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Appendix A. Public and Agency Consultation Plan

Appendix B. Consultation Activities

Appendix C. Public Information Centre Material

Appendix D. Long List Alternatives Evaluation

Appendix E. Environmental Desktop Review

Appendix F. Natural Features Impact Assessment

Appendix G. Geotechnical Analysis

Appendix H. Cultural Heritage Resource Assessment

Appendix I. Stage 1 Archeological Assessment

Appendix J. Hydraulic Analysis

Appendix K. Traffic and Transport Assessment

Appendix L. Cost Assessment of Alternatives

Appendix M. Short List Alternatives Evaluation