Transportation Environmental Study Report

Highway 6 South Widening from Highway 403 to Upper James Street – Preliminary Design & Class Environmental Assessment Update Study (G.W.P. 2010-21-00)

Ontario Ministry of Transportation

60677652

April 2024

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AECOM: 2015-04-13

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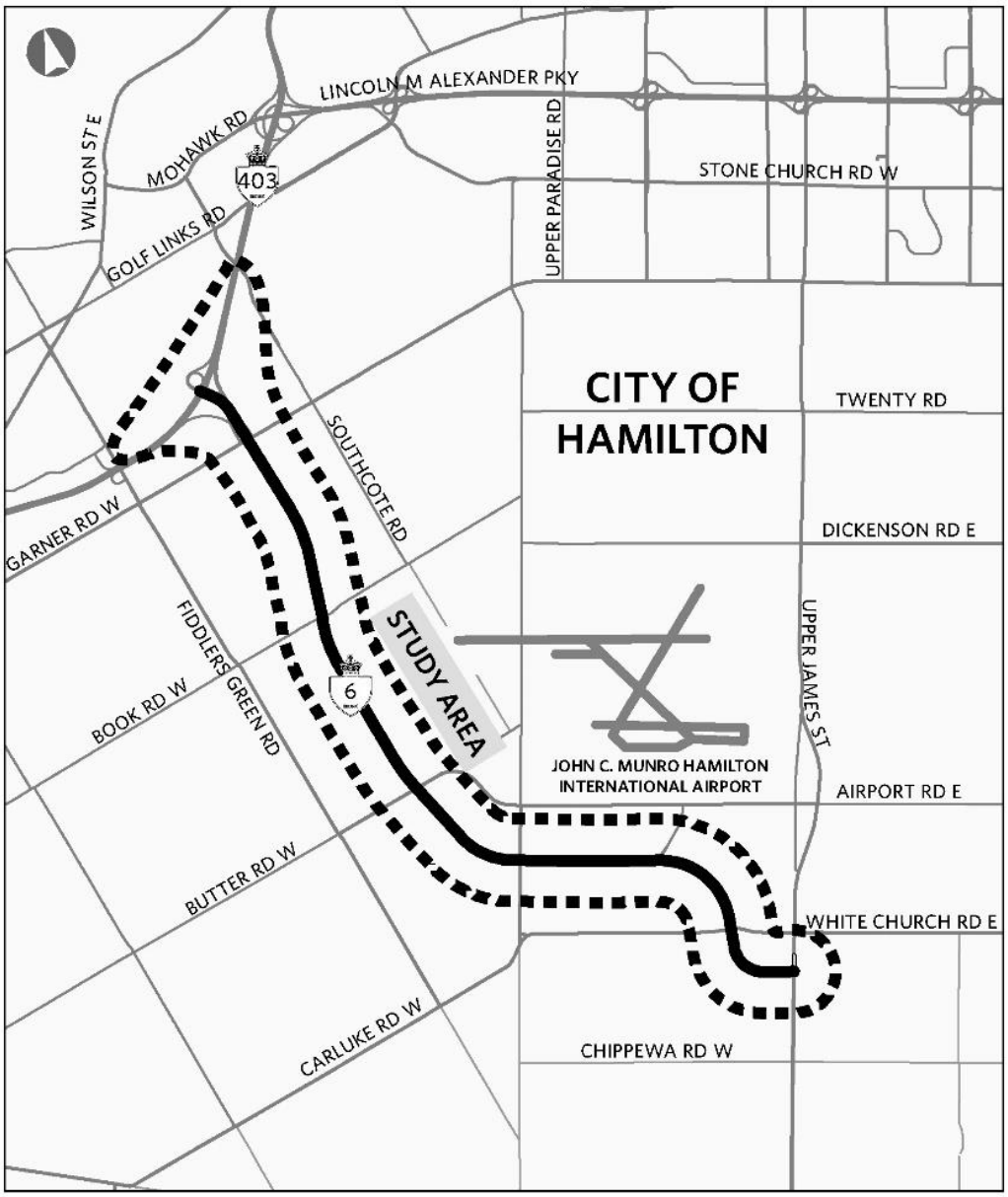
Executive Summary

The Ontario Ministry of Transportation has undertaken an update study for the Preliminary Design and Class Environmental Assessment for Highway 6 South from Highway 403 to Upper James Street ("the Project"). The study limits extend from the Highway 403 interchange along Highway 6 South to Upper James Street (approximately 9 kilometres), in the City of Hamilton.

Figure E1: Study Area



The purpose of this Project is to enhance connections to John C. Munro Hamilton International Airport, support future growth in the area and update the Preliminary Design to current Ontario Ministry of Transportation Standards for the 4-lanes. The Recommended Plan (refer to **Section 8** and **Appendix C**) includes the following improvements:

- Twinning of Highway 6 South from 2 lanes to 4 lanes (new southbound lanes). Includes enhancements to Highway 6 South geometrics – curve flattening;
- Improvements to Ramp Highway 6 South – Highway 403 East;
- Signalization of the Garner Road west ramp terminal intersection (By Others - City of Hamilton);
- Highway 6 South alignment refinements;
- Structural improvements (i.e., replacement/rehabilitation of culverts and bridge structures);
- Drainage improvements;
- Illumination;
- Speed transition to slow southbound traffic approaching Upper James Street;
- New Parclo A-4 interchange at Book Road East – signalized ramp terminal intersections, illumination, drainage ditch and stormwater management ponds;
- New Trumpet interchange at Airport Connection Road – signalized Airport Road intersection, illumination, drainage ditch and stormwater management ponds; and
- Intersection improvements at Upper James Street – double left turn for eastbound vehicles heading north on Highway 6 South.

Government agencies, Indigenous Communities, municipalities, interest groups and utility companies were notified at the beginning of the Project by letter in April 2022. The general public was notified via newspaper advertisements and letters for the Public Information Centres, informing them of the Project and to solicit their comments. Two Public Information Centres were held for this Project in November 2022 (to present the need for the Project and alternatives under consideration) and September 2023 (to present the evaluation of alternatives, the Recommended Plan, property requirements and proposed mitigation measures). Meetings with impacted property owners and Conservation Authorities were held following the selection of the Recommended Plan. A website was also created for the public to access and learn more about the Project.

Meetings were held throughout the Project at key milestones with the City of Hamilton, John C. Munro Hamilton International Airport, NAV CANADA, Conservation Authorities and Hydro One. These meetings focused on collection of existing conditions information and to present and obtain feedback on the generation and evaluation of alternatives, the Preliminary Design details of the preferred alternatives, potential environmental impact, and proposed mitigation measures.

Impacts to the natural, socio-economic, and cultural environments as well as impacts to property and infrastructure have been identified with the Recommended Plan for the Project within the Study Area. Mitigation measures to minimize or avoid potential adverse environmental impacts as well as commitments to future work and commitments from the previously approved 1987 Environmental Assessment have been identified and / or carried over and will be further addressed during future design stages. In addition, standard mitigation measures will be employed during the implementation of the Recommended Plan as documented in this Transportation Environmental Study Report to reduce or avoid environmental impacts.

The Public Record

A digital copy of this document has been submitted to the following office of the Ministry of the Environment, Conservation and Parks to be placed in the Public Record:

Ministry of Environment, Conservation and Parks
Hamilton District Office
Ellen Fairclough Building 9th Floor
119 King Street West
Hamilton, Ontario L8P 4Y7

The Transportation Environmental Study Report will be available for a 30-day comment period from **May 13, 2024 to June 12, 2024** on the Project Website.

- **Project Website:** https://hwy6southwideninghamilton.ca/

Comments

If you have questions or comments, you can send an email or visit the project website.

- **Email:** ProjectTeam@hwy6SouthWideningHamilton.ca
- **Project Website:** www.hwy6southwideninghamilton.ca

If you have any accessibility requirements in order to participate in this Project, please contact the Project Team at ProjectTeam@hwy6SouthWideningHamilton.ca.

Cette publication hautement spécialisée Transportation Environmental Study Report Highway 6 South Widening from Highway 403 to Upper James Street – Preliminary Design and Class Environmental Update Study n'est disponible qu'en anglais conformément au Règlement 671/92, selon lequel il n'est pas obligatoire de la traduire en vertu de la Loi sur les services en français. Pour obtenir des renseignements en français, veuillez communiquer avec Amy Ingriselli au AECOM au 705-669-4709 ou ProjectTeam@Hwy6SouthWideningHamilton.ca.

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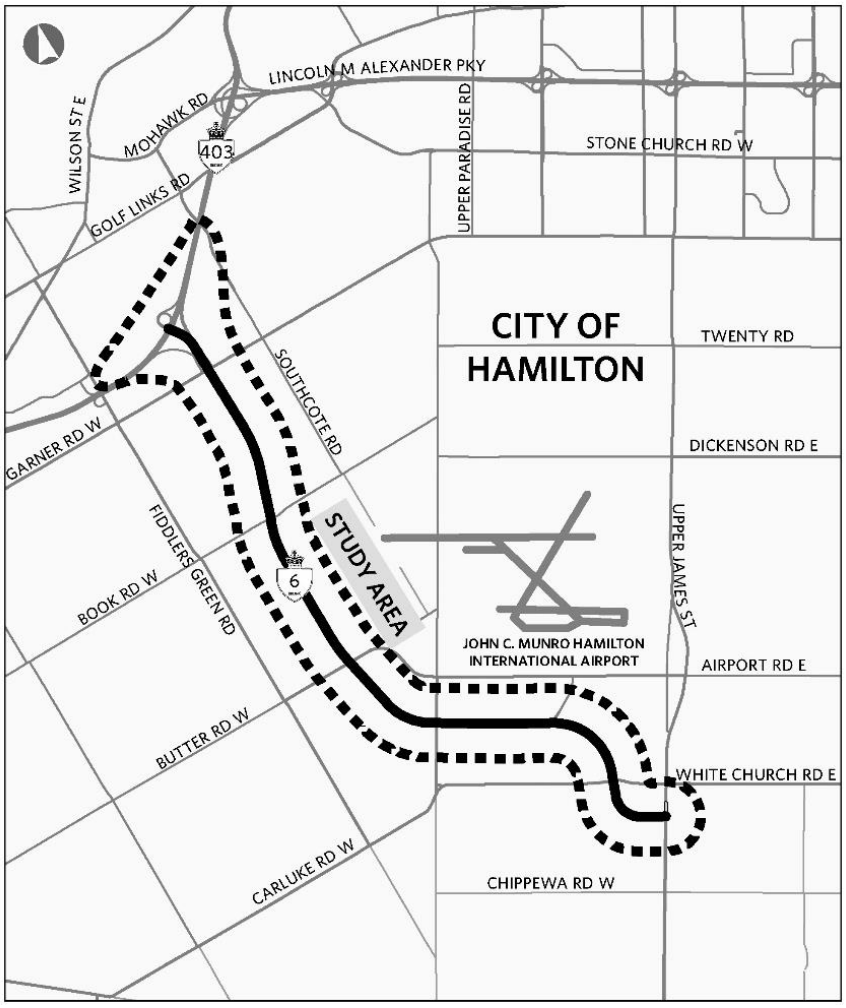
1. Overview of the Project

1.1 Study Background and Location

AECOM Canada Limited (AECOM) was retained by the Ontario Ministry of Transportation to update the Preliminary Design and Class Environmental Assessment Study for Highway 6 South from Highway 403 to Upper James Street ("the Project"). The study limits extend from the Highway 403 interchange along Highway 6 South to Upper James Street (approximately 9 kilometres), in the City of Hamilton (refer to **Figure 1**).

Figure 1: Study Area



Highway 6 South is a major north-south arterial highway carrying commuter and commercial traffic between the Niagara Peninsula and Hamilton area. Within the project limits, the majority of the existing Highway 6 South is a two-lane undivided Controlled Access Highway with a posted speed on 80 kilometres per hour.

1.2 1987 Environmental Assessment Report and Preliminary Design

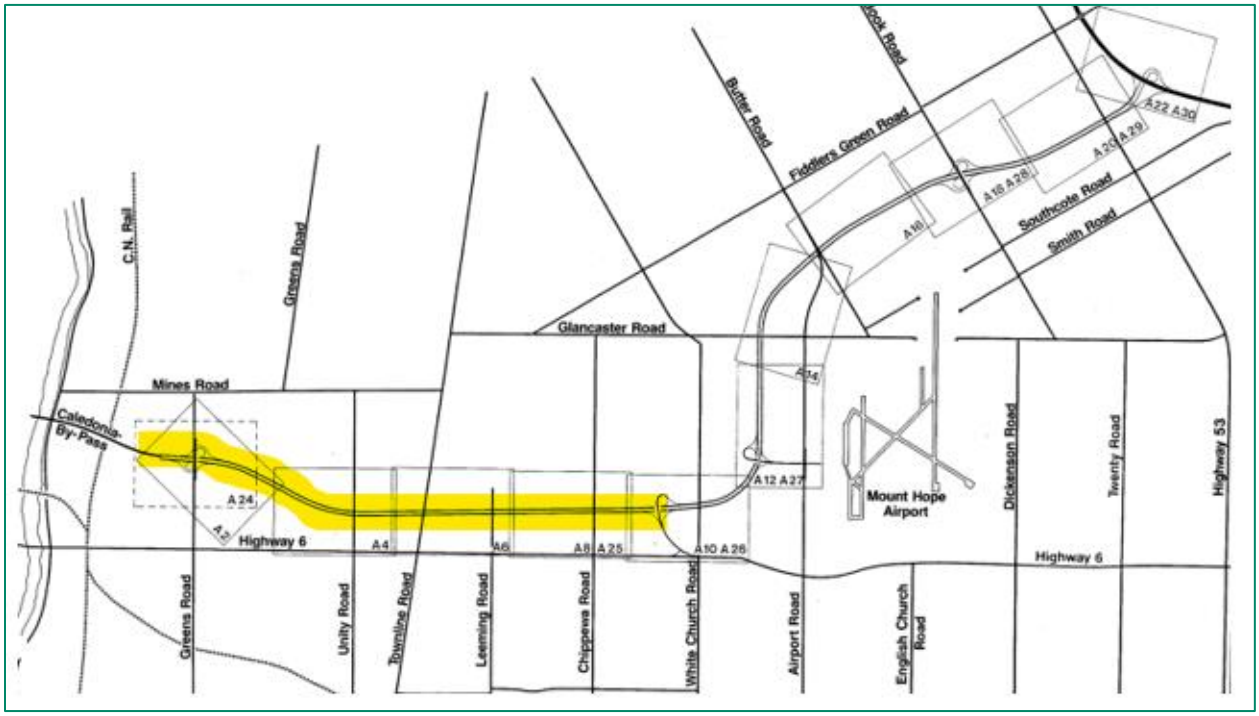
A previous Environmental Assessment and Preliminary Design was conducted in 1987, which proposed an ultimate configuration of Highway 6 (New) with a six-lane cross-section from Hamilton to Caledonia. The 1987 Environmental Assessment Report identified and documented environmental commitments and proposed design configurations, which was approved by an Order in Council (O.C. 3540/92) by the Minister of the Environment, Conservation and Parks in 1992. Since the completion of the 1987 Environmental Assessment Report, the existing two-lane configuration of Highway 6 South and structures at Butter Road East, Glancaster Road and White Church Road West have been constructed. It should be mentioned that the 1987 Environmental Assessment Report was completed under a different environmental assessment process and this Environmental Assessment Update Study is following the amending process outlined in Chapter 10 of the 2000 *Class Environmental Assessment for Provincial Transportation Facilities.*

Commitments made in the 1987 Environmental Assessment Report and those included in Order in Council 3540/92 have been carried through all subsequent environmental studies completed for the Project. Commitments identified in the 1987 Environmental Assessment Report and Order in Council 3540/92, and how they have been addressed for the 4-lanes, as well as all new commitments identified during this Project are outlined in **Section 8** of this report.

1.3 Extension to Caledonia Bypass

The 1987 Environmental Assessment Report did include an interchange on Highway 6 (New) between Chippewa and White Church Road which extends Highway 6 (New) from this proposed interchange to Unity Road with overpasses at Chippewa, Leeming and Townline Roads before proceeding south and terminating at a new interchange at Greens Road providing access to Caledonia. **Figure 2** below is from the 1987 Environmental Assessment Report, which provides a snapshot of the approved recommended plan, the extension of Highway 6 (New) to the Caledonia Bypass is highlighted. Additional details on the approved recommended plan are provided via the Preliminary Design plates (shown as the rectangle viewports in **Figure 2**) within the aforementioned report. The extension of Highway 6 (New) from Upper James Street to Caldonia Bypass is currently not on the 5-year Ontario Southern Highways Program; and the timing of this work is not yet known.

Figure 2: 1987 Environmental Assessment Report Approved Recommended Plan



Note: Yellow = Extension to Caledonia Bypass

1.4 Growth Plan for the Greater Golden Horseshoe

A Place to Grow: Growth Plan for the Greater Golden Horseshoe was published in 2020 by The Ministry of Municipal Affairs and Housing and further outlines a long-term plan for the Greater Golden Horseshoe by promoting economic growth, increasing housing supply, creating jobs, and building communities. The Greater Golden Horseshoe extends around the west side of Lake Ontario stretching south to Lake Erie and north to Lake Scugog, and Georgian Bay and includes the City of Hamilton. The Growth Plan outlines a strategy for managing growth and development, and guiding planning decisions in the Great Golden Horseshoe.

The Ontario Ministry of Transportation published the Connecting the Greater Golden Horseshoe: A Transportation Plan for the Greater Golden Horseshoe (February 2022). The Greater Golden Horseshoe Transportation Plan provides a 30-year vision for mobility across the Greater Golden Horseshoe to provide the efficient and safe movement of people and goods. The improvements identified in this Transportation Environmental Study Report are consistent with the Growth Plan and the Transportation Plan for the Greater Golden Horseshoe as improvements to Highway 6 South form part of the infrastructure required to support future growth.

2. Project Purpose, Objectives, and Scope

The purpose of this Project is to enhance connections to John C. Munro Hamilton International Airport and to support future growth. The proposed works under this update have included developing, reviewing, and evaluating alternatives for the widening / twinning of Highway 6 South from two lanes to four lanes, in accordance with the approved 1987 Environmental Assessment Report, as well as interchange and intersection improvements.

The key objectives of the Project included:

- Updating the approved 1987 Environmental Assessment Report and complete the Preliminary Design to widen Highway 6 South from Highway 403 to Upper James Street to four lanes;
- Reviewing the commitments made in the previous 1987 Environmental Assessment Report and ensuring that they are appropriately carried forward for this Project;
- Completing documentation review to update to current existing environmental conditions;
- Designing the Highway 6 South corridor to be a controlled access freeway operating at a higher posted speed;
- Updating the Preliminary Design in the 1987 Environmental Assessment Report to current Ontario Ministry of Transportation design standards and policies including improvements to Highway 403 / Highway 6 South and Garner Road East interchanges; and
- Generating and evaluating alternative designs at Highway 6 South and Book Road East, Airport Connection Road, and Upper James Street.

2.1 Study Process

This Project has been carried out in accordance with the approved planning process for a Group ‘A’ project under the Ontario Ministry of Transportation Class Environmental Assessment for Provincial Transportation Facilities (amended 2000) (Class Environmental Assessment). The Class Environmental Assessment was modernized in the 2023 and again in 2024 (Class Environmental Assessment for Provincial Transportation Facilities and Municipal Expressways [Class EA]). If applicable, the requirements to transition Detail Design to the 2024 Class EA will be considered to ensure conformance with the Environmental Assessment process.

As outlined in **Section 1.2**, the 1987 Environmental Assessment Report was approved by an Order in Council 3540/92 by the Minister of the Environment, Conservation and Parks in 1992 and this Project is following the amending process as outlined in Chapter 10 of the Class Environmental Assessment.

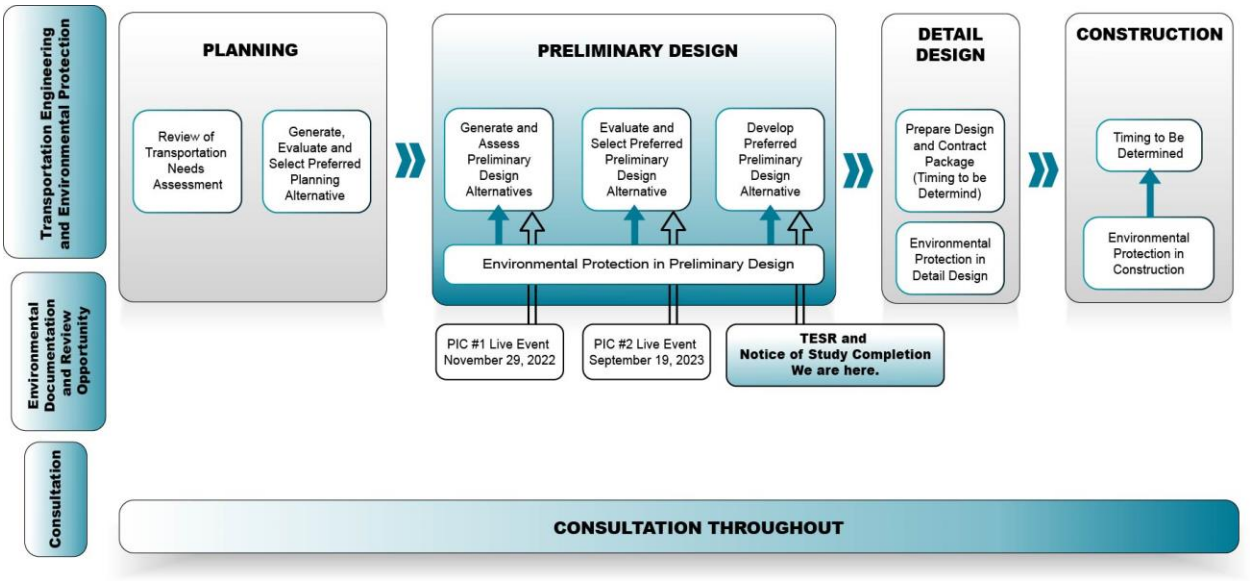
This Project included a review of the proposed changes to the Preliminary Design, as well as an update to the existing environmental conditions, potential impacts, and proposed mitigation for the Recommended Plan. This Project also included consultation with Indigenous Communities, landowners, key stakeholders including the City of Hamilton and the Hamilton Airport, as well as Conservation Authorities. Two Public Information Centres provided opportunity for stakeholders and the public to review the proposed changes, anticipated environmental effects and proposed mitigation identified during the Project.

This Transportation Environmental Study Report documents the Class Environmental Assessment process that was followed for the Project and includes the following:

- A description of the Environmental Assessment process and consultation that was undertaken throughout the Project;
- Existing environmental (natural, socio-economic and cultural environments) and transportation conditions within the Study Area;
- An assessment of identified transportation problems and needs within the Study Area, along with opportunities to address identified issues;
- The generation, assessment and evaluation of interchange alternatives;
- Details of the Recommended Plan (the Preferred Preliminary Design); and
- Potential impacts associated with the Recommended Plan and proposed measures to avoid, minimize, and mitigate potential impacts.

This Transportation Environmental Study Report has been prepared and made available for a 30-day public comment period from **May 13, 2024 to June 12, 2024**. As the undertaking, outlined in the 1987 Environmental Assessment Report has been previously approved, the Ontario Ministry of Transportation is seeking public review of the changes in the Recommended Plan. If there are no outstanding concerns after the 30-day review period, the Project will be considered to have met the requirements of the Class Environmental Assessment and may proceed to subsequent steps in the process leading to construction tendering. **Figure 3** shows an overview of the Class Environmental Assessment process of Group ‘A’ projects. The study process provided opportunities for public and external agency review at key project milestones, as well as for a continuous, evolving approach to the technical work involved.

Figure 3: Study Process



During the public review period a request may be made the Minister of the Environment, Conservation and Parks for an order requiring a higher level of study (for example requiring a comprehensive Environmental Assessment approval before being able to proceed), or that conditions be imposed (for example require further studies), only on the grounds that the requested order may prevent, mitigate or remedy adverse impacts on the constitutionally protected Aboriginal and treaty rights. Requests on other grounds will not be considered. Requests should include the requester contact information and full name for the ministry.

Requests should specify what kind of order is being requested (request for additional conditions or a request for a comprehensive environmental assessment), how an order may prevent, mitigate, or remedy those potential adverse impacts, and any information in support of the statements in the request. This will ensure that the ministry is able to efficiently begin reviewing the request.

The request should be sent in writing or by email as per the information in **Section 3**.

2.2 Related Projects

The following projects and initiatives are related to this Environmental Assessment as a result of their proximity to the Study Area and influence with respect to this Project:

- **Airport Employment Growth District Transportation Master Plan Update**: The City of Hamilton completed the Airport Employment Growth District Transportation Master Plan Update in November 2023. The Airport Employment Growth District encompasses Highway 6 South and stretches

from Garner Road East in the north, Fiddler's Green Road in the west, White Church Road West in the south and Upper James Street in the east. The Transportation Master Plan Update objectives were to identify infrastructure improvements, policies and programs required to manage both existing and future transportation requirements for the business park.

- **Book Road Environmental Assessment**: The City of Hamilton has noted an upcoming Environmental Assessment study for the widening of Book Road East. Book Road East is a municipal east/west crossing road that provides access to the Highway 6 South corridor between Garner Road East and Butter Road East.

2.3 General Description of the Recommended Plan

The Recommended Plan (refer to **Section 8 for further details**) for the Project includes:

- Twinning of Highway 6 South from 2 lanes to 4 lanes (new southbound lanes). Includes enhancements to Highway 6 South geometrics and design speed– curve flattening to accommodate new 130 kilometres per hour design speed upgrade;
- Improvements to Ramp Highway 6 South – Highway 403 East;
- Signalization of the Garner Road west ramp terminal intersection (By Others - City of Hamilton);
- Highway 6 South alignment refinements;
- Structural improvements (for example replacement / rehabilitation of culverts and bridge structures);
- Drainage improvements;
- Illumination;
- Speed transition to slow southbound traffic approaching Upper James Street;
- New Parclo A-4 interchange at Book Road East – new underpass crossing over Highway 6 South, signalized ramp terminal intersections, illumination, drainage ditch and stormwater management ponds;
- New Trumpet interchange at Airport Connection Road – new underpass crossing over Highway 6 South, signalized Airport Road intersection, illumination, drainage ditch and stormwater management ponds; and
- Intersection improvements at Upper James Street – double left turn for eastbound vehicles heading north on Highway 6 South.

The Recommended Plan drawings can be found in **Appendix C**.

3. Environmental Assessment Process

3.1 The Ontario Environmental Assessment Act and Class Environmental Assessment Process

The Class Environmental Assessment process is a planning process approved under the Environmental Assessment Act (1990) that provides a streamlined process that must be followed for projects or activities within a defined “class”. When the Class Environmental Assessment planning process is adhered to for a project, the requirements of the Environmental Assessment Act (1990) are also fulfilled and formal approval under the Environmental Assessment Act (1990) is not required. The Class Environmental Assessment requirements must be met before a project can be implemented. Projects and activities that are defined within a “class” are generally ones that are recurring, carried out routinely and have predictable environmental effects that can usually be mitigated.

This Project is following the Ontario Ministry of Transportation Class Environmental Assessment for Provincial Transportation Facilities (amended 2000), which outlines the Environmental Assessment process to be followed for specific groups of provincial transportation projects. Project groupings within the Class Environmental Assessment were established for the purposes of consultation, documentation, and formal Environmental Assessment challenge (Section 16.0 request).

As outlined in **Section 1.2** of this report, the 1987 Environmental Assessment Report was approved by an Order in Council 3540/92 by the Minister of the Environment, Conservation and Parks in 1992. This Project is undertaking the amending process as outlined in Chapter 10 of the Class Environmental Assessment and is following the Class Environmental Assessment process for a Group ‘A’ project, which generally includes new facilities.

It should be noted that this Transportation Environmental Study Report has been prepared for the interim configuration of Highway 6 South widening from 2 to 4 lanes from Highway 403 interchange to Upper James Street. At the time of this report there is no available funding for future stages of design or construction for the 4-laning.

This report will provide input to the next stage of design and the future Environmental Assessment Study. This Transportation Environmental Study Report for the 4-laning of Highway 6 South from Highway 403 to Upper James will act as an addendum to the original 1987 Environmental Assessment Report and will summarize the findings of the Project and be made available for a 30-day public review period.

3.2 Federal Impact Assessment Act

In August 2019, the Canadian Environmental Assessment Act (2012) was replaced by the Impact Assessment Act, which revised the activities which could trigger a federal impact assessment and created a new impact assessment process. Projects which are listed on the Impact Assessment Act's Physical Activities Regulations are automatically designated for assessment. Additionally, the Minister of the Environment and Climate Change has the discretionary authority to designate a proposed project that is not on the list following a request from the proponent, public, Indigenous Communities, interested stakeholders, agencies, or other jurisdictions.

The Highway 6 South Widening Project for the 4-laning does not meet the criteria within the Physical Activities Regulations and is therefore not required to complete an impact assessment as part of Impact Assessment Act at this time.

3.3 Purpose of the Transportation Environmental Study Report

This Transportation Environmental Study Report documents the transportation problems and opportunities, the generation, assessment and evaluation of alternatives, the Recommended Plan for the widening of Highway 6 South, a summary of potential environmental effects and proposed mitigation measures, and a summary of consultation undertaken throughout the Project.

As required under the amending process of the amended 2000 Ontario Ministry of Transportation Class Environmental Assessment, this Transportation Environmental Study Report is being made available to the public, other interested parties, and external agencies for a 30-day comment period commencing on **May 13, 2024 (ending June 12, 2024)** on the Project Website: https://hwy6southwideninghamilton.ca/

A "Notice of Completion" was placed in the Hamilton Spectator, and Hamilton Le Regional (French) to notify interested parties of the opportunity to review this Transportation Environmental Study Report. Letters were also sent to individuals on the project mailing the week of April 29, 2024.

Interested persons are encouraged to review the Transportation Environmental Study Report and provide comments by **June 12, 2024,** through the Project Website or Project Team contacts:

- **Jonathan Pasquali, P.Eng.**, Project Engineer
  Ontario Ministry of Transportation
  159 Sir William Hearst Avenue, 4th Floor, Toronto, Ontario M3M 0B7
  ProjectTeam@Hwy6SouthWideningHamilton.ca

- **Tim Sorochinsky, P.Eng.**, Consultant Senior Project Manager
  AECOM Canada Ltd.
  105 Commerce Valley Drive West, Markham, Ontario L3T 7W3
  ProjectTeam@Hwy6SouthWideningHamilton.ca

In addition, a request may be made to the Ministry of the Environment, Conservation and Parks for an order requiring a higher level of study (for example requiring a comprehensive Environmental Assessment approval before being able to proceed), or that conditions be imposed (for example require further studies), only on the grounds that the requested order may prevent, mitigate or remedy adverse impacts on constitutionally protected Aboriginal and Treaty Rights. Requests on other grounds will not be considered. Requests should include the requester contact information and full name for the ministry.

Requests should specify what kind of order is being requested (request for additional conditions or a request for a comprehensive environmental assessment), how an order may prevent, mitigate, or remedy those potential adverse impacts, and any information in support of the statements in the request. This will ensure that the ministry is able to efficiently begin reviewing the request.

The request should be sent in writing or by email to the Ontario Ministry of Transportation Project Engineer listed above and to:

- **Minister of the Environment, Conservation and Parks**
  Ministry of Environment, Conservation and Parks
  777 Bay Street, 5th Floor, Toronto, Ontario M7A 2J3
  Email: minister.mecp@ontario.ca

  and

- **Director, Environmental Assessment Branch**
  Ministry of Environment, Conservation and Parks
  135 St. Clair Avenue West, 1st Floor, Toronto, Ontario M4V 1P5
  Email: EABDirector@ontario.ca

Comments are being collected to provide and obtain information, and to identify concerns in accordance with the Environmental Assessment Act (1990). This material will be maintained on file for use during the Project and may be included in Project documentation.

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

If you have any accessibility requirements in order to participate in the review of this Transportation Environmental Study Report, please contact the Project Team.

4. Consultation

Consultation is an integral part of a “Group A” project under the Class Environmental Assessment process, as it provides opportunity for two-way communication between the Project Team and interested stakeholders.

Stakeholder consultation was undertaken to assist in planning the impact assessment for this Project. Individuals and organizations consulted include:

- External agencies (Provincial Ministries and Agencies, Federal Departments, and the local Conservation Authorities);
- City of Hamilton;
- Indigenous Communities; and
- Members of the public (including affected land and business owners, community / interest groups and the general public).

To facilitate a comprehensive consultation program for this Project, the Project Team implemented the following communication and consultation activities to reach all stakeholders and provide them the opportunity to submit comments and feedback for consideration by the Project Team:

- Project Website: https://hwy6southwideninghamilton.ca/;
- Project Contact List;
- Emails via the Project Team email address (ProjectTeam@Hwy6SouthWideningHamilton.ca);
- Mailings / notifications (via physical mail or email);
- Newspaper advertisements;
- Distributions of brochure notifications (copy of the Ontario Government Notice) through Canada Post Neighbourhood Mail to residences and businesses within 500 metres of the Study Area);
- Public Information Centres (two held as live online events);
- Outreach regarding engagement and consultation with Indigenous Communities;
- Meetings and correspondences with municipalities, conservation authorities and government agencies; and
- Correspondence with technical stakeholders, local community groups and property owners.

4.1 Public Consultation

4.1.1 Study Notices

4.1.1.1 Notice of Study Commencement

A Notice of Study Commencement was published for the Highway 6 South Widening from Highway 403 to Upper James Preliminary Design and Environmental Assessment Update Study in the Hamilton Spectator, Hamilton Community News and Hamilton Le Regional in French on April 7, 2022. Letters were distributed to the Project contact list by mail and / or email on April 8, 2022, and April 4, 2022, to Members of Provincial Parliament. The notice was also distributed as a brochure through Canada Post Neighbourhood Mail to residences and business within the Study Area (approximately 6,003 notices at the time of Study Commencement in April 2022).

4.1.1.2 Notice of Public Information Centre #1

A Notice of Public Information Centre #1 was published for the Highway 6 South Widening Project in the Hamilton Spectator, Hamilton Community News, and Hamilton Le Regional (French) on November 17, 2022, notifying the public of Public Information Centre #1 being held on November 29, 2022. Letters were distributed to the Project contact list by mail and/or email on November 11, 2022, November 9, 2022, to Members of Provincial Parliament and November 14 to Indigenous Communities. The notice was distributed as a brochure through Canada Post Neighbourhood Mail to residences and business within the Study Area (approximately 6,435 notices).

4.1.1.3 Notice of Public Information Centre #2

A Notice of Public Information Centre #2 was published for the Highway 6 South Widening Project in the Hamilton Spectator, Hamilton Community News, and Hamilton Le Regional (French) on September 7, 2023, notifying the public of Public Information Centre #2 being held on September 19, 2023. Letters were distributed to the Project contact list by mail and/or email on September 6 and 7, 2023 and on September 1, 2023, to Members of Provincial Parliament. The notice was distributed as a brochure through Canada Post Neighbourhood Mail to residences and business within the Study Area (approximately 6,616 notices).

4.1.1.4 Property Owner Letters

Letters to the owners of property that were identified as directly impacted by the Recommended Plan (property required) were mailed to the property owners on September 7, 2023.

4.1.1.5 Notice of Completion

Notification letters were mailed / emailed to individuals on the project mailing list to notify stakeholders of the 30-day public and agency comment period for this Transportation Environmental Study Report. In addition, a “Notice of Completion” was placed in the Hamilton Spectator (online) and Hamilton Le Regional (French) and was made available on the Project website (https://hwy6southwideninghamilton.ca/). A copy of the Transportation Environmental Study Report was also made available on the Project Website.

4.1.2 Project Website

A Project Website (https://hwy6southwideninghamilton.ca/) was created to keep stakeholders and members of the public up to date with the progress of the Project and for the Project Team to share consultation material (for example the public information centre materials) publicly. The Project Website also provided an additional method for the public to request that they be added to the Project Contact List. The Project Website contained a landing page that provided visitors with an overview of the Project and key map along with tabs along the top of the page, each representing different categories of information. These tabs included categories such as:

- **Consultation** – provides information on how visitors could get involved and provide feedback. The tab also contains Public Information Centre #1 and #2 material for review or download.
- **Documents and Links** – contains download links to the official Project Notices along with links to review and download background reports, such as the redacted 1987 Environmental Assessment Report and supporting documents. The tab also contains the download link to the Transportation Environmental Study Report.
- **Question and Answers** – contains the Project’s most frequently asked questions and answers.
- **Contact Us** – provides visitors with the opportunity to reach out to the Project Team to provide comments or ask questions they may have about the Project.
- **Français** – provides readers who required French materials to contact the Project Team for further assistance.

It should be mentioned that the Project Website will be removed at the completion of the Project.

4.2 Public Information Centres

As a result of the public health measures due to the COVID-19 pandemic, in-person gatherings were prohibited or restricted for a period of time, and many venues which hosted gatherings closed. Due to these restrictions, the Project Team held online consultation events (e.g., meetings with technical stakeholders, Public Information Centres) by leveraging various platforms (for example Microsoft Teams and / or Zoom). These online events included opportunities to view materials on the Project website with extended comment periods to provide feedback to the Project Team and opportunities to request one-on-one meetings with the Project Team. Within the online platform there was an opportunity to address accessibility needs as they arose.

4.2.1 Public Information Centre #1

Public Information Centre #1 for the Project was held virtually from November 17 to December 8, 2022, which is when stakeholders were invited to provide comments and feedback to the Project Team. A Public Information Centre Live Event was also held on November 29, 2022, from 4:00 PM to 6:00 PM via Zoom where stakeholders and members of the public were invited to register for the Zoom meeting prior to the event. The Live Event contained a live presentation of the Project presented to the public and other stakeholders from representatives from the Ontario Ministry of Transportation and AECOM and included question and answer periods throughout the allotted time. Prior to the Live Event, stakeholders and members of the public were able to view the Public Information Centre material (for example display boards, roll plans, video presentation, frequently asked questions, etcetera.). A copy of the Public Information Centre materials was available for attendees to download should they wish. This material was left on the Project website after the Public Information Centre for reference.

The Project Team provided written responses (via email) to comments received through the Project Website or through the Project Email throughout the Public Information Centre (November 17 – December 8, 2022) and to those that asked a question during the live question and answer period in which the Project Team could not get to at the time of the Live Event.

The purpose of Public Information Session #1 was to present and receive feedback on the Study Area and scope, key objectives of the Project, study process and schedule, the Preliminary Design alternatives at Book Road East, Airport Connection Road and Upper James Street interchanges, the design refinements including improvements at Highway 403 / Highway 6 South and Garner Road East, and the proposed evaluation criteria.

There were 32 individuals registered for the event, in which 17 attendants logged onto the Zoom meeting and 1 attendee called in on the telephone. According to the available analytics for the Project Website, 36 unique visitors visited the Project Website on the day of the Public Information Centre Live Event. Notable attendees included the City of Hamilton Ward 11 Councillor and one member of the Hamilton Chamber of Commerce.

A total of 17 individuals provided comments during the Public Information Centre comment period (November 17th until the close of the comment period, December 8th). Eight of these individuals provided their comments on the Public Information Centre materials and presentation through the question-and-answer function during the Public Information Centre Live Event (November 29th). The remainder of the comments were received via Public Information Centre Comment Form or Project Email.

Table 1 provides a summary of the questions and comments received.

4.2.2 Public Information Centre #2

Public Information Centre #2 was held online between September 14 to October 5, 2023. During this time period, stakeholders and members of the public were able to view and download the Public Information Centre materials from the Project website and provide their questions/comments. Another Zoom Live Event was also held on September 19, 2023, from 4:00 PM to 6:00 PM to present and receive feedback on the evaluation of alternatives, the Preliminary Design details of the Recommended Plan and the mitigation and environmental protection strategies. Like Public Information Centre #1, Project Team representatives from the Ontario Ministry of Transportation and AECOM answered live questions and questions submitted in advance during the Public Information Centre as well as presented the Public Information Centre boards. There were 51 individuals that registered for the event, and 35 attended. Two people joined by telephone. Notable attendees included the City of Hamilton Ward 11 Councillor, three members from the City of Hamilton, one member from the Hamilton Conservation Authority, one member from the Niagara Peninsula Conservation Authority, and one member from Jetport at the John C. Munro Hamilton International Airport.

Stakeholders and members of the public were able to submit comments through the Public Information Centre comment form or by emailing the Project email. Over the comment period, a total of 38 individuals provided comments. **Table 2** provides a summary of the questions and comments received.

Table 1: Summary of Public Information Centre #1 Questions and Comments

Stakeholder Comments	Project Team Response
Enquiries into the development application process and when the Ontario Ministry of Transportation right of way will be finalized throughout the corridor	■ The Project Team advised that they were reviewing design alternatives for some of the interchanges, as well as updating the 1987 Preliminary Design to meet current Ontario Ministry of Transportation design standards. Any development applications submitted to the Ontario Ministry of Transportation will be assessed based on the 1987 Preliminary Design and Environmental Assessment and this current Project. The review and requirements will be case-by-case basis, based on the location of the development in relation to the Highway 6 South footprint. Considering the study process requires extensive stakeholder consultation to finalize the preferred design alternative, property impacts and associated requirements, including the setback requirements, will be identified & confirmed during the course of the Project when the preferred alternative is finalized.
Question regarding the final posted speed and reason for the planned 24-metre median	■ The Project Team noted that the Highway 6 South corridor will be a higher posted speed and the 24-metre median follows the approved 1987 Environmental Assessment Report and allows for stormwater management by providing a grass swale. It also allows for the ultimate 6 lane configuration if ever needed in the future.
Question about the proposed changes to Airport Connection Road	■ The Project Team advised that several alternatives were being examined and evaluated for Airport Connection Road in order to select a preferred alternative that will be presented at Public Information Centre #2.
Question about the Ontario Ministry of Transportation's plan for a west exit to Highway 403 from Garner Road	■ The Project Team advised that the current loop ramp satisfies traffic volumes, and a direct ramp would impact woodlot and adjacent residential neighbourhoods.
Question about the EA process and the alternatives evaluation process	■ The Project Team advised that the Project is following the Group A process under the *Class Environmental Assessment for Transportation Facilities (amended 2000),* which is an approved process under the *Environmental Assessment Act*. During the evaluation of alternatives, an assessment is conducted against the evaluation criteria for each alternative in order to determine the preferred option and Recommended Plan.
Questions about traffic mitigation during construction stage	■ The Project Team noted that it is anticipated that Book Road East, Airport Connection Road and Upper James Street will likely experience some temporary traffic disruptions given the improvements proposed; however, the details of these impacts are not available at this time. Traffic impacts and closures during construction will be confirmed at the Detail Design stage.
Concerns about increases in traffic on municipal roads and the resulting increase of noise to residences Concern about noise within the Study Area and questions regarding the process of noise impact assessment and proposed mitigation or changes to existing noise barriers within, and in close proximity to, the Study Area	■ The Project Team noted that they will be reviewing additional traffic capacities due to the proposed extra lanes along Highway 6 South through a Noise Study to determine potential noise impacts of the Project on the Study Area. The focus of the Highway 6 South Widening from Highway 403 to Upper James Street Project will include only noise sensitive areas that are within the project limits. ■ Traffic forecast modelling takes into consideration future approved developments and their impacts to future traffic. This traffic modelling for the Project Study Area is used during our traffic noise assessment. ■ The Noise Study will be undertaken in accordance with the Ontario Ministry of Transportation Environmental Guide for Noise, 2022 and any impacts identified during the assessment will be reviewed for mitigation.
Request to review Ontario Ministry of Transportation's Noise Guidelines	■ The Project Team provided a link to the Ontario Ministry of Transportation Noise Guidelines that is available online.
Question about what communications/engagements are planned for the municipality, airport, companies located at the airport, and neighbouring property owners	■ The Project Team advised that this Project includes engagement will all interested and potentially affected stakeholders and that meetings are being arranged at key Project milestones to address existing conditions, the generations and evaluation of alternatives, the details of the Recommended Plan and potential impacts and mitigation strategies.

Stakeholder Comments	Project Team Response
Question about impacts and potential mitigation to woodlots, specifically Benedict woodlot, west of the existing Airport Connection Road intersection and tree removals.	■ The Project Team noted that retention of 70% of the Benedict Woodlot was one of the commitments made in the 1987 Environmental Assessment Report. Opportunities to minimize the impacts to this woodlot and others are being explored as part of this Project in order to satisfy the EA commitment and mitigate potential impacts.
Question about how the Project Team will design water crossings	■ The Project Team noted that watercourse crossings will be designed following the selection of the Preferred Preliminary Design. Construction at watercourse crossings may include replacement, widening and/or lengthening of existing culverts to maintain adequate flows and sufficient capacity for drainage requirements while minimizing impacts to aquatic ecosystems. Watercourse crossings are designed by highway and structural engineers in collaboration with surface water engineers and fish and fish habitat biologists.
Information shared about winter road conditions of Highway 6 South and concerns of white out conditions in this area	■ The Project Team advised that accident histories are examined during the collision analysis as part of the Project and that the Highway will be maintained as per MTP maintenance policies and practices.
Question regarding the estimated cost of the Project	■ The Project Team advised that the estimated construction costs and budget will be developed as the Project proceeds through the Preliminary Design and EA Update. However, estimated construction cost must be kept confidential to ensure that the Province receives the best competitive bids from contractors.
Question regarding the need for the Project	■ The Project Team advised that Highway 6 South from Highway 403 to Upper James Street is the primary connection from John C. Munro Hamilton International Airport to the Greater Golden Horseshoe via Highway 403. As part of the government's plan to build Ontario, increasing lane capacity from two lanes to four over a nine-kilometre segment between Highway 403 and Upper James Street will better connect communities, create good-paying jobs, and support the needs of a growing population.
Concern regarding an increase in traffic leading to higher Greenhouse Gas emissions	■ The Project Team acknowledged the concerns about climate change and advised that the need for highway improvements is highlighted by the Greater Golden Horseshoe population and employment growth forecasts. By 2051, the population of the Greater Golden Horseshoe is expected to grow to 14.8 million people, and unmanaged growth can have negative impacts on the region's air quality, water resources and natural heritage resources. Improvements to the existing highway network is key for the safe and efficient movement of goods and people, and to reduce greenhouse gas emissions and other negative environmental impacts.
Question asking if expropriation is a solution	■ The Project Team noted that the next steps in the Project were to evaluate the alternatives and select a Preferred Preliminary Design to identify any new property requirements beyond those identified in the approved 1987 Environmental Assessment Report. Should any property be required, the Project Team would reach out to the property owner.
Concern about the potential impacts to residential homes and the frequency of traffic incidents at the current Upper James Street and Highway 6 South intersection	■ The work proposed at Upper James Street will be constructed to Ontario Ministry of Transportation standards to ensure appropriate lighting and safety measures are implemented. Further information regarding these items will be available once the Recommended Plan is established and during detail design. ■ The City of Hamilton's Active Transportation Master Plan (2018) notes that Upper James Street is planned for a multi-use trail. Consultation with the City of Hamilton regarding the final design including the planned multi-use trail along Upper James will continue throughout the project design phase and will be subject to cost-sharing with the Municipality. ■ A traffic noise assessment will be completed to determine potential noise impacts of the Project. The Noise Study will be undertaken in accordance with the Ontario Ministry of Transportation Environmental Guide for Noise, 2022 and any impacts identified during the assessment will be reviewed for mitigation. Potential impacts and proposed mitigation measures will be summarized in a Transportation Environmental Study Report, which will be available for review following the Environmental Assessment.
Concern over impacts to turtle habitat and information shared with Project Team on Blanding's Turtles being recently recorded in the Study Area	■ An indication on the comment form received noted that a response was not required. However, this information was noted and considered during the existing conditions and impact assessment of terrestrial ecosystems within the Study Area.

Stakeholder Comments	Project Team Response
Concerns about climate change and suggestions to consider more rail transportation over highways Concern about the potential impacts to environmentally sensitive areas, loss of environmental features and farmland as a result of the Project	■ The Project Team acknowledged the concerns about climate change and advised that the need for highway improvements is highlighted by the Greater Golden Horseshoe population and employment growth forecasts. By 2051, the population of the Greater Golden Horseshoe is expected to grow to 14.8 million people, and unmanaged growth can have negative impacts on the region's air quality, water resources and natural heritage resources. Improvements to the existing highway network is key for the safe and efficient movement of goods and people, and to reduce greenhouse gas emissions and other negative environmental impacts. ■ The Project is an update to the approved 1987 Environmental Assessment Report for the widening of Highway 6 South from two lanes to four lanes from Highway 403/Highway 6 South interchange to Upper James Street. This Preliminary Design and Environmental Assessment Update will: – Review the commitments made in the 1987 Environmental Assessment Report and ensure they are appropriately carried forward for this Project; – Update the design in the 1987 Environmental Assessment Report to current Ontario Ministry of Transportation design standards and policies including improvements to Highway 403/Highway 6 South and Garner Road East interchanges; – Design Highway 6 South corridor to be a controlled access freeway operating at a higher posted speed; – Generation and evaluation of alternative designs along Highway 6 South at Book Road East, Airport Connection Road, and Upper James Street; – Complete documentation review to update current existing environmental conditions; – Documenting potential impacts of the Recommended Plan on the natural and social environment as well as identifying avoidance and mitigation measures and environmental commitments for future stages of the Project; and – The Recommended Plan and Environmental Assessment will be summarized and shared in the Transportation Environmental Study Report, which will be available for comment once complete.
Question regarding the required setback from Ontario Ministry of Transportation lands	■ The Project Team noted that it was understood discussions were ongoing with Ontario Ministry of Transportation corridor management regarding this matter.
Concerns about the size of roundabouts included in the intersection alternatives (they should be large enough for 53' transport trucks)	■ Concerns noted and have been considered in Project design development.
Request to consider interchanges at Butter Road and Glancaster Road in the future	■ The Project Team advised that due to the proximity to the interchanges proposed at Book Road East and Airport Connection Road, interchanges at Butter Road and Glancaster Road are not currently being considered.

Table 2: Summary of Public Information Centre #2 Questions and Comments

Stakeholder Comments	Project Team Response
Question regarding Indigenous consultation	■ The Project Team advised that they have been engaging and consulting with the Six Nations of the Grand River, Mississaugas of Credit First Nation, and the Haudenosaunee Confederacy Chiefs Council.
Question regarding the estimated cost of the Project and construction timelines	■ The Project Team noted that estimated construction cost must be kept confidential to ensure that the Province receives the best competitive bids from contractors. In addition, there is no confirmed timeline of construction as this is a Preliminary Design update Project.
Question regarding the need for the Project and future growth projections	■ The Project Team advised that Highway 6 South from Highway 403 to Upper James Street is the primary connection from John C. Munro Hamilton International Airport to the Greater Golden Horseshoe via Highway 403. As part of the government's plan to build Ontario, increasing lane capacity from two lanes to four over a nine-kilometre segment between Highway 403 and Upper James Street will better connect communities, create good-paying jobs, and support the needs of a growing population. ■ By 2051, the population of the Greater Golden Horseshoe is expected to grow to 14.8 million people. Improvements on the existing highway network is key for the safe and efficient movement of goods and people.
Concerns regarding climate change and the use of the 1987 Environmental Assessment Report	■ The Project's purpose is to provide an update to the approved 1987 Preliminary Design and Environmental Assessment. This means the design has been updated to meet current Ontario Ministry of Transportation design standards and policies and that the Environmental Assessment is also updated to ensure that our impact assessment of the recommended Preliminary Design is based on the existing environmental conditions of the Study Area as they appear today and that the Environmental Assessment is meeting the requirements of the current environmental policies and legislation. In addition, the Project Team noted that by 2051, the population of the Greater Golden Horseshoe is expected to grow to 14.8 million people, and unmanaged growth can have negative impacts on the region's air quality, water resources and natural heritage resources.
Question regarding public transit lanes and active transportation (for example along Book Road East)	■ The Project Team advised that the update of the Preliminary Design included a review of the current policies, municipal transportation master plans and development plans within the corridor. The City of Hamilton's Active Transportation Master Plan (2018) notes that Upper James Street is planned for a multi-use trail, however Highway 6 South and the other municipal roads within the Study limits are not currently identified as active transportation routes (for example Book Road East). Consultation with the City of Hamilton, transit providers and the John C. Munro Hamilton International Airport regarding active transportation and transit within the Project limits has taken place throughout our Project and will continue throughout future stages of the Project and will be subject to cost sharing with the municipality.
Question asking to fix the Lincoln M. Alexander Parkway	■ The Project Team noted improvements to the Highway 403 corridor and adjacent interchanges are not being considered as part of this Preliminary Design and Environmental Assessment Update. Any future improvements or widening of Highway 403 would be completed under a separate undertaking.
Concerns regarding groundwater and flooding	■ The Project Team advised as part of this Project, a groundwater study was completed to capture existing hydrogeological features and conditions and the results of this study will be summarized in the Transportation Environmental Study Report. Potential impacts to groundwater quantity and quality, as a result of construction and the necessary mitigation measures required for construction will be reviewed in future Detail Design stages of the Project. ■ Regarding flooding, the Project Team noted Project work includes a review of surface water conditions and completion of a drainage plan including recommendations on culvert placement and sizing to address the hydraulic needs of highway runoff for the Project Study Area. The surface water review and drainage design will continue into future stages of design as the Highway design is finalized.
Question about the pipelines that are currently present within the Study Area	■ The Project Team noted that the pipelines that are present belong to TransCanada and Enbridge Gas.
Question regarding property impacts, access, and meeting with property owners regarding potential expropriation	■ The Project Team advised that once the Recommended Plan is confirmed and impacted property owners are identified, meetings with impacted property owners will be scheduled.

