

Highway 401 Interchange Improvements at Palace Road

Transportation Environmental Study Report

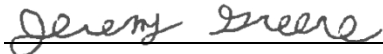
G.W.P 4197-13-00
Class Environmental Assessment and Preliminary Design Study

Ontario Ministry of Transportation

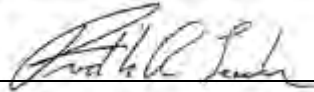
Book 1 of 2 (Main Report)

March 2019

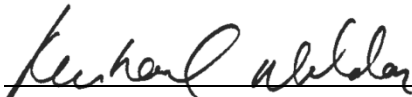
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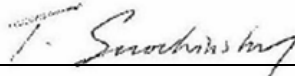
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Executive Summary

The Ontario Ministry of Transportation (MTO) retained AECOM to undertake a Preliminary Design and Class Environmental Assessment (EA) Study for improvements to the Highway 401 interchange at Palace Road (G.W.P. 4197-13-00), located in the Town of Greater Napanee within the County of Lennox and Addington.

Highway 401 (MacDonald-Cartier Freeway) is a Controlled Access Highway under the jurisdiction of MTO. The highway has a four-lane cross-section throughout the study area (two lanes in each direction with a concrete median barrier), and a posted speed limit of 100 km/h. The highway locally connects Napanee to Kingston in the east and Belleville in the west. Highway 401 crosses over Palace Road with twin structures. Palace Road is a two-lane road, designated as 'Rural Arterial (County)' according to the *County of Lennox and Addington Official Plan* (2015) and has a posted speed of 60 km/h within the study area. The Highway 401 interchange at Palace Road has a buttonhook configuration in the eastbound direction and a Parclo B configuration in the westbound direction.

The Highway 401 bridges over Palace Road were originally constructed in 1960. The Highway 401 eastbound and Highway 401 westbound structures underwent major rehabilitation in 1983 and 1988, respectively. A second round of rehabilitation was completed on both structures in 2012, which was limited in scope due to lane and ramp closure restrictions.

The primary focus of this Preliminary Design Environmental Assessment study is to:

- Review the structural requirements (e.g. major rehabilitation or replacement) of the two Palace Road bridges over Highway 401;
- Identify interim and long-term interchange improvements to address geometric and operational concerns;
- Develop a preliminary design including a staging plan to allow the technically preferred structural works and interchange improvements to be implemented efficiently, minimizing construction costs, traffic disruption and future throwaway.

Given the age and condition of the Highway 401 bridges at Palace Road, a major rehabilitation or replacement of the bridges is anticipated to be required within the short-term (5-year) planning horizon of the study. The existing bridges are too narrow to accommodate the necessary major rehabilitation works or a full replacement on their existing alignment without long-term temporary lane closures or staging impacts along Highway 401, partial temporary widening of the bridges for staging purposes, and/or temporary removal of the existing eastbound on-ramp and westbound off-ramp speed change lanes from the bridges.

In addition to the structural issues, this study identified a number of undesirable geometric elements including the following (refer to **Figure 2**):

- Tight horizontal curvature along all ramps, most notably the two off-ramps from Highway 401, which creates operational concerns along the ramps;

- Short length of speed change lanes for the eastbound and westbound off-ramps, which causes quick deceleration along the off-ramps;
- Short length of speed change lanes for the eastbound on-ramp, which causes slow moving traffic to merge with freeway traffic;
- High skew angle of Palace Road through the interchange, which restricts available turning sight distance at the ramp terminal intersections; and,
- Vertical grade of Highway 401 through the interchange rises to the east, which slows down acceleration of trucks and cars entering eastbound Highway 401 from Palace Road.

In order to minimize the traffic impacts during the major structural rehabilitation or replacement, as well as to address the existing and future geometric and traffic operational concerns at the interchange, the development of an ultimate plan for the Palace Road interchange is necessary. Development of an ultimate plan allows for the structural works to be implemented efficiently and in a cost effective manner, minimizing future throw-away while improving traffic operations.

Environmental Assessment Process

This Study has followed the approved planning process for a Group 'B' project under the MTO *Class EA for Provincial Transportation Facilities* (2000). This Transportation Environmental Study Report (TESR) documents the Class EA Process that has been followed for the Study and includes the following:

- A description of the EA process and consultation that was undertaken throughout the study;
- 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 the identified issues;
- The generation, assessment, and evaluation of interchange improvement alternatives;
- Details of the Technically Preferred Preliminary Design Alternative; and,
- Potential impacts associated with the Technically Preferred Alternative and proposed measures to avoid, minimize and mitigate potential impacts.

As required under the Class EA, this TESR is being made available for a 30-day public review period commencing on **March 8, 2019**. If, after consulting with Ministry of Transportation staff, a person (or persons) have serious unresolved concerns that have not been addressed through the Class EA process, they have the right to request the Minister of the Environment, Conservation and Parks (MECP) to issue a Part II Order (i.e. "bump up") for this project. If no Part II Order requests are received by **April 8, 2019**, the project will be considered to have met the requirements of MTO's Class EA and may proceed to the next stages of design and EA process involving the completion of Detail Design, followed by construction.

Consultation

Municipal, agency, public and Indigenous community input was sought upon study commencement and opportunities for additional input were pursued as the design progressed. The Project Team held two Public Information Centres (PICs) to present the evaluation of alternatives and gather feedback, held meetings with municipal staff from the Town of Greater Napanee and the County of Lennox and Addington, presented the project to the Town of Greater Napanee Council, and met with property owners and stakeholders upon request.

Key comments included the following:

- Comments regarding impacts to properties associated with the realignment of the interchange ramps (e.g. headlights from the Highway 401 interchange off-ramp; safety);
- Comments regarding the steep grade for vehicles entering eastbound Highway 401 from Palace Road and the associated difficulties merging with Highway 401 traffic;
- Comments regarding emergency services access and truck traffic associated with construction staging;
- Questions about the timing of construction; and,
- Support for improving the operational safety for traffic merging onto Highway 401.

Details related to the Study and consultation process are provided in **Section 2.3**.

Generation, Assessment and Evaluation of Alternatives

Following the identification of problems and opportunities associated with the Project, the Project Team determined that improvements to the interchange was the preferred solution. The Project Team examined alternatives to address the operational challenges associated with the Highway 401 and Palace Road interchange and to accommodate the structural rehabilitation or replacement requirements. Alternatives were developed and assessed separately for the north and south sides of the interchange.

First, a “Long List” of alternatives to reflect the ultimate interchange configuration and address the structural needs was developed by the Project Team and presented at PIC #1. The Long List was subjected to a screening-level qualitative assessment, which led to the identification of a “Short List” of alternatives. The Short List of alternatives was then evaluated applying a weighted score arithmetic evaluation system to a set of criteria. A weighted score arithmetic evaluation system was applied to a set of criteria to select the Technically Preferred Preliminary Design Alternatives for the north side and south side of the interchange. Details related to the generation, assessment and evaluation of alternatives are provided in **Section 5**.

The Technically Preferred Preliminary Design Alternatives

Based on the outcome of the evaluation, the long term Technically Preferred Preliminary Design Alternative includes the realignment of Palace Road to the west with

replacement of the existing structures with a new structure carrying Palace Road traffic over Highway 401 (refer to **Section 6** for further details and **Appendix A** for full plan). The recommended interchange improvements generally include the following:

- Reconfiguration of the existing eastbound buttonhook ramps (south side) with larger curves and the ramp terminal further south on Palace Road. The existing westbound ramps (north side) will be reconfigured from a Parclo B style to a Parclo A style interchange;
- Realignment of Palace Road to the west of the existing Highway 401 crossing with the construction of a new underpass structure over Highway 401; and
- Removal / backfill of the existing Palace Road structures.

The Technically Preferred Preliminary Design Alternative is illustrated schematically in **Figure E-1**. Additional details of the plan are available in **Section 6** and **Appendix A**.

Opportunities to incorporate interim improvements in advance of the ultimate interchange improvements were considered. However, the existing structures require major rehabilitation or replacement works in the short-term, and the proposed solution to address these short-term structural needs includes a bridge on a new alignment of Palace Road with reconfiguration of the interchange. As such, all aspects of the Technically Preferred Preliminary Design Alternative described above will be implemented in the short-term.

MTO recently undertook a minor rehabilitation of the Napanee River bridge. To avoid impacting the recently rehabilitated structure and widening the bridge over the Napanee River, a modified ramp design including reduced median shoulder width across the bridge was developed and incorporated into the Technically Preferred Alternative. While timelines for a future widening of Highway 401 to 6-lanes through this section are presently unknown, it is anticipated to be required within the 20-25 year planning horizon of the study. At that time, it is anticipated the Napanee River Bridge will require widening or replacement to accommodate a 6-lane Highway 401, and the eastbound off-ramp will be reconstructed at that time to the ultimate configuration. The anticipated ultimate ramp configuration is illustrated in **Figure E-1** and in **Appendix A**.

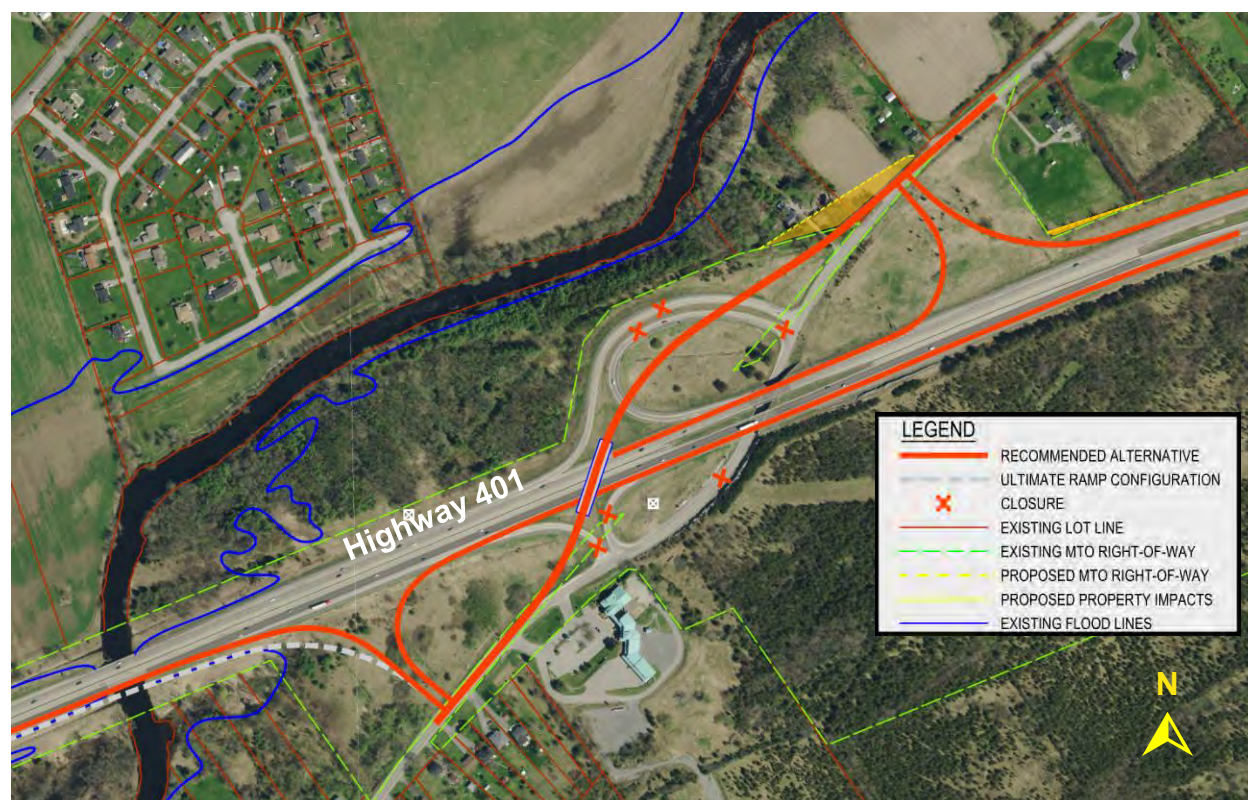
Environmental Assessment (EA) approval for the ultimate ramp configuration, including impacts and mitigation requirements associated with widening of the Napanee River structure, will be subject to a future study.

The Technically Preferred Preliminary Design Alternative will require full buy-out of one residential property, and an additional 0.2 ha of property from two other residential property parcels. While there are no direct property impacts south of Highway 401, there are six (6) residential properties opposite the Highway 401 eastbound ramp terminal intersection that currently access Palace Road. These entrances will be combined onto a service road / entrance located between Palace Road and the residential properties, and landscaping treatments will be provided to have visual shielding between the interchange area and the homes.

There is also a commercial property (Palace Village) in close proximity to Highway 401 on the south side. There are no direct property impacts to this property, although one of

the existing commercial entrances to the property along Palace Road will require closure with the technically preferred alternative.

Figure E-1: Technically Preferred Plan



Traffic Management and Staging during Construction

In general, long-term lane closures along Highway 401 and interchange ramps are not anticipated to be required to complete the interchange improvements. Short term night-time and/or weekend ramp closures are anticipated, as well as single lane closures and occasional short-term closures along Palace Road to complete interchange and structure works. A longer duration closure (1 month) of the eastbound and westbound on-ramps from Palace Road may be necessary to facilitate removal of the existing Palace Road structures. Detailed staging plans will be confirmed and further refined in detail design.

A conceptual construction staging strategy has been developed to complete the bridge replacement and interchange improvement works, and is outlined in **Section 6.9**.

Environmental Issues and Commitments

Following selection of the Technically Preferred Preliminary Design Alternative, the Project Team conducted a more detailed assessment of potential environmental (natural, socio-economic and cultural environments) and transportation impacts. Key environmental impacts associated with the Technically Preferred Alternative include:

- Up to 9.14 ha of vegetation communities will be affected, primarily consisting of lands identified as Cultural Meadow, as well as mixed and deciduous forest. The

impacted vegetation communities include lands considered to contain suitable habitat for up to 10 Species at Risk.

- Portions of the Napanee River and its associated riparian area designated as an Environmental Protection Area within the Town of Greater Napanee Official Plan will be affected by the proposed works, though there will be no structural work at the Highway 401 bridge crossing at the Napanee River and no in-water work.
- Full buy-out of one residential property will be required, as well as acquisition of an additional 0.2 ha of property from two other residential property parcels.
- Closure of one of the two entrances from Palace Road to the commercial property on the south side of Highway 401 will be required.
- One house and barn located on the property requiring full buy-out is considered to have cultural heritage value or interest according to *Ontario Regulation (O. Reg) 9/06*, though neither structure meets the criteria outlined in *O. Reg. 10/06*.
- Occasional night-time and/or weekend interchange ramp closures and single lane closures will be required along Highway 401 and Palace Road.

The impact assessment included the development of proposed measures to avoid, minimize and mitigate the identified potential impacts, which are outlined in **Section 7.0** and summarized in **Table 16**. Provided these mitigation measures and commitments to further work during Detail Design are followed, negative impacts as a result of the Project are anticipated to be minimal.

The Public Record

A copy of this Transportation Environmental Study Report (TESR) is available for review at the following locations:

**County of Lennox and Addington
Public Library - Napanee Branch**

25 River Road,
Napanee, ON K7R 3S6
Telephone: 613-354-2525
Monday to Thursday: 10:00 a.m. to 8:00 p.m.
Friday to Saturday: 10:00 a.m. to 5:00 p.m.

**Town of Greater Napanee
Town Hall**

124 John Street,
Greater Napanee, ON K7R 3L4
Telephone: 613-354-3351
Monday to Friday: 8:30 a.m. to 4:00 p.m.

**Ministry of Transportation,
Eastern Region**

1355 John Counter Boulevard
Kingston, ON K7L 5A3
Telephone: 1-800-267-0295
Monday to Friday: 8:30 a.m. to 5:00 p.m.

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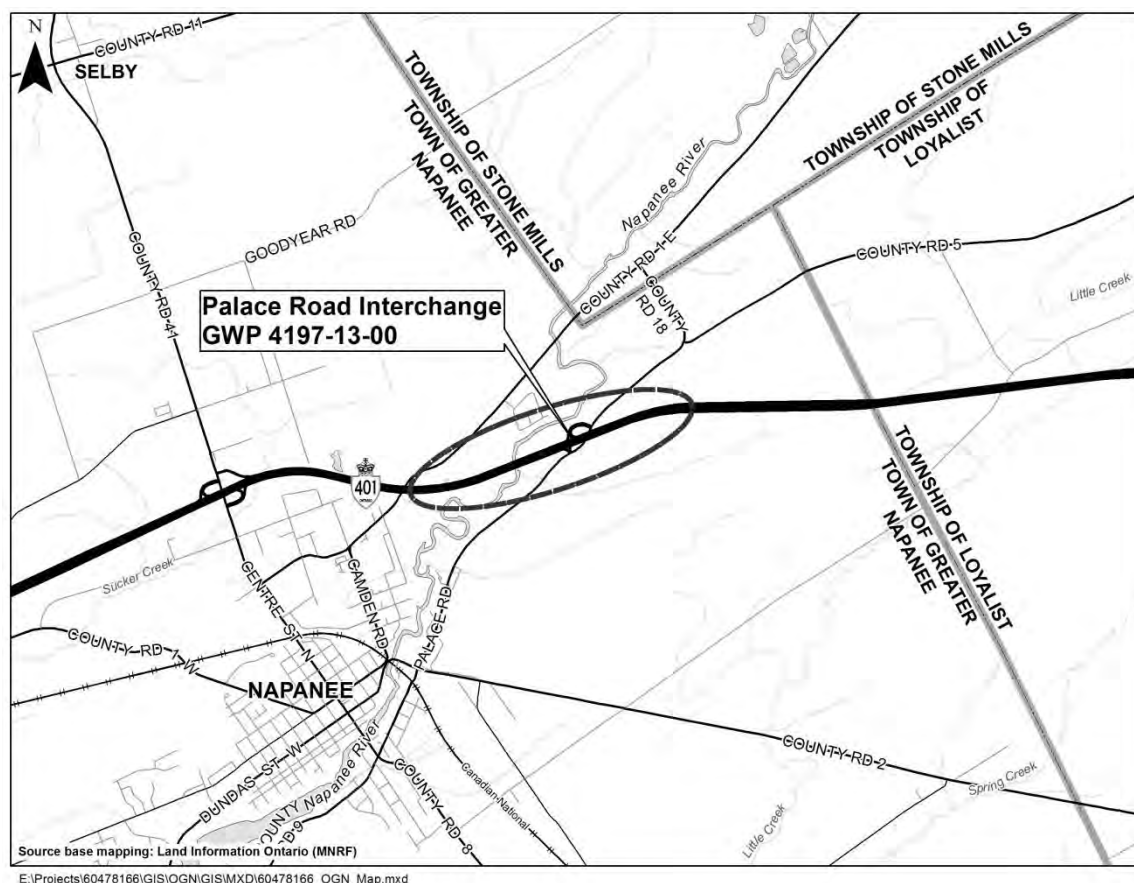
1. Overview of the Undertaking

1.1 Project Summary

1.1.1 Introduction

The Ontario Ministry of Transportation (MTO) retained AECOM to undertake a Preliminary Design and Class Environmental Assessment (EA) Study for improvements to the Highway 401 interchange at Palace Road (G.W.P. 4197-13-00), located in the Town of Greater Napanee within the County of Lennox and Addington (refer to **Figure 1**).

Figure 1: Study Area



This Study followed the requirements of the approved environmental planning process for Group 'B' projects under the MTO *Class Environmental Assessment for Provincial Transportation Facilities* (2000).

Highway 401 (MacDonald-Cartier Freeway) is a Controlled Access Highway under the jurisdiction of MTO. The highway has a four-lane cross-section throughout the study area (two lanes in each direction with a concrete median barrier), and a posted speed limit of 100 km/h. The highway locally connects Napanee to Kingston in the east and Belleville in the west.

Highway 401 crosses over Palace Road with twin structures. Palace Road is a two-lane road, designated as 'Rural Arterial (County)' according to the *County of Lennox and Addington Official Plan* (2015) and has a posted speed of 60 km/h within the study area. The Highway 401 interchange at Palace Road has a buttonhook configuration in the eastbound direction and a Parclo B configuration in the westbound direction.

The Highway 401 bridges over Palace Road were originally constructed in 1960. The Highway 401 eastbound and Highway 401 westbound structures underwent major rehabilitation in 1983 and 1988, respectively. A second round of rehabilitation was completed on both structures in 2012, which was limited in scope due to lane and ramp closure restrictions.

1.1.2 Study Purpose

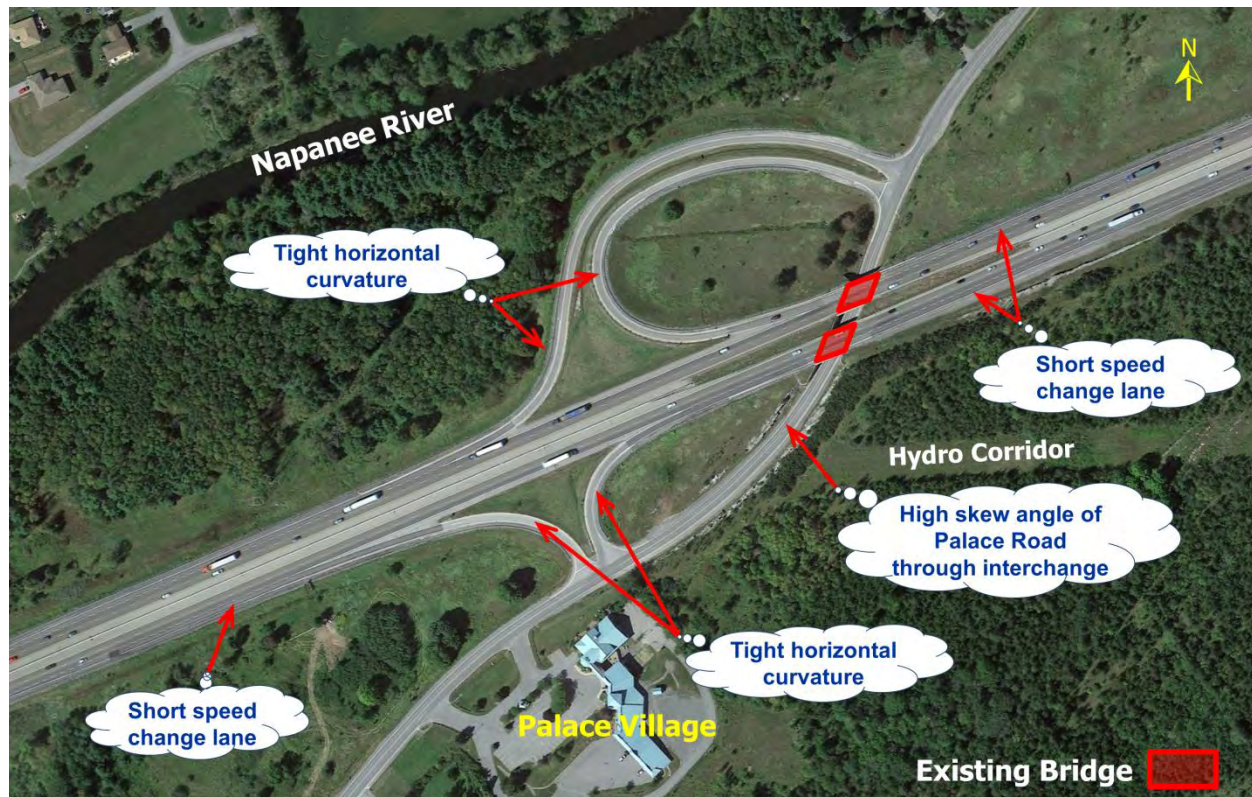
The primary focus of this study was to:

- Review the structural requirements (e.g. major rehabilitation or replacement) of the two Palace Road bridges over Highway 401;
- Identify interim and long-term interchange improvements to address geometric and operational concerns; and,
- Develop a preliminary design including a staging plan to allow the technically preferred structural works and interchange improvements to be implemented efficiently, minimizing construction costs, traffic disruption and future throwaway.

The study identified a number of undesirable geometric elements of concern including (refer to **Figure 2** for a graphic):

- Tight horizontal curvature along all ramps, most notably the two off-ramps from Highway 401, which creates operational concerns along the ramps;
- Short length of speed change lanes for the eastbound and westbound off-ramps, which causes quick deceleration along off-ramps;
- Short length of speed change lanes for the eastbound on-ramp, which causes slow moving traffic to merge with freeway traffic;
- High skew angle of Palace Road through the interchange, which restricts available turning sight distance at the ramp terminal intersections; and,
- Vertical grade of Highway 401 through the interchange rises to the east, which slows down acceleration of trucks and cars entering eastbound Highway 401 from Palace Road.

Figure 2: Overview of Undesirable Geometric Elements or Areas of Concern at the Highway 401 and Palace Road Interchange



Given the age and condition of the Highway 401 bridges at Palace Road, a major rehabilitation or replacement of the bridges is anticipated to be required within the short-term (5-year) planning horizon of the study. As well, the existing bridges are too narrow to accommodate either the necessary major rehabilitation works or a full replacement on their existing alignment without long-term temporary lane closures or staging impacts along Highway 401, partial temporary widening of the bridges for staging purposes, and/or temporary removal of the existing eastbound on-ramp and westbound off-ramp speed change lanes from the bridges.

In order to minimize the traffic impacts during the major rehabilitation or replacement, as well as to address existing and future geometric and traffic operational concerns at the interchange, the development of an ultimate plan for the Palace Road interchange is necessary. Development of the ultimate plan provides for the structural works to be implemented efficiently and in a cost effective manner, minimizing future throw-away while improving traffic operations.

1.1.3 Previous Studies and Recent Works

In 2011, MTO completed an Environmental Screening Document (W.P. 98-99-00 & W.P. 99-99-00) for rehabilitation of the two Palace Road bridges over Highway 401. The work was completed on both structures in 2012 and was limited in scope due to lane and ramp closure restrictions.

In early 2016, this current study was initiated to review the structural requirements of the two Highway 401 bridges over Palace Road, identify improvements to address

geometric and operational concerns, and to develop a preliminary design including a staging plan to allow the technically preferred structural works and interchange improvements to be implemented efficiently, minimizing construction costs, traffic disruption, and future throwaway.

MTO is concurrently undertaking a separate Preliminary Design and Class EA Study for improvements to the Highway 401 interchange at County Road 41 (G.W.P. 4459-04-00), located to the west of this study area.

1.1.4 Consultation

Municipal, agency, public and Indigenous community input was sought upon study commencement and opportunities for additional input were pursued as the design progressed. The Project Team held two Public Information Centres (PICs) to present the evaluation of alternatives and gather feedback, held meetings with municipal staff from the Town of Greater Napanee and the County of Lennox and Addington, presented the project to the Town of Greater Napanee Council, and met with property owners, business owners, and other stakeholders upon request.

Further details on consultation undertaken are available in **Section 2.3** of this TESR.

1.1.5 Evaluation of Alternatives

Following the identification of problems and opportunities associated with the Highway 401 and Palace Road interchange, the Project Team examined alternatives to address the operational challenges associated with the interchange and to accommodate both the short-term and long-term structural rehabilitation or replacement requirements. Alternatives were developed and assessed separately for the north and south sides of the interchange.

First a “long-list” of alternatives was developed and presented at PIC #1. The long-list was subjected to a screening-level qualitative assessment, which led to the identification of a “short-list” of alternatives. The alternatives were then evaluated based on the set of criteria (listed in **Section 5.3**) using a weighted score arithmetic evaluation system to select the Technically Preferred Preliminary Design Alternatives. Further details on the evaluation process are available in **Section 5** of this TESR.

1.1.6 General Description of the Technically Preferred Preliminary Design Alternative

The Technically Preferred Alternative for the Highway 401 interchange at Palace Road includes an upgraded interchange configuration, realignment of Palace Road to the west and replacement of the existing structures with a new structure carrying Palace Road traffic over Highway 401. While timelines for a future potential widening of Highway 401 to 6-lanes through this section are presently unknown, it is anticipated that such a widening would occur within the life span of a replacement structure. As such, the new underpass structure will accommodate a future widening to 6-lanes, and only minor adjustments will be required to the interchange ramps to match the future widened section.

The upgraded interchange will include a combination of Alternatives W-N-2 and W-S-2 (Buttonhook configuration with westerly realignment of Palace Road) as identified in the Short-List Alternative Evaluation. The Technically Preferred Preliminary Design Alternative is illustrated in **Figure 30** and in the preliminary design plates in **Appendix A**. The recommended interchange improvements include the following:

- Reconfiguration of the existing eastbound buttonhook ramps (south side) with larger curves and the ramp terminal further south on Palace Road. The existing westbound ramps (north side) will be reconfigured from a Parclo B style to a Parclo A style interchange;
- Realignment of Palace Road to the west of the existing Highway 401 crossing with the construction of a new underpass structure over Highway 401; and
- Removal / backfill of the existing Palace Road structures.

For further information on the Technically Preferred Preliminary Design Alternative, including details on the structures, foundations, pavement, electrical, utilities, drainage and traffic management and staging refer to **Section 6** and **Appendix A**.

1.2 Purpose of the TESR

This Transportation Environmental Study Report (TESR) documents the Class EA process that was followed for the Study and includes the following:

- A description of the EA process and consultation that was undertaken throughout the study;
- 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 improvement alternatives;
- Details of the Technically Preferred Preliminary Design Alternative; and,
- Potential impacts associated with the Technically Preferred Alternative and proposed measures to avoid, minimize and mitigate potential impacts.

As required under the Class EA, this TESR is being made available to the public, other interested parties and external agencies for a 30-day review period commencing on March 8, 2019 (ending April 8, 2019) at the following three (3) locations:

- The County of Lennox and Addington Public Library – Napanee Branch;
- The Town of Greater Napanee, Town Hall; and
- Ministry of Transportation, Eastern Region.

A “*Notice of Study Completion and TESR Submission*” was placed in the *Napanee Beaver* and *Napanee Guide* newspapers on March 7, 2019 to notify interested parties of the opportunity to review this TESR. Letters were also sent to individuals on the project mailing list on March 1, 2019.

Detailed background information, including supporting study reports, is contained in the environmental study file. The Ministry of Transportation and the AECOM Project Team members are available to discuss this information.

Interested persons are encouraged to review the TESR and provide comments by April 8, 2019. If, after consulting with Ministry of Transportation staff, you have serious unresolved concerns that have not been addressed through the Class EA process, you have the right to request the Minister of the Environment, Conservation and Parks (MECP) to issue a Part II Order (i.e. “bump up”) for this project. Any Part II Order request must be submitted to MECP by April 8, 2019, using a standard form developed by MECP. The standard Part II Order request form is available on the Ontario government Forms Repository website (<http://www.forms.ssb.gov.on.ca/>) and you can find it by searching “Part II Order” on the Repository’s main page. A copy of the completed form and any supporting information must also be forwarded to MTO at their addresses listed in **Table 1**. If no Part II Order requests are received by April 8, 2019, the project will be considered to have met the requirements of MTO’s Class EA and may proceed to the next stages of design and EA process involving the completion of Detail Design, followed by construction.

Comments are being collected to provide and obtain information, and to identify concerns in accordance with the *Class Environmental Assessment for Provincial Transportation Facilities*. This material will be maintained on file for use during the project and may be included in study 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 TESR, please contact the Project Team.

Table 1: Project Team Contact Information

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2. Environmental Assessment Process

2.1 The Ontario Environmental Assessment (EA) Act and Class EA Process

The purpose of Ontario's EA Act is to help protect and conserve Ontario's environment by requiring that projects subject to the Act follow a planning process leading to environmentally sound decision-making. For projects subject to the EA Act, an EA involves identifying and planning for environmental issues and effects prior to implementing a project. The process allows reasonable opportunities for public involvement in the decision-making process of the project. An EA document is prepared by the proponent of the project.

The Class EA process is a planning process approved under the EA Act that provides a streamlined process that must be followed for projects or activities within a defined "class". When the Class EA planning process is adhered to for a project, the requirements of the EA Act are also fulfilled and formal approval under the EA Act is not required. The Class EA 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.

The word "environment" within the EA Act is broadly defined and can include aspects of the natural, social, economic and cultural environments depending on the project in question. The *Class EA for Provincial Transportation Facilities* (2000) outlines the EA process to be followed for specific groups of provincial transportation projects. Project groupings within the Class EA were established for the purposes of consultation, documentation and formal EA challenge (Part II Order or 'bump-up' opportunity). The groups of projects are as follows:

- Group "A" – Projects involving new facilities;
- Group "B" – Projects involving major improvements to existing provincial transportation facilities;
- Group "C" – Projects involving minor improvements to existing provincial transportation facilities; and,
- Group "D" – Activities that involve operation, routine maintenance, administration and miscellaneous work for provincial transportation facilities. These activities are approved under the Environmental Assessment Act subject to compliance with applicable environmental legislation other than the Environmental Assessment Act.

This project is following the *Class EA* process for a Group 'B' project, which generally includes major improvements to existing provincial transportation facilities. Other aspects of the EA process applicable to Group 'B' projects are contained in the *Class EA*.

This Study was completed with a focus on the principles of the Class EA, including but not limited to:

- Transportation engineering principles:

- To provide a safe and effective transportation system while avoiding and minimizing negative environmental effects;
- Environmental protection principles:
 - To conduct the study with an inherent approach of avoiding or minimizing overall environmental impacts through consideration of alternatives;
 - To balance environmental protection considerations with transportation engineering considerations during each stage of the study, recognizing that safety and effectiveness of the transportation system is fundamental to decisions;
 - To recognize that it is seldom possible to satisfy all interests when making the tradeoffs necessary in the EA process, and that no single environmental factor is always “paramount”;
- External consultation principles:
 - To constructively address input received during the consultation process;
 - To provide timely, user-friendly opportunities for input by the public and agencies whose mandates are most directly affected;
 - To make reasonable efforts to resolve concerns;
- Evaluation principles:
 - To complete an evaluation process that is traceable, replicable and understandable by those who may be affected by the decisions;
 - To give due consideration to all relevant factors including transportation engineering and environmental protection;
 - To capitalize on significant transportation engineering opportunities while protecting significant environmental features as much as possible;
- Documentation principles:
 - To document the results of the study to date;
 - To provide an opportunity for public and stakeholders to review the documentation and provide comments;
- Bump-up principles:
 - To provide a notice that outlines the bump-up opportunity of at least 30 days upon formal submission of the TESR; and,
- Environmental clearance principles:
 - To apply the above principles in the Class EA process.

Readers interested in these matters are encouraged to refer to that document, which can be accessed at <http://www.mto.gov.on.ca/english/highway-bridges/pdfs/environmental-assessment-2000.pdf>.

2.2 The Canadian Environmental Assessment Act (CEEA)

In July 2012, the Government of Canada released new regulations required to implement the *Canadian EA Act, 2012 (CEAA 2012)*. The CEAA 2012 establishes a federal EA process focused on major projects that have a greater potential to have significant adverse effects on areas within federal jurisdiction. The types of activities to which the new *Act* applies (“designated projects”) are identified in the regulations. The *Act* requires the proponent of a designated project to submit a description of the project to the Canadian Environmental Assessment Agency (the Agency). Upon receipt of a project description, the Agency has 45 days, including a 20-day public comment period, to determine whether a federal EA is required.

The proposed interchange improvements to Highway 401 at Palace Road were reviewed and the project works are not listed as a “designated project” under the CEAA 2012. Therefore, CEAA requirements do not apply to this undertaking.

2.3 Consultation

Consultation is an integral component of a Group “B” project under the Class EA process, and therefore members of the public, Indigenous communities, municipalities, government agencies, and other stakeholders were engaged at key milestones throughout the study. The following section summarizes the consultation undertaken as part of this study, including key comments received throughout the study. Relevant correspondence including notification material is included in **Appendix F** of this document.

2.3.1 Notice of Study Commencement

A Notice of Study Commencement was published in the following local newspapers to inform the public of this study update on January 21 and January 28, 2016, respectively:

- *Napanee Beaver*; and,
- *Napanee Guide*.

Notification letters advising of the study were also mailed and/or emailed to everyone on the study contact list (60 contacts) which included:

- Indigenous communities;
- Members of Parliament (MPs) and Members of Provincial Parliament (MPPs);
- External government agencies (federal, provincial, and municipal);
- Emergency services;
- Utility services;
- Interest groups; and,
- Members of the public.

2.3.2 Public Information Centres

2.3.2.1 Public Information Centre #1

The first of two Public Information Centres (PIC #1) was held on July 28, 2016 at the Strathcona Paper Centre in Greater Napanee, Ontario. A one-hour preview session was held for municipalities, MPs/MPPs, external agencies, and Indigenous communities in advance of the PIC. The PIC presented and sought input on the following:

- Study area, purpose, and scope;
- Overall process;
- Timing of study activities;
- Previous studies;
- Overview of existing transportation and environmental conditions;
- Problems and opportunities;
- Identification and screening assessment of the long list of alternatives;
- Evaluation of the short list of alternatives – approach and criteria; and,
- Next steps in the study process.

A Notice of PIC #1 was published in the following local newspapers on July 14, 2016 to inform the public of the PIC:

- *Napanee Beaver*, and,
- *Napanee Guide*.

Notification letters advising of the PIC were also mailed and/or emailed to everyone on the study contact list (177 contacts) on July 11, 2016.

A total of 9 individuals attended PIC #1 (including the preview session). No comment sheets were received at the PIC. The Project Team received most comments verbally at the PIC from municipal and emergency services representatives. Feedback received at PIC #1 included the following:

- Comment regarding the steep grade for vehicles entering eastbound Highway 401 from northbound Palace Road and the associated difficulties merging with Highway 401 traffic;
- Comment noting that a lot of drivers use Palace Road to by-pass other traffic (at County Road 41);
- Questions regarding property impacts;
- Questions regarding operational highway noise and if there would be enough change as a result of this study to warrant mitigation;
- Preference for roundabouts;
- Preference for alternatives that realign Palace Road over Highway 401;

- Concerns regarding sightlines at the north ramp terminal turning north (looking south beneath existing Highway 401 bridges; and,
- Requests for copies of the alternatives presented at the PIC.