Stakeholder Comments	Project Team Response
Concerns regarding noise levels and traffic	■ The Project Team noted that the traffic forecasting model shows that the widening of the Highway 6 South corridor results in a considerable reduction in traffic along Butter Road compared to the Future “No Build Scenario”. Predictably, Highway 6 will carry more traffic in the “Build Scenario”. The reduction in traffic on roads other than Highway 6 South, within the Study Area is considered in the Noise modelling as well. Based on the results of the Noise Study, The Project Team is not recommending new noise walls. Noise Study results will be summarized and shared in the Transportation Environmental Study Report, which will be available for public comment.
Question regarding what a controlled access freeway is	■ The Project Team advised that Highway 6 South is being designed to be a controlled access freeway operating at a higher posted speed. Initial design considerations for the corridor focused on planning for a controlled access freeway with a design speed of 120 kilometres per hour, with the associated design standards. In June 2022, the Ontario Ministry of Transportation issued a Technical Memorandum updating the design speed on newly designed 400-series highways to 130 kilometres per hour to achieve a 110 kilometres per hour posted speed. This update will be applied to this Project. This policy change was made by the Ministry following several speed limit pilot and consultation projects, which included permanently raising the speed limit on six sections of 400-series highways in southern Ontario to 110 kilometres per hour. The increase in design and posted speeds on freeways will better align with the highway design standards for other provinces and jurisdictions, improve traffic operational efficiency, and maintain standards for freeway safety and operations.
Concerns regarding weather patterns, driving conditions and accidents	■ The Project Team noted that an Operational Performance Review Report will be developed for the Project. This report will include various items including a collision analysis. Potential impacts and proposed mitigation measures will be summarized in a Transportation Environmental Study Report.
Questions regarding the refinements at Garner Road	■ The Project Team noted that the Garner Road intersection would be signalized (west ramp terminal) by others (City of Hamilton).
Concerns regarding wildlife (for example turtles) and questions regarding the use of rail and land bridges to allow wildlife to cross the corridor	■ The Project Team noted similar observations in the field regarding turtles as part of our Environmental Assessment update studies and as such, consideration of reptile and small mammal crossing will be included in the Detail Design work. This commitment will be noted in the Transportation Environmental Study Report.
Questions regarding access to Highway 6 South from Butter Road	■ The Project Team noted that the Highway 6 Preliminary Design and Environmental Assessment project builds on the 1987 approved Environmental Assessment with input from the current growth plans from both the City of Hamilton and the Airport. The interchange planned for Airport Connection Road addresses the required services of the airport and surrounding residential density.
Questions regarding the timing of the Caledonia Bypass Extension	■ The Project Team advised that the 1987 Environmental Assessment Report and Preliminary Design Report included an ultimate six-lane highway from Highway 403 to Caledonia. The ultimate widening of Highway 6 South extension from Upper James Street to the Caledonia Bypass is currently not on the 5-year Ontario Southern Highways Program. Thus, the timing of this work is not yet known.
Concerns regarding the per-and polyfluoroalkyl substances contamination at the John C. Munro Hamilton International Airport	■ The Project Team advised that work to identify areas of potential concern, remediation, and soil management requirements as well as hydrogeological investigations will be completed in future stages of the Project when design and property requirements are finalized, and construction staging is determined. The Project Team noted that the Environmental Assessment Update included an existing conditions and impact assessment study of natural environment and land use, the results of which are summarized in the Transportation Environmental Study Report. The information shared regarding contamination and species at risk within the Project Study Area was passed along to the remediation and ecology specialists for review.
Support for the Project	■ The Project Team noted that their comments would become part of the public record and thanked them for providing their comments.
Concern regarding the loss of Greenbelt lands and natural features (for example wetlands)	■ The Project Team noted that they are completing an updated Environmental Assessment to current standards and reflecting modern day legislation. The Refinements proposed to the approved Highway 6 South Preliminary Design are captured under the updated Environmental Assessment. The identified impacts, proposed environmental protection measures and mitigation strategies will be summarized in the Transportation Environmental Study Report.

4.3 External Stakeholder and Indigenous Consultation

4.3.1 Indigenous Communities

Consultation is an integral part of the study process and under Section 35 of the Constitution Act, the Crown has a Duty to Consult with Indigenous communities if a proposed Crown activity or decision has the potential to adversely impact Aboriginal and / or Treaty Rights. The following Indigenous community contacts engaged for this Project are:

- Haudenosaunee Confederacy Chiefs Council / Haudenosaunee Development Institute;
- Mississaugas of the Credit First Nation; and
- Six Nations of the Grand River.

Notification was provided to Indigenous Communities at the onset of the Project and key milestones, i.e., two Public Information Centre Live Events, held on November 29, 2022, and September 19, 2023, and the Transportation Environmental Study Report comment period.

4.3.2 External Agencies and Utility Providers

External agencies and other technical stakeholders were engaged throughout the Project to-date, including federal, provincial, and municipal agencies, conservation authorities and other technical stakeholders (e.g., utility companies) are listed below.

Federal Agencies

- Transport Canada
- NAV CANADA
- Fisheries and Oceans Canada

Provincial Agencies

- Infrastructure Ontario
- Ministry of Agriculture, Food and Rural Affairs
- Ministry of Natural Resources and Forestry (formerly Ministry of Northern Development, Mines, Natural Resources and Forestry)
- Ministry of the Environment, Conservation and Parks

- Ministry of Citizenship and Multiculturalism (formerly Ministry of Heritage, Sport, Tourism, Culture Industries)
- Ministry of the Solicitor General
- Ontario Heritage Trust
- Ontario Trails Council
- Metrolinx
- Ontario Provincial Police

Municipal Agencies

- City of Hamilton Transit
- City of Hamilton
- City of Hamilton Paramedic Services
- City of Hamilton Fire Department
- Hamilton Police Service

Conservation Authorities

- Niagara Peninsula Conservation Authority
- Grand River Conservation Authority
- Hamilton Conservation Authority

Utility Service Providers

- TransCanada Pipelines
- Enbridge Gas
- Hydro One Networks Inc.
- Rogers Cable System Inc.
- Bell Canada

Other Technical Stakeholders

- John C. Munro Hamilton International Airport
- Ontario Trucking Association
- Southern Ontario Gateway Council
- Airways Transit
- Hamilton Cycling Committee
- Hamilton Burlington Trails Council
- Ontario Federation of Agriculture
- Hamilton-Wentworth Federation of Agriculture
- Hamilton Chamber of Commerce

School Boards and Transportation

- Hamilton-Wentworth Student Transportation Services
- Hamilton-Wentworth Catholic District School Board
- Hamilton-Wentworth District School Board
- Service de transport Francobus

4.3.3 External Stakeholder Meetings and Comments

At the outset of the Project and at key milestones, external agencies were contacted by mail and asked to provide input. The Project Team met with the City of Hamilton on October 19, 2022, and September 12, 2023, to obtain Study Area information (i.e., information about updates to the City of Hamilton's Transportation Master Plan and other potential studies/projects within the Study Area), input on the generation, assessment and evaluation of alternatives and their potential impacts, and support for the Recommended Plan. It should be mentioned that the City of Hamilton noted that they are planning a municipal class Environmental Assessment for the widening of Book Road East and the Ontario Ministry of Transportation will continue engaging with the City of Hamilton throughout the future design processes.

Separate meetings were held with NAV CANADA on September 27, 2022, and John C. Munro Hamilton International Airport on October 26, 2022, and August 22, 2023, to present the project overview, previous studies, project schedule including when the Public Information Centres were, and to receive input on the potential impacts of the Project for the airport. WSP, who is responsible for the preliminary aeronautical impact assessment, provided a summary of their 'quick findings' and the high-risk areas. The meeting dates and respective agencies are listed in **Table 3**.

Table 4 provides a summary of the external stakeholder questions and comments received and the corresponding response provided by the Project Team.

Table 3: External Stakeholder Meetings

Date	External Agency	Meeting Purpose
September 27, 2022	NAV CANADA	Introduce project, present alternatives, and seek feedback.
October 19, 2022	Municipal Meeting #1	Introduce project, present alternatives, and seek municipal feedback.
October 26, 2022	John C. Munro Hamilton International Airport Meeting #1	Introduce project, present alternatives, and seek feedback.
August 8, 2023	Hydro One Networks Inc.	Introduce project, identify hydro infrastructure in Study Area, note the areas of potential conflicts and provide a project schedule.
August 10, 2023	Enbridge Gas	Provide a project overview and discuss any possible impacts to utility infrastructure.
August 22, 2023	John C. Munro Hamilton International Airport Meeting #2	Present Recommended Plan for Highway 6 South corridor, Book Road East, Airport Connection Road, and Upper James Street.
September 12, 2023	Municipal Meeting #2	Present Recommended Plan for Highway 6 South corridor, Book Road East, Airport Connection Road, and Upper James Street and provided a brief update on the Noise Assessment findings.
December 12, 2023	Hamilton Conservation Authority and Grand River Consultation Authority (Niagara Peninsula Conservation Authority was unable to attend. Meeting materials were shared with them following the meeting.)	Provide a project overview and discuss any possible impacts to Conservation Authority regulated areas, permitting requirements, etc.

Table 4: Summary of External Agency Questions and Comments

External Agency Comments	Project Team Response
Hydro One Networks Inc: Comment about infrastructure in Study Area	Hydro One's infrastructure within the Study Area along with tower clearance and access requirements have been noted. The Project Team mentioned that the Project is at the Preliminary Design / Environmental Assessment stage and the Project Team understands Hydro One typically requests detail design level drawings to review, which will not be provided at this stage. The Project Team is committed to working with Hydro One in the identification of impacts and potential relocations in an effort to confirm future commitments.
Infrastructure Ontario: Noted that provincial government property may be present within the Study Area	The Project Team noted that there may be provincial government property within the Study Area and further consultation with Infrastructure Ontario will occur as the Project progresses, as necessary.
Ministry of Citizenship and Multiculturalism (formerly Ministry of Heritage, Sport, Tourism and Culture Industries): Questions regarding cultural heritage studies.	The Project Team advised that a Cultural Heritage Assessment Report will be completed as part of the Project to identify existing conditions of heritage resources, present an inventory of any cultural heritage resources/landscapes with the Study Area, and evaluate any potential impacts.
City of Brantford: Question regarding previous 1987 Environmental Assessment Report and interchange configurations at Highway 403	The Project Team provided a link to the 1987 Environmental Assessment Report and advised that the review of the Highways 403 and Highway 6 South Interchange includes investigations into opportunities for improvement to operations and safety.
Niagara Peninsula Conservation Authority: Information regarding watercourse crossings and regulated areas	The Project Team noted that the regulated areas mapping provided will be shared with the appropriate specialists.
NAV CANADA: No objection to the Project	No response was provided, and a meeting was set up with NAV CANADA to discuss the Project further.
Ministry of Natural Resources and Forestry: Information on the Study Area and applicable legislation	No response provided. However, information was passed along to applicable specialists for consideration.
Hamilton Conservation Authority: Information on the Study Area, potential impacts to natural features, alternatives within their jurisdiction, evaluation of alternatives and mitigation measures	The Project Team advised that the comments will be considered as the Project progresses and that a terrestrial ecosystems report, fish and fish habitat report and drainage report will be prepared as part of the Project. It was also noted that consultation with Hamilton Conservation Authority will continue throughout the Project.
John C. Munro Hamilton International Airport: Concerns of large trucks and recommendation of interchanges at Butter Road and Glancaster Road	The Project Team noted their comments related to traffic circles and large trucks using such infrastructure and advised that they will be considered as the Project progresses. In addition, due to the proximity to the interchanges proposed at Book Road East and Airport Connection Road, interchanges at Butter Road and Glancaster Road were not being considered.

5. Overview of Existing Conditions

To support the examination of a reasonable range of alternatives, all significant features within the Study Area were identified to determine their sensitivity and potential for impacts associated with the Highway 6 South Widening from Highway 403 to Upper James Street Project. Identifying significant features involved the collection of primary and secondary source data derived from surveys, field reviews, published and unpublished literature, government sources and consultation with agencies and the public. The data collected was grouped in the following categories:

- Natural Environment;
- Socio-Economic Environment;
- Cultural Environment; and
- Transportation.

Information about the existing environmental features within the Study Area was collected from the following sources:

- Observations recorded during field reviews;
- Aerial photos of the Study Area;
- City of Hamilton Official Plans;
- Ministry of Natural Resources Natural Heritage Information Centre database for significant species and designated nature features within, adjacent to, or in the vicinity of the Study Area; and
- Consultation with the Ministry of the Environment, Conservation and Parks, Ministry of Natural Resources and Forestry District Office, Niagara Peninsula Conservation Authority, Hamilton Conservation Authority and Grand River Conservation Authority to obtain any additional information about significant species, designated natural features and fisheries.

It should be noted that the commitments made in the approved 1987 Environmental Assessment Report have been carried through this Project and further details are provided in **Section 9**.

The following sections provide an overview of the existing environmental conditions within the Study Area.

5.1 Natural Environment

Natural environment studies have been conducted to document and assess existing features, to inform a discussion of potential impacts and mitigations associated with the

proposed highway improvements, and to identify applicable municipal, provincial, federal, or other regulatory approvals or permits associated with the environment that may be required for the Project.

Figures for the subsequent sections (**Sections 5.1.1 to 5.1.4**) can be viewed in **Appendix A, Figures A-1.1 to A-1.14**.

5.1.1 Topography and Drainage

The ground surface within the Study Area is generally undulating, with ground surface elevation generally decreasing to the south towards Lake Erie, and with low localized points at wetlands and streams. Specifically, ground elevation is at a maximum of approximately 250 metres above sea level at the northern edge of the Study Area and generally decreases southwards to approximately 215 metres above sea level at the southern edge of the Study Area.

In general, regional groundwater flow within the northern portion of the Study Area, which intercepts the Hamilton Region Source Protection Area is towards Lake Ontario (Halton-Hamilton Source Protection Committee, 2017). Regional groundwater flow within the small portion of the Study Area, which intercepts the Grand River Source Protection Area, on the western side of Highway 6 South at Book Road East, is southward towards Lake Erie (Lake Erie Region Source Protection Committee, 2022). The majority of the Study Area is within the Niagara Peninsula Source Protection Area. Regional groundwater flow within the Niagara Peninsula Source Protection Area has three main drainage areas, including Lake Ontario, the Niagara River, and Lake Erie (Niagara Peninsula Source Protection Committee, 2013). The portion of the Study Area located within the Niagara Peninsula Source protection Area is within the Niagara River drainage area, exclusively.

5.1.2 Physiography

According to the Physiography of Southern Ontario (Chapman and Putnam, 1984) and “Map 2226-Physiography of the South-Central Portion of Southern Ontario” (Ontario Department of Mines and Northern Affairs, 1972), the Study Area is located within the Haldimand Clay Plain physiographic region. The plain is described as stratified clay overlying till, with decreasing clay thickness in low morainic ridges which are present to in the northern area of the plain, which is generally within the vicinity of the Study Area. Specifically, the physiographic landforms are identified as clay plains throughout the Study Area except for within the immediate vicinity of Airport Road near John C. Munro Hamilton International Airport, where till moraines are present. Additionally, the northern area of the Haldimand Clay Plain is described as having more relief than the southern

area. Overburden within the plain is typically less than 50 feet near the Niagara Escarpment and increases towards the south. Drainage is controlled by several parallel streams, including the Welland River, that are oriented eastward along ridges.

5.1.3 Geology

5.1.3.1 Surficial and Bedrock Geology

According to the "Surficial Geology of Southern Ontario" (Ontario Geological Survey, MRD 128-REV), the following surficial geology deposits are located within the Study Area:

- Coarse textured glaciolacustrine deposits: sand, gravel, minor silt, and clay.
  - Present at the northern end of the Study Area at Highway 403, and south along Highway 6 South to Book Road East.
- Fine textured glaciolacustrine deposits: silt and clay, minor sand, and gravel. Massive to well laminated.
  - Present at the northern end of the Study Area on the east side of Highway 6 South, and from Book Road East to the southern end of the Study Area.
- Modern alluvial deposits: clay, silt, sand, gravel, may contain organic remains.
  - Present along the banks of the Welland River.
- Clay to silt-textured till (derived from glaciolacustrine deposits or shale).
  - Present in multiple isolated sections along stream tributaries located mainly on the east side of Highway 6 South, at Butter Road East and towards the south.

According to the "Bedrock Geology of Ontario, Southern Sheet" (Ontario Geological Survey's, Ministry of Northern Development and Mines, Map 2544) and available Ministry of the Environment, Conservation and Parks well records, underlying the overburden deposits within the Study Area is sandstone, shale, dolostone, siltstone of the Guelph Formation (Lower Silurian).

Based on the Ministry of the Environment, Conservation and Parks well records, the overburden thickness (depth to the bedrock) in the Study Area ranges from approximately 4.9 to 37.5 metres below ground surface.

5.1.4 Hydrogeology

According to the Ministry of the Environment, Conservation and Parks' Water Well Record, there are 244 wells within the Study Area. Of these 244 wells, there are

144 water supply wells, 46 monitoring wells/test holes, 24 abandoned wells, and 30 with no data available. The water well records available for the Study Area suggest the static groundwater levels for 38 overburden water supply wells ranged from 1.2 to 15.2 metres below ground surface. A review of the water well records for 99 bedrock water supply wells within the Study Area indicated that static groundwater levels ranged from 0.3 to 39.6 metres below ground surface. Three water supply water well records with unknown screened material indicated static groundwater levels ranging from 4.0 to 9.8 metres below ground surface. Static groundwater levels were available for three bedrock monitoring well water well records and ranged from 15.8 to 18.6 metres below ground surface.

5.1.4.1 Overburden and Bedrock Aquifers

The minimum recorded depth to bedrock of 4.9 metres below ground surface within the Study Area is located at the northern edge of the Study Area, on the south side of the Hamilton Golf and Country Club. Moving south to the area of Highway 403 and Garner Road East, bedrock was identified at approximately 35 to 27 metres below ground surface. Overburden in this area typically consists of sand/gravel at ground surface to depths ranging from 5 to 9 metres below ground surface, underlain by a significant (up to 18 metres thick) clay unit, interbedded in some areas by a minor coarse-grained unit, and followed by bedrock. Some water well records describe the clay unit as “sandy”. Moving southward along Highway 6 South, very few water well records with depth to bedrock data are available; minimal water well records indicate approximate depth to bedrock of 25 and 22 metres below ground surface at Book Road East and Butter Road East, respectively. At Book Road East, water well records indicate that overburden is typically fine-grained at ground surface, with several records showing clay/clayey silt at ground surface and extending to depths up to 25 metres below ground surface. One water well record adjacent to a stream just north of Book Road East and east of Highway 6 South indicates approximately 4 metres of alluvial material at ground surface, overlying the clay unit. At Butter Road East, the overburden consistently comprises clay material. At Glancaster Road, the depth to bedrock ranges from approximately 22 to 31 metres below ground surface. Overburden at Glancaster Road typically comprises clay/silty clay at ground surface, and in some cases extends to bedrock. In one instance, the water well records indicated a significant interbedded sand layer within the clay unit, located at 12 to 24 metres below ground surface. At Highway 6 South and Upper James Street, depth to bedrock ranges from approximately 24 to 33 metres below ground surface. Overburden in this area typically comprises clay at ground surface, with in some cases significant (up to 14 metres thick) sand layers interbedded within the clay. At several locations, a thin gravel layer was located directly

above the bedrock. The water well records indicate limestone as the most common bedrock type within the Study Area, with some instances of shale.

Out of the 144 water supply water well records within the Study Area, 100 water supply wells terminated in bedrock, 40 water supply wells terminated in overburden and four water supply well records had an unknown termination layer. This variability in screened material indicates that both overburden and bedrock aquifers are accessible and utilized for water supply within the Study Area. The overburden water supply wells are not limited to a particular area of the Study Area.

5.1.4.2 Groundwater

In general, the shallow groundwater flow within the overburden deposits is associated with the surface topography and conveyed to topographic lows, wetlands, and surface watercourses. The deeper aquifer systems, including bedrock aquifer, tend to be more uniform and are less influenced by topographic variations. Vertically, groundwater flow in the shallow aquifer will travel downwards towards the deeper aquifer system. Variations to the flow direction will change depending on proximity to surface watercourses and subsurface geology.

Locally, surface water runoff and groundwater flow are influenced by ground surface topography, flowing from elevated areas to the valleys, including towards local creeks and wetlands.

5.1.4.3 Source Water Protection

The Study Area is situated within three Source Protection Areas, including the Hamilton Region Source Protection Area, the Niagara Peninsula Source Protection Area, and the Grand River Source Protection Area. The Hamilton Region Source Protection Areas is part of the Halton-Hamilton Source Protection Region, and the Grand River Source Protection Area is part of the Lake Erie Source Protection Region. There is no overlying Source Protection Region for the Niagara Peninsula Source Protection Area.

Surface Water Intake Protection Zones are areas of land and water delineated around the end of the municipal intake pipes. These zones are typically determined by the amount of time it would take for spilled material to reach the water intake. Up to three zones may be established around an intake. The nearest to the intake is Zone 1, with Zones 2 and 3 extending out sequentially from the previous zone. Zone 1 is the most vulnerable zone for contamination, while Zone 3 is the least vulnerable zone. Each Intake Protection Zone provides an opportunity for the source protection committee or municipality to apply different levels of protective measures on activities planned or existing within the zone. A review of the Ministry of the Environment, Conservation and

Parks Source Protection Information Atlas as well as the Grand River Source protection Areas Assessment Report (Lake Erie Region Source Protection Committee, 2022) indicate no surface water intakes located within the Study Area. However, Intake Protection Zone 3 is located within the Study Area on the west side of Highway 6 South in the vicinity of Book Road East as well as Butter Road East. The Hamilton Region Source Protection Area Assessment Report (Halton-Hamilton Source Protection Committee, 2017) and Niagara Peninsula Source Protection Area Assessment Report (Niagara Peninsula Source Protection Committee, 2013) do not indicate Intake Protection Zones within the components of their respective Source Protection Areas located within the Study Area.

5.1.5 Fish and Fish Habitat

The Burlington Canal Hamilton Harbour quaternary watershed (containing the Ancaster Creek subwatershed) and the Welland River quaternary watershed (containing the Upper Welland River Subwatershed) are both situated in Hamilton, Ontario. These watersheds are located southwest of Lake Ontario and cover approximately 528 square kilometres and 87 square kilometres, respectively.

In addition to reviewing background information from Conservation Authorities and Government Agencies, a detailed fish and fish habitat assessment of the water features in the vicinity of the Study Area was conducted between April 26 – 29, 2022 (for example the spring confirmation) and September 26 – 28, 2022, and on October 4, 2022 (for example the fall confirmation). Fisheries assessments were conducted in accordance with the requirements under the 2020 Ontario Ministry of Transportation, Fisheries and Oceans Canada, Ministry of Natural Resources and Forestry Protocol for Protecting Fish and Fish Habitat.

Through the background information review, consultation with Ministry of Natural Resources and Forestry and Ministry of the Environment, Conservation and Parks, Conservation Authorities, and the 2022 fish habitat field reviews it was determined that 8 crossings are characterized as direct fish habitat or seasonally direct fish habitat, 29 crossings are characterized as indirect fish habitat, and 8 crossings are not characterized as fish habitat. Grass Pickerel (Special Concern) was identified in the portion of the Welland River (WC-15) that intersects the Study Area using the Fisheries and Oceans Canada online Aquatic Species at Risk mapping tool (2023).

The location and description of the existing conditions for each watercourse within the Study Area is outlined in **Table 5**. Maps of the watercourses within the Study Area can be found in **Appendix A, Figures A-2.1 to A-2.5**.

Table 5: Waterbody Locations within the Study Area

Watercourse ID	Waterbody ID	Flow	Thermal Regime	Fish Habitat	Substrate Type	Channel Morphology	Vegetation	Constraints & Opportunities	Significant Fish Habitat	Fish Species Present
Unnamed Tributary of Ancaster Creek – 1	WC-01	■ Permanent	■ Warmwater	■ Direct	■ Upstream: silt, clay, muck, detritus	■ Upstream: Flat 90%, pool/ wetland 10% ■ Downstream: Flat 100%	■ Instream: Various algae, Pondweed, Duckweed, Phragmites, Rushes	■ Phragmites management	■ None	■ Green Sunfish (*Lepomis cyanellus*) ■ Brook Stickleback (*Culaea inconstans*)
Unnamed Tributary of Ancaster Creek – 1	WC-02	■ Upstream: Ephemeral ■ Downstream: Permanent	■ Warmwater	■ Downstream: Direct ■ Upstream: Indirect	■ Upstream: Cobble, muck, detritus (at crossing inlet), Semi-aquatic emergent vegetation, grasses (upstream of crossing) ■ Downstream: Silt, clay, muck, detritus	■ Upstream: Riffle 10%; Flat 10%; Other 80% ■ Downstream: Flat 100%	■ Instream: Phragmites, grasses, rushes, algae	■ Phragmites management	■ None	■ Brook Stickleback ■ Fathead Minnow (*Pimephales promelas*)
Unnamed Tributary of Ancaster Creek -2	WC-01a	■ Ephemeral	■ Warmwater	■ Indirect	■ Upstream: Cobble ■ Downstream: Cobble, gravel	■ Upstream: Unknown ■ Downstream: Riffle 100%	■ Riparian: Terrestrial grasses, shrubs, and herbaceous vegetation	■ None	■ None	■ Assumed to be that of WC-01
Unnamed Tributary of Ancaster Creek -2	WC-01b	■ Ephemeral	■ Warmwater	■ Indirect	■ Upstream: Cobble, gravel	■ Upstream: Riffle 100%	■ Riparian: Terrestrial grasses, shrubs, and herbaceous vegetation	■ None	■ None	■ Assumed to be that of WC-01
Unnamed Tributary of Ancaster Creek -2	WC-02a	■ Ephemeral	■ Warmwater	■ Not fish habitat	■ N/A (no defined channel)	■ N/A (no defined channel)	■ Riparian: Terrestrial grasses, shrubs, and herbaceous vegetation	■ None	■ None	■ Assumed to be that of WC-02
Unnamed Tributary of Ancaster Creek-3	WC-01c	■ Ephemeral	■ Warmwater	■ Indirect	■ Upstream: Cobble	■ Upstream: Riffle 100%	■ Riparian: Terrestrial grasses, shrubs, and herbaceous vegetation	■ None	■ None	■ Assumed to be that of WC-01
Unnamed Tributary of Ancaster Creek 4	WC-03	■ Ephemeral	■ Warmwater	■ Indirect	■ Downstream: Muck, gravel, cobble	■ Downstream: Culvert; Run	■ Scattered patches of phragmites ■ Riparian area has high (90%) cover and is a mix of a woodlot and herbaceous area	■ None	■ None	■ Not Available
Unnamed Tributary of Ancaster Creek 4	WC-04	■ Ephemeral	■ Warmwater	■ Indirect	■ Upstream: Detritus	■ Upstream: Culvert; Flat	■ Instream: Algae ■ Riparian: herbaceous vegetation and terrestrial grasses	■ None	■ None	■ Not Available

Watercourse ID	Waterbody ID	Flow	Thermal Regime	Fish Habitat	Substrate Type	Channel Morphology	Vegetation	Constraints & Opportunities	Significant Fish Habitat	Fish Species Present
Unnamed Tributary of Welland River -1	WC-05a	■ Ephemeral	■ Warmwater	■ Indirect	■ Upstream: Muck, cobble ■ Downstream: Terrestrial vegetation	■ Upstream: Other 100% (undefined diffuse flow from swamp/woodland) ■ Downstream: Other 100%	■ Instream: Veronica sp., bidens, soft-stem bulrush, broadleaf cattail, reed canary grass, terrestrial grasses	■ Perched culvert present ■ Rip rap spillway at outlet	■ None	■ Not Available
Unnamed Tributary of Welland River -2	WC-05	■ Upstream: Ephemeral (No defined channel, drainage collected by topography) ■ Downstream: Intermittent (Roadside drainage collects and conveys to defined channel downstream)	■ Warmwater	■ Indirect	■ Upstream: Muck, detritus ■ Downstream: Silt, sand, gravel, cobble	■ Upstream: Flat 95%; Riffle 5% ■ Downstream: Run 85%; Riffle 15%	■ Instream: Algae, phragmites, grasses	■ Low flow potential seasonal migratory barrier ■ Phragmites management ■ Trash cleanup	■ None	■ Not Available
Unnamed Tributary of Welland River -2	WC-05b	■ Upstream: Ephemeral ■ Downstream: Permanent (constructed pond)	■ Warmwater	■ Indirect	■ Upstream: Muck, silt, detritus ■ Downstream: Muck	■ Upstream: Flat 100% ■ Downstream: Other 95% (pond); Run 4%; Culvert 1%	■ Instream: Cattail, reed canary grass, American brooklime, pondweed ■ Riparian: Skunk cabbage, Cattail, Red Osier Dogwood	■ Low flow potential seasonal migratory barrier ■ Replace Hybrid/Narrow-leaved Cattail and Purple Loosestrife with native species	■ None	■ Largemouth Bass
Unnamed Tributary of Welland River -2	WC-06	■ Ephemeral	■ Warmwater	■ Indirect	■ Upstream: Silt, sand, muck ■ Downstream: Muck, detritus	■ Upstream: Run 100% ■ Downstream: Flat 100%	■ Instream: Phragmites, algae, grasses	■ Culvert does not properly convey flow and requires adjustment ■ Perched culvert ■ Phragmites management	■ None	■ Not Available

Watercourse ID	Waterbody ID	Flow	Thermal Regime	Fish Habitat	Substrate Type	Channel Morphology	Vegetation	Constraints & Opportunities	Significant Fish Habitat	Fish Species Present
Unnamed Tributary of Welland River -2	WC-07	■ Ephemeral	■ Warmwater	■ Indirect	■ Upstream: Muck, detritus, cobble ■ Downstream: Silt, sand	■ Upstream: Flat 100% ■ Downstream: Run 100%	■ Instream: Algae, water lily, cattail, phragmites, rushes, grasses, willow, skunk cabbage, watercress	■ Potential groundwater inputs	■ Potential groundwater inputs (watercress)	■ Not Available
Unnamed Tributary of Welland River -2	WC-08	■ Upstream: Ephemeral ■ Downstream: Intermittent	■ Warmwater	■ Indirect	■ Upstream: Silt, sand, cobble ■ Downstream: Silt, muck, detritus	■ Upstream: Run 90%; Riffle 10% ■ Downstream: Flats 95%; Run 5%	■ Instream: Algae, phragmites, water lily, skunk cabbage, marsh marigold	■ Phragmites debris may create low flow barrier to fish passage ■ Potential groundwater inputs	■ Potential groundwater inputs (marsh marigold)	■ Not Available
Unnamed Tributary of Welland River -3	WC-09	■ Ephemeral	■ N/A	■ Not fish habitat	■ N/A	■ Dry, drainage channel that receives roadside runoff. The entire feature had terrestrial vegetation growing throughout	■ N/A	■ N/A	■ None	■ Not Available
Unnamed Tributary of Welland River -4	WC-10	■ Intermittent	■ Warmwater	■ Seasonal direct	■ Upstream: Silt, muck, sand ■ Downstream: Sand, clay, muck	■ Upstream: Run 80%; Pool 20% ■ Downstream: Flat 100%	■ Instream: Algae, duckweed, cattails, phragmites, grasses, rushes	■ Phragmites management ■ Improvements to nutrient runoff pollution – algae growth indicates possible nutrient loading	■ None	■ Not Available
Unnamed Tributary of Welland River -4	WC-10b	■ Intermittent	■ Warmwater	■ Seasonal direct	■ Upstream: Muck ■ Downstream: Muck, clay (dry channel)	■ Upstream: Run 50%; Pool 25%; Culvert 25% ■ Downstream: Other 100% (dry channel)	■ Instream: Cattail, phragmites, reed canary grasses, terrestrial grasses	■ Seasonally dry ■ Phragmites and non-native Cattail management	■ None	■ Not Available

Watercourse ID	Waterbody ID	Flow	Thermal Regime	Fish Habitat	Substrate Type	Channel Morphology	Vegetation	Constraints & Opportunities	Significant Fish Habitat	Fish Species Present
Unnamed Tributary of Welland River-5	WC-10a	■ Ephemeral	■ Warmwater	■ Indirect	■ Upstream: Silt, sand	■ Upstream: Run 100% ■ Downstream: Other 100%	■ Instream: Grasses, phragmites	■ Phragmites management ■ ATV tracks/ crossing modifying flow structure and generally impede fish passage (install bridge for ATVs or upgrade fence to prevent access) ■ Culvert potentially plugged with debris resulting in limited flow	■ None	■ Pumpkinseed
Unnamed Tributary of Welland River 6	WC -11a	■ Ephemeral	■ Warmwater	■ Indirect	■ Upstream: Muck, detritus	■ Upstream: Flat 100%	■ Instream: Phragmites ■ Riparian: Terrestrial grasses, shrubs, mixed forest / woodlot	■ Phragmites management	■ None	■ Not Available
Unnamed Tributary of Welland River 6	WC-12	■ Ephemeral	■ Warmwater	■ Indirect	■ Upstream: Silt, muck sand ■ Downstream: Detritus, muck	■ Upstream: Flat 90%; Run 10% ■ Downstream: Other 100%	■ Overhanging: Phragmites, cattail, shrubs, grasses	■ Phragmites management	■ None	■ Minnow sp. (*Leuciscidae*)
Unnamed Tributary of Welland River -7	WC-11b	■ Ephemeral	■ Warmwater	■ Indirect	■ Downstream: Muck, detritus	■ Downstream: Flat 100%	■ Instream: Phragmites, Cattails ■ Riparian: Terrestrial grasses, shrubs, Willow sp., deciduous trees	■ Phragmites management	■ None	■ Not Available
Unnamed Tributary of Welland River -8	WC-13	■ Ephemeral	■ Warmwater	■ Not fish habitat	■ Upstream: Detritus, terrestrial grasses ■ Downstream: Detritus	■ Upstream: Flat 100% ■ Downstream: Flat 100%	■ Instream: Phragmites	■ Phragmites management	■ None	■ Not Available
Unnamed Tributary of Welland River -9	■ WC-14	■ Ephemeral	■ Warmwater	■ Not fish habitat	■ Upstream: Detritus, gravel (from roadside) ■ Downstream: Detritus	■ Upstream: Flat 100% ■ Downstream: Flat 100%	■ Instream: Cattail, rushes ■ Riparian: Cattails, terrestrial grasses	■ Crossing outlets to active agricultural land – no downstream flow beyond ROW.	■ None	■ Not Available

Watercourse ID	Waterbody ID	Flow	Thermal Regime	Fish Habitat	Substrate Type	Channel Morphology	Vegetation	Constraints & Opportunities	Significant Fish Habitat	Fish Species Present
Welland River	■ WC-15	■ Permanent	■ Warmwater	■ Direct	■ Upstream: Sand, gravel, cobble, silt ■ Downstream: Silt, muck detritus	■ Upstream: Riffle 50%; Run 25%; Pool 25% ■ Downstream: Run 95%; riffle 5%	■ Instream: Algae, grasses	■ Bank stabilization/flow redirection	■ None	■ Black Bullhead (*Ameiurus melas)* ■ Black Crappie (*Pomoxis nigromaculatus)* ■ Bluntnose Minnow (*Pimephales notatus)* ■ Brown Bullhead (*Ameiurus nebulosus*) ■ Central Mudminnow ■ Common Carp (*Cyprinus carpio)* ■ Golden Shiner (*Notemigonus crysoleuca)* ■ Green Sunfish ■ Johnny Darter (*Etheostoma nigrum)* ■ Largemouth Bass (*Micropterus salmoides)* ■ Sunfishes (*Lepomis sp.)*. ■ Northern Pike (*Esox Lucius)* ■ Pumpkinseed (*Lepomis gibbosus)* ■ Tadpole Madtom (*Noturus gyrinus)* ■ White Crappie (*Pomoxis annularis)*

Watercourse ID	Waterbody ID	Flow	Thermal Regime	Fish Habitat	Substrate Type	Channel Morphology	Vegetation	Constraints & Opportunities	Significant Fish Habitat	Fish Species Present
										■ White Sucker (*Catostomus commersonii)* ■ Yellow Bullhead (*Ameiurus natalis)* ■ Yellow Perch (*Perca flavescens)*
Unnamed Tributary of Welland River -10	WC-16	■ Ephemeral	■ N/A	■ Not fish habitat	■ No defined channel (likely roadside drainage feature)	■ N/A	■ Terrestrial grasses and herbaceous vegetation	■ N/A	■ None	■ Not Available
Unnamed Tributary of Welland River -11	WC-16a	■ Ephemeral	■ Warmwater	■ Indirect	■ Upstream: Silt, muck, sand ■ Downstream: Silt, muck	■ Upstream: Flat 100% ■ Downstream: Flat 100%	■ Instream: Cattail, phragmites, algae, rushes	■ Phragmites management	■ None	■ Not Available
Unnamed Tributary of Welland River -12	WC-17	■ Ephemeral	■ Warmwater	■ Not fish habitat	■ N/A	■ N/A	■ Terrestrial grasses and herbaceous vegetation grew throughout roadside and agricultural field drainage channel	■ N/A	■ None	■ Not Available
Unnamed Tributary of Welland River -13	WC-18	■ Ephemeral	■ Warmwater	■ Indirect	■ Upstream: Silt, sand, cobble, gravel ■ Downstream: Silt, muck, clay detritus	■ Upstream: Flat 100% ■ Downstream: Flat 100%	■ Instream: Grasses, phragmites, cattail, rushes	■ None	■ None	■ Not Available
Unnamed Tributary of Welland River -14	WC-19	■ Ephemeral	■ Warmwater	■ Not fish habitat	■ Upstream: Silt, sand ■ Downstream: Organic debris	■ Upstream: Flat 30%, Culvert 10%, Other 70% (no channel) ■ Downstream: Other 100% (no channel)	■ Instream: Cattail (upstream) ■ Riparian: Terrestrial grasses	■ Crossing outlets to active agricultural land – no downstream flow beyond ROW.	■ None	■ Not Available
Unnamed Tributary of Welland River -15	WC-20	■ Permanent	■ Warmwater	■ Direct	■ Upstream: Sand, gravel, cobble ■ Downstream: Silt, muck, detritus, cobble	■ Upstream: Run 100% ■ Downstream: Run 50%; Pool 50%; Riffle 50%	■ Instream: Willow, cattail, rushes, algae, grasses	■ Install raised trail crossing to prevent sedimentation within channel	■ None	■ Central Mudminnow (*Umbra limi*)

Watercourse ID	Waterbody ID	Flow	Thermal Regime	Fish Habitat	Substrate Type	Channel Morphology	Vegetation	Constraints & Opportunities	Significant Fish Habitat	Fish Species Present
Unnamed Tributary of Welland River -16	WC-21	■ Ephemeral	■ Warmwater	■ Indirect	■ Upstream: Silt, sand ■ Downstream: Muck, detritus	■ Upstream: Flat 70%; Run 30% ■ Downstream: Flat 100%	■ Instream: Phragmites, grasses, shrubs, rushes	■ Phragmites management ■ Trail (for pipeline) crossing to avoid tracking through flow path	■ None	■ Not Available
Unnamed Tributary of Welland River -17	WC-22	■ Intermittent	■ Warmwater	■ Indirect	■ Upstream: Silt, muck, detritus ■ Downstream: Silt, muck, detritus	■ Upstream: Run 100% ■ Downstream: Flat 100%	■ Instream cattails and bullrushes ■ Riparian vegetation consisted of terrestrial grasses and herbaceous plants ■ Phragmites was present within the road ROW	■ Invasive plant removal	■ None	■ Not Available
Unnamed Tributary of Welland River -17	WC-22a	■ Intermittent	■ Warmwater	■ Indirect	■ Upstream: Boulder, cobble, silt, muck, detritus ■ Downstream: Clay, cobble, gravel	■ Upstream: Pool 33%; Culvert 33%; Other 33% (rip-rap) ■ Downstream: Run 70%’ Riffle 30%	■ Instream: Phragmites, cattail, grasses, algae, periphyton	■ Rip rap between culverts too steep to allow fish passage between culverts ■ No low flow channel within culvert to allow fish passage during low flows ■ Phragmites management ■ Erosion protection along downstream banks	■ None	■ Not Available
Unnamed Tributary of Welland River -18	WC-23	■ Intermittent	■ Warmwater	■ Indirect	■ Upstream: Silt, sand ■ Downstream: Silt, detritus	■ Upstream: Run 100% ■ Downstream: Flat 100%	■ Instream: Cattail, phragmites, algae	■ Dense vegetation may restrict fish passage during low flow ■ Phragmites management	■ None	■ Not Available

Watercourse ID	Waterbody ID	Flow	Thermal Regime	Fish Habitat	Substrate Type	Channel Morphology	Vegetation	Constraints & Opportunities	Significant Fish Habitat	Fish Species Present
Unnamed Tributary of Welland River -18	WC-23a	■ Intermittent	■ Warmwater	■ Indirect	■ Upstream: Boulder, rip rap ■ Downstream: Gravel, muck, detritus, boulder	■ Upstream: Culvert 100% ■ Downstream: Run 50%; Other 50% (riprap)	■ Instream: Cattail, phragmites	■ Rip-rap pile at end of downstream culvert is low flow migratory barrier ■ Low flow channel at downstream culvert outlet ■ Phragmites and non-native Cattail management	■ None	■ Not Available
Unnamed Tributary of Welland River -19	WC-24	■ Ephemeral	■ Warmwater	■ Indirect	■ Upstream: Silt, sand ■ Downstream: Silt, cobble	■ Upstream: Run 100% ■ Downstream: Run 100%	■ Instream: Grasses, phragmites, rushes	■ Address bank erosion	■ None	■ Not Available
Unnamed Tributary of Welland River -20	WC-25	■ Ephemeral	■ Warmwater	■ Not fish habitat	■ Upstream: Detritus, terrestrial grasses ■ Downstream: Detritus, muck	■ Upstream: Flat 100% ■ Downstream: Flat 100%	■ Instream: Phragmites	■ Phragmites management	■ None	■ Not Available
Unnamed Tributary of Welland River -21	WC-26	■ Intermittent	■ Warmwater	■ Seasonal direct	■ Upstream: Silt, muck ■ Downstream: Silt, muck	■ Upstream: Culvert 100% ■ Downstream: Flat 100%	■ None	■ Low flow potential seasonal migratory barrier	■ None	■ Not Available
Unnamed Tributary of Welland River -21	WC-26b	■ Intermittent	■ Warmwater	■ Seasonal direct	■ Upstream: Muck, silt, cabled concrete ■ Downstream: Muck, gravel, boulder, sand	■ Upstream: Run 100% ■ Downstream: Flat 100%	■ Instream: Cattails, grasses, pondweed, smartweed, water plantain, cursed crows foot	■ None	■ None	■ Not Available
Unnamed Tributary of Welland River -22	WC-26a	■ Intermittent	■ Warmwater	■ Indirect	■ Upstream: Muck, detritus ■ Downstream: Muck	■ Upstream: Flat 100% ■ Downstream: Culvert 100%	■ Instream: Phragmites, cattail	■ Phragmites and non-native Cattail management ■ Low flow potential seasonal migratory barrier	■ None	■ Not Available

Watercourse ID	Waterbody ID	Flow	Thermal Regime	Fish Habitat	Substrate Type	Channel Morphology	Vegetation	Constraints & Opportunities	Significant Fish Habitat	Fish Species Present
Unnamed Tributary of Welland River -22	WC-27	■ Intermittent	■ Warmwater	■ Indirect	■ Upstream: Silt, sand ■ Downstream: Silt, muck, sand, detritus	■ Upstream: Run 100% ■ Downstream: Flat 70%; Culvert 30%	■ Instream: Algae, cattail, rushes, duckweed, reeds	■ Garbage cleanup	■ None	■ Common Carp
Unnamed Tributary of Welland River -23	WC-28	■ Ephemeral	■ Warmwater	■ Indirect	■ Upstream: Silt, sand ■ Downstream: Sand, silt, detritus, muck	■ Upstream: Run 100% ■ Downstream: Run 65%; Culvert 25%; Flat 10%	■ Instream: Cattail, grasses, rushes	■ None	■ None	■ Not Available
Unnamed Tributary of Welland River -24	WC-29	■ Intermittent	■ Warmwater	■ Indirect	■ Upstream: Sand, silt, gravel ■ Downstream: Sand, silt, detritus	■ Upstream: Run 100% ■ Downstream: Flat 100%	■ Instream: Grasses, rushes, algae, phragmites, cattails	■ Address bank erosion ■ Low flow and absent channel are potential seasonal migratory barriers	■ None	■ Not Available
Unnamed Tributary of Welland River -24	WC – 29a	■ Ephemeral	■ Warmwater	■ Indirect	■ Upstream: Terrestrial grasses, detritus ■ Downstream: Muck 95%, boulder 5%	■ Upstream: Dry ■ Downstream: Dry	■ Instream: Cattail, phragmites ■ Riparian: Honeysuckle, Manitoba Maple, Purple Loosestrife, grasses, shrubs	■ Invasive plant management	■ None	■ Not Available
Unnamed Tributary of Welland River -24	WC – 29c	■ Ephemeral	■ Warmwater	■ Indirect	■ Upstream: Muck, gravel, detritus ■ Downstream: Muck 100%	■ Upstream: Other (standing water) ■ Downstream: Other (standing water)	■ Instream: Manna grass, phragmites, cattail, soft stem rush ■ Riparian: Asters, Canada Thistle, Teasle, Honeysuckle	■ Invasive plant management	■ None	■ Not Available

5.1.6 Terrestrial Ecosystems

A background review was completed to obtain information on known natural heritage features and species records including Species at Risk within the Study Area. As part of the background review, the Ministry of Natural Resources and Forestry, Ministry of the Environment, Conservation and Parks and Conservation Authorities were consulted to acquire background natural heritage information. Field reviews were also completed in accordance with the Ontario Ministry of Transportation's Environmental Reference for Highway Design to supplement available background information.

Figures for the subsequent sections (**Sections 5.1.6.1 – 5.1.6.4**) can be viewed in **Appendix A, Figures A-3.1 to A-3.20**.

5.1.6.1 Designated Significant Natural Areas

Natural features and areas identified for protection in the Provincial Policy Statement and other legislation (e.g., Greenbelt Act, 2005) are collectively referred to as 'designated natural areas. These include, but are not limited to, Areas of Natural and Scientific Interest, significant wetlands, Environmentally Significant/Sensitive Area, etc., and may be identified by the planning authority (e.g., province, municipality, conservation authority).

There is one environmentally significant / sensitive area in the Study Area. It is located at the Hamilton Golf and Country Club, which is located in at the northern limits of the Study Area north of Highway 403. There is also three regionally significant wetland units located south of Highway 6 South between Glancaster Road and White Church Road West along with some environmental policy areas such as the Greenbelt Protected Countryside and Natural Heritage System, City of Hamilton Urban and Rural Officials Plans Natural Heritage Systems and Deer Wintering Areas.

A summary of designated natural areas within the Study Area is provided in **Table 6** below.

Table 6: Designated Natural Areas within the Study Area

Area Type	Designated Natural Areas	Location Within Study Area
Environmentally Significant / Sensitive Areas	Hamilton Golf and Country Club	Located in the northern limits of the Study Area north of Highway 403.
Wetlands	Welland River Headwater Tributaries Wetland Complex Regionally Significant Wetland.	Three wetland units located south of Highway 6 South, between Glancaster Road and White Church Road West.
Wetlands	Unevaluated Wetlands	17 unevaluated wetland units are present within the Study Area.
Policy Areas	Deer Wintering Areas (Ministry of Natural Resources and Forestry)	A Stratum 2 Deer Wintering Area is present between Garner Road East and Book Road East.
Policy Areas	Greenbelt Plan - Protected Countryside and the Greenbelt Natural Heritage System	Includes a large section of the Study Area from Book Road East, south to the southern limit of the Study Area at Upper James Street.
Policy Areas	City of Hamilton Urban Hamilton Official Plan – Natural Heritage System[1]	The Urban Natural Heritage System Core Areas, Linkages, and areas of Parks & General throughout the northern portion of the Study Area.
Policy Areas	City of Hamilton Rural Hamilton Official Plan – Natural Heritage System[1]	The Rural Natural Heritage System Core Areas and Linkages and areas of Parks & General throughout the central and southern portions of the Study Area.

5.1.6.2 Vegetation Communities and Plants

In Ontario, vegetation communities are delineated according to the Ecological Land Classification system. The Ecological Land Classification system provides methods for identifying and mapping vegetation communities in a way that can be used for land use planning. The Study Area is located within Ecoregion 7E (Lake Erie-Lake Ontario). Ecoregion 7E, which is part of the Mixedwood Plains Ecozone, extends from Windsor to Toronto and includes the Niagara Region. The Lake Erie Lowland Ecoregion is underlain by carbonate-rich, Paleozoic bedrock, and is dominated by a variety of deep glacial deposits. Forests in this Ecoregion, which are sparse due to urban development and agriculture, are characterized by sugar maple (*Acer saccharum*), American beech (*Fagus grandifolia*), oaks (*Quercus* spp.), ash (*Fraxinus* spp.), American elm (*Ulmus americana*), eastern cottonwood (*Populus deltoids*), balsam poplar (*Populus balsamifera*) and silver maple (*Acer saccharinum*).

Agricultural lands largely represent the Study Area with some residential and commercial properties present along with the John C. Munro Hamilton International Airport. Natural areas are generally limited to remnant woodlands and wetlands persisting in an otherwise agriculturally dominated landscape, with some larger naturalized areas intersecting the Study Area.

It was confirmed that vegetation communities within the Study Area include deciduous, and mixed forests, plantations, cultural woodlands, thickets, and meadows, wetlands, and open water communities as well as deciduous swamps and swamp thickets communities. A total of 27 different vegetation community types were examined. Three rare vegetation communities were identified within the Study Area. Two Fresh - Moist Black Walnut Lowland Deciduous Forest communities were located at the northwest corner of Book Road East and Highway 6 South and one Fresh - Moist Shagbark Hickory Deciduous Forest community was located between Garner Road East and Book Road East. The Fresh - Moist Shagbark Hickory Deciduous Forest community is intersected by the existing Highway 6 South.

Vegetation communities present along existing roadways within the Ontario Ministry of Transportation right-of-way, which have resulted from or have been maintained by anthropogenic disturbances (for example seed mixes and plantings as part of restoration activities and / or continued maintenance or mowing), were largely delineated and classified as Dry-Fresh Old Field Cultural Meadow and Mineral Cultural Thicket communities with some exceptions (for example, directly North and South of Book Road East) where the right-of-way extends beyond the limits of the road corridor. Vegetation within the right-of-way was largely characterized by large proportions of exotic and invasive species.

Three Species at Risk and Species of Conservation Concern plant records were identified in the vicinity of the Study Area through a review of the background information sources. Further details on the vegetation communities observed is summarized in **Table 7**.

Table 7: Summary of Vegetation Communities within the Study Area

Ecological Land Classification Code	Tree Canopy	Shrub Layer	Ground Layer	Location in Study Area	Comments
Dry – Fresh Old Field Cultural Meadow	■ Typical species included green ash (*Fraxinus pennsylvanica*), trembling aspen (*Populus tremuloides*), eastern cottonwood (*Populus deltoides*), Manitoba maple (*Acer negundo*), white elm (*Ulmus americana*), bitternut hickory (*Carya cordiformis*), eastern white pine (*Pinus strobus*), and Scots pine (*Pinus sylvestris*).	■ Typically dominated by common buckthorn (*Rhamnus cathartica*), gray dogwood (*Cornus racemosa*), red-osier dogwood (*Cornus sericea*) staghorn sumac (*Rhus typhina*), multiflora rose (*Rosa multiflora*), North American red raspberry (*rubus ideas* spp*. strigosus*) and Allegheny Blackberry (*Rubus allegheniensis*).	■ Dominant species included smooth brome (*Bormus inermis)*, reed canary grass (*Phalaris arundinacea* var*. arundinacea*), panicled aster (*Symphyotrichum lanceolatum*), Canada goldenrod (*Solidago canadensis*), tall goldenrod (*Solidago altissima*), New England aster (*Symphyotrichum novae-ang acemoseliae*), heath aster (*Symphyotrichum ercoides*), tufted vetch (*Vicia cracca*), Canada thistle (*Cirsium arvense*), tall goldenrod (*Solidago altissima*), coltsfoot (*tussilago farfara*), field sow thistle (*Sonchus arvensis*), Kentucky bluegrass (*Poa pratensis*), grass-leaved goldenrod (*Euthamia graminafolia*), bird's-foot trefoil (*Lotus corniculatus*), erect hedge-parsley (*Torilis japonica*), white sweet-clover (*Melilotus alba*), and wild chicory (*Cichorium intybus*)	■ Cultural meadow communities were present throughout the Study Area.	■ None
Coniferous Plantation Ecosite	■ Dominant species included Norway spruce (*Picea abies*), with some tamarack (*Larix laricina*)	■ Typical species included green ash, white ash (*Fraxinus americana*), red elderberry (*Sambucus racemosa*), riverbank grape (*Vitis riparia*), and North American red raspberry.	■ Dominant species included herb-robert (*Geranium robertianum*), spotted jewelweed (*Impatiens capensis*), yellow avens (*Geum aleppicum*), heart-leaved aster (*Symphyotrichum cordifolium*), broad-leaved enchanter's nightsade (*Circaea canadensis*), and erect hedge-parsley.	■ This community was located on the east side of Highway 6, south of Butter Road.	■ None
White Pine Coniferous Plantation	■ Dominant species included White pine and Norway spruce.	■ Dominated by European buckthorn (*Rhamnus cathartica*) with some grey dogwood, river bank grape, and thicket creeper (*Parthenocissus vitacea*).	■ Typical species included yellow avens, and garlic mustard (*Alliaria petiolate*).	■ This community was located at the northeastern most extent of the Study Area, on the north side of Highway 403.	■ None

Ecological Land Classification Code	Tree Canopy	Shrub Layer	Ground Layer	Location in Study Area	Comments
White Spruce Coniferous Plantation	■ Dominated by white spruce (*Picea glauca*), followed by some black cherry (*Prunus serotina*), Scots pine, and trembling aspen.	■ Typical species included trembling aspen, European buckthorn, multiflora rose, riverbank grape, and staghorn sumac (*Rhus typhina*).	■ Typical species included Trembling aspen, tall goldenrod, Canada goldenrod, wood avens (*Geum urbanum*), calico aster (*Symphyotrichum lateriflorum*), arrow-leaved aster (*Symphyotrichum urophyllum*), and poison ivy (*Toxicodendron radicans*)	■ This community was located on the west side of Highway 6 South, south of Butter Road.	■ None
Mineral Cultural Thicket Ecosite	■ Typical species included white ash, Manitoba maple, green ash, black cherry, black locust (*Robinia pseudoacacia*), and black walnut (*Juglans nigra*).	■ Dominated by European buckthorn, grey dogwood, hawthorn species (*Crataegus* sp.) and nannyberry (*Viburnum lentago*).	■ Dominant species included tall goldenrod, European buckthorn, aster species (*Symphyotrichum* sp.), and Kentucky bluegrass.	■ Most cultural thicket communities are focused on the northwestern end of the Study Area, south of Highway 403 and west of Highway 6 South, though they were present throughout the Study Area a example outdoor basketball courts etcetera Area.	■ None
Sumac Cultural Thicket	■ Typical species included eastern cottonwood, bitternut hickory, black walnut, Manitoba maple, and black cherry.	■ Dominated by staghorn sumac, with some Morrow's honeysuckle (*Lonicera morrowii*), grey dogwood, Tatarian honeysuckle (*Lonicera tatarica*), multiflora rose, and European buckthorn.	■ Dominant species included Kentucky bluegrass, tall goldenrod, aster species, smooth brome, orchard grass (*Dactylis glomerata*), and Canada goldenrod.	■ Sumac cultural thicket communities were present on the east side of Highway 6 South, south of Butter Road, and on the north side of Highway 403.	■ None
Gray Dogwood Cultural Thicket	■ The community lacked a defined canopy.	■ Dominated by grey dogwood, with some European buckthorn, Tatarian honeysuckle, and Manitoba maple.	■ Dominant species included Kentucky bluegrass, smooth brome, tall goldenrod, and white heath aster (*Symphyotrichum ericoides*).	■ This community was located east of Upper James Street on the north and south side of White Church Road.	■ None

Ecological Land Classification Code	Tree Canopy	Shrub Layer	Ground Layer	Location in Study Area	Comments
Mineral Cultural Woodland Ecosite	■ Typical species included eastern cottonwood, eastern white pine, sugar maple (*Acer saccharum*), American beech (*Fagus grandifolia*), black locust, Norway maple (*Acer platanoides*), and black walnut.	■ Typical species included European buckthorn, multiflora rose, staghorn sumac, riverbank grape, North American red raspberry, red-osier dogwood,	■ Typical species included smooth brome, Canada goldenrod, tall goldenrod, reed canary grass, Kentucky blue-grass, yellow avens, and broad-leaved enchanter's nightshade,	■ Cultural woodland communities were present throughout the Study Area.	■ The community north of Garner Road, west of Highway 6 South contained a Mineral Meadow Marsh inclusion. ■ The community north of Book Road East, west of Highway 6 South contained a Mineral Meadow Marsh inclusion. ■ The community south of Book Road East, west of Highway 6 South contained a Buttonbush Mineral Thicket Swamp inclusion. ■ The community within the Highway 6 South right-of-way on the west side, south of Book Road East, contained a Buttonbush Mineral Thicket Swamp inclusion. ■ The community within the Highway 6 South right-of-way on the east side, south of Book Road East, was complexed with a Cultural Thicket community.
Dry – Fresh Upland Deciduous Forest Ecosite	■ Dominated by black walnut with some black cherry, eastern white pine, green ash, and shagbark hickory (*Carya ovata*).	■ Dominant species included European buckthorn, Morrow's honeysuckle, riverbank grape, grey dogwood, and multiflora rose.	■ Dominant species included Kentucky bluegrass, redtop (*Agrostis gigantea*), tall goldenrod, Canada avens, black raspberry (*Rubus occidentalis*), thicket creeper, and Canada goldenrod.	■ Fresh upland deciduous forest ecosites are present throughout the Study Area.	■ The community east of Highway 6 South on the North side of Book Road East contains a moist lowland deciduous forest ecosite inclusion.
Dry - Fresh Beech Deciduous Forest	■ Dominated by American beech followed by bitternut hickory, sugar maple, and black cherry.	■ Dominated by American beech, black cherry, bitternut hickory, and alternate-leaved dogwood (*Cornus alternifolia*).	■ Dominated by Virginia smartweed (*Persicaria virginiana*), thicket creeper, Canada avens, and broad-laved enchanter's nightshade.	■ This community was located east of Glancaster Road on the south side of Highway 6 South.	■ None
Dry - Fresh Sugar Maple Deciduous Forest	■ Dominated by sugar maple followed by American beech, bitternut hickory, white elm, eastern cottonwood, and black cherry.	■ Dominant species included European buckthorn, American beech, green ash, North American red raspberry, chokecherry (*Prunus virginiana*), and alternate-leaved dogwood	■ Dominant species included young sugar maple, plantain-leaved sedge (*Carex plantaginea*), Pennsylvania sedge (*Carex pensylvanica*), yellow avens thicket creeper, and garlic mustard.	■ One community was located west of Woodworth Drive on the north side on Highway 403. ■ One community was located east of Glancaster Road, south of Highway 6 South.	■ The community west of Woodworth Drive on the north side on Highway 403 was complexed with a Cultural Thicket community.

Ecological Land Classification Code	Tree Canopy	Shrub Layer	Ground Layer	Location in Study Area	Comments
Dry - Fresh Sugar Maple - Beech Deciduous Forest	■ Dominated by sugar maple followed by American beech black cherry, bitternut hickory, white oak (*Quercus alba*), and red oak (*Quercus rubra*)	■ Dominant species included sugar maple, chokecherry, European buckthorn, and alternate-leaved dogwood.	■ Dominant species included young sugar maple, broad-leaved enchanter's nightshade, sedge species (*carex* sp.), Canada avens, and running strawberry-bush (*Euonymus obovatus*).	■ One community was located south of Book Road East on the east side of Highway 6 South. ■ One community was located on the southwest side of Highway 6, south of Butter Road. ■ One community was located on the south side of Highway 6 South at the Hamilton International Airport exit.	■ The community south of Book Road East on the east side of Highway 6 South contained a green ash mineral deciduous swamp inclusion.
Fresh - Moist Lowland Deciduous Forest	■ Dominated by crack willow followed by black cherry and black walnut.	■ Dominated by crack willow followed by Manitoba maple, black walnut, grey dogwood, European buckthorn, and riverbank grape.	■ Dominant species included tall goldenrod, Canada goldenrod, and panicled aster.	■ This community was located at the northeast corner of Butter Road and Highway 6 South.	■ None
Fresh - Moist Willow Lowland Deciduous Forest	■ Dominated by willow species (*Salix* sp.) followed by black walnut and black cherry.	■ Dominated by willow species, white elm, green ash, Manitoba maple, European buckthorn, riverbank grape, and grey dogwood.	■ Dominant species included tall goldenrod, Canada goldenrod, New England aster (*Symphyotrichum novae-angliae*), panicled aster, sow-thistle species (*Sonchus* sp.), wild chicory, and European reed (*Phragmites australis* ssp. *australis*).	■ This community was located at the southwest corner of Butter Road and Highway 6 South.	■ None
Fresh - Moist Black Walnut Lowland Deciduous Forest	■ Dominated by black walnut followed by white elm, eastern cottonwood, green ash, and Manitoba maple.	■ Dominated by European buckthorn followed by Manitoba maple and grey dogwood.	■ Dominated by tall goldenrod, panicled aster, redtop, spotted jewelweed, Virginia smartweed, and reed canary grass.	■ Both communities are located at the northwest corner of Book Road East and Highway 6 South.	■ The west-most community is complexed with a Cultural Thicket community
Fresh - Moist Shagbark Hickory Deciduous Forest	■ Dominated by shagbark hickory, red maple (*Acer rubrum*), ash species (*Fraxinus* sp.), and bitternut hickory.	■ Dominated by European buckthorn, grey dogwood, multiflora rose, and nannyberry.	■ Dominant species included sedge species, sensitive fern (*Onoclea sensibilis*), ash species, and European buckthorn.	■ One community was located between John Frederick Drive and Highway 6 South ■ One community was located on the east side of Highway 6 South, south of Garner Road.	■ The community on the east side of Highway 6 South, south of Garner Road contained a Cultural Woodlands inclusion.
Dry - Fresh White Pine – Sugar Maple Mixed Forest Type	■ Dominated by eastern white pine followed by sugar maple, black cherry, American beech, eastern hop-hornbeam (*Ostrya virginiana*), and bitternut hickory.	■ Dominated by European buckthorn, multiflora rose, and chokecherry.	■ Dominated by broad-leaved enchanter's nightshade, thicket creeper, riverbank grape, and common lady fern (*Athyrium filix-femina*).	■ This community was located south of Book Road East and east of Highway 6 South.	■ None

Ecological Land Classification Code	Tree Canopy	Shrub Layer	Ground Layer	Location in Study Area	Comments
Mineral Meadow Marsh Ecosite	■ The community lacked a defined canopy.	■ The community lacked a defined shrub layer.	■ Dominated by European common reed and narrow-leaved cattail (*Typha angustifolia*) followed by aster species and spotted jewelweed.	■ This community was located at the southwest corner of Book Road East and Highway 6 South.	■ None
Reed-canary Grass Mineral Meadow Marsh	■ The community lacked a defined canopy.	■ The community lacked a defined shrub layer.	■ Dominated by reed canary grass followed by some European common reed, hybrid cattail (*Typha* x *glauca*), cutgrass species (*Leersia* sp.) and spotted jewelweed.	■ One community was located east of Glancaster Road on the north side of Highway 6 South. ■ Two communities are located on the south side of Highway 6 South at the Hamilton International Airport exit	■ None
Shallow Marsh Ecosite	■ Dominated by eastern cottonwood.	■ Dominated by purple willow (*Salix purpurea*), balsam poplar (*Populus balsamifera*), sandbar willow (*Salix interior*) and eastern cottonwood.	■ Dominated by European reed followed by narrow-leaved cattail, reed canary grass, spreading dogbane (*Apocynum androsaemifolium*), scouring-rush (*Equisetum hyemale*), and Alpine rush (*Juncus alpinoarticulatus*).	■ This community was located on the southwest side of the Highway 403 exit ramp to Highway 6 South.	■ None
Cattail Mineral Shallow Marsh	■ Dominant species included hybrid crack willow (*Salix* x *fragilis*), Manitoba maple, black walnut, and eastern cottonwood.	■ Dominant species included grey dogwood, European buckthorn, staghorn sumac, and sandbar willow.	■ Dominated by narrow-leaved cattail, broad-leaved cattail (*Typha latifolia*), and hybrid cattail followed by reed canary grass, European common reed, and spotted jewelweed.	■ Cattail mineral shallow marsh communities were present throughout the Study Area.	■ The community south of Highway 6 South on the east side Glancaster Road was complexed with a bulrush mineral shallow marsh community. ■ The community at the northwest corner of Highway 6 and White Church Road was complexed with an open aquatic ecosite.
Open Aquatic Ecosite	■ The community lacked a defined canopy.	■ The community lacked a defined shrub layer.	■ Dominated by broad-leaved cattail, narrow-leaved cattail, and reed canary grass, followed by devil's beggarticks (*Bidens 48rondose*). The water surface was dominated by common duckweed (*Lemna minor*).	■ One community was located at the southeast corner of Book Road East and Highway 6 South. ■ One community was located at the southwest corner of Glancaster Road and Highway 6 South. ■ One community was located at the northeast corner of White Church Road and Highway 6.	■ The community located at the southeast corner of Book Road East and Highway 6 South is complexed with a mineral swallow marsh community. ■ The community located at the southwest corner of Glancaster Road and Highway 6 South is complexed with a mineral swallow marsh community. ■ The community located at the northeast corner of White Church Road and Highway 6 South is complexed with a mineral swallow marsh community.

Ecological Land Classification Code	Tree Canopy	Shrub Layer	Ground Layer	Location in Study Area	Comments
Shallow Aquatic Ecosite	■ The community lacked a defined canopy.	■ The community lacked a defined shrub layer.	■ Dominated by broad-leaved cattail with some reed canary grass, and needle spikerush (*Eleocharis acicularis*). The water column was dominated by milfoil species (*Myriophyllum* sp.) and pondweed species (*Potamogeton* sp.).	■ This community was located at the southeast corner of Butter Road and Highway 6 South.	■ This community is complexed with a mineral swallow marsh community.
Willow Mineral Deciduous Swamp	■ Dominated by crack willow, black walnut, silver maple (*Acer saccharinum*), green ash, and eastern cottonwood.	■ Dominated by grey dogwood, sandbar willow, red osier dogwood, and European buckthorn.	■ Dominated by rice cutgrass (*Leersia oryzoides*) with some spotted joe pye weed (*Eutrochium maculatum*), broad-leaved cattail, and tall goldenrod.	■ This community was located east of Highway 6 South on the north side of Book Road East.	■ None
Alder Mineral Thicket Swamp	■ Dominated by European black alder (*Alnus glutinosa*) and hybrid crack willow.	■ Dominated by grey alder (*Alnus incana*) with some grey dogwood and red-osier dogwood.	■ Dominated by eastern skunk cabbage (*Symplocarpus foetidus*), redtop, common marsh bedstraw (*Galium palustre*), and spotted jewelweed.	■ This community was located on the southwest side of the Highway 403 exit ramp to Highway 6 South.	■ None
Willow Mineral Thicket Swamp	■ The community lacked a defined canopy.	■ Dominated by sandbar willow with some grey dogwood, European buckthorn, trembling aspen, and black raspberry.	■ Dominated by narrow-leaved cattail broad-leaved cattail, spotted jewelweed, and reed canary grass with some water sedge (*Carex aquatilis*).	■ Willow mineral thicket swamp communities were present throughout the Study Area.	■ None
Red-osier Mineral Thicket Swamp	■ The community lacked a defined canopy.	■ Dominated by red-osier dogwood and American black currant (*Ribes americanum*) with some common elderberry (*Sambucus canadensis*) and narrow-leaved cattail.	■ Dominated by American hog-peanut (*Amphicarpaea bracteate*), redtop, eastern skunk cabbage, and spotted jewelweed.	■ One community was located at the northeast corner of Book Road East and Highway 6 South. ■ One community was located at the northwest corner of Book Road and Highway 6 South.	■ None

5.1.6.3 Wildlife and Significant Wildlife Habitat

5.1.6.3.1 Amphibian Habitat

Amphibian night call surveys followed the protocol as outlined under the Bird Studies Canada 2009 Marsh Monitoring Program Participant's Handbook for Surveying Amphibians. Surveys were completed on three separate occasions (at least 15 days apart) between April and June: April 29, May 19, and June 28, 2023. A total of nine locations were confirmed to be potentially suitable as they contained either permanent or seasonal standing water. Amphibians were recorded calling at the majority of the stations during at least one date. Species recorded included the Grey Treefrog, Green Frog and Spring Peeper. Only one station met the criteria of Amphibian Breeding Habitat (Wetlands) significant Wildlife Habitat as defined in the Significant Wildlife Habitat Criteria Schedule for Ecoregion 7E document published by the Ministry of Natural Resources and Forestry in January 2015.

5.1.6.3.2 Breeding Birds

Breeding bird surveys were conducted in a variety of different habitats representative of the Study Area including forest, woodland, thicket, meadow, and marsh. While habitat is generally concentrated outside the highway right-of-way, migratory birds may also nest within the highway right-of-way where there are trees, shrubs, or dense ground vegetation cover.

A total of 59 species were identified over two rounds of point count sampling. Of these, breeding evidence was confirmed for the following species that are protected under the Migratory Birds Convention Act:

- American Robin (*Turdus migratorius*)
- Eastern Bluebird (*Salia sialis*)
- Red-winged Blackbird (*Agelaius phoeniceus*)
- Song Sparrow (*Melospiza melodia*)
- Tree Swallow (*Tachycineta bicolor*)
- White-breasted Nuthatch (*Sitta carolinensis*)
- Wild Turkey (*Meleagris gallopavo*)

No Species at Risk or Species of Conservation Concern had confirmed breeding evidence; however, Eastern Wood-pewee was the only Species of Conservation Concern that was observed with probable breeding evidence.

In should be noted that all structures along Highway 6 South and the crossing roads, where safety and access on private property was granted, were checked for the

presence / absence of bird nests. Nests observed on structures within the Study Area included the following species protected under the Migratory Birds Convention Act: Barn Swallow (*Hirundo rustica)*, Cliff Swallow (*Petrochelidon pyrrhonota*), and Eastern Phoebe (*Sayornis phoebe*). The single Barn Swallow nest under the Glancaster Road bridge did not have adults or young present, or eggshells beneath the nest during the breeding bird season. As such, it is believed that this nest was not active.

5.1.6.3.3 Incidental Wildlife Observations

During the confirmation of existing conditions, any evidence (e.g., observation, scat, tracks, calls, etc.) of wildlife and their associated habitat and habitat usages were documented. Incidental wildlife observations, other than birds, made during field investigations are provided in **Table 8**.

5.1.6.3.4 Significant Wildlife Habitat

Several candidate Significant Wildlife Habitat were identified to potentially occur in the Study Area based on information collected through a review of available background resources and interpretation of aerial photography. Further analysis using the results of the field investigations confirmed the presence of three Significant Wildlife Habitat types within the Study Area. The following provides details regarding confirmed Significant Wildlife Habitats:

- **Deer Winter Congregation Areas** – A White-tailed Deer Wintering Area (Stratum 2) is present within the Study Area between Garner Road East and Book Road East. Although qualifying forested ecosites do not meet the size criteria (greater than 50 hectares), this type of Significant Wildlife Habitat is mapped by the Ministry of Natural Resources and Forestry and assumed confirmed.
- **Rare Vegetation Communities**
  - Two Fresh - Moist Black Walnut Lowland Deciduous Forests (FOD7-4) were confirmed within the Study Area located at the northwest corner of Book Road East and Highway 6 South.
  - Fresh - Moist Shagbark Hickory Deciduous Forest (FOD9-4) were confirmed within the Study Area. One community is located between John Frederick Drive and Highway 6 South and the second is located on the east side of Highway 6 South, south of Garner Road East.
  - **Amphibian Breeding Habitat (Wetlands)** - The required number of indicator species (2 or more of the listed frog / toad species with Call Level Codes of 3) were recorded calling with a Call Code Level of 3. A chorus of Spring Peepers and Gray Treefrog were both recorded on May 19, 2022.

Table 8: Incidental Wildlife Observation

Taxon	Common Name	Scientific Name	S-Rank	Endangered Species Act Status
Amphibians	American Toad	*Anaxyrus americanus*	S5	-
Amphibians	Green Frog	*Lithobates clamitans*	S5	-
Amphibians	Northern Leopard Frog	*Lithobates pipiens*	S5	NAR
Arachnids	Banded Garden Orbweaver	*Argiope trifasciata*	S5	-
Arachnids	Shamrock Orbweaver	*Araneus trifolium*	S5	-
Arachnids	Spined Orbweaver	*Micrathena gracilis*	S3S4	-
Arachnids	Yellow Garden Orbweaver	*Argiope aurantia*	S5	-
Birds	American Goldfinch	*Spinus tristis*	S5B	-
Birds	Baltimore Oriole	*Icterus galbula*	S4B	-
Birds	Barn Swallow	*Hirundo rustica*	S4B	SC
Birds	Blue-headed Vireo	*Vireo solitarius*	S5B	-
Birds	Blue Jay	*Cyanocitta cristata*	S5	-
Birds	Cliff Swallow	*Petrochelidon pyrrhonota*	S4B	-
Birds	Common Yellowthroat	*Geothlypis trichas*	S5B	-
Birds	Downy Woodpecker	*Dryobates pubescens*	S5	-
Birds	Eastern Phoebe	*Sayornis phoebe*	S5B	-
Birds	Eastern Wood-pewee	*Contopus virens*	S4B	SC
Birds	Gray Catbird	*Dumetella carolinensis*	S4B	-
Birds	Great Crested Flycatcher	*Myiarchus crinitus*	S4B	-
Birds	Indigo Bunting	*Passerina cyanea*	S4B	-
Birds	Mallard	*Anas platyrhynchos*	S5	-
Birds	Northern Cardinal	*Cardinalis cardinalis*	S5	-
Birds	Northern Flicker	*Colaptes auratus*	S4B	-
Birds	Northern Mockingbird	*Mimus polyglottos*	S4	-
Birds	Red-eyed Vireo	*Vireo olivaceus*	S5B	-
Birds	Red-tailed Hawk	*Buteo jamaicensis*	S5	NAR
Birds	Song Sparrow	*Melospiza melodia*	S5B	-
Birds	Spotted Sandpiper	*Actitis macularius*	S5B	
Birds	Warbling Vireo	*Vireo gilvus*	S5B	-
Birds	Wild Turkey	*Meleagris gallopavo*	S5	-
Crustaceans	Calico Crayfish	*Faxonius immunis*	S4	-
Insects – Coleoptera	Hide Beetle species	*Trox* sp.	-	-
Insects – Coleoptera	Immaculate Rove Beetle	*Platydracus immaculatus*	S4	-
Insects – Diptera	Black-shouldered Drone Fly	*Eristalsis dimidiata*	S5	-
Insects – Diptera	European Drone Fly	*Eristalsis arbustorum*	SNA	-
Insects – Diptera	Narrow-headed Marsh Fly	*Helophilus fasciatus*	S5	-
Insects – Hemiptera	Jagged Ambush Bug	*Phymata americana*	SNR	-
Insects – Hemiptera	Large Milkweed Bug	*Oncopeltus fasciatus*	S4S5	-
Insects – Hymenoptera	Common Eastern Bumble Bee	*Bombus impatiens*	S5	-
Insects – Hymenoptera	Two-spotted Bumble Bee	*Bombus bimaculatus*	S5	-
Insects – Lepidoptera	Baltimore Checkerspot	*Euphydryas phaeton*	S4	-
Insects – Lepidoptera	Black Swallowtail	*Papilio polyxenes*	S5	-
Insects – Lepidoptera	Cabbage White	*Pieris rapae*	SNA	-
Insects – Lepidoptera	Clouded Sulphur	*Colias philodice*	S5	-
Insects – Lepidoptera	Common Ringlet	*Coenonympha california*	S5	-
Insects – Lepidoptera	Common Wood-nymph	*Cercyonis pegala*	S5	-
Insects – Lepidoptera	Eastern Tailed Blue	*Cupido comyntas*	S5	-
Insects – Lepidoptera	Gray Comma	*Polygonia progne*	S5	-
Insects – Lepidoptera	Great Spangled Fritillary	*Speyeria cybele*	S5	-
Insects – Lepidoptera	Hickory Hairstreak	*Satyrium caryaevorus*	S4	-
Insects – Lepidoptera	Monarch	*Danaus plexippus*	S2N,S4B	SC
Insects – Lepidoptera	Orange Sulphur	*Colias eurytheme*	S5	-
Insects – Lepidoptera	Striped Hairstreak	*Satyrium liparops*	S5	-
Insects – Lepidoptera	Viceroy	*Limenitis archippus*	S5	-
Insects – Mantodea	Chinese Mantis	*Tenodera sinensis*	SNA	-
Insects – Mantodea	Praying Mantis	*Mantis religiosa*	SNA	-
Insects – Odonata	Autumn Meadowhawk	*Sympetrum vicinum*	S5	-
Insects – Odonata	Black Saddlebags	*Tramea lacerata*	S4	-
Insects – Odonata	Common Whitetail	*Plathemis lydia*	S5	-
Insects – Odonata	Eastern Pondhawk	*Erythemis simplicicollis*	S5	-
Insects – Odonata	Lance-tipped Darner	*Aeshna constricta*	S5	-
Insects – Odonata	Shadow Darner	*Aeshna umbrosa*	S5	-
Insects – Odonata	Twelve-spotted Skimmer	*Libellula pulchella*	S5	-
Insects – Orthoptera	Black-legged Meadow Katydid	*Orchelimum nigripes*	S4	-
Insects – Orthoptera	Black-horned Tree Cricket	*Oecanthus nigricornis*	S4	-
Insects – Orthoptera	Differential Grasshopper	*Melanoplus differentialis*	S3	-
Mammals	Bat species	-	-	-
Mammals	Beaver	*Castor canadensis*	S5	-
Mammals	Eastern Chipmunk	*Tamias striatus*	S5	-
Mammals	Eastern Gray Squirrel	*Sciurus carolinensis*	S5	-
Mammals	Muskrat	*Ondatra zibethicus*	S5	-
Mammals	Red Squirrel	*Tamiasciurus hudsonicus*	S5	-
Mammals	White-tailed Deer	*Odocoileus virginianus*	S5	-
Reptiles	Eastern Gartersnake	*Thamnophis sirtalis sirtalis*	S5	
Reptiles	Snapping Turtle	*Chelydra serpentina*	S4	SC

- **Habitat for Special Concern and Rare Wildlife Species** – Species of Conservation Concern with confirmed habitat are shown in **Table 9** below.

Table 9: Species of Conservation Concern Identified with Medium or High Potential to Occur within the Study Area

Taxa	Common Name	Scientific Name	S-Rank[1]	ESA Status[2]	Probability of Occurrence
Amphibian	Western Chorus Frog (Great Lakes / St. Lawrence – Canadian Shield population)	*Pseudacris maculata*	S3	NAR	Medium
Arachnid	Spined Orbweaver	*Micrathena gracilis*	S3S4	-	High
Bird	Barn Swallow	*Hirundo rustica*	S4B	SC	High
Bird	Eastern Wood-Pewee	*Contopus virens*	S4B	SC	High
Bird	Wood Thrush	*Hylocichla mustelina*	S4B	SC	High
Insect	Monarch	*Danaus plexippus*	S2N, S4B	SC	High
Insect	Differential Grasshopper	*Melanoplus differentialis*	S3	-	High
Mammal	Woodland Vole	*Microtis pinetorum*	S3?	SC	Medium
Plant	Perfoliate bellwort	*Uvularia perfoliata*	S1S2	-	Medium
Plant	Kentucky coffee-tree	*Gymnocladus dioica*	S2	-	Medium
Reptile	Snapping Turtle	*Chelydra serpentina*	S4	SC	High

Additional Significant Wildlife Habitats that may be present within the Study Area includes candidate Raptor Wintering Area, candidate Bat Maternity Colonies, candidate Turtle Wintering Areas, candidate Reptile Hibernaculum, candidate Turtle Nesting Areas, candidate Seeps and Springs and candidate habitat for Terrestrial Crayfish.

5.1.6.4 Species at Risk and Species at Risk Habitat

Species at Risk include Endangered or Threatened species under the Ontario Endangered Species Act or migratory birds with these designations under Schedule 1 of the Species at Risk Act. A total of 24 Species at Risk were recorded within the Study Area based on a review of the background information sources. A habitat assessment was completed to determine whether there was potential for the identified Species at Risk to occur within the Study Area.

Species listed as Special Concern provincially are not afforded protection under the Endangered Species Act but have been included in the Species at Risk screening to avoid future implications should the status of these species change under the Endangered Species Act. Furthermore, habitats of Species of Conservation Concern, which includes Special Concern species, are considered Significant Wildlife Habitat under the Provincial Policy Statement and associated Natural Heritage Reference Manual. For this reason, consideration was given to identifying Special Concern species in addition to Threatened and Endangered species.

Through this assessment, 11 Species at Risk were determined to have high or medium potential to occur in the Study Area based on the candidate habitat being present. A table summarizing these species and the locations of their respective potential habitats is provided in **Table 10** below.

Table 10: Species at Risk Identified with High or Medium Potential to Occur within the Study Area

Taxa	Common Name	Scientific Name	Endangered Species Act Status	Species at Risk Act Status	Probability of Occurrence
Bird	Barn Owl	*Tyto alba*	END	END	Medium
Bird	Bobolink	*Dolichonyx oryzivorus*	THR	THR	Medium
Bird	Eastern Meadowlark	*Sturnella magna*	THR	THR	Medium
Bird	Red-headed Woodpecker	*Melanerpes erythrocephalus*	END	END	Medium
Mammal	Eastern Small-footed Myotis	*Myotis leibii*	END	-	Medium
Mammal	Little Brown Myotis	*Myotis lucifugus*	END	END	Medium
Mammal	Northern Myotis	*Myotis septentrionalis*	END	END	Medium
Mammal	Tricolored Bat	*Perimyotis subflavus*	END	END	Medium
Plant	American chestnut	*Castanea dentata*	END	END	Medium
Plant	Black ash	*Fraxinus nigra*	END	THR	Medium
Plant	Butternut	*Juglans cinerea*	END	END	High

5.2 Socio-Economic Environment

Socio-economic environment studies were undertaken to document and assess existing social and economic features.

5.2.1 Land Use and Property

Background data was collected from relevant secondary sources to identify the existing and planned land use information within the Study Area. A review of the following sources was undertaken:

- Provincial Policy Statement, 2020;
- Growth Plan for Greater Golden Horseshoe, 2020;
- Transportation Plan for the Greater Golden Horseshoe, 2022;
- Greenbelt Plan, 2017;
- Rural Hamilton Official Plan, 2012;
- Urban Hamilton Official Plan, 2013;
- City of Hamilton Transportation Master Plan, 2018;
- City of Hamilton Cycling Master Plan, no date;
- Airport Employment Growth District Transportation Master Plan, 2011;
- John C. Munro Hamilton International Airport's Master Plan and Development, 2010; and
- Municipal secondary plans.

5.2.1.1 Existing Land Use Conditions

The Study Area is located within the City of Hamilton rural and urban areas. The predominant land uses within the Study Area are characterized by 'Rural' and 'Agricultural' lands.

5.2.1.1.1 Agricultural Land

The majority of the lands located within the Study Area are designated as 'Agriculture'. These lands reside to the south of Highway 6 South and range from north of Book Road East to Upper James Street. The intent of agricultural lands is to permit agricultural uses, agricultural-related commercial, agricultural-related industrial uses, and on-farm secondary uses.

It should be noted that the Ontario Ministry of Agriculture, Food and Rural Affairs Agricultural Land Base Map (2018) notes that these lands within the Study Area fall within the 'Prime Agricultural Area' designation, which requires that prime agricultural

areas be protected and designated for long term agricultural use. An *Agricultural Impact Assessment* was prepared as part of this Project, the results of which are summarized in **Section 9** of this report.

Access to Agricultural

There are many access points to agricultural lands throughout the Highway 6 South corridor. Access points are either found on roads that cross the Highway 6 South corridor and do not provide a direct link to Highway 6 South (i.e., Garner Road East, Butter Road East, and Glancaster Road) or have a direct link to the Highway 6 South corridor (for example utility corridor between Garner Road East and Book Road East, Book Road East, and Upper James Street).

5.2.1.1.2 Residential

Lands designated as ‘Neighbourhoods’ within the Study Area are located north of Garner Road East on either side of the Highway 6 South and Highway 403 interchange. Neighbourhood designated lands are also located to the north of Highway 6 South along White Church Road West, White Church Road East, and Upper James Street. These lands contain detached, semi detached and townhouse style residential homes.

5.2.1.1.3 Rural Lands

A large portion of the Study Area on the north side and a small portion on the south side of Highway 6 South is designated as ‘Rural’. These lands range from approximately Garner Road East to Upper James Street. While these lands are characterized as having lower capability for agriculture due to a range of factors, the intent is to protect and maintain agricultural uses as the primary and predominant land use in these areas and to protect farm operations from incompatible forms of development to preserve these lands for agricultural use. Uses permitted in these lands are limited to agricultural uses, agricultural-related commercial, agricultural-related industrial uses, and on-farm secondary uses (as appropriate), other resource-based rural uses and institutional uses serving the rural community.

5.2.1.1.4 Urban Open Space

Portions of land located surrounding the Highway 6 South and Highway 403 interchange along with lands south of Garner Road East and Book Road East are designated as ‘Open Space’ in the City of Hamilton Urban Official Plan (2013). The intent of ‘Open Space’ designated lands is to provide a variety of passive and active recreational opportunities for residents and visitors to the City of Hamilton. The ‘Open Space’ parcels of land described above contain the Hamilton Golf & Country Club and environmental features such as woodlots and water features.

5.2.1.1.5 Rural Open Space

A small portion of land located within the Study Area is designated as 'Open Space' in the City of Hamilton Rural Official Plan (2012). This land resides to the south of Book Road East (east of the Highway 6 South and Book Road East intersection).

5.2.1.1.6 Commercial, Industrial & Tourism

Hamilton Airport Employment Growth District

Lands designated as 'Airport Employment Growth District' allow for various permitted land uses such as manufacturing, warehousing, airport-related industrial uses, hotels, offices, post-secondary schools, restaurants, etc. These lands are located between Garner Road East and Book Road East as well as north of Highway 6 South along Airport Road West.

District Commercial

Land designated as 'District Commercial' are located within the Study Area to the east of John C. Munro Hamilton International Airport along Airport Road West and at the intersection of White Church Road West and Upper James Street. The intent for these lands is to provide retail and service commercial uses to the immediate neighbourhood, which shall include a range of retail shops and services that cater to the daily / weekly shopping needs of residents in the surrounding neighbourhoods.

John C. Munro Hamilton International Airport

The John C. Munro Hamilton International Airport is located north of Airport Road near the south end of the Study Area. The Airport is connected to Highway 6 South via Airport Connection Road. It should be noted that the Study Area falls below the approach and departure flight paths for Runways 06 and 12, and within the boundaries of the John C. Munro Hamilton International Airport Zoning Regulations (SOR/217-200) under the Aeronautics Act, which is under the jurisdiction of Transport Canada. Airport zoning regulations restrict the heights of buildings, structures, and objects (including natural growth, such as trees) on regulated land, and prohibits activities and land uses that attract wildlife – particularly birds.

John C. Munro Hamilton International Airport has two runways that are adjacent to the Highway 6 South corridor. The approach and departure paths for these runways are protected from obstacles and hazards to aeronautical safety through the airport zoning regulations. Another reference considered as part the aeronautical impact assessment

is Transport Canada's publication TP 312 *Aerodrome Standards and Recommended Practices, 5th Edition*. TP 312 standard 2.3.3.8 states, as follows:

> *Objects, including mobile objects in the take-off flight path area that protrude above the plane surface are regarded as obstacles.* ***As a minimum, 5.2 metres of clearance is provided above the crown of a multilane highway****, 4.6 metres above the crown of other roads; and 7.0 metres above the top of the rails of a railway. An aeronautical evaluation, determining the height of the most critical obstacle, establishes the minimum clearance height above a waterway, river, canal, etc.*

Canadian Warplane Heritage Museum

The Canadian Warplane Heritage Museum is located adjacent to the John C. Munro Hamilton International Airport on Airport Road. An amusement centre and flight simulator, Air Combat Zone, is located on the east side of the museum.

5.2.1.1.7 Community Facilities

Academic Institutes

Four academic institutes are located within the Study Area. Christadelphian Heritage College is located on Book Road East adjacent to Southcote Road. Mohawk College, Centre for Aviation Technology is located on the western side of the John C. Munro Hamilton International Airport while Mount Hope Elementary school is located east of John C. Munro Hamilton International Airport on Airport Road. Grandview Adventist Academy is located south of Highway 6 South on Upper James Street.

Religious Institutes

Providence Canadian Reformed Church and Sayyidah Aminah Islamic Centre are located to the east of Highway 6 South on Southcote Road. No other religious institutes are located within the Study Area.

Cemeteries

The following cemeteries are located within the Study Area:

- White Brick Cemetery located at the intersection of Garner Road East and Anson Drive.
- Book-Parkin Cemetery located at the intersection of Highway 6 South and Book Road East.
- Ancaster Pet Cemetery located to the east of Highway 6 South on Book Road East.

- White Church Cemetery located to the east of Highway 6 South on White Church Road West.

5.2.1.1.8 Recreation

Parks

The following neighbourhood parks are located within the Study Area:

- Perth Park located on Woodworth Drive adjacent to Hamilton Golf & Country Club and the northside of Highway 403.
- Maple Lane Park located on Miller Drive. The park is situated west of Highway 6 South and north of Garner Road East.
- Bookjans Park located at the intersection of Bookjans Drive and John Frederick Drive. The park is situated to the north of Garner Road East and east of Highway 6 South.
- Harmony Park located on Annalee Drive. The park is situated north of Garner Road East and east of the Highway 6 South / Highway 403 interchange.
- Moorland Park located on Moorland Crescent. The park is situated north of Garner Road East and east of the Highway 6 South / Highway 403 interchange.
- Water Reserve Park located on the northside of White Church Road West on the western side of Highway 6 South.
- Southampton Estates Park located on Thames Way. The park is situated east of Highway 6 South and north of White Church Road West.

5.2.1.1.9 Utilities

The lands designated as ‘Utilities’ in the Study Area are reserved for significant utility infrastructure such as hydroelectric transmission facilities, pipelines, stormwater management facilities, etc. Utility lands are located between Garner Road East and Book Road East running perpendicular to Highway 6 South. These lands contain a Hydro One Network Inc. hydroelectric transmission corridor and infrastructure. In addition, there is a TransCanada pipeline north of Book Road East in proximity to the aforementioned Utility lands as well as an Enbridge Gas pipeline near Airport Connection Road.

5.2.1.2 Future and Planned Land Use

There are a variety of development projects taking place in the City of Hamilton. Within the Project Limits or immediately adjacent, there are approximately 38 development applications at the time of writing of the Land Use Factors Report (19 residential related applications, 17 commercial / industrial related applications, and 2 telecommunication related applications). It should be mentioned that the City of Hamilton's Airport Employment Growth District is anticipated to change the existing land use surrounding the Highway 6 South corridor in the future.

5.2.2 Noise and Vibration

Land uses designated as noise sensitive by the Ontario Ministry of Transportation Environmental Guide for Noise, 2022, consist of the following:

- Private homes such as single-family residences;
- Townhouses;
- Multiple unit buildings, such as apartments with Outdoor Living Areas for use by all occupants; and
- Hospitals, nursing homes for the aged, where there are Outdoor Living Areas for the patients.

In addition to the above, where certain land uses are considered "part of a community", meaning located next to a Traditional Noise Sensitive Area, and they have been included in the analysis. The land uses considered noise sensitive when part of a community include:

- Educational facilities and day care centres, where there are Outdoor Living Areas for students;
- Campgrounds that provide overnight accommodation;
- Hotels / motels where there are Outdoor Living Areas for visitors;
- Community centres with Outdoor Living Areas (for example outdoor basketball courts etc.);
- Municipal parks (excluding golf courses and trails); and
- Places of worship with Outdoor Living Areas.

Additionally, the following land uses would also qualify as a Noise Sensitive Areas, provided that a new freeway / highway corridor or route is planned:

- Educational facilities and day care centres, where there are Outdoor living Areas for students;

- Campgrounds that provide overnight accommodation;
- Hotels / motels where there are Outdoor Living Areas for visitors;
- Community centres with Outdoor Living Areas (for example outdoor basketball courts etc.);
- Municipal parks only as part of a community (excluding golf courses and trails); and
- Places of worship with Outdoor Living Areas only as part of a community.

Land uses that do not qualify as noise sensitive by the Ontario Ministry of Transportation's Noise Guide, and are not included in the traffic noise assessment, consist of the following:

- Apartment balconies above ground floor;
- Cemeteries;
- All commercial; and
- All industrial.

In general, the areas adjacent to the Project consist mainly of rural areas with scattered residential properties. However, there are more densely populated suburban areas located near the interchange with Highway 403 and north of the terminus at Upper James Street. Noise Sensitive Areas examined as part of the Noise Study are shown in **Appendix A, Figures A-4.1 to A-4.2.**

5.2.3 Air Quality

5.2.3.1 Sensitive and Critical Receptors

Locations of existing sensitive and critical receptors were reviewed within the Study Area. As per the Ontario Ministry of Transportation's Environmental Guide for Assessing and Mitigating the Air Quality Impacts and Greenhouse Gas Emissions of Provincial Transportation Projects (2020), sensitive receptors are defined as all permanent locations of residence (for example detached housing, apartments, and condominiums, etcetera) and critical receptors included health care facilities, educational institutions, childcare facilities, or nursing / long-term care facilities. Within the Study Area, 79 sensitive receptors and six critical receptors were identified.

5.2.3.2 Existing Ambient Air Quality

The baseline ambient air quality levels were based on publicly available historical data from ambient air quality monitoring stations within Ontario. Data utilized is the most recent publicly available at the time of the preparation of this assessment (August

2023). The following National Air Pollution Surveillance air quality monitoring stations were selected as representative of the ambient air quality within the Study Area:

- Beasley Park Hamilton Downtown (NAPS ID 60512)
- Experimental Farm Simcoe (NAPS ID 62601)

These stations are located nearest to the Study Area and monitored (in combination) all relevant Criteria Air Contaminants for the assessment, since one station is unable to monitor all Criteria Air Contaminants. Where multiple stations were found to monitor a common Criteria Air Contaminant, the closest representative station was selected for the assessment.

5.2.4 Contaminated Property

A records review, which included a Study Area inspection and documentation, interpretation, and assessment of data to identify potential source of site contamination within the Study Area based on land uses was completed for the Project. The assessment of presence or absence of site contamination was only based on visual observations made from the roadside in the publicly accessible areas.

No actual sources of contamination were identified during the Study Area reconnaissance. With respect to potential sources of contamination, areas of potential environmental concern with high and moderate potential for contamination were identified within the Study Area and generally include:

- Storage Tanks (above ground and underground storage for heating oil storage, wastewater storage, and equipment refuelling;
- Commercial and Industrial Land Use;
- Fuel Storage Tanks; and
- Waste Disposal and Waste Management Sites.

5.3 Cultural Environment

5.3.1 Archaeology

A Stage 1 archaeological assessment was undertaken in accordance with the requirements of the Ontario Heritage Act and the Standards and Guidelines for Consultant Archaeologists.

Based on a review of the Ontario Archaeological Sites Database, there are 100 registered archaeological sites within or in close proximity to the Study Area.

The Stage 1 Archaeological Assessment captured three cemeteries located within the Study Area. These include the Book-Parkin Cemetery, White Church Cemetery and Ancaster Pet Cemetery. It is pertinent to note that only Book-Parkin Cemetery and White Church Cemetery contain human burials and remains; the Ancaster Pet Cemetery contains exclusively the burials and remains of domestic animals (pets). As such, it was not subject to the same recommendations as those cemeteries containing human burials and remains, per the guidance provided by the Ministry of Citizenship and Multiculturalism. Through the Stage 1 background research and property inspection completed, the fenced boundaries of Book-Parkin Cemetery and White Church Cemetery were confirmed and are all determined and intact. Based on the background information, mapping, diagrams where available, and consultation with cemetery management (City of Hamilton), there is low potential for unmarked human burials to exist beyond the known cemetery property limits within the Study Area for both Book and White Church cemeteries.

Based on the results of the Stage 1 Archaeological Assessment, the potential for the recovery of archaeological resources within the Study Area is high. Areas where archaeological potential has been removed include areas determined to have been subject to extensive land alterations that have significantly compromised the recovery of archaeological materials, constructed roadways, and buildings. With regard to cemeteries, the existing fence line of Book-Parkin Cemetery and White Church Cemetery have been confirmed to represent the legal limits of the cemetery properties.