Copies of the PIC #1 display materials and the PIC Summary Report are available in **Appendix G**.

2.3.2.2 Public Information Centre #2

A second Public Information Centre (PIC #2) was held on November 22, 2017 at the Selby Community Hall in Selby, Ontario. The purpose of PIC #2 was to present the following:

- Purpose of PIC #2;
- Study area, purpose and scope;
- Study process;
- Timing of study activities;
- Study overview and PIC #1;
- Summary of problems and opportunities;
- Generation and evaluation of preliminary design alternatives;
- Overview and summary of the evaluation of the short list of alternatives;
- Conceptual construction staging;
- Other improvements being recommended;
- Proposed mitigation measures and recommendations for further work;
- Next steps in the study process; and,
- Freedom of Information and Protection of Privacy Act.

A Notice of PIC #2 was published in the following local newspapers on November 9, 2017 to inform the public of the PIC:

- *Napanee Beaver*; and,
- *Napanee Guide*.

In order to reach a larger population in the study area who may not have been familiar with the study, a Project brochure was distributed to properties within a 7 km radius of the study area using Canada Post's Neighbourhood Mail service (6,882 brochures) which included similar information to the PIC displays and Project Team contact information for members of the public to submit comments.

Notification letters advising of the PIC were also mailed and/or emailed to everyone on the study contact list (187 contacts) on November 1, 2017.

A total of 20 individuals attended PIC #2 and two (2) comments sheets were received at the PIC. Feedback received at and after PIC #2 included the following:

- Concerns regarding traffic headlights shining into windows of private residences opposite the interchange ramp terminal at the Highway 401 eastbound off-ramp at Palace Road;
- Concerns regarding safety of the Highway 401 eastbound off-ramp at Palace Road being located directly across from residential driveways;
- Questions about driveway access during construction;
- Questions about controlled access highway designation limits and driveway restrictions within these limits;
- General questions about property acquisition;
- Support from the Ontario Provincial Police (OPP) regarding the redesign of the interchange ramps at Palace Road as they felt the changes address a number of operational and safety concerns;
- Request from the OPP to consider design enhancements along Highway 401 eastbound and westbound between County Road 41 and Palace Road where they could park a police car either off the shoulder or in the median to monitor traffic;
- Request from the OPP to be involved in the construction staging discussions at the beginning of the Detail Design process and that they be invited to a pre-construction meeting;
- Request from the OPP that the two interchanges not be under construction at the same time as they each act as emergency detour routes for each other;
- Questions regarding the addition of gates at the ramps for highway closures;
- Request for provision of a queue warning system along Highway 401 during construction;
- Questions about the EA process;
- Questions about timing of construction;
- Questions about a potential municipal bypass of Napanee on the east side of the Town;
- Questions about the County Official Plan;
- Questions about Council and Municipal staff involvement; and,
- Comments about detours during construction putting a stress on Town infrastructure.

Prior to PIC #2, all potentially impacted property owners were sent a letter indicating that their property would be potentially impacted by the recommended plan and that they were invited to attend PIC #2 to meet with the Project Team or could request to meet at another date. The Project Team discussed property impacts with various property owners at the PIC to answer any questions directly relating to their property and discuss the study process.

Copies of the PIC #2 display materials and the PIC Summary Report are available in **Appendix G**.

2.3.3 Permission to Enter

In August 2017, the Project Team sent out Permission to Enter Request letters to numerous properties adjacent to Highway 401 within the study area. The potential property impacts were not known at the time therefore letters were sent to a larger number of properties than where permission was later determined to be required. These letters also functioned as a method to inform the owners of property adjacent to the highway of the study and provide them with a method of contacting the Project Team.

2.3.4 Stakeholder Meetings and Discussions

2.3.4.1 Indigenous Communities

The following Indigenous communities were engaged in the study:

- Aamjiwnaang First Nation;
- Alderville First Nation;
- Beausoleil First Nation;
- Chippewas of Georgina Island First Nation;
- Chippewas of Kettle and Stony Point First Nation;
- Chippewas of Nawash First Nation;
- Chippewas of Rama First Nation;
- Chippewas of Thames First Nation;
- Curve Lake First Nation;
- Hiawatha First Nation;
- M'Chigeeng First Nation;
- Mississaugas of Scugog Island First Nation;
- Mississaugas of New Credit First Nation;
- Mohawks of Akwesasne;
- Mohawks of the Bay of Quinte;
- Métis Nation of Ontario;
- Saugeen First Nation;
- Six Nations of the Grand River Territory;
- Sheguiandah First Nation;
- Walpole Island First Nation;
- Zhiibaahaasing First Nation;
- Ministry of Indigenous Relations and Reconciliation; and,
- Indigenous and Northern Affairs Canada.

The Mohawks of the Bay of Quinte expressed interest in the study and requested to be apprised of study and archaeological documentation available for review.

2.3.4.2 External Agencies and Utility Service Providers

The following external agencies and utility service providers were engaged at key milestones throughout the study (i.e. Study Commencement, existing conditions assessment, PIC #1, PIC #2, and TESR Submission):

- Fisheries and Oceans Canada (DFO);
- Transport Canada;
- Ministry of the Environment, Conservation and Parks (MECP);
- Ministry of Agriculture, Food and Rural Affairs (OMAFRA);
- Ministry of Municipal Affairs and Housing (MAH);
- Ministry of Natural Resources and Forestry (MNRF);
- Ministry of Tourism, Culture and Sport (MTCS);
- Cataraqui Region Conservation Authority (CRCA);
- Quinte Conservation;
- Algonquin & Lakeshore Catholic District School Board;
- Limestone District School Board;
- Tri-Board Student Transportation Services;
- Bell Canada;
- Cogeco;
- Enbridge;
- Hydro One;
- Trans Canada Pipeline Ltd.; and,
- Union Gas.

MNRF was consulted early in the study process as part of the preparation of natural environment existing conditions documentation to obtain project-specific data related to natural sciences, Species at Risk (SAR), and drainage.

The Project Team met with Hydro One via teleconference on November 8, 2017 to discuss potential impacts to the existing Hydro One towers / corridor crossing of Highway 401 through the Palace Road interchange, and general steps for completing the relocation/modification design and construction.

2.3.4.3 Public and Impacted Property Owners

In addition to general notification of study commencement and PICs, impacted property owners and members of the public who expressed interest in the study were consulted. The Project Team sent letters to property owners who were directly impacted by one or

more of the alternatives on September 22, 2016, following PIC #1. The Project Team also discussed the study and study process with those who contacted the Project Team throughout the study. Meetings were held with public stakeholders and potentially impacted property owners upon request.

A number of comments and concerns were raised at and subsequent to PIC #2 regarding the Technically Preferred Preliminary Design Alternative regarding the eastbound exit and entrance ramp on the south side of Highway 401. In particular, concerns expressed by property owners with regards to the realignment of the Highway 401 eastbound ramps included:

- Concerns regarding safety along Palace Road with the off-ramp being located across from residences (i.e. pedestrian safety, children along Palace Road, school buses, driver safety with truck traffic, access to and from driveways along Palace Road);
- Concerns regarding headlight glare (i.e. shine into homes) from vehicles and trucks on the Highway 401 eastbound off-ramp onto Palace Road;
- Concerns regarding noise from the on and off-ramps; and,
- Concerns regarding impacts to re-sale value of the houses, and requests for MTO to purchase the properties as part of the process.

Based on the comments received from landowners, the Project Team initiated a review of the technically preferred ramp configuration on the south side of the highway in an attempt to mitigate the identified concerns. A number of design refinements were considered as part of this review including modifying the angle of the off-ramp approach to Palace Road, shifting the location of the off-ramp, additional landscaping, provision of a shared access road and combined entrances. A letter and plans detailing the refinements that were considered was sent to concerned land owners (included in **Appendix F**), and a follow-up meeting was held on March 12, 2018 to discuss the proposed solutions. At that meeting, the majority of property owners in attendance were not in favour of the presented mitigation, and preferred the existing south ramp terminal and off-ramp remain unchanged from the present condition.

Following the meeting on March 12, 2018, MTO took back the comments received by the property owners and further assessed the concerns of the six residential properties within the interchange area and the location of the new ramp terminal. With the design refinements and landscaping mitigation proposed, and given the horizontal and vertical distance from the houses to the new ramp, it is felt that there would be no direct impacts from headlight glare to the houses. A noise assessment was undertaken and determined that the impacts of the interchange reconfiguration would result in no noticeable change in noise levels, given that the predominant source of traffic noise is from Highway 401. In addition, the Project Team reviewed further refinements to the off-ramp configuration to either shift the ramp north of the location presented at PIC #2, or to maintain the ramp at the existing location. It was determined that neither of these options could be safely accommodated with the proposed Palace Road realignment due to geometric concerns and sub-standard sight-distance.

Given that the Ministry needs to make improvements to the interchange and that these landowners were still very concerned, the Ministry offered to purchase the properties from these six landowners. The Ministry will continue to implement the mitigation offered at the south ramp terminal for future potential home owners in the vicinity. The mitigation will include:

- Service road/entrance onto Palace Road to service all six houses within the interchange area. No other access to Palace Road (from these residential properties) would be allowed. This service entrance may be transferred to be under the jurisdiction of the Town of Greater Napenee (to be determined);
- Landscaping between the service entrance and Palace Road and/or between the houses and the service entrance (to be determined with detail design of the service entrance); and,
- Slight refinement to the ramp terminal intersection location, approximately 10 m to the north.

Section 5.5 includes additional discussion of the refinements that were considered and presents the proposed modifications to the Technically Preferred Alternative.

2.3.4.4 Municipalities and Emergency Services

The Project Team met with the Town of Greater Napenee and the County of Lennox and Addington, and emergency services throughout the Study to discuss the need for the interchange improvements, the evaluation process of the design alternatives (long list and short list), and potential future development within the study area. The Project Team met with staff from the municipalities in advance of both PICs.

The following is a summary of the general feedback received by the municipalities and emergency services:

- Municipal staff agreed with the list of transportation problems that were identified at the interchange;
- Municipal staff noted that pedestrian traffic through the interchange is low. As such, paved shoulders (that could also accommodate cycling) may be sufficient for pedestrians in lieu of a sidewalk;
- Municipal utilities generally end along Palace Road south of the interchange (e.g. water and sewer) and there is no significant reason to extend these utilities to the north, given the limited development north of Highway 401;
- Palace Road through the interchange will likely be re-paved by the County within 5 to 10 years;
- It was agreed that future interchange works by MTO should be coordinated with the necessary pavement works required by the County; and
- The need to accommodate Long Combination Vehicles (LCV) traffic at the interchange is not anticipated.

In addition, the Project Team presented an overview of the Evaluation of Alternatives and the Technically Preferred Preliminary Design Alternative to the Town of Greater

Napanee Council on March 27, 2018. The following is a summary of notable questions and comments raised by Council:

- Comments regarding property owner concerns with the proposed interchange works;
- Inquiries regarding other interchange alternatives that were considered;
- Inquiries about potential impacts to driveways along Palace Road;
- Comment regarding future development in the area resulting in increased traffic throughout the interchange; and,
- Inquiries about a possible future widening of Highway 401.

3. Existing Conditions

All significant features within the study area were identified to determine their sensitivity and for potential impacts associated with the improvements to the Highway 401 interchange at Palace Road. Identifying significant features involved the collection of information from primary and secondary 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 conditions.

The following sections provide details related to the existing conditions data collection undertaken for this study.

3.1 Natural Environment

3.1.1 Terrestrial Ecosystem

A Terrestrial Ecosystems Existing Conditions and Impact Assessment was prepared for this study in accordance with the *Environmental Reference for Highway Design* (ERHD, 2013), and the MTO's *Environmental Standards and Practices*. A summary of the findings of the report is outlined below and further details can be found in the report itself which is available in **Appendix H** of this TESR.

Background research and field investigations were conducted within an area 600 m in width at the Highway 401 and Palace Road interchange and extending along Highway 401 from the Newburgh Road underpass easterly across the Napanee River to 1300 m east of the existing Palace Road overpass structures (hereinafter referred to as the "Overall Study Area"). The Potentially Impacted Area includes the right-of-way (ROW) and adjacent lands. In order to be consistent with the area examined for fish and fish habitat (with respect to riparian vegetation canopy and bank vegetation), the Potentially Impacted Area also extends along the Napanee River 50 m upstream and 200 m downstream of the Highway 401 / MTO ROW. The Overall Study Area and the Potentially Impacted Area are represented in **Figure 3**.

A desktop review was completed to obtain background information on known natural heritage features and species records within the Overall Study Area.

In order to acquire information on the existing terrestrial ecosystems within the Overall Study Area, field investigations were conducted on June 2 and 3, 2016 and October 4 and 5, 2016 by AECOM ecologists. Field investigations were completed in accordance with the MTO Environmental Reference for Design (ERHD) (2013) to supplement available background information. Field investigations were undertaken for the Potentially Impacted Area, where access was granted. The majority of this area is highway ROW and MTO-owned land. Aerial interpretation was used to determine the vegetation communities located outside of the ROW.

Field investigations included the following:

- Vegetation community mapping, including dominant species associations, using the *Ecological Land Classification (ELC) System for Southern Ontario* to Ecosite or Vegetation Type;
- Location of wetland boundaries relevant to the proposed undertaking;
- List of plant species observed;
- List of wildlife species observed, and evidence of wildlife habitat on man-made structures include direct observation and incidental evidence;
- Location and species of any bird nests on, under, or in any structure or individual trees likely to be affected by construction;
- Assessment of habitat potential based on wildlife observations and site conditions;
- Location of any species of conservation concern, or Species at Risk (SAR) or their habitat; and,
- Evidence of groundwater upwelling and high groundwater table.

Incidental wildlife observations were recorded during all field investigations. Incidental observations noted include species sightings, tracks, scat, as well as any other wildlife activity.

3.1.1.1 Physiography, Geology and Soils

The study area is located in Lake Simcoe-Rideau (Ecoregion 6E), which is part of the Mixedwood Plains Ecozone. This Ecoregion extends from Lake Huron in the west to the Ottawa River in the east and is considered the second most densely populated ecoregion in Ontario.

The surface is gently undulating to rolling terrain of ice-laid materials deeply covering bedrock. Mineral materials represent more than 95% of substrates within this ecoregion. Forests within this ecoregion are diverse. Upland sites typically dominated by Sugar Maple (*Acer saccharum*), American Beech (*Fagus grandifolia*), White Ash (*Fraxinus americana*) and Eastern Hemlock (*Tsuga canadensis*) while lowland forests are often represented by Green Ash (*Fraxinus pennsylvanica*), Silver Maple (*Acer saccharinum*), Red Maple (*Acer rubrum*), Eastern White Cedar (*Thuja occidentalis*), Yellow Birch (*Betula allegheniensis*), Balsam Fir (*Abies balsamea*) and Black Ash (*Fraxinus nigra*).

3.1.1.2 Significant Features

Areas of Natural and Scientific Interest

An Area of Natural and Scientific Interest (ANSI) is defined as an area of land and/or water containing natural landscapes or features that have been scientifically identified (by the MNRF) as having life science or earth science values related to protection, scientific study or education. ANSIs are designated as earth science (geological) or life science (biological) depending on the features present. The background information review of the

MNRF Make-a-Map: Natural Heritage Areas Application, indicated that there are no designated ANSIs located within the Overall Study Area.

Provincially and Locally Significant Wetlands

Wetlands are described as lands that are seasonally or permanently flooded by shallow water, as well as lands where the water table is close to the surface and present an abundance of water that has caused the formation of hydric soil, which supports primarily hydrophytic or water tolerant plants. The MNRF evaluates the significance of wetlands through the Ontario Wetland Evaluation System. The evaluation system uses a scoring system to assign values to four principal components of the wetland, which are the biological, social, hydrological, and special features. Based on the resulting scoring of an evaluation, an evaluated wetland can fall into one of two classes: Provincially Significant or Locally Significant.

According to the background information review of the *MNRF Make-a-Map: Natural Heritage Areas Application*, there are no Provincially or Locally Significant Wetlands located within the Overall Study Area; however, there are areas of unevaluated wetland within the Overall Study Area located south of Highway 401 west of the Napanee River, and north of Highway 401 east of the Napanee River.

Environmental Protection Areas

The Official Plan of the Town of Greater Napanee applies the Environmental Protection designation to ANSIs, Provincially or non-Provincially or Locally significant wetlands, significant habitat of endangered and threatened species, fish habitat and lands having inherent environmental hazard, such as poor drainage, organic soils, steep slopes karstic conditions or that are subject to flooding and/or erosion. Within the Overall Study Area, the Napanee River and its riparian area are designated Environmental Protection on Schedule C of the *Town of Greater Napanee Official Plan (2014)*.

3.1.1.3 Vegetation

The majority of the study area is comprised of Cultural Meadow (CUM1), with Mixed Forest (FOM), Deciduous Forest (FOD) and Coniferous Plantation (CUP3) ELC communities adjacent to the ROW on the northwest, southwest and eastern limits, respectively. A map of these ELCs is provided in **Figure 3**.

Vegetation composition within the ROW north and south of Highway 401, as well as locations between the entrance and exit ramps, was represented by a Mineral Cultural Meadow (CUM1) and appeared to be periodically maintained (i.e., mowed). These areas were dominated by several common grass and forb species including Reed Canary Grass (*Phalaris arundinacea*), Timothy (*Phleum pratense*), Awnless Brome (*Bromus inermis* ssp. *inermis*), sedges (*Carex* species), Goldenrod (*Solidago* sp.), Wild Carrot (*Daucus carota*) and Cow Vetch (*Vicia cracca*). Trees and shrubs included Norway Maple (*Acer platanoides*), Austrian Pine (*Pinus nigra*), Common Buckthorn (*Rhamnus cathartica*), Sweetbriar (*Rosa rubiginosa*), Gray Dogwood (*Cornus racemosa*) and Choke Cherry (*Prunus virginiana*). Highly invasive species such as Common Reed (*Phragmites australis*) were also noted to be present within the Mineral Cultural Meadow.

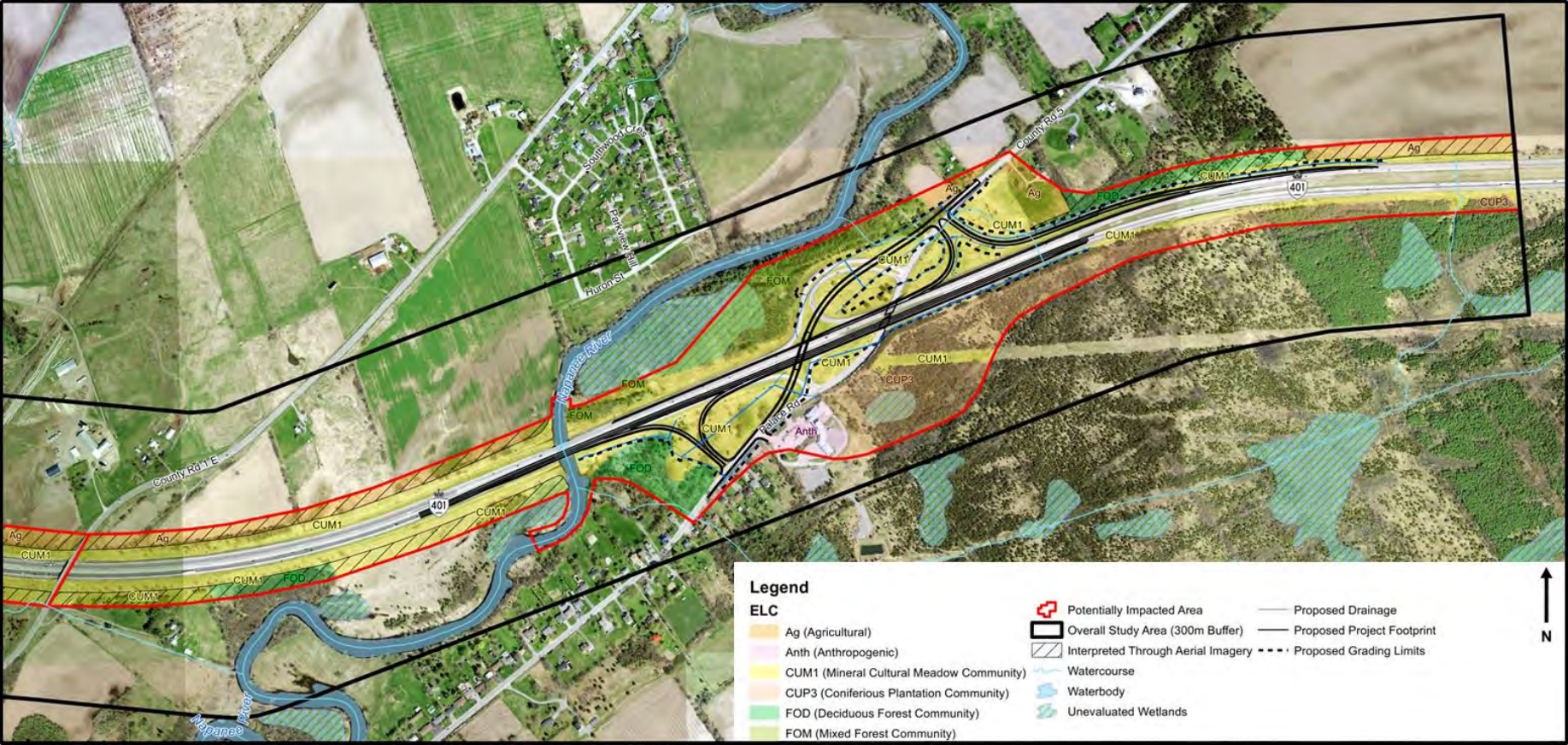
A Mixed Forest (FOM) community was found to exist north of Highway 401, west of Palace Road and east of the Napanee River. Tree and shrub species noted included

Basswood (*Tilia americana*), White Ash, Austrian Pine, Spruce (*Picea* sp.), Common Buckthorn and Honeysuckle (*Lonicera* sp.).

A Coniferous Plantation community (CUP3) was identified south of Highway 401, east of Palace Road. The canopy was dominated by coniferous tree species such as Austrian Pine, Eastern White Pine (*Pinus strobus*) and Eastern Red Cedar (*Juniperus virginiana*), as well as White Ash, Common Apple (*Malus sylvestris*) with Choke Cherry in the understorey. A Cultural Meadow (CUM) community was found to represent the hydro corridor within the Cultural Plantation.

A Deciduous Forest community (FOD) was found to exist southwest of the interchange, along the western limits of the Potentially Impacted Area. The canopy was dominated by deciduous tree species such as Manitoba Maple (*Acer negundo*), Norway Maple (*Acer plantanoides*), White Ash and Austrian Pine, with Common Buckthorn in the understorey.

Figure 3: Ecological Land Classifications within the Study Area



3.1.1.4 Wildlife

No incidental wildlife was observed during the 2016 field investigations. Nest searches were conducted at the two Highway 401 overpass structures at Palace Road and the bridge structure at the Napanee River. No nests were found on these bridges.

The Overall Study Area provides suitable habitat for a variety of wildlife species. Although the existing Highway 401 presents a barrier to wildlife movement, it is likely that the Napanee River provides some opportunity for wildlife movement under the existing Highway.

According to the Atlas of the Mammals of Ontario, a total of 23 common mammal species have been recorded within 10 x 10 km UTM block 18QU40 that encompasses the Overall Study area. **Table 2** below provides a summary of these species and their *Endangered Species Act (ESA) 2007* status. The Little Brown Bat (*Myotis lucifuga*) identified in this background review is listed as Endangered in Ontario and will be further discussed in **Section 3.1.1.5**.

Table 2: Atlas of the Mammals of Ontario Records

Common Name	Scientific Name	ESA Status
Virginia Opossum	<i>Dedelphis virginiana</i>	-
Common Shrew	<i>Sorex cinereus</i>	-
Northern Short-tailed Shrew	<i>Blarina brevicauda</i>	-
Star-nosed Mole	<i>Condylura cristata</i>	-
Little Brown Bat	<i>Myotis lucifuga</i>	Endangered
Big Brown Bat	<i>Eptesicus fuscus</i>	-
Eastern Red Bat	<i>Lasiurus borealis</i>	-
Hoary Bat	<i>Lasiurus cinereus</i>	-
Eastern Cottontail	<i>Sylvilagus floridanus</i>	-
Snowshoe Hare	<i>Lepus americanus</i>	-
Eastern Chipmunk	<i>Tamias striatus</i>	-
Woodchuck	<i>Marmota monax</i>	-
Gray Squirrel	<i>Sciurus carolinensis</i>	-
Red Squirrel	<i>Tamiasciurus hudsonicus</i>	-
Northern Flying Squirrel	<i>Glaucomys sabrinus</i>	-
White-footed Mouse	<i>Peromyscus leucopus</i>	-
Deer Mouse	<i>Peromyscus maniculatus</i>	-
Meadow Vole	<i>Microtus pennsylvanicus</i>	-
Muskrat	<i>Ondatra zibethicus</i>	-
Norway Rat	<i>Rattus norvegicus</i>	-
House Mouse	<i>Mus musculus</i>	-
Porcupine	<i>Erethizon dosatum</i>	-
Beaver	<i>Castor Canadensis</i>	-

3.1.1.5 Species at Risk

There were no Species at Risk (SAR) observed within the Potentially Impacted Area during the 2016 field investigations; however, based on a review of background information, there is potential for a number of SAR to occur within the Overall Study Area.

The Little Brown Bat was identified as potentially occurring within the Overall Study Area during background review. It should also be noted that three other bat species have recently been uplisted to the Species at Risk Ontario List including Eastern Small-footed Myotis (*Myotis leibii*), Tri-colored Bat (*Perimyotis subflavus*) and Northern Myotis (*Myotis septentrionalis*). These species may find suitable habitat within the FOM communities in the Potentially Impacted Area.

According to the Ontario Breeding Bird Atlas (OBBA), a total of 107 bird species have been recorded within the in 10 x 10 km UTM block 18QU40 that encompasses the Overall Study Area. The OBBA has records of 10 bird Species at Risk, either confirmed or possibly breeding in the Overall Study Area. **Table 3** below provides a summary of these bird species and their *ESA 2007* status.

Table 3: Ontario Breeding Bird Atlas Bird Species at Risk Records

Common Name	Scientific Name	ESA Status	Habitat Potential
Bank Swallow	<i>Riparia riparia</i>	Threatened	No suitable habitat present
Barn Swallow	<i>Hirundo rustica</i>	Threatened	Foraging habitat present
Bobolink	<i>Dolichonyx oryzivorus</i>	Threatened	Suitable habitat present
Chimney Swift	<i>Chaetura pelagica</i>	Threatened	Foraging habitat present
Common Nighthawk	<i>Chordeiles minor</i>	Special Concern	Suitable habitat present
Eastern Meadowlark	<i>Sturnella magna</i>	Threatened	Suitable habitat present
Eastern Wood-Pewee	<i>Contopus virens</i>	Special Concern	Suitable habitat present
Loggerhead Shrike	<i>Lanius ludovicianus</i>	Endangered	Suitable habitat present
Eastern Whip-poor-will	<i>Caprimulgus vociferous</i>	Threatened	Suitable habitat present
Wood Thrush	<i>Hylocichla mustelina</i>	Special Concern	Suitable habitat present

An information request was sent to the MNRF Peterborough District on March 15, 2016 asking for identification of any Species at Risk records within the Overall Study Area. A response from the MNRF was given on March 16, 2016 and indicated the following Species at Risk in **Table 4** as potentially occurring within or in the vicinity the Overall Study Area.

Table 4: MNR Species at Risk Consultation Results

Common Name	Scientific Name	ESA Status	Habitat Potential
Eastern Musk Turtle	<i>Sternotherus odouratus</i>	Threatened	No suitable habitat present
Four-leaved Milkweed	<i>Asclepias quadrifolia</i>	Endangered	No suitable habitat present
Northern Map Turtle	<i>Graptemys geographica</i>	Special Concern	No suitable habitat present
Ogden's Pondweed	<i>Potamogeton ogdenii</i>	Endangered	No suitable habitat present
Snapping Turtle	<i>Chelydra serpentine</i>	Special Concern	Suitable habitat present

A total of 19 SAR were identified as having potential to occur within or in the vicinity of the Overall Study Area based on the review of background information from the OBBA, the Atlas of the Mammals of Ontario and through consultation with the MNR. It should be noted that the MNR had identified the potential for Eastern Milksnake (*Lampropeltis triangulum*) within the Overall Study Area. At the time, Eastern Milksnake was listed as a Species of Special Concern; however, this species was removed from the Species at Risk in Ontario (SARO) list in June 2016.

An assessment was completed to determine the presence of suitable habitat for each of the 19 SAR identified during background review. This assessment was completed using aerial photo interpretation to delineate habitat communities in the study area and was further refined after ELC community delineation during field investigations. A habitat assessment of each of the 19 SAR, including their habitat preferences and assessment of potential occurrence in the Overall Study Area is provided below with further detail in the *Terrestrial Ecosystem Existing Conditions and Impact Assessment Report*.

Bank Swallow (*Riparia riparia*) – This species is listed as Threatened in Ontario. Bank Swallows nest in erodible soils on vertical or near-vertical banks and bluffs in lowland areas that are dominated by rivers, streams, lakes, and oceans. Through the background information review of the OBBA, Bank Swallow were identified to occur within the OBBA survey square 18QU40 which encompasses the Overall Study Area. During the field investigations, no vertical faces in silt and sand deposits were identified for nesting along the Napanee River; as such, no suitable habitat for the Bank Swallow was observed within the Potentially Impacted Area.

Barn Swallow (*Hirundo rustica*) – This species is listed as Threatened in Ontario. Barn Swallows occur in close association with human-made structures, building their cup-shaped mud nests almost exclusively on structures such as open barns, under bridges and in culverts. Potentially suitable habitat (i.e., bridges) was present within the Potentially Impacted Area. However, visual nest surveys were conducted during field investigations and no nests were observed on any of the structures within the Potentially Impacted Area.

Bobolink (*Dolichonyx oryzivorus*) – This species is listed as Threatened in Ontario. Bobolink utilizes large, open expansive grasslands with dense ground cover; hayfields, meadows or fallow fields; marshes. Bobolink prefers larger grasslands, generally

greater than 10 ha in size. Cultural Meadow (CUM1) communities represent a large portion of the Potentially Impacted Area, while agricultural land exists within the Potentially Impacted Area. As such, suitable habitat may exist within the Potentially Impacted Area.

Chimney Swift (*Chaetura pelagica*) – This species is listed as Threatened in Ontario. Chimney Swifts are found in and around urban settlements where they nest and roost in chimneys and other manmade structures. Based on the results of the habitat assessment there is no suitable habitat for the Chimney Swift within the Potentially Impacted Area and the species is unlikely to occur.

Common Nighthawk (*Chordeiles minor*) – This species is listed as Special Concern in Ontario. Common Nighthawk is usually found in open areas with little to no ground vegetation, such as logged or burned-over areas, forest clearings, rock barrens, peat bogs, lakeshores, and mine tailings. The species may also nests in cultivated fields, orchards, urban parks, mine tailings and along gravel roads and railways but generally prefer natural areas. Suitable habitat may exist within the Potentially Impacted Area.

Eastern Meadowlark (*Sturnella magna*) – This species is listed as Threatened in Ontario. Eastern Meadowlark utilizes native grasslands, savannah, old fields, hayfields, lightly grazed pastures, weedy meadows, fields with occasional shrubs. Eastern Meadowlark requires a core habitat of at least 5 ha and can be negatively impacted by habitat fragmentation. Cultural Meadow (CUM1) communities were common within the Potentially Impacted Area and may provide suitable habitat

Eastern Musk Turtle (*Sternotherus odouratus*) – This species is listed as Threatened in Ontario. The Eastern Musk Turtle utilizes ponds, lakes, marshes and rivers that are generally slow-moving have abundant emergent vegetation and muddy bottoms that they burrow into for winter hibernation. The Napanee River presents potential habitat within the Potentially Impacted Area.

Eastern Small-footed Myotis (*Myotis leibii*) – Eastern Small-Footed Myotis roosts in a variety of habitats, including under rocks and bridges and in rock outcrops, caves, mines, and hollow trees. Individuals may change their roosting location daily. Along with other bat species, the Eastern Small-footed Myotis swarming occurs at or near their hibernacula. This species hibernates in caves and abandoned mines, preferring colder, drier sites and showing strong hibernation site fidelity. This species was recently emergency listed under the *ESA 2007* as it is one of the rarest bats in eastern North America, and was one of the rarest even prior to the introduction of White Nose Syndrome. Suitable habitat may be present within the forest and plantation communities in the Potentially Impacted Area.

Eastern Whip-Poor-Will (*Caprimulgus vociferous*) – This species is listed as Threatened in Ontario. Whip-poor-Will is usually found in areas with a mix of open and forested areas, such as savannahs, open woodlands or openings in more mature, deciduous, coniferous and mixed forests. Suitable habitat may be present within the forest communities in the Potentially Impacted Area.

Eastern Wood-Pewee (*Contopus virens*) – This species is listed as Special Concern in Ontario. Eastern Wood-Pewee can be found in deciduous, coniferous and mixed forests in eastern North America. Additionally, the size of the forest does not appear to be an important factor in habitat selection as this species has been found in both small

fragmented forests and larger forest tracks. Suitable habitat may be present within the forest communities in the Potentially Impacted Area.

Four-leaved Milkweed (*Asclepias quadrifolia*) – This species is listed as Endangered in Ontario. The Four-leaved Milkweed is found in two types of habitat in Ontario: dry woodlands dominated by Tallgrass prairie herbs, Bur Oak and Shagbark Hickory, and in woodland alvar communities dominated by Red Cedar pasture grasses, cultivated by human activity. Based on the results of the habitat assessment there is no suitable habitat for the Four-leaved Milkweed in the Potentially Impacted Area and the species is unlikely to occur within the Potentially Impacted Area.

Little Brown Bat (*Myotis lucifugus*) – This species is listed as Endangered in Ontario. Little Brown Bats are typically between four or five centimeters long, with wingspans of 22 to 27 centimeters. Little Brown Bats are active in two or three hours after sunset, feeding on insects. During the day, Little Brown Bats roost in trees and buildings, and are known to use attics, abandoned buildings and barns during the summer to raise their young and hibernate in caves or abandoned mines during the winter months. Suitable habitat may be present within the forest and plantation communities in the Potentially Impacted Area.

Loggerhead Shrike (*Lanuis ludovicianus*) – This species is listed as Endangered in Ontario. The Loggerhead Shrike prefers pasture or grassland habitats with scattered trees and low shrubs. Remaining Loggerhead Shrikes are found in two core grassland habitats, the Carden Plain north of Lindsay, and the Napanee Limestone Plain. There is low potential for this species to occur within the Potentially Impacted Area.

Northern Map Turtle (*Graptemys geographica*) – This species is listed as Special Concern in Ontario. Northern map turtle inhabits lakes and rivers, showing a preference for slow moving currents, muddy bottoms, and abundant aquatic vegetation. The Napanee River presents potential habitat within the Potentially Impacted Area.

Northern Myotis (*Myotis septentrionalis*) – Northern Myotis is primarily a forest-dwelling species. It is often associated with old growth mixed or coniferous forests and is known to roost under loose bark or in tree cavities. Unlike other bats, this species rarely roosts in anthropogenic structures. Breeding occurs in late summer in maternal colonies, and migration to hibernation sites in caves or mines begins in October. This species remains in hibernation until late March or April. Suitable habitat may be present within the forest and plantation communities in the Potentially Impacted Area.

Ogden's Pondweed (*Potamogeton ogdenii*) – This species is listed as Endangered in Ontario. Ogden's pondweed is an underwater plant with branching, thread-like stems and is found in clear, slow moving streams, beaver ponds and lakes. In Canada, Ogden's Pondweed was found only in southeastern Ontario at Murphys Point Provincial Park and Davis Lock on the Rideau Canal between 1970 and 1990. There is no suitable habitat present within the Potentially Impacted Area.

Snapping Turtle (*Chelydra serpentina*) – This species is listed as Special Concern in Ontario. The Snapping Turtle utilizes a wide variety of shallow freshwater water habitats including: ponds, sloughs, shallow bays, river edges, slow streams, or areas combining several of these wetland habitats. Individual turtles can also persist in urbanized water bodies, such as golf course ponds and irrigation canals, but it is unlikely that a population could become established in such habitats. The Napanee River presents

potential habitat within the Potentially Impacted Area and Snapping Turtle may nest in the gravel or loose soil adjacent to the highway near the Napanee River.

Tri-colored Bat (*Perimyotis subflavus*) – Tri-colored Bat lives in a variety of forested habitats, forming day roosts and maternity colonies in older forests and occasionally in anthropogenic structures. This species is rare and thus has a scattered distribution in southern Ontario. The Tri-colored Bat forages over water and along streams in the forest where it eats flying insects and spiders. At the end of the summer, individual bats swarm to an overwintering location generally underground or near a cave. Similar to Little Brown Myotis and Northern Myotis, mating occurs during swarming behaviour which is typically associated with hibernacula. Individual overwintering bats typically roost by themselves rather than as part of a group. Suitable habitat may be present within the forest and plantation communities in the Potentially Impacted Area.

Wood Thrush (*Hylocichla mustelina*) – This species is listed as Special Concern in Ontario. Wood Thrush can be found in the interior and along the edges of well-developed upland deciduous and mixed forests. To be considered suitable, these forests should have: trees that are greater than 16 m in height, a high variety of deciduous tree species, a moderate sub-canopy and shrub density, shade, a fairly open forest floor, moist soils and decaying leaf litter. There is potential habitat for this species within the forest communities located east of the Napanee River, north and south of Highway 401.