5.3.2 Built Heritage

A Cultural Heritage Resource Assessment Report was prepared to identify all potential built heritage resources and cultural heritage landscapes located within the Study Area. A total of six Built Heritage Resources and 22 Cultural Heritage Landscapes were identified within the Study Area. An overview of Built Heritage Resources and Cultural Heritage Landscapes is presented in **Table 11.**

Table 11: Overview of Built Heritage Resources and Cultural Heritage Landscapes

Feature IDs	Location/Address	Property Type	Heritage Status	Description of Property
Cultural Heritage Landscape 1	232 Golf Links Road	Golf Course	Inventoried	■ Hamilton Golf and Country Club ■ 18-hole golf private course ■ Founded in 1894 ■ Present course constructed 1914-1917, designed by British architect Harry Shapland Colt ■ Three-storey Chateau-style clubhouse constructed in 1929 ■ Driveway with decorative gateposts off Golf Links Road
Cultural Heritage Landscape 2	167 Book Road East	Residential	Inventoried (Demolished)	■ Adam Book House ■ Constructed in 1831 ■ House was set far back from road, and not visible from public right-of-way ■ Five-bay, two-storey Georgian Style house with low-pitched side-gable roof, paired chimneys, central front entranceway with sidelights. ■ Constructed by Adam Book, son of early settler John Book ■ In the City of Hamilton's Built Heritage Inventory as the oldest brick building in Ancaster ■ Demolished in March 2020, two years after the roof collapsed. ■ Pending City of Hamilton staff review, it may be removed as an active Inventoried property if it is determined that all cultural heritage resources are removed from the property.
Cultural Heritage Landscape 3	451 Book Road East	Farm Complex	Registered (non-designated)	■ Farm complex with one-and-a-half storey Gothic Revival house. ■ House is of frame construction, clad in white vinyl or aluminium siding with steeply pitched intersecting gable roof. ■ Gable roofed barn located to the northwest of the house, with several modern farm buildings behind. ■ Long tree-lined driveway. ■ City of Hamilton's Built Heritage Inventory identifies house as being constructed in 1840.
Cultural Heritage Landscape 4	343 Book Road East	Residential	Inventoried	■ One-and-a-half storey vernacular style house with Insulbrick and foam cladding. ■ Long driveway to east of house leading to agricultural fields at the rear. ■ City of Hamilton's Built Heritage Inventory identifies the house as being constructed in 1870.
Cultural Heritage Landscape 5	281 Book Road East	Cemetery	Designated Part IV By-law #18-079	■ Book-Parkin Cemetery ■ Burial site of members of the Book Family ■ Established in 1815 by John Book and his wife Charity for the interment of their son Henry ■ Used until 1912 ■ 88 recorded burials, 85 monuments recorded (2010) ■ Not visible from public right-of-way ■ The cemetery is depicted on the 1907 and 1923 NTS Maps
Cultural Heritage Landscape 6	330 Book Road East	Cemetery	Inventoried	■ Gateway Memorial – Ancaster Pet Cemetery ■ Established in 1969 by Dudley Collins, a Hamilton-area veterinarian ■ Acquired by Gateway Pet Memorial, a member of The International Association of Pet Cemeteries and Crematories, in 2019 ■ Burial site of an average of 50 burials a year, with remaining space for approximately 2500 animals ■ Includes close to 3 acres of land and a chapel ■ Space for individuals to memorialize their pets, which is significant to the local community. ■ Driveway on south side of Book Road East ■ Gate and chain-link fence ■ Landscaped property with mature trees and flowerbeds

Feature IDs	Location/Address	Property Type	Heritage Status	Description of Property
Cultural Heritage Landscape 7	394 Book Road East	Farm Complex	Inventoried	■ Two-storey Italianate style house with low-pitched hipped roof. ■ Red brick cladding with buff brick quoins and voussoirs. ■ Two-storey bay window on east side of main façade ■ Small barn or driveshed at rear, Google satellite imagery appears to show foundation of larger barn ■ City of Hamilton's Built Heritage Inventory provides construction date of 1882. ■ A brick structure is illustrated in the approximate location of this house on the 1907 and 1923 NTS maps
Cultural Heritage Landscape 8	157 Butter Road East	Farm Complex	Inventoried	■ One-and-a-half story Ontario farmhouse with T-shaped plan ■ Intersecting gabled roof ■ Red brick with voussoirs over window and door openings ■ Rounded arched window opening in front dormer ■ Enclosed verandah/porch ■ Two small drive sheds or barns ■ City of Hamilton's Built Heritage Inventory provides construction date of 1850 ■ A structure identified as a steam sawmill is shown on the 1859 Illustrated Historical Atlas map in the approximate location of the farmhouse, on a parcel of land owned by P.S. Stephenson.
Cultural Heritage Landscape 9	363 Butter Road East	Farm Complex	Inventoried	■ One-and-a-half storey Gothic Revival farmhouse ■ Red brick with rounded arch in front dormer ■ T-shaped centre-hall plan with intersecting gable roof ■ Full width verandah ■ Two barns, silo, and two smaller outbuildings ■ City of Hamilton's Built Heritage Inventory provides construction date of 1908
Cultural Heritage Landscape 10	153 Carluke Road East	Farm Complex	Inventoried	■ One-and-a-half storey farmhouse with dichromatic brickwork ■ T-shaped plan with intersecting gable roof ■ Verandah on south façade ■ Screened from road by trees ■ Gambrel-roofed barn with several outbuildings ■ City of Hamilton's Built Heritage Inventory provides construction date of 1880
Cultural Heritage Landscape 11	9300 Airport Road	Airport	Cultural Heritage Landscape Inventory, Inventoried	■ John C. Munro Hamilton International Airport ■ 484 Hectare Airport complex ■ Two runways, one passenger terminal, several outbuildings ■ Established as Mount Hope Airport in 1940 ■ Originally used as Royal Canadian Air Force Wing 477 during the Second World War ■ Location of the Canadian Warplane Heritage Museum ■ Near the entrance is an Ontario Heritage Trust Provincial Plaque titled '*Eileen Vollick 1908-1968*.' This plaque commemorates Canada's first licensed female pilot.
Cultural Heritage Landscape 12	9705 Airport Road	Vacant	Cultural Heritage Landscape Inventory	■ Identified on City of Hamilton Inventory as Agricultural Landscape ■ Vacant property with remnants of a silo ■ A structure and associated orchard were shown in the location of Cultural Heritage Landscape 12 on the 1875 *Illustrated Historical Atlas* on a parcel of land owned by I. Jerome. Google satellite imagery indicates all structures on property were demolished between 2005 and 2009

Feature IDs	Location/Address	Property Type	Heritage Status	Description of Property
Cultural Heritage Landscape 13	9630 White Church Road West	Farm Complex	Inventoried	■ One-and-a-half storey Regency Style house ■ Low-pitched side gable roof with paired chimney ■ Symmetrical three bay façade ■ Verandah on south and west side ■ City of Hamilton's Built Heritage Inventory provides construction date of 1820, builder listed as Gideon Smith ■ A structure and associated orchard are depicted on a parcel of land owned by Gideon Smith on the 1875 *Illustrated Historical Atlas* in the approximate location of the existing farmhouse. ■ Small barn or driveshed at rear
Cultural Heritage Landscape 14	9370 White Church Road West	Farm Complex	Inventoried	■ One-a-half storey Ontario Farmhouse with tail wing ■ Dichromatic brickwork, with rounded arched window in front dormer ■ Wrap-around verandah on south and west side ■ Side gable roof ■ City of Hamilton's Built Heritage Inventory provides construction date of 1868. Dickenson Brothers listed as builders of the original building ■ A house and orchard at the location of Cultural Heritage Landscape 14 is shown on the 1875 *Illustrated Historical Atlas* on a parcel of land owned by George F. Smith. ■ One-and-a-half storey frame house with intersecting gable roof ■ Gambrel roofed barn and silo ■ Within the parcel boundary of the Inventoried property (Cultural Heritage Landscape 14) at 9370 White Church Road West.
Cultural Heritage Landscape 15	9349 White Church Road West	Farm Complex	Inventoried	■ Two-and-a-half storey Edwardian Style house ■ Red brick exterior with voussoirs ■ Steep hipped roof ■ Asymmetrical façade with offset front bay and dormer ■ Large gambrel-roofed barn ■ City of Hamilton's Built Heritage Inventory provides construction date of 1911, original owner listed as Ernest Whalley ■ A structure and associated orchard are depicted on the 1875 *Illustrated Historical Atlas* west of the current house on a parcel of land owned by Mrs. S.A. Howard, indicating that this structure may have replaced an earlier farmhouse.
Cultural Heritage Landscape 16	9062 White Church Road West	Cemetery	Inventory of Cemeteries and Burial Grounds	■ White Church Cemetery ■ 350 Monuments ■ Earliest known interment dates to 1831 ■ Former location of Methodist Church, constructed c.1838 ■ The former church and cemetery are depicted on the 1875 *Illustrated Historical Atlas*. ■ Services ceased in 1913, church demolished at later date
Cultural Heritage Landscape 17	3738 Highway 6	Farm Complex	Inventoried	■ Not visible from public right-of-way ■ No information provided on City of Hamilton Built Heritage Inventory ■ Gambrel roof barn visible above trees ■ Google satellite imagery appears to show L-shaped house with series of overlapping flat roofs

Feature IDs	Location/Address	Property Type	Heritage Status	Description of Property
Cultural Heritage Landscape 18	3751 Highway 6	Farm Complex	Inventoried	■ Two-storey Georgian Revival house (not visible from public right-of-way) ■ Symmetrical five bay façade with hipped roof ■ Two-storey verandah ■ City of Hamilton's Built Heritage Inventory provides construction date of 1820 ■ Believed to have been constructed by Jacob Choate, and operated as a hotel from 1820-1830 ■ Gambrel roofed barn visible above trees
Cultural Heritage Landscape 19	2004 Glancaster Road	Farm Complex	Inventoried	■ Large commercial nursery complex, known as Braun Nurseries ■ One-and-a-half storey Gothic Revival farmhouse with steeply pitched intersecting gable roof ■ Dichromatic brickwork ■ Lancet-arched window in front dormer ■ Screened from road by trees ■ Numerous modern farm buildings at rear
Cultural Heritage Landscape 20	9485 White Church Road West	Farm Complex	Inventoried	■ Property known as the Smith-Pearce Farm ■ Contains a farmhouse constructed ca. 1842 and a barn. ■ A structure and orchard are shown on the property of Cyrus Smith in the 1875 *Illustrated Historical Atlas*
Cultural Heritage Landscape 21	Butter Road East	Streetscape	Cultural Heritage Landscape Inventory	■ Formerly, there was a stump fence along Butter Road East noted for preservation that was assumed to have been removed as part of the City of Hamilton's efforts to improve the Butter Road-Airport Road route to the airport (Source: GWP9-91-00). ■ Based on the AECOM field review, remnants of the stump fence remain within the Butter Road East Streetscape. ■ The Butter Road East Streetscape remains an Inventoried landscape.
Built Heritage Resource 1	243 Garner Road East	Residential	Designated, Part IV By-law# 85-90	■ Richard Hyslop Frebold House, constructed 1858 ■ One-and-a-half storey Gothic Revival house ■ Stone block construction ■ An orchard is depicted on the 1875 Illustrated Historical Atlas in the approximate location of BHR 1, with the associated farmhouse shown further north ■ Symmetrical façade ■ Central front entranceway with sidelights and transom light ■ Lancet arched window with decorative spire above
Built Heritage Resource 2	254 Garner Road East	Residential	Inventoried	■ Kendrick House ■ One-and-a-half storey frame house with modern board-and-batten style siding ■ Steeply pitched intersecting gable roof ■ City of Hamilton's Built Heritage Inventory provides construction date of c. 1895. Notes that a recent Cultural Heritage Impact Assessment was completed (2018) and determined that house was significantly altered and "no longer representative of a particular style"
Built Heritage Resource 3	378 Garner Road East	Residential	Inventoried	■ Two-and-a-half storey Edwardian Style house ■ Red brick exterior ■ Symmetrical façade ■ Side-gable roof with paired chimneys ■ Central dormer ■ Central veranda ■ City of Hamilton's Built Heritage Inventory provides construction date of 1920 ■ An orchard is depicted on the 1875 *Illustrated Historical Atlas* in the approximate location of this house, with the associated farmhouse shown further north, indicating that this structure may have replaced an earlier farmhouse. ■ Vacant at time of field review

Feature IDs	Location/Address	Property Type	Heritage Status	Description of Property
Built Heritage Resource 4	166 Book Road East	Residential	Inventoried	■ Two-and-a-half storey Foursquare house ■ Red brick exterior ■ Low-pitched hipped roof with central front dormer ■ Chimney on east side ■ Offset entrance with covered porch ■ City of Hamilton's Built Heritage Inventory provides construction date of 1875
Built Heritage Resource 5	1640 Glancaster Road	Residential	Inventoried	■ One-and-a-half storey Ontario Farmhouse ■ Red brick exterior with buff brick accents ■ Intersecting gable roof ■ Rounded arched window in font dormer ■ Verandah and bay window on ground floor ■ City of Hamilton's Built Heritage Inventory provides construction date of 1900
Built Heritage Resource 6	3487 Upper James Street	Residential	Inventoried	■ Two-and-a-half storey Foursquare house ■ Brown brick cladding ■ Low-pitched hipped roof with central front dormer ■ Chimney on south side ■ Stone lintels and sill ■ Enclosed front porch

5.4 Transportation Infrastructure

5.4.1 Highways

5.4.1.1 Highway 403

Highway 403 is a major east-west controlled access freeway linking the cities of Toronto, Hamilton, Brantford, and Woodstock. The Project's Study Area includes the Highway 403 interchanges with Highway 6 South in between Southcote Road and Fiddlers Green Road. The existing lane arrangement consists of 3 general purpose lanes in both east and westbound directions.

5.4.1.2 Highway 6 South

Highway 6 South is a major north-south arterial highway carrying commuter and commercial traffic between the Niagara Peninsula and Hamilton area. The Project's Study Area includes Highway 6 South from the Highway 403 interchange to Upper James Street. The existing lane configuration includes a single general-purpose lane in both north and south directions.

5.4.2 Municipal Roads

Within the Project limits, municipal roads are listed as follows:

- **Garner Road East** is a single lane road crossing east-west under Highway 6 South near the Highway 403 / Highway 6 South interchange connecting residential communities east and west of the highway. Garner Road connects to the on-ramp from Highway 6 South to Highway 403 eastbound and provides an exit ramp connection from Highway 403 west bound.
- **Book Road East** is a single lane east-west road intersecting Highway 6 South with left hand turn lanes at the Highway 6 South intersection.
- **Butter Road East** is a single lane east-west road that crosses over Highway 6 South before curving south-southeast towards the John C. Munro Hamilton International Airport where it changes names to Airport Road West. There is no access to Highway 6 South from Butter Road East.
- **Glancaster Road** is a single lane north-south road that crosses over Highway 6 South and connects Airport Road West and White Church Road West. There is no access to Highway 6 South from Glancaster Road.

- **Airport Connection Road** is a single lane north/south road that connects the John C. Munro Hamilton International Airport to Highway 6 South.
- **White Church Road West** is a single lane east-west road that crosses over Highway 6 South and connects Glancaster Road and Upper James Street. There is no access to Highway 6 South from Whitechurch Road.
- **Upper James Street** is a double lane north-south road that intersections with Highway 6 South at the eastern limit of the Study Area. Upper James Street provides a direct connection to Highway 6 South and connects Hamilton to Caledonia and beyond.

5.4.3 Transit Service

The following municipal bus routes are situated within the Study Area:

- The Route 20 A-Line Express bus route operates from the John C. Munro Hamilton International Airport to the Pier 7 Boardwalk on Discovery Drive. A portion of Route 20 utilizes the entrance of the airport and Airport Road within the Study Area.
- The Route 44 Rymal bus route operates from Cormorant Road to Goderich Road. A portion of Route 44 crosses the Study Area along Garner Road East.
- The Ancaster fair bus route operates from Claybar Road to MacNab Street South. This bus route only operates during the Ancaster Fair (3rd weekend after Labour Day) and utilizes Highway 403 within the Study Area.

There are no other transit services (i.e., rail infrastructure) present within the Study Area.

5.4.4 Utilities

The following stakeholders have infrastructure within the Study Area:

- Hydro - Hydro One Network Inc. (Distribution/Transmission)
- Pipelines (Enbridge Gas Inc., TransCanada, Westover Express)
- Telecom (Telus, Rogers, Bell, Zayo)
- City of Hamilton (Water / Wastewater)

6. Review of the 1987 Environmental Assessment Report

The 1987 Environmental Assessment Report was completed between 1984 and 1987 and the Preliminary Design and Environmental Assessment Report was approved by Order in Council 3540/92 by the Minister of the Environment, Conservation and Parks in 1992. Since then, a two-lane highway has been constructed connecting Highway 403 and Upper James (Highway 6 South) with overpasses at Butter Road East, Glancaster Road and White Church Road West.

As per the Class Environmental Assessment for Provincial Transportation Facilities (amended 2000), the Project Team completed a Transportation Environmental Study Report Review as the 1987 Environmental Assessment Report was completed more than five years ago. This Transportation Environmental Study Report identifies the proposed changes from the previously approved 1987 Preliminary Design as well as the environmental impacts and proposed mitigation for the Recommended Plan.

The sections below outline the purpose and objectives of the overall 1987 undertaking and identifies which of those are carried through and addressed as part of this Environmental Assessment update for the 4-laning.

6.1 Need for the Undertaking

The purpose of the undertaking, as outlined in the 1987 Environmental Assessment Report, was to provide a new fully grade separated freeway facility on Highway 6 South in order to:

- Improve access to the Hamilton Airport;
- Encourage industrial and residential growth in Townsend / Nanticoke and Hamilton-Wenworth Region; and
- Alleviate operational deficiencies on Highway 6 that existed in 1987.

This Project and Class Environmental Assessment Update Study will address the purpose of the undertaking identified in 1987, aside from the objective to encourage industrial and residential growth in Townsend / Nanticoke as this Project's improvements are contained to the Study Area, which entails the 9-kilometre segment of Highway 6 South between Highway 403 and Upper James Street within the City of Hamilton. As discussed in **Section 1.3** this Project does not include an update to the Environmental Assessment for the extension to the Caledonia Bypass.

To fulfill this purpose, the 1987 Environmental Assessment Report outlined the following objectives:

- Provide access from the airport to the existing provincial freeway system to improve accessibility to the west and east of Hamilton.
- Increase use of the Caledonia Bypass.
- Improve access to and provide flexibility for development in Townsend / Nanticoke.
- Improve access to the industrial area of lower Hamilton, such as access currently provided by the local road system.
- Select a route that can be staged-constructed in a realistic and economical manner.

The 1987 Environmental Assessment Report culminated in the selection of a route for Highway 6 (New) that could be stage-constructed in a realistic and economical manner and included the following stages:

- Stage 1 – two-lane undivided arterial highway.
- Stage 2 – four-lane divided rural freeway.
- Stage 3 – six-lane divided rural freeway.

Stage 1 for Highway 6 (New) between Highway 403 and Upper James Street has been completed and the Project is in the Preliminary Design and Environmental Assessment update for Stage 2 of this segment of Highway (a four-lane divided rural freeway between Highway 403 and Upper James Street).

Of the remaining objectives, the Project carries forward the following objectives from the 1987 Environmental Assessment Report:

- Provide access from the airport to the existing Provincial freeway system to improve accessibility to the west and east of Hamilton.
- Improve access to the industrial area of lower Hamilton, such as access currently provided by the local road system.

6.2 Assessment of Alternatives to the Undertaking

The 1987 Environmental Assessment Report conducted an assessment of the Alternatives to the Undertaking that included three options:

- A new Highway 6 South corridor;
- Modal (transit, rail, air);

- Upgrading of existing facilities; and
- 'Do nothing'.

These alternatives were compared against the transportation objectives, which noted that none of the alternatives other than a new Highway 6 South corridor met the objectives of the project and thus were not considered further.

6.3 1987 Recommended Plan

The advantages and disadvantages of the undertaking, an assessment of Alternatives to the Undertaking and review of corridor and alignment alternatives of the Highway 6 (New) was completed as part of the 1987 Environmental Assessment Report, which determined that the objectives reviewed in **Section 6.1** of this report were met by the 1987 Preliminary Design's recommended plan, which was an ultimate six-lane, fully grade separated, divided, rural freeway with a 120 kilometres per hour design speed. It should be noted that the conclusions and recommendations in this report are for the interim configuration of Highway 6 South widening from 2 to 4 lanes from Highway 403 interchange to Upper James Street. At the time of this report there is no available funding for future stages of design or construction. This report will provide input to the next stage of design and the future Environmental Assessment Study.

As previously stated, this Transportation Environmental Study Report summarizes the Environmental Assessment process undertaken for the widening of Highway 6 South between Highway 403 and Upper James Street in Hamilton. This update requires updating the Preliminary Design to meet current Ontario Ministry of Transportation design standards and policies as well as generate and evaluate interchange alternative designs along Highway 6 South at Book Road East, Airport Connection Road, and Upper James Street. The Assessment of Alternatives completed for the Preliminary Design options at these interchanges is outlined in **Section 7** of this report.

7. Generation, Assessment and Evaluation of Highway 6 South Improvement Alternatives

In addition to the twinning of the Highway 6 South corridor from 2 lanes to 4 lanes, interchange improvement alternatives (at Book Road East, Airport Connection Road, and Upper James Street) were developed and evaluated to select preferred alternatives for each location.

Based on the expected growth in the area, mainline widening of Highway 6 South within the Study Area was examined along with interchange alternatives at Highway 6 South and Book Road East, Airport Connection Road, and Upper James Street.

7.1 Highway 6 South Widening

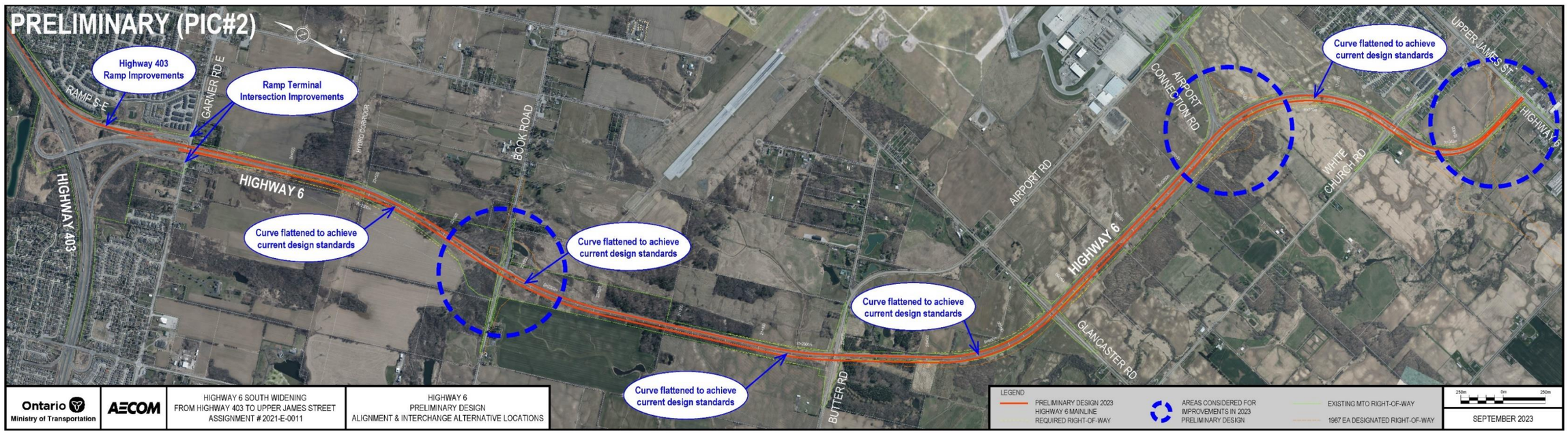
As part of this Project, geometric (horizontal and vertical) improvements to the mainline alignment of Highway 6 South were reviewed and implemented prior to the development of interchange alternatives. Recommendations included curve flattening of radii along the Highway 6 South corridor to meet design requirements for a controlled access freeway with posted speed of 110 kilometres per hour. **Figure 4** shows the locations where the Highway 6 South alignment was enhanced to meet the design requirements for a controlled access freeway.

7.2 Interchange Alternatives

Interchange alternatives were generated and evaluated at three locations within the Study Area as follows:

- Highway 6 South and Book Road East Interchange;
- Highway 6 South and Airport Connection Road Interchange; and
- Highway 6 South and Upper James Street Interchange.

Figure 4: Highway 6 South Alignment Enhancements



The interchange alternatives (modifications to existing interchanges or new configurations) that were developed typically considered the following design criteria:

- Previous commitments from the 1987 approved Environmental Assessment and subsequent studies (1997);
- Addressing future capacity and operational issues to accommodate future growth within the Study Area;
- Enhance safety features for road users and opportunities for active transportation;
- Minimizing impacts to natural, social, economic, and cultural environments, where possible, and develop mitigation strategies for the impacts triggered by the Recommended Plan; and
- Constructability and cost.

7.2.1 Book Road East Interchange

Four alternatives were developed for the Highway 6 South and Book Road East Interchange and are summarized below:

- **Alternative 1A:** This Alternative consists of a Parclo A4 interchange configuration with directional free flow on and off ramps to and from the east and west of the widened Highway 6 South. This Alternative involves Book Road East being realigned to the north with signalized exit terminals being introduced to the east and west of a new underpass structure. Structure placement differs from the existing conditions of the intersection due to the realignment of Book Road East. This Alternative was carried forward (**Figure 5**).
- **Alternative 1B:** This Alternative consists of a Parclo A2 configuration with directional free flow ramps, which conclude at roundabout ramp terminals to the east and west of the new Book Road East underpass structure. Book Road East is also realigned to the north to accommodate Highway 6 South widening (**Figure 6**).
- **Alternative 2A:** This Alternative consists of a diamond interchange with on and off ramps commencing and concluding, respectively, at signalized ramp terminals east and west of the widened Highway 6 South along the realigned Book Road East (**Figure 7**).
- **Alternative 2B:** This Alternative has a similar diamond configuration to that of 2A; however, roundabouts were introduced at the ramp terminals. Book Road East is again realigned to the north the accommodate Highway 6 South widening and the new underpass structure (**Figure 8**).

Figure 5: Book Road East Alternative 1A

Figure 6: Book Road East Alternative 1B

Figure 7: Book Road East Alternative 2A

Figure 8: Book Road East Alternative 2B

7.2.2 Airport Connection Road Interchange

Three alternatives were developed for the Highway 6 South and Airport Connection Road Interchange and are summarized below:

- **Alternative 1:** This Alternative involves replacing the existing Airport Connection Road and Highway 6 South intersection with a Trumpet A interchange configuration with a loop on ramp and directional off ramp connecting with a realigned Airport Connection Road to the east. The new Airport Connection Road underpass structure would be built on the new alignment with free flow directional ramps from the north and south converging at the existing Airport Road and Airport Connection Road intersection. The intersection at Airport Road and Airport Connection Road would be modified. This Alternative was carried forward (**Figure 9**).
- **Alternative 2:** This Alternative considered a partial diamond interchange with a T intersection ramp terminal to the south of Highway 6 South and a realignment of Airport Connection Road to the east with directional ramps to and from Highway 6 South north and south. Airport Road and Airport Connection Road intersection would be replaced with a roundabout (**Figure 10**).
- **Alternative 3:** This Alternative also considered a trumpet style configuration; however, this Alternative has a larger loop ramp and is further east and south of existing Airport Connection Road and Highway 6 South. The new Airport Connection Road underpass structure would be built on the new alignment with free flow directional ramps from the north and south converging at the existing Airport Road and Airport Connection Road intersection. The intersection at Airport Road and Airport Connection Road would be modified (**Figure 11**).

Figure 9: Airport Connection Road Alternative 1

Figure 10: Airport Connection Road Alternative 2

Figure 11: Airport Connection Road Alternative 3

7.2.3 Upper James Street Interchange

Six alternatives were developed for the Highway 6 South and Upper James Street Interchange and are summarized below:

- **Alternative 1A:** This Alternative sees the termination of the newly widened Highway 6 South at the existing Upper James Street intersection as both northbound and southbound lanes converge utilizing the existing R=340 metre horizontal curve on Highway 6 South and maintaining existing intersection spacing between Highway 6 South and White Church Road intersections along Upper James Street. Modifications to the Upper James Street and Highway 6 South intersection to accommodate traffic growth will also take place (**Figure 12**).
- **Alternative 1B:** This Alternative is similar to 1A; however, the configuration replaces the existing intersection at Highway 6 South and Upper James Street with a roundabout as a termination point of the twinning of Highway 6 South. Intersection spacing between Highway 6 South and White Church Road is slightly reduced from 415 metres to 385 metres (**Figure 13**).

Figure 12: Upper James Street Alternative 1A

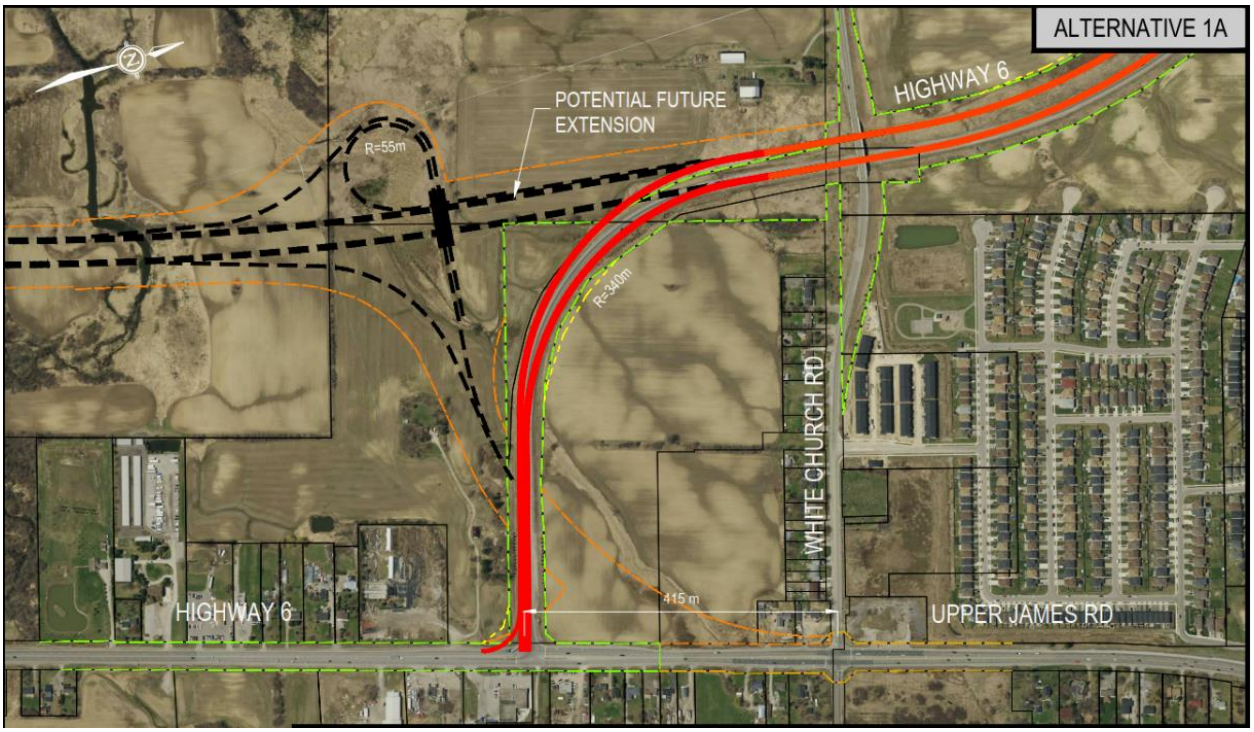
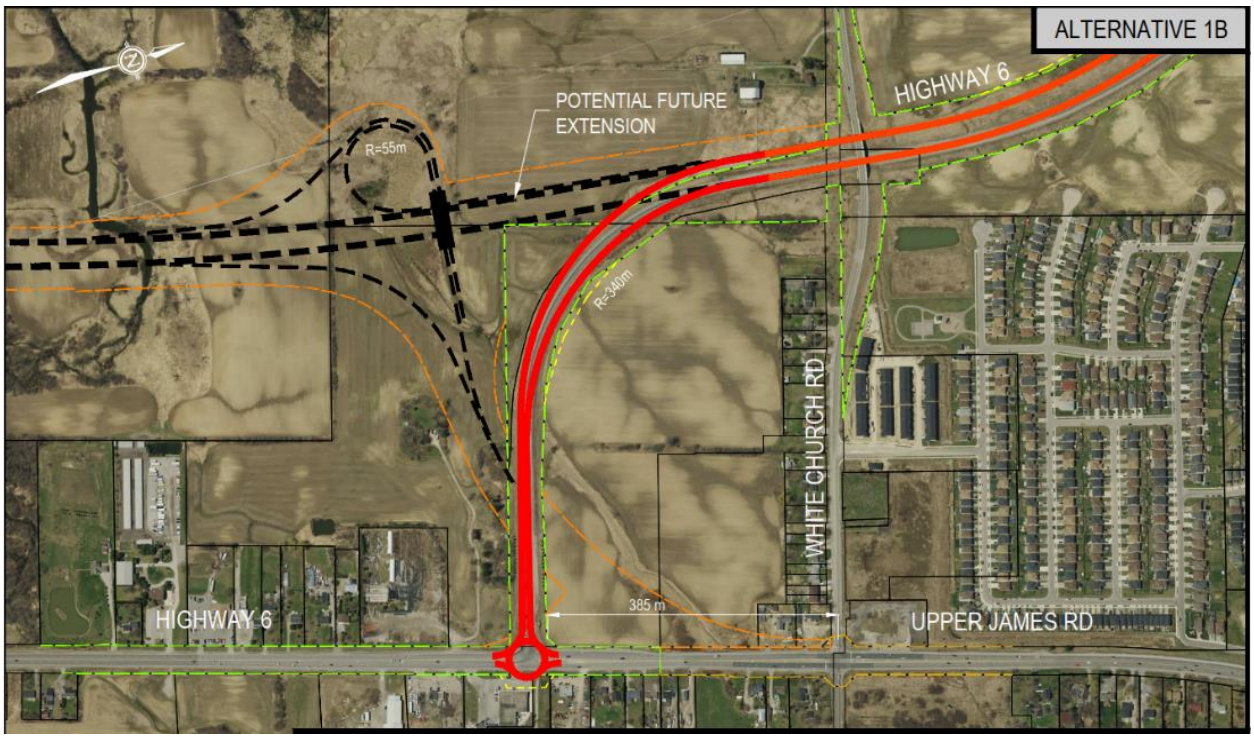


Figure 13: Upper James Street Alternative 1B



- **Alternative 2:** This Alternative also utilizes the 340-metre curve along Highway 6 South; however, shifts the existing Upper James Street and Highway 6 South intersection south and uses a 250-metre curve to transition the new widened Highway 6 South. Another 250-metre curve was used to connect Upper James Street north to the new intersection and increased the intersection spacing between the Highway 6 South and White Church Road from 415 metres to 455 metres (**Figure 14**).
- **Alternative 3A:** This Alternative sees the introduction of a new R=200 metre curve along Highway 6 South, which then ties the newly widened Highway 6 South into Upper James Street using R=500 metre curve at the existing White Church Road intersection. The Upper James Street and Highway 6 South intersection is shifted into the northwest quadrant of the existing intersection and reduces the intersection spacing from 415 metres to 325 metres (**Figure 15**).
- **Alternative 3B:** This alternative is similar to the previous; however, both the Highway 6 South and White Church Road intersections are converted to roundabouts. The addition of these 2 roundabouts further reduces the intersection spacing between the two to 240 metres (**Figure 16**).
- **Alternative 4:** This Alternative is a modification of Alternative 3B with the only change being that the southbound lanes along Highway 6 South would utilize a proposed R=55 metre loop ramp to which would tie into a potential future Highway 6 South extension and a Trumpet type interchange (**Figure 17**).

Figure 14: Upper James Street Alternative 2

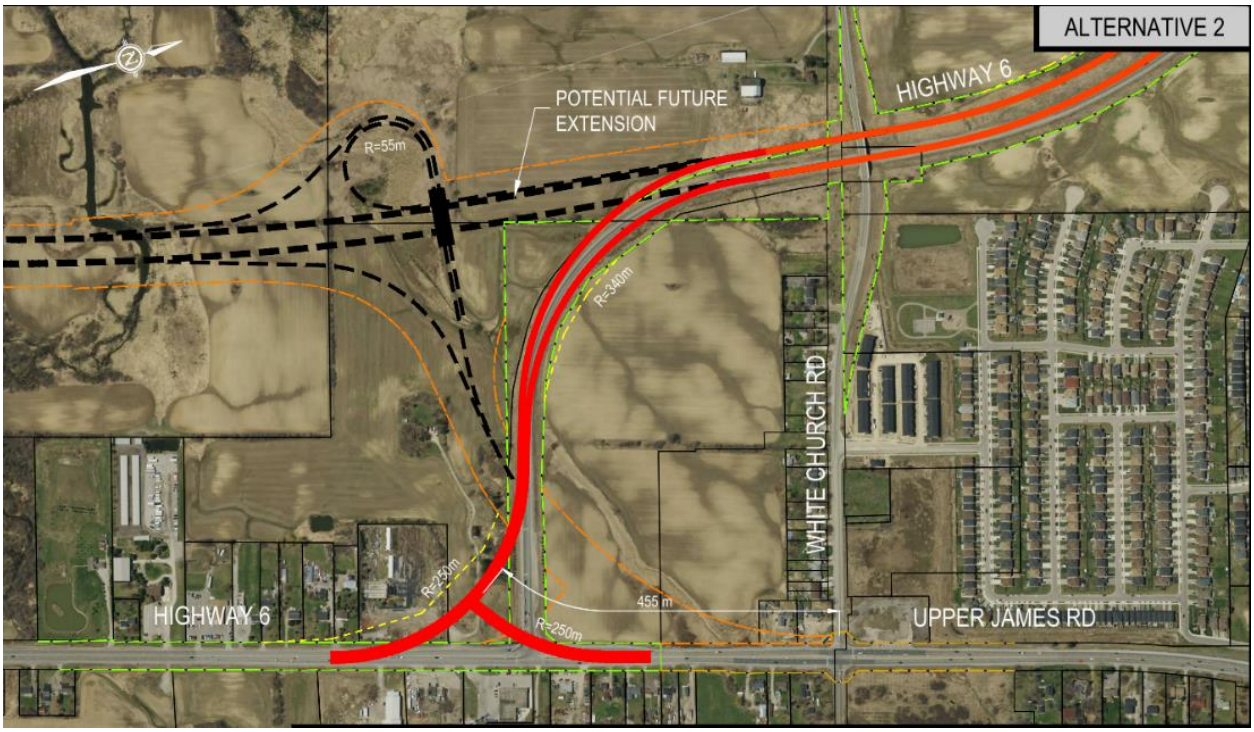


Figure 15: Upper James Street Alternative 3A

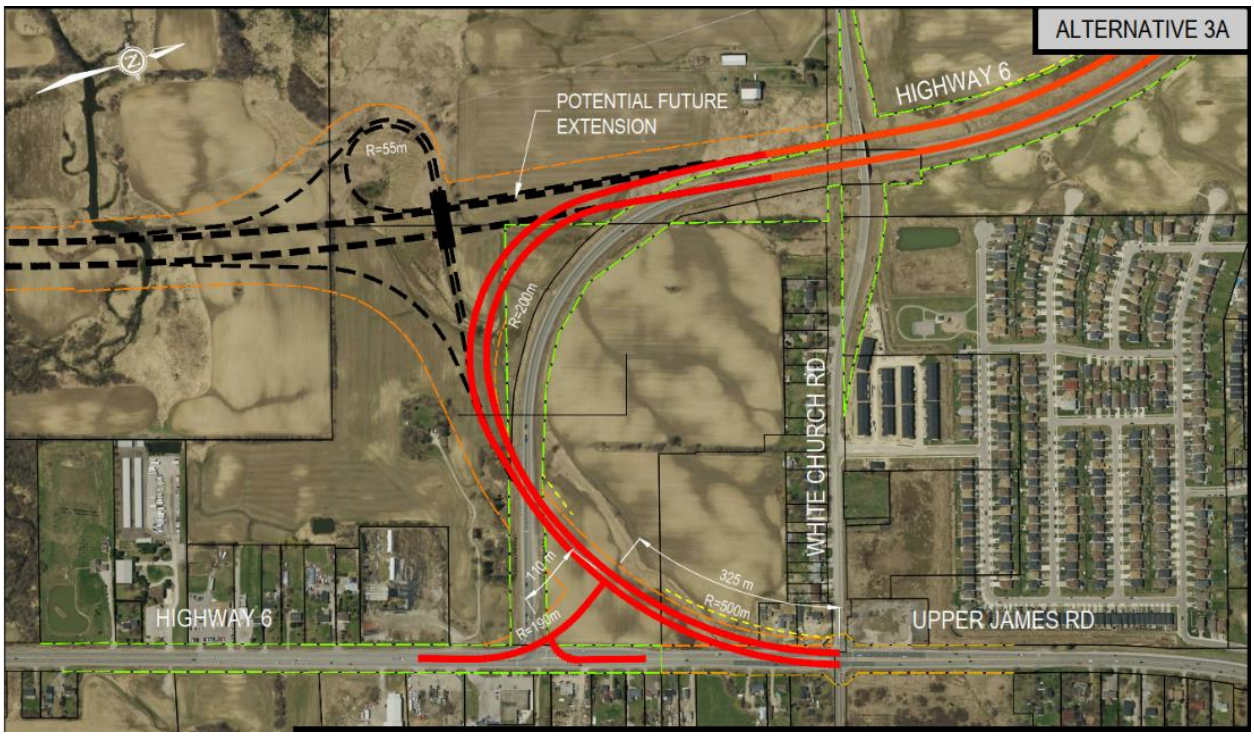


Figure 16: Upper James Street Alternative 3B

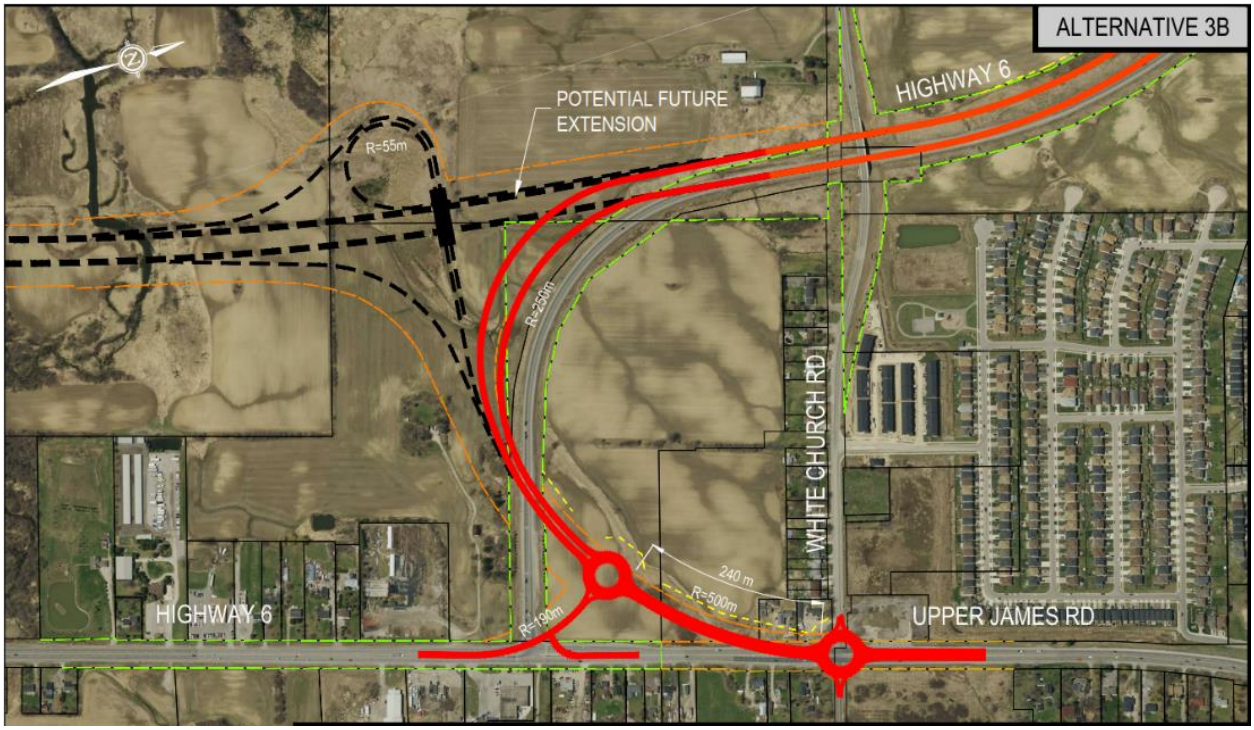
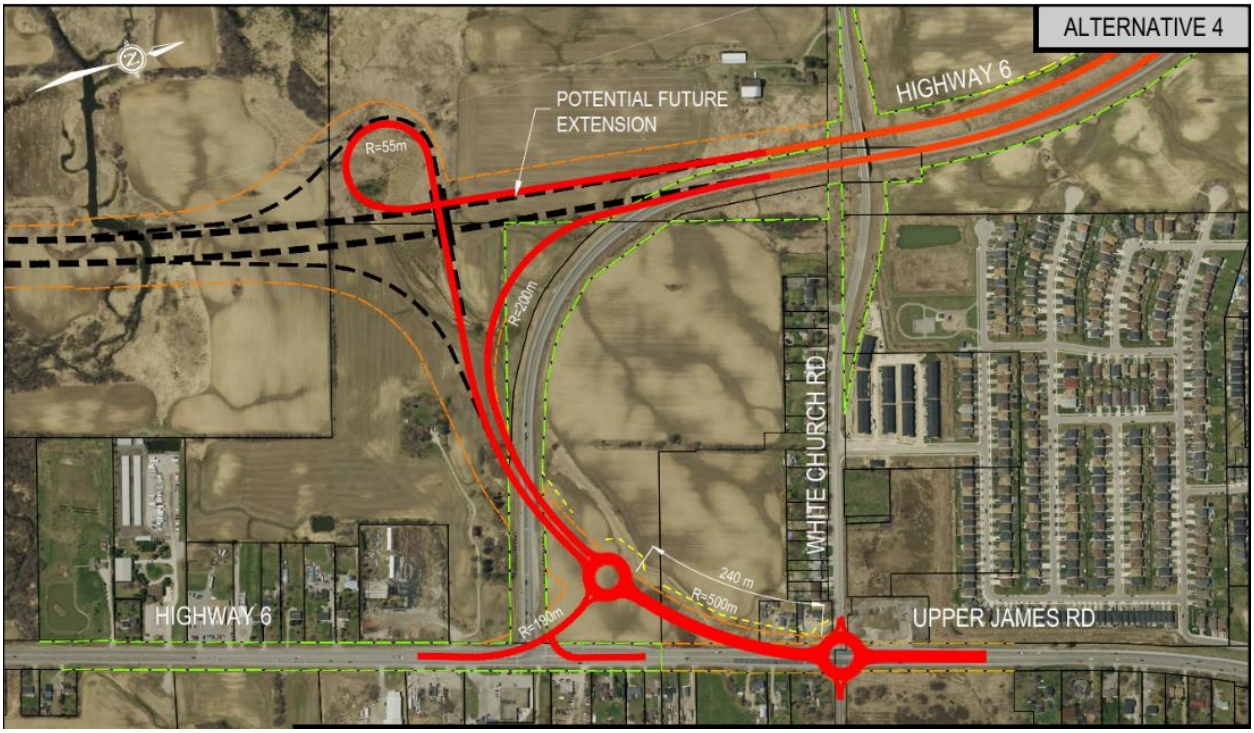


Figure 17: Upper James Street Alternative 4



7.3 Assessment and Evaluation of Alternatives

7.3.1 Evaluation Methodology / Criteria

The evaluation criteria used for this Project was based on the 1987 Environmental Assessment Report and updated to include any newly identified evaluation components.

The evaluation method used in this Project was the Reasoned Argument Method (Trade-Off Method). The Reasoned Argument Method considered the advantages and disadvantages of each alternative and the relative significance of the impacts. The Project Team, which includes engineering and environmental experts and specialists, and the input from stakeholders were used to assess the significance of impacts. The Reasoned Argument Method then presented a clear and thorough evaluation of the trade-offs between various categories, factors, indicators, and the reasons why one alternative was preferred over another.

Alternatives under consideration were assessed and evaluated based on natural, socio-economic, cultural, transportation and cost considerations using the criteria listed in **Table 12** with the full evaluation tables in **Appendix B**.

Table 12: Evaluation Criteria

Evaluation Component	Criteria
Transportation, Engineering and Cost	■ Traffic Operations & Safety ■ Geometrics ■ Constructability ■ Utilities ■ Cost (construction cost)
Natural Environment	■ Fish and Fish Habitat ■ Terrestrial Wildlife and Habitats (including Species at Risk) ■ Groundwater ■ Surface Water
Socio-Economic Environment	■ Noise ■ Air Quality ■ Community Impacts ■ Agricultural Operations and Access ■ Property Impacts ■ Planning Policies ■ Impacts to Views and Vistas
Cultural Environment	■ Archeological Resources ■ Built Heritage Resources and Cultural Heritage Landscapes

7.3.2 Summary of Book Road East Interchange Evaluation

7.3.2.1 Transportation, Engineering and Cost

The four alternatives recommend interchanges at Book Road East, which results in enhanced capacity and serviceability for road users. **Alternative 1A**, the Parclo A4 configuration, is the interchange type that provides the most capacity and free flow serviceability for road users via the on/off ramps. **Alternatives 2A** and **2B** are diamond interchanges, which has less capacity in comparison to **Alternative 1A**.

Alternatives 1A and **2A** considers stop controlled / signalized intersections while **Alternatives 1B** and **2B** includes roundabouts, which are anticipated to enhance safety by reducing the number of vehicular conflict points and reducing vehicular speeds, which will reduce the potential for severe crashes and serious injury. Also, **Alternatives 2A** and **2B** roundabout configurations enhance free-flow conditions. However, roundabouts require a larger property footprint and would result in more impacts to private property and the natural environment.

Alternative 1A requires construction of additional ramps; however, **Alternatives 1B** and **2B** require construction of two (2) roundabouts. **Alternative 2A** is the least complex option to construct as it minimizes the number of ramps and does not include a roundabout at ramp terminals. Due to the lower complexity of construction, **Alternative 2A** has the lowest overall cost.

Alternative 1B impacts the most utility crossings (14) while the other alternatives are very similar when considering impacts to existing utilities within the Book Road East Study Area.

Alternative 1A is preferred from a traffic operations and safety perspective, but the complexity of construction and cost would be higher when compared to **Alternative 2A**. **Alternative 1A** is consistent with the recommendations from the approved 1987 Environmental Assessment Report.

7.3.2.2 Natural Environment

Alternative 1B has the least impacts to Significant Wildlife Habitat, candidate Species at Risk habitat, wetlands, existing surface drainage systems as well as fewest potential new watercourse crossing locations. **Alternatives 2A** and **2B** avoid a rare vegetation community in the northwest quadrant of the interchange and may avoid impacts to the existing pond in the southeast quadrant but have more watercourse crossings than **Alternative 1B**. **Alternative 1A** has the most potential new watercourse crossings, impacts to the existing pond and natural features including the rare vegetation

community in the northwest quadrant. All alternatives have similar overall environmental impacts, all of which can be properly mitigated and are in line with the commitments made in the approved 1987 Environmental Assessment Report. However, **Alternative 1B** has the least potential impacts to the natural environment and is preferred from a natural environment perspective.

7.3.2.3 Socio-Economic Environment

Alternative 1B has the least potential impacts to agricultural lands compared to **Alternatives 1A, 2A** and **2B**. **Alternative 1B** also has fewest impacts to views/vistas, air quality and noise impacts that would be potentially experienced by the resident west of the southwest quadrant of the Highway 6 South and Book Road East Interchange. **Alternative 1A** has slightly more impacts to properties outside the designated Ontario Ministry of Transportation right-of-way, which would require more property in the northeast quadrant. Like the impacts to the natural environment, all alternatives have similar impacts to lands outside the existing Ontario Ministry of Transportation right-of-way and overall socio-economic impacts, all of which can be properly mitigated and are in line with the commitments made in the approved 1987 Environmental Assessment Report. However, **Alternative 1B** has the least potential impacts to the socio-economic environment and is preferred from a socio-economic environment perspective.

7.3.2.4 Cultural Environment

Alternative 1B has the least potential access and property impacts to Book-Parkin Cemetery than **Alternatives 1A, 2A** and **2B**. **Alternative 1A** has the most potential impacts to the access to Book-Parkin Cemetery. In addition, all alternatives contain undisturbed lands that have archaeological potential, have the same impact to lands outside the existing Ontario Ministry of Transportation right-of-way and have similar overall cultural environment impacts, all of which can be properly mitigated and are in line with the commitments made in the approved 1987 Environmental Assessment Report. Overall, **Alternative 1B** has the least potential impacts to the cultural environment and is preferred from a cultural environment perspective.

Given impacts to the natural, socio-economic, and cultural environments are similar in nature and impact can be mitigated and are in line with the commitments made in the approved 1987 Environmental Assessment Report, Alternative **1A** is the preferred alternative as it provides free flow of traffic, has less risk of wrong way and left turn movements, and can better accommodate larger trucks. A comparative review of the Book Road East Interchange alternatives is presented in **Table 13**.

Table 13: Book Road East Interchange Summary Evaluation

Category	Summary	Alternative 1A	Alternative 1B	Alternative 2A	Alternative 2B
Transportation, Engineering and Cost	■ Alternative 1A, the Parclo A4 configuration, is the interchange type that provides the most capacity and free flow serviceability for road users via the on/off ramps. ■ Alternatives 2A and 2B are diamond interchanges, which has less capacity in comparison to Alternative 1A. ■ Alternatives 1A and 2A considers stop controlled / signalized intersections while Alternatives 1B and 2B includes roundabouts, which are anticipated to enhance safety by reducing the number of vehicular conflict points and reducing vehicular speeds, which will reduce the potential for severe crashes and serious injury. Also, Alternatives 2A and 2B roundabout configurations enhance free-flow conditions. However, roundabouts require a larger property footprint and would result in more impacts to private property and the natural environment. ■ Alternative 1A requires construction of additional ramps; however, Alternatives 1B and 2B require construction of two (2) roundabouts. Alternative 2A is the least complex option to construct as it minimizes the number of ramps and does not include a roundabout at ramp terminals. Due to the lower complexity of construction, Alternative 2A has the lowest overall cost. ■ Alternative 1B impacts the most utility crossings (14) while the other alternatives are very similar when considering impacts to existing utilities within the Book Road East Study Area. ■ Alternative 1A is preferred from a traffic operations and safety perspective, but the complexity of construction and cost would be higher when compared to Alternative 2A. ■ Alternative 1A is consistent with the recommendations from the approved 1987 Environmental Assessment Report.				
Natural Environment	■ Alternative 1B has the least impacts to Significant Wildlife Habitat, candidate Species at Risk habitat, wetlands, existing surface drainage systems as well as fewest potential new watercourse crossing locations. ■ Alternatives 2A and 2B avoid a rare vegetation community in the northwest quadrant of the interchange and may avoid impacts to the existing pond in the southeast quadrant but have more watercourse crossings than Alternative 1B. ■ Alternative 1A has the most potential new watercourse crossings, impacts to the existing pond and natural features including the rare vegetation community in the northwest quadrant. ■ All alternatives have similar overall environmental impacts, all of which can be properly mitigated and are in line with the commitments made in the approved 1987 Environmental Assessment Report. ■ Alternative 1B is preferred from a natural environment perspective.				
Socio-Economic Environment	■ Alternative 1B has the least potential impacts to agricultural lands compared to Alternatives 1A, 2A and 2B. ■ Alternative 1B also has fewest impacts to views/vistas, air quality and noise impacts that would be potentially experienced by the resident west of the southwest quadrant of the Highway 6 South and Book Road East Interchange. ■ Alternative 1A has slightly more impacts to properties outside the designated Ontario Ministry of Transportation right-of-way, which would require more property in the northeast quadrant. ■ All alternatives have similar impacts to lands outside the existing Ontario Ministry of Transportation right-of-way and overall socio-economic impacts, all of which can be properly mitigated and are in line with the commitments made in the approved 1987 Environmental Assessment Report. ■ Alternative 1B is preferred from a socio-economic environment perspective.				

Category	Summary	Alternative 1A	Alternative 1B	Alternative 2A	Alternative 2B
Cultural Environment	■ Alternative 1B has the least potential access and property impacts to Book-Parkin Cemetery than Alternative 1A, 2A and 2B. Alternative 1A has the most potential impacts to the access to Book-Parkin Cemetery. ■ All alternatives contain undisturbed lands that have archaeological potential. ■ All alternatives have the same impact to lands outside the existing Ontario Ministry of Transportation right-of-way, and have similar overall cultural environment impacts, all of which can be properly mitigated and are in line with commitments made in the approved 1987 Environmental Assessment Report. ■ Alternative 1B is preferred from a cultural environment perspective.				
Evaluation Summary	■ Alternative 1A, a Parclo A4 with signalized ramp terminals, was preferred from a transportation and operations perspective. Though the alternative has greater environmental impacts anticipated outside the Ontario Ministry of Transportation right-of-way, these impacts can be mitigated where feasible. ■ Alternative 1A is also consistent with the recommendations and environmental commitments from the approved 1987 Environmental Assessment Report, thus has been selected as the preferred alternative.	-	-	-	-

Legend	Least Preferred	-	-	-	Most Preferred
Icon					

7.3.3 Summary of Airport Connection Road Interchange Evaluation

7.3.3.1 Transportation, Engineering and Cost

The three interchanges alternatives recommended at Airport Connection Road will result in enhanced capacity and serviceability for road users. **Alternative 1**, the Trumpet A configuration, is the interchange type that provides the most capacity and free flow serviceability for road users via the on/off ramps. **Alternatives 3** also provides similar capacity; however, at a much larger footprint. **Alternative 2**, the diamond interchange, has less capacity in comparison to the other configurations but minimizes the interchange footprint along the west side of Highway 6 South considerably. **Alternatives 1** and **3** allow for on/off ramp traffic free flow while **Alternative 2** considers stop controlled/signalized intersections.

Alternative 1 and **3** are similar from a constructability perspective while **Alternative 2** reduces construction complexity by simplifying the on/off ramp configuration of the interchange on the west side of Highway 6 South. Due to the lower complexity of construction, **Alternative 2** also has the lowest overall cost while **Alternative 3** has the highest due to the additional ramp lengths and property requirement.

Alternatives 1 and **3** impact similar number of utilities; however, **Alternative 2** impacts the most (7).

Alternative 1 is preferred from a traffic operations and safety perspective and promotes a high level of constructability while optimizing utility impacts. In addition, this alternative is consistent with the recommendations made in the approved 1987 Environmental Assessment Report.

7.3.3.2 Natural Environment

Alternative 3 has the most impacts to fish habitat, ecological land classification vegetation communities and surface drainage. Construction of **Alternative 2** over the existing pipeline will create a similar construction disturbance footprint as seem for **Alternative 1**. For this reason, many of the impacts for **Alternatives 1** and **2** are similar including impacts to significant wildlife habitat, candidate Species at Risk habitat and wetlands. **Alternative 2** is slightly preferred due to its less impacts to existing surface drainage systems.

Alternatives 1 and **2** will have the least impacts outside the designated Ontario Ministry of Transportation right-of-way and, given the slightly less impacts mentioned above,

Alternative 2 has the least potential impacts to the natural environment and is preferred from a natural environment perspective.

7.3.3.3 Socio-Economic Environment

Alternative 3 has the most impacts including significant impacts to views/vistas, agricultural lands, and private property. **Alternatives 1** and **2** have similar impacts due to the fact that the construction area required to construct **Alternative 2** over the existing pipeline will result in additional impacts outside of the right-of-way, similar to those of **Alternative 1**. In addition, the stop intersection proposed for **Alternative 2** has a greater potential for greenhouse gas emissions. Thus, **Alternative 1** has the least potential impacts to the socio-economic environment and is preferred from a socio-economic environment perspective.

7.3.3.4 Cultural Environment

All alternatives contain undisturbed lands that have archaeological potential. Additionally, the construction area required to construct **Alternative 2** over the existing pipeline will result in additional impacts outside of the right-of-way, similar to those of **Alternative 1**. For this reason, **Alternative 1** has the least potential impacts to the cultural environment and is preferred from a cultural environment perspective.

Alternative 1 is the preferred alternative as it provides free flow of traffic, has less risk of wrong way and fewer vehicle conflicts. It also contains a preferable transition from lower speed relative to the other alternative considered and it provides high capacity. In addition, Alternative 1 has less impacts to cultural heritage features, is the preferred alternative from a socio-economic perspective and is consistent with the recommendations and environmental commitments made in the approved 1987 Environmental Assessment Report (for example, retaining 70% of the Benedict Woodlot located adjacent to the Highway 6 South and Airport Connection Road Interchange). A comparative review of the Airport Connection Road Interchange alternatives is presented in **Table 14**.

Table 14: Airport Connection Road Interchange Summary Evaluation

Category	Summary	Alternative 1	Alternative 2	Alternative 3
Transportation, Engineering and Cost	■ Alternative 1, the Trumpet A configuration, is the interchange type that provides the most capacity and free flow serviceability for road users via the on/off ramps. Alternatives 3 also provides similar capacity; however, at a much larger footprint. Alternative 2, the diamond interchange, has less capacity in comparison to the other configurations but minimizes the interchange footprint along the west side of Highway 6 South considerably. Alternatives 1 and 3 allow for on/off ramp traffic free flow while Alternative 2 considers stop controlled/signalized intersections. ■ Alternative 1 and 3 are similar from a constructability perspective while Alternative 2 reduces construction complexity by simplifying the on/off ramp configuration of the interchange on the west side of Highway 6 South. Due to the lower complexity of construction, Alternative 2 also has the lowest overall cost while Alternative 3 has the highest due to the additional ramp lengths and property requirement. ■ Alternatives 1 and 3 impact similar number of utilities; however, Alternative 2 impacts the most (7). ■ Alternative 1 is preferred from a traffic operations and safety perspective and promotes a high level of constructability while optimizing utility impacts. ■ Alternative 1 is consistent with the recommendations made in the approved 1987 Environmental Assessment Report.	●	◑	◑
Natural Environment	■ Alternative 3 has the most impacts to fish habitat, ecological land classification vegetation communities and surface drainage. ■ Construction of Alternative 2 over the existing pipeline will create a similar construction disturbance footprint as seem for Alternative 1. For this reason, many of the impacts for Alternatives 1 and 2 are similar including impacts to significant wildlife habitat, candidate Species at Risk habitat and wetlands. ■ Alternative 2 is slightly preferred due to its less impacts to existing surface drainage systems. ■ Alternatives 1 and 2 will have the least impacts outside the designated Ontario Ministry of Transportation right-of-way and, given the slightly less impacts mentioned above, Alternative 2 is preferred from a natural environment perspective.	◕	●	◑
Socio-Economic Environment	■ Alternative 3 has the most impacts including significant impacts to views/vistas, agricultural lands, and private property. ■ Alternatives 1 and 2 have similar impacts due to the fact that the construction area required to construct Alternative 2 over the existing pipeline will result in additional impacts outside of the right-of-way, similar to those of Alternative 1. ■ The stop intersection proposed for Alternative 2 has a greater potential for greenhouse gas emissions. ■ Alternative 1 is preferred from a socio-economic environment perspective.	●	◕	◑
Cultural Environment	■ All alternatives contain undisturbed lands that have archaeological potential. ■ The construction area required to construct Alternative 2 over the existing pipeline will result in additional impacts outside of the right-of-way, similar to those of Alternative 1. For this reason, Alternative 1 has the least potential impacts to the cultural environment and is preferred from a cultural environment perspective.	●	◕	◑
Evaluation Summary	■ Alternative 1, Trumpet A interchange, allows for free flow operations, enhances safety by eliminating left turn/wrong way moves and provides the most desirable speed reduction. ■ Alternative 1 also meets the approved 1987 Environmental Assessment Report commitment to retain 70% of the Benedict Woodlot and has less potential for greenhouse gas emissions and impacts to cultural resources. ■ Alternative 1 is consistent with the recommendations and commitments made in the approved 1987 Environmental Assessment Report, thus has been selected as the preferred alternative.	-	-	-

Legend	Least Preferred	-	-	-	Most Preferred
Icon	○	◔	◑	◕	●

7.3.4 Summary of Upper James Street Interchange Evaluation

7.3.4.1 Transportation, Engineering and Cost

The six alternatives recommended at Upper James Street result in enhanced capacity and serviceability for road users. **Alternatives 1A** and **1B** similarly provide the most capacity and free flow serviceability and both provide freeway termination at Upper James Street through the existing intersection configuration and a roundabout, respectively. **Alternative 2**, realignment of the Highway 6 South and Upper James Street intersection to the West, provides similar capacity to **Alternatives 1A** and **1B;** however, it has a larger footprint and less than desirable geometry to provide free flow from the new twinned Highway 6 South to existing Highway 6 South. **Alternatives 3A** and **3B** both provide similar capacity and flow through realignments of the Highway 6 South and Upper James Street intersection to the East through multiple stop-controlled intersections and roundabouts, respectively. **Alternative 4**, like **Alternative 3B**, provides a realignment of the Highway 6 South and Upper James Street intersection to the East using roundabouts; however, an additional off-ramp loop increases the footprint and potential capacity of the alternative. Additionally, free flow and driver decision will be impacted by the added loop ramp.

Alternative 1A is the least complex alternative from a constructability and cost perspective. **Alternatives 1B** and **2** both slightly increase construction complexity and cost in comparison to **Alternative 1A** with the addition of the roundabout and the realignment of the Highway 6 South Upper James Street intersection to the West. **Alternatives 3A** and **3B** increases construction complexity by realigning the Highway 6 South and Upper James Street intersection, which would result in an increased footprint North and South of the existing Highway 6 South. This would also lead to an increase in cost compared to **Alternatives 1A, 1B** and **2**. **Alternative 4** further increases the construction complexity and cost compared to **Alternatives 3A** and **3B** with an increased footprint in the form of an additional structure and loop ramp to go along with multiple roundabouts.

In terms of utility impacts, **Alternatives 1A** and **2** impact a similar number of utilities; however, **Alternatives 1B, 3A, 3B** and **4** impact a much larger amount (8).

Based on the results of the evaluation, **Alternative 1A** is the preferred alternative from a traffic operations and safety perspective as it promotes a high level of constructability while optimizing utility impacts. In addition, this alternative is consistent with the recommendations made in the approved 1987 Environmental Assessment Report.

7.3.4.2 Natural Environment

Due to the low complexity and smaller footprint, **Alternatives 1A** and **1B** have the least impacts on the natural environment. Potential impacts on the natural environment gradually increase with the order of the Alternatives presented, with **Alternative 4** having the most impacts to the natural environment. No impacts are anticipated to Species at Risk or their habitat, designated natural areas and both have the least potential impacts to indirect fish habitat and ecological land classification vegetation communities. Thus, **Alternatives 1A** and **1B** have the least potential impacts to the natural environment and is preferred from a natural environment perspective.

7.3.4.3 Socio-Economic Environment

Alternatives 1A and **1B** are similar in nature with the only difference being a preference for free flow of traffic that would be created with a roundabout at the intersection of Highway 6 South and Upper James Street. **Alternatives 2, 3A, 3B** and **4** have increasingly more impacts to greenbelt lands, water wells and property outside of the designated Ontario Ministry of Transportation right-of-way. **Alternative 2** also raises concerns for potential impacts to access to properties west of Highway 6 South on Upper James Street. Therefore, **Alternative 1B** is preferred from a socio-economic perspective with **Alternative 1A** very close behind.

7.3.4.4 Cultural Environment

As noted in **Section 7.3.4.2,** due to the low complexity and smaller footprint, **Alternatives 1A** and **1B** have the least impacts on the cultural environment with impacts gradually increasing with the order of the Alternatives presented (**Alternative 4** having the most impacts to the cultural environment). In addition, all alternatives contain undisturbed lands that have archaeological potential. Consequently, **Alternatives 1A** and **1B** have the least potential impacts and is preferred from a cultural environment perspective.

Alternative 1A, a Signalized Intersection Termination at Upper James Street, maintains existing traffic patterns, provides the highest capacity, and has the lowest construction cost and complexity against all other alternatives.

Alternative 1A has the least impacts to private property, greenbelt lands as well as minimum impacts to potential cultural heritage resources and agricultural lands. **Alternative 1 A** is consistent with the recommendations made in the approved 1987 Environmental Assessment Report and is thus, the selected preferred alternative. A comparative review of the Upper James Street Interchange alternatives is presented in **Table 15**.

Table 15: Upper James Street Interchange Summary Evaluation

Category	Summary	Alternative 1A	Alternative 1B	Alternative 2	Alternative 3A	Alternative 3B	Alternative 4
Transportation, Engineering and Cost	■ Alternatives 1A and 1B similarly provide the most capacity and free flow serviceability and both provide freeway termination at Upper James Street through the existing intersection configuration and a roundabout, respectively. ■ Alternative 2, realignment of the Highway 6 South and Upper James Street intersection to the West, provides similar capacity to Alternatives 1A and 1B; however, it has a larger footprint and less than desirable geometry to provide free flow from the new twinned Highway 6 South to existing Highway 6 South. ■ Alternatives 3A and 3B both provide similar capacity and flow through realignments of the Highway 6 South and Upper James Street intersection to the East through multiple stop-controlled intersections and roundabouts, respectively. ■ Alternative 4, like Alternative 3B, provides a realignment of the Highway 6 South and Upper James Street intersection to the East using roundabouts; however, an additional off-ramp loop increases the footprint and potential capacity of the alternative. Additionally, free flow and driver decision will be impacted by the added loop ramp. ■ Alternative 1A is the least complex alternative from a constructability and cost perspective. ■ Alternatives 1B and 2 both slightly increase construction complexity and cost in comparison to Alternative 1A with the addition of the roundabout and the realignment of the Highway 6 South Upper James Street intersection to the West. ■ Alternatives 3A and 3B increases construction complexity by realigning the Highway 6 South and Upper James Street intersection, which would result in an increased footprint North and South of the existing Highway 6 South. This would also lead to an increase in cost compared to Alternatives 1A, 1B and 2. ■ Alternative 4 further increases the construction complexity and cost compared to Alternatives 3A and 3B with an increased footprint in the form of an additional structure and loop ramp to go along with multiple roundabouts. ■ Alternatives 1A and 2 impact a similar number of utilities; however, Alternatives 1B, 3A, 3B and 4 impact a much larger amount (8). ■ Alternative 1A is the preferred alternative from a traffic operations and safety perspective as it promotes a high level of constructability while optimizing utility impacts. In addition, this alternative is consistent with the recommendations made in the approved 1987 Environmental Assessment Report.	●	◕	◕	◑	◑	◔
Natural Environment	■ No impacts are anticipated to Species at Risk or their habitat, designated natural areas for Alternatives 1A and 1B and both have the least potential impacts to indirect fish habitat and ecological land classification vegetation communities. ■ Alternatives 1A and 1B have the least impacts on the natural environment overall with potential impacts on the natural environment gradually increasing with the order of the Alternatives presented, with Alternative 4 having the most impacts to the natural environment (largest footprint). ■ Alternatives 1A and 1B are preferred from a natural environment perspective.	●	●	◕	◑	◔	○

Category	Summary	Alternative 1A	Alternative 1B	Alternative 2	Alternative 3A	Alternative 3B	Alternative 4
Socio-Economic Environment	■ Alternatives 1A and 1B are similar in nature with the only difference being a preference for free flow of traffic that would be created with a roundabout at the intersection of Highway 6 South and Upper James Street. ■ Alternatives 2, 3A, 3B and 4 have increasingly more impacts to greenbelt lands, water wells and property outside of the designated Ontario Ministry of Transportation right-of-way. ■ Alternative 2 also raises concerns for potential impacts to access to properties west of Highway 6 South on Upper James Street. ■ Alternative 1B is preferred from a socio-economic perspective with Alternative 1A very close behind.	●	●	◕	◑	◑	◔
Cultural Environment	■ Alternatives 1A and 1B have the least impacts on the cultural environment with impacts gradually increasing with the order of the Alternatives presented. (Alternative 4 having the most impacts to the cultural environment). ■ All alternatives contain undisturbed lands that have archaeological potential. ■ Alternatives 1A and 1B are preferred from a cultural environment perspective.	●	●	◕	◑	◔	◔
Evaluation Summary	■ Alternative 1A, a Signalized Intersection Termination at Upper James Street, maintains existing traffic patterns, provides the highest capacity, and has the lowest construction cost and complexity against other alternatives. ■ Alternative 1A has the least impacts to private property, greenbelt lands as well as minimum impacts to potential cultural heritage resources and agricultural lands. ■ Alternative 1A is consistent with the recommendations and commitments made in the approved 1987 Environmental Assessment Report, thus has been selected as the preferred alternative.	-	-	-	-	-	-

Legend	Least Preferred	-	-	-	Most Preferred
Icon	○	◔	◑	◕	●

8. The Recommended Plan

8.1 Changes Made to the Recommended Plan After PIC #2

Modifications to the Recommended Plan shared at Public Information Centre #2 includes:

- Optimization of radii for the southeast ramp at Airport Connection Road from a radii of 340 metres to 250 metres. This allowed a more desirable stormwater management pond to be designed within the interchange and enhance the weaving distance to the Airport Road intersection from 170 metres to 215 metres.
- Partial / decision point lighting at interchange bullnose and intersections.
- Completion of the Drainage and Stormwater Management Plan that includes:
  - Replacement of 17 culverts;
  - Extension of 11 culverts;
  - Construction of 10 new culverts (5 each at Book Road East and Airport Connection Road);
  - Side ditches throughout the Highway 6 South corridor with flat-bottom grassed swales, where possible, for water quality treatment of runoff; and
  - 3 stormwater management ponds (2 at Book Road East Interchange and 1 at Airport Connection Road Interchange).

8.2 Summary of the Recommended Plan

The Recommended Plan for the Highway 6 South corridor includes the following improvements:

- Twinning of Highway 6 South from 2 lanes to 4 lanes (new southbound lanes). Includes enhancements to Highway 6 South geometrics – curve flattening;
  - Curve flattening included in the design north/south of Book Road East, north of Butter Road, north of Glancaster Road and between Airport Connection Road and Upper James Street.
- Improvements to Highway 6 South – Highway 403 South to East Ramp

- Signalization of the Garner Road west ramp terminal intersection (to be completed by the City of Hamilton);
- Highway 6 South alignment refinements;
- Structural improvements (for example replacement / rehabilitation of culverts and bridge structures);
- Decision point lighting and traffic signals at interchanges;
- Speed transition to slow southbound traffic approaching Upper James Street;
- New Parclo A-4 interchange at Book Road East – signalized ramp terminal intersections, illumination, drainage ditch and stormwater management ponds;
  - Preferred from a transportation and operations perspective (higher capacity and flexibility to accommodate future needs).
  - Greater environmental impacts anticipated however will be mitigated where feasible.
  - Consistent with the recommendations and environmental commitments from the 1987 approved Environmental Assessment.
- New Trumpet interchange at Airport Connection Road – signalized Airport Road intersection, illumination, drainage ditch and stormwater management ponds;
  - Allows for free flow operations, enhances safety (reduces left turn/wrong way moves) and provides the most desirable speed reduction. Better capacity and flexibility to accommodate future needs.
  - Meets the Environmental Assessment commitment to retain 70% of the Benedict Woodlot.
  - Less potential for greenhouse gas emissions and impacts to cultural resources.
- Intersection improvements at Upper James Street – double left turn for eastbound vehicles heading north on Highway 6 South.
  - Maintains existing traffic patterns, provides the highest capacity, and has the lowest construction cost and complexity.
  - Least impacts to private property, and greenbelt lands as well as minimum impacts to potential cultural heritage resources and agricultural lands.
  - Consistent with the recommendations from the 1987 approved Environmental Assessment (initial condition).

- Drainage improvements including:
  - Replacement of 17 culverts;
  - Construction of 10 new culverts for drainage and watercourse conveyance at Book Road and Airport Connection Road interchanges;
  - Side ditches throughout the Highway 6 corridor and flat-bottom swales where possible for water quality treatment;
  - Three Stormwater Management ponds that will provide quantity and quality control of runoff, including two located at Book Road interchange and one pond located at Airport Connection Road interchange.

9. Environmental Issues, Effects, Mitigation Measures and Commitments

9.1 1987 Environmental Assessment Report Commitments

As described in **Section 6,** the 1987 Environmental Assessment Report was approved by Order in Council 3540/92 by the Minister of the Environment, Conservation and Parks in 1992. Both the approved 1987 Environmental Assessment Report and the 1992 Order in Council 3540/92 contained commitments for future work. These commitments are to be carried out as appropriate as the design stages progress. **Table 16** below outlines the commitments for future work from the 1987 Environmental Assessment Report and **Table 17** outlines the commitments listed in the Order in Council 3540/92. The tables outline how the commitments, pertaining to the 4-laning within the Project limits, were addressed as part of this Preliminary Design and Environmental Assessment Update and how that commitment will be carried forward to Detail Design. It should be noted that commitments not addressed at the Preliminary Design stage will be directly carried forward to Detail Design and mitigation for impacts as a result of construction will be identified in Detail Design.

The following sections outline the direct and indirect environmental (natural, socio-economic, and cultural) effects, as well as transportation effects, associated with the Recommended Plan as identified in **Section 8**. This section also describes the mitigation measures that will be implemented to avoid or minimize the potential effects associated with the Recommended Plan. The mitigation measures and commitments outlined in this report will be refined in greater detail in the Detail Design stage. Specific environmental controls based on these detailed mitigation measures will then be included in the contract documents to address specific environmental and operational concerns during the preparation of the contact documents in the Detail Design stage.

Table 16: Approved 1987 Environmental Assessment Report Commitments for Future Work

#	Issue /Concern (Potential/Actual Impacts)	I.D.	Commitment/Issue	How was the Commitment Addressed During this Project?	Commitment carried forward to Detail Design
1	**Erosion and Sedimentation**	1.1	■ Undertake detailed soil investigation during Detail Design, including bank stability and erosion potential at stream crossings.	■ Commitment carried forward to Detail Design	■ Undertake detailed soil investigation during Detail Design, including bank stability and erosion potential at stream crossings.
1	**Erosion and Sedimentation**	1.2	■ Investigate mitigation for soil erosion during construction.	■ Mitigations for soil erosion during construction are included in this report and will also be reviewed and reevaluated in Detail Design.	■ Review and re-evaluate the mitigations for soil erosion during construction identified in this report during Detail Design.
2	**Groundwater Quality and Quantity**	2.1	■ Investigate during Detail Design potential for impacts to groundwater quantity (for example effects to flow rate) and quality (for example chemical and organic content) due to construction, including mitigating measures and /or monitoring program as required.	■ Commitment carried forward to Detail Design	■ Investigate during Detail Design potential for impacts to groundwater quantity (for example effects to flow rate) and quality (for example chemical and organic content) due to construction, including mitigating measures and /or monitoring program as required.
2	**Groundwater Quality and Quantity**	2.2	■ Investigate during Detail Design potential impacts to private sewage / septic systems adjacent to alignment.	■ Commitment carried forward to Detail Design	■ Investigate during Detail Design potential impacts to private sewage / septic systems adjacent to alignment.
3	**Surface Water / Drainage & Hydrology**	3.1	■ Ancaster Creek crossing subject to Hamilton Conservation Authority review (Fill Construction & Alteration to waterways regulations).	■ Drainage Plan and Preliminary Design recommendations shared with Hamilton Conservation Authority.	■ Ongoing consultation with Hamilton Conservation Authority on the design of Ancaster Creek crossing required in Detail Design.
3	**Surface Water / Drainage & Hydrology**	3.1	■ Undertake detailed drainage study prior to construction, including investigation of increase in volume and frequency of flow changes (storm events);	■ Preliminary Drainage and Stormwater Management Plan completed for the Preliminary Design Recommended Plan.	■ Drainage and Stormwater Management Plan to be finalized in Detail Design following fluvial geomorphology study complete for watercourse crossings.
3	**Surface Water / Drainage & Hydrology**	3.2	■ Review stream crossings, fill permits and structures design with Ministry of Natural Resources and Forestry and Conservation Authority prior to construction.	■ Commitment carried forward to Detail Design	■ Review stream crossings, fill permits and structures design with Ministry of Natural Resources and Forestry and Conservation Authority prior in Detail Design.
3	**Surface Water / Drainage & Hydrology**	3.3	■ Investigate potential for any possible mitigation measures for erosion at stream crossings and sedimentation from general construction operations, including fill placement and cuts.	■ Commitment carried forward to Detail Design	■ Investigate potential for any possible mitigation measures for erosion at stream crossings and sedimentation from general construction operations, including fill placement and cuts.
3	**Surface Water / Drainage & Hydrology**	3.4	■ Determine during Detail Design whether Floodplain Planning policy statement has been approved; provide consideration of approved statement in Design and Construction Report(s).	■ Commitment carried forward to Detail Design	■ Determine during Detail Design whether Floodplain Planning policy statement has been approved; provide consideration of approved statement in Design and Construction Report(s).
3	**Surface Water / Drainage & Hydrology**	3.5	■ Investigate restrictions on refuelling, storage of fuel and pesticide containers, escape of petroleum products adjacent to watercourses.	■ Commitment carried forward to Detail Design	■ Investigate restrictions on refuelling, storage of fuel and pesticide containers, escape of petroleum products adjacent to watercourses.
3	**Surface Water / Drainage & Hydrology**	3.6	■ Investigate use of sedimentation ponds, or other settling measures for dewatering operations and /or water course diversions.	■ Commitment carried forward to Detail Design	■ Investigate use of sedimentation ponds, or other settling measures for dewatering operations and /or water course diversion.

#	Issue /Concern (Potential/Actual Impacts)	I.D.	Commitment/Issue	How was the Commitment Addressed During this Project?	Commitment carried forward to Detail Design
3	**Surface Water / Drainage & Hydrology**	3.7	■ Undertake detailed drainage study during Detail Design; to include consideration of changes to surface water quality as a result of proposed surface drainage; including consideration of possible effects to salt-sensitive areas of roadway drainage.	■ Commitment carried forward to Detail Design	■ Undertake detailed drainage study during Detail Design; to include consideration of changes to surface water quality as a result of proposed surface drainage; including consideration of possible effects to salt-sensitive areas of roadway drainage.
3	**Surface Water / Drainage & Hydrology**	3.8	■ Hamilton-Wentworth Health Unit to be advised of any anticipated effects of surface drainage from highway or relocation of streams on adjacent wells or septic systems; and of proposed mitigation during detail design.	■ Commitment carried forward to Detail Design	■ Hamilton-Wentworth Health Unit to be advised of any anticipated effects of surface drainage from highway or relocation of streams on adjacent wells or septic systems; and of proposed mitigation during Detail Design.
3	**Surface Water / Drainage & Hydrology**	3.9	■ Investigate sediment control measures.	■ Commitment carried forward to Detail Design	■ Investigate sediment control measures.
4	**Wildlife habitat**	4.1	■ Investigate mitigation measures to minimize disruption to waterfowl habitats during construction.	■ Waterfowl habitat identified in the 1987 Environmental Assessment Report is not directly impacted by the Project's Recommended Plan but potential for disturbance or impacts to waterfowl during construction should be investigated in Detail Design.	■ Investigate mitigation measures to minimize disruption to waterfowl habitats during Detail Design.
5	**Vegetation**		■ During Detail Design, investigation will be carried out to minimize impacts of the selected alternatives to wooded areas where possible. This will include consideration of: – Investigation of tree removal strategy within right-of-way (gradual, pre-stressed clearance) – A survey of rare or significant plants along the centre line of proposed right-of-way to locate any significant specimens. ■ Construction measures to minimize impacts as a result of major cut or fill operations for significant stands of trees, where possible.	■ Commitment carried forward to Detail Design	■ During Detail Design, investigation will be carried out to minimize impacts of the selected alternatives to wooded areas where possible. This will include consideration of: – Investigation of tree removal strategy within right-of-way (gradual, pre-stressed clearance) – A survey of rare or significant plants along the centre line of proposed right-of-way to locate any significant specimens. – Construction measures to minimize impacts as a result of major cut or fill operations for significant stands of trees, where possible.
5	**Vegetation**	5.1	■ Vegetation specialist to walk the centre line of proposed right-of-way to locate any significant plant specimens; mitigation to protect or minimize disruption / damage to regionally rare species to be determined.	■ Commitment carried forward to Detail Design	■ Vegetation specialist to walk the centre line of proposed right-of-way to locate any significant plant specimens; mitigation to protect or minimize disruption / damage to regionally rare species to be determined.
5	**Vegetation**	5.2	■ Investigate tree removal strategy within right-of-way including possible pre-stressing of woodlot areas to be cleared.	■ Commitment carried forward to Detail Design	■ Investigate tree removal strategy within right-of-way including possible pre-stressing of woodlot areas to be cleared.
5	**Vegetation**	5.3	■ Investigate appropriate areas for identification of natural regeneration areas.	■ Commitment carried forward to Detail Design	■ Investigate appropriate areas for identification of natural regeneration areas.

#	Issue /Concern (Potential/Actual Impacts)	I.D.	Commitment/Issue	How was the Commitment Addressed During this Project?	Commitment carried forward to Detail Design
5	**Vegetation**	5.4	■ Investigate effects of major cuts / fills on significant stands of trees and determine mitigation to minimize effect, where possible.	■ Commitment carried forward to Detail Design	■ Investigate effects of major cuts / fills on significant stands of trees and determine mitigation to minimize effect, where possible.
6	**Property**	6.1	■ Enter into negotiations to obtain right-of-way requirements on a willing seller basis prior to construction if possible.	■ Property requirements identified for the Preliminary Design Recommended Plan. ■ Ontario Ministry of Transportation to acquire necessary property following completion of the Project.	■ Property negotiations to be completed by the Ontario Ministry of Transportation during Detail Design.
6	**Property**	6.2	■ Identify any property acquired, which may be surplus to Ontario Ministry of Transportation requirements and investigate appropriateness of disposal to private sector.	■ Commitment carried forward to Detail Design	■ Following completing of detail design, identify any property acquired, which may be surplus to the Ontario Ministry of Transportation requirements and investigate appropriateness of disposal to private sector.
7	**Agriculture**	7.1	■ Provide access to be provided to new farm units created where feasible.	■ Property requirements identified for the Preliminary Design Recommended Plan. ■ Ontario Ministry of Transportation to acquire necessary property following completion of the Project.	■ Property negotiations including creation of new accesses to be completed by the Ontario Ministry of Transportation during Detain Design.
7	**Agriculture**	7.2	■ Identify land locked parcels for Ontario Ministry of Transportation acquisition, with consideration for sale of surplus properties to adjacent owners.	■ Property requirements identified for the Preliminary Design Recommended Plan. ■ Ontario Ministry of Transportation to acquire necessary property following completion of the Project.	■ Property negotiations to be completed by the Ontario Ministry of Transportation during Detail Design.
7	**Agriculture**	7.3	■ Investigate possible temporary restrictions to farm equipment movement as a result of construction of grade separations at local roads.	■ The Preliminary Design Recommended Plan does accommodate large machinery movements; however, temporary impacts to machinery movement during construction is possible. This commitment carried forward for consideration in Detail Design.	■ During Detail Design, investigate possible temporary restrictions to farm equipment movement as a result of construction of grade separations at local roads.
7	**Agriculture**	7.4	■ Investigate possible impacts to any tile beds and outlets identified during Detail Design, and determine appropriate mitigation	■ Commitment carried forward to Detail Design	■ Investigate possible impacts to any tile beds and outlets identified during Detail Design and determine appropriate mitigation.
7	**Agriculture**	7.5	■ Consider any new speciality crop areas identified during Detail Design, with a view to mitigating possible construction and operation / maintenance effects.	■ Specialty crop areas are not present within the Study Area at the time of this Project. Commitment carried forward for consideration in Detail Design.	■ Consider any new speciality crop areas identified during Detail Design, with a view to mitigating possible construction and operation / maintenance effects.
7	**Agriculture**	7.6	■ Investigate possible temporary limited interest uses of agricultural areas for construction, including restoration of disturbed areas.	■ Commitment carried forward to Detail Design	■ During Detail Design, investigate possible temporary limited interest uses of agricultural areas for construction, including restoration of disturbed areas.
7	**Agriculture**	7.7	■ Investigate scheduling of construction timing so as to salvage current crop.	■ Commitment carried forward to Detail Design	■ During Detail Design, investigate scheduling of construction timing so as to salvage current crop.

#	Issue /Concern (Potential/Actual Impacts)	I.D.	Commitment/Issue	How was the Commitment Addressed During this Project?	Commitment carried forward to Detail Design
7	**Agriculture**	7.8	■ Determine whether Foodland Preservation policy statement has been approved during Detail Design; provide consideration of approved statement in Design & Construction Report(s).	■ Commitment carried forward to Detail Design	■ Determine whether Foodland Preservation policy statement has been approved during Detail Design; provide consideration of approved statement in Design & Construction Report(s).
8	**Noise and Vibration**	8.1	■ Investigate during Detail Design appropriate design for mitigation at Highway 53 crossing.	■ Mitigation at Highway 53 was completed in earlier works and the Noise Assessment completed for the Preliminary Design Recommended Plan as per Ontario Ministry of Transportation's Noise Guide, 2022, confirmed that noise mitigation is not warranted for the Project.	■ Review of 2023 Noise Assessment in Detail Design.
8	**Noise and Vibration**	8.2	■ Re-evaluate noise impacts at all noise sensitive sites (for example residential and school amenity areas) at crossings of local roads using updated traffic volume predictions; re-evaluate appropriate mitigation measures, including vertical alignment shifts, use of specific pavement types, noise berms and / or barriers, per the Ministry of the Environment, Conservation and Parks-Ontario Ministry of Transportation noise protocol.	■ A Noise Assessment was undertaken as per Ontario Ministry of Transportation Noise Guidelines (2022).	■ Review of 2023 Noise Assessment in Detail Design.
8	**Noise and Vibration**	8.3	■ Investigate mitigation measures for construction noise, per Ministry of the Environment, Conservation and Parks-Ontario Ministry of Transportation noise protocol.	■ Commitment carried forward to Detail Design	■ During Detail Design, investigate mitigation measures for construction noise, per Ministry of the Environment, Conservation and Parks-Ontario Ministry of Transportation noise protocol.
8	**Noise and Vibration**	8.4	■ Investigate use of any blasting; determine appropriate mitigating measures, including pre-blast survey and monitoring program, as appropriate.	■ Commitment carried forward to Detail Design	■ Investigate use of any blasting; determine appropriate mitigating measures, including pre-blast survey and monitoring program, as appropriate.
9	**Air Quality**	9.1	■ Investigate restrictions on open burning	■ Commitment carried forward to Detail Design	■ Investigate restrictions on open burning
9	**Air Quality**	9.2	■ Investigate methods of dust control during construction.	■ Commitment carried forward to Detail Design	■ During Detail Design, investigate methods of dust control during construction.
9	**Air Quality**	9.3	■ Investigate controls on Asphalt-laying times in areas close to residences and on location of plant, to minimize effects of odours, fumes, etc.	■ Commitment carried forward to Detail Design	■ Investigate controls on Asphalt-laying times in areas close to residences and location of plant, to minimize effects of odours, fumes, etcetera.
10	**Landscaping**	10.1	■ Landscaping program to be investigated and implemented as part of, or following, construction; to include construction areas within right-of-way, borrow areas as required.	■ Preliminary Landscape Plan completed for the Preliminary Design Recommended Plan. To be finalized in Detail Design.	■ Landscaping program to be investigated and implemented as part of, or following, construction; to include construction areas within right-of-way, borrow areas as required.
11	**Archaeology**	11.1	■ Complete archaeological survey along alignment; based on significance of resources identified, determine appropriate mitigation measures, and implement program of appropriate mitigation; where possible, salvage or other mitigation to be implemented between time of property acquisition and construction.	■ Stage 1 Archaeological Assessment for the Study Area is complete. Stage 2 Archaeological Assessment is recommended within areas with archaeological potential within the proposed right-of-way of the Preliminary Design Recommended Plan.	■ Review the 2022 Stage 1 Archaeological Assessment Report and prior to ground disturbance complete the necessary Stage 2,3 and 4 Archaeological surveys within proposed right-of-way as required per Ministry of Citizenship and Multiculturism's Standards and Guidelines.

#	Issue /Concern (Potential/Actual Impacts)	I.D.	Commitment/Issue	How was the Commitment Addressed During this Project?	Commitment carried forward to Detail Design
12	**Cultural Heritage**	11.2	■ Fence and provide access from Book Road East to historic abandoned human cemetery (Book-Parkin Cemetery).	■ Cemetery is currently fenced. Preliminary Design Recommended Plan allows for access to cemetery.	■ Fence and provide access from Book Road East to historic abandoned human cemetery (Book-Parkin Cemetery).
12	**Cultural Heritage**	11.3	■ Negotiate with Town of Ancaster for Town to continue responsibility for maintenance of cemetery.	■ Ancaster has amalgamated with the City of Hamilton. ■ Commitment carried forward to Detail Design	■ Negotiate with City of Hamilton to continue responsibility for maintenance of cemetery.
12	**Cultural Heritage**	11.4	■ Investigate interim maintenance requirements for cemetery under Cemetery Act if negotiations with Ancaster not completed prior to Ontario Ministry of Transportation acquisition of right-of-way.	■ Ancaster has amalgamated with the City of Hamilton. ■ Commitment carried forward to Detail Design	■ Investigate interim maintenance requirements for cemetery under Cemetery Act if negotiations with the City of Hamilton are not completed prior to Ontario Ministry of Transportation acquisition of right-of-way.
12	**Cultural Heritage**	11.5	■ Include in property negotiation possibility of retention of stump fence remnants (if any) on private property along Butter Road, and of relocation opportunity for owner of barn on Book Road East ridge at owner's cost to retain sense of farmstead grouping.	■ The stump fence on Butter Road previously noted for preservation is no longer present. Field work confirmed that stump fence is existing at 396 Butter Road East. ■ Barn at 211 Book Road East no longer exists.	■ This commitment is no longer relevant and is therefore not carried forward to Detail Design.
12	**Cultural Heritage**	11.6	■ All properties beyond proposed right-of-way acquired through property negotiations to be screened for heritage concern by Ontario Ministry of Transportation Environmental Unit to determine appropriate mitigation.	■ Cultural Heritage Assessment was completed as part of this Project.	■ Further assessment of the Heritage features identified for the recommended plan in the Cultural Heritage Resources Assessment Report in Detail Design.
13	**Utilities**	13.1	■ Investigate modifications to utility plans during Detail Design.	■ Utility Plan completed as part of the Project identified conflicts with Hydro One towers and at the pipelines present at Airport Connection Road interchange. Both pipelines will require mitigation measure to protect the pipelines during and post construction. Potential mitigation and relocation plans have been discussed with Hydro One. Consideration of all conflicts will continue into Detail Design.	■ Continued consultation with Hydro One, TC Energy, Westover Express and Enbridge Gas and any other utilities identified in Detail Design.
14	**Traffic and Access**	14.1	■ Maintain access to individual residences during construction	■ Commitment carried forward to Detail Design	■ Maintain access to individual residences during construction
14	**Traffic and Access**	14.2	■ Investigate possible detour requirements for local roads during construction of grade separations; maintain access on such local roads where possible.	■ Commitment carried forward to Detail Design	■ During Detail Design, investigate possible detour requirements for local roads during construction of grade separations; maintain access on such local roads where possible.
15	**Signage**	15.1	■ Investigate appropriate and adequate signing	■ Commitment carried forward to Detail Design	■ Investigate appropriate and adequate signing
16	**Aggregate Mineral Resources**	16.1	■ Investigate use of potential mineral aggregate resources within "designation" at Highway 403 for construction purposes, in consideration of Mineral Aggregate Resources policy statement.	■ Commitment carried forward to Detail Design	■ Use of local resources for construction purposes like the sand / gravel resource area identified north of Book Road East should be considered further in Detail Design.

#	Issue /Concern (Potential/Actual Impacts)	I.D.	Commitment/Issue	How was the Commitment Addressed During this Project?	Commitment carried forward to Detail Design
17	**Borrow Sources**	17.1	■ Refine balance profile in order to minimize borrow requirements	■ Commitment carried forward to Detail Design	■ Refine balance profile in order to minimize borrow requirements
17	**Borrow Sources**	17.2	■ Investigate post-construction rehabilitation of borrow pits.	■ Commitment carried forward to Detail Design	■ Investigate post-construction rehabilitation of borrow pits.
17	**Borrow Sources**	17.3	■ Investigate need to designate possible borrow sites, haul, and construction access roads.	■ Commitment carried forward to Detail Design	■ Investigate need to designate possible borrow sites, haul, and construction access roads.
18	**Disposal Sites**	18.1	■ Investigate / identify appropriate disposal sites on or off right-of-way, including landscaping, as required.	■ Commitment carried forward to Detail Design	■ Investigate / identify appropriate disposal sites on or off right-of-way, including landscaping, as required.
18	**Disposal Sites**	18.2	■ Investigate minimizing amount of disposal of material unsuitable for roadway construction, by use within right-of-way for slope flattering, median, if possible.	■ Commitment carried forward to Detail Design	■ Investigate minimizing amount of disposal of material unsuitable for roadway construction, by use within right-of-way for slope flattering, median, if possible.
19	**Design and Construction Report**	19.1	■ Submission to the Ministry of the Environment, Conservation and Parks for information and monitoring purposes, 30 days (minimum) prior to construction for each contract, or group of contracts (send to Environmental Assessment Branch).	■ Commitment carried forward to Detail Design	■ Submission to the Ministry of the Environment, Conservation and Parks for information and monitoring purposes, 30 days (minimum) prior to construction for each contract, or group of contracts (send to Environmental Assessment Branch).
19	**Design and Construction Report**	19.2	■ Submission prior to construction to appropriate Conservation Authority, and the Ministry of the Environment, Conservation and Parks- Land Use Branch.	■ Commitment carried forward to Detail Design	■ Submission prior to construction to appropriate Conservation Authority, and the Ministry of the Environment, Conservation and Parks- Land Use Branch.
20	**Consultation**	20.1	■ The following stakeholders and agencies are to be consulted on the additional work required for the commitments outlined in this table: – Ministry of the Environment – Property Owners – Haldimand/Norfolk Board of Education – Town of Ancaster – Grand River Conservation Authority – Hamilton Conservation Authority – Niagara Peninsula Conservation Authority – Ministry of Natural Resources and Forestry – Ministry of Citizenship and Culture – Regional Health Units – Ministry of Tourism and Recreation	■ Consultation with the following agencies took place in this Preliminary Design and Environmental Assessment Update: – Ministry of the Environment, Conservation and Parks – Property Owners – Haldimand/Norfolk Board of Education – City of Hamilton – Grand River Conservation Authority – Hamilton Conservation Authority – Niagara Peninsula Conservation Authority – Ministry of Natural Resources and Forestry – Ministry of Citizenship and Multiculturalism	■ The following stakeholders and agencies are to be consulted on the additional work required for the commitments outlined in this table: – Ministry of the Environment, Conservation and Parks – Property Owners – Haldimand / Norfolk Board of Education – City of Hamilton – Grand River Conservation Authority – Hamilton Conservation Authority – Niagara Peninsula Conservation Authority – Ministry of Natural Resources and Forestry – Ministry of Citizenship and Multiculturalism – Regional Health Units – Ministry of Tourism, Culture and Sport

Table 17: Commitments listed in the Order in Council (O.C. 3540/92)

I.D.	Commitment	How was the Commitment Addressed to date?	Commitment carried forward to Detail Design
1.1	■ In order to mitigate the significant and unique property impacts resulting from the construction of Highway 6 (New) and the associated relocation of Butter Road, Ontario Ministry of Transportation is to offer to acquire the affected property at 211 Butter Road East on a willing buyer / willing seller basis at the current open market value. No further mitigation to the property will be required.	■ Ontario Ministry of Transportation has purchased 211 Butter Road.	■ This commitment has been met and does not need to be carried forward to Detail Design.
1.2	■ In order to mitigate the significant property impacts resulting from the construction of Highway 6 (New) and the associated interchange at Airport Road, Ontario Ministry of Transportation is to refine the design of the interchange to reduce the amount of woodlot required by modifying the vertical alignment of the Highway and associated ramps and constructing a retaining wall along the outer edge of the interchange. The amount of woodlot to be retained will not be less than 70 percent.	■ Preliminary Design Recommended Plan for Airport Connection Road Interchange retains 70 percent of the woodlot.	■ Construction of Highway 6 (New) and the associated interchange at Airport Connection Road, needs to retain at least 70 percent of the woodlot (Benedict Woodlot) as it existed in 1987. A review of opportunities to further refine the design of the interchange and / or retain the existing vegetation throughout construction and operations in order to reduce the impact to the woodlot should be completed in Detail Design.
1.3	■ Except as otherwise provided by these conditions, the undertaking shall be carried out in accordance with the provisions of the Environmental Assessment which are incorporated herein by reference.	■ Commitments from the approved 1987 Environmental Assessment Report were considered throughout the Project and the status of each commitment is outlined in **Table 17** and as such will be carried forward, where necessary to Detail Design.	■ All commitments outlined in **Table 16** and **Table 17** are commitments made in this Transportation Environmental Study Report and will be addressed by the Ontario Ministry of Transportation or by the Ministry's agent prior to construction of the works outlined in **Section 8** of this report.

9.2 Natural Environment

These sections describe potential impacts and proposed mitigation measures to the natural environment based on the existing conditions described in **Section 5**. These impacts and mitigation measures will be reviewed and refined during the Detail Design stage.

9.2.1 Fish and Fish Habitat

A fish and fish habitat impact assessment was completed based on the Recommended Plan to identify any potential constraints to proposed activities and suggest general mitigation measures to avoid harm to fish and fish habitat, which shall be refined in Detail Design.

9.2.1.1 Summary of Proposed In-Water Works

Details of the proposed in-water works anticipated to occur in either direct or indirect fish habitat within the Study Area are summarized in **Table 18**.

9.2.1.2 Summary of Potential Impacts

The following is a summary of the other potential direct and indirect effects on fish and fish habitat, which may result in the activities associated with the proposed work described in **Table 18**.

9.2.1.2.1 Land-based Activities

- Use of industrial equipment may result in alterations to contaminant concentrations from fuel or fluid leaks. An increase in sediment may result from increased erosion potential where industrial equipment has exposed and loosened soils.
- Vegetation clearing may result in alterations to sediment concentrations, habitat structure and cover, and water temperature because of increased erosion potential and sediment deposition from unstable or exposed banks and changes in shade. Changes in food supply and nutrient concentrations may result from the loss of external inputs with a reduction in riparian vegetation. The use of herbicides may result in changes to contaminant concentrations.
- Grading may result in alterations to sediment concentrations and habitat structure and cover because of increased erosion potential and sediment deposition.

Table 18: Summary of Proposed In-Water Works

Stated in 8.1.1.1 Watercourse Identification.	Fisheries Crossing Identification[1]	Culvert Identification	Existing Structure Type	Existing Structure Length (m)	Existing Structure Width (mm)	Existing Structure Height (mm)	New Structure Type	New Structure Length (m)	New Structure Width (mm)	New Structure Height (mm)	New Structure Proposed in-water Works
Unnamed Tributary of Welland River - 2	WC-05	PH6-CL-23	Concrete Box	36.1	1800	900	Concrete Box	100.0	1800	900	■ Potential culvert relocation and extension. Watercourse realignment.
Unnamed Tributary of Welland River – 2	WC-05b	PBR-SR-4	Concrete box	31.8 (Approx.)	1800	1200	Concrete Box	60	1800	1200	■ Existing pond to be removed and replaced with an offline Stormwater Management Pond (P-SWMP-2).
Unnamed Tributary of Welland River – 2	WC-06	PH6-CL-20	HDPE	33.0	825	825	HDPE	77.3	825	825	■ Culvert extension.
Unnamed Tributary of Welland River – 2	WC-07	PH6-CL-19A		24.7				65.4			■ Culvert extension at both ends.
Unnamed Tributary of Welland River - 2	WC-08	PH6-CL-19B	Concrete Box	19.90	1800	1200	Concrete Box	60.0	1800	1200	■ Proposed replacement with a longer, 1800 millimetres by 1200 millimetres concrete box. Culvert extension at both ends. Watercourse realignment may be required upstream and downstream.
Unnamed Tributary of Welland River - 4	WC-10	PH6-CL-18	Concrete Box	44.0	2-2400	1500	Concrete Box	84.0	2-2400	1500	■ Culvert extension at downstream end. Watercourse adjustment required at the downstream side.
Unnamed Tributary of Welland River - 6	WC-12	PH6-CL-17	Concrete Box	29.7	1800	900	Concrete Box	63.7	1800	900	■ Culvert extension at both ends. Watercourse realignment will be required.
Welland River	WC-15	PH6-CL-14	Concrete Box	41.5	2-3000	2100	Concrete Box	77.0	2-3000	2100	■ Culvert extension at both ends.
Unnamed Tributary of Welland River - 11	WC-16a	PH6-CL-13	Concrete Box	24.1	1800	900	Concrete Box	60.1	1800	900	■ Culvert extension at both ends. Potential replacement and relocation. Watercourse realignment may be required.
Unnamed Tributary of Welland River - 13	WC-18	PH6-CL-12	Concrete Box	56.3	1800	1200	Concrete Box	112.5	1800	1200	■ Culvert extension. Likely limited to the downstream end. Watercourse realignment.
Unnamed Tributary of Welland River - 15	WC-20	PH6-CL-10	Concrete Box	39.0	2400	1800	Concrete Box	77.7	2400	1800	■ Culvert extension likely limited to the downstream end.
Unnamed Tributary of Welland River - 16	WC-21	PH6-CL-9	Concrete Box	42.0	1800	900	Concrete Box	82.0	1800	900	■ Culvert extension at both ends.
Unnamed Tributary of Welland River - 17	WC-22	PH6-CL-8	Concrete Box	53.7	1800	1200	Concrete Box	102.0	1800	1200	■ Culvert extension at both ends. Potential culvert relocation and watercourse realignment.

1. All fisheries crossing identifications listed support fish habitat (either direct or indirect).

Stated in 8.1.1.1 Watercourse Identification.	Fisheries Crossing Identification[1]	Culvert Identification	Existing Structure Type	Existing Structure Length (m)	Existing Structure Width (mm)	Existing Structure Height (mm)	New Structure Type	New Structure Length (m)	New Structure Width (mm)	New Structure Height (mm)	New Structure Proposed in-water Works
Unnamed Tributary of Welland River - 18	WC-23	PH6-CL-7	Concrete Box	39.0	1800	900	Concrete Box	83.0	1800	900	■ Culvert extension at both ends. Watercourse relocation will be required
Unnamed Tributary of Welland River - 19	WC-24	PH6-CL-6	Concrete Box	41.5	1800	1200	Concrete Box	90.0	1800	1200	■ Culvert extension at both ends.
Unnamed Tributary of Welland River - 21	WC-26	PH6-CL-4	Concrete Box	22.8	3000	2400	Concrete Box	70.0	3000	2400	■ Culvert size to be increased to meet hydraulic requirements. Culvert extension at both ends.
Unnamed Tributary of Welland River - 22	WC-27	PH6-CL-3	Concrete Box	16.2	2-2400	1200	Concrete Box	58.5	2-2400	1200	■ Culvert size to be increased to meet hydraulic requirements. ■ Culvert extension. Watercourse relocation will be required
Unnamed Tributary of Welland River - 23	WC-28	PH6-CL-2	Concrete Box	23.0	2-2400	1200	Concrete Box	62.0	2-2400	1200	■ Culvert extension.
Unnamed Tributary of Welland River – 24	WC-29	PH6-CL-1	Concrete Box	39.0	2400	1200	Concrete Box	60.0	2400	1200	■ Culvert extension.

9.2.1.2.2 In-water Activities

- Placement of material or structures in water can result in changes in channel or shoreline morphology, hydraulics, aquatic macrophytes, and substrate composition. This can lead to changes in sediment concentration, habitat structure and cover, food supply, nutrient concentrations, and may result in direct or indirect impacts to fish and fish habitat.
- Removal of aquatic vegetation may result in changes in water temperature, dissolved oxygen concentrations, food supply, nutrient concentrations, habitat structure and cover, sediment concentrations or contaminant concentrations because of the release of sediment, or changes in nutrient inputs, primary productivity, and light penetration.
- Use of industrial equipment below the high-water mark could result in impacts to fish and fish habitat as a result of alterations to sediment concentrations from unstable or exposed banks or through the re-suspension of sediment. Fish and fish habitat could also be impacted through an increase in contaminant concentrations from fluid leaks from equipment. Impacts may also result from direct physical contact with equipment.
- The installation of in-water work isolation measures may result in incidental entrainment or potential death of fish and limit habitat access.
- Dewatering and pumping of isolated in-water work areas could displace or strand fish and change access to habitat features. Alterations to flows could increase erosion and scour potential and result in alterations to water temperature and concentrations of sediment, food, contaminants, or nutrients. Water extraction using pumps could also result in the death of fish by entrainment in pumps and machinery.
- Changes to fish passage associated with culvert replacements or extensions could result in incidental entrainment, impingement or mortality of resident species and changes to habitat access through changes in flow and migration patterns.
- Structure removals associated with culvert relocations could result in changes to sediment or contaminant concentrations, habitat structure and cover, or food supply due to changes in channel or shoreline morphology, hydraulics, substrate composition, or sediment release.