3.1.2 Fish and Fish Habitat

A Fish and Fish Habitat Existing Conditions and Impact Assessment was prepared for this study in accordance with the *ERHD* (2013), and the MTO's Environmental Standards and Practices. A summary of the findings of the report is outlined below and further details can be found in the report itself which is available in **Appendix I** of this TESR.

Consistent with the Terrestrial Ecosystem Assessment, the Overall Study Area for this project is 600 m wide, extending along Highway 401 from the Newburgh Road underpass easterly across the Napanee River to 1,300 m east of the Palace Road bridges. The Napanee River was the only watercourse identified within the Palace Road study area and as such, for the purposes of this report, and in accordance with the MTO *Environmental Guide for Fish and Fish Habitat* (2009), the area of assessment extends along the Napanee River 50 m upstream and 200 m downstream of the Highway 401 ROW.

The existing conditions assessment was completed by AECOM to fulfill the requirements under the *MTO/DFO/MNRF Fisheries Protocol for Protecting Fish and Fish Habitat on Provincial Transportation Undertakings, Version 3* (the Protocol, 2016).

3.1.2.1 Background Review and Field Investigations

In accordance with Step 2 of the Fisheries Protocol (2016), pertinent information on the fish and fish habitat features of the study area were obtained through review of secondary source material. The Napanee River is within the jurisdiction of Quinte Conservation and Peterborough District Ministry of Natural Resources and Forestry (MNRF). The Overall Study Area does not contain any Provincially Significant Wetlands.

Based on email correspondence from the Peterborough MNRF, American Eel (listed as Endangered with the Provincial *Endangered Species Act*; ESA) is present in the Napanee River. Further information on this can be found in **Section 3.1.2.7**.

The Napanee River was found to contain fish habitat that is managed as warmwater habitat by the MNRF. The Napanee River is a permanent warmwater system that supports a mixed warmwater and coolwater assemblage. The Peterborough District Area MNRF noted that the Napanee River has dams in the Town of Napanee, Strathcona, Camden East, and Colebrook which inhibit fish migration up the river. MNRF files also indicate that there is a waterfall in the Town of Yarker and an escarpment between Howes Lake and Bass Lake that act as natural barriers.

On June 3, and on October 4 and 5, 2016, AECOM ecologists conducted a Fisheries and Aquatic Habitat assessment to determine the existing conditions of the Napanee River. The Fisheries and Aquatic Habitat Assessment was completed in accordance with the Guide (June 2009). Sufficient information (confirmed by MNRF as representative of current conditions) was available within background information to characterize the fish community within the vicinity of the study area. As such, fish community sampling was not conducted.

A canoe was utilized to obtain grab samples of the river substrate and to document the depth profile across the river in various locations, both upstream and downstream of the bridge.

As per Section 3.1.2 of the *MTO ERHD* (2013), for the purposes of investigating the potential impacts of the Project on fish and fish habitat, the study area, for each respective structure, was divided into two (2) zones: the Zone of Detailed Assessment (ZDA), which includes the areas within the MTO ROW, from 0 m to 50 m downstream of the ROW, and from 0 m to 20 m upstream of the ROW and the Zone of General Assessment (ZGA), which included from 50 m to 200 m downstream of the ROW and from 20 m to 50 m upstream of the ROW (of which only a general description of the aquatic environment is documented).

The recorded criteria included the following:

- Surrounding natural features and land uses (i.e., wetland, agriculture, industrial etc.);
- Channel dimensions, channel morphology and bank stability;
- Stream morphology dimensions:
 - Runs – typically deep, fast moving water with little to no turbulence of water
 - Riffles – shallow, fast moving water typically running over rocks; riffles provide areas of high oxygenated waters
 - Flats – low flowing water with a smooth un-agitated surface
 - Pools – are described as deep pockets of slow moving water that provide ideal habitat for fish;
- Substrate composition (e.g., clay, silt, sand, gravel, cobble, rock, boulder, muck and detritus);

- Indicators of water clarity, water colour, presence and type of aquatic macrophytes, algal growth and evidence of runoff;
- Potential enhancement opportunities; and,
- Pollution sources (i.e., tile drain discharges, other piped discharges and road runoff).

In-stream cover was documented based on the percentage of cover provided by woody debris, boulders (>256 millimetres (mm) diameter), cobble (256-64 mm diameter), gravel (64-2 mm), aquatic vegetation and undercut banks. In-stream cover was classified as high if there was in-stream coverage between the areas of 76 to 100%; moderate 31 to 75%; and low 0 to 30%. Riparian vegetation canopy cover was provided as a percentage of cover over the site of investigation. Overall canopy cover was classified as: high 61 to 100%; moderate cover 31 to 60%; and low cover 0 to 30%.

3.1.2.2 Napanee River

The Napanee River is a permanent, large, slow to moderate flowing river. The wetted width was approximately 18-20 m. The structure at Highway 401 is a two-span concrete bridge with its centre pier in the centre of the river, and with abutments that constitute the shoreline under the bridge. No barriers to fish passage were observed during the site reconnaissance of the Potentially Impacted Area (although as noted above, there are dams in the Town of Napanee, Strathcona, Camden East, and Colebrook). No specialized fish habitats (e.g., spawning, feeding, nursery areas) were identified within the Napanee River study area.

3.1.2.3 Zone of Detailed Assessment

Upstream (extending 20 m upstream of the highway ROW)

Upstream of the bridge the riparian zone was approximately 10-15 m wide and dominated by herbaceous and grass species. Beyond this zone was highway immediately south and agricultural fields to the east, further northwest a manicured park was observed. The entire reach was dominated by a flat. The substrate consisted of a detritus with fine sand and silt as evidenced by a grab sample. The mean wetted width was 18 to 20 m and water depth was measured to be an average of 1.23 m (east bank = 0.7 m, centre = 1.7 m, west bank = 1.3 m). Instream cover consisted of aquatic vegetation (70%), undercut banks (40%), and woody debris (25%). The instream vegetation was estimated to account for 50%, mainly mosses, Tape grass, and Canada waterweed, while the overhanging vegetation (herbaceous grasses) accounted for 20%. The banks were observed to be moderately unstable and very silty, as roots were exposed at the water's edge. It was evident that the river was under a period of decreased flow during the site reconnaissance and that increased flow from previous months had eroded some of the bank material away. The west bank consisted of large mature trees, including White pines, Basswood, and White/Green Ash, with Cattails dominating within the immediate impact area. The east bank had a smaller riparian area (5 m wide) of mature trees adjacent to the manicured park. The east bank was steeper (3 m in height) with herbaceous grasses as main riparian species. Less canopy cover existed on the east bank however submerged vegetation was present, including Canada waterweed and algae. No evidence of groundwater was observed and no

specialized fish habitats for the warmwater fishery (e.g., spawning, feeding, nursery areas) were identified at the site. No barriers to fish passage were observed during the site reconnaissance. A school of Bluntnose minnows (*Pimephales notatus*) was observed near the east bank approximately 20 m upstream of the bridge and a Black sandshell (*Ligumia recta*) mussel was captured with a substrate grab sample at the east bank within the immediate area of potential impact.

Downstream (extending 50 m downstream of the highway ROW)

Downstream of the bridge the riparian zone was approximately 5 m wide and dominated by herbaceous and grass species. Similar to the upstream reach, the downstream was dominated by a flat. The dominant substrate was a dark detritus comprised of organic matter with fine sandy silt. An organic odour was noticed from the sample which may indicate elevated levels of nitrogen and phosphorous along with decaying plant matter and an increased level of algae which was evident at the time of the site visit. Mean wetted width was 14-15 m and water depth was measured to be an average of 1.53 m (east bank = 1.3 m, centre = 2.0 m, west bank = 1.3 m). Instream cover was high and consisted of submergent and emergent vegetation including Yellow water lily (*Nuphar lutea*), Canada waterweed (*Elodea canadensis*), and a variety of unidentified mosses and algae. The instream vegetation accounted for 60%, mainly mosses and Canada waterweed, while the overhanging vegetation accounted for 40%. Moss and algae was present on submerged rocks. The banks were grass covered and moderately unstable as the silty areas were eroding or beginning to erode, however, they were well vegetated with grasses, Cow vetch, Sensitive fern, and Sweet white clover. A moderate amount of canopy cover existed, however more canopy cover was present on the east bank. No evidence of groundwater was observed, however; potential specialized fish habitats (e.g., spawning, feeding, nursery areas) were identified at the site. Approximately 5 m downstream of the bridge at the west bank, a ditch area appeared to be connected to the flood plain and was inundated with water during the site reconnaissance with a wetted width of approximately 1 m. Earth barriers were observed to prevent fish from possibly migrating further up the ditch to the west. Approximately 20 m downstream of the bridge on the east side was an area of inundation where the river is well connected to the floodplain. It is possible that these areas on the east and west banks may provide potential Pike spawning during the spring season when flows are increased.

3.1.2.4 Zone of General Assessment

Upstream (extending from 20 m to 30 m upstream of the highway ROW)

The upstream habitat is similar to that of the habitat within the detailed zone of assessment. The banks were predominately silt with mature tree cover and moderately unstable. The aquatic vegetation consisted mainly of Tape grass and Canada waterweed and was very prevalent. A downed tree was present in the water at the east bank. The average water depth measured at 0.97 m (east bank = 0.72 m, centre = 1.10 m, west bank = 1.10 m). The adjacent land uses were forest, residential, highway, and parkland.

Downstream (extending from 50 m – 150 m downstream of the highway ROW)

The downstream habitat was surrounded by private residential properties. Mature tree cover was present as the creek flowed downstream. The river appeared consistent in morphology throughout the detailed and general zone of assessment. The average water depth measured at 1.7 m (east bank = 1.7 m, centre = 2.0 m, west bank = 1.4 m). Approximately 20 m to 30 m downstream of the bridge the river was very well connected to the floodplain. The area at this location is likely subject to inundation during increased flows and likely provides Pike spawning habitat due to the presence of some hummocks and suitable vegetation including sedges, Cow vetch, Asters, Cattails, Sensitive fern, Arrowhead, and Sweet white clover were observed in this area. During the site reconnaissance, the area was not inundated with water. The adjacent land uses were forest, residential, highway, and parkland.

3.1.2.5 Extended Study Area

The extended study area was included to encompass the additional land that extends to Newburgh Road from west of the Napanee River. The area to the west of Newburgh Road is included in the study area for the *Improvements to the Highway 401 Interchange at County Road 41 (G.W.P. 4459-04-00)* which is documented in the *Fish and Fish Habitat Existing Conditions Report (January 2019)* for that study.

Southwest of Highway 401

An inundated channel was identified within the roadside ditch along the south side of Highway 401, however; the water was not connected to the river due to earth barriers. The roadside ditch along the south side of the highway provides potential fish habitat for 75 m west from the Napanee River. Beyond the 75 m the ditch was observed to have only approximately 0.01 m of water which was likely from overland flow and rainfall.

At approximately 100 m east of Newburgh Road the ditch had a gravel bottom with decreased amounts of vegetation and 0.05 m of water with some flow. A perched corrugated steel pipe (CSP) culvert was observed creating a pooling of water flowing from north of the highway. A steep bank was observed immediately east, as the roadside ditch ended. From the identified CSP to Newburgh Road no potential fish habitat was identified.

Northwest of the Highway 401 Interchange at Palace Road

A 1.5 m by 1.5 m cast in place culvert for road drainage was identified. The area was dry at the time of the site reconnaissance; however it appeared to convey storm water from the highway to an entrenched channel overgrown with grasses. It was not likely potential fish habitat and not connected to any existing fish habitat.

Northeast of the Highway 401 Interchange at Palace Road

Overland flow likely passes through this area as evidenced by an entrenched ditch approximately 0.5 m wide and 0.25 m deep. There was no water observed during the site visit, however during periods of high flow and storm events, the channel likely conveys flow into the forest. The ditch line has cattails but no defined channel or water.

Southeast of the Highway 401 Interchange at Palace Road

The ditch line is mowed up to a rock cut and beyond to the Pine trees. A grate to drain overland flow was observed approximately 150 m east of Palace Road. No fish habitat was observed in this section.

Southwest of the Highway 401 Interchange at Palace Road

The ditch is dominated by cattails with no defined channel or water present. Upland vegetation increases to the east. Closer to the river there is the possibility for connection if water were to flow around the steeper banks as the river is very well connected to floodplain in this area; however it is not likely that full connection from the river to the ditch area would occur.

3.1.2.6 Fish Community Structure

Initial review of fish community data provided through MNRF information requests was greater than 10 years old, however, MNRF indicated that the fish community records provided were still considered relevant and valid to characterize fish community and as such the fish community survey was not conducted. **Table 5** summarizes the existing fish community assemblage based on Template 10.2 of the MTO Fish Guide.

Table 5: Summary of Existing Fish and Fish Habitat Conditions

GWP or Project Name	Waterbody	Latitude	Longitude	Flow	Thermal Regime	Fish Habitat	Fish Species Present	Substrate Type	Vegetation	Constraints and Opportunity	Important, Exceptional Fish Habitat	Species at Risk / Critical Habitat Present	*In-water Works Timing Window
Improvements to Highway 401 Interchange at Palace Road (GWP 4197-13-00)	Napanee River	44.267639	76.932412	Permanent	Warm	Yes	<p>Source: <u>MNR (2016)</u> American Eel (captured in 2010)</p> <p>Source: <u>MNR (1977)</u> White Perch, Yellow Perch, Brown Bullhead, Northern Pike, Smallmouth Bass, Burbot, Black Crappie, Yellow Bullhead, White Sucker, Rock Bass, Bluegill, Pumpkinseed</p> <p>Source: <u>Beak Consultants Limited (1995)</u> Northern Pike, Walleye, Smallmouth Bass, Rock Bass, Pumpkinseed, Fallfish, White Sucker, Yellow Bullhead, Logperch, American Eel, Largemouth Bass, Burbot,</p> <p>Source: <u>P.Riebel Associates Inc. (1999)</u> Common Shiner, Mimic Shiner, Bluntnose Minnow</p> <p>Source: <u>Minnow Environmental Inc. (2002)</u> Bluntnose Minnow, Brown Bullhead, Yellow Bullhead, Creek Chub, Johnny Darter, Common Shiner, Golden Shiner, Mimic Shiner, Pumpkinseed,</p>	Detritus with fine sand and silt	<p>Riparian- herbaceous plants and grass species</p> <p>In-stream- Moss, Tape grass, algae, and Canada waterweed</p>	Eroding banks	The assessed reach provides habitat for fish migration, spawning (Northern Pike), feeding and rearing however, no limiting important or exceptional habitat was identified.	Potential habitat for American Eel.	In water works are restricted between: - April 1 and June 30 (no in water work allowed) Source: MNR Peterborough District Office correspondence, dated March 16, 2016.

GWP or Project Name	Waterbody	Latitude	Longitude	Flow	Thermal Regime	Fish Habitat	Fish Species Present	Substrate Type	Vegetation	Constraints and Opportunity	Important, Exceptional Fish Habitat	Species at Risk / Critical Habitat Present	*In-water Works Timing Window
							Brook Silverside, Northern Pike, Rock Bass, Yellow Perch, White Sucker Source: Minnow Environmental Inc. (2005) Bluntnose Minnow, Fathead Minnow, Golden Shiner, Brown Bullhead, Logperch, Mimic Shiner, Central Mudminnow, Northern Pike, Pumpkinseed, Rock Bass, Brook Silverside, White Sucker, Yellow Perch, Johnny Darter						

3.1.2.7 Species at Risk (SAR)

As noted in **Section 3.1.2.1**, based on email correspondence from the Peterborough MNR, American Eel (listed as Endangered with the Provincial *Endangered Species Act, ESA*) is present in the Napanee River. The species was not identified on the species list for the Napanee River which was received from the Peterborough MNR on March 16, 2016, however; clarification from the Peterborough MNR stated that an MNR researcher has caught American Eel in the River in 2010 and the species has the potential to inhabit the river presently. Further, although American Eel are not currently listed as a SAR under the federal Species at Risk Act (SARA), it is considered Threatened by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), and DFO has indicated American Eel is under consideration for listing to Schedule 1 of SARA.

Present science considers the American Eel to consist of a single breeding population in which all individuals travel to the Sargasso Sea in the Atlantic Ocean to spawn. From there, young eels drift with ocean currents and most eventually migrate inland into streams, rivers and lakes.

American Eel begin moving upstream to freshwater habitats when the water temperatures reach 10°C and continue until the temperatures exceed 20°C. In Canada this is typically between late April and early August. However, the eels can tolerate a wide range of water temperatures and lotic conditions.

The Napanee River exhibits many of the habitat characteristics that American Eel require. This includes a silty substrate and slow to moderate flowing water. Further, habitat conditions within the assessed reach contain non-limiting feeding and migratory habitat that is likely conducive to eels, including pools for elvers protection and silt substrate for periods of rest.

There were no barriers to fish passage present upstream of the Highway 401 interchange at Palace Road during the site reconnaissance that would prevent eels from swimming upstream.

3.1.3 Hydrogeology and Groundwater

A groundwater assessment was completed as part of this study to:

- Evaluate the local hydrogeological conditions within the study area;
- Identify potential impacts from the interchange improvement work to the local hydrogeology of the study area;
- Identify existing and potential drinking water threats within the study area and potential impacts from the interchange improvement work to the drinking water wells located within the study area; and,
- Recommend measures that could mitigate the identified potential impacts.

The assessment followed the *ERHD (2013)* and the *Environmental Standards and Practices for Groundwater*. The following sections include a summary of the findings, further information can be found in the *Groundwater Assessment Report*, available in **Appendix K** of this TESR.

3.1.3.1 Physiography, Topography and Drainage

The study area is located within the Napanee Plain physiographic region and is dominated by bare limestone terrain and bedrock-drift complex topography. Bedrock ridges are exposed at the ground surface intermixed with valleys and low-lying depressions. While the majority of the limestone terrane exhibits shallow soil cover of only a few inches, glacial till deposits present along the stream valley could be deep (up to 60 m) in some areas.

According to the topographic map for the area and site observations, the topography in the vicinity of the study area is undulating in nature. Limestone (with interbedded shale) bedrock ridges are exposed at the ground surface intermixed with valleys and low-lying depressions. The lands on the west and east sides of Napanee River, generally slope downwards towards the river. The elevations of the study area ranged from approximately 90 m above mean sea level (amsl) in the vicinity of the river, to greater than 120 m amsl at the eastern end.

The study area is located within the Napanee River Watershed. The Napanee River Watershed has a drainage area of 800 square kilometres and originated on the Canadian Shield descending 172 metres through the Limestone Terrane to the Bay of Quinte. The Napanee River crosses the study area in a northeast-southwest orientation on the west side of Palace Road and drains southwesterly to the Bay of Quinte, which is located on the Lake Ontario.

Based on the groundwater elevation table map covering the Greater Napanee area, the regional groundwater flow direction consists of different components in the vicinity of the study area: the regional groundwater flow generally flows towards the Napanee River and the Bay of Quinte. Locally, surface runoff and shallow groundwater flow is influenced by ground surface topography, flowing from elevated areas to low lying areas and surface water bodies.

3.1.3.2 Geology

According to the *Quaternary Geology of Ontario, Southern Sheet*, the quaternary deposit within the majority of the study area consists of glaciolacustrine deposits of silt and clay (basin and quiet water deposit) on top of limestone bedrock. Modern alluvial deposits of clay, silt and gravel are observed along the Napanee River valley. Sandy deposits are observed in a limited area on the north side of the interchange.

According to the *Bedrock Geology of Ontario, Southern Sheet*, and available well records, underlying the overburden deposits within the study area is the Upper Ordovician aged limestone of the Simcoe Group. Minor shale is present within the upper layer of the limestone bedrock. Bedrock exposure at the ground surface is mapped at the western portion of the study area along the Highway 401 and in the vicinity of the interchange along Palace Road. Bedrock outcrop is also mapped in a very limited area at the northwestern end of the study area in the vicinity of Newburgh Road. A fault line is present along the Napanee River on the west side following the river direction. As discussed in the earlier sections, the study area is situated within a limestone terrane. The majority of the limestone terrane exhibits shallow soil cover (a few inches), while glacial till deposits present along the stream valleys could be deep (up to 60 m) in some areas. Based on the MECP well records and overburden deposit thickness map, the

thickness of the overburden deposits ranged from approximately 1.2 m to 4.9 m below ground surface within the study area.

3.1.3.3 Hydrogeology

Overburden and Bedrock Aquifers

Based on the aquifer information provided in the Assessment Report for Quinte Source Protection Authority (SPA), the majority of wells (approximately 95 percent) in the region obtain supply from fractured bedrock aquifers. The remaining 5 percent obtain supply from overburden aquifers comprising of sand and gravel where the soil is of sufficient thickness. There are two major bedrock aquifer systems in Greater Napanee area: the shallow limestone aquifer and the deep Precambrian aquifer. Yield from the Quinte Source Protection Region (SPR) aquifers is typically low to moderate and considered adequate for meeting most domestic and agricultural needs.

The quality of supply from the Quinte SPA aquifers is normally good with fresh water reported on well records. However the water is often hard and in some areas natural water quality problems such as mineralization, gas and sulphur may be experienced. These natural water quality problems are typically encountered when wells are drilled deep (i.e., depths greater than 30 metres in limestone bedrock) or in areas of groundwater discharge.

Potable water in Napanee is municipally supplied with water obtained from Lake Ontario. The study area is located near the eastern boundary of Napanee and based on the MECP well records, there are a number of private wells present within the study area. All existing water wells within the study area are bedrock wells, with the majority of them drawing water from the limestone aquifer.

Water Table Elevations and Groundwater Flow

Groundwater flow is controlled by the permeability and porosity of the soil / rock material and by the existing hydraulic gradients. In general, 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.

As discussed earlier, there are two major bedrock aquifer systems in Greater Napanee area: the shallow limestone aquifer and the deep Precambrian aquifer. The limestone aquifer is the predominant aquifer for potable water supplies in the vicinity of the study area. The movement of groundwater in the limestone aquifer is typically a reflection of surface topography with groundwater flowing from areas of high elevations to low. Based on the MECP well records, the static groundwater level in the existing water wells ranges from approximately 2.1 m to 17.7 m below ground surface within the study area, which reflects the water table elevations in both the shallow and deep bedrock aquifers. The water table elevation in the shallow limestone aquifer is generally within or at 5 m below ground surface (bgs). Based on the water table elevation map covering the Greater Napanee area, the regional groundwater flow direction in the vicinity of the study area is towards the Napanee River and the Bay of Quinte.

Groundwater Recharge and Discharge Conditions

Recharge areas are characterized by permeable soils exposed at the ground surface, such as sand or gravel which allows rain water to seep easily into the ground to recharge the underlying aquifer. A recharge area is considered significant when it helps maintain the water level in an aquifer that supplies a community with drinking water, or supplies groundwater recharge to a cold water ecosystem that is dependent on this recharge to maintain its ecological function.

According to the Tier 1 Water Budget Report completed as part of the July 2014 Quinte SPR Assessment Report, the annual recharge rates for the limestone aquifer were calculated in the order of 81 to 109 mm with an average of 93 mm. The average annual recharge rate of the Precambrian (granite) aquifer was approximately 50 mm. The groundwater recharge in the vicinity of the study area is considered medium and according to the Significant Groundwater Recharge Areas (SGRAs) mapped as part of the July 2014 Quinte SPR Assessment Report, there are no significant SGRAs present within the study area.

Groundwater discharges from the groundwater system to the surface as springs, seeps or upwellings and groundwater discharge occurs along surface water bodies, streams and wetlands. Within the study area, groundwater discharge likely occurs along Napanee River, its tributaries and associated wetlands.

Groundwater Vulnerability to Contamination

Aquifer vulnerability is a measure of how easy and how fast contamination at the ground surface reaches the underlying production aquifers. The degree of groundwater vulnerability largely depends on the presence or absence of permeable surficial materials, the depth to the water table and location relative to surface water features and water wells. Generally, aquifer vulnerability is higher in areas characterized as having a shallow aquifer system and overlain by permeable surficial soil deposits.

Within the study area, the limestone bedrock aquifer is the dominant aquifer in use for domestic and commercial water supply. This aquifer is most susceptible to potential sources of surface contamination where bedrock outcrops at the surface or where the overburden deposit is thin. The rate of groundwater and contaminant transmission depends on the amount of fractured zones of the bedrock.

Given the fact that shallow soil/bedrock and shallow groundwater table conditions (generally within or at 5 m bgs) are present throughout the study area, the groundwater vulnerability within the study area is rated as having a high potential for contamination.

This is consistent with the highly vulnerable aquifers (HVAs) mapped as part of the July 2014 Quinte SPR Assessment Report.

Water Well Records Review and Groundwater Usage

According to the MECP well records, there are seven existing water supply wells identified within the study area. The primary water use for six wells is domestic (i.e., used by private homes), and for one well is commercial. There are no municipal wells identified within the study area. In addition, there are a number of private drinking water wells identified within a residential area on the south side of Newburgh Road. A small portion of this residential area is located within the study area. The well locations as reported by the MECP well records are actually out of the study area.

All existing water wells are bedrock wells with well depths ranging from approximately 11.0 to 38.7 m bgs. Among the seven existing water wells, there are two shallow wells with well depths less than 15 m bgs. Depths to bedrock ranged from approximately 1.2 to 4.9 m bgs. All existing water wells identified by the MECP well records appear drilled with a casing diameter of 15.24 cm. The static water levels for the water wells ranged from approximately 2.1 m (well ID 3705380) to 17.7 m bgs (well ID 3701819).

Based on the well records, the recommended pumping rates for the existing water wells ranged from approximately 0.004 Litre/Second (L/s) (1 gallon/minute (GPM)) to 3 L/s (40 GPM). There are no high yield wells (yield a rate of more than 60 L/s), as defined by the Ontario Well Regulation (Regulation 903 as amended under the *Ontario Water Resources Act* R.R.O. 1990).

Residential areas are located along Newburgh Road south and north of Highway 401, and along Palace Road. Based on the *Drinking Water Quality Management System, Operational Plan for A.L. Dafoe DWS & Sandhurst Shores DWS* (Town of Greater Napanee, revised 2016.02. 17), the residential area along Palace Road south of Highway 401 is serviced by the town drinking water system. The remaining study area is not serviced with municipal drinking water.

Municipal Wells and Wellhead Protection Areas

According to the MECP well records discussed in the previous section and the wellhead protection areas delineated as part of the July 2014 Quinte SPR Assessment Report, there are no municipal water supply wells and/or their associated wellhead protection areas (WHPAs) located within or adjacent to the study area. The closest municipal well is located approximately 33 km southwest of the study area in the community of Peats Point

Surface Water Intakes

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 a 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 and extending out sequentially are Zones 2 and 3. Each zone provides opportunity for the source protection committee or municipality to apply different levels of protective measures on activities planned or existing within the zone.

According to the July 2014 Quinte SPR Assessment Report, a large piece of land within the study area along Napanee River has been classified as surface water Intake Protection Zone (IPZ) 2 (Napanee Intake IPZ-2). In addition, a water Intake Protection Zone 3 (Deseronto Intake IPZ-3A) is located at the eastern end of the study area (within the study area limit). IPZs are considered vulnerable areas from the source water protection perspective.

3.1.3.4 Drinking Water Source Protection

The study area is located within the Quinte Source Protection Region (SPR). The Quinte Source Protection Area, together with the Town of Greater Napanee, are identified as having important roles in implementing the Source Protection Plan for the Quinte SPR in the vicinity of the study area. The key objectives of the Source Protection Plan are outlined within the *Clean Water Act* and require existing and future drinking

water sources within the source protection area be protected. Key objectives also include ensuring that, for areas identified within the July 2014 Quinte SPR Assessment Report as areas where an activity is or would be a significant drinking water threat; the activity never becomes or ceases to be a significant drinking water threat.

3.2 Socio-Economic Environment

3.2.1 Land Use

3.2.1.1 Location and Population

The study area is located within the Town of Greater Napanee within the County of Lennox and Addington. Based on 2016 Statistics Canada census data, the Town of Greater Napanee has a population of 15,892.

3.2.1.2 Existing Land Use

The majority of the study area consists of 'Low Density Residential' in the southwest and southeast, 'Arterial Commercial' and 'Fringe Area' located in the southeast, a combination of Rural and Environmentally Sensitive land use in the northeast, and a combination of Rural, Environmentally Sensitive and Environmental Protection land use in the northwest. In addition to the primary land uses in the study area, there is also some 'Medium Density Residential' and 'Major Institutional' land uses south of Highway 401 to the west of the Napanee River. A map of land use designations is provided in **Figure 4**.

To the south of Highway 401 there are residences on both the east and west sides of Palace Road. The land is designated as 'Low Density Residential' and mainly consists of single family dwellings on large parcels of land. To the south of Highway 401, to the west of the Napanee River, there is also a small section of land designated as medium density residential.

The land use in the southeast quadrant is designated as 'Arterial Commercial'. This land is occupied by the Palace Village which consists of a number of retail stores, office space and restaurants.

Strathcona Paper Company has a facility located approximately 4.5 km to the north of the interchange off of County Road 16, and County Road 1 (Camden Road). Napanee Quarry is located approximately 3 km to the south of the interchange off of County Road 2.

Figure 4: Land Use Designations within the Study Area



3.2.1.3 Recreational Areas

The Salmon River Trail runs along the Napanee River, along Newburgh Road in the Study Area, and can be used for hiking, walking, running, and cycling (roads, paths and off-road).

The Newburgh Trail also runs through the study area along Palace Road and is part of the cycling routes in Lennox and Addington County. The trail can be used for hiking, walking, and cycling (roads, paths, and off-road).

3.2.1.4 Natural Areas

The Napanee River is zoned as Environmental Protection land in the Town of Greater Napanee's Official Plan.

3.2.1.5 Aesthetics

The study area presents a rural setting with residences north and south of Highway 401 along Palace Road, and Palace Village, designated as commercial land, in the southeast quadrant of the interchange. The residences on the north side of Highway 401 are located on large plots of land, some with active agricultural operations and are zoned rural according to the Town of Greater Napanee Official Plan (2014). The residences on the south side of Highway 401 are more evenly spaced and are zoned low-density residential according to the Town of Greater Napanee Official Plan (2014).

The Napanee River runs through the study area to the west of the interchange and is lined with dense vegetation. The river can be seen from Highway 401 but the view is primarily blocked by a mix of deciduous and coniferous trees along Palace Road and the interchange ramps.

The land on the south side of Highway 401 is undulating with an exposed rock face at the Highway 401 eastbound ramp terminal just south of the Highway 401 bridges over Palace Road.

3.2.1.6 Related Projects and Initiatives

The Highway 401 Interchange Improvements at County Road 41, to the west of the Highway 401 interchange at Palace Road, is being undertaken as a separate Preliminary Design and Class Environmental Assessment Study (G.W.P. 4459-04-00) by MTO; however, many of the environmental impact studies were undertaken in conjunction with this study.

3.2.1.7 Future Planned Development

As noted in the *Town of Greater Napanee Official Plan* (2014), the Town of Greater Napanee is expected to grow to a population of between 19,700 to 21,600 by 2023. The Town is encouraging development and balances growth with environmental protection and protection of areas with resource potential. The land in the southeast quadrant of the study area, adjacent to the land designated Arterial Commercial, is designated as Fringe Area. The Fringe Area land use designation according to the *Town of Greater Napanee Official Plan* (2014) is used for land where the Town has plans for the extension of full municipal services, typically over the long-term where existing urban

areas are expanding. The area currently designated as Fringe Area within the study area is currently rural, forested land and is occupied by a major hydro transmission corridor.

3.2.2 Waste and Contamination

A Contamination Overview Study (COS) was undertaken to identify and review properties within the Study Area with actual or potential site contamination that may affect the highway design, and to identify appropriate future environmental work and mitigation measures to be implemented. The analysis included determining the relative potential (high, medium and low potential) for soil and groundwater contamination in the COS study area. The analysis was generally based on current and historical land use (sources of contamination); and on surficial geology, hydrogeology and topography (contaminant migration and sensitive receptors).

Properties of “high” environmental concern generally include gas stations/service centres, and industrial or manufacturing sites. Gas stations/service centres operate pump islands (i.e., USTs for storing fuel), small chemical storage areas, and may include service areas for changing engine oil or full automotive repair. Gasoline and diesel fuel are usually delivered from bulk container trucks to large on-site USTs. Spills at transfer areas and pumps, along with overfilling of and leakage from the USTs, are potential sources of site contamination.

Properties which were never developed or were developed but only used for agricultural, residential or parkland uses were rated as having a “low” potential for contamination.

The results of the COS identified 3 parcels within the Study Area as having a “high” potential for environmental contamination, and 1 parcel with “medium” potential. In addition, 6 spill records representing 4 different locations within the Study Area were found to have had significant historical spills, which were also considered as having “high” potential for contamination. Further details of the study are available in the *Contamination Overview Study* (AECOM, October 2017).

Preliminary Site Screenings were completed on all private properties that have been identified as required for the Technically Preferred Preliminary Design Alternative in order to determine the need for specific environmental site assessments.

3.2.3 Noise Sensitive Areas

Predicted noise levels are assessed at Noise Sensitive Areas (NSAs). Land use designated as noise sensitive by the MTO *Environmental Guide for Noise* (2006) consists of the following:

- Private homes such as single family residences;
- Townhouses;
- Multiple unit buildings, such as apartments, with Outdoor Living Areas (OLAs) for use by all occupants. The OLA can be situated on any side of a NSA which accommodates outdoor living activities, and is generally taken to be the backyard;

- Hospitals, nursing homes for the aged, where there are OLAs for the patients.

Additionally the following land uses would qualify as a NSA provided that a new freeway / highway corridor or route is planned:

- Educational facilities and day care centres where there are OLA for students;
- Campgrounds that provide overnight accommodation; and,
- Hotels/motels where there are OLAs for visitors.

Land uses that do not qualify as noise sensitive by the MTO *Environmental Guide for Noise* consist of the following:

- Apartment balconies above ground floor;
- Educational facilities (except dormitories with OLA's);
- Churches;
- Cemeteries;
- Parks and picnic areas which are not inherently part of a NSA;
- Daycare centres; and,
- All commercial and industrial areas.

In general, the areas within the study area are zoned for rural or Environmental Protection uses. There are scattered residential buildings in north and south of Highway 401 and east and west of Palace Road in all quadrants of the interchange that are considered to be NSAs.

Further details can be found in the *Traffic Noise Impact Assessment* (February 2019).

3.3 Cultural Environment

3.3.1 Archaeology

A Stage 1-2 Archaeological Assessment was completed by AECOM for the Highway 401 interchange at Palace Road. The Stage 1 background research looked at the archaeological and land use history of the study area and indicated that although much of the study area had been disturbed by past construction activity, several areas appeared to be undisturbed and therefore contained archaeological potential. AECOM conducted the Stage 1 field review and the Stage 2 test pitting survey from December 5 to December 7, 2017. The study area consisted primarily of areas with deep and extensive ground disturbance, areas of excessive slope, and low-lying wet areas. The remaining portions of the study area that were not visually disturbed, sloped or wet were subject to test pitting at 5 m and 10 m judgemental intervals in accordance with *Section 2.1.1 Test Pit Survey* in the *Standards and Guidelines for Consultant Archaeologists* (2011). While the majority of the study area had been previously disturbed by construction activity and no longer contained archaeological potential, positive test pits were dug in the northeastern section of the study area. Although the positive test pits

contained mid-to late- 19th century Euro-Canadian artifacts, they are likely associated with the historic structure that is extant on this property today and therefore are not considered to contain further Cultural Heritage Value or interest.

3.3.2 Built Heritage

This study determined that one property within the study area may have cultural heritage significance and therefore a Cultural Heritage Evaluation Report (CHER) was completed for 931 Palace Road. The CHER was conducted and prepared in accordance with the *Ontario Regulation 9/06* and *Ontario Regulation 10/06 (O.Reg)*, as required by the Ministry of Tourism, Culture and Sport's (MTCS) *Standards and Guidelines for the Conservation of Provincial Heritage Properties* (2010), the *Ontario Heritage Toolkit*, as well as the *MTO Environmental Standards and Practices* to determine whether the property met the criteria for cultural heritage value or interest according to *O.Reg 09/06* or *O.Reg 10/06*.

The property includes a. c. 1870 1½ -storey red brick house (the “van Alstine house”), vernacular in design and a late 19th century barn. The building is situated within a 1.88 hectare lot in a largely agricultural area. The lot faces Palace Road, with the Highway 401 and Palace Road interchange located south west of the house; and is bound to the north by the Napanee River.

Despite being in close proximity to Highway 401, the setting of the house and barn is pastoral. Active agricultural fields surround the property and mature trees and act as a barrier, screening the property from the road. The pastoral nature of the property is further characterized by the barn located west of the house, which is a contributing element in a rural agricultural Cultural Heritage Landscape.

The CHER determined that the house and barn located at 931 Palace Road, have cultural heritage value or interest according to *O.Reg 09/06*. Cultural heritage value is embodied in the Design / Physical Value of both the house and barn and Contextual Value of the overall property in that they are excellent examples of vernacular built structures associated with the mid-19th through to the mid-20th century agricultural economy of the region. The van Alstine house is a fine representative example of a mid-19th century 1 ½ storey vernacular house reflecting the materials, scale and common ornamental touches of its age, with some very notable details. Together, the house and barn act as a contributing element in a rural agricultural Cultural Heritage landscape. However, neither structure meets the criteria outlined in *O.Reg 10/06*. As a result the CHER recommends that 931 Palace Road is considered a Provincial Heritage Property (PHP).