9.2.1.3 Proposed Mitigation Measures

The following section provides a summary of proposed mitigation measures to avoid or mitigate potential impacts to fish and fish habitat. Although mitigation measures presented below are anticipated to be generally applicable for the proposed works

(within or adjacent to fisheries watercourses), the efficacy of these mitigation measures to negate or avoid impacts will be further assessed during Detail Design.

9.2.1.3.1 Operational Constraints

- An Access Management Plan shall be created to limit access to waterbodies and banks to protect riparian vegetation and to minimize bank disturbance.
- In-water work below the high-water mark and work on watercourse banks shall be carried out during the appropriate timing window:
  - Permitted in-water timing window of July 1 – February 28/29 (no in-water work is permitted from March 1 – June 30).

9.2.1.3.2 Management Practices and Controls

- Design and install riparian plantings to avoid or minimize encroachment into and/or alteration of bank and bed profile.
- Fish shall be removed from isolated in-water work areas prior to the commencement of work. Fish must be safely relocated downstream of the work area in a manner that prevents harm and minimizes stress. Any fish isolated in the work area shall be transferred (using appropriate capture, handling, and release techniques to prevent harm and minimize stress) downstream or away from the construction area. A Licence to Collect Fish for Scientific Purposes shall be obtained prior to the start of any fish relocation works. Fish screens shall be used to avoid entrainment of fish in pumps or hoses.
- The contractor shall develop and implement an Erosion and Sediment Control plan to contain / isolate exposed soils, stockpiled materials, and unstable areas in the work zone to prevent the release of sediment to waterbodies during all phases of the Project. Prior to the removal of Erosion and Sediment Control measures following construction, the work site must be stabilized. Site-specific Erosions and Sediment Control plans shall be developed during Detail Design for each watercourse crossing where work is proposed within 30 metres of a watercourse.
- Design and implement an in-water work area isolation plan to maintain clean flow around the work area where in-water work is proposed. The design shall:
  - Use only clean materials free of particle matter for temporary cofferdams;
  - Manage flow withdrawal and discharge to prevent erosion and the release of sediment to a waterbody; and
  - Ensure work zones are stabilized against high flows at the end of each workday.
- Design and install culverts to prevent the creation of barriers to fish movement and maintain bankfull channel and habitat functions to the extent possible. Where

permanent in-water structures are placed in fish habitat, naturalize these areas by placing riverstone below the 2-year high water mark. Design and install in-stream cover to replace or re-instate fish cover removed, altered, or disturbed during construction.

- Design drainage systems to avoid diversion of or otherwise minimize changes in drainage to or from a waterbody (do not divert across waterbody boundaries).
- Design and plan activities and works in waterbody such that loss or disturbance to aquatic habitat is minimized and sensitive spawning habitats are avoided.
- Design stormwater management measures to manage runoff to waterbody considering discharge (for example velocities to avoid erosion) as well as quality (for example formal stormwater management ponds, enhanced ditches, and filtration).
- Clearing of riparian vegetation shall be kept to a minimum and if removal is necessary use proper clearing techniques and protect retained vegetation. When practical, prune or top the vegetation instead of grubbing / uprooting.
- Watercourses requiring realignment shall be designed using Natural Channel Design principles in accordance with the Fluvial Geomorphological Assessment that will be completed during Detail Design.
- Design and implement a work area containment plan to isolate all above-water work to prevent the release of sediment or other contaminants to a waterbody. The design shall include regular inspection, repair, removal, and disposal of isolation measures and materials. Work zones shall be clearly delineated before work to avoid unintentional intrusions into nearby natural areas.
- Where possible, organic material barriers (for example fibre roll barrier, sediment log, coir rolls etc.) shall be used in the drainage ditches to mitigate sediment transport.
- Materials used or generated during construction (for example organics, soil, woody debris, temporary stockpiles, construction debris, etc.) shall be stored and managed in a way that prevents the release of these materials to a waterbody. This shall include storing materials a safe distance from a waterbody (for example greater than 30 metres from any watercourse) and implementing isolation measures.
- Dewatering operations shall be managed to prevent erosion or the release of sediment-laden water to a waterbody.
- A Spills Management Plan shall be prepared and shall include materials, instructions, education, and emergency numbers. The plan shall be kept onsite at all times, communicated to work crews, and be properly implemented in the event of accidental spills.

- Operate, store, and maintain equipment and associated materials in a manner and at a distance that prevents the entry of any deleterious substance from entering a waterbody. Any part of equipment entering the waterbody or operating from the bank shall be clean, free of fluid leaks and in good working condition.
- The contractor shall refer to and incorporate mitigation measures and obtain applicable permits identified in the Wildlife Management Plan, Access Management Plan, Erosion and Sediment Control Plan, Invasive Species Management Plan, and any other management plan that may be developed at a later stage of the Project.

9.2.1.3.3 Rehabilitation

- Stabilize any portion of the bed of a waterbody disturbed during construction to pre-construction conditions (or better). This shall include substrates.
- Stabilize the banks of a waterbody that have been disturbed during construction to pre-construction conditions or better. This shall include riparian vegetation or stone material, temporary measures, and the avoidance of hard engineering.
- Design and implement vegetation rehabilitation plan following construction to replant riparian vegetation to pre-construction or better condition (for example trees for shade to cool water and provide overhead cover).
- Stabilize and re-vegetate soils exposed or disturbed during construction, including new or cleaned-out ditches.

9.2.1.3.4 Monitoring

- Should a permit under the Endangered Species Act, Species at Risk Act, or an Authorization under the Fisheries Act be required, the construction and post-construction monitoring shall incorporate all requirements of these approvals.
- In-water and near-water work shall be monitored to ensure mitigation measures are properly implemented, functioning, maintained and repaired as needed, and removed following construction.
- Erosion and Sediment Control implementation shall be monitored regularly.

9.2.1.3.5 Fisheries and Oceans Canada Review under the Federal Fisheries Act

This impact assessment (including the identification of environmental protection and mitigation measures), has determined that potential negative residual effects of the proposed works can be avoided or mitigated at most locations provided environmental protection and mitigation measures are properly implemented, monitored, and are maintained for effectiveness through the duration of construction. However, an updated impact assessment and determination of harmful alteration, disruption, or destruction of

fish habitat shall be completed during Detail Design to ensure that design recommendations have been carried through and to assess any potential design changes which may have been incorporated.

The proposed infilling of a stormwater management pond at Book Road East containing fish has been assessed to determine the likelihood of harmful alteration, disruption, or destruction of fish habitat. During confirmation of existing conditions, hydraulic connectivity of the pond to downstream fish habitat could not be determined due to property access issues. As such, a determination of the potential for harmful alteration, disruption, or destruction of fish habitat cannot be confirmed at this design stage. Additional field investigations during a suitable season (for example spring freshet) shall be completed during Detail Design. Should additional investigation confirm that the stormwater management pond has no connection to downstream fish habitat (is off-line), the proposed work would not result in a harmful alteration, disruption, or destruction of fish habitat in accordance with the 2020 Fisheries Protocol. However, should direct connectivity with a fish-bearing feature be confirmed, an assessment at Step 4 of the protocol shall be completed and a Request for Review would likely need to be submitted to the Department of Fisheries and Oceans Canada during Detail Design.

9.2.2 Erosion and Sediment Control

An Erosion and Sedimentation Overview Risk Assessment was undertaken for the proposed Project. The purpose of the Erosion and Sedimentation Overview Risk Assessment was to document the erosion potential within a broad area where the proposed Highway 6 South widening works will take place. Erosion and Sedimentation Overview Risk Assessment requirements are based on requirements outlined in the Ontario Ministry of Transportation's Environmental Guide for Erosion and Sediment Control During Construction of Highway Projects (September 2015). The risk for erosion potential is evaluated accounting for the characteristics of a broad area in terms of soils type and erodibility, slopes gradient and length, sensitivity of environmental features, the existing drainage pattern, and the nature of the proposed highway works. The results from this preliminary analysis led to identify the appropriate Erosion and Sediment Control approach that will address erosion potential concerns during construction of the Recommended Plan. This approach is to be confirmed during Detail Design.

Based on the Ontario Soil Survey Report No. 32 for the Wentworth County, the predominant soil groups within the Study Area are identified as Beverly (silt loam) Brantford (silt loam) and traces of Alberton (silt loam/silt clay loam). Based on Table 5.1 included in the Ontario Ministry of Transportation's Erosion and Sedimentation Overview Risk Assessment Guidelines, silt loam is related to high soil erodibility rating. Areas with an Erosion and Sedimentation Risk value of High will require an Erosion and

Sediment Control Plan based on Approach 3 (Two-Part Erosions and Sediment Control Plan: Main and Supplementary). Approach 3 is typically applied to higher risk areas where a higher amount of effort in Erosion and Sediment Control is warranted.

9.2.2.1 Summary of Potential Impacts

There is a high potential for adverse effects of uncontrolled erosion and resultant sedimentation due to the very close proximity of works to watercourses, loss or degradation of vegetation cover, wildlife habitat, Significant Wildlife Habitat and Species at Risk habitat, disturbance to wildlife including Species of Risk and Species of Conservation Concern as a result of construction activities, and potential impacts on vegetation communities, wildlife and wildlife habitat including wetland complexes within the Study Area.

9.2.2.2 Proposed Mitigation Measures

The Two-Part Erosion and Sediment Control Plan requires procedural and structural Best Management Practices, staged construction and progressive rehabilitation, more intensive sediment control Best Management Practices and construction monitoring. An Erosion and Sediment Control Plan will be completed in Detail Design.

9.2.3 Groundwater

A Groundwater Existing Conditions Study was undertaken for the Study Area. The results of the study indicated that there are approximately 144 existing water supply wells (mostly private, no active municipal water supply wells) that are present within the Study Area. In addition, highly vulnerable aquifers are present within the northern portion of the Study Area, from the vicinity of Highway 403 south towards Book Road East, in an isolated section on the west side of Highway 6 South, approximately 300 m south of Glancaster Road and in a large section on the east side of Highway 6 South from Airport Road to the southern limits of the Study Area.

9.2.3.1 Summary of Potential Impacts

9.2.3.1.1 Groundwater Recharge and Discharge

Impervious surfaces prevent infiltration of the surface runoff water into the soils and the removal of vegetation eliminates the plant transpiration from the evapotranspiration component of the natural water balance, and therefore these practices result in increased surface water runoff and a decrease in water infiltration into the subsurface. Consequently, this will affect groundwater recharge/discharge and possibly the environmental groundwater quality in the shallow aquifer system. In addition, compaction during roadbed preparation prior to road surfacing activities will reduce the

void space in the soil, and therefore result in reduced groundwater recharge to the overburden and bedrock aquifers systems. Obstruction to groundwater recharge will have the greatest impact in elevated areas where permeable deposits such as sand and gravel are removed, compacted, or paved over.

Based on the nature of this highway project, there will be an increase in the amount of pavement surfaces. Obstruction to groundwater discharge may occur if paving or compaction takes place adjacent to surface water bodies and seepage zones. However, paving compaction can also increase surface water runoff to nearby watercourses.

9.2.3.1.2 Construction Dewatering

Cuts and excavations which intercept the water table have the potential to capture and redirect groundwater flow in the shallow aquifer system. Excavations below the water table in areas where fine-textured soils are present will release a limited quantity of groundwater; most of the groundwater would be retained in the soil during excavation. In these areas, seepage into excavations would be minimal and dewatering may not be needed. More significant impacts would occur when excavating within saturated permeable deposits, where dewatering may be required. Construction under the water table and the consequent dewatering activities can result in a temporary or permanent change of groundwater level, groundwater flow patterns and possibly the groundwater quality of the underlying aquifer and water wells in surrounding areas. Embankments, foundations, footings, abutments, and piers constructed for bridges and culverts constructed to convey streams across the roadways can obstruct and hence alter the flow of groundwater (base flow) to surface water courses.

9.2.3.1.3 Release of Contaminants

There is a potential of accidental spill/release of fuels during highway construction work. Spills onto fine-textured soils (i.e., clay and silt) have a higher potential to impact the surface water quality due to surface runoff. Spills onto more permeable soils, directly onto the bedrock or bedrock with thin soil cover, have more potential to impact the groundwater system influencing the rate of infiltration. Spills occurring in the wetland areas or where the water table is at or near the ground surface have the most potential to impact the groundwater quality.

9.2.3.1.4 Potential Water Well Impacts

Potential groundwater impacts resulting from highway construction activities are expected to be greatest for private water well users with the following conditions:

- Water wells of shallow depth and/or large diameter in areas where road construction work is being performed below the shallow water table.

Groundwater seeping into the excavation has the potential to impact groundwater resources as groundwater will have to be pumped out during excavation. This action may lower the water table, temporarily reducing water supply to local wells, particularly shallow water wells;

- Water wells drilled/bored/dug in the shallow aquifer, as road construction activities have the potential to adversely impact the shallow aquifer through disturbing contaminated soils, or handling and management practices (e.g., spills of fuel, lubricants etc.); thus, introducing contaminants that could enter the groundwater system and impact nearby water wells; and
- Water wells closest to the area of construction, as road construction activities have the potential to physically impact water wells due to vibration and shock.

9.2.3.2 Proposed Mitigation Measures

The following mitigation measures will be employed to manage the potential impacts to groundwater resources:

- Minimize disturbance to existing vegetation and grassed slopes where re-grading is required (disturbed areas shall be re-vegetated as quickly as possible after completion of construction activities);
- Prepare and implement a spill prevention and control management plan as per the Ontario Ministry of Transportation's Best Management Practices;
- If excavations and groundwater dewatering are required during the work:
  - Dewatering activities shall be conducted in accordance with the control procedures as specified in the Ontario Provincial Standard Specification (OPSS) 518 Construction Specification for Control of Water from Dewatering Operations;
  - As per Ontario Regulation 387/04 (water taking regulation) and Ontario Regulation 63/16 (water taking registration regulation), the dewatering activities will need to be registered as "prescribed activities" on the Environmental Activity and Sector Registry if the amount of water taking exceeds 50 metres cubed per day and is below 400 metres cubed per day. A Category 3 Permit to Take Water must be obtained from the Ministry of the Environment, Conservation and Parks if the amount of water taken exceeds 400 metres cubed per day. Further site-specific investigations including drilling/installation of groundwater monitoring wells, groundwater and/or soil sampling will be required in support of the hydrogeological assessment in support of the Environmental

Activity and Sector Registry registration and/or Category 3 Permit to Take Water applications; and

- A door-to-door water well survey will be required to confirm the presence and/or absence of the water wells in the vicinity (i.e., within a 500-metre radius) of the dewatering locations to establish baseline conditions. A Groundwater Monitoring and Water Well Protection Program shall be developed by the Dewatering Contractor to monitor and mitigate potential impacts to the water wells in the vicinity of the dewatering locations.

- Any groundwater monitoring wells or water wells within the Study Area, if no longer in use or in the construction zone, or any other unregistered water wells (if encountered) shall be properly decommissioned as per the Ontario Wells Regulation (R.R.O. 1990, Reg. 903) to avoid the creation of potential pathways for surficial contamination to get to the underlying aquifers.

9.2.4 Surface Water

A preliminary Stormwater Management strategy was developed to minimize impacts in terms of water quality and erosion potential to the existing drainage system and natural environment along Highway 6 South due to the proposed road widening and proposed highway works. The Stormwater Management strategy for this Highway 6 South Project includes the following:

- 11,810 metres of flat-bottom grassed swales along side ditches and highway ramps;
- Two stormwater management ponds located at the Highway 6 South and Book Road interchange and one stormwater management pond located at the Highway 6 South and Airport Road interchange; and
- Enhanced grassed swales at the upstream of wetlands, marshes, and fish sensitive areas.

Determination of a Permit to Take Water or Environmental Activity and Sector Registry shall be determined in Detail Design.

9.2.4.1 Proposed Mitigation Measures

Construction will require clearing of vegetation, topsoil stripping and earth grading that leaves exposed soils vulnerable to wind and water erosion. Stringent sediment and erosion control measures will need to be implemented to ensure that the receiving storm drainage system or watercourses are not negatively impacted by construction practices. Sediment release due to construction activities is not only detrimental to the

health of the receiving system but will also result in costly future maintenance work of the existing downstream drainage infrastructure.

During construction, erosion and sedimentation control measures shall be implemented to prevent the migration of soils from the site. The following recommendations shall be considered when developing the detailed Erosion and Sediment Control Plan:

- Minimize erosion potential by implementing effective measures, procedural Best Management Practices, and Stormwater Management Best Management Practices; and
- Apply sediment control measures Best Management Practices to prevent off-site sediment release in the event of sediment mobilization.

9.2.4.1.1 Vegetative

- All areas not subject to active construction shall be top soiled and seeded immediately after completion of such grading; and
- Immediately following seed application, a straw erosion control blanket (or equivalent) shall be installed on any exposed slopes adjacent to sensitive features.

9.2.4.1.2 Structural

- As construction proceeds, diversion swales shall be graded where needed along the right-of-way boundaries to intercept drainage from external areas and direct it away from exposed surfaces;
- Temporary sedimentation traps shall be sized based on 125 cubic metre per hectare of drainage area;
- All culvert work shall be conducted “in the dry”;
- All dewatering for culvert installation shall be directed to a sediment / dewatering trap;
- The locations of sediment / dewatering traps shall be confirmed in the field by the on-site inspector and environmental inspector;
- Temporary silt fencing shall be installed around sensitive vegetative features and approximately 2 metres from the final toe-of-slope for the roadway embankment widening areas;
- Rock checks dams shall be provided in roadside ditches. Rock check dams detain runoff and promote sedimentation, and reduce channel flow velocities thereby reducing potential for channel erosion;

- Runoff from excavated areas or unvegetated soil will not be permitted to discharge off-site or directly into active or temporary watercourses or any natural areas; and

9.2.4.1.3 Supervision, Inspection and Maintenance

To ensure that the intent of the Erosion and Sediment Control Plan is maintained, and that erosion and sedimentation potential is minimized until the development areas have been stabilized, the following is recommended:

- The construction of the erosion control works shall be carefully supervised;
- Inspection of proposed measures shall be completed after periods of excessive precipitation (for example, rainfall depths exceed 15 millimetres);
- Bi-weekly inspection reports prepared by the engineer responsible for the Project shall be submitted to the contract administrator during construction until the development area has been stabilized;
- Control features that fail shall be repaired and an evaluation shall be completed to determine whether additional measures are required; and
- Prior to removal of controls, the contractor, and the engineer responsible for the Project shall conduct a joint inspection of the development area;
- Conduct a fluvial assessment on all watercourse crossings requiring realignment, new culverts, or extended culvert work in Detail Design; and
- Revisit all culvert locations in Detail Design to assess they are still operational or require resizing or rehabilitation.

9.2.5 Terrestrial Ecosystems

9.2.5.1 Summary of Potential Impacts

The potential impacts associated with the proposed undertaking include:

- Loss or degradation of vegetation cover, wildlife habitat, Significant Wildlife Habitat and Species at Risk habitat;
- Disturbance to wildlife including Species at Risk and Species of Conservation Concern as a result of construction activities; and
- Possible injury and mortality of wildlife, including Species of Conservation Concern and Species at Risk during construction.

Potential effects on vegetation communities, wildlife and wildlife habitat including Significant Wildlife Habitat, and Species at Risk and their habitats as a result of

vegetation removal are summarized in **Table 19** below. A total of 103.3 hectares of vegetation communities will be impacted by proposed works. An additional 10.5 hectares of agricultural fields will also be impacted. It is anticipated that not all vegetation will be removed, as Project refinements during Detail Design, in addition to the implementation of proper mitigation measures, are anticipated to reduce impacts.

9.2.5.1.1 Designated Natural Areas, Vegetation Communities and Plants

The potential impacts to vegetation communities are described as follows:

- **Loss of and/or damage to vegetation and/or Ecological Land Classification communities:**
  A total of 19 vegetation community types have the potential to be impacted by the proposed works, including a mixture of meadow, thicket, forest, and wetland habitats. Of the 103.3 hectares of affected vegetation communities, the majority (80.0 hectares or 77.4%) is represented by cultural communities (meadow, thicket, woodland, and plantation). Forested and wetland/aquatic communities account for the remaining 15.8% and 6.8% of the total affected area, respectively. The areas outside the existing Highway 6 South right-of-way will need to be acquired by the Ontario Ministry of Transportation and no removals will take place until after the Ontario Ministry of Transportation acquires the property and permits identified as required during Detail Design.

Table 19: Summary of Vegetation Community Impacts

Ecological Land Classification Community	Total Area (hectares) in Study Area	Total Impacted Area (hectares)	Affected Significant Wildlife Habitat	Potentially Affected Species at Risk Habitat
Cultural Meadow	157.2	59.0	■ Confirmed Differential Grasshopper Habitat ■ Confirmed Monarch Habitat	■ Candidate Bobolink, Eastern Meadowlark and Barn Owl Habitat
Cultural Thicket	18.0	7.9	■ N/A	■ N/A
Cultural Thicket	4.8	4.0	■ N/A	■ N/A
CUT Subtotal	22.8	11.9	-	-
Cultural Woodland	19.6	7.8	■ Confirmed Wood Thrush Habitat ■ Confirmed Eastern Wood-Pewee habitat	■ Candidate Red-headed Woodpecker Habitat ■ Candidate Bat Species at Risk Habitat
Cultural Plantation	4.3	0.1	■ N/A	■ Candidate Bat Species at Risk Habitat
Cultural Plantation	6.7	1.1	■ N/A	■ Candidate Bat Species at Risk Habitat
Deciduous Forest	23.6	6.5	■ Confirmed Rare Vegetation Community (Fresh - Moist Black Walnut Lowland Deciduous Forest and Fresh - Moist Shagbark Hickory Deciduous Forest) ■ Confirmed Deer Winter Congregation Area ■ Confirmed Wood Thrush Habitat ■ Confirmed Eastern Wood-pewee Habitat ■ Confirmed Spined Orbweaver Habitat	■ Confirmed Butternut Habitat ■ Candidate Red-headed Woodpecker Habitat ■ Candidate Bat Species at Risk Habitat ■ Candidate Black Ash and American Chestnut Habitat
Deciduous Forest	1.1	1.0	■ Same as above.	■ Same as above.
Deciduous Forest	12.7	0.4	■ Same as above.	■ Same as above.
Deciduous Forest	21.7	5.8	■ Same as above.	■ Same as above.
Deciduous Forest	2.7	0.8	■ Same as above.	■ Same as above.
Deciduous Forest	9.4	1.9	■ Same as above.	■ Same as above.
FOD Subtotal	71.2	16.4	-	-
Meadow Marsh	2.2	2.2	■ N/A	■ N/A
Meadow Marsh	5.9	0.3	■ N/A	■ N/A
MAM Subtotal	8.1	2.5	-	-
Shallow Marsh	17.9	1.9	■ Confirmed Amphibian Breeding Habitat Wetlands	■ N/A
Shallow Marsh	1.4	0.2	■ Confirmed Amphibian Breeding Habitat Wetlands	■ N/
MAS Subtotal	19.3	2.0		-
Open Aquatic	0.4	0.4	■ N/A	■ N/A
Deciduous Swamp	1.9	0.3	■ N/A	■ Candidate Red-headed Woodpecker Habitat ■ Candidate Bat Species at Risk Habitat ■ Candidate Black Ash Habitat
Swamp Thicket	2.0	1.8	■ N/A	■ N/A
Grand Total	**313.5**	**103.3**	-	-

- **Loss of and/or damage to designated natural area:**
  A total of 0.5 hectares of the Regionally Significant Welland River Headwater Tributaries Wetland Complex (171.27 hectares) and 4.0 hectares of unevaluated wetlands are anticipated to be affected by proposed works. The Recommended Plan also overlaps with Protected Countryside of the Greenbelt Plan (65.8 hectares). It is anticipated that there will be no potential impacts to the Hamilton Golf and Country Club Environmentally Sensitive Area.
  - According to the Provincial Policy Statement and the Greenbelt Plan, while "development" is not permitted in Provincially Significant Wetlands, the definition of "development" does not pertain to the creation or maintenance of infrastructure such as transit and transportation corridors and facilities authorized under an Environmental Assessment process. Section 1.6.8.6. of the Provincial Policy Statement states that consideration shall be given to significant resources (for example Provincially Significant Wetlands) when planning for corridors and right-of-ways of significant transportation. **Section 9.2.5.3** provides mitigation measures in consideration of minimizing effects on the wetlands including the Regionally Significant Welland River Headwater Tributaries Wetland Complex.
  - Infrastructure (for example transportation corridors and facilities) is permitted in Greenbelt Plan Protected Countryside.

Adjacent retained Ecological Land Classification communities and designated natural areas may also be inadvertently damaged or indirectly affected, as described below, if not appropriately mitigated:

- **Indirect loss and/or damage to vegetation, Ecological Land Classification communities and designated natural areas:**
  Incidental intrusion into vegetation communities and designated natural areas adjacent to proposed works.
- **Fill and sediment deposition within vegetation communities:**
  During grubbing or grading of the site, fill and sediment runoff from the active construction area may enter vegetation communities and adjacent watercourses, if not appropriately controlled.
- **Soil or water contamination (including groundwater):**
  Oil, gasoline, grease and other materials from construction equipment, materials, storage, and handling may enter vegetation communities and adjacent watercourses, if not appropriately managed.

- **Introduction or spread of invasive species:**
  A total of 51 of the 370 plants (14%) recorded within the Study Area during field investigations are non-native including some highly invasive species such as phragmites (*Phragmites australis* ssp. *Australis*), garlic mustard and European buckthorn. Phragmites is an aggressive non-native invasive plant that forms dense monoculture stands, displacing native species and degrading habitat particularly wetlands. Vegetation clearing and grubbing or grading and movement of construction equipment may perpetuate the establishment of invasive species in new areas and further spread in already established areas if control measures are not implemented.

The potential effects to vegetation, Ecological Land Classification communities and designated natural areas described above are anticipated to be minimal provided that mitigation measures are implemented.

9.2.5.1.2 Wildlife and Wildlife Habitat

Vegetation communities provide breeding habitat and movement corridors for a variety of wildlife including Species of Conservation Concern and/or birds protected under the Migratory Birds Convention Act. Species of Conservation Concern confirmed to be present, and their habitats potentially affected by proposed works include Barn Swallow, Differential Grasshopper, Eastern Wood-pewee, Wood Thrush, Spined Orbweaver, Snapping Turtle and Monarch. Furthermore, migratory birds may use humanmade structures, isolated trees, and shrubs as well as suitable ground cover for nesting. The potential impacts to wildlife and wildlife habitat as a result of the proposed works are described as follows:

- **Disturbance or displacement of migratory birds and destruction of their nests:**
  - Vegetation removal has the potential to disturb or displace nesting birds, including Species of Conservation Concern and/or species protected under the Migratory Birds Convention Act, and destroy their active nests if activities are conducted during the overall bird nesting period of April 1 to August 31.
  - Nests of species listed under Schedule 1 of the Migratory Birds Regulation may be present within the proposed limits of work and could require removal. Bird species listed under Schedule 1 receive year-round protection under the Migratory Birds Regulation as these species are known to reuse nests annually. While not observed during breeding bird surveys, records of occurrences and suitable nesting habitat were identified for two species listed under Schedule 1, Green Heron, and

Pileated Woodpecker. As such, potential nests of Schedule 1 species shall be identified, where suitable habitat is present, during Detail Design. Permit or registration under the Migratory Birds Regulation may be required if removal of nests of Schedule 1 species cannot be avoided.

- Nests of Eastern Phoebe, Barn Swallow and Cliff Swallow, all protected under the Migratory Birds Convention Act, were identified under the White Church Road bridge, Glancaster Road bridge, Butter Road bridge, and a culvert under Highway 6 South. Structure replacements or rehabilitation may therefore result in the disturbance or displacement of birds protected under the Migratory Birds Convention Act and destruction of their nests if conducted during the overall bird nesting period of April 1 to August 31.

- **Loss of and/or damage to wildlife habitat:**
  Vegetation removal may result in the direct or indirect loss of wildlife habitat including confirmed significant Deer Winter Congregation Areas, Rare Vegetation Communities, Amphibian Breeding Habitat (Wetlands) and habitat for Special Concern and Rare Wildlife Species (Eastern Wood-pewee, Wood Thrush, Differential Grasshopper, Spined Orbweaver and Monarch). Additional candidate significant wildlife habitat was identified within the Study Area and may be affected by proposed works if present including Raptor Wintering Areas, Bat Maternity Colonies, Turtle Wintering Areas, Reptile Hibernaculum, Turtle Nesting Areas, Seeps and Springs and Terrestrial Crayfish. Generally, impacts are limited to the edge of vegetation communities and wildlife habitat except where there are new interchanges/bridges proposed at Book Road East and Airport Connection Road. Vegetation communities and wildlife habitat that are temporarily disturbed will be restored through the planting of native vegetation following the completion of construction activities and implementation of applicable management plans. Effects to vegetation communities and wildlife habitat situated within the proposed right-of-way but outside of the permanent footprint of the highway infrastructure will either be avoided or temporarily disturbed until vegetation is re-established or rehabilitated following the completion of construction activities.

- **Disturbance to wildlife from lighting, noise, and vibration:**
  Wildlife within the surrounding area, although likely already adapted to and tolerant of existing anthropogenic sources of noise (for example existing roads) may be temporarily disturbed or displaced initially by increased lighting and noise emissions from construction activities and future use of the proposed infrastructure, including use of heavy equipment; however, wildlife can become habituated to temporarily increased noise levels.

- **Incidental wildlife injury or mortality from construction activities:**
  There are several Significant Wildlife Habitats (candidate and confirmed), and other wildlife habitats present within the Study Area. Wildlife may enter the construction work area and become susceptible to accidental injury or mortality associated with construction machinery and equipment if not mitigated.

- **Wildlife mortality through vehicle collisions:**
  A review of Land Information Gartner identified Deer Wintering Areas (Stratum 2) across Highway 6 South between Garner Road East and Book Road East. Evidence of White-tailed Deer was observed in this location as well as on the west side of Highway 6 South north of the proposed Airport Connection Road. Approximately 3.5 hectares of the Deer Wintering Area (Stratum 2) is anticipated to be impacted by the proposed works. Snapping Turtle roadkill was observed south of Book Road East. Reptiles are particularly susceptible to vehicular collisions as they are inconspicuous and generally move slowly across roadways. Twinning of Highway 6 South may increase wildlife vehicle collisions as wildlife will have to travel a further distance to reach habitat and thereby be subjected to longer exposure to vehicles.

Potential impacts to wildlife and wildlife habitat are anticipated to be low provided avoidance and mitigation measures are implemented.

9.2.5.2 Species at Risk

Several Species at Risk may be negatively affected by removal / disturbance of vegetation communities and increased disturbance during construction and operations. Potential impacts to Species at Risk and their habitats include:

- **Possible injury and mortality of tree Species at Risk (American chestnut, butternut, and black ash):**
  Butternut trees were confirmed present in several vegetation communities throughout the Study Area. Although no American chestnut or black ash trees were identified, potential for these species could not be excluded as a tree inventory was not completed as part of the field investigations. A tree inventory within the Construction Disturbance Area, where suitable habitat is present, is recommended during Detail Design to identify the presence of any additional tree Species at Risk (i.e., American chestnut, black ash, etcetera.). The removal or ground disturbance work (for example grading, excavation) adjacent to a tree Species at Risk may require an Endangered Species Act permit and/or authorization, thus any necessary permits/approvals for tree Species at Risk shall be obtained during Detail Design.

- **Removal of candidate bat Species at Risk (Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis, Tri-colored Bat) habitat and possible disturbance, mortality, or injury:**
  The Recommended Plan overlaps approximately 25.7 hectares of deciduous forest, cultural woodland, cultural plantation, and deciduous swamp, which has potential to provide maternity roost habitat for bat Species at Risk. Should these vegetation communities be confirmed bat Species at Risk habitat, individuals of these protected species may be inadvertently killed or injured as a result of the removal or accidental damage of potential roost trees if vegetation clearing occurs during the bat roosting season between April 1 and September 30. Eastern Small-footed Myotis will tend to chose rock features over trees for roosting habitat. Potential maternity roost habitat for this species in the form of rock fencerows may be present within the Study Area; as such, Eastern Small-footed Myotis may be inadvertently killed or injured as a result of the removal of these features, if present, between March 15 and November 30. Vegetation removal will generally be limited to the edges of these communities with the exception of the following: Cultural Woodland northwest of Garner Road East, Deciduous Forest and Cultural Woodland northwest of Book Road East, Deciduous Forest on the east side of Highway 6 South between Book Road East and Butter Road East and Deciduous Forest on west side of Highway 6 South just south of Glancaster Road. The removal of vegetation along edges of communities is not anticipated to prevent the continued use of the remaining treed habitat for roosting by bat Species at Risk; however, given the extent of bat Species at Risk habitat removal, additional targeted species surveys following the *Bat & Treed Habitats – Maternity Roost Surveys* protocol are recommended to be undertaken where tree removal is proposed in candidate bat Species at Risk habitat to qualify potential maternity roost habitat and confirm presence or absence of bat Species at Risk via acoustic monitoring. The removal of candidate bat Species at Risk habitat may require an Endangered Species Act permit if presence of bat Species at Risk is confirmed, and impacts cannot be avoided.

- **Removal of candidate grassland bird Species at Risk (Bobolink and Eastern Meadowlark) habitat and possible disturbance, mortality or injury:**
  Although no Bobolink or Eastern Meadowlark were observed during field investigations, the Recommended Plan overlaps approximately 46.8 hectares of sufficiently large (at least 5 hectares) agricultural fields and cultural meadow that may provide suitable breeding habitat for the species. Additional

targeted species surveys shall occur as part of Detail Design as these species may find new nesting territories year to year. Furthermore, the presence of Bobolink and Eastern Meadowlark within agricultural fields largely depends on the type of crop planted, which can vary annually. If impacts to Bobolink and Eastern Meadowlark habitat cannot be avoided, authorization under the O. Reg. 830/21 of the Endangered Species Act may be required provided the area of habitat damaged or destroyed is equal to or less than 30 hectares. Furthermore, vegetation removal between April 1 and August 31, may result in the disturbance, mortality or injury of nesting Bobolink and Eastern Meadowlark their eggs and/or nestlings, as the species build their nests on the ground concealed by dense vegetation.

- **Removal of candidate Red-headed Woodpecker habitat and possible disturbance, mortality, or injury:**
  Although no Red-headed Woodpecker were observed, the Recommended Plan overlaps approximately 24.4 hectares of suitable woodland habitat. Additional targeted species surveys following the *Search Protocol for Red-headed Woodpecker in Canada: Detection and Critical Habitat Biophysical Attributes Mapping* (GEI, 2021), or other Ministry of the Environment, Conservation and Parks approved protocol, are recommended to be undertaken during Detail Design where tree removal is proposed in candidate habitat. If vegetation removal occurs between April 1 and August 31, nesting Red-headed Woodpecker, their nests and young may be incidentally killed or harmed by vegetation clearing activities. The removal of candidate Red-headed Woodpecker habitat may require an Endangered Species permit or authorization if presence of the species is confirmed, and impacts cannot be avoided.

The eastern population of the Barn Owl is at the northern limit of its range in North America in Ontario with a S-rank of S1, which indicates that currently the species is extremely rare provincially (five or fewer occurrences). Barn Owls nest in both naturally formed cavities in large, hollow trees and human-made structures; however, barns and other human-made structures (for example silos) are expected to be particularly important for species nesting and roosting in the province as they provide shelter from the elements and may aid in heat retention. As such, no impacts to Barn Owl are anticipated as no suitable agricultural buildings will be demolished. Furthermore, potential natural nest sites will be addressed through identification of potential Schedule 1 Migratory Birds Regulation species (for example Pileated Woodpecker) and Red-headed Woodpecker nest trees during Detail Design. The removal of Species at Risk habitat and possible injury or mortality of Species at Risk will be minimal provided that mitigation measures are implemented.

9.2.5.3 Proposed Mitigation Measures

Proposed mitigation and avoidance measure for the potential impacts on specific terrestrial features as identified in the previous section are described below. The mitigation measures shall be reviewed at Detail Design to determine if the mitigation measures are valid or if new and/or updated mitigation strategies shall be considered.

- To assist in mitigating potential impacts, the following measures shall be utilized, at a minimum:
  - Vegetation removal, grading and soil compaction shall be kept to a minimum. Further analysis of the required limits of work will be completed during the Detail Design phase of the Project to assess if impacts to certain vegetation communities located within the proposed right-of-way can be avoided;
  - All planned vegetation removals as identified in the Preliminary Design will occur within Ontario Ministry of Transportation owned lands. However, should anything change, and removals be required outside of the Ontario Ministry of Transportation right-of-way, a Tree Protection Plan will be prepared if required;
  - To the extent feasible, affected areas shall be re-seeded and re-vegetated and restored to pre-disturbance conditions, using native species appropriate for the community type disturbed;
    - Seeded mixes that include common milkweed and native flowering plants shall be used to rehabilitate or restore areas of herbaceous vegetation temporarily disturbed during proposed works.
  - Construction material shall be stored within an authorized location (which will be identified in Detail Design), and any soil stockpiles shall be located within a suitable sediment fenced and protected location;
    - If stockpiles of gravel and sandy substrates are required during the active turtle season (April 1 to October 15), turtle exclusion fencing shall be installed in accordance with the reptile and amphibian exclusion fencing best management practices around stockpiles prior to April 1 or immediately after stockpile created if after April 1.
  - All works within 30 metres of a waterbody shall:
    - Site isolation measures (for example cofferdams, turbidity curtains) shall be installed prior to any in-water works;
    - All disturbed areas shall be immediately restored after a disturbance or upon completion o the work;

- All contaminants, building materials, waste materials, and stockpiles shall be managed in a way that prevents them from entering a waterbody;
- All in-water works and mitigation measures for fish and fish habitat, including Erosion and Sediment Control, is covered under the Fish and Fish Habitat Existing Conditions and Impact Assessment Report;

– Temporary Erosion and Sediment Control measures shall be installed during construction in accordance with the Erosion and Sediment Control Plan (to be developed in Detail Design).

- Erosion and Sediment Control measures shall be installed along the construction footprint within 30 metres of any wetland;
- Where dewatering is required: Temporary Erosion and Sediment Control measures will be applied;
- Water from dewatering operations shall be directed to a sediment control measure and / or a discharge area 30 metres away from waterbodies or as far away as practicable from the top of the bank of any waterbody, prior to discharge to the natural environment;
- The discharge of water to the natural environment shall not be directed across pavements, curb and gutter or similar hard surfaces;
- Dewatering works will be monitored daily for impacts such as settlement and erosion or as per the Permit-to-Take-Water requirements;

– All machinery, construction equipment and vehicles shall be washed prior to leaving the construction site in order to prevent the spread of invasive species to other locations;

– Migratory Bird Protection:

- Schedule vegetation removal to occur outside of the overall bird nesting period of April 1 to August 31 to avoid disturbance to breeding migratory birds including Species at Risk and / or damage / destruction of their nests. If vegetation removal must occur within this time period, active nest searches must be conducted prior to vegetation removal by a qualified biologist within ‘simple habitats’ (for example manicured lawn) or if minor vegetation clearing is required, to ensure that no active nests of breeding migratory birds or bird Species at Risk are destroyed, in order to prevent contravention of the Migratory Birds Convention Act and / or the Endangered Species Act;
- Migratory Birds Convention Act protected birds (for example Eastern Phoebe, Barn Swallow and Cliff Swallow) were observed nesting under structures likely to be affected by construction. As such, it is

recommended that they be examined to confirm the presence or absence of migratory bird nests the year prior to construction. If birds are observed nesting in, under or on the structure prior to or during rehabilitation or replacement, a qualified biologist shall be consulted to determine the appropriate steps taken to reduce impacts to wildlife and avoid a potential contravention of the Migratory Birds Convention Act. Such measures may include the installation of bird exclusion measures in accordance with *Best Management Practices for Excluding Barn Swallows and Chimney Swifts from Buildings and Structures*;

- Review history of wildlife and vehicle collisions within the corridor and consider the need for wildlife mitigation (for example fencing, signage) in Detail Design. The following mitigation measures are to be considered in Detail Design:
  - **Wildlife Exclusion Fencing –** Permanent Wildlife Exclusion Fencing will be considered along the Highway 6 South right-of-way where there is opportunity for mammals and herpetofauna to enter the right-of-way. Particular consideration will be given to the Stratum 2 deer yard areas. Additionally, jump-outs are recommended at approximately 1.4-kilometre intervals to ensure that wildlife trapped within the right-of-way are able to exit. Wildlife is likely to experience fence-end effects at the limits of the Study Area, wherein wildlife attempting to cross the right-of-way will walk along the fence and cross where the fence ends. This may result in an increase in wildlife crossing at the limits of the Study Area. To mitigate end-effects, it is recommended that fence ends angle away from the right-of-way for a distance up to 100 metres.
  - **Ecopassages –** Where possible in Detail Design culverts will be considered to provide openness ratios that would allow for the passage of herpetofauna and / or small mammals specifically in culverts connecting wetland areas or areas of observed wildlife movement. Ecopassages that are within fisheries watercourses will need to consider that there are no adverse impacts to fish and fish habitat. An openness ratio of 0.4 would permit usage by medium-sized mammals, while the minimum openness ratio to be considered shall be 0.25, which would permit usage by reptiles such as turtles. Other characteristics to consider in Detail Design for culverts that are considered for ecopassages during Detail Design phase include the following:
    - Around the culvert structure, avoid the use of rip-rap or sharp rock protection and ensure areas on both sides of the watercourse provide substrate materials conducive to animal movement, where possible,

- If rip-rap must be used, fill the interstitial space with small materials which would provide appropriate footing for wildlife,
- Include natural substrates within the structure,
- Provide suitable cover elements adjacent to the structure (for example retained or planted vegetation) that can facilitate wildlife use of the structures (for example cover/shelter on route to structure) while not blocking the structure entrance,
- Wherever possible, ensure that entrance and exits to the structures are reasonably level (for example no major grade changes) to provide an unimpeded view through the structure and habitat beyond,
- Ensure that the elevation and slope of the structure does not result in flooding,
- Remove or reduce potential predator perches (for example ledges) to the extent possible,
- Avoid artificial light sources near the entrances/exit of the wildlife passage,
- Any landscaping and erosion control materials required shall not include materials known to accidentally entrap snakes or fish; and
- Restore adjacent vegetation areas disturbed for construction access using native species.

- Avoid or minimize the extent possible vegetation removal within treed communities that provide confirmed butternut habitat and any confirmed habitat for other tree Species at Risk, bat Species at Risk and Red-headed Woodpecker. Additional targeted species surveys are recommended at Detail Design.
- All vegetation removal within any confirmed bat Species at Risk habitat shall occur outside of the bat roosting season between April 1 and September 30 and can only proceed upon confirmation from the Ministry of the Environment, Conservation and Parks as an authorization under the Endangered Species Act may be required.
- For areas adjacent to natural heritage features (for example woodlands and wetlands) conduct construction activities during daylights hours for increased visibility (for example avoid wildlife strikes) and to avoid light pollution effects during the night, whenever possible.
- The need for additional plans (for example wildlife management, wildlife monitoring, ecological restoration, environmental management, Invasive Species management, road salting) to support the proposed works shall be determined during Detail Design.

- Avoid or minimize the extent possible vegetation removal within any confirmed Bobolink and Eastern Meadowlark Habitat. If impacts to Bobolink and Eastern Meadowlark habitat cannot be avoided, authorization under the O. Reg. 830/21 of the Endangered Species Act may be required. Additional targeted species surveys within candidate habitat are recommended at Detail Design.
- Additional mitigation specific to Species at Risk will be confirmed through consultation with the Ministry of the Environment, Conservation and Parks, and permitting processes.

9.3 Socio-Economic Environment

9.3.1 Land Use

The Project has the potential to impact the surrounding land uses, agricultural operations and access, utilities, the John C. Munro Hamilton International Airport, private property, residential homes, amongst others. However, mitigation measures such as minimizing the impacts to such features where feasible, maintaining access to cemeteries and agricultural fields and continuing consultation with landowners will assist in minimizing or avoiding potential impacts.

9.3.2 Private Property

Approximately 29 hectares of property beyond the Ontario Ministry of Transportation right-of-way (from six residential, three commercial properties, 23 agricultural properties and approximately four parcels of municipal and provincial property) will be impacted and needs to be acquired by the Ontario Ministry of Transportation to accommodate the Recommended Plan. The majority are larger swaths of property parcels just beyond the existing limits of the existing right-of-way and at future interchange locations. Areas of potentially affected properties outside of the existing right-of-way are illustrated in **Appendix C.**

Efforts have been made to minimize the properties required. Potentially impacted property owners will be consulted further prior to or during the Detail Design stage regarding the details of the required property taking and property acquisition process. Compensation will be based on the fair market value of the property at the time of acquisition.

9.3.3 John C. Munro Hamilton International Airport Study

An assessment of the Recommended Plan for Highway 6 South twinning and widening in the vicinity of the John C. Munro Hamilton International Airport has been completed

with reference to the John C. Munro Hamilton International Airport Zoning Regulations, Statutory Orders and Regulations (SOR) 2017-200, and information supplied by the Ontario Ministry of Transportation for review. This assessment excluded a Transport Canada Aeronautical Assessment, and NAV CANADA Land Use Application.

John C. Munro Hamilton International Airport is currently developing a comprehensive Airport Master Plan that provides a long-term view to airport operations and capital planning. As part of the aeronautical impact assessment, John C. Munro Hamilton International Airport was consulted to understand their future growth plans and to discuss potential concerns with Preliminary Design and construction of a widened Highway 6 South. Through this process, it is understood that the Airport is planning for an extension of approximately 650 metres to Runway 06 that would bring the threshold much closer to the Highway 6 South corridor. This extension is already protected for under the existing Airport Zoning Regulations, and therefore was considered as part of the assessment.

NAV CANADA is Canada's federally designated air navigation service provider. They are a not-for-profit corporation created through the Civil Air Navigation Services Commercialization Act and regulated by Transport Canada. NAV CANADA is responsible for the provision of air traffic control, enroute and oceanic air navigation services, and the publication of aeronautical data and instrument flight procedures. As part of the aeronautical impact assessment, NAV CANADA was consulted to inform them of future plans for the Highway 6 South corridor in an effort to mitigate any potential impacts on instrument flight procedures. NAV CANADA did request a digital model of the proposed design to evaluate for impact to existing instrument flight procedures, but at the time of reporting, a comprehensive model that met the technical requirements for NAV CANADA was not provided. NAV CANADA also has a formal Land Use Application process that shall be followed, including submission of the appropriate Land Use Application Form.

9.3.3.1 Future Commitments

9.3.3.1.1 NAV CANADA

Additional aeronautical impact assessment is recommended to evaluate the final proposed design as well as construction activities and temporary obstacles for potential impact on the airport, and assessment of Detail Design to ensure compliance with Airport Zoning Regulations as well as requirements for obstacle marking and lighting in accordance with the Canadian Aviation Regulations.

The Ontario Ministry of Transportation shall continue to consult with NAV CANADA and obtain a Land Use permit for evaluation of potential impacts to published instrument flight procedures for the John C. Munro Hamilton International Airport.

9.3.3.1.2 Transport Canada – Aeronautical

The Ontario Ministry of Transportation shall continue to consult with Transport Canada Civil Aviation and obtain their acceptance and direction for obstacle marking and lighting prior to the start of construction. Timely notification to Transport Canada is required prior to use of cranes, concrete pumps, or similar construction equipment that may pose a threat to aviation safety. Transport Canada will also provide confirmation on the requirements for marking and lighting of obstacles that present a hazard to aviation.

9.3.3.1.3 John C. Munro Hamilton International Airport

The Ontario Ministry of Transportation shall continue to consult with the John C. Munro Hamilton International Airport to ensure that any changes to the airport and / or any updates to the Master Plan is taken into consideration at Detail Design.

9.3.4 Agriculture

9.3.4.1 Summary of Potential Impacts

The following list includes potential impacts to agriculture that were identified in the Ontario Ministry of Agriculture, Food and Rural Affairs 2018 draft Agricultural Impact Assessment Guidance Document, and includes other impacts identified by farmers and landowners:

- Interim or permanent loss of agricultural lands
- Fragmentation of agricultural lands and operations
- The loss of existing and future farming opportunities
- The loss of infrastructure, services, or assets
- The loss of investments in structures and land improvements
- Disruption or loss of functional drainage systems
- Disruption or loss of irrigation systems
- Changes to soil drainage
- Changes to surface drainage
- Changes to landforms
- Changes to hydrogeological conditions
- Disruption to surrounding farm operations
- Effects of noise, vibration, dust

- Potential interim compatibility concerns
- Traffic concerns
- Changes to adjacent cropping due to light pollution

9.3.4.2 Proposed Mitigation Measures

Potential mitigation measures may include:

- The use of berms, vegetated features, or fencing, where feasible, between the different types and intensities of land uses to reduce the potential for trespassing and potential vandalism. These types of buffers reduce impacts by preventing trespassing and associated problems such as litter and vandalism.
- The use of buffers between agriculture and transportation / urban uses may combine a separation of uses, vegetation / plantings, windbreaks, and berms. Vegetated buffers will include the use of deciduous and coniferous plants, with foliage from base to crown to mitigate against dust, light trespass, and litter.
- The use of salt management plans to reduce the amount of salt required for de-icing (liquid de-icers, broad casting, and selective broad casting).
- The use of plantings / vegetation as screens and buffers to reduce visual impacts. Consideration of plantings / vegetation barriers within the Ontario Ministry of Transportation right-of-way (as to not impact additional agricultural lands) as visual screening where appropriate.
- Design new structures and side road improvements to be compatible with farm equipment.
- Further assessment of potential impacts to existing groundwater and surface water monitoring and providing new well or water access to those potentially impacted by groundwater disruption in future stages of the Project.
- Restore tile drainage systems in the Secondary Study Area that may be impacted by the widening of Highway 6 South (as necessary).
- Restore impacts to irrigation systems (as necessary).
- Create a traffic plan that identifies closures and open routes to minimize impacts to local traffic during construction.
- Maintain local roads to allow access for the movement of oversized agricultural equipment.
- Due to the locations and numbers of water wells in the Prime Agricultural Study Area and the Secondary Study Area, it will be important to either

preserve the existing wells, or properly engineer the closing/capping of any water well, where necessary, to prevent potential groundwater contamination.

- Field entrances and farm accesses impacted by the Recommended Plan will be relocated and/or accommodated to the extent possible. Impacts will be confirmed at the Detail Design stage and relocation, or accommodation of existing accesses will be reviewed in consultation with the municipality and the property owner.
- The Highway 6 South corridor has been designed to be a controlled access freeway with full access to and from Highway 6 South from Book Road and Airport Connection Road interchanges. Similar to Highway 403 and for safety reasons, the Ministry's policies for a controlled access freeway are applicable to the Highway 6 South corridor as it pertains to access for vehicles. For farm vehicles currently using Highway 6 South for access, the possibility of providing an alternative access from an adjacent local road will be considered in consultation with the property owner and the municipality in Detail Design.
- The Ontario Ministry of Transportation will provide appropriate compensation to impacted landowners including property buyout, property exchange and purchase of landlocked parcels where necessary.

9.3.5 Contaminated Property

9.3.5.1 Summary of Potential Impacts

As outlined in **Section 5.2.4**, Areas of Potential Environmental Concern have been identified within the Study Area. 12 properties / areas of high potential for soil and groundwater contamination were identified in the Study Area (for example former gas service station, possible vehicle repair garages, former waste and waste disposal sites, airport, and industrial or manufacturing sites) and 5 areas / properties of medium potential for soil and groundwater contamination were identified in the Study Area.

In addition to the properties rated high or medium due to site activities, there were total of 7 spills and accidental releases records, representing six liquid spill locations in which three were considered significant and having "high" potential for soil and / or groundwater contamination.

9.3.5.2 Proposed Mitigation Measures

Further environmental studies / investigations of "high" and "medium" properties to be directly impacted by interim and long-term Highway 6 South improvements from Highway 403 to Upper James Street are recommended to confirm the environmental

conditions on those lands in support of property acquisition, environmental due diligence, road construction and management of surplus / excess soil / materials. These studies / investigations may include Phase One Environmental Site Assessments and Phase Two Environmental Site Assessments. If contamination is identified, mitigation measures may need to be developed and implemented, which may include environmental site clean-up / remediation and / or risk assessment.

Details of excess material generated to facilitate construction and the associated need for soil management or disposal of contaminated soils will be determined during Detail Design and or construction.

9.3.6 Canadian Navigable Waters Act

It was determined that the provisions of the Canadian Navigable Waters Act do not apply to this Project; and therefore, Canadian Navigable Waters Act approval is not required.

9.3.7 Noise

A noise assessment was completed for the Project. The assessment was completed in accordance with the Ontario Ministry of Transportation's Environmental Guide for Noise (the Guide) published in 2022. The Guide provides detailed guidance for the assessment of two categories: the long-term traffic noise levels, and construction noise.

Under the Guide, the "noise impact" is defined as the difference between the future "No Build" (no project) and the future "Build" (with project in place) noise levels, as well as the projected overall future noise level with the project during the subject year of assessment (Horizon Year), which for this project is 2041. The projected noise impacts are determined for Noise Sensitive Areas within the Study Area, which for this noise assessment included mostly residential homes. The Guide defines Noise Sensitive Areas as:

- Traditional Noise Sensitive Areas, which include the following land uses with associated Outdoor living Areas:
  - Private homes such as single family residences;
  - Townhouses;
  - Multiple unit buildings, such as apartments with Outdoor living Areas for use by all occupants; and
  - Hospitals, nursing homes for the aged, where there are Outdoor Living Areas for the patients.

- In addition to the above, certain land uses are considered "part of a community", meaning located next to a Traditional Noise Sensitive Area. The land uses considered noise sensitive when part of a community include:
  - Educational facilities and day care centres, where there are Outdoor Living Areas for students;
  - Campgrounds that provide overnight accommodation;
  - Hotels/motels where there are Outdoor Living Areas for visitors;
  - Community centres with Outdoor Living Areas (example outdoor basketball courts etcetera);
  - Municipal parks (excluding golf courses and trails); and
  - Places of worship with Outdoor Living Areas.
- Additionally, the following land uses would also qualify as Noise Sensitive Areas, provided that a new freeway/highway corridor or route is planned:
  - Educational facilities and day care centres, where there are Outdoor Living Areas for students;
  - Campgrounds that provide overnight accommodation;
  - Hotels/motels where there are Outdoor Living Areas for visitors;
  - Community centres with Outdoor Living Areas (example outdoor basketball courts etcetera);
  - Municipal parks only as part of a community (excluding golf courses and trails); and
  - Places of worship with Outdoor Living Areas only as part of a community.
- Land uses that do not qualify as noise sensitive by the Guide consist of the following:
  - Apartment balconies above ground floor;
  - Cemeteries;
  - All commercial; and
  - All industrial.

The noise assessment captured all Noise Sensitive Areas within 600 metres perpendicular to the edge of pavement, extending longitudinally 100 metres along the alignment from the end of the project pavement. A total of fourteen Noise Sensitive Areas were assessed for this Project. In general, the areas adjacent to the Project consist mainly of rural areas with scattered residential properties. However, there are more densely populated suburban areas located near the interchange with Highway 403 and north of the terminus at Upper James Street.

9.3.7.1 Summary of Potential Impacts

Traffic noise and traffic data were analyzed to establish the existing and predict the future noise levels to assess the requirement for noise mitigation investigation. Noise Sensitive Areas and their accompanying receptors are shown on **Figures A-4.1 and A-4.2 in Appendix A**. Assessment results are presented in **Table 20**.

Table 20: Noise Impact Assessment

Assessment Location	Predicted $L_{eq, 24}$ (dBA) No Build	Predicted $L_{eq, 24}$ (dBA) Build	Change (dB)	Mitigation Investigation (Yes/No) ≥5 dB Change	Mitigation Investigation (Yes/No) ≥ 65 dBA
NSA01R01	64.2	64.3	0.1	No	No
NSA01R02	64.0	64.1	0.1	No	No
NSA01R03	60.7	59.8	-0.9	No	No
NSA01R04	62.6	61.9	-0.7	No	No
NSA01R05	51.6	51.6	0.0	No	No
NSA02R01	51.9	52.4	0.5	No	No
NSA02R02	62.5	63.5	1.0	No	No
NSA02R03	62.4	63.2	0.8	No	No
NSA02R04	64.1	64.2	0.1	No	No
NSA03R01	58.1	58.5	0.4	No	No
NSA03R02	57.6	57.4	-0.2	No	No
NSA03R03	57.2	56.7	-0.5	No	No
NSA03R04	56.6	56.1	-0.5	No	No
NSA03R05	56.4	55.8	-0.6	No	No
NSA03R06	56.0	55.4	-0.6	No	No
NSA03R07	54.6	53.9	-0.7	No	No
NSA03R08	53.1	52.2	-0.9	No	No
NSA04R01	56.0	55.3	-0.7	No	No
NSA04R02	50.2	47.9	-2.3	No	No
NSA04R03	49.0	46.7	-2.3	No	No
NSA04R04	39.3	38.9	-0.4	No	No
NSA04R05	39.5	38.8	-0.7	No	No
NSA04R06	45.7	43.5	-2.2	No	No
NSA04R07	49.4	46.5	-2.9	No	No
NSA04R08	49.0	45.9	-3.1	No	No
NSA04R09	50.0	46.6	-3.4	No	No
NSA04R10	49.1	45.9	-3.2	No	No
NSA04R11	48.9	46.2	-2.7	No	No

Assessment Location	Predicted $L_{eq, 24}$ (dBA) No Build	Predicted $L_{eq, 24}$ (dBA) Build	Change (dB)	Mitigation Investigation (Yes/No) ≥5 dB Change	Mitigation Investigation (Yes/No) ≥ 65 dBA
NSA04R12	48.4	45.6	-2.8	No	No
NSA04R13	48.3	45.2	-3.1	No	No
NSA04R14	48.7	45.7	-3.0	No	No
NSA04R15	47.2	44.9	-2.3	No	No
NSA04R16	46.6	44.7	-1.9	No	No
NSA04R17	50.5	48.9	-1.6	No	No
NSA05R01	54.4	54.7	0.3	No	No
NSA05R02	55.3	54.7	-0.6	No	No
NSA05R03	54.7	54.2	-0.5	No	No
NSA05R04	59.1	58.5	-0.6	No	No
NSA06R01	48.2	48.8	0.6	No	No
NSA07R01	52.9	53.6	0.7	No	No
NSA07R02	52.9	53.0	0.1	No	No
NSA07R03	61.3	61.2	-0.1	No	No
NSA07R04	62.1	62.3	0.2	No	No
NSA08R01	50.7	50.8	0.1	No	No
NSA08R02	51.9	52.0	0.1	No	No
NSA08R03	53.5	53.4	-0.1	No	No
NSA08R04	53.9	56.1	2.2	No	No
NSA09R01	51.0	51.4	0.4	No	No
NSA09R02	55.9	55.9	0.0	No	No
NSA10R01	50.4	51.5	1.1	No	No
NSA10R02	60.4	60.6	0.2	No	No
NSA10R03	43.9	45.9	2.0	No	No
NSA11R01	57.5	57.3	-0.2	No	No
NSA12R01	56.8	58.0	1.2	No	No
NSA12R02	57.6	58.5	0.9	No	No
NSA12R03	59.7	60.3	0.6	No	No
NSA12R04	53.7	55.5	1.8	No	No
NSA12R05	52.2	53.4	1.2	No	No
NSA12R06	53.9	54.9	1.0	No	No
NSA12R07	58.2	58.4	0.2	No	No
NSA13R01	56.8	58.6	1.8	No	No
NSA13R02	63.2	63.6	0.4	No	No
NSA13R03	54.6	55.5	0.9	No	No
NSA13R04	56.6	57.9	1.3	No	No

Assessment Location	Predicted $L_{eq, 24}$ (dBA) No Build	Predicted $L_{eq, 24}$ (dBA) Build	Change (dB)	Mitigation Investigation (Yes/No) ≥5 dB Change	Mitigation Investigation (Yes/No) ≥ 65 dBA
NSA13R05	52.1	54.4	2.3	No	No
NSA13R06	52.0	53.7	1.7	No	No
NSA13R07	52.0	53.7	1.7	No	No
NSA13R08	51.5	53.0	1.5	No	No
NSA13R09	52.0	53.5	1.5	No	No
NSA13R10	51.9	53.7	1.8	No	No
NSA13R10a	50.6	51.6	1.0	No	No
NSA13R11	53.2	54.3	1.1	No	No
NSA13R12	53.5	54.4	0.9	No	No
NSA13R13	53.3	54.1	0.8	No	No
NSA13R14	53.5	54.3	0.8	No	No
NSA13R15	53.7	54.4	0.7	No	No
NSA13R16	54.3	54.9	0.6	No	No
NSA13R17	55.2	55.7	0.5	No	No
NSA13R18	55.9	56.1	0.2	No	No
NSA13R19	55.7	55.9	0.2	No	No
NSA13R20	55.9	55.9	0.0	No	No
NSA13R21	55.9	55.9	0.0	No	No
NSA13R22	56.2	56.2	0.0	No	No
NSA13R23	56.3	56.3	0.0	No	No
NSA13R24	56.7	56.7	0.0	No	No
NSA13R25	56.4	56.4	0.0	No	No
NSA13R26	56.7	56.6	-0.1	No	No
NSA13R27	56.1	56.0	-0.1	No	No
NSA13R28	60.6	60.4	-0.2	No	No
NSA13R29	58.0	57.8	-0.2	No	No
NSA13R30	58.6	58.4	-0.2	No	No
NSA13R31	57.6	57.3	-0.3	No	No
NSA13R32	61.1	60.8	-0.3	No	No
NSA13R33	61.5	61.3	-0.2	No	No
NSA14R01	57.8	57.6	-0.2	No	No
NSA14R02	58.3	58.0	-0.3	No	No
NSA14R03	58.2	58.0	-0.2	No	No

Results in the above table indicate that noise mitigation investigation is not required. As noise levels decrease with lower speeds, noise mitigation investigation would likewise not be required if the future speed limits decrease (for example lowering to 100 kilometres per hour from 110 kilometres per hour).

9.3.7.2 Proposed Mitigation Measures

Results in **Table 20** indicate that noise mitigation investigation is not required for the future noise from the Project. As such, noise mitigation for this Project centres on construction noise.

Construction noise is temporary in nature and will cease at the end of the construction activities; it can be a cause of disturbance to the surrounding Noise Sensitive Areas. Although Ontario does not have any applicable regulatory noise level limits for construction noise impacts on Noise Sensitive Areas, construction noise disturbance and potential for complaints can be reduced with the implementation of best practices and other noise control measures.

The Guide requires that construction noise be controlled and mitigated. General recommendations to be considered during future stages of the Project include:

- Consider constraints on construction noise with respect to the City of Hamilton noise control By-laws:
  - Although the Ministry does not require a noise by-law exemption, for works conducted:
    - From 7:00 p.m. from one day to 7:00 a.m. the next day
    - Submit a Notice of Works letter to the City in advance of the works, which will allow the City to notify area residents through the local councillor.
- Equipment shall comply with the sound emission standards for construction equipment outlined in Ministry of the Environment, Conservation and Parks publications NPC-115 and NPC-118 (contractor to confirm latest version by contacting the Ministry of the Environment, Conservation and Parks[2]), which are the following:
  - NPC-115: Construction Equipment
  - NPC-118: Motorized Conveyances

2. Available from the Ontario Ministry of Environment, Conservation and Parks – Client Services and Information Branch or Environmental Assessment and Permissions Branch, Phone: 416-314-8001 or 1-800-461-6290

- Where feasible, equipment with broadband backup alarms instead of tonal backup alarms / beepers shall be utilized.
- Equipment shall be maintained in an operating condition that prevents unnecessary noise, including but not limited to non-defective muffler systems, properly secured components, and the lubrication of moving parts.
- Idling of equipment shall be restricted to the minimum necessary to perform the specified work.
- Stationary equipment shall be located as far away from sensitive locations as feasible.
- Setup a noise complaint process in accordance with the Ontario Ministry of Transportation's Environmental Guide for Noise.
- Investigate and address noise complaints in accordance with the Guide.
- Consider conducting a more detailed construction noise study as construction methods further develop.

Some examples of best practices to be considered for the Project include, but are not limited to:

- Minimize nighttime construction where possible.
- Use site layout where possible to screen nearby noise sensitive areas from loud construction activities, and where possible orient equipment noise emissions away from noise sensitive areas.
- Minimize the use of impact equipment.
- Consider lining metal bins / chutes with rubber to minimize sound of falling debris.
- Consider the use of localized mobile noise screens.
- Where multiple construction methods are available, consider using method with the lowest noise emissions.

9.3.8 Air Quality

The air quality assessment undertaken as part of this Project examined the following air contaminants:

- Carbon monoxide;
- Nitrogen dioxide;
- Particulate matter with diameter less than 10 micron;
- Particulate matter with diameter less than 2.5 micron;

- Sulphur dioxide;
- Formaldehyde;
- Acetaldehyde;
- Benzene;
- 1,3-butadiene;
- Benzo(a)pyrene; and
- Acrolein.

9.3.8.1 Summary of Potential Impacts

There are five Criteria Air Contaminants with modelled cumulative concentrations above the respective provincial and/or federal air quality criteria, specifically the 1-hour and annual averaging period of Nitrogen Dioxide, the 1-hour and annual averaging period of Sulphur Dioxide, the annual averaging period of particulate matter with diameter less than 2.5 micron, the annual averaging period of Benzene, and the 24-hour and annual averaging periods of Benzo(a)pyrene.

The exceedances of Nitrogen Dioxide, Sulphur Dioxide, Particulate matter with diameter less than 2.5-micron, Benzene, and Benzo(a)pyrene is due predominately to elevated existing ambient air quality concentrations, which already exceed the provincial and/or federal air quality criteria prior to including the project contributions:

- Nitrogen Dioxide is at 226% of the Ambient Air Quality Criteria limit for the 1-hr averaging period.
- Sulphur Dioxide is at 131% of the Ambient Air Quality Criteria limit for the 1-hr averaging period.
- Particulate matter with diameter less than 2.5 micron is at 108% of the Ambient Air Quality Criteria limit for the annual averaging period.
- Benzene is at 135% of the Ambient Air Quality Criteria limit for the annual averaging period.
- Benzo(a)pyrene is at 727% of the Ambient Air Quality Criteria limit for the 24-hr period and at 1312% for the annual averaging period.

However, even with these exceedances, when compared to Existing Conditions, the concentrations for these contaminants decrease in the Future Build Conditions.

Potential impacts include:

- Increased nitrogen dioxide, carbon monoxide, sulfur dioxide, particulate, and volatile organic compounds impact levels at nearby receptors; and

- Construction related air pollution include diesel combustion and particulate emissions. Odour and visible dust may cause public annoyance at existing sensitive receptors within the Study Area.

9.3.8.1.1 Greenhouse Gas Emissions Assessment

Mobile vehicles emit the following greenhouse gases in significant amounts:

- Carbon dioxide;
- Methane; and
- Nitrous oxide.

Total greenhouse gas emissions were calculated using a combination of MOVES emission rates and total annual vehicle usage projections for the project sources of air quality contaminant emissions. MOVES is capable of calculating atmospheric carbon dioxide, methane, and nitrous oxide emissions varying with vehicle class, speed, and emission process type (for example running emissions, starting emissions, etcetera).

Individual greenhouse gases have differing abilities to absorb heat in the atmosphere. These varying heat absorption properties are quantified by an individual global warming potential factor for each contaminant, which converts the mass of a greenhouse gas to the representative equivalent mass of carbon dioxide.

Currently, there are no greenhouse gas emission standards in Canada or the United States on a per-source basis. However, National Resources Canada reports annual greenhouse gas emissions for various industrial sectors, including the Transportation sector. The Project contributions of greenhouse gas emissions in the Future Build year (2041) were compared to the 2019 carbon dioxide equivalent contributions from the Ontario Transportation sector, shown below in **Table 21**.

Table 21: Greenhouse Gas Project Contribution Regional Assessment

Contaminant	Future Build (2041) (Megatonnes)	Ontario 2019 Reported Greenhouse Gas Emissions for the Transportation Sector (Megatonnes of carbon dioxide equivalent)	% Future Build Project Contribution
Carbon dioxide	0.66	-	-
Methane	1.30E-03	-	-
Nitrous Oxide	7.22E-06	-	-
Carbon dioxide equivalent	0.70	51.8 [3]	1.36%

As shown above, the Project greenhouse gas emission contributions are less than 2% compared to the total Transportation 2019 carbon dioxide equivalent emissions.

9.3.8.1.2 Construction Air Quality Impacts

Construction activity creates and releases fine particulates (fugitive dust) and other vapours into the surrounding community, including diesel combustion exhaust, asphalt volatile contaminant emissions, etcetera. Emissions from construction activity are temporary and unlikely to have long-lasting effects on the surrounding area.

9.3.8.2 Proposed Mitigation Measures

To mitigate the impacts identified due to the operation of the highway with the proposed improvements in place the implementation of vegetation (such as plantings through screening and/or barriers) within the Study Area is suggested in order to decrease ground level dispersion of particulate.

Mitigation to address impacts of air quality during construction of the Project will be identified in Detail Design. Additional mitigation measures for construction air quality will be identified Detail Design.

9.3.9 Climate Change Considerations

9.3.9.1 Summary of Potential Impacts

In accordance with Ontario's Guide for Considering Climate Change in the Environmental Assessment Process (Ministry of the Environment, Conservation and Parks, 2017), the Project examined current climate portraits in the Study Area along with future climate portraits. In the future, the climate of the Study Area is projected to be warmer and wetter. Temperature follows an increasing trend. Consequently, more heatwaves, more days with temperatures higher than 30 degrees Celsius and higher seasonal temperatures are expected. This will cause the freeze-thaw cycles to follow a decreasing trend. Along with this trend, precipitation follows an increasing trend as well. An increasing trend of temperature will likely cause a drop in annual snowfall; however, the total winter precipitation increases. This suggests that in transition seasons, the light snowfall events will turn into rainfall. The variation of climate indicators (for example annual average temperature, number of days per year with + 20 millimetres of rainfall, freeze-thaw cycle, etcetera) can introduce new risks / hazards or intensify the current risks / hazards including but not limited to washout and accelerated deterioration of roads, damage to road-side vegetation and snow drifting.

The Preliminary Design of the Recommended Plan has been developed in consideration of design considerations that account for climate change hazards and potential impacts.

9.3.9.2 Proposed Mitigation Measures for the Identified Hazards

Mitigations for the potential impacts to highway infrastructure and user safety are already incorporated into existing Ontario Ministry of Transportation standards and guidelines. Mitigation measures such as sizing culverts and ditches appropriately to accommodate large precipitation events, shall be reviewed at Detail Design.

As feasible/applicable, design related solutions to manage hazards and potential impacts to highway infrastructure and road user safety related to climate change considerations, as well as opportunities to reduce impacts during highway construction, maintenance and operations on climate will be revisited in Detail Design.

9.3.10 Landscape Composition

9.3.10.1 Summary of Potential Impacts

Removal of vegetation within the construction disturbance area is anticipated during construction of the Project. This vegetation could provide wildlife habitat, screening of snow and wind to and from the roadway, and protection for agricultural lands and vegetation communities outside of right-of-way from salt spray. Removal of vegetation could result in:

- Hazardous road conditions due to drifting snow or high winds;
- Loss of wildlife habitat;
- Death of vegetation following construction due to exposure to wind and salt spray;
- Loss of useable agricultural lands due to increased exposure to salt spray; and
- Erosion and sedimentation of exposed soils.

9.3.10.2 Proposed Mitigation Measures

In order to minimize or avoid potential impacts, the following mitigation measures shall be considered:

- Retain as much vegetation where possible, particularly at Benedict Woodlot and in candidate Species at Risk habitat;
- Plant rows of coniferous trees where required as they act as s screen for wind, salt and snow;
- Restore the construction disturbance zone with roadside seeding mixes;
- Interchange plantings at Book Road East and Airport Connection Road;

- Plant salt resistant vegetation at newly exposed forest edges to protect existing forests from salt spray and wind; and
- Stabilize slopes where necessary with plantings (for example Butter Road embankments).

The preliminary landscape plan can be seen in **Appendix D**.

9.4 Cultural Environment

9.4.1 Archaeology

9.4.1.1 Summary of Potential Impacts

Based on a review of the historical, environmental, and archaeological context of the Study Area, it has been determined that potential for the recovery of pre- and post-contact Indigenous and 19th century Euro-Canadian archaeological resources within a small portion of the Study Area is high based on the presence of the following features:

- Proximity to previously-identified archaeological sites;
- Distance to various types of water sources;
- Soil texture and drainage (Haldimand Clay Plain);
- Glacial geomorphology, elevated topography and the general topographic variability of the area;
- Resource areas including food or medicinal plants, and scarce raw materials;
- Areas of early Euro-Canadian settlement and early transportation routes;
- Properties listed on municipal register of properties designated under the *Ontario Heritage Act*;
- Historic landmarks or sites (two historic pioneer cemeteries, Book-Parkin Cemetery and White Church Cemetery); and
- Location within a zone of archaeological potential identified in the City of Hamilton Archaeology Management Plan.

9.4.1.2 Proposed Mitigation Measures

The Stage 1 Archaeological Assessment Report outlines where a Stage 2 Archaeological Assessment will be required prior to any ground disturbance. Areas where archaeological potential has been removed include areas determined to have been subject to extensive land alterations that have significantly compromised the

recovery of archaeological materials and constructed roadways. All potentially undisturbed areas shall be subject to Stage 2 field investigation. The Stage 2 assessment will be completed during Detail Design.

With regard to Book-Parkin Cemetery and White Church Cemetery, based on the background research and consultation with cemetery management and Bereavement Authority of Ontario, it is reasonable to believe that the fence lines represent the cemetery limits. Thus, it has been determined that there is little to no potential for unmarked burials to exist associated with these cemeteries. While there are currently no plans to impact the cemetery lands, if changes to design includes impacts by the Project, or any future impacts are proposed within the fenced limits of the cemetery properties, further Stage 1 archaeological assessment may be required (in discussion with the Ontario Ministry of Transportation, the Ministry of Citizenship and Multiculturalism and the appropriate regulatory agency) to determine the potential to impact unmarked burials.

With regard to the Ancaster Pet Cemetery, there is not the same expectation to carry out investigations to confirm the presence or absence of pet burials as there would be for human burial sites. Further, there are no impacts to the Ancaster Pet Cemetery. If this changes, further consultation with the Ministry of Citizenship and Multiculturalism and the appropriate regulatory agency should be undertaken in Detail Design.

9.4.2 Built Heritage

The Cultural Heritage Resource Assessment Report includes a preliminary assessment of the potential impacts from the proposed project activities. The report includes recommendations on project alternatives, mitigations, and next steps to conserve potential cultural heritage resources within the Study Area. The assessment of potential impacts on built heritage and cultural heritage landscapes is characterized in three Study Area zones:

- **Study Zone 1:** Study Zone 1 comprises of the Preliminary Construction Disturbance Area, which includes all land anticipated to experience direct (physical) construction impacts. The Preliminary Construction Disturbance Area encompasses a broader area than the existing Ontario Ministry of Transportation right-of-way.
- **Study Zone 2:** A 25-metre study zone is located immediately beside the Preliminary Construction Disturbance Area and has potential for associated land clearance. The anticipated impacts within Study Zone 2 are direct or indirect, permanent, or temporary, negative impacts from displacement,

disruption, isolation, vibration, change to character of setting and full or partial removal, or demolition.

- **Study Zone 3:** Study Zone 3 is a 25 to 250-metre study zone off the Preliminary Construction Disturbance Area comprising an area where land clearance is unlikely to occur, however, where impacts to built heritage resources and cultural heritage landscapes may be experienced. The anticipated impacts within Study Zone 3 are indirect, permanent, or temporary, negative, or positive impacts from disruption, isolation, vibration, change to character of setting or introduction of new interpretive / commemorative features.

Table 22 identifies Built Heritage Resources and Cultural Heritage Landscapes, potential impacts, and proposed mitigation measures.

Based on the results of the background research and the preliminary impact assessment, the following next steps have been identified and will be confirmed at Detail Design:

- **Further Assessment:** Properties identified as known or potential built heritage resources and cultural heritage landscapes that may be negatively impacted by one of the alternatives and/or the Preliminary Construction Disturbance Area shall be evaluated to determine whether they have cultural heritage value or interest recorded in a Cultural Heritage Evaluation Report. In total, fifteen (15) Cultural Heritage Evaluation Reports are recommended. A Cultural Heritage Evaluation Report shall be completed by a Qualified Person(s)[3]. It should also be mentioned that the proposed land use in the Study Area may change from now until Detail Design due to the anticipated development in the area (for example the Airport Employment Growth District). It is recommended that built heritage and landscape features are confirmed in Detail Design to carry out the necessary Cultural Heritage Evaluation Reports on existing features.
- **Heritage Impact Assessment:** Where properties are determined by the Ministry to meet the criteria in O. Reg. 9/06 or O. Reg. 10/06 of the *Ontario Heritage Act* and may be impacted by one or more of the Preliminary Design alternatives and/or the construction disturbance associated with the highway improvements a Heritage Impact Assessment shall be completed by a Qualified Person(s).

3. Qualified persons means individuals – professional engineers, architects, archaeologists, etc. – having relevant, recent experience in the conservation of cultural heritage resources

Table 22: Potential Impact Assessment and Recommendations

Feature Identification	Location/Address	Heritage Status	Potential Impacts	Recommended Mitigations and Next Steps
Cultural Heritage Landscape 1	232 Golf Links Road	Inventoried	■ Cultural Heritage Landscape 1 is within Study Zones 2 and 3. However, there is no proposed widening or reconfiguration of the Highway 403 and Highway 6 South interchange for this Project. Therefore, no direct impacts are anticipated.	■ No specific mitigation measures or next steps are required.
Cultural Heritage Landscape 2	167 Book Road East	Inventoried (Demolished)	■ Cultural Heritage Landscape 2 is within Study Zones 1, 2, and 3. A portion of the property is within the Preliminary Construction Disturbance Area (Study Zone 1), however, the house that was previously located within the property has been demolished. Therefore, no direct adverse impacts are anticipated.	■ No specific mitigation measures or next steps are required.
Cultural Heritage Landscape 3	451 Book Road East	Registered (Non-Designated)	■ Cultural Heritage Landscape 3 is within Study Zone 3. There are no direct adverse Project impacts anticipated to potential cultural heritage value or interest for this property. **Preliminary Design Alternatives** ■ None of the Preliminary Design Alternatives transect Cultural Heritage Landscape 3. No direct impacts from the alternatives are anticipated.	■ No specific mitigation measures or next steps are required.
Cultural Heritage Landscape 4	343 Book Road East	Inventoried	■ Cultural Heritage Landscape 4 is entirely within the Preliminary Construction Disturbance Area (Study Zone 1) and has potential to be directly and indirectly adversely impacted by the Project due to the potential road grading, vibration impacts associated with the construction activities and the transportation of construction materials and personnel.	■ Refine the Preliminary Construction Disturbance Area to avoid Cultural Heritage Landscape 4, where feasible. ■ If avoidance of Cultural Heritage Landscape 4 is not feasible and the Project continues to adversely impact the cultural heritage value or interest of the property, then further assessment of the impacts on the property and mitigation is required (for example Heritage Impact Assessment), if the property is determined to have cultural heritage value or interest in the Cultural Heritage Evaluation Report. <u>Next Steps:</u> ■ The next step is for a Qualified Person to determine the cultural heritage value or interest of the property by completing a Cultural Heritage Evaluation Report. If cultural heritage value or interest is determined by the Ministry and the Project continues to impact the property, then further assessment of impacts and mitigation is recommended by completing a Heritage Impact Assessment.

Feature Identification	Location/Address	Heritage Status	Potential Impacts	Recommended Mitigations and Next Steps
Cultural Heritage Landscape 5	281 Book Road East	Designated Part IV By-law #18-079	■ Cultural Heritage Landscape 5 is entirely within the Preliminary Construction Disturbance Area (Study Zone 1) and has potential to be directly and indirectly adversely impacted by the Project due to the potential road grading, vibration impacts associated with the construction activities and the transportation of construction materials and personnel.	■ Refine the Preliminary Construction Disturbance Area to avoid the property within Cultural Heritage Landscape 5, where feasible. ■ If avoidance of Cultural Heritage Landscape 5 is not feasible and the Project continues to adversely impact the cultural heritage value or interest of the property, then further assessment of the impacts on the property and mitigation is required (for example a Heritage Impact Assessment), if the property is determined to have cultural heritage value or interest in the Cultural Heritage Assessment Report. <u>Next Steps:</u> ■ The next step is for a Qualified Person to determine the cultural heritage value or interests of the property by completing a Cultural Heritage Evaluation Report. ■ If cultural heritage value or interest is determined by the Ministry and the Project continues to impact the property, then further assessment of impacts and mitigation is recommended by completing a Heritage Impact Assessment.
Cultural Heritage Landscape 6	330 Book Road East	Inventoried	■ Cultural Heritage Landscape 6 is entirely within the Preliminary Construction Disturbance Area (Study Zone 1) and has potential to be directly and indirectly adversely impacted by the Project due to the potential road grading, vibration impacts associated with the construction activities and the transportation of construction materials and personnel.	■ Refine the Preliminary Construction Disturbance Area to avoid the property within Cultural Heritage Landscape 6. ■ If avoidance of Cultural Heritage Landscape 6 is not feasible and the Project continues to adversely impact the cultural heritage value or interest of the property, then further assessment of the impacts on the property and mitigation is required (for example a Heritage Impact Assessment), if the property is determined to have cultural heritage value or interest in the Cultural Heritage Assessment Report. <u>Next Steps:</u> ■ The next step is for a Qualified Person to determine the cultural heritage value or interests of the property by completing a Cultural Heritage Evaluation Report. ■ If cultural heritage value or interest is determined by the Ministry and the Project continues to impact the property, then further assessment of impacts and mitigation is recommended by completing a Heritage Impact Assessment.

Feature Identification	Location/Address	Heritage Status	Potential Impacts	Recommended Mitigations and Next Steps
Cultural Heritage Landscape 7	394 Book Road East	Inventoried	■ Cultural Heritage Landscape 7 is within Study Zones 1, 2, and 3. A portion of the property, including the laneway and agricultural fields are within Study Zones 1 and therefore has potential to be directly and indirectly adversely impacted by the Project due to the potential road grading and the transportation of construction materials and personnel.	■ Refine the Preliminary Construction Disturbance Area to avoid the property within Cultural Heritage Landscape 7. ■ If avoidance of Cultural Heritage Landscape 7 is not feasible and the Project continues to adversely impact the cultural heritage value or interest of the property, then further assessment of the impacts on the property and mitigation is required (for example a Heritage Impact Assessment), if the property is determined to have cultural heritage value or interest in the Cultural Heritage Assessment Report. <u>Next Steps:</u> ■ The next step is for a Qualified Person to determine the cultural heritage value or interests of the property by completing a Cultural Heritage Evaluation Report. ■ If cultural heritage value or interest is determined by the Ministry and the Project continues to impact the property, then further assessment of impacts and mitigation is recommended by completing a Heritage Impact Assessment.
Cultural Heritage Landscape 8	157 Butter Road East	Inventoried	■ Cultural Heritage Landscape 8 is within Study Zones 1, 2, and 3. A portion of the property, including the laneway and agricultural fields are within Study Zone 1 and therefore has potential to be directly and indirectly adversely impacted by the Project due to the potential road grading and the transportation of construction materials and personnel.	■ Refine the Preliminary Construction Disturbance Area to avoid the property within Cultural Heritage Landscape 8, where feasible. ■ If avoidance of Cultural Heritage Landscape 8 is not feasible and the Project continues to adversely impact the cultural heritage value or interest of the property, then further assessment of the impacts on the property and mitigation is required (for example a Heritage Impact Assessment), if the property is determined to have cultural heritage value or interest in the Cultural Heritage Assessment Report. <u>Next Steps:</u> ■ The next step is for a Qualified Person to determine the cultural heritage value or interests of the property by completing a Cultural Heritage Evaluation Report. ■ If cultural heritage value or interest is determined by the Ministry and the Project continues to impact the property, then further assessment of impacts and mitigation is recommended by completing a Heritage Impact Assessment.
Cultural Heritage Landscape 9	363 Butter Road East	Inventoried	■ Cultural Heritage Landscape 9 is within Study Zones 1, 2, and 3. A small portion of agricultural field associated with Cultural Heritage Landscape 9 is within the Preliminary Construction Disturbance Area (Study Zone 1), however the structures are within Study Zone 3. Therefore, there are no adverse impacts anticipated to this property.	■ No specific mitigation measures or next steps are required.
Cultural Heritage Landscape 10	153 Carluke Road East	Inventoried	■ Cultural Heritage Landscape 10 is within Study Zones 1, 2, and 3. However, the nearest structure on the property is approximately 1.9 kilometres to the south of the edge of Study Zone 1 within the property; therefore, no direct adverse impacts are anticipated.	■ No specific mitigation measures or next steps are required.

Feature Identification	Location/Address	Heritage Status	Potential Impacts	Recommended Mitigations and Next Steps
Cultural Heritage Landscape 11	9300 Airport Road West	Inventoried, Cultural Heritage Landscape Inventory	■ Cultural Heritage Landscape 11 is within Study Zones 1, 2, and 3. A portion of the property including the Ontario Provincial Plaque, paved driveways and manicured lawns are within the Preliminary Construction Disturbance Area (Study Zone 1). All the structures associated with Cultural Heritage Landscape 11 are within Study Zone 3. Study Zone 1 suggests that modifications to airport entrance may be required. Therefore, potential direct or indirect adverse impacts to this property are anticipated due to the potential road grading and the transportation of construction materials and personnel.	■ Refine the Preliminary Construction Disturbance Area to avoid the property within Cultural Heritage Landscape 11, where feasible. ■ If avoidance of Cultural Heritage Landscape 11 is not feasible and the Project continues to adversely impact the cultural heritage value or interest of the property, then further assessment of the impacts on the property and mitigation is required (for example a Heritage Impact Assessment), if the property is determined to have cultural heritage value or interest in the Cultural Heritage Assessment Report. <u>Next Steps:</u> ■ The next step is for a Qualified Person to determine the cultural heritage value or interests of the property by completing a Cultural Heritage Evaluation Report. ■ If cultural heritage value or interest is determined by the Ministry and the Project continues to impact the property, then further assessment of impacts and mitigation is recommended by completing a Heritage Impact Assessment.
Cultural Heritage Landscape12	9705 Airport Road	Cultural Heritage Landscape Inventory	■ All structures on the property have been demolished; only a remnant silo remains. The silo is in Study Zone 3 and is not anticipated to be impacted by this Project.	■ No specific mitigation measures or next steps are required.
Cultural Heritage Landscape 13	9630 White Church Road West	Inventoried	Cultural Heritage Landscape 13 is within Study Zones 1, 2, and 3. A narrow portion of Cultural Heritage Landscape 13 along the rear of the property will be impacted by this Project. The structures are within Study Zone 3, approximately 650 metres to the south along White Church Road West. Therefore, no direct impacts to Cultural Heritage Landscape 13 anticipated.	■ No specific mitigation measures or next steps are required.
Cultural Heritage Landscape 14	9370 White Church Road West	Inventoried	■ Cultural Heritage Landscape 14 is within Study Zones 1, 2, and 3. A large portion of the wooded area of the property is within the Preliminary Construction Disturbance Area (Study Zone 1). The eastern structures associated with Cultural Heritage Landscape 14 are within Study Zone 3. However, given a large portion of Cultural Heritage Landscape 14, including agricultural fields and wooded lots are within Study Zone 1, direct adverse impacts may be anticipated due to the potential road grading and the transportation of construction materials and personnel.	■ Refine the Preliminary Construction Disturbance Area to avoid the property within Cultural Heritage Landscape 14. ■ If avoidance of Cultural Heritage Landscape 14 is not feasible and the Project continues to adversely impact the cultural heritage value or interest of the property, then further assessment of the impacts on the property and mitigation is required (for example a Heritage Impact Assessment), if the property is determined to have cultural heritage value or interest in the Cultural Heritage Assessment Report. <u>Next Steps:</u> ■ The next step is for a Qualified Person to determine the cultural heritage value or interests of the property by completing a Cultural Heritage Evaluation Report. ■ If cultural heritage value or interest is determined by the Ministry and the Project continues to impact the property, then further assessment of impacts and mitigation is recommended by completing a Heritage Impact Assessment.

Feature Identification	Location/Address	Heritage Status	Potential Impacts	Recommended Mitigations and Next Steps
Cultural Heritage Landscape 15	9349 White Church Road West	Inventoried	■ Cultural Heritage Landscape 15 is within Study Zones 1, 2, and 3. A portion of the property within the Preliminary Construction Disturbance Area (Study Zone 1), including part of the easternmost barn and the eastern portion of the agricultural fields. The easternmost barn is anticipated to be directly and indirectly impacted by the potential road grading, vibration impacts associated with the construction activities and the transportation of construction materials and personnel.	■ Refine the Preliminary Construction Disturbance Area to avoid the property within Cultural Heritage Landscape 15, if feasible. ■ If avoidance of Cultural Heritage Landscape 15 is not feasible and the Project continues to adversely impact the cultural heritage value or interest of the property, then further assessment of the impacts on the property and mitigation is required (for example a Heritage Impact Assessment), if the property is determined to have cultural heritage value or interest in the Cultural Heritage Assessment Report. <u>Next Steps:</u> ■ The next step is for a Qualified Person to determine the cultural heritage value or interests of the property by completing a Cultural Heritage Evaluation Report. ■ If cultural heritage value or interest is determined by the Ministry and the Project continues to impact the property, then further assessment of impacts and mitigation is recommended by completing a Heritage Impact Assessment.
Cultural Heritage Landscape 16	9062 White Church Road West	Inventory of Cemeteries and Burial Grounds	■ Cultural Heritage Landscape 16 is within Study Zone 3, there are no anticipated physical impacts from the Project.	No specific mitigation measures or next steps are required.
Cultural Heritage Landscape 17	3738 Highway 6	Inventoried	■ Cultural Heritage Landscape 17 is entirely within Study Zone 1 (Preliminary Construction Disturbance Area) and has potential to be directly and indirectly adversely impacted by the Project due to the potential road grading, vibration impacts associated with the construction activities and the transportation of construction materials and personnel.	■ Refine the Preliminary Construction Disturbance Area to avoid the property within Cultural Heritage Landscape 17, if feasible. ■ If avoidance of Cultural Heritage Landscape 17 is not feasible and the Project continues to adversely impact the cultural heritage value or interest of the property, then further assessment of the impacts on the property and mitigation is required (for example a Heritage Impact Assessment), if the property is determined to have cultural heritage value or interest in the Cultural Heritage Assessment Report. <u>Next Steps:</u> ■ The next step is for a Qualified Person to determine the cultural heritage value or interests of the property by completing a Cultural Heritage Evaluation Report. ■ If cultural heritage value or interest is determined by the Ministry and the Project continues to impact the property, then further assessment of impacts and mitigation is recommended by completing a Heritage Impact Assessment.

Feature Identification	Location/Address	Heritage Status	Potential Impacts	Recommended Mitigations and Next Steps
Cultural Heritage Landscape 18	3751 Highway 6	Inventoried	■ Cultural Heritage Landscape 18 is within Study Zones 1, 2, and 3. A portion of the property including gravel driveway within Study Zone 1. Therefore, it is anticipated there will be direct and indirect adverse impacts due to the potential road grading and the transportation of construction materials and personnel. All the structures within Cultural Heritage Landscape 18 are in Study Zone 3.	■ Refine the Preliminary Construction Disturbance Area to avoid the property within Cultural Heritage Landscape 18, if feasible. ■ If avoidance of Cultural Heritage Landscape 18 is not feasible and the Project continues to adversely impact the cultural heritage value or interest of the property, then further assessment of the impacts on the property and mitigation is required (for example a Heritage Impact Assessment), if the property is determined to have cultural heritage value or interest in the Cultural Heritage Assessment Report. <u>Next Steps:</u> ■ The next step is for a Qualified Person to determine the cultural heritage value or interests of the property by completing a Cultural Heritage Evaluation Report. ■ If cultural heritage value or interest is determined by the Ministry and the Project continues to impact the property, then further assessment of impacts and mitigation is recommended by completing a Heritage Impact Assessment.
Cultural Heritage Landscape 19	2004 Glancaster Road	Inventoried	■ Cultural Heritage Landscape 19 is within Study Zones 1, 2, and 3. A portion of the property is within Study Zone 1 along the edge of Highway 6 South right-of-way consisting of a wooded area and agricultural fields, however all structures within Cultural Heritage Landscape 19 are outside of Study Zone 3. The house is approximately 195 metres south of Study Zone 3. Therefore, there are no adverse impacts anticipated to this property.	■ No specific mitigation measures or next steps are required.
Cultural Heritage Landscape 20	9485 White Church Road West	Inventoried	■ A portion of Cultural Heritage Landscape 20 is within Study Zone 3. All of the structures within Cultural Heritage Landscape 20 are outside of Study Zone 3. Therefore, there are no adverse impacts anticipated to this property.	■ No specific mitigation measures or next steps are required.
Cultural Heritage Landscape 21	Butter Road East Streetscape	Cultural Heritage Landscape Inventory	■ Cultural Heritage Landscape 21 is within Study Zone 1, 2, and 3. A small portion of the western end of the Butter Road East streetscape is within the Preliminary Construction Disturbance Area (Study Zone 1), and remnants of the former stump fence are within Study Zone 3. Therefore, it is anticipated there will be direct and indirect adverse impacts due to the potential road grading and the transportation of construction materials and personnel.	■ Refine the Preliminary Construction Disturbance Area to avoid the property within Cultural Heritage Landscape 21, if feasible. ■ If avoidance of Cultural Heritage Landscape 21 is not feasible and the Project continues to adversely impact the cultural heritage value or interest of the property, then further assessment of the impacts on the property and mitigation is required (for example a Heritage Impact Assessment), if the property is determined to have cultural heritage value or interest in the Cultural Heritage Assessment Report. <u>Next Steps:</u> ■ The next step is for a Qualified Person to determine the cultural heritage value or interests of the property by completing a Cultural Heritage Evaluation Report. ■ If cultural heritage value or interest is determined by the Ministry and the Project continues to impact the property, then further assessment of impacts and mitigation is recommended by completing a Heritage Impact Assessment.

Feature Identification	Location/Address	Heritage Status	Potential Impacts	Recommended Mitigations and Next Steps
Built Heritage Resource 1	243 Garner Road East	Designated, Part IV By-law# 85-90	■ Built Heritage Resource 1 is within Study Zones 1, 2, and 3. A portion of the property is within Study Zone 1, including the house and historic plaque. Therefore, it is anticipated there will be direct and indirect adverse impacts due to the potential road grading, vibration impacts associated with the construction activities and the transportation of construction materials and personnel.	■ Refine the Preliminary Construction Disturbance Area to avoid Built Heritage Resource 1, if feasible. ■ If avoidance of Built Heritage Resource 1 is not feasible and the Project continues to adversely impact the cultural heritage value or interest of the property, then further assessment of the impacts on the property and mitigation is required (for example Heritage Impact Assessment), if the property is determined to have cultural heritage value or interest in the Cultural Heritage Evaluation Report. <u>Next Steps:</u> ■ The next step is for a Qualified Person to determine the cultural heritage value or interest of the property by completing a Cultural Heritage Evaluation Report. If cultural heritage value or interest is determined by the Ministry and the Project continues to impact the property, then further assessment of impacts and mitigation is recommended by completing a Heritage Impact Assessment.
Built Heritage Resource 2	254 Garner Road East	Inventoried	■ Built Heritage Resource 2 is within Study Zones 1, 2, and 3. A portion of the property near Garner Road East including the gravel driveway and manicured lawn are within Study Zone 1. The structures are within Study Zone 3. Therefore, it is anticipated there will be direct and indirect adverse impacts due to the potential road grading and the transportation of construction materials and personnel.	■ Refine the Preliminary Construction Disturbance Area to avoid Built Heritage Resource 2, if feasible. ■ If avoidance of Built Heritage Resource 2 is not feasible and the Project continues to adversely impact the cultural heritage value or interest of the property, then further assessment of the impacts on the property and mitigation is required (for example Heritage Impact Assessment), if the property is determined to have cultural heritage value or interest in the Cultural Heritage Evaluation Report. <u>Next Steps:</u> ■ The next step is for a Qualified Person to determine the cultural heritage value or interest of the property by completing a Cultural Heritage Evaluation Report. If cultural heritage value or interest is determined by the Ministry and the Project continues to impact the property, then further assessment of impacts and mitigation is recommended by completing a Heritage Impact Assessment.
Built Heritage Resource 3	378 Garner Road East	Inventoried	■ Built Heritage Resource 3 is within Study Zones 1, 2, and 3. A portion of the property including the gravel driveway and manicured lawns are within Study Zone 1. The house is within Study Zone 2. And the shed within Study Zone 3. Therefore, it is anticipated there will be direct and indirect adverse impacts due to the potential road grading and the transportation of construction materials and personnel.	■ Refine the Preliminary Construction Disturbance Area to avoid Built Heritage Resource 3, if feasible. ■ If avoidance of Built Heritage Resource 3 is not feasible and the Project continues to adversely impact the cultural heritage value or interest of the property, then further assessment of the impacts on the property and mitigation is required (for example Heritage Impact Assessment), if the property is determined to have cultural heritage value or interest in the Cultural Heritage Evaluation Report. <u>Next Steps:</u> ■ The next step is for a Qualified Person to determine the cultural heritage value or interest of the property by completing a Cultural Heritage Evaluation Report. If cultural heritage value or interest is determined by the Ministry and the Project continues to impact the property, then further assessment of impacts and mitigation is recommended by completing a Heritage Impact Assessment.

Feature Identification	Location/Address	Heritage Status	Potential Impacts	Recommended Mitigations and Next Steps
Built Heritage Resource 4	166 Book Road East	Inventoried	■ Built Heritage Resource 4 is entirely within the Preliminary Construction Disturbance Area (Study Zone 1) and has potential to be directly and indirectly adversely impacted by the Project due to the potential road grading, vibration impacts associated with the construction activities and the transportation of construction materials and personnel.	■ Refine the Preliminary Construction Disturbance Area to avoid Built Heritage Resource 4, if feasible. ■ If avoidance of Built Heritage Resource 4 is not feasible and the Project continues to adversely impact the cultural heritage value or interest of the property, then further assessment of the impacts on the property and mitigation is required (for example Heritage Impact Assessment), if the property is determined to have cultural heritage value or interest in the Cultural Heritage Evaluation Report. <u>Next Steps:</u> ■ The next step is for a Qualified Person to determine the cultural heritage value or interest of the property by completing a Cultural Heritage Evaluation Report. If cultural heritage value or interest is determined by the Ministry and the Project continues to impact the property, then further assessment of impacts and mitigation is recommended by completing a Heritage Impact Assessment.
Built Heritage Resource 5	1640 Glancaster Road	Inventoried	■ Built Heritage Resource 5 is within Study Zone 3 and is not anticipated by be adversely impacted by the Project.	■ No specific mitigation measures or next steps are required.
Built Heritage Landscape 6	3487 Upper James Street	Inventoried	■ Built Heritage Resource 6 is within Study Zone 3 and is not anticipated by be adversely impacted by the Project.	■ No specific mitigation measures or next steps are required.

General mitigation measures and commitments to be confirmed at Detail Design include:

- Construction activities shall be suitably planned and undertaken to avoid impacts to potential built heritage resources and cultural heritage landscapes (for example remain within the proposed right-of-way). Suitable mitigation measures during construction are recommended, including establishing no-go zones adjacent to all of the built heritage resources and cultural heritage landscapes and issuing instructions to construction crews in order to prevent impacts to existing structures.
- To ensure designated built heritage resources and cultural heritage landscapes within and adjacent to are not adversely indirectly impacted by mechanical vibration during construction, a vibration assessment shall be undertaken. Should this vibration assessment determine that the structures or landscape features within the potential built heritage resources and cultural heritage landscapes will be subject to adverse impacts due to vibration, a vibration monitoring plan shall be prepared and implemented to lessen vibration impacts related to construction.
- If the Ontario Ministry of Transportation determines that a property is a provincial heritage property of provincial significance, the Ontario Ministry of Transportation shall obtain the consent of the Minister of Citizenship and Multiculturalism before removing or demolishing buildings or structures on the property, or before transferring the property from provincial control.
- Should there be refinements to and / or expansion of the Preliminary Design Alternatives, Qualified Person(s) shall assess if there are any changes in impacts and/or mitigation recommendations to the known or potential built heritage resources and cultural heritage landscapes that have been identified in the Cultural Heritage Resources Assessment Report (for example additional heritage studies).
- Should there be refinements to and / or expansion of the Preliminary Design Alternatives, Qualified Person(s) shall assess if there are any changes in impacts and/or mitigation recommendations to the known or potential built heritage resources and cultural heritage landscapes that have been identified in the Cultural Heritage Resources Assessment Report (for example additional heritage studies).

9.5 Transportation

9.5.1 Traffic Disruption and Construction Staging

The construction of the widening of Highway 6 South, Highway 403 Southeast Ramp improvements, new interchanges at Book Road East and Airport Connection Road, structural rehabilitations, and replacements as well as remaining intersection improvements and minor works are proposed to be carried out in four stages. In the initial phases, southbound Highway 6 South lanes will be constructed along with ramp improvements and culvert replacements, while traffic continues on the existing Highway 6 South. Subsequent stages involve the shifting of Highway 6 South traffic to newly constructed lanes, the separation of traffic into northbound and southbound lanes, and the completion of interchanges at Book Road East and Airport Connection. Concurrently, Book Road East undergoes temporary realignment, the construction of a new underpass, and subsequent shifts to a new alignment. Similarly, Airport Connection Road interchange ramps and underpass construction is achieved via traffic shifts similar to Book Road East. The final stage addresses intersection improvements, bridge rehabilitation, and remaining work at Book Road East and Airport Connection Road interchanges, emphasizing a phased approach to optimize construction sequencing and minimize traffic disruptions throughout the entire Project area.

9.5.2 Active Transportation

This Preliminary Design will not preclude any work proposed by the City of Hamilton outlined in the City's Transportation Master Plan for the area and the Project Team has consulted with the City of Hamilton regarding proposed road network improvements, alternatives, and the Recommended Plan. The Book Road East underpass structure is designed to accommodate active transportation proposed in the City of Hamilton' Transportation Master Plan with 2.0 metre shoulders and 1.8 metre sidewalk / multi-use purpose lanes on both sides. Heavy vehicles are projected to access the airport via Airport Connection Road; therefore, a wider 4.75 metre lane and 2.5 metre shoulder is recommended on both sides.

9.5.3 Utilities

The utility stakeholders that have crossings within the Study Area are:

- Hydro One
- TC Energy
- Enbridge Gas

- Westover Express
- Telecom Communications

A utility conflict plan was developed during the Preliminary Design and potential areas of conflict were identified. Hydro One has two separate high voltage hydro crossings that are anchored on hydro towers that lie within the corridor required for the widening of Highway 6 South. One of the crossings is just north of the new Book Road East interchange and the second just south of the Butter Road underpass. Potential conflicts were also identified at the new Airport Connection Road interchange where pipelines (TC Energy, Westover Express and Enbridge Gas) run parallel to Highway 6 South along the south side. These pipelines will require mitigation measures to protect the lines during and post construction of the interchange ramps due to the widening of the roadway. Potential mitigation and relocation plans have been discussed with Hydro One and plans have commenced to discover the full extents of the relocations. Further details to follow in Detail Design.

9.6 Summary of Environmental Effects, Mitigation and Commitments to Future Work

The proposed mitigation measures and commitments to future work to address specific concerns associated with the Recommended Plan are listed in **Table 23**.