3.4 Transportation

3.4.1 Road Network

3.4.1.1 Highway 401

Highway 401 (MacDonald-Cartier Freeway) is a Controlled Access Highway under the jurisdiction of MTO. The highway has a posted speed limit of 100 km/h and locally connects Napanee to Kingston in the east and Belleville to the west.

Highway 401 through the study limits includes four through lanes (two lanes in each direction) and additional speed change lanes located within the limits of the Palace Road interchange. The eastbound and westbound lanes are typically separated by a variable width paved median protected by concrete median barrier. Typical sections of Highway 401, including at the Palace Road Overpass, are presented in **Figures 5 and 6**.

Figure 5: Typical Section – Highway 401 with Paved Median

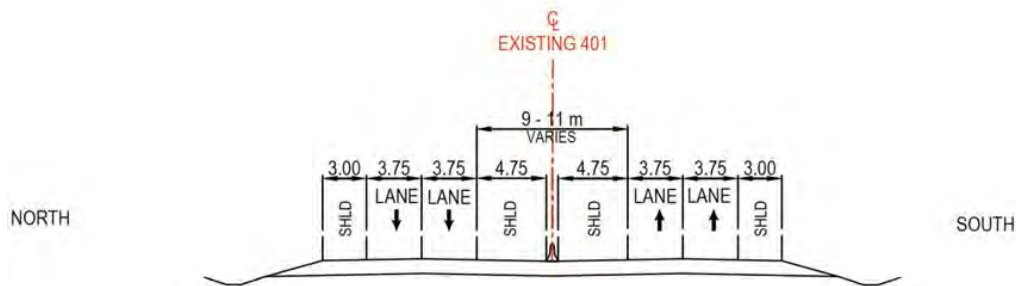
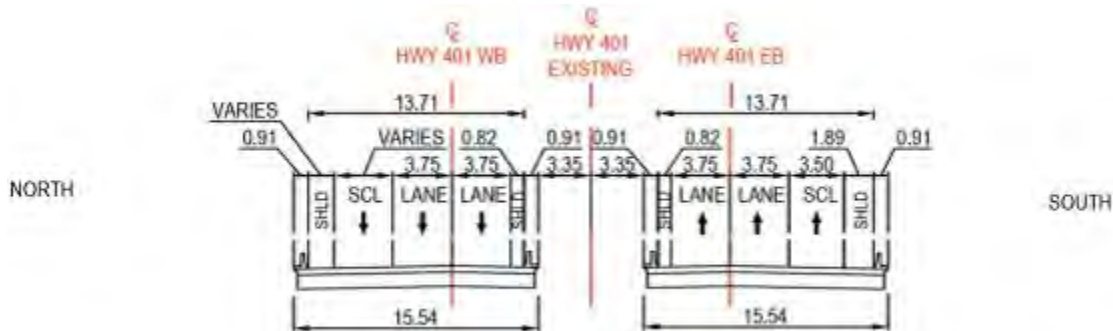


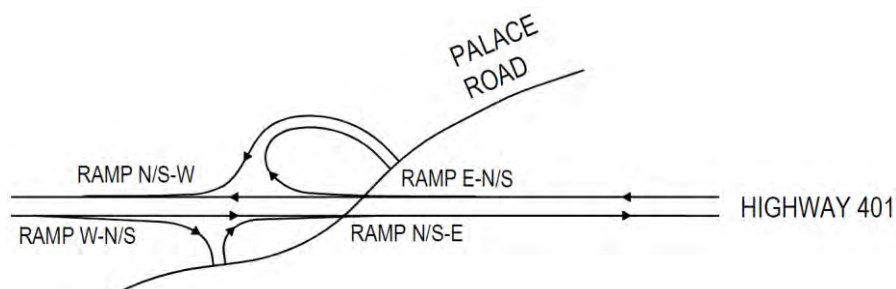
Figure 6: Typical Section – Highway 401 and Palace Road Overpass



3.4.1.2 Palace Road and Highway 401 Interchange at Palace Road

Palace Road is a two-lane road designated as 'Rural Arterial (County)' according to the *County of Lennox and Addington Official Plan (2015)*. The current Highway 401 interchange at Palace Road has a buttonhook configuration in the eastbound direction and Parclo B configuration in the westbound direction with twin structures carrying Highway 401 traffic over Palace Road. A schematic illustration of the Palace Road interchange is provided in **Figure 7**.

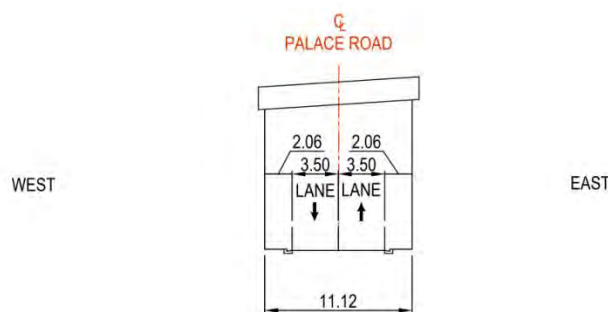
Figure 7: Highway 401 Interchange at Palace Road Schematic



Numerous residential private entrances are located along Palace Road north and south of the interchange, while the interchange is also utilized by heavy truck traffic from a significant aggregate supply property (Napanee Quarry) and the Strathcona Paper Company to the north. North of Highway 401, Palace Road winds to the west and connects to County Road 1 (Newburgh Road), which crosses Highway 401 via an underpass.

Within the study area, the alignment of Palace Road is skewed at approximately 46 degrees with respect to Highway 401, and has horizontal curves directly north and south of the interchange which restrict sight distance at the ramp terminal intersections. The Napanee River crosses beneath Highway 401 approximately 700 m west of the Palace Road crossing. Other notable constraints adjacent to the interchange include the Palace Village on the east side of Palace Road, a hydro corridor crossing through the interchange, rock cut and a woodlot in the southeast quadrant. Palace Road has a posted speed limit of 60 km/h south of Highway 401 and between the north and south ramp terminal. North of the north ramp terminal the posted speed is 80 km/h. A typical section of Palace Road under Highway 401 is provided in **Figure 8**.

Figure 8: Typical Section – Palace Road at Highway 401



3.4.2 Structures

Highway 401 crosses over Palace Road with twin structures at the interchange. The Highway 401 / Palace Road twin overpasses were originally constructed in 1960. The twin bridges are skewed at an angle of 46° to the centreline of Highway 401 and carry two lanes of Highway 401 eastbound traffic and two lanes of Highway 401 westbound traffic, including an additional ramp lane in each direction. The bridges are single-span steel girder structures with a clear span length of approximately 18 m. The eastbound and westbound structures underwent major rehabilitation in 1983 and 1988, respectively. A second round of rehabilitation was completed on both structures in 2012, which was limited in scope due to lane and ramp closure restrictions.

A future major rehabilitation or full replacement of the structures is anticipated to be required within the next 5 years. Based on the current structure configurations, these works cannot be completed without long-term lane temporary closures or staging impacts along Highway 401, partial temporary widening of the existing structures for staging purposes, and/or temporary removal of the existing eastbound and westbound off-ramp speed change lanes from the structure. While timelines for a future potential widening of Highway 401 to 6 lanes through this section are presently unknown, it is anticipated that such a widening would occur within the life span of any potential

replacement structures and the future replacement structure(s) should be designed to accommodate this potential highway widening.

The Highway 401 bridge over the Napanee River carries four lanes of Highway 401 traffic (two lanes eastbound and two lanes westbound), approximately 700 m west of the existing Palace Road centreline. Rehabilitation of the Napanee River bridge was scheduled for completion in 2018 as part of MTO Contract 2017-4021, and the bridge was not considered further as part of this study.

3.4.3 Traffic Operations

A traffic operational analysis for the Palace Road interchange and along Highway 401 within the study area was undertaken. This analysis included a review of existing traffic operations at the interchange, an assessment of estimated traffic growth and expected future traffic volumes, analysis of projected future traffic operations based on maintaining the existing roadway network, and the identification of potential operational deficiencies associated with the future traffic growth.

Level of service (LOS) refers to a combined measure of vehicle delay and traffic volume, describing operational conditions with the roadway network, and their perception by motorists and/or passengers. LOS 'A' through 'D' typically reflect adequate operations, while LOS 'E' reflects increasing congestion and operations at capacity, and LOS 'F' reflects unstable traffic flows, long delays, and, in some cases, severe traffic congestion.

Existing traffic LOS operations at the interchange are good overall with all turning movements operating with LOS 'B' or better. Despite the absence of dedicated left-turn lanes along Palace Road to access Highway 401, minimal queuing was identified at both ramp terminal intersections given the relatively low volumes. Acceptable traffic Level of Service (LOS 'A' or 'B') was identified along the Highway 401 mainline including at all ramp merge/diverge locations.

A future conditions analysis was undertaken based on projected traffic volumes along Highway 401 and at the interchange. This analysis was undertaken for horizon years of 2023, 2028 and 2038, representing 5, 10 and 20 years from an assumed 2018 project completion date. Future traffic volumes were derived based on historical annual growth rates, and consideration of annual growth rates taken from the County of Lennox and Addington Transportation Master Plan. No notable changes in traffic operations were identified for any of the future horizon years as compared to existing conditions, given the low volumes and relatively low growth rates anticipated within the study area.

An assessment of potential construction staging requirements and anticipated traffic impacts associated with rehabilitation or replacement of the bridges based on the current bridge and interchange configuration was also undertaken. In this scenario, rehabilitation or replacement of the two structures would require a reduction to a single lane in each direction along Highway 401 for a portion of the bridge rehabilitation. A Queue Analysis was completed to analyze the effects of the single lane closure along Highway 401 approaching the Palace Road structures. Based on the analysis, it is anticipated that the queue along eastbound Highway 401 approaching Palace Road would extend between 9.3 km (fall) to 12.7 km (summer). In the westbound direction, the anticipated queue would extend between 6.6 km (fall) to nearly 20 km (summer).

In addition to the operational concerns along Highway 401 associated with the single lane reduction, the structural rehabilitation would require temporary closure of the eastbound on-ramp and westbound off-ramp, impacting traffic operations along the surrounding municipal road network. With these ramp closures, a 4.2 km (minimum) detour via westbound Highway 401 (if turning around at County Road 41) would be required for the Palace Road traffic to access eastbound Highway 401. Closure of the eastbound off-ramp would result in an approximate 7 km detour via local roads, with vehicles utilizing the signed Emergency Detour Route crossing at Newburgh Road to access Palace Road.

3.4.4 Pavement

A visual pavement condition survey was completed in May 2016, in accordance with the *MTO Document SP-024, Manual for Condition Rating of Flexible Pavements*. **Table 6** below summarizes the observed conditions:

Table 6: Pavement Condition and Ride Condition Rating

Location			Pavement Condition	Ride Quality
Facility	From (Road)	To (Road)	Condition	Ride
Highway 401				
Eastbound	County Road 41	Palace Road	Fair	Fair
Westbound	Palace Road	County Road 41	Fair	Good
Palace Road				
Northbound	House #738	House #974	Excellent	Good
Southbound	House #974	House #738	Good	Fair
Palace Road Interchange				
N/S-W On-Ramp	Palace Rd	Bullnose	Fair	Fair
N/S-W SCL	Bullnose	Highway 401	Excellent	Excellent
E-N/S SCL	Highway 401	Bullnose	Good	Good
E-N/S Off-Ramp	Bullnose	Palace Rd	Excellent	Excellent
W-N/S SCL	Highway 401	Bullnose	Excellent	Excellent
W-N/S Off-Ramp	Bullnose	Palace Rd	Excellent	Excellent
N/S-E On-Ramp	Palace Rd	Bullnose	Good	Fair
N/S-E SCL	Bullnose	Highway 401	Good	Fair

3.4.5 Electrical

Currently there is no illumination or traffic signals provided at the Palace Road interchange. There is an advanced road weather information system located on the north side of Highway 401, west of Palace Road.

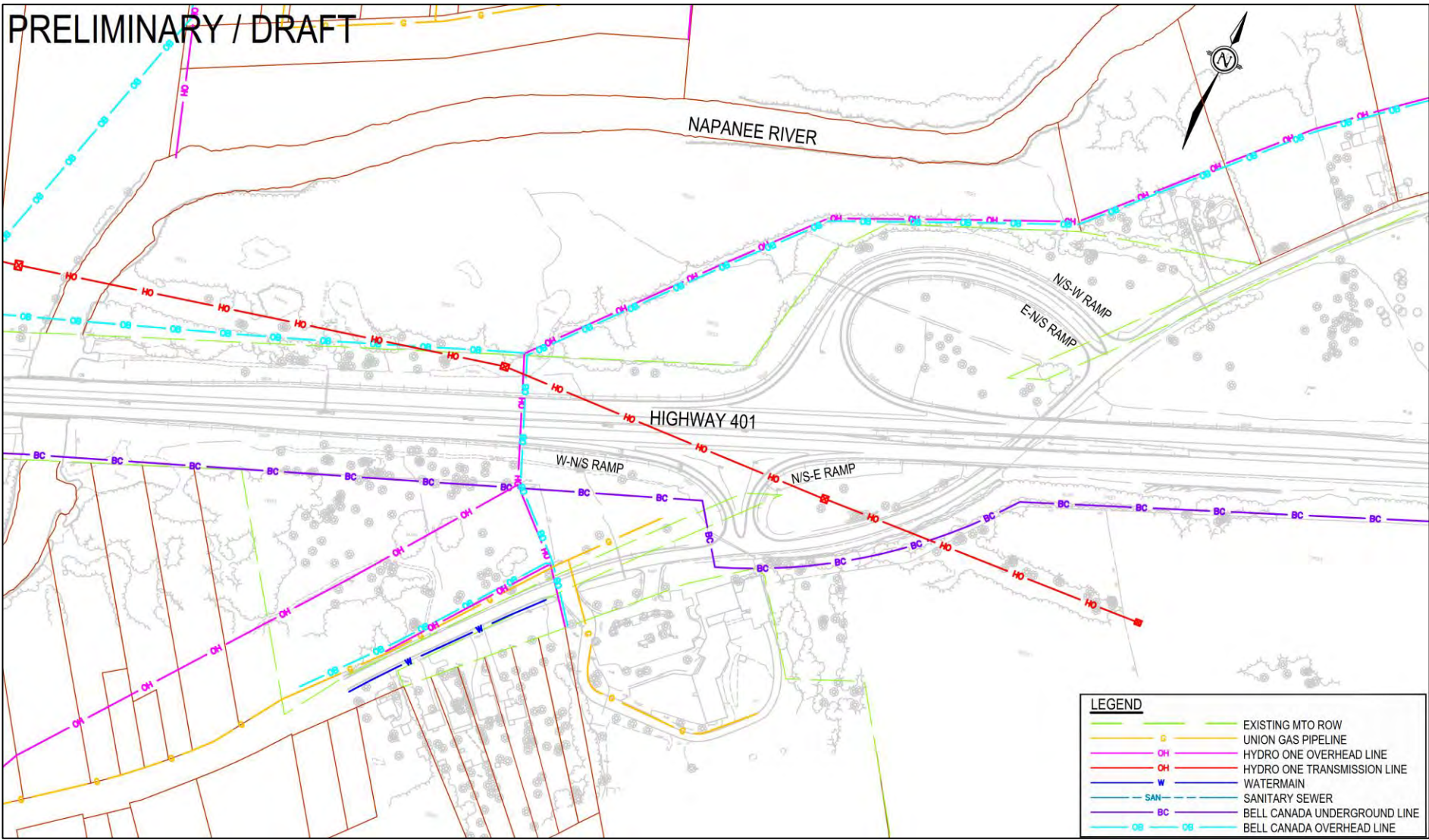
3.4.6 Utilities

The following utilities are located within or adjacent to the study area:

- Bell Canada;
- Hydro One;
- Town of Napanee (watermain);
- Trans Canada Pipeline Ltd.; and,
- Union Gas.

Existing utilities within the study area are illustrated below in **Figure 9**.

Figure 9: Composite Utility Plan



3.4.7 Drainage

The study area is located in the Napanee River watershed which is managed by Quinte Conservation Authority. The Napanee River drains an area of 818 km². The watershed is triangular in shape funneling into the Bay of Quinte at its junction with Long Reach. The total length of the main channel is 128 km, flows from north to south, crosses Highway 401 and then flows southwesterly to discharge into the Bay of Quinte at Lake Ontario. A catchment area of approximately 801 km² was estimated upstream of the Highway 401 crossing the Napanee River based on the Ontario Flow Assessment Tool (OFAT) created by MNRF. The Napanee River watershed is predominantly undeveloped with woodland and pasture. Within the study area, the Palace Road Interchange and Highway 401 drain to the Napanee River.

Highway 401 Drainage

Within the study area, Highway 401 consists of a rural cross section with a median storm sewer/central ditch and ditches on both sides. The highway drains to the Napanee River through the median sewer system, median and road side ditches. The median storm sewer collects runoff from the inner lanes and shoulders and conveys this to ditches and ultimately to the Napanee River. At locations near the Napanee River, a central ditch collects runoff from the inner lanes instead of a median storm sewer and conveys it across the highway through ditch inlets and crossing sewers.

Palace Road Interchange Drainage

The existing drainage system of the Highway 401 interchange at Palace Road is described in detail below, and illustrated in **Figure 10**.

Drainage culverts: There are six drainage culverts within the Palace Road Interchange. Among these culverts, four are located beneath Palace Road (C1-EX, C2-EX, C4-EX and C5-EX), one is beneath the westbound on and off-ramps (C3-EX) and the remaining one is underneath Highway 401 (C6-EX). The existing culverts are summarized in **Table 7**. The catchments of these culverts were delineated based on the Ontario Base Map (OBM) 5 m contour. The runoff generated from the catchments flow through these culverts and ultimately discharge into the Napanee River.

Outlet: As shown in **Figure 10**, runoff from the study area outlets to the Napanee River at three locations. However, one outlet was defined to compare peak flows simulated under the existing and proposed conditions: located approximately 100 m downstream of the Highway 401 Bridge. The runoff is conveyed through non watercourse culverts and ultimately gathers at the outlet defined above.

Northwest quadrant: Storm runoff from the northwest quadrant of the Highway 401 interchange at Palace Road is collected through the road side ditches and conveyed across the westbound on-ramp through a culvert (C3-EX) into a ditch located northwest of the ramp. The ditch ultimately discharges into the Napanee River upstream of the Highway 401 bridge.

Southwest quadrant: Runoff from the southwest quadrant of the Highway 401 and Palace Road Interchange is collected through the road side ditches and conveyed across the eastbound off and on-ramps through the ditch inlets and storm sewers, and

drained into a Highway 401 south ditch. The runoff ultimately discharges into the Napanee River downstream of the Highway 401 bridge.

Southeast quadrant: Runoff from the southeast quadrant of the Highway 401 and Palace Road Interchange is collected through the road side ditches and conveyed across Palace Road through a culvert (C2-EX). The runoff ultimately discharges into the Napanee River downstream of the Highway 401 bridge.

Further details regarding existing drainage conditions can be found in the *Drainage and Hydrology Report (January 2019)*.

Figure 10: Existing Drainage System



Table 7: Existing Culverts Inventory

Culvert ID	Location	Existing Culvert Dimensions			Culvert Type	Material	Flow Direction	Observed Condition based on Visual Inspection
		Span (mm)	Rise / Diameter (mm)	Length (m)				
C1-EX	Palace Road	-	900	23	Pipe Culvert	HDPE	S → N	<ul style="list-style-type: none"> • Good condition • No spalling/ cracks/ settlement/ exposed footing • Light vegetation at culvert opening • No sediment inside the culvert
C2-EX	Palace Road	-	650	50	Pipe Culvert	Corrugated Iron	SE → NW	<ul style="list-style-type: none"> • Poor condition at upstream end • Presence of severe damage at US • Settlement at upstream end • Good condition at downstream end • Reinforced by gabion at downstream end
C3-EX	Ramp N/S-W and E-N/S	-	750	31	Pipe Culvert	Corrugated Iron	SE → NW	<ul style="list-style-type: none"> • Poor condition at upstream end • Inlet culvert severely damaged at opening; • Settlement at upstream end • Medium vegetation observed • Moderate rust inside the culvert
C4-EX	Palace Road	-	950	18.5	Pipe Culvert	Corrugated Iron	SE → NW	<ul style="list-style-type: none"> • Poor condition at upstream end • Rust and damage at upstream end • Good condition at downstream end • Moderate rust inside the culvert

Culvert ID	Location	Existing Culvert Dimensions			Culvert Type	Material	Flow Direction	Observed Condition based on Visual Inspection
		Span (mm)	Rise / Diameter (mm)	Length (m)				
C5-EX	Palace Road	-	900	17	Pipe Culvert	Corrugated Iron	S → N	<ul style="list-style-type: none"> • Poor condition at upstream end • Inlet culvert moderately damaged & rusted at upstream end • Sediment deposition inside the culvert and at opening • Debris accumulation at culvert opening
C6-EX	Highway 401	1220	1600 (up-stream) 1220 (down-stream)	46	Box Culvert	Concrete	S → N	<ul style="list-style-type: none"> • Good condition • No Spalling • Presence of minor cracks • Medium vegetation at culvert inlet & outlet • No sediment inside the culvert

Note: All existing culverts are recommended for removal / replacement to accommodate the proposed interchange re-construction / Palace Road realignment.

4. Needs Assessment

A review of existing and future transportation and infrastructure conditions was undertaken for the Highway 401 interchange at Palace Road and adjacent segments of Highway 401 (i.e. problems and opportunities). The review included consideration of structural requirements, existing and future traffic operations, geometric conditions and deficiencies, collision history, and drainage concerns. Opportunities to address the existing and future transportation and infrastructure needs were subsequently identified.

The following sections summarize the identified transportation problems and needs within the study area, along with opportunities to address these issues, and to provide a reference point for the generation and assessment of alternatives.

4.1 Problems

Structural

A structural evaluation of the existing structure was carried out in accordance with the *Canadian Highway Bridge Design Code (CHBDC)*, CAN/CSA S6-14 and the MTO Structural Manual. Based on the structural evaluation the following was determined:

- A major rehabilitation or full replacement of the twin Palace Road overpass structures is anticipated to be required within the next 5 years.
- The existing structures cannot accommodate the necessary structural works without long-term lane closures or staging impacts along Highway 401, partial temporary widening of the structures for staging purposes, and/or temporary removal of the existing eastbound and westbound off-ramp speed change lanes from the structure.
- Replacement of the structures at the existing location would also present challenges to future rehabilitation as future work would have similar impacts along Highway 401 including temporary widening and/or removal of the speed change lanes from the structure.

Traffic Operations and Geometrics

As outlined in **Section 3.4.3**, a traffic operational analysis for the Highway 401 interchange at Palace Road was undertaken which included a review of existing traffic operations at the interchange, an assessment of estimated traffic growth and expected future traffic volumes, analysis of projected future traffic operations based on maintaining the existing road network and the identification of potential operational deficiencies associated with the future traffic growth. The following problems were identified:

- Existing and future traffic LOS (e.g. vehicle delay) operations at the interchange are generally considered acceptable (overall LOS 'A' or 'B'), however a number of collision-prone areas and locations with undesirable geometric elements were identified (refer to **Figure 11**). These elements pose a potential safety and operational concern at the interchange, which may lead to further increased collision risk as traffic volumes slowly increase over time. The most notable geometric and operational concerns include:

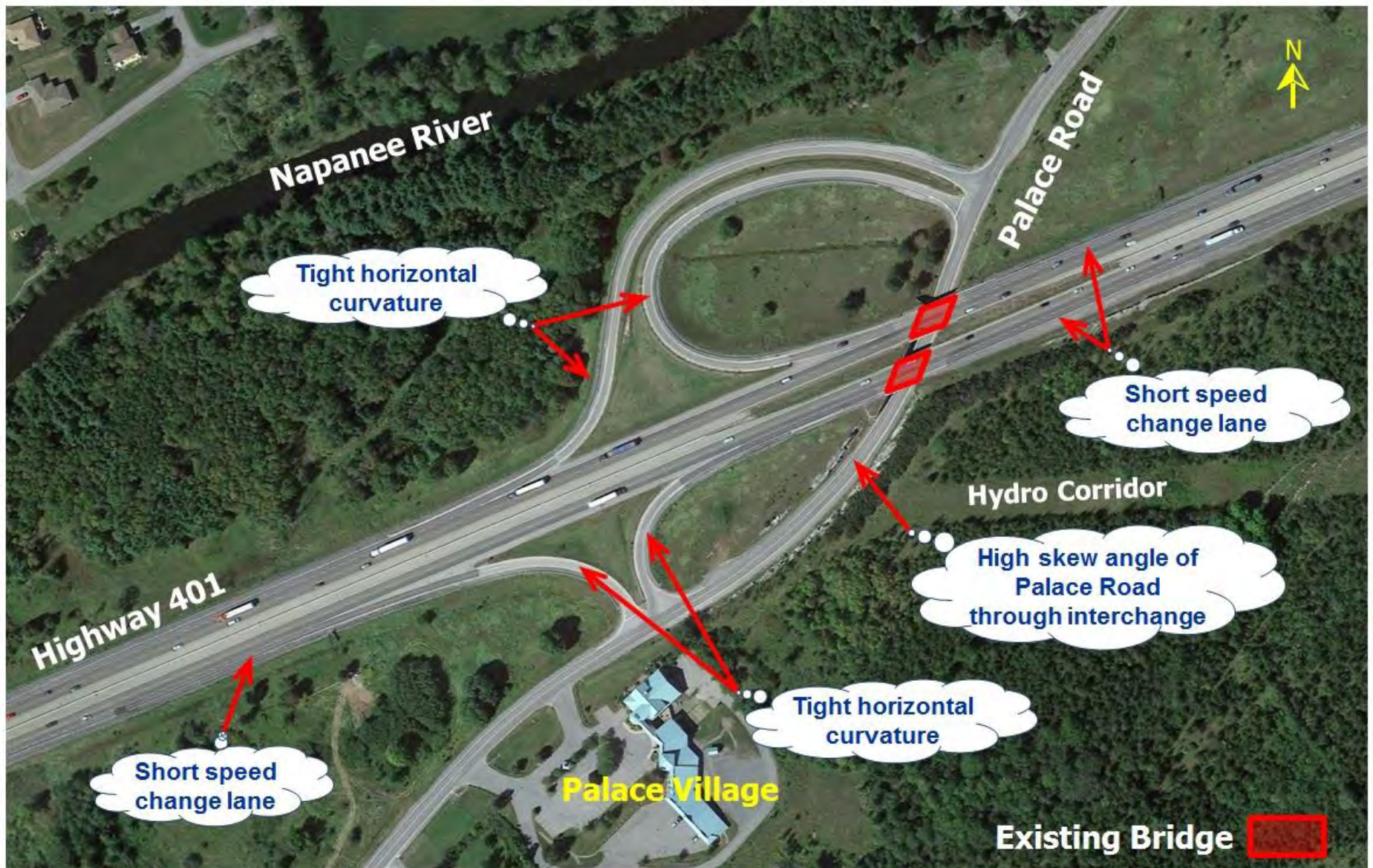
- Less than desirable speed change lane lengths for the eastbound off-ramp, eastbound on-ramp and westbound off-ramp;
 - Tight horizontal curvature along the two off-ramps which require additional deceleration along the speed change lanes prior to reaching the bullnose. Horizontal curvature along the eastbound and westbound on-ramps is also less than desirable;
 - Right shoulder adjacent to westbound on-ramp narrows on approach to the Napanee River, and guiderail in advance of bridge is often struck;
 - The Palace Road interchange is located through a section of Highway 401 on a 3% vertical grade, rising to the east. This grade impedes the acceleration of trucks and cars entering eastbound Highway 401 from Palace Road, resulting in operational and safety concerns where ramp traffic merges with highway traffic; and,
 - Sight distance at the westbound off-ramp turning north (looking to the south) and the eastbound off-ramp turning west (looking to the northeast) is insufficient due to the proximity of these interchanges to the Palace Road overpass structures and the horizontal curvature of Palace Road through the interchange.
- The collision history review identified increased collision numbers along Highway 401 adjacent to the on and off-ramp speed change lanes in both directions, which can be attributed to the less than desirable interchange geometry.
 - The queue length that would be anticipated with a reduction to a single lane during a bridge rehabilitation (without improvements to the road network or new bridge construction) would extend between 9.3 km (fall) to 12.7 km (summer) along Highway 401 in the eastbound direction. In the westbound direction, the anticipated queue would extend between 6.6 km (fall) to nearly 20 km (summer) along Highway 401. In addition, closure of the ramps across the existing bridges would require detours between 4.2 km and 7 km along the local road network.

4.2 Opportunities

Based on the problems identified in **Section 4.1**, the following opportunities were determined:

- Development of a strategy to address the structural rehabilitation or replacement needs of the twin Palace Road bridges under Highway 401 is required;
- Improvements of interchange geometrics to reduce collision risks, improve overall safety at the interchange, and provide for good overall traffic operations along Highway 401, Palace Road and at the interchange into the future; and,
- Development of an ultimate plan for the Palace Road interchange to provide for efficient and cost-effective implementation of the necessary structural rehabilitation or replacement works and minimize future throwaway.

Figure 11: Transportation Issues at the Interchange



5. Generation, Assessment and Evaluation of Interchange Improvement Alternatives

Following the identification of problems and opportunities associated with the Project, the Project Team developed and assessed broad-based alternatives to address the identified transportation needs. Once the preferred solution was determined, alternatives to address the operational challenges associated with the interchange and to accommodate both the short-term and long-term structural rehabilitation or replacement requirements were developed. Alternatives were developed and assessed separately for the north and south sides of the interchange.

First, a “long-list” of alternatives was developed and presented at PIC #1. The long list was subjected to a screening-level qualitative assessment, which led to the identification of a “short-list” of alternatives. The alternatives were then evaluated based on the set of criteria (listed in **Section 5.3**) using a weighted score arithmetic evaluation system to select the Technically Preferred Preliminary Design Alternative.

5.1 Alternatives to the Undertaking

Alternatives to the Undertaking are broad-based alternatives that represent functionally different ways of addressing the identified transportation needs. As described below, the Project Team considered a range of Alternatives to the Undertaking, as well as the “Do Nothing” alternative, which was used as a baseline for comparison purposes.

- Do nothing;
- Structural improvements; and,
- Improvements to the Highway 401 interchange at Palace Road (including improvements to the structure).

The do nothing alternative does not address the existing structural needs (e.g. the existing structures cannot accommodate the necessary structural works without long-term lane closures or staging impacts along Highway 401) and future structural needs (e.g. a major rehabilitation or full replacement of the twin Highway 401 bridges over Palace Road is anticipated within the next 5 to 10 years).

The structural improvements alternative addresses the requirement of a future major rehabilitation or full replacement of the structures within the next 5 to 10 years. However it does not address the undesirable geometric elements that have been identified as part of this study (i.e. tight horizontal curvature along all ramps, short length of speed change lanes for the eastbound and westbound off-ramps, etc.). As such this alternative may be considered along with other alternatives.

Improvements to the Highway 401 interchange at Palace Road have the potential to resolve the majority of the main structural, operational and geometric deficiencies at the interchange.

After careful consideration, it was determined that improvements to the Highway 401 interchange at Palace Road was the preferred solution to be carried forward.

5.2 Long List of Alternatives

A long list of interchange alternatives (drawings available in **Appendix B** and descriptions below) was developed and subjected to a screening-level qualitative assessment based on the following technical and environmental criteria:

- Construction staging;
- Traffic operations, including geometrics and safety;
- Structural requirements;
- Construction cost;
- Socio-economic impacts;
- Natural environment impacts; and,
- Cultural heritage impacts.

The long list of alternatives included a “do-nothing” alternative along with ten (10) alternatives for the north half of the interchange and 14 alternatives for the south half of the interchange. The “do nothing” alternative was considered in order to provide a baseline against which of the effects of other alternatives could be compared. The “do nothing” alternative involved no change to the existing interchange ramps and would include a rehabilitation or replacement of the existing Highway 401 bridge over Palace Road. The ‘do nothing’ alternative to the Project does not address the problems and opportunities identified in **Section 4**, and was therefore not considered as a feasible alternative.

The following sections describe the north and south alternatives that were considered.

5.2.1 North Side of the Interchange

The following alternatives for the north side of the Highway 401 interchange at Palace Road were considered:

- Alternative E-N-1 Parclo A2 with minor Palace Road realignment and new overpass structures:
 - Standard westbound buttonhook off-ramp;
 - Directional on-ramp (southbound Palace Road to westbound Hwy 401);
 - Inner-loop on-ramp (northbound Palace Road to westbound Hwy 401);
 - Maintain same general alignment of Palace Road (slight correction in skew angle); and,
 - Replace existing bridges with new overpass structures at same general location (reduce skew angle).
- Alternative E-N-2 Standard buttonhook with minor Palace Road realignment and new overpass structures:

- Westbound buttonhook off-ramp;
- Westbound buttonhook on-ramp (southbound and northbound Palace Road to westbound Hwy 401);
- Left-turn from southbound Palace Road to westbound on-ramp; and,
- Replace existing bridges with new overpass structures either west of existing alignment or at same general location as existing (reduce skew angle).
- Alternative E-N-3 Buttonhook with westbound directional on-ramp, northbound left-turn, minor Palace Road realignment and new overpass structures:
 - Standard westbound buttonhook off-ramp;
 - Directional on-ramp (southbound Palace Road to westbound Hwy 401);
 - Left-turn from northbound Palace Road to westbound on-ramp;
 - Maintain same general alignment of Palace Road (slight correction in skew angle); and,
 - Replace existing bridges with new overpass structures at same general location (reduce skew angle).
- Alternative E-N-4 Diamond with minor Palace Road realignment and new overpass structures:
 - Westbound diamond off and on-ramps;
 - Left-turn from northbound Palace Road to westbound on-ramp;
 - Maintain same general alignment of Palace Road (slight correction in skew angle); and,
 - Replace existing bridges with new overpass structures at same general location (reduce skew angle).
- Alternative E-N-5 Diamond with roundabout, minor Palace Road realignment, and new overpass structures:
 - Westbound diamond off-ramp into roundabout;
 - Westbound on-ramp from roundabout;
 - Partial realignment of Palace Road approaching roundabout; and,
 - Replace existing bridges with new overpass structures slightly to east of existing bridges, with reduced skew angle.
- Alternative W-N-1 Parclo A2 with westerly Palace Road realignment and new underpass structure:
 - Standard westbound buttonhook off-ramp;
 - Directional on-ramp (southbound Palace Road to westbound Hwy 401);
 - Inner-loop on-ramp (northbound Palace Road to westbound Hwy 401);

- Realign Palace Road to the west at Highway 401 crossing and construct new underpass structure; and,
- Remove existing Palace Road structures.
- Alternative W-N-2 Standard buttonhook with westerly Palace Road realignment and new underpass structure:
 - Westbound buttonhook off-ramp;
 - Westbound buttonhook on-ramp (southbound and northbound Palace Road to westbound Hwy 401);
 - Left-turn from southbound Palace Road to westbound on-ramp;
 - Realign Palace Road to the west at Highway 401 crossing and construct new underpass structure; and,
 - Remove existing Palace Road structures.
- Alternative W-N-3 Buttonhook with westbound direction on-ramp, northbound left-turn, westerly Palace Road realignment and new underpass structure:
 - Standard westbound buttonhook off-ramp;
 - Directional on-ramp (southbound Palace Road to westbound Hwy 401);
 - Left-turn from northbound Palace Road to westbound on-ramp;
 - Realign Palace Road to the west at Highway 401 crossing and construct new underpass structure; and,
 - Remove existing Palace Road structures.
- Alternative W-N-4 Diamond with Westerly Palace Road realignment and new underpass structure:
 - Westbound diamond off and on-ramps;
 - Left-turn from northbound Palace Road to westbound on-ramp;
 - Realign Palace Road to the west at Highway 401 crossing and construct new underpass structure; and,
 - Remove existing Palace Road structures.
- Alternative W-N-5: Diamond with roundabout, westerly Palace Road realignment and new underpass structure:
 - Westbound diamond off-ramp into roundabout;
 - Westbound on-ramp from roundabout ;
 - Realign Palace Road to the west at Highway 401 crossing and construct new underpass structure with reduced skew angle; and,
 - Remove existing Palace Road structures.

Of the long-list of alternatives, five (5) north alternatives were screened out and not carried forward for further analysis. The full long-list alternative screening summary can

be found in **Appendix C**. The alternatives that were carried forward are further described in **Section 5.3** under the Short List of Alternatives.

5.2.2 South Side Alternatives

The following alternatives for the south side of the Highway 401 interchange at Palace Road were considered:

- Alternative E-S-1 Buttonhook/Parclo with minor Palace Road realignment and new overpass structures:
 - Standard eastbound buttonhook off-ramp;
 - Directional on-ramp (northbound Palace Road to eastbound Highway 401);
 - Inner-loop on-ramp (southbound Palace Road to eastbound Highway 401);
 - Maintain same general alignment of Palace Road (slight correction in skew angle); and,
 - Replace existing bridges with new overpass structures at same general location (reduce skew angle).
- Alternative E-S-2 Standard buttonhook with minor Palace Road realignment and new overpass structures:
 - Standard eastbound buttonhook off-ramp;
 - Eastbound buttonhook on-ramp (northbound and southbound Palace Road to eastbound Hwy 401);
 - Left-turn from northbound Palace Road to eastbound on-ramp;
 - Maintain same general alignment of Palace Road (slight correction in skew angle); and,
 - Replace existing bridges with new overpass structures at same general location (reduce skew angle).
- Alternative E-S-3 Standard buttonhook with eastbound directional on-ramp, southbound left-turn and minor Palace Road realignment and new overpass structures:
 - Standard eastbound buttonhook off-ramp;
 - Directional on-ramp (northbound Palace Road to eastbound Hwy 401);
 - Left-turn from southbound Palace Road to eastbound on-ramp;
 - Maintain same general alignment of Palace Road (slight correction in skew angle); and,
 - Replace existing bridges with new overpass structures at same general location (reduce skew angle).

- Alternative E-S-4 Diamond with minor Palace Road realignment and new overpass structures:
 - Eastbound diamond/buttonhook off-ramp;
 - Eastbound diamond on-ramp (northbound and southbound Palace Road to eastbound Hwy 401);
 - Left-turn from southbound Palace Road to eastbound on-ramp;
 - Maintain same general alignment of Palace Road (slight correction in skew angle); and,
 - Replace existing bridges with new overpass structures at same general location (reduce skew angle).
- Alternative E-S-5 Diamond with roundabout and minor Palace Road realignment and new overpass structures:
 - Eastbound diamond off-ramp into roundabout;
 - Eastbound on-ramp from roundabout;
 - Partial realignment of Palace Road approaching roundabout; and,
 - Replace existing bridges with new overpass structures slightly to west, with reduced skew angle.
- Alternative E-S-6 Partial diamond to roundabout with directional on-ramp and minor Palace Road realignment and new overpass structures:
 - Eastbound diamond off-ramp into roundabout;
 - Eastbound directional on-ramp from Palace Road (U-turn required through roundabout for traffic from southbound Palace Road);
 - Maintain same general alignment of Palace Road (slight correction in skew angle); and,
 - Replace existing bridges with new overpass structures at same general location (reduce skew angle).
- Alternative E-S-7 Parclo B with minor Palace Road realignment and new overpass structures:
 - Eastbound Parclo B off-ramp east of Palace Road;
 - Eastbound on-ramp from Palace Road (Left-turn from southbound Palace Road);
 - Maintain same general alignment of Palace Road (slight correction in skew angle); and,
 - Replace existing bridges with new overpass structures at same general location (reduce skew angle).
- Alternative W-S-1 Buttonhook/Parclo with Palace Road westerly realignment and new underpass structure:
 - Standard eastbound buttonhook off-ramp;

- Directional on-ramp (northbound Palace Road to eastbound Hwy 401);
- Inner-loop on-ramp (southbound Palace Road to eastbound Hwy 401);
- Realign Palace Road to the west at Highway 401 crossing and construct new underpass structure;
- Merge two eastbound on-ramps prior to merging with Hwy 401; and,
- Remove existing Palace Road structures.
- Alternative W-S-2 Standard buttonhook with Palace Road westerly realignment and new underpass structure:
 - Standard eastbound buttonhook off-ramp;
 - Eastbound buttonhook on-ramp (northbound and southbound Palace Road to eastbound Hwy 401);
 - Left-turn from northbound Palace Road to eastbound on-ramp;
 - Realign Palace Road to the west at Highway 401 crossing and construct new underpass structure; and,
 - Remove existing Palace Road structures.
- Alternative W-S-3 Standard buttonhook with eastbound directional on-ramp, southbound left-turn and Palace Road westerly realignment and new underpass structure:
 - Standard eastbound buttonhook off-ramp;
 - Directional on-ramp (northbound Palace Road to eastbound Hwy 401);
 - Left-turn from southbound Palace Road to eastbound on-ramp;
 - Realign Palace Road to the west at Highway 401 crossing and construct new underpass structure; and,
 - Remove existing Palace Road structures.
- Alternative W-S-4 Diamond with Palace Road westerly realignment and new underpass structure :
 - Eastbound diamond off-ramp;
 - Eastbound diamond on-ramp (northbound and southbound Palace Road to eastbound Hwy 401);
 - Left-turn from southbound Palace Road to eastbound on-ramp;
 - Realign Palace Road to the west at Highway 401 crossing and construct new underpass structure; and,
 - Remove existing Palace Road structures.
- Alternative W-S-5 Diamond with roundabout and Palace Road westerly realignment and new underpass structure:
 - Eastbound diamond off-ramp into roundabout;

- Eastbound on-ramp from roundabout;
- Realign Palace Road to the west at Highway 401 crossing and construct new underpass structure with reduced skew angle; and,
- Remove existing Palace Road structures.
- Alternative W-S-6 Parclo B with Palace Road westerly realignment and new underpass structure:
 - Eastbound Parclo B off-ramp to westerly realignment of Palace Road;
 - Eastbound on-ramp from Palace Road (Left-turn from southbound Palace Road);
 - Left-turn from southbound Palace Road to eastbound on-ramp;
 - Realign Palace Road to the west at Highway 401 crossing and construct new underpass structure; and,
 - Remove existing Palace Road structures.
- Alternative W-S-7 Parclo B with roundabout and Palace Road westerly realignment and new underpass structure:
 - Eastbound Parclo B off-ramp into roundabout;
 - Eastbound on-ramp from roundabout;
 - Realign Palace Road to the west at Highway 401 crossing and construct new underpass structure with reduced skew angle; and,
 - Remove existing Palace Road structures.

Of the long-list of alternatives, seven (7) south alternatives were screened out and not carried forward for further analysis. The full long-list alternative screening summary can be found in **Appendix C**. The alternatives that were carried forward are further described in **Section 5.3** under the Short List of Alternatives.

5.3 Short List of Alternatives

The short list of interchange alternatives that were carried forward (drawings available in **Appendix D**) were evaluated based on the set of criteria provided in **Table 8**.

A weighted score arithmetic evaluation system was used, which involves assigning relative weightings to each of the evaluation categories and criteria based on their level of importance. Criteria were measured either quantitatively or qualitatively, and then the scores were multiplied by a relative weight for that indicator. The weighted scores for each indicator were then summed to arrive at a total score for each alternative. The alternative that produced the highest total weighted score was preferred as it had the best balance of benefits and impacts to the natural, socio-economic, and cultural environmental, as well as transportation and cost considerations.

Table 8: Criteria for Evaluation of Alternatives

Evaluation Component	Category Weighting	Criteria
Transportation	55%	<ul style="list-style-type: none"> • Interchange operations • Safety • Geometrics
Natural Environment	15%	<ul style="list-style-type: none"> • Terrestrial ecosystems • Fish and fish habitat • Groundwater
Socio-Economic Environment	15%	<ul style="list-style-type: none"> • Aesthetics • Noise • Community effects • Waste and contamination
Cultural Environment	5%	<ul style="list-style-type: none"> • Archaeological resources • Built heritage
Cost and Constructability	10%	<ul style="list-style-type: none"> • Construction staging • Construction cost • Utility impacts

The following sections describe the alternatives that were carried forward and summarize the evaluation outcomes.

5.3.1 North Side of Interchange

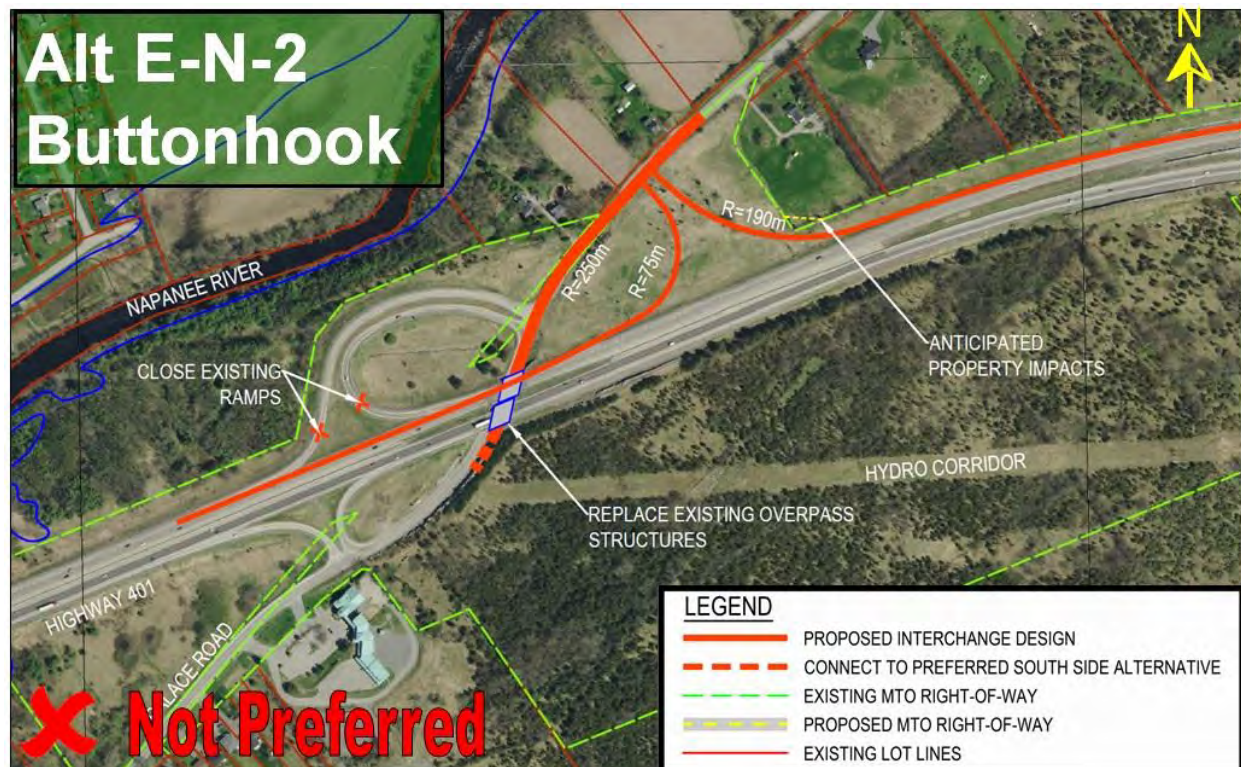
5.3.1.1 Alternative E-N-2 Buttonhook

Alternative E-N-2 is described as a standard buttonhook configuration with a minor realignment of Palace Road (refer to **Figure 12**). This alternative involves the following improvements:

- Westbound buttonhook off-ramp;
- Westbound buttonhook on-ramp (southbound and northbound Palace Road to westbound Highway 401);
- Left-turn from southbound Palace Road to westbound on-ramp;
- Maintain same general alignment of Palace Road (slight change in skew angle); and,
- Replace existing bridges with new overpass structures at same general location (reduce skew angle).

This alternative avoids potential displacement of residential property with local cultural heritage value and has the lowest overall construction cost; however, it requires temporary widening of one existing Palace Road structure and a Highway 401 median cross-over to complete construction. The new configuration will also results in greater impacts to Highway 401 traffic operations during future bridge rehabilitations.

Figure 12: Alternative E-N-2 Buttonhook



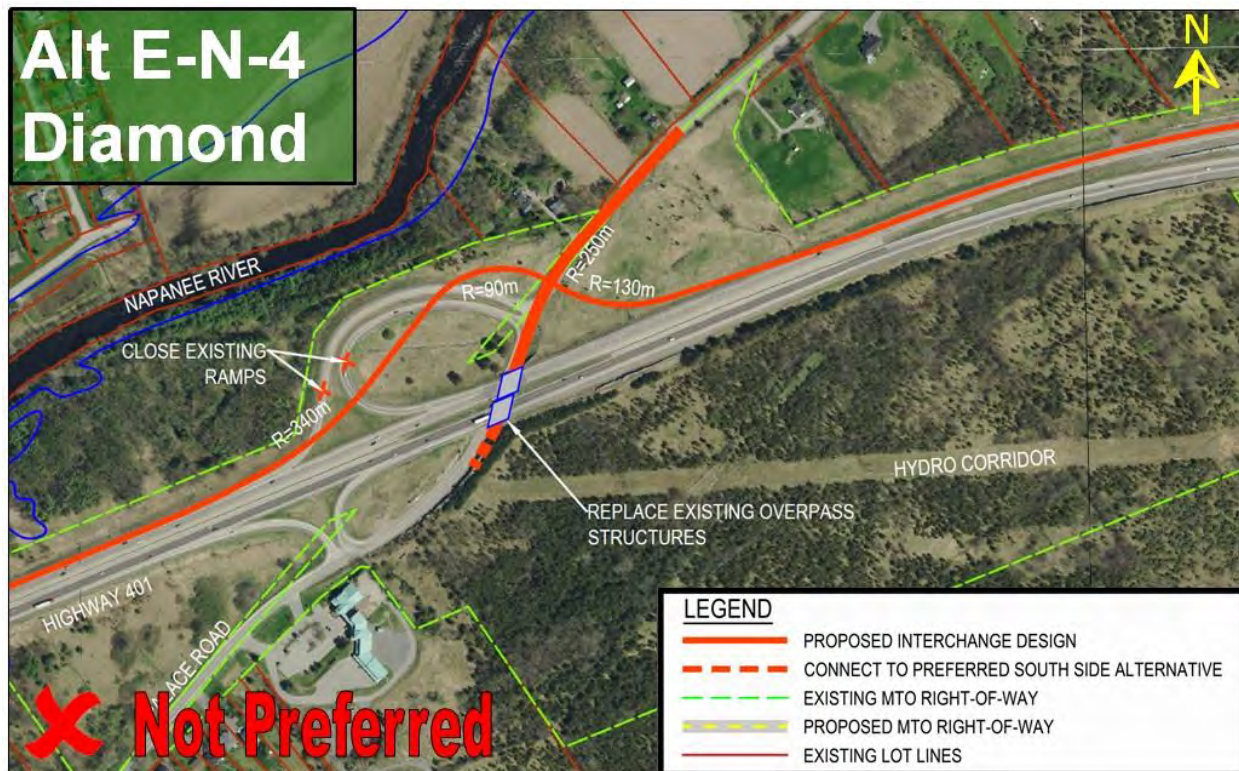
5.3.1.2 Alternative E-N-4 Diamond

Alternative E-N-4 is described as a diamond configuration with a minor realignment of Palace Road (refer to **Figure 13**). This alternative involves the following improvements:

- Westbound diamond on and off ramps;
- Left-turn from northbound Palace Road to westbound on-ramp;
- Maintain same general alignment of Palace Road (slight change in skew angle); and,
- Replace existing bridges with new overpass structures at same general location (reduce skew angle).

This alternative avoids potential displacement of residential property with local heritage value and is preferred or equally preferred from a natural, socio-economic and cultural environment perspective; however, this diamond configuration has less than desirable turning sight distance to and from the ramp terminal intersection. This alternative requires temporary widening of one existing Palace Road structure and a Highway 401 median cross-over to complete construction and will result in greater impacts to Highway 401 traffic operations during future bridge rehabilitations.

Figure 13: Alternative E-N-4 Diamond



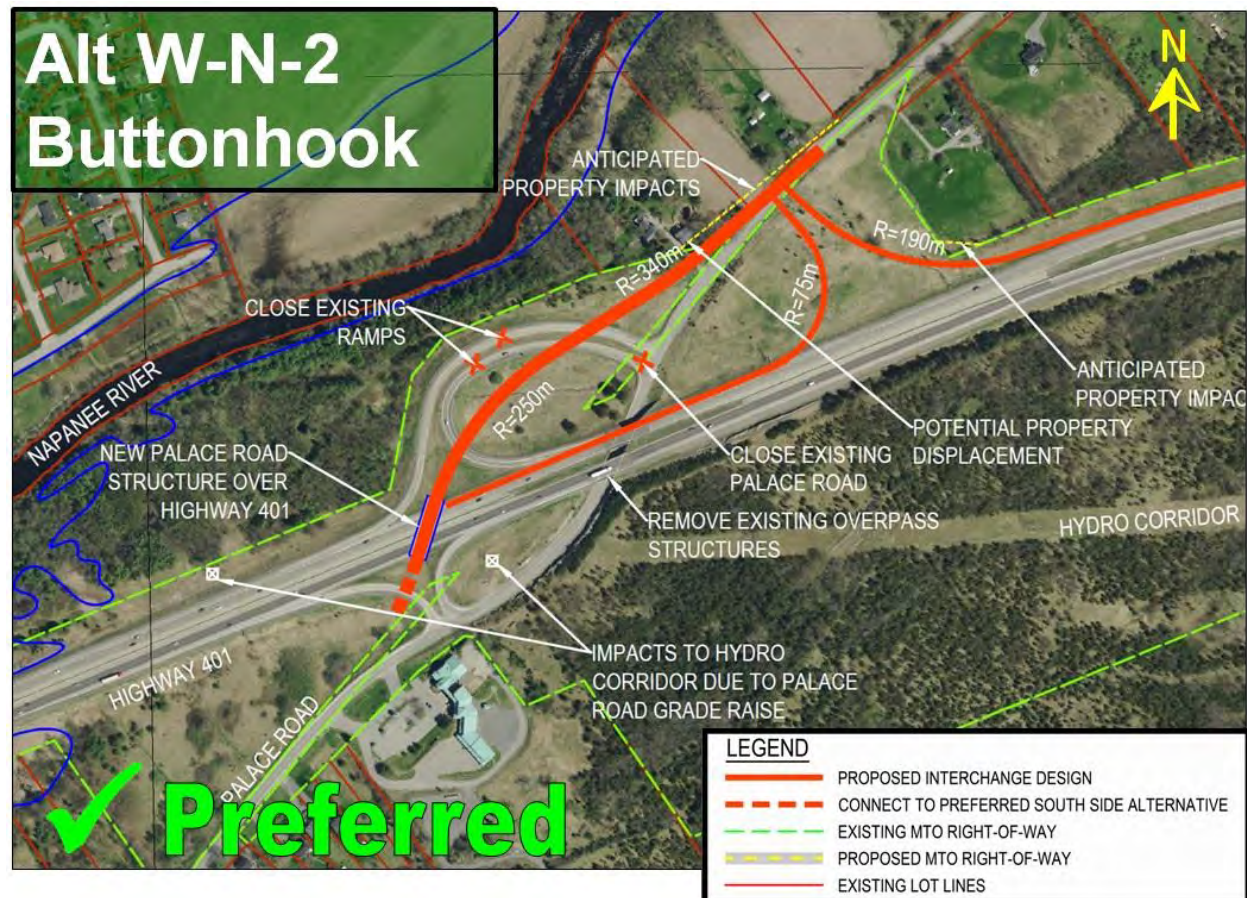
5.3.1.3 Alternative W-N-2 Buttonhook

Alternative W-N-2 is described as a standard buttonhook configuration with a westerly realignment of Palace Road (refer to **Figure 14**). This alternative involves the following improvements:

- Westbound buttonhook off-ramp;
- Westbound buttonhook on-ramp (southbound and northbound Palace Road to westbound Highway 401);
- Left-turn from southbound Palace Road to westbound on-ramp;
- Realign Palace Road to the west of the existing Highway 401 crossing and construct new underpass structure with reduced skew angle; and,
- Remove existing Palace Road structures.

This alternative avoids any temporary widening of the Highway 401 structures over Palace Road and avoids Highway 401 median cross-overs. This configuration will result in reduced impacts to Highway 401 traffic operations during future rehabilitations. This alternative has potential to displace residential property with local cultural heritage value and impacts the existing hydro transmission corridor.

Figure 14: Alternative W-N-2 Buttonhook



5.3.1.4 Alternative W-N-4 Diamond

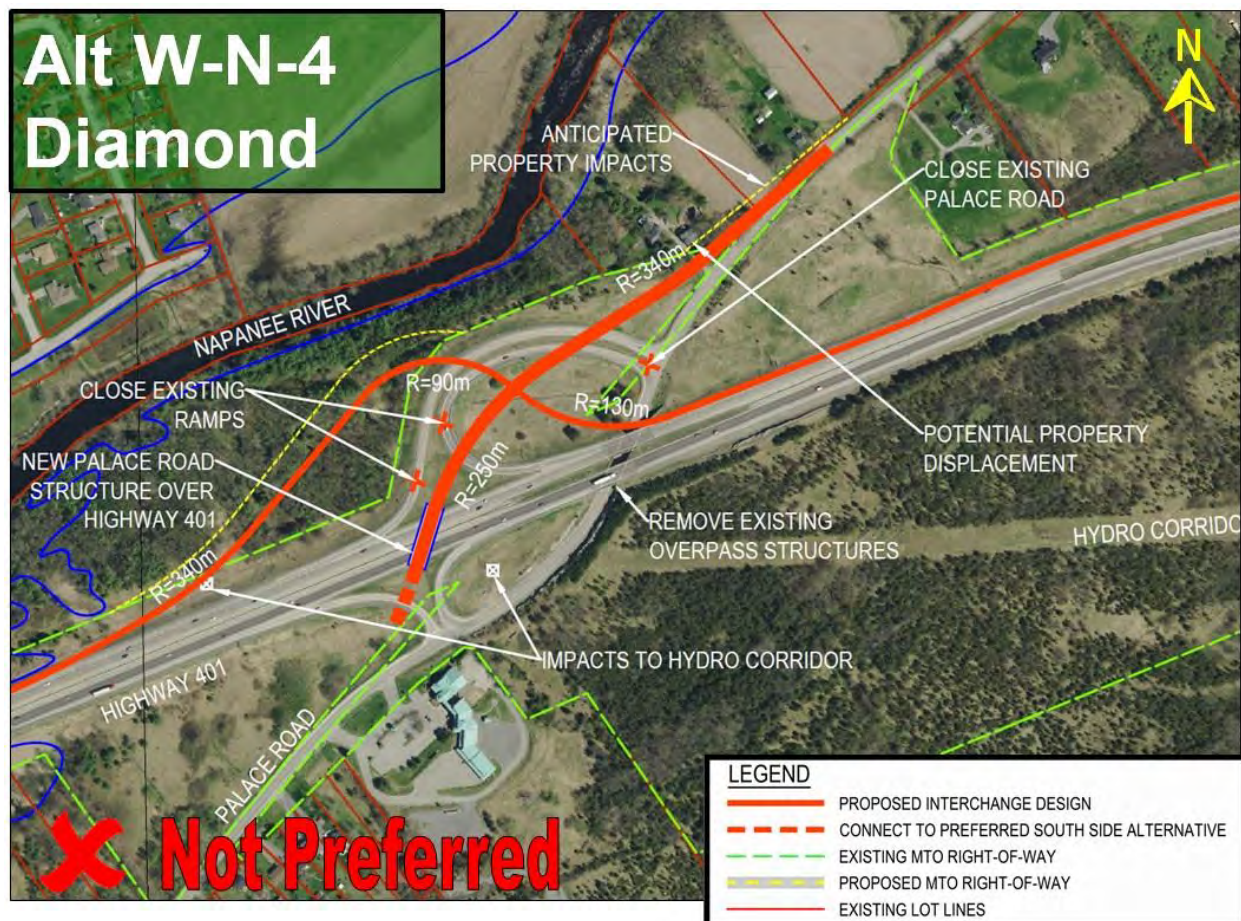
Alternative W-N-4 is described as a diamond configuration with a westerly realignment of Palace Road (refer to **Figure 15**). This alternative involves the following improvements:

- Westbound diamond off and on-ramps;
- Left-turn from northbound Palace Road to westbound on-ramp;
- Realign Palace Road to the west of the existing Highway 401 crossing and construct new underpass structure; and,
- Remove existing Palace Road structures.

This alternative addresses the geometric and operational concerns associated with the existing ramps with low-moderate complexity of construction.

This alternative has reduced impacts to traffic operations along Highway 401 and along Palace Road during this proposed construction and future rehabilitation works. This alternative, however, has potential to displace residential property with local cultural heritage value, has less than desirable turning sight distance to and from the intersection, requires widening of the Napanee River bridge and has the highest construction cost and impacts to the existing hydro transmission corridor.

Figure 15: Alternative W-N-4 Diamond



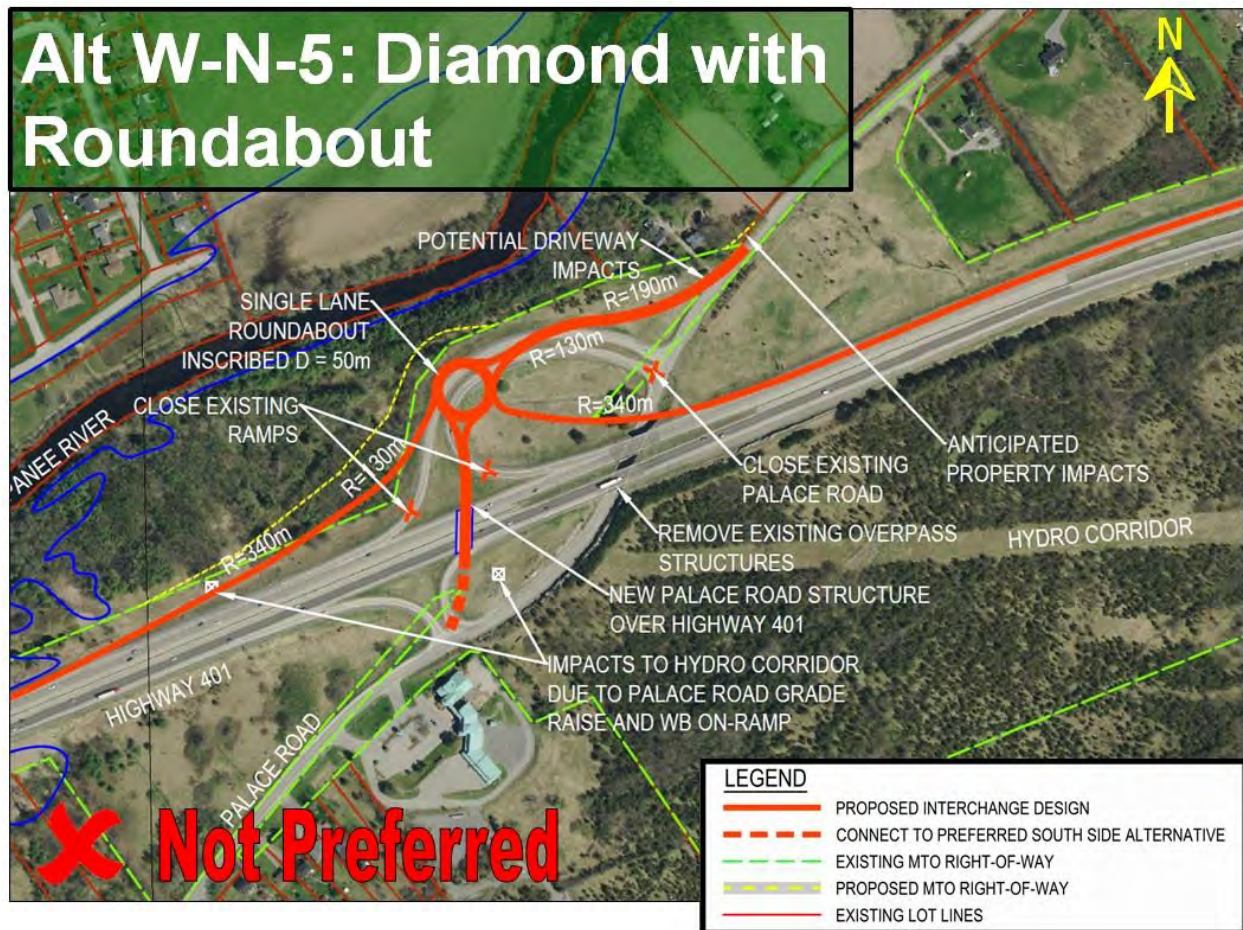
5.3.1.5 Alternative W-N-5 Diamond with Roundabout

Alternative W-N-5 is described as a diamond configuration with a roundabout and westerly realignment of Palace Road (refer to **Figure 16**). This alternative involves the following improvements:

- Westbound diamond off-ramp into roundabout;
- Westbound on-ramp from roundabout;
- Realign Palace Road to the west of the existing Highway 401 crossing and construct new underpass structure with reduced skew angle; and,
- Remove existing Palace Road structures.

This alternative avoids the potential displacement of residential property with local cultural heritage value and reduces impacts to traffic operations along Highway 401 and along Palace Road during current and future construction. The roundabout configuration also eliminates direct left-turns which is anticipated to reduce the severity of collisions. This alternative; however, is an unfamiliar configuration and less compatible with trucks, it requires widening of the Highway 401 bridge over the Napanee River (increased natural environment impacts), and has the highest construct cost and impacts to the existing hydro transmission corridor.

Figure 16: Alternative W-N-5 Diamond with Roundabouts



5.3.2 South Side of Interchange

5.3.2.1 Alternative E-S-2 Buttonhook

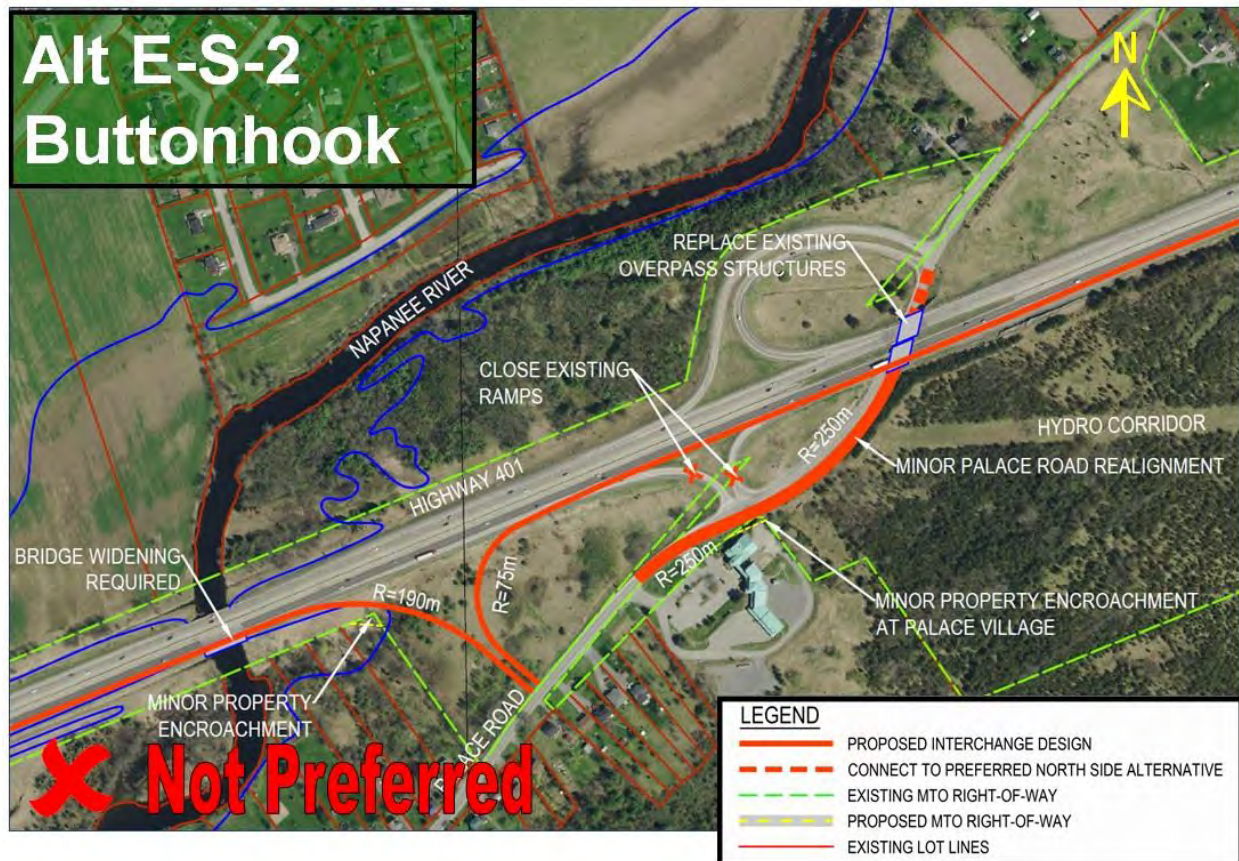
Alternative E-S-2 is described as a standard buttonhook configuration with a minor realignment of Palace Road (refer to **Figure 17**). This alternative involves the following improvements:

- Standard eastbound buttonhook off-ramp;
- Eastbound buttonhook on-ramp (northbound and southbound Palace Road to eastbound Highway 401);
- Left-turn from northbound Palace Road to eastbound on-ramp;
- Maintain same general alignment of Palace Road (slight change in skew angle); and,
- Replace existing bridges with new overpass structures at same general location (reduce skew angle).

This alternative avoids impacts to the hydro transmission corridor; however, it requires widening of one of the existing Highway 401 bridges over Palace Road and requires a Highway 401 median cross-over to complete construction. This alternative results in

greater impacts to Highway 401 traffic operations during future bridge rehabilitations and requires widening of the Highway 401 bridge over the Napanee River.

Figure 17: Alternative E-S-2 Buttonhook



5.3.2.2 Alternative E-S-4 Diamond

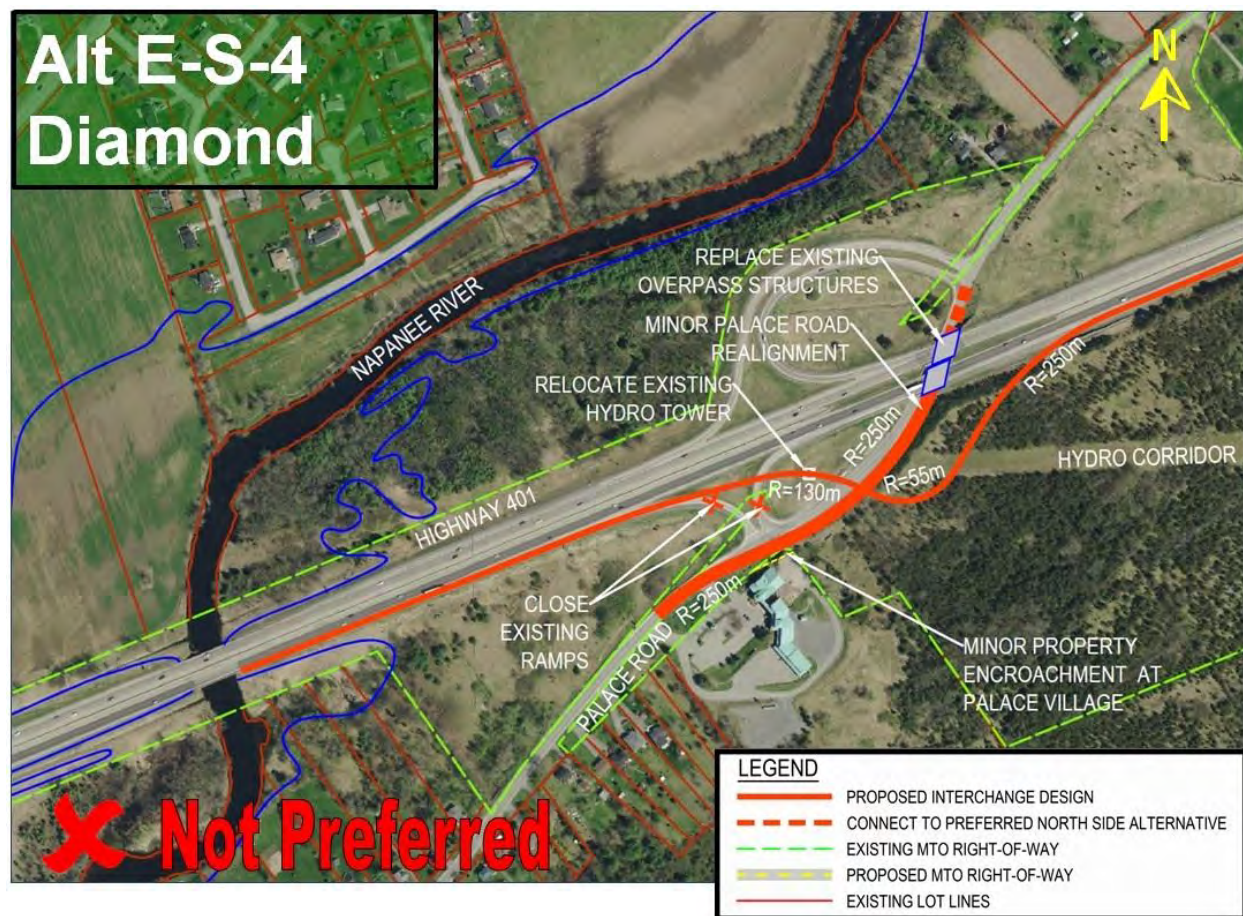
Alternative E-S-4 is described as a diamond configuration with a minor realignment of Palace Road (refer to **Figure 18**). This alternative involves the following improvements:

- Eastbound diamond/buttonhook off-ramp;
- Eastbound diamond on-ramp (northbound and southbound Palace Road to eastbound Highway 401);
- Left-turn from southbound Palace Road to eastbound on-ramp;
- Maintain same general alignment of Palace Road (slight change in skew angle); and,
- Replace existing bridges with new overpass structures at same general location (reduce skew angle).

This alternative is preferred or equally preferred from a natural, socio-economic and cultural environment perspective and has lower construct costs than the other options. This alternative; however, has less than desirable turning sight distance at the intersection, requires temporary widening of one of the Highway 401 bridges over Palace Road and a Highway 401 median cross-over to complete construction, and

results in greater impacts to Highway 401 traffic operations during future bridge rehabilitations.