Table 23: Summary of Environmental Concerns, Mitigation Measures and Commitments to Future Work

Summary of Environmental Concerns, Mitigation Measures and Commitments from this Transportation Environmental Study Report To be Confirmed During Detail Design

Discipline	ID #	Environmental Concern and Potential Impact	Concerned Agencies	ID #	Mitigation, Protection, Monitoring, and Commitments to be carried forward to Detail Design
1.0 Fish and Fish Habitat	1.1	Changes to water quality and quantity due to construction works and alterations to fish and fish habitat.	■ Ontario Ministry of Transportation ■ Ministry of Natural Resources and Forestry ■ Fisheries and Oceans Canada ■ Conservation Authorities	1.1.1	■ An Access Management Plan shall be created to limit access to waterbodies and banks to protect riparian vegetation and to minimize bank disturbance
1.0 Fish and Fish Habitat	1.1	Changes to water quality and quantity due to construction works and alterations to fish and fish habitat.	■ Ontario Ministry of Transportation ■ Ministry of Natural Resources and Forestry ■ Fisheries and Oceans Canada ■ Conservation Authorities	1.1.2	■ In-water work below the high-water mark and work on watercourse banks shall be carried out during the appropriate timing window: – Permitted in-water timing window of July 1 – February 28/29 (i.e., no in-water work is permitted from March 1 – June 30).
1.0 Fish and Fish Habitat	1.1	Changes to water quality and quantity due to construction works and alterations to fish and fish habitat.	■ Ontario Ministry of Transportation ■ Ministry of Natural Resources and Forestry ■ Fisheries and Oceans Canada ■ Conservation Authorities	1.1.3	■ Fish must be removed from isolated in-water work areas prior to the commencement of work. Fish must be safely relocated downstream of the work area in a manner that prevents harm and minimizes stress. Any fish isolated in the work area shall be transferred (using appropriate capture, handling, and release techniques to prevent harm and minimize stress) downstream or away from the construction area. A Licence to Collect Fish for Scientific Purposes shall be obtained prior to the start of any fish relocation works. Fish screens shall be used to avoid entrainment of fish in pumps or hoses.
1.0 Fish and Fish Habitat	1.1	Changes to water quality and quantity due to construction works and alterations to fish and fish habitat.	■ Ontario Ministry of Transportation ■ Ministry of Natural Resources and Forestry ■ Fisheries and Oceans Canada ■ Conservation Authorities	1.1.4	■ The contractor shall develop and implement an Erosion and Sediment Control plan to contain / isolate exposed soils, stockpiled materials, and unstable areas in the work zone to prevent the release of sediment to waterbodies during all phases of the Project. Prior to the removal of Erosion and Sediment Control measures following construction, the work site must be stabilized. Site-specific Erosions and Sediment Control plans shall be developed during Detail Design for each watercourse crossing where work is proposed within 30 metres of a watercourse.
1.0 Fish and Fish Habitat	1.1	Changes to water quality and quantity due to construction works and alterations to fish and fish habitat.	■ Ontario Ministry of Transportation ■ Ministry of Natural Resources and Forestry ■ Fisheries and Oceans Canada ■ Conservation Authorities	1.1.5	■ Design and implement an in-water work area isolation plan to maintain clean flow around the work area where in-water work is proposed. The design shall: – Use only clean materials free of particle matter for temporary cofferdams, – Manage flow withdrawal and discharge to prevent erosion and the release of sediment to a waterbody, and – Ensure work zones are stabilized against high flows at the end of each workday.
1.0 Fish and Fish Habitat	1.1	Changes to water quality and quantity due to construction works and alterations to fish and fish habitat.	■ Ontario Ministry of Transportation ■ Ministry of Natural Resources and Forestry ■ Fisheries and Oceans Canada ■ Conservation Authorities	1.1.6	■ Design and install culverts to prevent the creation of barriers to fish movement and maintain bankfull channel and habitat functions to the extent possible. Where permanent in-water structures are placed in fish habitat, naturalize these areas by placing riverstone below the 2-year high water mark. Design and install in-stream cover to replace or re-instate fish cover removed, altered, or disturbed during construction.
1.0 Fish and Fish Habitat	1.1	Changes to water quality and quantity due to construction works and alterations to fish and fish habitat.	■ Ontario Ministry of Transportation ■ Ministry of Natural Resources and Forestry ■ Fisheries and Oceans Canada ■ Conservation Authorities	1.1.7	■ Design drainage systems to avoid diversion of or otherwise minimize changes in drainage to or from a waterbody (do not divert across waterbody boundaries).

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1.0 Fish and Fish Habitat	1.1	Changes to water quality and quantity due to construction works and alterations to fish and fish habitat.	■ Ontario Ministry of Transportation ■ Ministry of Natural Resources and Forestry ■ Fisheries and Oceans Canada ■ Conservation Authorities	1.1.8	■ Design and plan activities and works in waterbody such that loss or disturbance to aquatic habitat is minimized and sensitive spawning habitats are avoided.
1.0 Fish and Fish Habitat	1.1	Changes to water quality and quantity due to construction works and alterations to fish and fish habitat.	■ Ontario Ministry of Transportation ■ Ministry of Natural Resources and Forestry ■ Fisheries and Oceans Canada ■ Conservation Authorities	1.1.9	■ Design stormwater management measures to manage runoff to waterbody considering discharge (for example velocities to avoid erosion) as well as quality (for example formal stormwater management ponds, enhanced ditches, and filtration).
1.0 Fish and Fish Habitat	1.1	Changes to water quality and quantity due to construction works and alterations to fish and fish habitat.	■ Ontario Ministry of Transportation ■ Ministry of Natural Resources and Forestry ■ Fisheries and Oceans Canada ■ Conservation Authorities	1.1.10	■ Watercourses requiring realignment shall be designed using Natural Channel Design principles in accordance with the Fluvial Geomorphological Assessment that will be completed during Detail Design.
1.0 Fish and Fish Habitat	1.1	Changes to water quality and quantity due to construction works and alterations to fish and fish habitat.	■ Ontario Ministry of Transportation ■ Ministry of Natural Resources and Forestry ■ Fisheries and Oceans Canada ■ Conservation Authorities	1.1.11	■ Design and implement a work area containment plan to isolate all above-water work to prevent the release of sediment or other contaminants to a waterbody. The design shall include regular inspection, repair, removal, and disposal of isolation measures and materials. Work zones shall be clearly delineated before work to avoid unintentional intrusions into nearby natural areas.
1.0 Fish and Fish Habitat	1.1	Changes to water quality and quantity due to construction works and alterations to fish and fish habitat.	■ Ontario Ministry of Transportation ■ Ministry of Natural Resources and Forestry ■ Fisheries and Oceans Canada ■ Conservation Authorities	1.1.12	■ Where possible, organic material barriers (for example fibre roll barrier, sediment log, coir rolls etc.) shall be used in the drainage ditches to mitigate sediment transport.
1.0 Fish and Fish Habitat	1.1	Changes to water quality and quantity due to construction works and alterations to fish and fish habitat.	■ Ontario Ministry of Transportation ■ Ministry of Natural Resources and Forestry ■ Fisheries and Oceans Canada ■ Conservation Authorities	1.1.13	■ Materials used or generated during construction (for example organics, soil, woody debris, temporary stockpiles, construction debris, etc.) shall be stored and managed in a way that prevents the release of these materials to a waterbody. This shall include storing materials a safe distance from a waterbody (for example greater than 30 metres from any watercourse) and implementing isolation measures.
1.0 Fish and Fish Habitat	1.1	Changes to water quality and quantity due to construction works and alterations to fish and fish habitat.	■ Ontario Ministry of Transportation ■ Ministry of Natural Resources and Forestry ■ Fisheries and Oceans Canada ■ Conservation Authorities	1.1.14	■ Dewatering operations shall be managed to prevent erosion or the release of sediment-laden water to a waterbody.
1.0 Fish and Fish Habitat	1.1	Changes to water quality and quantity due to construction works and alterations to fish and fish habitat.	■ Ontario Ministry of Transportation ■ Ministry of Natural Resources and Forestry ■ Fisheries and Oceans Canada ■ Conservation Authorities	1.1.15	■ A Spills Management Plan shall be prepared and shall include materials, instructions, education, and emergency numbers. The plan shall be kept onsite at all times, communicated to work crews, and be properly implemented in the event of accidental spills.

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1.0 Fish and Fish Habitat	1.1	Changes to water quality and quantity due to construction works and alterations to fish and fish habitat.	■ Ontario Ministry of Transportation ■ Ministry of Natural Resources and Forestry ■ Fisheries and Oceans Canada ■ Conservation Authorities	1.1.16	■ Operate, store, and maintain equipment and associated materials in a manner and at a distance that prevents the entry of any deleterious substance from entering a waterbody. Any part of equipment entering the waterbody or operating from the bank shall be clean, free of fluid leaks and in good working condition.
1.0 Fish and Fish Habitat	1.1	Changes to water quality and quantity due to construction works and alterations to fish and fish habitat.	■ Ontario Ministry of Transportation ■ Ministry of Natural Resources and Forestry ■ Fisheries and Oceans Canada ■ Conservation Authorities	1.1.17	■ The contractor shall refer to and incorporate mitigation measures and obtain applicable permits identified in the Wildlife Management Plan, Access Management Plan, Erosion and Sediment Control Plan, Invasive Species Management Plan, and any other management plan that may be developed at a later stage of the Project.
1.0 Fish and Fish Habitat	1.1	Changes to water quality and quantity due to construction works and alterations to fish and fish habitat.	■ Ontario Ministry of Transportation ■ Ministry of Natural Resources and Forestry ■ Fisheries and Oceans Canada ■ Conservation Authorities	1.1.18	■ Stabilize any portion of the bed of a waterbody disturbed during construction to pre-construction conditions (or better). This shall include substrates.
1.0 Fish and Fish Habitat	1.1	Changes to water quality and quantity due to construction works and alterations to fish and fish habitat.	■ Ontario Ministry of Transportation ■ Ministry of Natural Resources and Forestry ■ Fisheries and Oceans Canada ■ Conservation Authorities	1.1.19	■ In-water and near-water work shall be monitored to ensure mitigation measures are properly implemented, functioning, maintained and repaired as needed, and removed following construction.
1.0 Fish and Fish Habitat	1.1	Changes to water quality and quantity due to construction works and alterations to fish and fish habitat.	■ Ontario Ministry of Transportation ■ Ministry of Natural Resources and Forestry ■ Fisheries and Oceans Canada ■ Conservation Authorities	1.1.20	■ Erosion and Sediment Control implementation shall be monitored regularly.
1.0 Fish and Fish Habitat	1.2	Loss of vegetation	■ Ontario Ministry of Transportation ■ Ministry of Natural Resources and Forestry ■ Fisheries and Oceans Canada ■ Conservation Authorities	1.2.1	■ Design and implement vegetation rehabilitation plan following construction to replant riparian vegetation to pre-construction or better condition (for example trees for shade to cool water and provide overhead cover).
1.0 Fish and Fish Habitat	1.2	Loss of vegetation	■ Ontario Ministry of Transportation ■ Ministry of Natural Resources and Forestry ■ Fisheries and Oceans Canada ■ Conservation Authorities	1.2.2	■ Clearing of riparian vegetation shall be kept to a minimum and if removal is necessary use proper clearing techniques and protect retained vegetation. When practical, prune or top the vegetation instead of grubbing / uprooting.
1.0 Fish and Fish Habitat	1.2	Loss of vegetation	■ Ontario Ministry of Transportation ■ Ministry of Natural Resources and Forestry ■ Fisheries and Oceans Canada ■ Conservation Authorities	1.2.3	■ Stabilize and re-vegetate soils exposed or disturbed during construction, including new or cleaned-out ditches.

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1.0 Fish and Fish Habitat	1.2	Loss of vegetation	■ Ontario Ministry of Transportation ■ Ministry of Natural Resources and Forestry ■ Fisheries and Oceans Canada ■ Conservation Authorities	1.2.4	■ Stabilize the banks of a waterbody that have been disturbed during construction to pre-construction conditions or better. This shall include riparian vegetation or stone material, temporary measures, and the avoidance of hard engineering.
1.0 Fish and Fish Habitat	1.2	Loss of vegetation	■ Ontario Ministry of Transportation ■ Ministry of Natural Resources and Forestry ■ Fisheries and Oceans Canada ■ Conservation Authorities	1.2.5	■ Design and install riparian plantings to avoid or minimize encroachment into and/or alteration of bank and bed profile.
1.0 Fish and Fish Habitat	1.3	Fisheries Act Approvals from Fisheries and Oceans Canada	■ Ontario Ministry of Transportation ■ Ministry of Natural Resources and Forestry ■ Fisheries and Oceans Canada ■ Conservation Authorities	1.3.1	■ Should a permit under the Endangered Species Act, Species at Risk Act, or an Authorization under the Fisheries Act be required, the construction and post-construction monitoring shall incorporate all requirements of these approvals.
1.0 Fish and Fish Habitat	1.3	Fisheries Act Approvals from Fisheries and Oceans Canada	■ Ontario Ministry of Transportation ■ Ministry of Natural Resources and Forestry ■ Fisheries and Oceans Canada ■ Conservation Authorities	1.3.2	■ Confirm in Detail Design the need to submit a Request for Review to DFO (stormwater management pond at Book Road East).
2.0 Erosion and Sediment	2.1	Impacts caused by erosion and sedimentation	■ Ontario Ministry of Transportation ■ Ministry of Natural Resources and Forestry ■ Fisheries and Oceans Canada ■ Conservation Authorities	2.1.1	■ An Erosion and Sediment Control Plan will be completed in Detail Design.
3.0 Groundwater	3.1	Impacts to groundwater quality and quantity	■ Ontario Ministry of Transportation ■ Ministry of the Environment, Conservation and Parks ■ Ministry of Natural Resources and Forestry ■ Conservation Authorities ■ Municipalities	3.1.1	■ Minimize disturbance to existing vegetation and grassed slopes where re-grading is required (disturbed areas shall be re-vegetated as quickly as possible after completion of construction activities).
3.0 Groundwater	3.1	Impacts to groundwater quality and quantity	■ Ontario Ministry of Transportation ■ Ministry of the Environment, Conservation and Parks ■ Ministry of Natural Resources and Forestry ■ Conservation Authorities ■ Municipalities	3.1.2	■ Prepare and implement a spill prevention and control management plan as per the Ontario Ministry of Transportation's Best Management Practices.

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3.0 Groundwater	3.1	Impacts to groundwater quality and quantity	■ Ontario Ministry of Transportation ■ Ministry of the Environment, Conservation and Parks ■ Ministry of Natural Resources and Forestry ■ Conservation Authorities ■ Municipalities	3.1.3	■ If excavations and groundwater dewatering are required during the work: – Dewatering activities shall be conducted in accordance with the control procedures as specified in the Ontario Provincial Standard Specification (OPSS) 518 Construction Specification for Control of Water from Dewatering Operations; – As per Ontario Regulation 387/04 (water taking regulation) and Ontario Regulation 63/16 (water taking registration regulation), the dewatering activities will need to be registered as “prescribed activities” on the Environmental Activity and Sector Registry if the amount of water taking exceeds 50 metres cubed per day and is below 400 metres cubed per day. Design and install riparian plantings to avoid or minimize encroachment into and/or alteration of bank and bed profile A Category 3 Permit to Take Water must be obtained from the Ministry of the Environment, Conservation and Parks if the amount of water taken exceeds 400 metres cubed per day. Further site-specific investigations including drilling/installation of groundwater monitoring wells, groundwater and/or soil sampling will be required in support of the hydrogeological assessment in support of the Environmental Activity and Sector Registry registration and/or Category 3 Permit to Take Water applications; and – A door-to-door water well survey will be required to confirm the presence and/or absence of the water wells in the vicinity (500 metre radius) of the dewatering locations to establish baseline conditions. A Groundwater Monitoring and Water Well Protection Program shall be developed by the Dewatering Contractor to monitor and mitigate potential impacts to the water wells in the vicinity of the dewatering locations.
3.0 Groundwater	3.1	Impacts to groundwater quality and quantity	■ Ontario Ministry of Transportation ■ Ministry of the Environment, Conservation and Parks ■ Ministry of Natural Resources and Forestry ■ Conservation Authorities ■ Municipalities	3.1.4	■ Any groundwater monitoring wells or water wells within the Study Area, if no longer in use or in the construction zone, or any other unregistered water wells (if encountered) shall be properly decommissioned as per the Ontario Wells Regulation (R.R.O. 1990, Reg. 903) to avoid the creation of potential pathways for surficial contamination to get to the underlying aquifers.
4.0 Surface Water	4.1	Impacts from erosion and sedimentation	■ Ontario Ministry of Transportation ■ Ministry of the Environment, Conservation and Parks	4.1.1	■ The following recommendations shall be considered when developing the detailed Erosion and Sediment Control Plan: – Minimize erosion potential by implementing effective measures, procedural Best Management Practices, and Stormwater Management Best Management Practices; and – Apply sediment control measures Best Management Practices to prevent off-site sediment release in the event of sediment mobilization.

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4.0 Surface Water	4.1	Impacts from erosion and sedimentation	■ Ontario Ministry of Transportation ■ Ministry of the Environment, Conservation and Parks	4.1.2	■ All areas not subject to active construction shall be top soiled and seeded immediately after completion of such grading; and ■ Immediately following seed application, a straw erosion control blanket (or equivalent) shall be installed on any exposed slopes adjacent to sensitive features. ■ The construction of the erosion control works shall be carefully supervised; ■ Inspection of proposed measures shall be completed after periods of excessive precipitation (for example rainfall depths exceed 15 millimetres); ■ Bi-weekly inspection reports prepared by the engineer responsible for the Project shall be submitted to the contract administrator during construction until the development area has been stabilized; ■ Control features that fail shall be repaired and an evaluation shall be completed to determine whether additional measures are required; and ■ Prior to removal of controls, the contractor, and the engineer responsible for the Project shall conduct a joint inspection of the development area. ■ Conduct a fluvial assessment on all watercourse crossings requiring realignment, new culverts, or extended culvert work in Detail Design. ■ Revisit all culvert locations in Detail Design to assess they are still operational or require resizing or rehabilitation.
4.0 Surface Water	4.2	Impacts to local drainage patterns	■ Ontario Ministry of Transportation ■ Ministry of the Environment, Conservation and Parks	4.2.1	■ As construction proceeds, diversion swales shall be graded where needed along the right-of-way boundaries to intercept drainage from external areas and direct it away from exposed surfaces; ■ Temporary sedimentation traps shall be sized based on 125 cubic metre per hectare of drainage area; ■ All culvert work shall be conducted “in the dry”; ■ All dewatering for culvert installation shall be directed to a sediment / dewatering trap; ■ The locations of sediment / dewatering traps shall be confirmed in the field by the on-site inspector and environmental inspector; ■ Temporary silt fencing shall be installed around sensitive vegetative features and approximately 2 metres from the final toe-of-slope for the roadway embankment widening areas; ■ Rock checks dams shall be provided in roadside ditches. Rock check dams detain runoff and promote sedimentation, and reduce channel flow velocities thereby reducing potential for channel erosion; and ■ Runoff from excavated areas or unvegetated soil will not be permitted to discharge off-site or directly into active or temporary watercourses or any natural areas.
5.0 Terrestrial Ecosystems	5.1	Loss of and/or damage to vegetation, Ecological Land Classification communities and designated natural areas	■ Ministry of Natural Resources and Forestry ■ Ministry of the Environment, Conservation and Parks ■ Conservation Authorities	5.1.1	■ Vegetation removal, grading and soil compaction shall be kept to a minimum. Further analysis of the required limits of work shall be completed during the Detail Design phase of the Project to assess if impacts to certain vegetation communities located within the proposed right-of-way can be avoided.
5.0 Terrestrial Ecosystems	5.1	Loss of and/or damage to vegetation, Ecological Land Classification communities and designated natural areas	■ Ministry of Natural Resources and Forestry ■ Ministry of the Environment, Conservation and Parks ■ Conservation Authorities	5.1.2	■ All planned vegetation removals as identified in the Preliminary Design will occur within Ontario Ministry of Transportation owned lands. However, should anything change, and removals be required outside of the Ontario Ministry of Transportation right-of-way, a tree inventory, an arborist report and a Tree Protection Plan may be required to obtain permits to injure or remove trees beyond the Ontario Ministry of Transportation right-of-way in accordance with applicable municipal by-laws.

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5.0 Terrestrial Ecosystems	5.1	Loss of and/or damage to vegetation, Ecological Land Classification communities and designated natural areas	■ Ministry of Natural Resources and Forestry ■ Ministry of the Environment, Conservation and Parks ■ Conservation Authorities	5.1.3	■ To the extent feasible, affected areas shall be re-seeded and re-vegetated and restored to pre-disturbance conditions, using native species appropriate for the community type disturbed.
5.0 Terrestrial Ecosystems	5.1	Loss of and/or damage to vegetation, Ecological Land Classification communities and designated natural areas	■ Ministry of Natural Resources and Forestry ■ Ministry of the Environment, Conservation and Parks ■ Conservation Authorities	5.1.4	■ Seeded mixes that include common milkweed and native flowering plants shall be used to rehabilitate or restore areas of herbaceous vegetation temporarily disturbed during proposed works.
5.0 Terrestrial Ecosystems	5.1	Loss of and/or damage to vegetation, Ecological Land Classification communities and designated natural areas	■ Ministry of Natural Resources and Forestry ■ Ministry of the Environment, Conservation and Parks ■ Conservation Authorities	5.1.5	■ Construction material shall be stored within an authorized location (which will be identified in Detail Design), and any soil stockpiles shall be located within a suitable sediment fenced and protected location.
5.0 Terrestrial Ecosystems	5.1	Loss of and/or damage to vegetation, Ecological Land Classification communities and designated natural areas	■ Ministry of Natural Resources and Forestry ■ Ministry of the Environment, Conservation and Parks ■ Conservation Authorities	5.1.6	■ If stockpiles of gravel and sandy substrates are required during the active turtle season (April 1 to October 15), turtle exclusion fencing shall be installed in accordance with the reptile and amphibian exclusion fencing best management practices around stockpiles prior to April 1 or immediately after stockpile created if after April 1.
5.0 Terrestrial Ecosystems	5.1	Loss of and/or damage to vegetation, Ecological Land Classification communities and designated natural areas	■ Ministry of Natural Resources and Forestry ■ Ministry of the Environment, Conservation and Parks ■ Conservation Authorities	5.1.7	■ All works within 30 metres of a waterbody shall: – Site isolation measures (for example cofferdams, turbidity curtains) shall be installed prior to any in-water works – All disturbed areas shall be immediately restored after a disturbance or upon completion o the work – All contaminants, building materials, waste materials, and stockpiles shall be managed in a way that prevents them from entering a waterbody – All in-water works and mitigation measures for fish and fish habitat, including Erosion and Sediment Control, is covered under the Fish and Fish Habitat Existing Conditions and Impact Assessment Report
5.0 Terrestrial Ecosystems	5.1	Loss of and/or damage to vegetation, Ecological Land Classification communities and designated natural areas	■ Ministry of Natural Resources and Forestry ■ Ministry of the Environment, Conservation and Parks ■ Conservation Authorities	5.1.8	■ Temporary Erosion and Sediment Control measures shall be installed during construction in accordance with the Erosion and Sediment Control plan (to be developed in Detail Design).
5.0 Terrestrial Ecosystems	5.1	Loss of and/or damage to vegetation, Ecological Land Classification communities and designated natural areas	■ Ministry of Natural Resources and Forestry ■ Ministry of the Environment, Conservation and Parks ■ Conservation Authorities	5.1.9	■ Erosion and Sediment Control measures shall be installed along the construction footprint within 30 metres of any wetland.

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5.0 Terrestrial Ecosystems	5.1	Loss of and/or damage to vegetation, Ecological Land Classification communities and designated natural areas	■ Ministry of Natural Resources and Forestry ■ Ministry of the Environment, Conservation and Parks ■ Conservation Authorities	5.1.10	■ Where dewatering is required: Temporary Erosion and Sediment Control measures shall be applied.
5.0 Terrestrial Ecosystems	5.1	Loss of and/or damage to vegetation, Ecological Land Classification communities and designated natural areas	■ Ministry of Natural Resources and Forestry ■ Ministry of the Environment, Conservation and Parks ■ Conservation Authorities	5.1.11	■ Water from dewatering operations shall be directed to a sediment control measure and/or a discharge area 30 metres away from waterbodies or as far away as practicable from the top of the bank of any waterbody, prior to discharge to the natural environment.
5.0 Terrestrial Ecosystems	5.1	Loss of and/or damage to vegetation, Ecological Land Classification communities and designated natural areas	■ Ministry of Natural Resources and Forestry ■ Ministry of the Environment, Conservation and Parks ■ Conservation Authorities	5.1.12	■ The discharge of water to the natural environment shall not be directed across pavements, curb and gutter or similar hard surfaces.
5.0 Terrestrial Ecosystems	5.1	Loss of and/or damage to vegetation, Ecological Land Classification communities and designated natural areas	■ Ministry of Natural Resources and Forestry ■ Ministry of the Environment, Conservation and Parks ■ Conservation Authorities	5.1.13	■ Dewatering works shall be monitored daily for impacts such as settlement and erosion or as per the Permit-to-Take-Water requirements.
5.0 Terrestrial Ecosystems	5.1	Loss of and/or damage to vegetation, Ecological Land Classification communities and designated natural areas	■ Ministry of Natural Resources and Forestry ■ Ministry of the Environment, Conservation and Parks ■ Conservation Authorities	5.1.14	■ The need for additional plans (for example wildlife management, wildlife monitoring, ecological restoration, environmental management, Invasive Species management, road salting) to support the proposed works shall be determined during Detail Design.
5.0 Terrestrial Ecosystems	5.2	Disturbance or displacement of Species at Risk and Species at Risk habitat	■ Ministry of Natural Resources and Forestry ■ Ministry of the Environment, Conservation and Parks ■ Conservation Authorities	5.2.1	■ Avoid or minimize the extent possible vegetation removal within treed communities that provide confirmed butternut habitat and any confirmed habitat for other tree Species at Risk, bat Species at Risk and Red-headed Woodpecker. Additional targeted species surveys are recommended at Detail Design.
5.0 Terrestrial Ecosystems	5.2	Disturbance or displacement of Species at Risk and Species at Risk habitat	■ Ministry of Natural Resources and Forestry ■ Ministry of the Environment, Conservation and Parks ■ Conservation Authorities	5.2.2	■ All vegetation removal within any confirmed bat Species at Risk habitat shall occur outside of the bat roosting season between April 1 and September 30 and can only proceed upon confirmation from the Ministry of the Environment, Conservation and Parks as an authorization under the Endangered Species Act may be required.
5.0 Terrestrial Ecosystems	5.2	Disturbance or displacement of Species at Risk and Species at Risk habitat	■ Ministry of Natural Resources and Forestry ■ Ministry of the Environment, Conservation and Parks ■ Conservation Authorities	5.2.3	■ Avoid or minimize the extent possible vegetation removal within any confirmed Bobolink and Eastern Meadowlark Habitat. If impacts to Bobolink and Eastern Meadowlark habitat cannot be avoided, authorization under the O. Reg. 830/21 of the Endangered Species Act may be required. Additional targeted species surveys within candidate habitat are recommended at Detail Design.

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5.0 Terrestrial Ecosystems	5.2	Disturbance or displacement of Species at Risk and Species at Risk habitat	■ Ministry of Natural Resources and Forestry ■ Ministry of the Environment, Conservation and Parks ■ Conservation Authorities	5.2.4	■ Additional mitigation specific to Species at Risk will be confirmed through consultation with the Ministry of the Environment, Conservation and Parks, and permitting processes.
5.0 Terrestrial Ecosystems	5.3	Introduction or spread of invasive species	■ Ministry of Natural Resources and Forestry ■ Ministry of the Environment, Conservation and Parks ■ Conservation Authorities	5.3.1	■ All machinery, construction equipment and vehicles shall be washed prior to leaving the construction site in order to prevent the spread of invasive species to other locations.
5.0 Terrestrial Ecosystems	5.4	Disturbance or displacement of migratory birds and destruction of their nests	■ Ministry of Natural Resources and Forestry ■ Ministry of the Environment, Conservation and Parks ■ Conservation Authorities	5.4.1	■ Migratory Bird Protection: – Schedule vegetation removal to occur outside of the overall bird nesting period of April 1 to August 31 to avoid disturbance to breeding migratory birds including Species at Risk and/or damage/destruction of their nests. If vegetation removal must occur within this time period, active nest searches must be conducted prior to vegetation removal by a qualified biologist within 'simple habitats' (e.g., manicured lawn) or if minor vegetation clearing is required, to ensure that no active nests of breeding migratory birds or bird Species at Risk are destroyed, in order to prevent contravention of the Migratory Birds Convention Act and/or the Endangered Species Act – Migratory Birds Convention Act protected birds (for example Eastern Phoebe, Barn Swallow and Cliff Swallow) were observed nesting under structures likely to be affected by construction. As such, it is recommended that they be examined to confirm the presence or absence of migratory bird nests the year prior to construction. If birds are observed nesting in, under or on the structure prior to or during rehabilitation or replacement, a qualified biologist should be consulted to determine the appropriate steps taken to reduce impacts to wildlife and avoid a potential contravention of the Migratory Birds Convention Act. Such measures may include the installation of bird exclusion measures in accordance with *Best Management Practices for Excluding Barn Swallows and Chimney Swifts from Buildings and Structures*

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5.0 Terrestrial Ecosystems	5.5	Wildlife mortality through construction or vehicle collisions	■ Ministry of Natural Resources and Forestry ■ Ministry of the Environment, Conservation and Parks ■ Conservation Authorities	5.5.1	■ Review history of wildlife and vehicle collisions within the corridor and consider the need for wildlife mitigation (e.g., fencing, signage) in Detail Design. The following mitigation measures are to be considered in Detail Design: – **Wildlife Exclusion Fencing –** Permanent Wildlife Exclusion Fencing shall be considered along the Highway 6 right-of-way where there is opportunity for mammals and herpetofauna to enter the right-of-way. Particular consideration shall be given to the Stratum 2 deer yard areas. Additionally, jump-outs are recommended at approximately 1.4-kilometre intervals to ensure that wildlife trapped within the right-of-way are able to exit. Wildlife is likely to experience fence-end effects at the limits of the Study Area, wherein wildlife attempting to cross the right-of-way will walk along the fence and cross where the fence ends. This may result in an increase in wildlife crossing at the limits of the Study Area. To mitigate end-effects, it is recommended that fence ends angle away from the right-of-way for a distance up to 100 metres. – **Ecopassages –** Where possible in Detail Design culverts shall be considered to provide openness ratios that would allow for the passage of herpetofauna and/or small mammals specifically in culverts connecting wetland areas or areas of observed wildlife movement. Ecopassages that are within a fisheries watercourse will need to consider that there are no adverse impacts to fish or fish habitat. An openness ratio of 0.4 would permit usage by medium-sized mammals, while the minimum openness ratio to be considered shall be 0.25, which would permit usage by reptiles such as turtles. Other characteristics to consider in Detail Design for culverts that are considered for ecopassages during Detail Design phase include the following: - Around the culvert structure, avoid the use of rip-rap or sharp rock protection and ensure areas on both sides of the watercourse provide substrate materials conducive to animal movement, where possible, - If rip-rap must be used, fill the interstitial space with small materials which would provide appropriate footing for wildlife, - Include natural substrates within the structure, - Provide suitable cover elements adjacent to the structure (for example retained or planted vegetation) that can facilitate wildlife use of the structures (for example cover/shelter on route to structure) while not blocking the structure entrance, - Wherever possible, ensure that entrance and exits to the structures are reasonably level (for example no major grade changes) to provide an unimpeded view through the structure and habitat beyond, - Ensure that the elevation and slope of the structure does not result in flooding, - Remove or reduce potential predator perches (for example ledges) to the extent possible, - Avoid artificial light sources near the entrances/exit of the wildlife passage, - Any landscaping and erosion control materials required shall not include materials known to accidentally entrap snakes or fish; and - Restore adjacent vegetation areas disturbed for construction access using native species.
5.0 Terrestrial Ecosystems	5.6	Disturbance or displacement of wildlife	■ Ministry of Natural Resources and Forestry ■ Ministry of the Environment, Conservation and Parks ■ Conservation Authorities	5.6.1	■ For areas adjacent to natural heritage features (for example woodlands and wetlands) conduct construction activities during daylights hours for increased visibility (for example avoid wildlife strikes) and to avoid light pollution effects during the night, whenever possible.

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6.0 Land Use and Property	6.1	Impacts to private property	■ Ontario Ministry of Transportation ■ Municipalities	6.1.1	■ Property impacts will be confirmed during the subsequent Detail Design phase and compensation will be provided at market value, which is determined at the time of purchase by a property appraisal report.
6.0 Land Use and Property	6.2	Impacts to property access	■ Ontario Ministry of Transportation ■ Municipalities	6.2.1	■ Safe access to the commercial and private entrances shall be maintained at all times during construction.
6.0 Land Use and Property	6.2	Impacts to property access	■ Ontario Ministry of Transportation ■ Municipalities	6.2.2	■ If there are impacts to signs, vegetation, landscaping, or driveways of any of the commercial, private, or municipal properties, the area of impact shall be returned to the conditions of the land prior to construction or better. ■ Based on the Recommended Plan for the interim 4-laning of Highway 6 South, access to properties at the Highway 6 South / Upper James Street intersection will be maintained; however, restricted to right in / right out turning movements due to enhancements to safety and design of the intersection. Consultation with affected property owners and a further review of this intersection design and associated property access will be undertaken during Detail Design.
7.0 Airport	7.1	Impacts to aviation	■ Ontario Ministry of Transportation ■ NAV CANADA	7.1.1	■ Additional aeronautical impact assessment(s) is / are recommended to evaluate the final proposed design as well as construction activities and temporary obstacles for potential impact on the airport, and assessment of Detail Design to ensure compliance with Airport Zoning Regulations as well as requirements for obstacle marking and lighting in accordance with the Canadian Aviation Regulations. ■ The Ontario Ministry of Transportation shall continue to consult with NAV CANADA and obtain a Land Use permit for evaluation of potential impacts to published instrument flight procedures for the John C. Munro Hamilton International Airport.
7.0 Airport	7.1	Impacts to aviation	■ Ontario Ministry of Transportation ■ Transport Canada	7.1.2	■ The Ontario Ministry of Transportation shall continue to consult with Transport Canada Civil Aviation and obtain their acceptance and direction for obstacle marking and lighting prior to the start of construction. Timely notification to Transport Canada is required prior to use of cranes, concrete pumps, or similar construction equipment that may pose a threat to aviation safety. Transport Canada will also provide confirmation on the requirements for marking and lighting of obstacles that present a hazard to aviation.
7.0 Airport	7.1	Impacts to aviation	■ Ontario Ministry of Transportation ■ John C. Munro Hamilton International Airport	7.1.3	■ The Ontario Ministry of Transportation shall continue to consult with the John C. Munro Hamilton International Airport to ensure that any changes to the airport and / or any updates to the Master Plan is taken into consideration at Detail Design.
8.0 Agriculture	8.1	Impacts to Prime Agricultural Land / Agricultural Operations	■ Ontario Ministry of Transportation ■ Ontario Ministry of Agriculture, Food and Rural Affairs	8.1.1	■ The use of berms, vegetated features, or fencing, where feasible, between the different types and intensities of land uses to reduce the potential for trespassing and potential vandalism. These types of buffers reduce impacts by preventing trespassing and associated problems such as litter and vandalism.
8.0 Agriculture	8.1	Impacts to Prime Agricultural Land / Agricultural Operations	■ Ontario Ministry of Transportation ■ Ontario Ministry of Agriculture, Food and Rural Affairs	8.1.2	■ The use of buffers between agriculture and transportation/urban uses may combine a separation of uses, vegetation/plantings, windbreaks, and berms. Vegetated buffers shall include the use of deciduous and coniferous plants, with foliage from base to crown to mitigate against dust, light trespass, and litter.
8.0 Agriculture	8.1	Impacts to Prime Agricultural Land / Agricultural Operations	■ Ontario Ministry of Transportation ■ Ontario Ministry of Agriculture, Food and Rural Affairs	8.1.3	■ The use of salt management plans to reduce the amount of salt required for de-icing (liquid de-icers, broad casting, and selective broad casting).

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8.0 Agriculture	8.1	Impacts to Prime Agricultural Land / Agricultural Operations	■ Ontario Ministry of Transportation ■ Ontario Ministry of Agriculture, Food and Rural Affairs	8.1.4	■ The use of plantings / vegetation as screens and buffers to reduce visual impacts. Consideration of plantings/vegetation barriers within the Ontario Ministry of Transportation right-of-way (as to not impact additional agricultural lands) as visual screening where appropriate.
8.0 Agriculture	8.1	Impacts to Prime Agricultural Land / Agricultural Operations	■ Ontario Ministry of Transportation ■ Ontario Ministry of Agriculture, Food and Rural Affairs	8.1.5	■ Design new structures and side road improvements to be compatible with farm equipment.
8.0 Agriculture	8.1	Impacts to Prime Agricultural Land / Agricultural Operations	■ Ontario Ministry of Transportation ■ Ontario Ministry of Agriculture, Food and Rural Affairs	8.1.6	■ Further assessment of potential impacts to existing groundwater and surface water monitoring and providing new well or water access to those potentially impacted by groundwater disruption in future stages of the Project.
8.0 Agriculture	8.1	Impacts to Prime Agricultural Land / Agricultural Operations	■ Ontario Ministry of Transportation ■ Ontario Ministry of Agriculture, Food and Rural Affairs	8.1.7	■ Restore tile drainage systems in the Secondary Study Area that may be impacted by the widening of Highway 6 South (as necessary).
8.0 Agriculture	8.1	Impacts to Prime Agricultural Land / Agricultural Operations	■ Ontario Ministry of Transportation ■ Ontario Ministry of Agriculture, Food and Rural Affairs	8.1.8	■ Restore impacts to irrigation systems (as necessary).
8.0 Agriculture	8.1	Impacts to Prime Agricultural Land / Agricultural Operations	■ Ontario Ministry of Transportation ■ Ontario Ministry of Agriculture, Food and Rural Affairs	8.1.9	■ Create a traffic plan that identifies closures and open routes to minimize impacts to local traffic during construction.
8.0 Agriculture	8.1	Impacts to Prime Agricultural Land / Agricultural Operations	■ Ontario Ministry of Transportation ■ Ontario Ministry of Agriculture, Food and Rural Affairs	8.1.10	■ Maintain local roads to allow access for the movement of oversized agricultural equipment.
8.0 Agriculture	8.1	Impacts to Prime Agricultural Land / Agricultural Operations	■ Ontario Ministry of Transportation ■ Ontario Ministry of Agriculture, Food and Rural Affairs	8.1.11	■ Due to the locations and numbers of water wells in the Prime Agricultural Study Area and the Secondary Study Area, it will be important to either preserve the existing wells, or properly engineer the closing / capping of any water well, where necessary, to prevent potential groundwater contamination.
8.0 Agriculture	8.1	Impacts to Prime Agricultural Land / Agricultural Operations	■ Ontario Ministry of Transportation ■ Ontario Ministry of Agriculture, Food and Rural Affairs	8.1.12	■ Field entrances and farm accesses impacted by the Recommended Plan will be relocated and/or accommodated to the extent possible. Impacts will be confirmed at the Detail Design stage and relocation, or accommodation of existing accesses will be reviewed in consultation with the municipality and the property owner.
8.0 Agriculture	8.1	Impacts to Prime Agricultural Land / Agricultural Operations	■ Ontario Ministry of Transportation ■ Ontario Ministry of Agriculture, Food and Rural Affairs	8.1.13	■ The Highway 6 South corridor has been designed to be a controlled access freeway with full access to and from Highway 6 South from Book Road and Airport Connection Road interchanges. Similar to Highway 403 and for safety reasons, the Ministry's policies for a controlled access freeway are applicable to the Highway 6 South corridor as it pertains to access for vehicles. For farm vehicles currently using Highway 6 South for access, the possibility of providing an alternative access from an adjacent local road will be considered in consultation with the property owner and the municipality in Detail Design.
8.0 Agriculture	8.1	Impacts to Prime Agricultural Land / Agricultural Operations	■ Ontario Ministry of Transportation ■ Ontario Ministry of Agriculture, Food and Rural Affairs	8.1.14	■ The Ontario Ministry of Transportation will provide appropriate compensation to impacted landowners including property buyout, property exchange and purchase of landlocked parcels where necessary.

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9.0 Contaminated Property	9.1	Potential contamination of soil and water	■ Ontario Ministry of Transportation ■ Ministry of the Environment, Conservation and Parks	9.1.1	■ Further environmental studies / investigations of those “high” and “medium” properties to be directly impacted by interim and long-term Highway 6 South improvements from Highway 403 to Upper James Street are recommended to confirm the environmental conditions on those lands in support of property acquisition, environmental due diligence, road construction and management of surplus / excess soil / materials. These studies / investigations may include Phase One Environmental Site Assessments and Phase Two Environmental Site Assessments.
10.0 Noise	10.1	Temporary increase in noise levels during construction	■ Ontario Ministry of Transportation ■ Ministry of the Environment, Conservation and Parks ■ Municipalities	10.1.1	■ Consider constraints on construction noise with respect to the City of Hamilton noise control By-laws. ■ Submit a Notice of Works letter to the City in advance of the works, which will allow the City to notify area residents through the local councillor.
10.0 Noise	10.1	Temporary increase in noise levels during construction	■ Ontario Ministry of Transportation ■ Ministry of the Environment, Conservation and Parks ■ Municipalities	10.1.2	■ Equipment shall comply with the sound emission standards for construction equipment outlined in Ministry of Environment, Conservation and Parks publications NPC-115 and NPC-118 (contractor to confirm latest version by contacting the Ministry of the Environment, Conservation and Parks[4]), which are the following: – NPC-115: Construction Equipment – NPC-118: Motorized Conveyances
10.0 Noise	10.1	Temporary increase in noise levels during construction	■ Ontario Ministry of Transportation ■ Ministry of the Environment, Conservation and Parks ■ Municipalities	10.1.3	■ Where feasible, equipment with broadband backup alarms instead of tonal backup alarms / beepers shall be utilized.
10.0 Noise	10.1	Temporary increase in noise levels during construction	■ Ontario Ministry of Transportation ■ Ministry of the Environment, Conservation and Parks ■ Municipalities	10.1.4	■ Equipment shall be maintained in an operating condition that prevents unnecessary noise, including but not limited to non-defective muffler systems, properly secured components, and the lubrication of moving parts.
10.0 Noise	10.1	Temporary increase in noise levels during construction	■ Ontario Ministry of Transportation ■ Ministry of the Environment, Conservation and Parks ■ Municipalities	10.1.5	■ Idling of equipment shall be restricted to the minimum necessary to perform the specified work.
10.0 Noise	10.1	Temporary increase in noise levels during construction	■ Ontario Ministry of Transportation ■ Ministry of the Environment, Conservation and Parks ■ Municipalities	10.1.6	■ Stationary equipment shall be located as far away from sensitive locations as feasible.
10.0 Noise	10.1	Temporary increase in noise levels during construction	■ Ontario Ministry of Transportation ■ Ministry of the Environment, Conservation and Parks ■ Municipalities	10.1.7	■ Setup a noise complaint process in accordance with the Ontario Ministry of Transportation’s Environmental Guide for Noise.
10.0 Noise	10.1	Temporary increase in noise levels during construction	■ Ontario Ministry of Transportation ■ Ministry of the Environment, Conservation and Parks ■ Municipalities	10.1.8	■ Investigate and address noise complaints in accordance with the Guide.

4. Available from the Ontario Ministry of Environment, Conservation and Parks – Client Services and Information Branch or Environmental Assessment and Permissions Branch, Phone: 416-314-8001 or 1-800-461-6290

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10.0 Noise	10.1	Temporary increase in noise levels during construction	■ Ontario Ministry of Transportation ■ Ministry of the Environment, Conservation and Parks ■ Municipalities	10.1.9	■ Consider conducting a more detailed construction noise study as construction methods further develop.
10.0 Noise	10.1	Temporary increase in noise levels during construction	■ Ontario Ministry of Transportation ■ Ministry of the Environment, Conservation and Parks ■ Municipalities	10.1.10	■ Minimize nighttime construction where possible.
10.0 Noise	10.1	Temporary increase in noise levels during construction	■ Ontario Ministry of Transportation ■ Ministry of the Environment, Conservation and Parks ■ Municipalities	10.1.11	■ Use site layout where possible to screen nearby noise sensitive areas from loud construction activities, and where possible orient equipment noise emissions away from noise sensitive areas.
10.0 Noise	10.1	Temporary increase in noise levels during construction	■ Ontario Ministry of Transportation ■ Ministry of the Environment, Conservation and Parks ■ Municipalities	10.1.12	■ Minimize the use of impact equipment.
10.0 Noise	10.1	Temporary increase in noise levels during construction	■ Ontario Ministry of Transportation ■ Ministry of the Environment, Conservation and Parks ■ Municipalities	10.1.13	■ Consider lining metal bins / chutes with rubber to minimize sound of falling debris.
10.0 Noise	10.1	Temporary increase in noise levels during construction	■ Ontario Ministry of Transportation ■ Ministry of the Environment, Conservation and Parks ■ Municipalities	10.1.14	■ Consider the use of localized mobile noise screens.
10.0 Noise	10.1	Temporary increase in noise levels during construction	■ Ontario Ministry of Transportation ■ Ministry of the Environment, Conservation and Parks ■ Municipalities	10.1.15	■ Where multiple construction methods are available, consider using method with the lowest noise emissions.
11.0 Air Quality	11.1	Increased contaminants and particulate as a result of highway operation	■ Ontario Ministry of Transportation ■ Ministry of the Environment, Conservation and Parks	11.1.1	■ Implementation of vegetation (such as plantings through screening and/or barriers) within the Study Area.
11.0 Air Quality	11.1	Short term effects of construction operations on adjacent sensitive receivers (residences, flora, and fauna)	■ Ontario Ministry of Transportation ■ Ministry of the Environment, Conservation and Parks	11.1.2	■ Mitigation to address impacts of air quality during construction of the Project will be identified in Detail Design.
12.0 Climate Change	12.1	Impacts related to Climate Change	■ Ontario Ministry of Transportation ■ Ministry of the Environment, Conservation and Parks	12.1.1	■ Mitigations for the potential impacts to highway infrastructure and user safety are already incorporated into existing Ontario Ministry of Transportation standards and guidelines. Mitigation measures such as sizing culverts and ditches appropriately to accommodate large precipitation events, shall be reviewed at Detail Design.

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13.0 Landscape and Composition	13.1	Impacts to existing vegetation, salt spray and wind/snow screens	■ Ontario Ministry of Transportation ■ Ministry of the Environment, Conservation and Parks ■ Municipalities	13.1.1	■ Retain as much vegetation where possible, particularly at Benedict Woodlot and in candidate Species at Risk habitat; ■ Plant rows of coniferous trees where required as they act as s screen for wind, salt and snow; ■ Restore the construction disturbance zone with roadside seeding mixes; ■ Interchange plantings at Book Road East and Airport Connection Road; ■ Plant salt resistant vegetation at newly exposed forest edges to protect existing forests from salt spray and wind; and ■ Stabilize slopes where necessary with plantings (for example Butter Road embankments).
14.0 Archaeology	14.1	Archaeological material may be encountered during construction of the proposed Project.	■ Ontario Ministry of Transportation ■ Ministry of Citizenship and Multiculturalism	14.1.1	■ During Detail Design, undertake Stage 2 Archaeological Assessments for areas with archaeological potential that will be impacted by construction activities.
14.0 Archaeology	14.1	Potential impacts to Book-Parkin Cemetery and Ancaster Pet Cemetery	■ Ontario Ministry of Transportation ■ Ministry of Citizenship and Multiculturalism	14.1.2	■ Should changes to design result in impacts to Book-Parkin Cemetery or Ancaster Pet Cemetery the Ontario Ministry of Transportation will undertake additional consultation with the Ontario Ministry of Citizenship and Multiculturism in Detail Design.
15.0 Built Heritage	15.1	Loss of heritage landscapes / structures / resources	■ Ontario Ministry of Transportation ■ Ministry of Citizenship and Multiculturalism ■ Ontario Heritage Trust	15.1.1	■ General mitigation measures and commitments to be confirmed at Detail Design include: – Construction activities shall be suitably planned and undertaken to avoid impacts to potential built heritage resources and cultural heritage landscapes (for example remain within the proposed right-of-way). Suitable mitigation measures during construction are recommended, including establishing no-go zones adjacent to all of the built heritage resources and cultural heritage landscapes and issuing instructions to construction crews in order to prevent impacts to existing structures. – To ensure designated built heritage resources and cultural heritage landscapes within and adjacent to are not adversely indirectly impacted by mechanical vibration during construction, a vibration assessment shall be undertaken. Should this vibration assessment determine that the structures or landscape features within the potential built heritage resources and cultural heritage landscapes will be subject to adverse impacts due to vibration, a vibration monitoring plan shall be prepared and implemented to lessen vibration impacts related to construction. – If the Ontario Ministry of Transportation determines that a property is a provincial heritage property of provincial significance, the Ontario Ministry of Transportation shall obtain the consent of the Minister of Citizenship and Multiculturalism before removing or demolishing buildings or structures on the property, or before transferring the property from provincial control. – Should there be refinements to and / or expansion of the Preliminary Design Alternatives, Qualified Person(s) shall assess if there are any changes in impacts and/or mitigation recommendations to the known or potential built heritage resources and cultural heritage landscapes that have been identified in the Cultural Heritage Resources Assessment Report (for example additional heritage studies). – Should there be refinements to and / or expansion of the Preliminary Design Alternatives, Qualified Person(s) shall assess if there are any changes in impacts and/or mitigation recommendations to the known or potential built heritage resources and cultural heritage landscapes that have been identified in the Cultural Heritage Resources Assessment Report (for example additional heritage studies).

Discipline	ID #	Environmental Concern and Potential Impact	Concerned Agencies	ID #	Mitigation, Protection, Monitoring, and Commitments to be carried forward to Detail Design
16.0 Transportation	16.1	Traffic disruptions and construction staging	■ Ontario Ministry of Transportation ■ Municipalities	16.1.1	■ A construction staging plan will be developed during Detail Design.
16.0 Transportation	16.1	Traffic disruptions and construction staging	■ Ontario Ministry of Transportation ■ Municipalities	16.1.2	■ Consultation with municipalities, emergency services and potentially affected stakeholders regarding the details of traffic disruptions associated with road closures, access restrictions, detour plans and the development of the construction staging plan during the Detail Design stage.
16.0 Transportation and Infrastructure	16.2	Active transportation	■ Ontario Ministry of Transportation ■ Municipalities	16.2.1	■ Continue consultation with the City of Hamilton regarding active transportation in the Study Area as per the plans set forth in the City of Hamilton's Transportation Master Plan. The Recommended Plan at Book Road East is designed to accommodate active transportation with 2.0 metre shoulders and 1.8 metre sidewalk / multi-purpose lanes on both sides of the road.
16.0 Transportation and Infrastructure	16.3	Disruptions / damage to utility infrastructure	■ Ontario Ministry of Transportation ■ Municipalities ■ Utilities	16.3.1	■ All potentially affected utility companies (for example Hydro One, TC Energy, Enbridge Gas, Westover Express and Telecom Communications) will be contacted to develop a utility relocation plan prior to construction during Detail Design.
16.0 Transportation and Infrastructure	16.3	Disruptions / damage to utility infrastructure	■ Ontario Ministry of Transportation ■ Municipalities ■ Utilities	16.3.2	■ If it is necessary to complete utility relocations during construction, the Contractor will be required to co-ordinate the timing of each operation to ensure that they are carried out independently. Special provisions will be included in the contract to address this, and to ensure that care and precautions are taken to safeguard existing utilities from damage.

10. Next Steps

Following the 30-day comment period of the Transportation Environmental Study Report, the Ontario Ministry of Transportation may proceed to Detail Design as outlined in the Ontario Ministry of Transportation Class Environmental Assessment for Provincial Transportation Facilities, amended 2000.

The Detail Design phase will follow through with the commitments made in **Table 16**, **Table 17** and **Table 23** to satisfy the requirements under the Environmental Assessment Act and will advance the recommended Preliminary Design to a refined level and a contract package for construction will also be prepared. Additional field investigations will be completed to provide more data that is specific to the refined design.

Permits and approvals will be obtained during Detail Design. Any mitigation, monitoring or reporting requirements identified through a permit or approval will be implemented and completed through the construction contract requirements.

The construction phase is the implementation of the Project. During construction, the Ontario Ministry of Transportation or Contract Administrator will ensure that the implementation of the mitigation measures and key design features are consistent with the construction contract.

At this time, the timeframe for the Detail Design stage and construction is not known.