Figure 18: Alternative E-S-4 Diamond



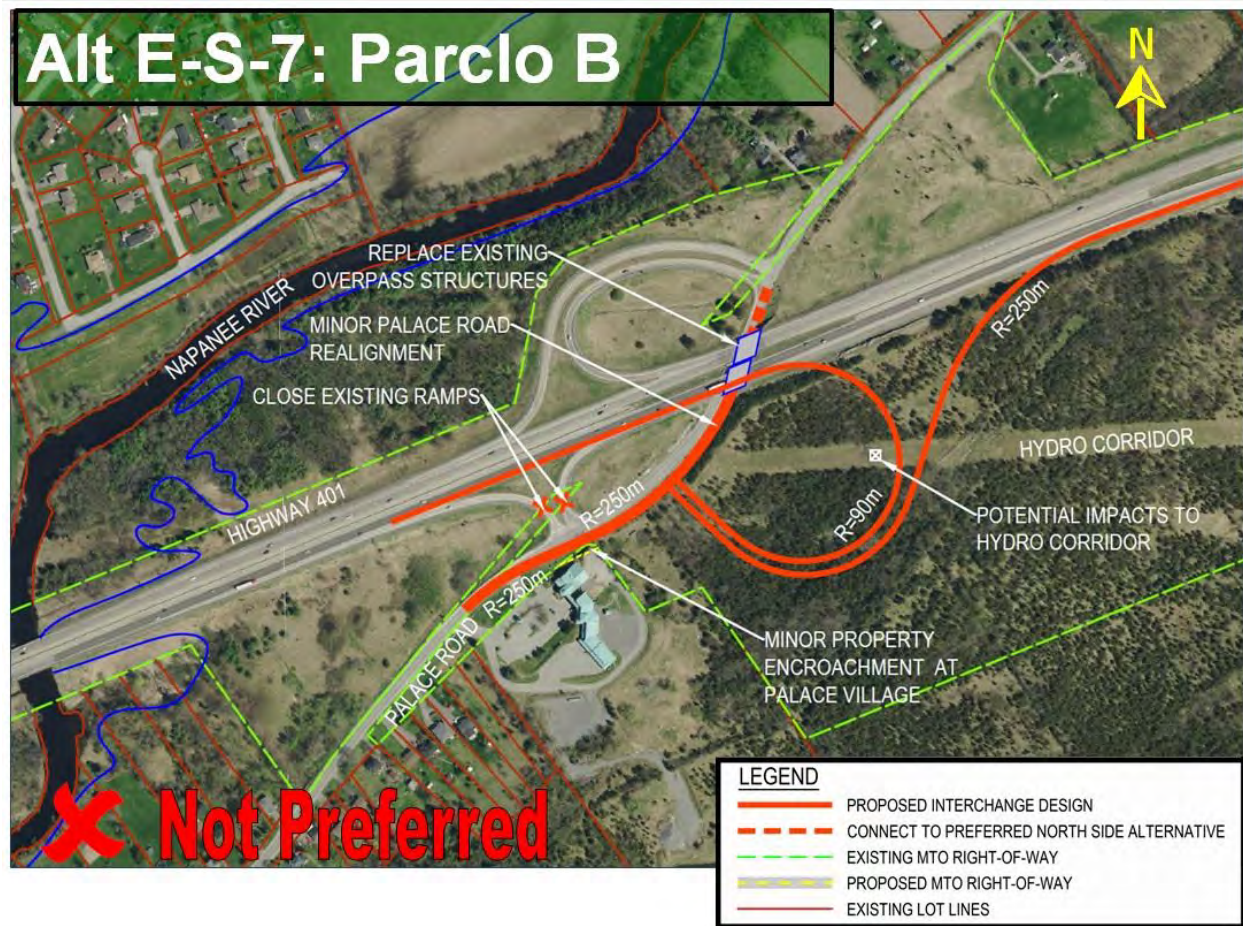
5.3.2.3 Alternative E-S-7 Parclo B

Alternative E-S-7 is described as a Parclo B configuration with a minor realignment of Palace Road (refer to **Figure 19**). This alternative involves the following improvements:

- Eastbound Parclo B off-ramp east of Palace Road;
- Eastbound on-ramp from Palace Road (left-turn from southbound Palace Road);
- Maintain same general alignment of Palace Road (slight change in skew angle); and,
- Replace existing bridges with new overpass structures at same general location (reduce skew angle).

This alternative is preferred or equally preferred from a socio-economic and cultural environment perspective; however, it has less than desirable turning sight-distance at the intersection. It also requires temporary widening of one of the Highway 401 bridges over Palace Road and a Highway 401 median cross-over to complete construction, results in greater impacts to Highway 401 traffic operations during future bridge rehabilitations and has the highest construction cost.

Figure 19: Alternative E-S-7 Parclo B



5.3.2.4 Alternative W-S-2 Buttonhook

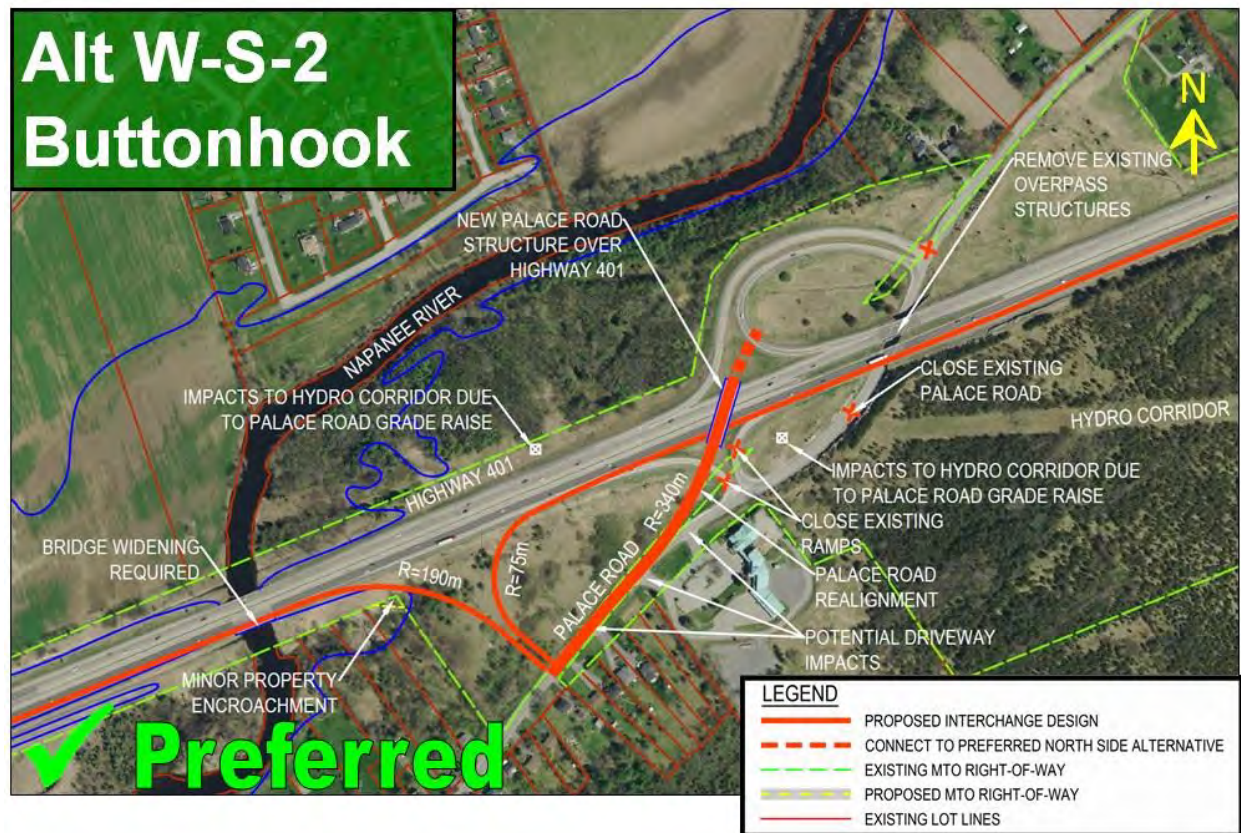
Alternative W-S-2 is described as a standard buttonhook configuration with a westerly realignment of Palace Road (refer to **Figure 20**). This alternative involves the following improvements:

- Standard eastbound buttonhook off-ramp;
- Eastbound buttonhook on-ramp (northbound and southbound Palace Road to eastbound Highway 401);
- Left-turn from northbound Palace Road to eastbound on-ramp;
- Realign Palace Road to the west of the existing Highway 401 crossing and construct new underpass structure; and,
- Remove existing Palace Road structures.

This alternative avoids temporary widening of the Highway 401 bridge over Palace Road and a Highway 401 median cross-over during construction. This alternative provides the most desirable overall geometrics, reduces impacts to Highway 401 traffic operations during future bridge rehabilitations and has a lower construction cost than the other options. This alternative; however, may require widening of the Highway 401

bridge over the Napanee River, results in impacts to the existing hydro transmission corridor, and results in impacts to residential and commercial driveways.

Figure 20: Alternative W-S-2 Buttonhook



5.3.2.5 Alternative W-S-4 Diamond

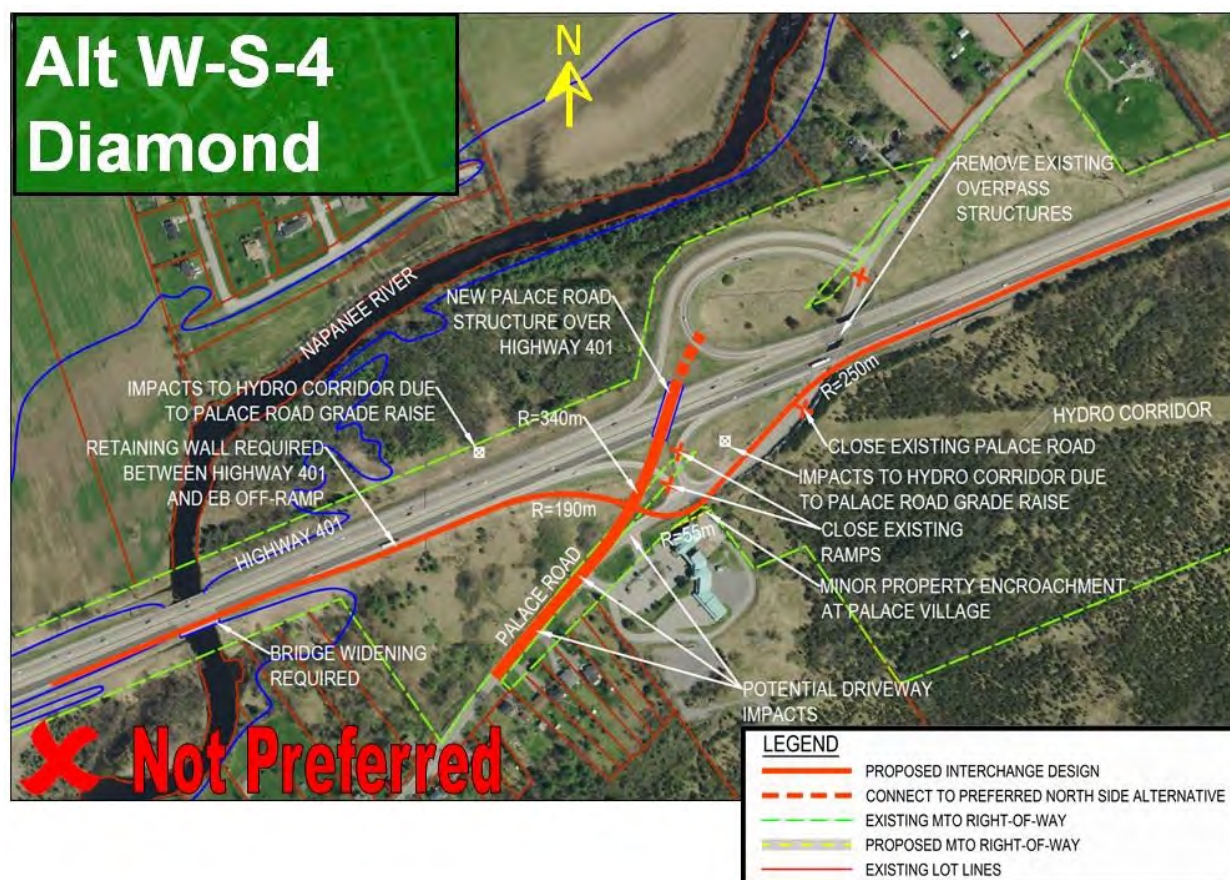
Alternative W-S-4 is described as a diamond configuration with a westerly realignment of Palace Road (refer to **Figure 21**). This alternative involves the following improvements:

- Eastbound diamond off-ramp;
- Eastbound diamond on-ramp (northbound and southbound Palace Road to eastbound Highway 401);
- Left-turn from southbound Palace Road to eastbound on-ramp;
- Realign Palace Road to the west of the existing Highway 401 crossing and construct new underpass structure; and,
- Remove existing Palace Road structures.

This alternative avoids temporary widening of the Highway 401 bridges over Palace Road and a Highway 401 median cross-over during construction. This alternative also reduces impacts to Highway 401 traffic operations during future bridge rehabilitations. This alternative; however, has less than desirable turning sight distance at the intersection, requires widening of the Highway 401 bridge over the Napanee River,

impacts the existing hydro transmission corridor and results in impacts to residential and commercial driveways.

Figure 21: Alternative W-S-4 Diamond



5.3.2.6 Alternative W-S-5 Diamond with Roundabout

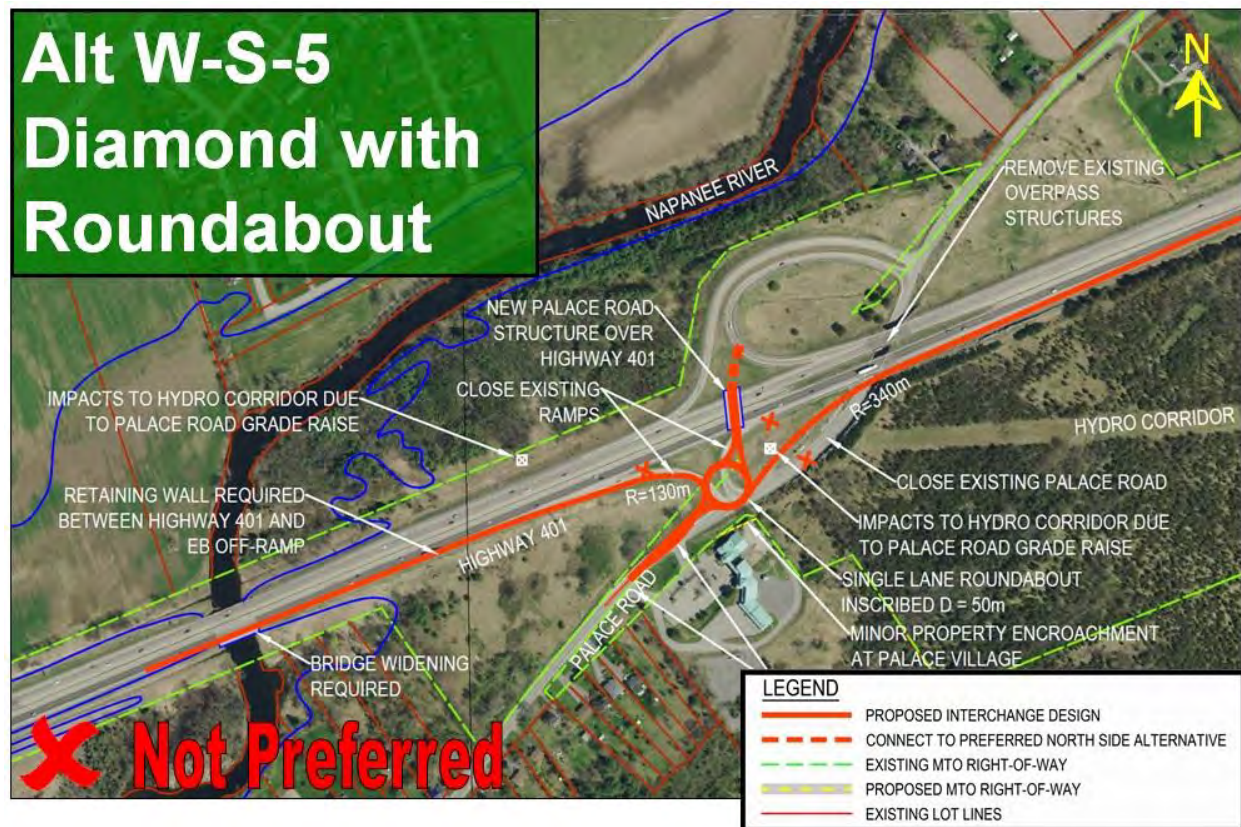
Alternative W-S-5 is described as a diamond configuration with a roundabout and westerly realignment of Palace Road (refer to **Figure 22**). This alternative involves the following improvements:

- Eastbound diamond off-ramp into roundabout;
- Eastbound on-ramp from roundabout;
- Realign Palace Road to the west of the existing Highway 401 crossing and construct new underpass structure with reduced skew angle; and,
- Remove existing Palace Road structures.

The roundabout configuration eliminates direct left-turns which is anticipated to reduce the severity of collisions. The configuration avoids temporary widening of the Highway 401 bridges over Palace Road and avoids a Highway 401 median cross-over during construction. This alternative reduces impacts to Highway 401 traffic operations during future bridge rehabilitations. This alternative; however, includes a roundabout which is unfamiliar and less compatible for truck traffic, requires widening of the Highway 401

bridge over the Napanee River, impacts the existing hydro transmission corridor and impacts residential and commercial driveways.

Figure 22: Alternative W-S-5 Diamond with Roundabout



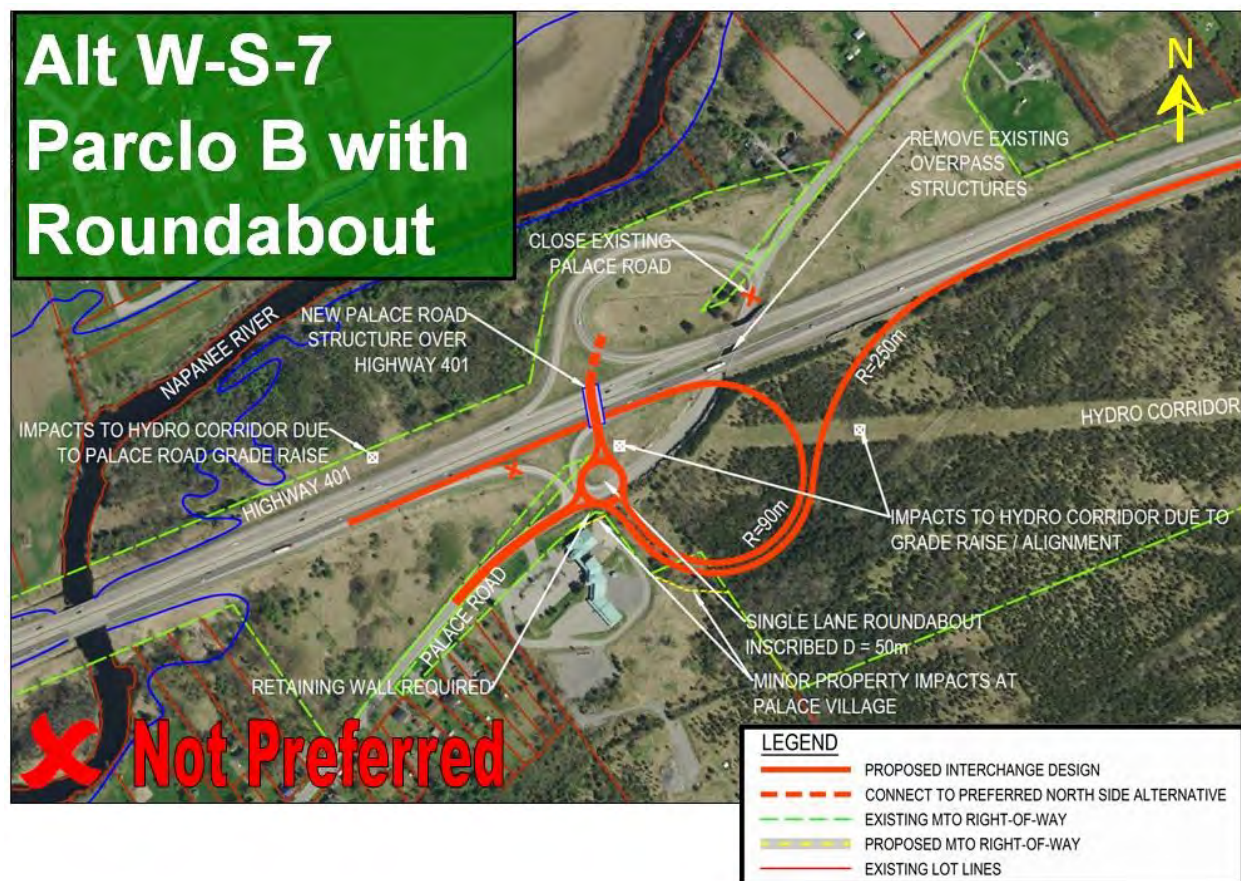
5.3.2.7 Alternative W-S-7 Parclo B with Roundabout

Alternative W-S-7 is described as a Parclo B configuration with a roundabout and westerly realignment of Palace Road (refer to **Figure 23**). This alternative involves the following improvements:

- Eastbound Parclo B off-ramp into roundabout;
- Eastbound on-ramp from roundabout;
- Realign Palace Road to the west of the existing Highway 401 crossing and construct new underpass structure with reduced skew angle; and,
- Remove existing Palace Road structures.

The roundabout configuration eliminates direct left-turns which is anticipated to reduce the severity of collisions. The configuration avoids temporary widening of the Highway 401 bridges over Palace Road and avoids a Highway 401 median cross-over during construction. This alternative also results in a lower construction cost than other options; however, the roundabout is an unfamiliar configuration and less compatible with truck traffic. The configuration has less than desirable sight distance with off-ramp configuration approaching the roundabout, impacts the existing hydro transmission corridor and has minor impacts to residential and commercial driveways.

Figure 23: Alternative W-S-7 Parclo B with Roundabout



5.4 Summary of Evaluation

Based on the evaluations of alternatives on both sides of the interchange, the Technically Preferred Preliminary Design Alternatives for the ultimate interchange are Alternative W-N-2 Buttonhook on the north side and Alternative W-S-2 Buttonhook on the south side. These alternatives were selected for the following reasons:

- The westerly realignment alternatives (with a new bridge constructed over Highway 401) are preferred based on both short-term and long-term traffic staging impacts (avoid temporary widening of existing structure, and minimize future staging impacts to Highway 401 traffic);
- Alternatives W-N-2 and W-S-2 are preferred from a Transportation perspective, as they allow existing ramps and Palace Road to remain open to traffic during construction (only short-term closures required); and,
- Alternatives W-N-2 and W-S-2 have the most desirable geometrics, improved sight distance, and is similarly preferred to other alternatives from an environmental perspective.

The results of the evaluation are summarized in **Tables 9** and **10**, and detailed evaluation tables are available in **Appendix E**.

Table 9: North Side Evaluation Summary

Factor	Existing Alignment Alternatives		Westerly Realignment Alternatives		
	Alternative E-N-2 Buttonhook	Alternative E-N-4 Diamond	Alternative W-N-2 Buttonhook	Alternative W-N-4 Diamond	Alternative W-N-5 Diamond with Roundabout
Transportation					
Natural Environment					
Socio-Economic Environment					
Cultural Environment					
Cost					
Recommendation					

Legend		
Highest Category Weighting		Lowest Category Weighting
Most Preferred Alternative		Least Preferred Alternative

Table 10: South Side Evaluation Summary

Factor	Existing Alignment Alternatives			Westerly Realignment Alternatives			
	Alternative E-S-2 Buttonhook	Alternative E-S-4 Diamond	Alternative E-S-7 Parclo B	Alternative W-S-2 Buttonhook	Alternative W-S-4 Diamond	Alternative W-S-5 Diamond with Roundabout	Alternative W-S-7 Parclo B with Roundabout
Transportation							
Natural Environment							
Socio-Economic Environment							
Cultural Environment							
Cost							
Recommendation							

Legend		
Highest Category Weighting		Lowest Category Weighting
Most Preferred Alternative		Least Preferred Alternative

5.5 Refinements to the Technically Preferred Alternative

5.5.1 Eastbound On and Off-Ramps at Palace Road

Following the presentation of the Technically Preferred Preliminary Design Alternatives at PIC #2 and as discussed further in **Section 2.3.4.3**, a number of refinements to the eastbound exit and entrance ramps were considered in an attempt to mitigate stakeholder concerns expressed by adjacent property owners. In particular, the project team reviewed alternatives to relocate the off-ramp closer to the existing ramp, adjustments to the angle of the eastbound off-ramp approach to Palace Road, provision of additional landscaping, provision of a shared access road, and combined entrances.

Alternatives Considered

Alternative 1: The first refinement that was considered included relocation of the eastbound ramp terminal intersection opposite the Palace Village entrance, while maintaining the same general interchange configuration presented at PIC #2 which included a westerly realignment of Palace Road. This alternative is illustrated in **Figure 24**, based on connection to a future 6-lane Highway 401.

Alternative 2: The second refinement that was considered included a modified ramp terminal located approximately 60 m east of the location included as part of the Technically Preferred Alternative. This alternative is illustrated in **Figure 25** and included potential entrance modifications for Palace Village.

Figure 24: Alternative 1 Refinement – Off-Ramp Modification with Relocation Opposite Palace Village

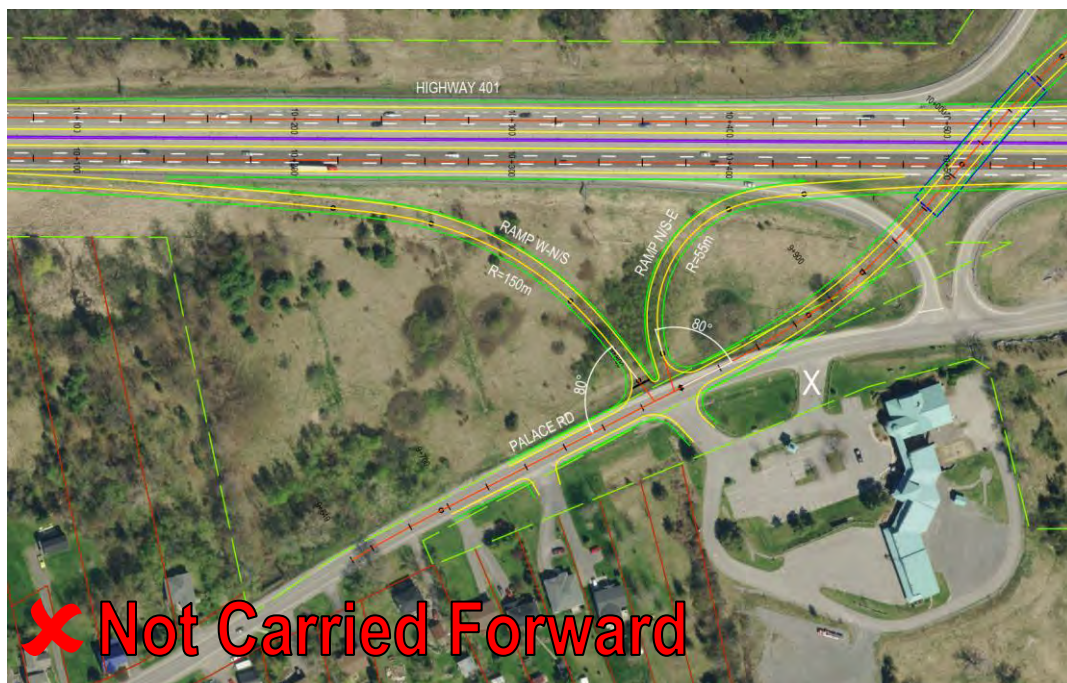
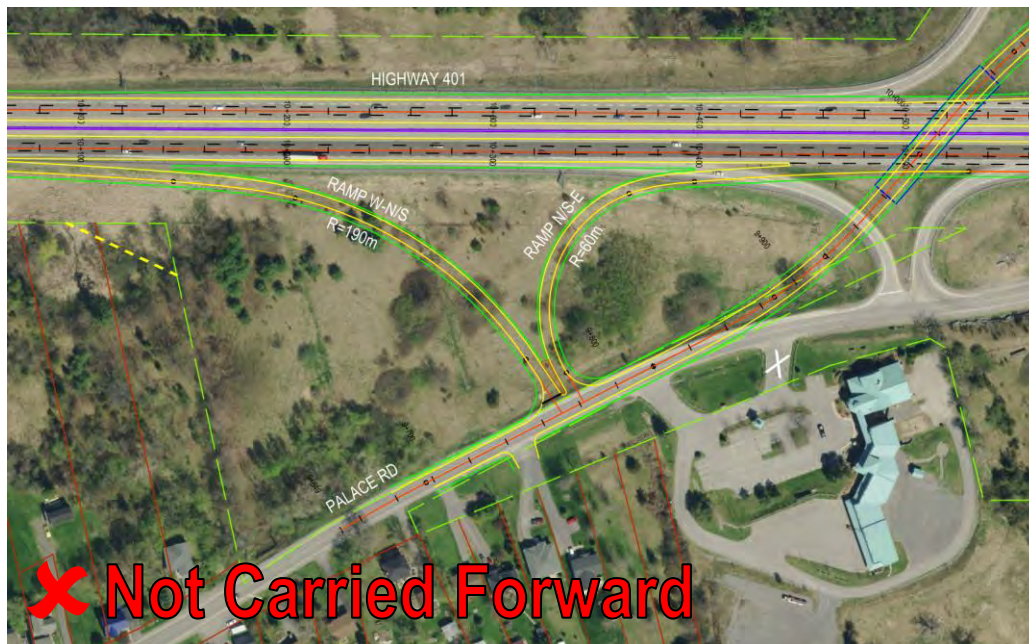


Figure 25: Alternative 2 Refinement – Off-Ramp Modification with Relocation 60 m to East



For both Alternatives 1 and 2, it was determined the configurations could not be safely accommodated as they would require tighter horizontal curvature along both the eastbound off and on-ramps (relative to the Technically Preferred Alternative). They would also result in additional safety concerns associated with sub-standard sight distance for turning vehicles from the off-ramp and along the realigned Palace Road approaching the intersections. These alternatives were therefore not considered feasible and were eliminated from further consideration.

Alternative 3: The Alternative 3 refinements considered for the eastbound off-ramp were developed to help address concerns with the proximity of the ramp adjacent to private entrances, as well as the potential impacts of headlight glare. These refinements included reducing the angle of the eastbound off-ramp approach to Palace Road from 90° to 80°, which would angle the off-ramp at the stop bar between the properties on the south side of Palace Road. Other refinements that were considered included provision of a service road/entrance, parallel to Palace Road, which would open up additional opportunities for landscaping / shielding between this access and Palace Road. In addition, this refinement would shift the nearest driveway further west of the ramp terminal intersection. These set of refinement alternatives are illustrated in **Figure 26**.

Figure 26: Alternative 3 Refinement – Modified Angle of Off-Ramp Intersection with Shared Driveway and Landscaping



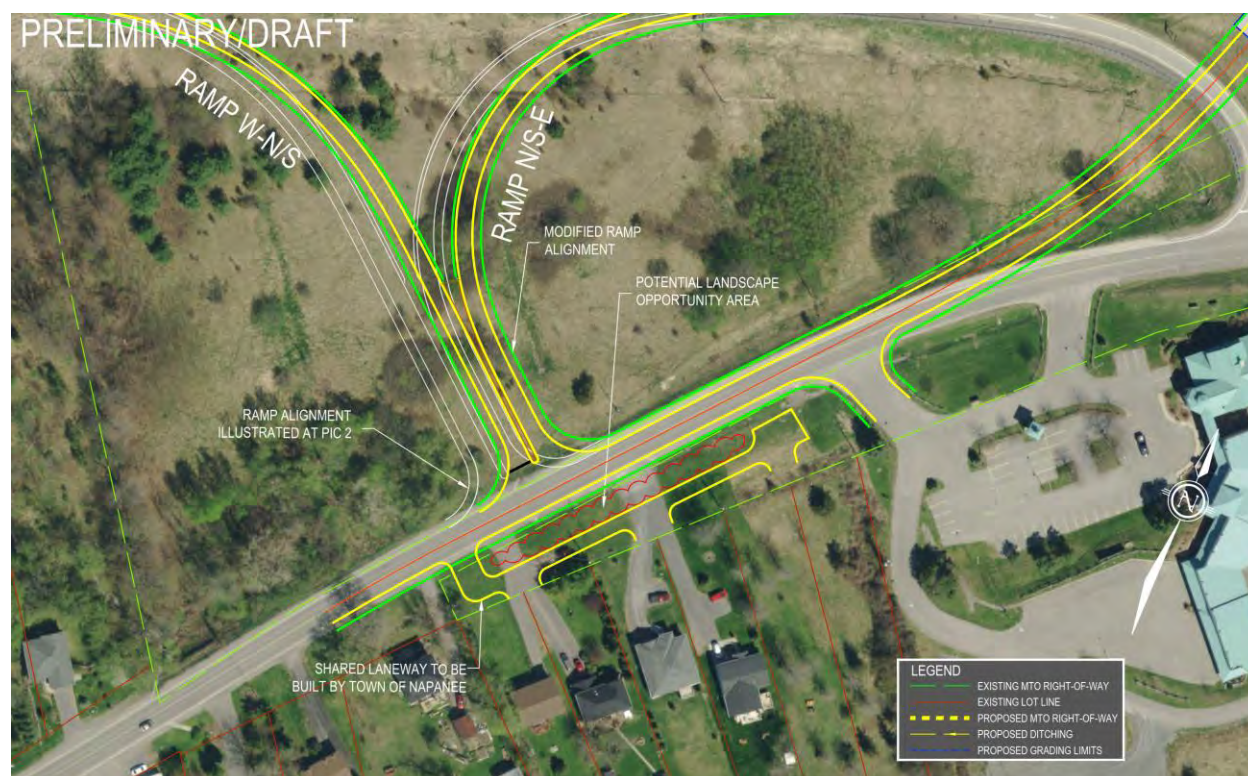
Following additional discussions between MTO and property owners, the Ministry offered to purchase the properties from these six landowners. The Ministry will continue to implement the mitigation offered at the south ramp terminal for future potential home owners in the vicinity. It is noted that MTO typically restricts private access within interchange areas in order to maintain a high level of service for traffic flows. As the residential properties currently all have separate direct access to Palace Road, providing a service road/entrance for all six properties would maintain access to the properties while maintaining the integrity of a controlled access interchange.

The recommended mitigation would include:

- Service road / entrance onto Palace Road to service all six houses within the interchange area. No other access to Palace Road (from these residential properties) would be allowed. It is anticipated that this service road/entrance will be transferred to be under the jurisdiction of the Town of Greater Napenee;
- Landscaping between the service entrance and Palace Road and/or between the houses and the service entrance (to be determined with detail design of the service entrance); and,
- Relocation of the ramp terminal intersection approximately 10 m to the northeast. This refinement would direct any potential headlight glare at the off-ramp stop-bar to be between the properties on the south side of Palace Road

The recommended refinements to the Technically Preferred Alternative are illustrated in **Figure 27**.

Figure 27: Recommended Refinements to Technically Preferred Alternative – Modifications at Eastbound Ramp Terminal



5.5.2 Eastbound Off-Ramp Across Napanee River Bridge

MTO recently undertook a minor rehabilitation of the Highway 401 / Napanee River bridge under **Contract 2017-4021**. The scope of rehabilitation included replacement of the concrete median barrier, partial depth concrete repairs, crack repairs, and new waterproofing and paving to extend the service life of the structure. To avoid impacting the recently rehabilitated structure and widening the bridge over the Napanee River, opportunities to accommodate the Technically Preferred Alternative on the existing structure were considered. In particular, the Technically Preferred Alternative includes relocating the eastbound off-ramp approximately 280 m west of the existing off-ramp such that the speed change lane extends across the Highway 401 / Napanee River bridge. Based on the existing width of the bridge, this speed change lane cannot be accommodated on the structure without geometric adjustments.

To fit the eastbound off-ramp speed change lane across the existing Napanee River bridge and avoid impacts to the bridge and river, a modified ramp design was developed. This design includes a reduction in the ramp radius (compared to the Technically Preferred Alternative presented at PIC #2), in addition to localized shoulder reductions along Highway 401. The eastbound through lanes of Highway 401 will be shifted into the median across the structure, resulting in a 1.0 m median shoulder.

While timelines for a future widening of Highway 401 to 6-lanes through this section are presently unknown, it is anticipated to be required within the 20-25 year planning horizon of the study. At that time, it is anticipated the Napanee River Bridge will require widening or replacement to accommodate a 6-lane Highway 401, and the eastbound

off-ramp will be reconstructed at that time to the ultimate configuration. The ultimate configuration includes partial reconstruction of the eastbound off-ramp to tie-into the 6-lane Highway 401. Furthermore, the ramp radius will be increased and standard shoulder widths will be provided at that time. It should be noted that Environmental Assessment (EA) approval for the ultimate ramp configuration, including impacts and mitigation requirements associated with widening of the Napanee River structure, will be subject to a future study.

The modified eastbound off-ramp configuration which was incorporated as a refinement to the Technically Preferred Alternative is illustrated in **Figure 28**. This plan also illustrates the potential ultimate ramp configuration for when Highway 401 is widened to 6-lanes. Typical cross-sections across the Napanee River bridge are included in **Figure 29**.

Figure 28: Recommended Refinements to Technically Preferred Alternative – Interim and Ultimate Eastbound Off-Ramp at Napanee River

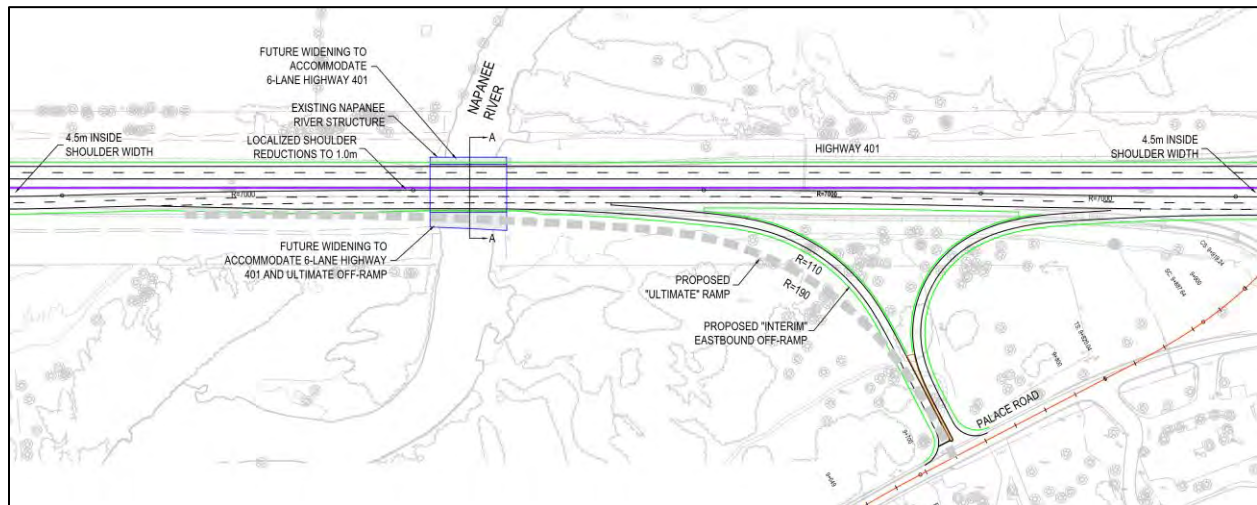
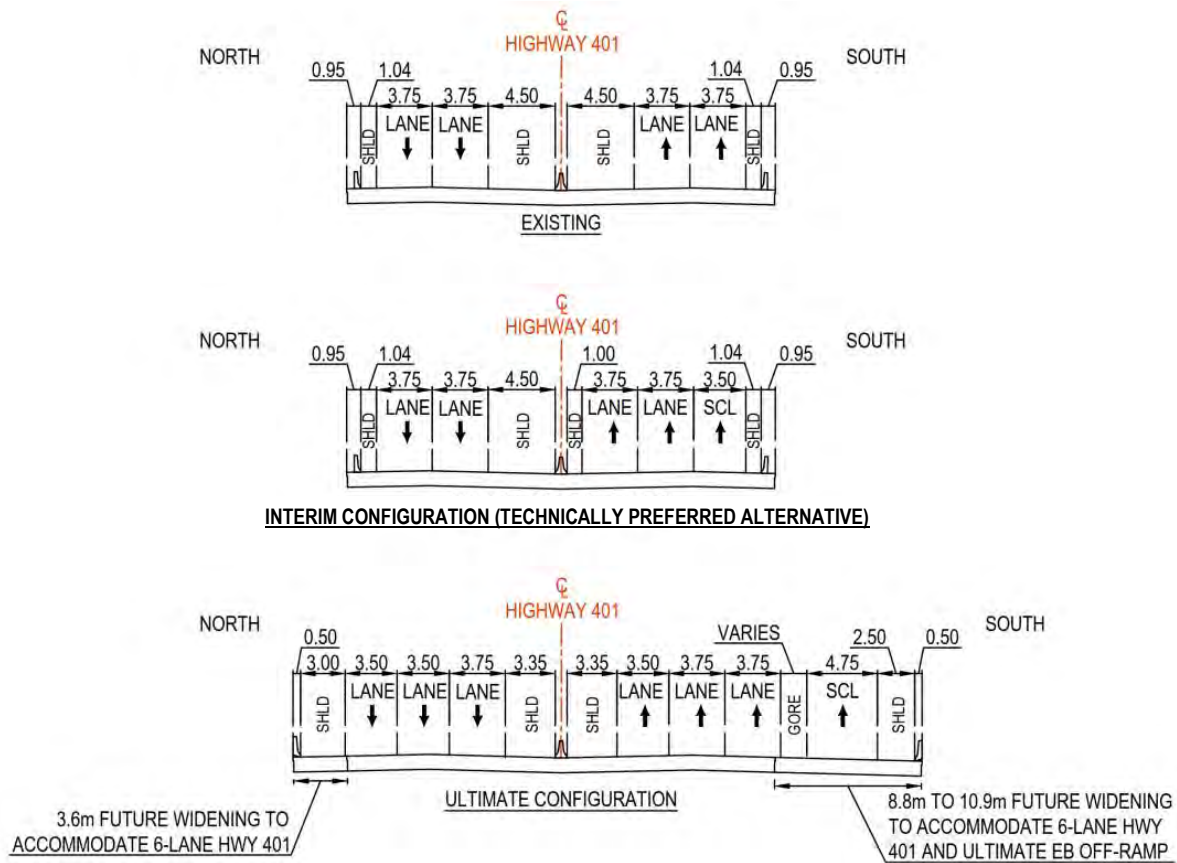


Figure 29: Napanee River Bridge – Typical Sections



6. The Recommended Plan

The following sections summarize the proposed improvements to the Highway 401 interchange at Palace Road and within the project limits. The Technically Preferred Preliminary Design Alternative for the interchange improvements along the corridor is illustrated below in **Figure 30** and in the Preliminary Design plates provided in **Appendix A**. Additional details regarding the recommended improvements and rehabilitation needs are provided in the various technical reports prepared as part of this study, under separate cover.

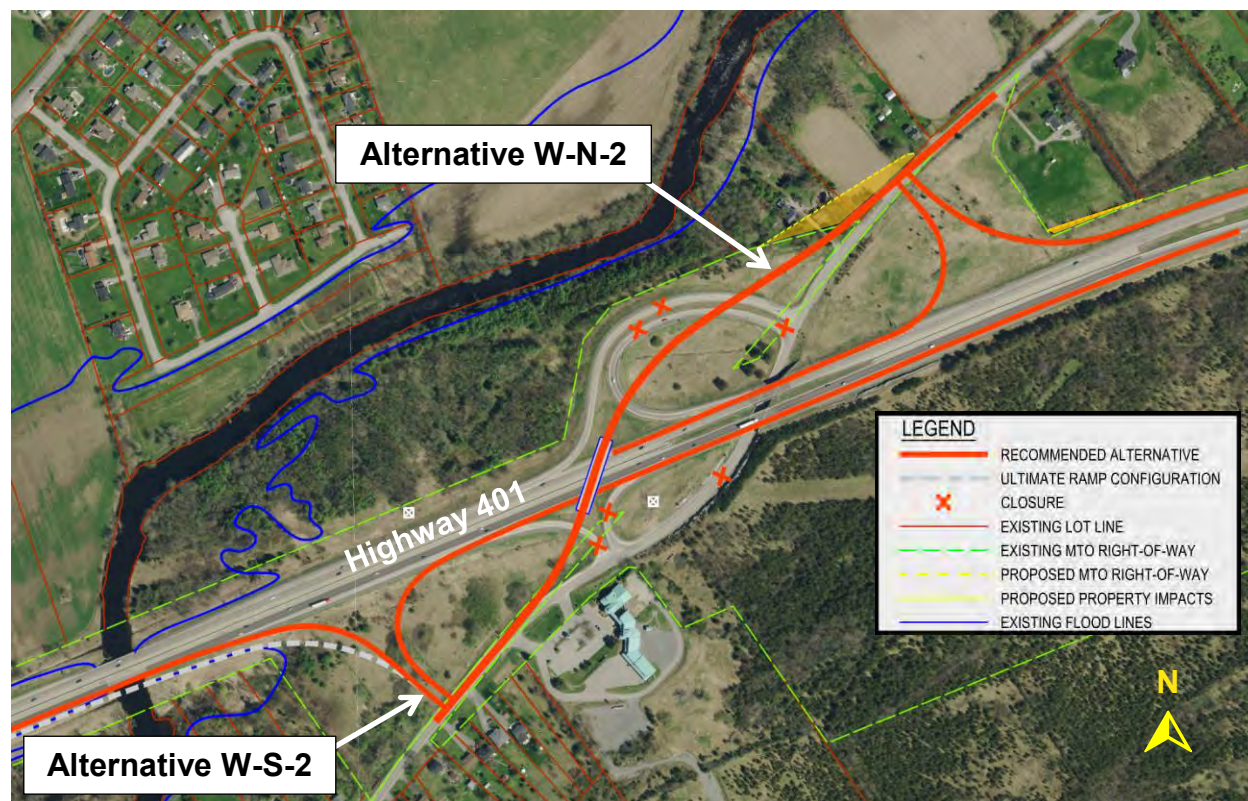
6.1 Technically Preferred Interchange Configuration

The upgraded Highway 401 interchange at Palace Road will include realignment of Palace Road to the west with replacement of the existing structures with a new structure carrying Palace Road traffic over Highway 401. While timelines for a future potential widening of Highway 401 to 6-lanes through this section are presently unknown, it is anticipated that such a widening would occur within the life span of a replacement structure. As such, the new underpass structure will accommodate a future widening to 6-lanes, and only minor adjustments will be required to the interchange ramps to match the future widened section.

The upgraded interchange will include a combination of Alternatives W-N-2 and W-S-2, as identified as Alternative W-N-2 and W-S-2 in the Short-List Alternative Evaluation (**Section 5.3**), along with the minor design refinements at the south ramp terminal intersection discussed in **Section 5.5**. The recommended interchange configuration is illustrated schematically in **Figure 30** and in the preliminary design plates in **Appendix A**. The recommended interchange improvements generally include the following:

- Reconfiguration of the existing eastbound buttonhook ramps (south side) with larger curves and the ramp terminal further south on Palace Road. The existing westbound ramps (north side) will be reconfigured from a Parclo B style to a Parclo A style interchange;
- Realignment of Palace Road to the west of the existing Highway 401 crossing with the construction of a new underpass structure over Highway 401; and
- Removal / backfill of the existing Palace Road structures.

Figure 30: Recommended Plan



Palace Road is a two-lane road designated as 'Rural Arterial (County)' according to the *County of Lennox and Addington Official Plan (2015)*. As part of the Recommended Plan, Palace Road will be realigned to the west and will cross over Highway 401 via a new structure located approximately 200 m west of the existing bridges. In addition, the design speed along Palace Road will be increased from 70 km/h to 80 km/h through the interchange. Posted speeds are proposed to remain the same. The proposed cross-section along Palace Road includes two through lanes with a width of 3.75 m and a 2.5 m shoulder on both sides.

As discussed in **Section 4.1**, there are a number of geometric concerns associated with the existing interchange that will be improved in the Recommended Plan. In particular, the horizontal curvature and configuration of the existing ramps are less than desirable and will be improved. The proposed improvements to the horizontal curvature are summarized in **Table 11**.

Table 11: Horizontal Curvature Modifications

Ramp	Existing Ramp		Proposed Ramp	
	Radius of Critical Curvature (m)	Equivalent Design Speed of Curve (km/h)	Radius of Critical Curvature (m)	Equivalent Design Speed of Curve (km/h)
Ramp W-N/S (Eastbound Off-Ramp)	50	40	110	50

Ramp	Existing Ramp		Proposed Ramp	
	Radius of Critical Curvature (m)	Equivalent Design Speed of Curve (km/h)	Radius of Critical Curvature (m)	Equivalent Design Speed of Curve (km/h)
Ramp N/S-E (Eastbound On-Ramp)	40	<40	60	40
Ramp E-N/S (Westbound Off-Ramp)	40	<40	130	60
Ramp N/S-W (Westbound On-Ramp)	75	40	60*	40

*The Ramp N/S-W will be reconfigured from a Parclo B style to a Parclo A style configuration.

The Recommended Plan will also include upgrades to the existing speed change lane lengths along Highway 401 to meet the requirements for the 120 km/h design speed of Highway 401, improving safety conditions along Highway 401 for vehicles entering and exiting the freeway. The existing and proposed speed change lane lengths along Highway 401 for each ramp are summarized in **Table 12**.

Table 12: Speed Change Lane Length Modifications

Ramp	Existing Speed Change Lane		Proposed Speed Change Lane	
	Length (m)	Equivalent Design Speed (km/h)	Length (m)	Equivalent Design Speed (km/h)
Ramp W-N/S (Eastbound Off-Ramp)	310	100	345	120
Ramp N/S-E (Eastbound On-Ramp)	530	100*	800	120*
Ramp E-N/S (Westbound Off-Ramp)	335	100*	380	120*
Ramp N/S-W (Westbound On-Ramp)	390	>120*	300	120*

*The equivalent design speeds of these speed change lanes take into account that Highway 401 is on a 3% grade (increasing to the east) along the length of the speed change lane. This 3% grade affects the requirements for either deceleration (along off-ramps) or acceleration (along on-ramps).

The recommended plan will also improve the sight distances at the westbound off-ramp for vehicles turning north (looking to the south) and the eastbound off-ramp for vehicles turning west (looking to the northeast). These distances are presently considered substandard due to the proximity of these intersections to the existing Palace Road

overpass structures and the horizontal curvature of Palace Road through the interchange.

To help accommodate the significant elevation change between Highway 401 and Palace Road, and to minimize property impacts, a short toe wall (retaining wall) is proposed recommended adjacent to the westbound off-ramp between the ramp and Highway 401. The toe wall will allow the off-ramp to be constructed closer to Highway 401, thus reducing property impacts adjacent to the off-ramp. Additional foundation investigations will be required in Detail Design to confirm the toe wall requirements.

6.2 Structures

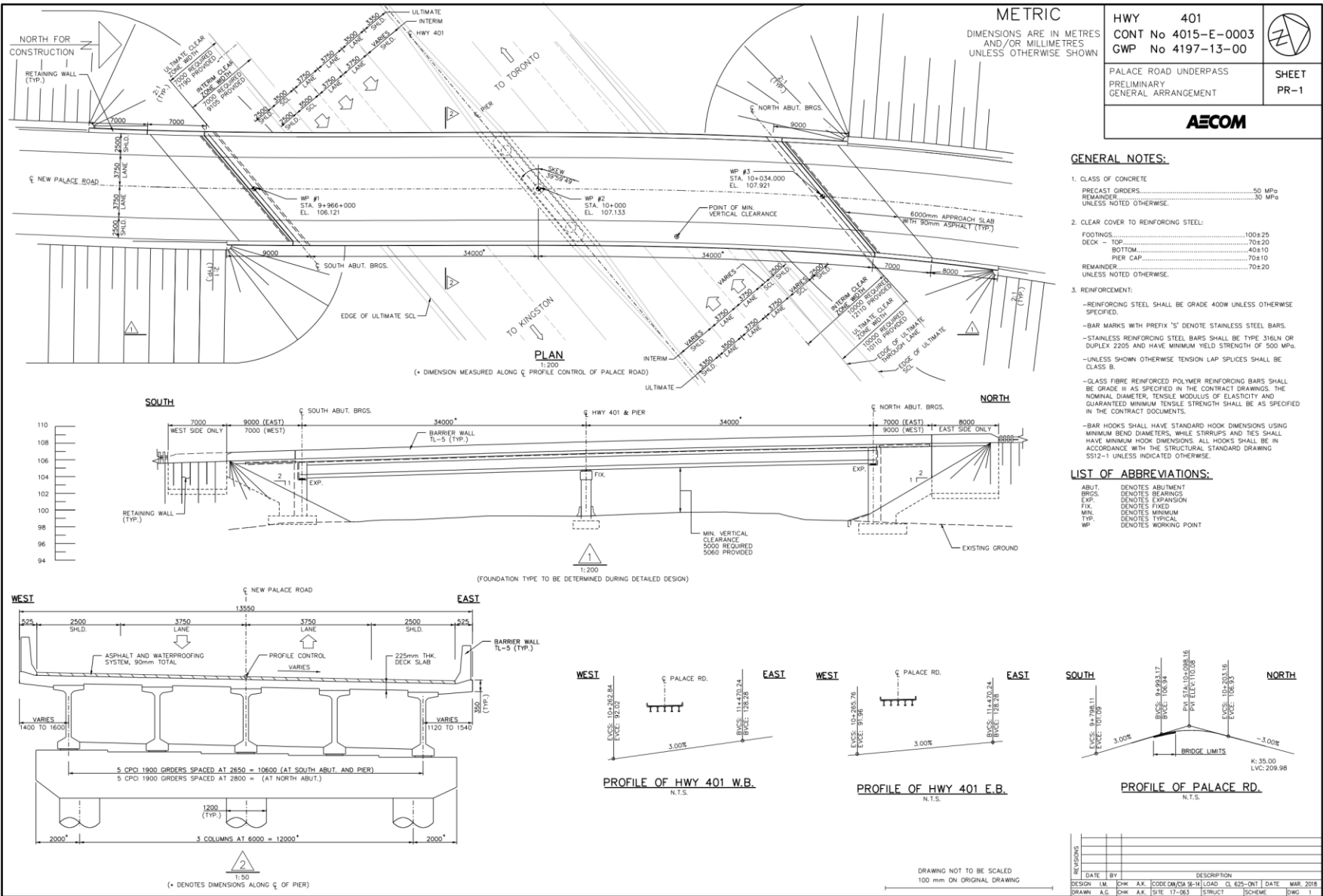
6.2.1 Palace Road Structure

The existing Palace Road structures at Highway 401 will be removed and replaced with a new structure carrying Palace Road over Highway 401, west of the existing structures. The recommended new underpass is a two-span (34 m each) CPCI 1900 slab-on-girder bridge over Highway 401 with conventional abutments and expansion joints. The centreline of the structure is at a skew angle of 40° to the centreline of Highway 401. The overall deck width is 13.55 m, and accommodates two lanes of Palace Road over Highway 401. The cross-section of the proposed structure from west to east is as follows: 50 mm fascia; 475 mm barrier wall; 2.5 m left shoulder; two 3.75 m general purpose lanes; 2.5 m right shoulder; 475 mm barrier wall; and 50 mm fascia. A preliminary General Arrangement drawing is provided in **Figure 31**. The new underpass will span the existing Highway 401 and will accommodate a 6-lane Highway 401 should future widening be required. It is anticipated that a future widening to 6-lanes at this location would be accommodated by widening primarily to the outside, with a reduction in the overall median width from approximately 10 m to 7.5 m. This configuration is illustrated in Figure 29, and will be confirmed as part of a future study.

Following construction of the new underpass structure, the two existing structures along the current alignment of Palace Road at Highway 401 will be removed and backfilled.

Highway 401 Interchange Improvements at Palace Road

Figure 31: Preliminary General Arrangement



6.2.2 Napanee River Structure

As discussed further in **Section 5.5.2**, MTO recently undertook a minor rehabilitation of the Highway 401 / Napanee River bridge under **Contract 2017-4021**. The scope of rehabilitation included replacement of the concrete median barrier, partial depth concrete repairs, crack repairs, and new waterproofing and paving to extend the service life of the structure. To avoid impacting the recently rehabilitated structure and widening the bridge over the Napanee River, a modified ramp design was developed to avoid impacts to the bridge and river.

It is anticipated that widening of Highway 401 to 6-lanes will be required within the 20-25 year planning horizon of this study. At that time, it is anticipated the Napanee River bridge will require widening or replacement to accommodate a 6-lane Highway 401, and the interim eastbound off-ramp will be reconstructed to the ultimate configuration. Refer to **Section 5.5.2** and **Figure 29** for additional information and typical cross-sections across the Napanee River bridge.

6.3 Foundations

Preliminary foundation engineering analysis was undertaken as part of this study, consisting of a desktop study only.

The foundation investigations identified a substantial thickness of stiff-to-soft layered clay and silt overlying the bedrock in the vicinity of the Napanee River, just west of the new structure location. The presence of a buried bedrock valley in the vicinity of the proposed structure suggests that the founding conditions of the proposed structure on the new alignment are uncertain. Three potential foundation-type scenarios include:

- Both abutments and pier supported on shallow foundations on bedrock, considered unlikely.
- South abutment on shallow footing on bedrock, and north abutment on deep foundation to bedrock. The pier would be uncertain.
- Both abutments and pier on deep foundations to bedrock.

Additional investigations consisting of boreholes located within the actual foundation footprints will be undertaken during detail design to complete the design of the foundations of the new structure on the new alignment.

6.4 Pavement

The recommended pavement structure for new construction on soil subgrade is summarized below in **Table 13**.

Table 13: Recommended Pavement Structure

	Palace Road	Ramps
Superpave 12.5 FC2	50 mm	40 mm
Superpave 19	70 mm	60 mm
Granular A Base	150 mm	150 mm
Granular B Type I Subbase	400 mm	400 mm

Where bedrock or rock fill subgrade is present, the thickness of the subbase layer can be reduced to 150 mm. A rock shatter layer will be required on bedrock subgrade.

6.5 Electrical

New partial illumination at decision points will be provided at the interchange ramps and ramp terminal intersections. Traffic signals are not warranted at either ramp terminal intersection in the current condition or within the 20 year horizon period based on projected traffic growth at the interchange. The proposed illumination layout at the interchange is illustrated in **Figures 32 and 33**.

Figure 32: Preliminary Illumination Layout on the North Side of the Highway 401 Interchange at Palace Road

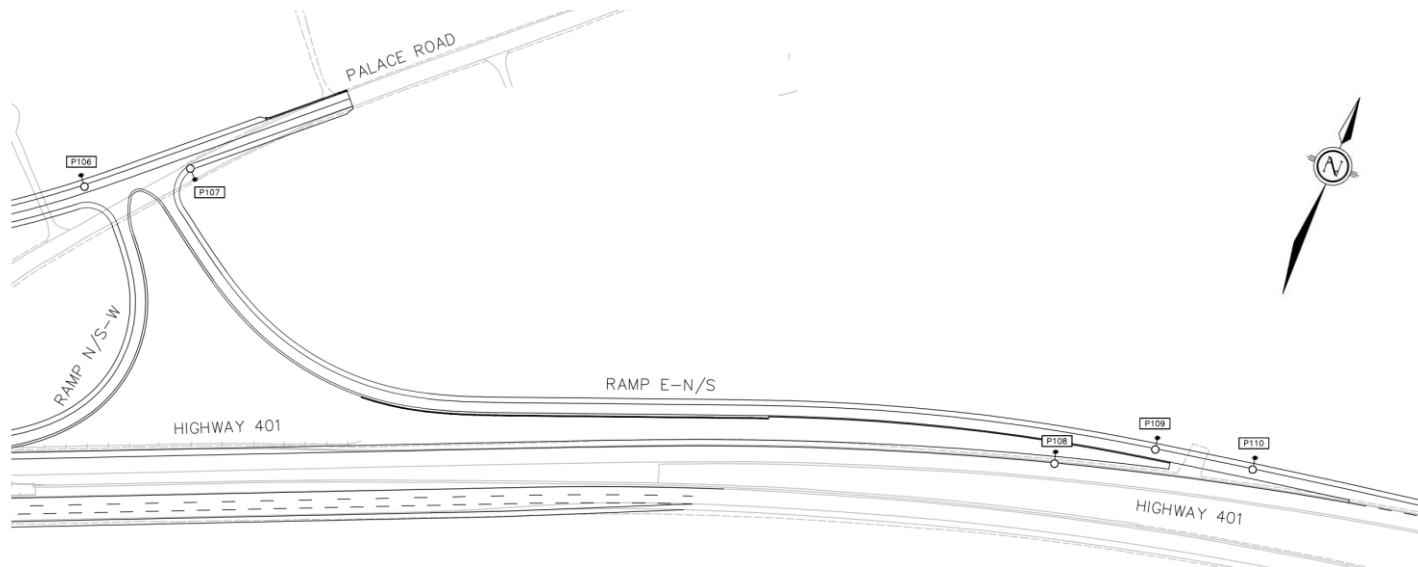
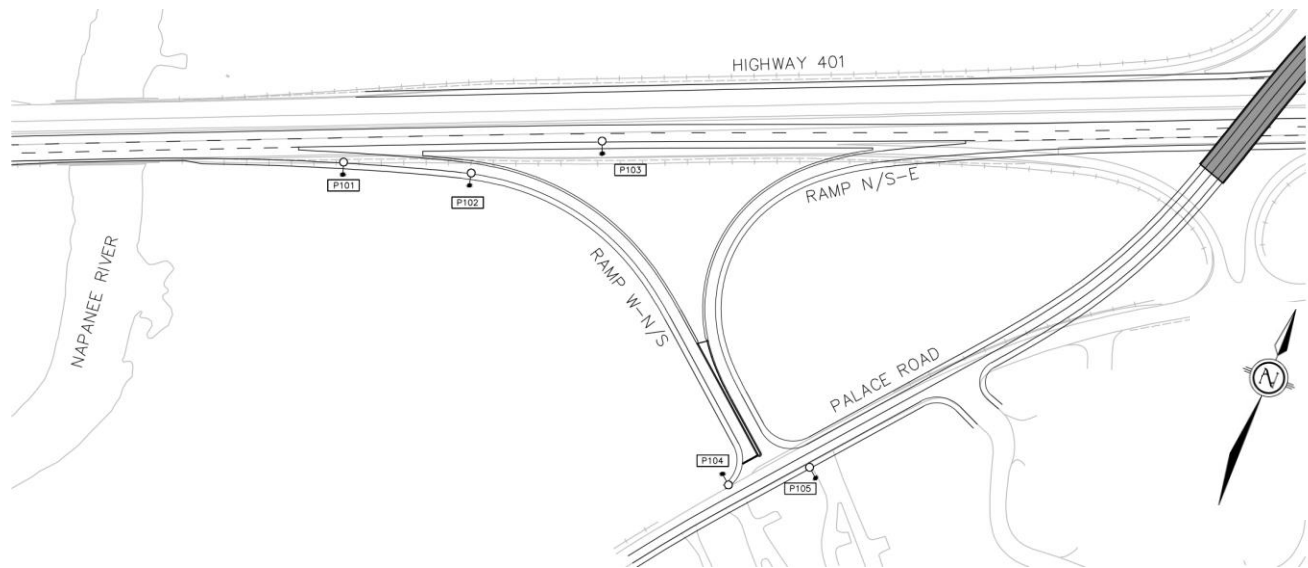


Figure 33: Preliminary Illumination Layout on the South Side of the Highway 401 Interchange at Palace Road



6.6 Utilities

Bell Canada, Hydro One, Union Gas, and the Town of Napanee (watermain) all have plants located within the project limits. Due to the recommended interchange improvements, a number of utilities are anticipated to require relocation prior to the construction of these improvements. The potential utility impacts may include the following:

- Watermain, gas main, overhead / underground Bell, and overhead Hydro due to Palace Road realignment / grade raise.

In addition to the potential utility impacts that will be confirmed during Detail Design, the existing hydro transmission corridor / towers will be impacted due to the Palace Road realignment / grade raise. All potentially affected utility companies will be contacted early during Detail Design to confirm plant locations and discuss relocation strategies / mitigation strategies.

The potential utility impacts are highlighted on the utility plan in **Figure 34**.

6.7 Drainage

Modifications to the drainage layout at Palace Road are required due to the interchange reconfiguration. The proposed drainage works are illustrated in **Figure 35** and summarized below:

- Remove five existing culverts within the Palace Road interchange, including four beneath Palace Road (C1-EX, C2-EX, C4-EX and C5-EX), and one beneath the existing westbound ramps (C3-EX). All five culverts require removal due to either the Palace Road or interchange ramp realignments.
- Install four new culverts beneath the Palace Road realignment (C1-PR, C2-PR, C3-PR and C5-PR), which will be designed to convey the 25 year design storm. Install two new culverts beneath the eastbound ramps (C2-1-PR and C2-2-PR), and one new culvert under the new westbound on-ramp (C4-PR), each of which will be designed to convey the 50 year design storm.
- Remove one existing culvert (C6-EX) beneath Highway 401, and design two new ditches to accommodate the flows originally passing through the existing culvert. Upon removal of Culvert C6-EX, the flow would be diverted to a new ditch grading westerly along the south side of Highway 401 from the existing Culvert C6-EX to new Culvert C2-PR. The diverted flow would be conveyed through proposed culverts C2-PR and C2-1-PR, and drain into a new ditch that runs southwest of the new eastbound off-ramp and ultimately discharges to the Napanee River. The ditches will be designed to convey the 100 year diverted flows; and,
- Design new ditches in northeast, southwest and northwest quadrants and regrade/realign the existing ditches along new westbound off-ramp to convey the flows to/from new culverts based on proposed road alignment.

It is noted that while efforts to maintain Culvert C6-EX beneath Highway 401 were considered, removal of the culvert is recommended as the culvert is constrained by the alignment and elevation of the proposed westbound off-ramp. Extension of the existing

culvert was considered but was not considered practical given that the westbound off-ramp will be substantially lower than the existing culvert, requiring substantial structural design effort for a drop structure for an extension. Reconstructing Culvert C6-EX in the existing location at a greater depth would allow the culvert to extend below the new ramp, but was considered not feasible as the upstream inlet to the deeper culvert would be more than 5 m deep. Furthermore, reconstructing Culvert C6-EX in a different location and diverting flows to the new crossing would result in insufficient cover to construct the new culvert under Highway 401 using trenchless technology, and the culvert would require construction using open trench methods across Highway 401 which was not considered practical. As such, diversion of the flows from Culvert C6-EX to new ditches and culverts C2-PR and C2-1-PR is considered the preferred alternative to address the drainage design requirements.

6.7.1 Stormwater Management

Under existing conditions, no specific water quality or quantity measures exist within the study area. The proposed improvement works will not result in any significant changes in the peak flow rates in the receiving Napanee River, and therefore no quantity control measures are recommended. For quality control and potential in-stream erosion considerations, enhanced grassed swales with check dams will be provided to collect, store, treat and convey storm runoff prior to discharge to the Napanee River.

6.7.2 Median Storm Sewers

The existing median storm sewers east of the Napanee River were constructed under Contract No. 2003-4015. The existing median storm sewers along Highway 401 through the Palace Road interchange have sufficient capacity to accommodate the 10-year storm event required for the system based on both the existing and future condition. These storm sewers will therefore be maintained, with the exception of one storm sewer segment adjacent to the Palace Road realignment which will require removal to accommodate the median pier of the new bridge structure.

Figure 34: Potential Utility Impacts

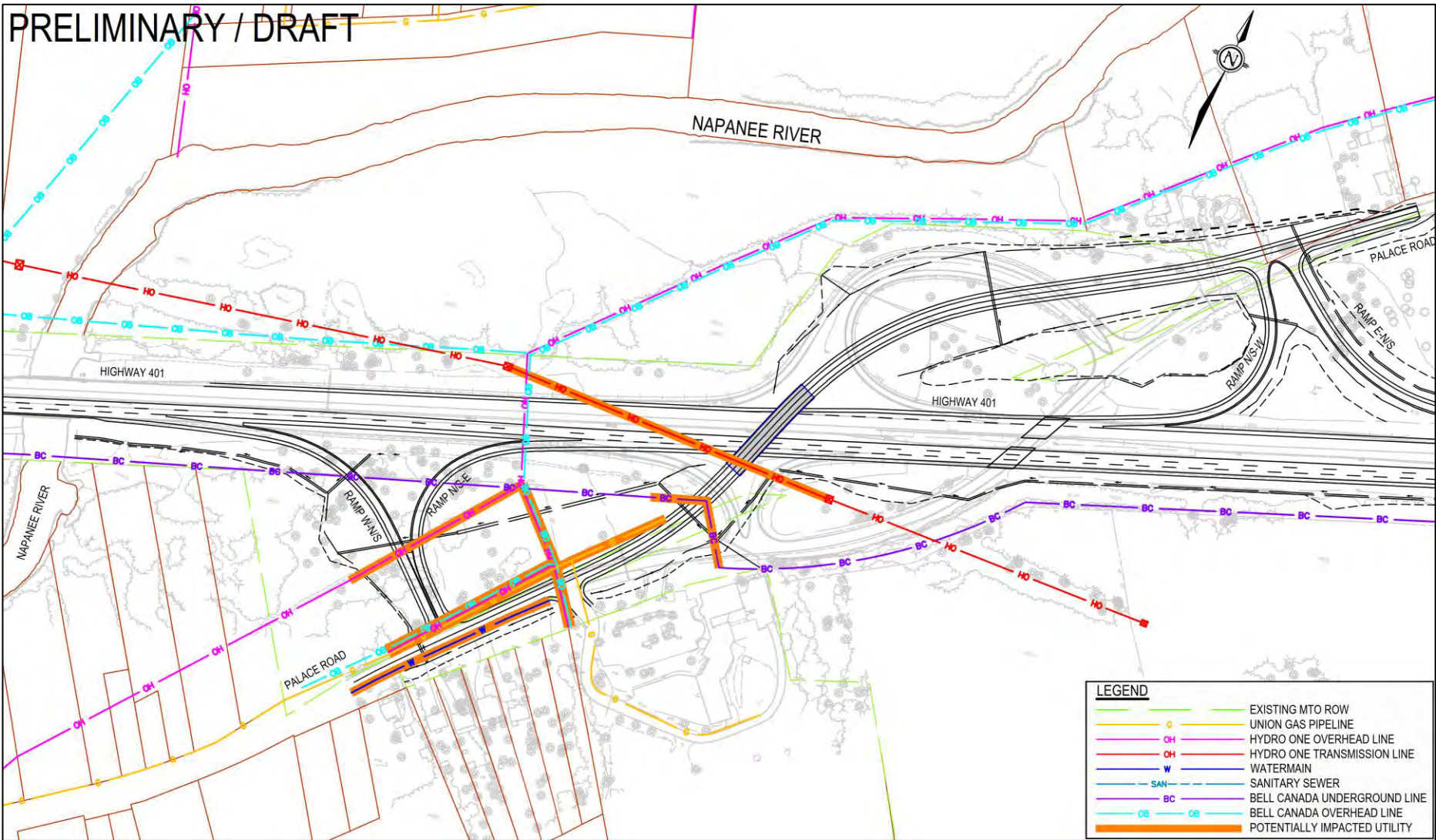
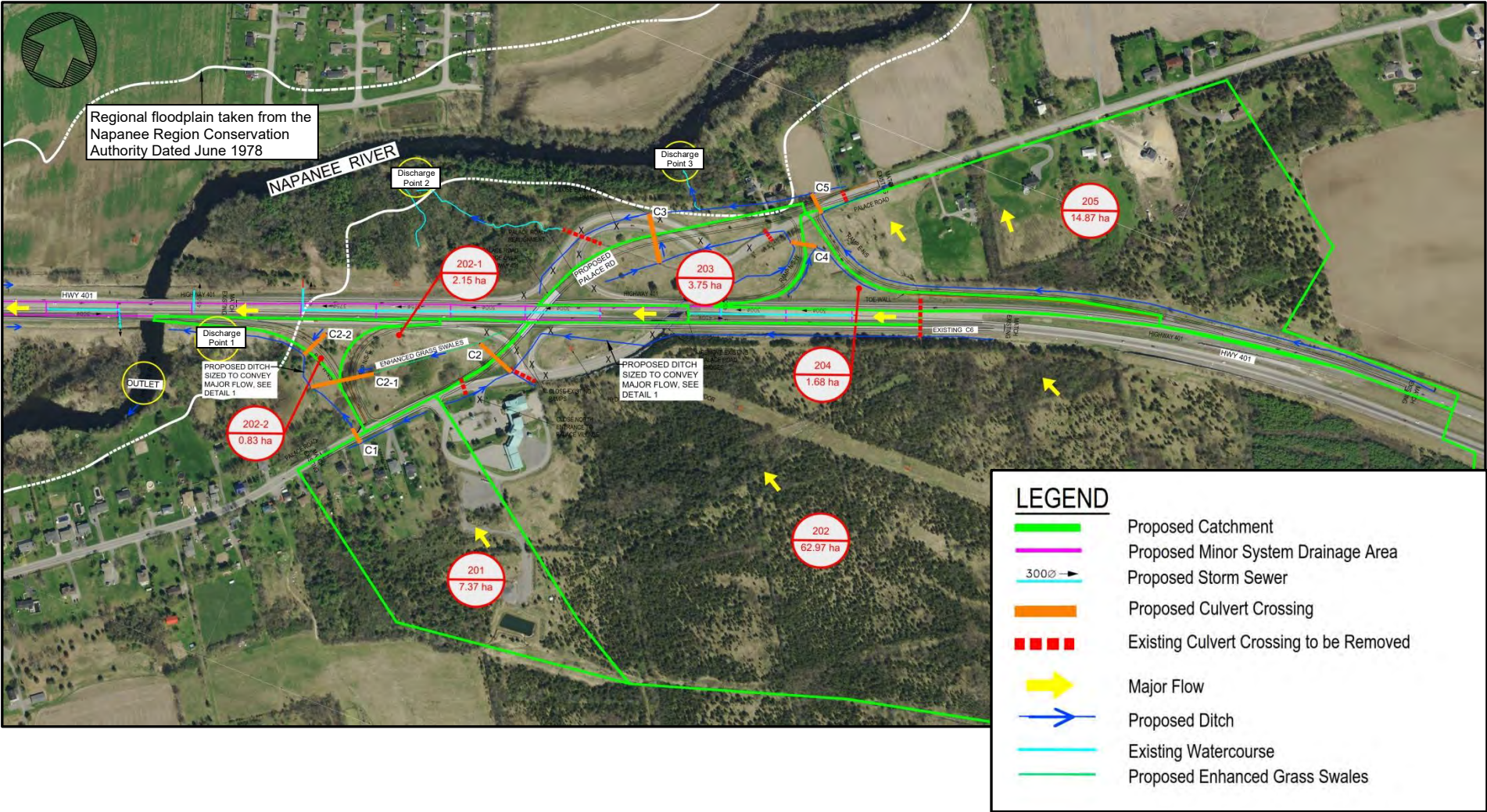


Figure 35: Proposed Drainage System



6.8 Property

The Technically Preferred Alternative will require full buy-out of one residential property, and an additional 0.2 ha of property from two other residential property parcels. While there are no direct property impacts south of Highway 401, there are six (6) residential properties opposite the Highway 401 eastbound ramp terminal intersection that currently access Palace Road. Given the concerns expressed by these property owners and in order to minimize the number of residential driveways with access to Palace Road within the interchange area, the Ministry offered to purchase the properties from these landowners. The Ministry will continue to implement various mitigation measures at this location for future potential home owners in the vicinity of the interchange. The recommended mitigation would include provision of a service road / entrance onto Palace Road to service all six houses within the interchange area, and landscaping between Palace Road and the houses. The service road / entrance is anticipated to be transferred to be under the jurisdiction of the Town of Greater Napanee.

The recommended plan will also require closure of the north entrance of one commercial property (Palace Village) along Palace Road due to visibility / safety concerns on the new grade at Palace Road. The southerly entrance to Palace Village will be extended and full access maintained.

Further details are outlined in **Section 7.2.2** of this TESR.

6.9 Traffic Management and Staging During Construction

In general, long-term lane closures along Highway 401 and interchange ramps are not anticipated to be required to complete the interchange improvements. Short term night-time and/or weekend ramp closures are anticipated, as well as single lane closures and occasional short-term closures along Palace Road to complete interchange and structure works. A longer duration (1 month) closure of the eastbound and westbound on-ramps may also be necessary to facilitate removal of the existing Palace Road structures. Detailed staging plans will be confirmed and further refined in detail design.

A conceptual construction staging strategy has been developed to complete the bridge replacement and interchange works and is available in **Appendix M**. The conceptual construction staging strategy is summarized below.

Stage 1

1. Construct new westbound and eastbound on- and off-ramps.

Stage 2

1. Shift traffic to the new interchange ramps and close the existing ramps.
2. Construct the new Palace Road alignment and the new bridge over Highway 401.

Stage 3A

1. Relocate traffic onto the new Palace Road alignment and the new bridge over Highway 401, and close the existing Palace Road under Highway 401.
2. Fill in the existing alignment.

Stage 3B

1. Remove the existing Palace Road structures and complete fill-in work (night time and / or weekend lane closures along Highway 401 are anticipated, along with up to a 1 month closure of the existing on-ramps to Highway 401).

7. Environmental Issues, Effects, Mitigation Measures and Commitments

The following sections document the potential impacts and proposed mitigation measures pertaining to the natural, socio-economic and cultural environments, and traffic operations as a result of the proposed Highway 401 interchange improvements at Palace Road. These sections describe impacts based on the existing conditions described in **Section 3**. These impacts and mitigation measures will be reviewed and refined in detail design and documented in a future Design and Construction Report (DCR).

7.1 Natural Environment

7.1.1 Terrestrial Ecosystem

A terrestrial ecosystems impact assessment was prepared in accordance with the *MTO ERHD (2013)* to provide an assessment of impacts and proposed mitigation measures based on the proposed design. The following sections summarize the impact assessment and proposed mitigation measures. Additional information is available in the *Terrestrial Ecosystems Impact Assessment Report (AECOM, January 2019)* included in **Appendix H**.

7.1.1.1 Potential Impacts

Vegetation Communities and Designated Natural Areas

There are no ANSIs or PSWs present within the construction footprint; therefore, no impacts to provincially designated natural areas are anticipated.

The potential impacts to vegetation communities and municipally designated natural areas are described as follows:

- It is anticipated that a total of up to 9.14 ha of vegetation communities will be affected. This includes 8.38 ha of Cultural Meadow (CUM1); 0.08 ha of Coniferous Plantation (CUP3), 0.32 ha of Deciduous Forest (FOD) and 0.35 ha of Mixed Forest (FOM). The existing Meadow (CUM1) is considered to be disturbed by anthropogenic influences (due to periodic mowing and proximity to Highway 401) and at the time of field investigation was largely dominated by non-native species. No SAR plants were identified within the construction disturbance footprint.
- Portions of the Napanee River and its associated riparian area designated as an Environmental Protection Area within the Town of Greater Napanee Official Plan will be affected by the proposed works.
- Alteration of surface water runoff or groundwater inputs may result in damage or alteration to the vegetation communities.
- During construction earth material, sediment runoff and/or debris may enter vegetation communities and drainage ditches.

- The proposed works and use of construction equipment may perpetuate the spread and establishment of non-native and invasive species. Thirty of the 69 plants (43%) recorded within the Overall Study Area during field investigations are non-native, which includes some highly invasive species such as Common Reed (*Phragmites australis*) and Common Buckthorn.

Wildlife

The majority of the Overall Study Area consists of a Cultural Meadow (CUM1) community with small portions of Coniferous Plantation (CUP3), Deciduous Forest (FOD) and mixed Forest (FOM) communities. Vegetation communities and planted trees present within the Overall Study Area are likely to support breeding birds.

The potential impacts to breeding birds as a result of the proposed works include:

- Vegetation clearing during the breeding bird season of April 1st to August 31st could result in the disturbance/displacement of breeding birds and/or destruction of their active nests. The proposed works will result in a loss of some vegetated areas and habitat for some common species; however, the area lost provides only marginal habitat which is disturbed by existing anthropogenic impacts.

Species at Risk

The Overall Study Area was considered to contain potentially suitable habitat for a total of 11 SAR, of which the construction footprint may represent habitat for up to 10 of these including: Barn Swallow, Bobolink, Eastern Meadowlark, Eastern Whip-Poor-Will, Eastern Wood Pewee, Little Brown Myotis, Northern Myotis, Eastern Small-footed Myotis, Tricolored Bat and Snapping Turtle. While a Cultural Meadow community (CUM1) is located within the construction footprint, it is considered disturbed anthropogenic influences (i.e., periodic mowing and proximity to Highway 401) and is also largely dominated by non-native species. These areas are considered poor quality habitat for Bobolink and Eastern Meadowlark and it is unlikely that the species are using this area for breeding. Similarly the woodland edges associated with vegetation removal in the construction footprint is also considered disturbed and it is unlikely that the Eastern Whip-Poor-Will are using this area for breeding.

The wooded communities within the construction footprint (i.e., Coniferous Plantation (CUP3), Deciduous Forest (FOD) and Mixed Forest (FOM)) may represent suitable habitat for Barn Swallow and bat SAR. The potential impacts to SAR as a result of the proposed works are described as follows:

- Disturbance / displacement or mortality of SAR:
 - Barn Swallow and Bat SAR may be displaced or disturbed as a result of noise during construction. Light used during nighttime construction may also result in the displacement or disturbance of bat SAR. There is also a low possibility of species being injured or killed as a result of collision with construction vehicles. These potential impacts would result in a contravention of the *ESA 2007*.
- Habitat removal:

- Up to 0.75 ha of wooded habitat (i.e., Coniferous Plantation (CUP3), Deciduous Forest (FOD) and Mixed Forest (FOM)) that is potentially suitable for bat SAR may be lost as a result of proposed works. The removal of bat SAR habitat would result in a contravention of the *ESA 2007*. The removal of the existing bridges may result in the loss of habitat for Barn Swallow.

7.1.1.2 Proposed Mitigation Measures

Proposed mitigation and avoidance measures for the potential impacts on terrestrial features are summarized below:

General

- To assist in mitigating potential impacts to terrestrial ecosystems applicable MTO Provisions should be included in contract documents and utilized during construction.

Vegetation Communities and Designated Natural Areas

- Vegetation removal should be kept to a minimum and will be limited to the construction disturbance footprint;
- A landscape plan should be developed to address removal of woody vegetation using similar native species;
- Areas of herbaceous vegetation disturbed during proposed works should be seeded with a site appropriate native MTO approved seed mix;
- Construction material should be stored within authorized location and any soil stockpiles should be located within a suitable sediment fenced and protected location only;
- The construction disturbance areas should be clearly delineated to define the working area and prevent accidental intrusion into adjacent vegetation;

Wildlife and Species at Risk

- Vegetation removal should be scheduled to occur outside of the breeding bird seasons of April 1st to August 31st to avoid disturbance to breeding birds and destroying active nests, including any bird SAR. If vegetation removal must occur within this time period, active nest searches may be conducted prior to vegetation removal by a qualified biologist within 'simple habitats' to ensure that no active nests of breeding birds or bird SAR are destroyed, in order to prevent any contravention of the *Migratory Birds Convention Act, 1994* and / or the *ESA 2007*;
- In the event a nesting Snapping Turtle is observed, the individual will be permitted to continue nesting and the nest location shall be reported to MTO and MNRF immediately; and,
- Any SAR observations should be reported to MTO and MNRF and protection should be implemented immediately to ensure compliance with the *ESA (2007)*.

If mitigation measures identified above are implemented, impacts to SAR, SAR habitat and terrestrial ecosystems within the Overall Study Area, and net effects are expected to be minimal. Bat SAR may be impacted as a result of the proposed works and these disturbance and destruction impacts must be addressed by future correspondence with the MNRF during Detail Design and may require Authorization under the *ESA 2007*.

7.1.1.3 Commitments to Work during Detail Design

The following commitments to work during detail design are included:

- The precise locations of Common Reed shall be identified to aid in the development of mitigation measures to halt the spread of this species.
- If during Detail Design it is determined that vegetation removals cannot be avoided, additional species specific investigations should be undertaken to determine the presence or absence of bat SAR within the construction footprint. If it is confirmed that the proposed activities require removal of confirmed habitat for bat SAR an Authorization under the *ESA 2007*, generally an Overall Benefit Permit under clause 17(2)(c) would be required;
- It is recommended that nest surveys be undertaken at all affected structures to confirm if nesting birds, particularly Barn Swallow, are breeding or nesting at or on structures. Findings from these surveys will determine whether or not proposed works on the structure require registration under the *ESA 2007*.

7.1.2 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. The following sections are a summary of the impact assessment, which is further document in the *Fish and Fish Habitat Impact Assessment Report (AECOM, February 2019)* included in **Appendix J**.

7.1.2.1 Summary of Proposed Works

There will be no structural work at the Highway 401 bridge crossing at the Napanee River and no in-water work will be required. Grading associated with the new interchange ramps will extend to within 80 m east of the river on the north (upstream) side of Highway 401 and to within 10 m east of the river on the south (downstream) side of Highway 401. Grading work will be confined within the Highway 401 and Palace Road right-of-ways, with only small areas abutting the Napanee River bridge being located within the historical floodplain.

Since the ditch along the north side of the highway is not well connected to the floodplain in the potential area of impact it is not considered seasonal fish habitat that could be impacted by the work. Grading of the ditch along the south side of Highway 401 is not likely to encroach on potential sensitive spawning areas for Northern Pike, as that was located 20 to 30 m downstream from the bridge. Generally, habitat suitable for pike spawning is non-limiting throughout this reach.

7.1.2.2 Summary of Potential Impacts

The proposed work is anticipated to be conducted in compliance with MTO Routine Works in accordance with Step 3 of the *MTO/DFO/MNRF Protocol for Protecting Fish and Fish Habitat on Provincial Transportation Undertakings* – Version 3, 2016. In this case, works qualifying as Routine and/or those that can be conducted in accordance with the Best Management Practices (BMPs) need not be carried forward in the fisheries assessment process (Step 4 of the Protocol), and Notification to MTO Head Office and to DFO would not be required. Provided the proposed work complies with the measures and provisions stipulated under the appropriate guidance documented for Routine Works, and the mitigation measures outlined in Table 16, potential impacts to fish and fish habitat associated with the proposed activities can be avoided or mitigated.

Further, serious harm to the fish that are part of, or support a commercial, recreational or Aboriginal (CRA) fishery (i.e., the Napanee River) will be avoided. This determination of 'no serious harm' is further supported by the following rationale:

- No in-water works or work below the High Water Mark (HWM) are proposed and as such, the project will not result in death; or harm to fish and/or aquatic SAR (i.e. American Eel);
- Near-water works at the Napanee River will be timed to avoid wet and windy conditions; and,
- There will be no destruction and/or permanent alteration of fish habitat that would limit or diminish fishes' ability to continue to rely upon the habitat as spawning grounds, or as nursery, rearing, or food supply areas, or as a migration corridor, or any other area required by fishes to carry out one or more of their life processes.
- Although suitable habitat for the American Eel is present within the Napanee River, it is unlikely that proposed work will result in any negative effects to the species or its habitat. No work will occur below the HWM to construct a new bridge and ramps at the Palace Road interchange. Grading associated with the new interchange ramps will extend to within 80 m east of the river on the north (upstream) side of Highway 401 and to within 10 m east of the River on the south (downstream) side of Highway 401 however it is expected that all grading work adjacent to Highway 401 will be effectively contained using erosion and sediment controls to prevent the entry to deleterious substances to the watercourse.

7.1.2.3 Proposed Mitigation Measures

The following section provides a summary of proposed mitigation measures to avoid or mitigate potential impacts to fish and fish habitat. Additional information is provided in Table 16. Provided these measures are appropriately implemented, monitored and maintained, serious harm to a CRA fishery can be avoided. Should proposed activities change in Detail Design such that in-water works are required, then MTO routine works may not apply. The application of BMPs should be assessed and MNRF should be consulted as it relates to American Eel to confirm their permitting expectations and any specific mitigation measures required for the project.

Timing of Work

- Near-water works at the Napanee River will be timed to avoid wet and windy conditions;

Erosion and Sediment Control

- An Erosion and Sediment Control Plan shall be developed and implemented before starting the work, and be maintained for the site that minimizes risk of sedimentation of the waterbody during all phases of the project;

Operation of Machinery

- Activities near water shall be conducted such that materials such as paint, primers, blasting abrasives, rust, solvents, degreasers, grout or other chemicals do not enter the watercourse;
- A response plan for spills shall be developed before work commences. This plan shall be implemented immediately in the event of a sediment release or spill of a deleterious substance and an emergency spill kit shall be maintained on site;
- Clearing of riparian vegetation shall be kept to a minimum to avoid disturbance to the riparian vegetation and prevent soil compaction. When practicable, prune or top the vegetation instead of grubbing/uprooting;

Dewatering Activities

- Although de-watering of surface watercourses is not anticipated, if this requirement is confirmed during detail design a temporary water passage/isolation/containment system should be implemented during construction to isolate the work area from the open area of the watercourse, in order to maintain fish passage and water flow that is both adequate and clean.

7.1.3 Hydrogeology and Groundwater

7.1.3.1 Potential Impacts

The shallow groundwater levels in this area are high, generally within 5 m below ground surface. It is anticipated that excavations will be required during construction which have the potential for groundwater interference therefore an Environmental Activity Sector Registry (EASR) / Permit to Take Water (PTTW) will likely be required. Further analysis will be undertaken once further details are known during the Detail Design stage to confirm and support the need for an EASR / PTTW for these works.

The potential impacts from the interchange improvement work to the local groundwater system include, but are not limited to, the following:

- Changes to recharge/discharge regimes resulting from the disturbance of the ground surface, ground clearing, compaction, road cuttings, placement of fill and the potential addition of impervious road surface;

- Dewatering impacts (if dewatering is required) that include a reduction in groundwater level and/or reduced flow to the nearby water wells and groundwater dependent water bodies;
- Potential spills of hydrocarbons and other chemicals used during construction activities that could impact the groundwater aquifer and groundwater-dependent water bodies;
- The use of salt for road de-icing in winter seasons during future highway operations.

Threat to drinking water assessment has been completed for Quinte Source Protection Region for highly vulnerable aquifers, Significant Groundwater Recharge Areas and wellhead protection areas by the Quinte Source Protection Area. There are no municipal water supply wells or their associated WHPAs located within the study area. Therefore, the proposed interchange rehabilitation work will not pose significant drinking water threats from a WHPA perspective.

7.1.3.2 Proposed Mitigation Measures

The following mitigation measures are recommended to manage the potential impacts:

- If dewatering is required during the future interchange improvement work:
 - Dewatering activities shall be conducted in accordance with the control procedures as specified in the 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 EASR, if the amount of water taking exceeds 50 m³/day and is below 400 m³/day. A Category 3 Permit to Take Water (PTTW) must be obtained from the MECP if the amount of water taken exceeds 400 m³/day;
 - A pre-construction door-to-door water well survey is recommended to confirm the presence or absence of existing water wells in the vicinity (within 500 m radius) of the future dewatering locations, if required, and document the baseline conditions (both quality and quantity) of these wells. A water well monitoring program shall be developed and implemented during and after the dewatering activities, if deemed necessary. In addition, any water wells to be removed during the interchange improvement activities will have to be decommissioned properly as per the Ontario Wells Regulation (R.R.O. 1990, Reg. 903).
- Minimize disturbance to existing vegetation and grassed slopes where re-grading is required (disturbed areas should be re-vegetated as quickly as possible after completion of construction activities);
- Prepare and implement a stormwater management plan to protect the quality of surface runoff that may infiltrate groundwater resources;

- Minimize groundwater recharge impacts in the area by directing the surface runoff to roadside ditches and improve ditch conditions;
- Prepare and implement a spill prevention and control management plan as per *the Plan* policies and MTO's best management practices; and,
- Minimize salt usage and runoff during road de-icing applications by following *the Plan* policies and best practices consistent with those used across North America and employ the latest winter maintenance technologies.

7.1.4 Stormwater Management

As noted in **Section 3.4.7**, a *Drainage and Hydrology Report* (AECOM, January 2019) was completed as part of this study to assess existing drainage conditions in the study area, identify the potential drainage impacts associated with the proposed improvements, and recommend measures to mitigate potential impacts with the proposed improvements.

Based on the assessment it was determined that no adverse impacts are anticipated from the proposed improvement works and no quantity control measures are recommended.

Under existing conditions, no specific water quality measures exist within the study area. The additional paved surfaces could potentially impact the water quality which will be mitigated through the construction of grass swales with check dams. Grassed swales are provided to collect, store, treat, and convey storm runoff. The following features shall be incorporated into the design of swales during Detail Design:

- Convey flows up to and including the 100-year storm events;
- Mild slope with check dams to reduce velocity, facilitate attenuation, encourage infiltration and recharge of groundwater; and,
- Plantation along grassed swales to provide dense shading to mitigate thermal impact.

7.2 Socio-Economic Environment

7.2.1 Land Use

The Highway 401 interchange Improvements will primarily take place within the existing MTO ROW with direct impacts to residential land use in the northwest and north east quadrants. The improvements will also include impacts to commercial and residential driveways along the south side of Palace Road, south of Highway 401.

Opportunities to minimize impacts will be investigated during Detail Design and consultation will be undertaken with agricultural operations and local businesses to minimize impacts to their operations as much as feasible.

Refer to **Appendix A** for an outline of the Recommended Plan.

7.2.2 Property

The Technically Preferred Alternative will require full buy-out of one residential property, and an additional 0.2 ha of property from two other residential property parcels. While there are no direct property impacts south of Highway 401, there are six (6) residential properties opposite the Highway 401 eastbound ramp terminal intersection that currently access Palace Road. Given the concerns expressed by these property owners and in order to minimize the number of residential driveways with access to Palace Road within the interchange area, the Ministry offered to purchase the properties from these landowners. The Ministry will continue to implement various mitigation measures at this location for future potential home owners in the vicinity of the interchange. The recommended mitigation will include provision of a service road / entrance onto Palace Road to service all six houses within the interchange area, and landscaping between Palace Road and the houses. The service road / entrance is anticipated to be transferred to be under the jurisdiction of the Town of Greater Napanee.

The recommended plan will also require closure of the north entrance of one commercial property (Palace Village) along Palace Road due to visibility concerns on the new grade at Palace Road. The southerly entrance to Palace Village will be extended and access maintained.

If there are impacts to signs, vegetation, landscaping or driveways of any of the commercial, private or municipal properties, the area of impact will be returned to the conditions of the land prior to construction or better.

7.2.3 Landscaping

The recommended improvements will result in changes to the existing landscape due to edge impacts associated with the increased footprint and construction. A Landscape Opportunities Plan was developed to provide an overview of areas where the existing vegetation will require protection and where there are opportunities to implement landscaping if desired. This should be reviewed with the future detail design plan. The plan is available in **Appendix L**.

7.2.4 Waste and Contamination

As noted in **Section 3.2.2**, a Contamination Overview Study (COS) was undertaken to identify and review properties within the study area with actual or potential site contamination, and to identify appropriate future environmental work and mitigation measures to be implemented. The review identified 3 parcels within the Study Area as having a “high” potential for environmental contamination, and 1 location with “medium” potential. In addition, 6 spill records representing 4 different locations within the Study Area were found to have had significant historical spills, which were also considered as having “high” potential for contamination.

The first parcel identified as having high potential for environmental contamination is the Palace Village property on the south side of Highway 401. This property is the site of a former gas station, which may have experienced spills, overfilling and leaking of gasoline and diesel fuel and are considered potential sources of impact for soil and/or

groundwater quality. The other two properties with high potential for environmental contamination include residential homes with former orchards located on the properties, which may have historically experienced elevated levels of pesticides including lead and arsenic. The location identified as having medium potential for contamination includes the Riverside and Riverview Cemeteries.

Based on the recommended plan for improvements at the Palace Road interchange, none of the properties identified as having either high or medium potential for contamination will be directly impacted by the improvement works, and no further contamination investigation is therefore required.

In addition to the COS, Preliminary Site Screenings were completed for the 3 properties identified as partially or fully required to construct the recommended interchange improvements. No environmental concerns or evidence of contamination was identified as part of these screening assessments. However, given the proximity of the impacted properties to Highway 401 and due to de-icing activities during winter months, elevated levels of Sodium Adsorption Ratio, Electrical Conductivity, Sodium and Chloride may be encountered in soil and groundwater near the roadways. During construction of the improvements, the environmental quality of the soil should be evaluated for salt impact prior to removal of soil from the site. In addition, during construction special attention should be given to the soil and groundwater in the area for any visual evidence of contamination from highway spills. If visual evidence of contamination is noted, further investigation of the soil and/or groundwater quality in the area will be required.

If during Detail Design, additional properties are determined to be required, beyond those identified in this TESR, a Preliminary Site Screening shall be undertaken on each property to determine the need for further environmental site assessments.

7.2.5 Traffic Noise

A Traffic Noise Impact Assessment was completed for the interchange reconfiguration in accordance with the methods and procedures recommended in the MTO *Environmental Guide for Noise*. Under the *Guide*, the “noise impact” is defined as the difference between the “No Project” and the “With Project” noise levels during the subject year of assessment (Horizon Year), which is typically 10 years post-construction. For the purposes of this assessment, the horizon year of 2038 was utilized.

The *Guide* requires that the most exposed side of a dwelling unit be assessed as part of an initial screening. If the initial screening indicates that noise mitigation investigation is required, the point of assessment for determining the noise mitigation requirements is the Outdoor Living Area (OLA).

The OLA can be situated on any side of a Noise Sensitive Area (NSA) which accommodates outdoor living activities, and is generally taken to be the backyard. For this assessment, the location was taken as 3 metres from the applicable façade with a height of 1.2 metres above ground level.

In general, the lands surrounding the immediate Study Area are zoned for rural and environmental protection uses. A number of residential properties adjacent to the interchange are considered NSA's and were assessed as part of the Traffic Noise analysis. The location of the NSA's are identified in **Figure 36**.

Figure 36: Assessed Noise Sensitive Locations



The MTO criteria for mitigation investigation are based on both the noise increase due to the project and the overall noise level due to the project, refer to **Table 14** for the criteria.

Table 14: MTO Criteria for Noise Mitigation investigation

Change in Noise Level Above Future Ambient/Projected Noise Levels with Proposed Improvements	Mitigation Effort Required
< 5 dB Change and <65 dBA Overall	None
≥ 5 dB Change or ≥ 65 dBA Overall	Investigate noise control measures on right of way
	Introduce noise control measures within right of way and mitigate to ambient if technically, economically, and administratively feasible.
	Noise control measures, where introduced, should achieve a minimum of 5 dBA attenuation, over first row receivers.

The findings from the Traffic Noise Assessment for the NSA's are summarized in **Table 15**.

Table 15: Traffic Noise Assessment

Assessment Location	Predicted Leq, 16 (dBA)		Change (dB)	Perceived Noise Impact	Investigation of Noise Mitigation Requirement (Yes/No)	
	No Project	With Project			≥5 dB Change	≥65 dBA
R01	66	66	<1	Minor	No	Yes
R02	68	68	<1	Minor	No	Yes
R03	60	60	<1	Minor	No	No
R04	66	66	<1	Minor	No	Yes
R05	67	67	<1	Minor	No	Yes
R06	67	67	<1	Minor	No	Yes
R07	67	67	<1	Minor	No	Yes
R08	66	66	<1	Minor	No	Yes
R09	67	67	<1	Minor	No	Yes
R10	66	66	<1	Minor	No	Yes
R11	64	64	<1	Minor	No	No

The results of the assessment indicate that noise levels due to the reconfiguration of the Highway 401 and Palace Road interchange will not require noise mitigation as per the

MTO's *Environmental Guide for Noise*. The project is predicted to have a minor perceived noise impact (no noticeable change in noise levels) at the nearest noise sensitive areas. Some locations exceeded the MTO absolute noise level limit criterion for noise mitigation investigation on the most exposed side; however, when reviewing noise levels at the Outdoor Living Area (the point of assessment for noise mitigation), the results indicated that noise mitigation was not required.

7.2.6 Construction Noise

Construction noise impacts for this project may potentially be expected at nearby Noise Sensitive Areas. The potential for construction noise impacts will depend on the number of and type of construction equipment and processes to be used and the time of day that they may occur.

Best management practices for construction noise mitigation shall be employed by the use of standard special provisions in the contract during detail design.

The Town of Napanee restricts construction-type activities between the hours of 9:00 p.m. and 7:00 a.m. of the following day under By-Law Number 04-06, as amended by By-Law Number 04-49, Consolidated Noise By-Law. If construction is deemed to be required during these times, then a noise exemption should be sought during detail design.

7.3 Cultural Environment

7.3.1 Archaeology

Potential Impacts

As noted in **Section 3.3.1** a Stage 1-2 Archaeological Assessment was carried out on all potentially impacted properties. While the majority of the study area had been previously disturbed by construction activity and no longer contained archaeological potential, positive test pits were dug in the northeastern section of the study area. Although the positive test pits contained mid-to late- 19th century Euro-Canadian artifacts, they are likely associated with the historic structure that is extant on this property today and therefore are not considered to contain further Cultural Heritage Value or interest. As such, these properties can be considered clear of further archaeological concern and no further archaeological assessment is required on those lands.

Proposed Mitigation Measures

If the design changes and there are additional footprint impacts, the additional property shall be subject to a Stage 2 archaeological assessment as per the *Standards and Guidelines for Consultant Archaeologists* (MTCS, 2011). The Contractor shall comply with all recommendations outlined in the *Stage 1-2 Archaeological Assessment* (AECOM, September 2018) and any further assessments (i.e. Stage 3 and/or Stage 4 Archaeological Assessments) completed during Detail Design as required.

During construction there is the possibility of encountering deeply buried archaeological material. In the event the following situations are encountered during construction, the Contractor shall stop work immediately and undertake the actions as described below:

- Should previously undocumented archaeological resources be discovered, there may be a new archaeological site which would be subject to Section 48 (1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licenced consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48 (1) of the *Ontario Heritage Act*. The Heritage Operations Unit of the Ministry of Tourism, Culture and Sport must be notified immediately;
- The *Cemeteries Act*, R.S.O. 1990, c.C 4 and the *Funeral, Burial and Cremation Services Act*, 2002, S.O. 20002, c33 (when proclaimed in force) require that any person discovering human remains must notify the police or coroner and the Registrar of Cemeteries at the Ministry of Consumer Services; and,
- Archaeological sites recommended for further archaeological fieldwork or protection remain subject to Section 48 (1) of the *Ontario Heritage Act* and may not be altered, or have artifacts removed from them, except by a person holding an archaeological licence.

7.3.2 Built Heritage

As noted in **Section 3.3.2**, a Cultural Heritage Evaluation Report (CHER) was prepared in September 2017 for 931 Palace Road. The CHER determined that the house and barn located at 931 Palace Road have cultural heritage value or interest according to *O. Reg. 9/06*. Together, the house and barn at 931 Palace Road act as a contributing element in a rural agricultural Cultural Heritage Landscape. However, neither structure meets the criteria outlined in *O. Reg. 10/06*. As a result this CHER recommends that 931 Palace Road is considered a Provincial Heritage Property (PHP).

The CHER recommends the following:

- *Recommendation 1: Leave the house and barn in-situ*

Due to the cultural heritage value of the house and barn at 931 Palace Road, the preferred preservation option would be to leave the buildings *in-situ* and with the option of developing them with some form of adaptive re-use.

- *Recommendation 2: Relocate the house*

Should it be determined that the house cannot be retained *in-situ*, it could be relocated and adapted to some new function. If relocation is to occur, it would be preferable to have it moved to a location where a rural or rural-like landscape setting could be maintained. The relocation of the house should occur locally as to preserve the connection to the Greater Napanee area.

- *Recommendation 3: Document and salvage house and barn*

If the buildings cannot be adaptively reused either *in-situ* or in a new location, the house and Barn should be documented prior to demolition based on standards identified in the MTO *Environmental Standards and Practices Guide*, Section 7.5.2 (Heritage Documentation Report (HDR) for Built Heritage Resources).

- *Recommendation 4: Heritage Impact Assessment*

In the event that there will be impacts to the house, barn or property for 931 Palace Road, preparation of an HIA will be required during Detail Design. This HIA will address potential impacts to the identified heritage attributes for the property. It will also recommend option and mitigation measures in order to reduce negative impacts and help conserve its cultural heritage value or interest. The HIA will be prepared according to the *Standards and Guidelines for Conservation of Provincial Heritage Properties* (January 2017). The HIA should be completed as early as possible in the Detail Design phase so that the design team has time to consider mitigation option for the property before the design is completed.

Further assessment shall be undertaken during Detail Design to determine which of the above recommendations is feasible.

7.4 Traffic Operations

7.4.1 Community Access & Out of Way Travel

No permanent community access impacts are anticipated as a result of implementing the recommended plan. Construction activities will result in temporary impacts, such as short-term night-time and/or weekend ramp or lane closures and detours, which will be mitigated through advance notice and signage. The Town of Napanee, County of Lennox and Addington, Emergency service providers and adjacent property and business owners will be notified in advance of lane and road closures and potential out-of-way travel.

While long-term lane closures along Highway 401 are not anticipated, short term night-time and/or weekend ramp closures are anticipated, as well as single lane closures and occasional short-term closures along Palace Road to complete interchange and structure works. A longer duration closure of the eastbound and westbound on-ramps from Palace Road may be necessary to facilitate removal of the existing Palace Road structures. A conceptual construction staging strategy has been developed to complete the bridge replacement and interchange works. The strategy is discussed further in **Section 6.9** and presented in **Appendix M**.

While detailed staging and detour plans will be confirmed and further refined in detail design, the following closures and detour routes are anticipated:

- Closure of both the eastbound and westbound off-ramps is anticipated for 1-2 full weekends each to complete tie-in work for construction of the new on-ramps. The ramps will not be closed at the same time. During weekend closure of these off-ramps, it is anticipated that Highway 401 traffic will be signed to exit at the County Road 41 interchange. The signed detour route for both off-ramps would utilize the existing Emergency Detour Route, which includes southbound on County Road 41 and eastbound on Industrial Boulevard / Newburgh Road to access Palace Road. The out-of-way travel utilizing these detour routes is approximately 4.5 km (eastbound ramp closure) and 11 km (westbound ramp closure).

- Closure of the eastbound and westbound on-ramps to Highway 401 is anticipated for up to 1 month to facilitate removal of the existing Palace Road structures. For the westbound on-ramp closure, the anticipated detour route will include the existing Emergency Detour Route, following eastbound Palace Road / County Road 18 to Newburgh Road / Industrial Boulevard and County Road 41. For the eastbound on-ramp closure, the signed detour route would include eastbound/northbound on Palace Road/County Road 5, and County Road 4 southbound to Highway 401. The out-of-way travel utilizing these detour routes is approximately 4.5 km (westbound on-ramp closure) and 5 km (eastbound on-ramp closure).

Given the relatively low traffic volumes utilizing the Palace Road interchange, incremental traffic delays as a result of the detoured traffic is not anticipated along the detour routes.

7.5 Summary of Environmental Concerns, Mitigation Measures and Commitments to Future Work

Table 16 summarizes the environmental concerns and mitigation measures and commitments to future work to be undertaken and confirmed during Detail Design.

Legend

MTO – Ministry of Transportation

MUN – Applicable municipalities (Town of Greater Napanee, County of Lennox and Addington)

MNRF – Ministry of Natural Resources and Forestry

MECP – Ministry of the Environment, Conservation and Parks

MTCS – Ministry of Tourism, Culture and Sport

CRCA– Cataraqui Region Conservation Authority

QC – Quinte Conservation

The following commitments to future work during detail design are included in **Table 16**:

Terrestrial Environment

- The precise locations of Common Reed shall be identified to aid in the development of mitigation measures to halt the spread of this species.
- If during Detail Design it is determined that vegetation removals cannot be avoided, additional species specific investigations should be undertaken to determine the presence or absence of bat SAR within the construction footprint. If it is confirmed that the proposed activities require removal of confirmed habitat for bat SAR an Authorization under the ESA 2007, generally an Overall Benefit Permit under clause 17(2)(c) would be required;
- It is recommended that nest surveys be undertaken at all affected structures to confirm if nesting birds, particularly Barn Swallow, are breeding or nesting at or on structures. Findings from these surveys will determine whether or not proposed works on the structure require registration under the *ESA 2007*.

Land Use and Property

- Opportunities to minimize impacts will be investigated during Detail Design and consultation will be undertaken with agricultural operations and local businesses to minimize impacts to their operations as much as feasible.
- Additional discussions will be held during Detail Design with the Town of Napanee regarding the proposed access road between Palace Road and the six residential properties on the south side of the road within the interchange area, regarding design requirements and transferring of the road to be under municipal jurisdiction.

Landscaping

- The preliminary Landscape Opportunities Plan developed during Preliminary Design will be reviewed and further refined, including consideration of landscaping treatments required between Palace Road and the six residential properties on the south side of the road within the interchange area.

Waste and Contamination

- If any contamination is identified during Detail Design or during construction, mitigation measures may need to be developed and implemented which may include environmental site clean-up / remediation and/or risk assessment.
- A Preliminary Site Screening will be undertaken on any properties not identified as impacted during this study to determine the need for further environmental site assessments.

Traffic Noise

- A revised noise assessment may be required during Detail Design if there are significant modifications to the Technically Preferred Alternative.

Archaeology

- If the design changes and there are additional footprint impacts, the additional property shall be subject to a Stage 2 archaeological assessment as per the Standards and Guidelines for Consultant Archaeologists (MTCS, 2011).

Built Heritage

- Further assessment shall be undertaken during Detail Design to determine which of the recommendations from the Cultural Heritage Evaluation Report (CHER) undertaken for the property is feasible. In the event that there will be direct impacts to the house, barn or property in question, a Heritage Impact Assessment will be prepared during Detail Design. The HIA will recommend options and mitigation measures in order to reduce negative impacts and help conserve the properties cultural heritage value or interest.

Table 16: Summary of Environmental Concerns, Mitigation Measures and Commitments from this TESR to be confirmed during Detail Design

Summary of Environmental Concerns, Mitigation Measures and Commitments from this TESR to be confirmed during Detail Design				
ID #	Environmental Element / Concern and Potential Impact	Concerned Agencies	ID#	Mitigation, Protection, Monitoring, and Study Commitments to be carried forward to Detail Design
1.0 Terrestrial				
General				
1.1	Impacts to terrestrial ecosystems must be identified and appropriate mitigation measures utilized during construction	MTO / MNRF / QCA / CRCA	1.1.1	<ul style="list-style-type: none">Applicable MTO Provisions should be included in contract documents and utilized during construction
Vegetation				
1.2	The proposed improvements may affect up to 9.14 ha of vegetation communities, primarily consisting of Cultural Meadow, Deciduous and Mixed Forest.	MTO / MNRF / QCA / CRCA	1.2.1	<ul style="list-style-type: none">Vegetation removal should be kept to a minimum and will be limited to the construction disturbance footprint
			1.2.2	<ul style="list-style-type: none">A landscape plan should be developed to address removal of woody vegetation using similar native species
1.3	Construction activities may impact portions of the Napanee River and its associated riparian area designated as an Environmental Protection Area, and may alter surface water runoff or groundwater inputs including sediment runoff and/or debris into vegetation communities and drainage ditches.	MTO / MNRF / QCA / CRCA	1.3.1	<ul style="list-style-type: none">The construction disturbance areas should be clearly delineated to define the working area and prevent accidental intrusion into adjacent vegetation
			1.3.2	<ul style="list-style-type: none">Construction material should be stored within authorized location and any soil stockpiles should be located within a suitable sediment fenced and protected location only
			1.3.3	<ul style="list-style-type: none">Areas of herbaceous vegetation disturbed during proposed works should be seeded with a site appropriate native MTO approved seed mix
1.4	Construction activities may perpetuate the spread and establishment of non-native and invasive species.	MTO / MNRF / QCA / CRCA	1.4.1	<ul style="list-style-type: none">During Detail Design, it is recommended that the precise locations of Common Reed be identified to aid in the development of mitigation measure to halt the spread of this species
Wildlife and Species at Risk (SAR)				
1.5	Vegetation clearing may result in disturbance and potential destruction of breeding bird active nests and loss of vegetated areas and habitat for some common species. This includes disturbance of habitat potentially suitable for Species at Risk.	MTO / MNRF / QCA / CRCA	1.5.1	<ul style="list-style-type: none">If during Detail Design it is determined that avoidance of vegetation removal within woodlands is unfeasible, additional species specific investigations should be undertaken to determine the presence or absence of bat SAR within the construction footprint. If it is confirmed that the proposed activities require removal of confirmed habitat for bat SAR an Authorization under the ESA 2007, generally an Overall Benefit Permit under clause 17(2)(c) would be required.

Summary of Environmental Concerns, Mitigation Measures and Commitments from this TESR to be confirmed during Detail Design				
ID #	Environmental Element / Concern and Potential Impact	Concerned Agencies	ID#	Mitigation, Protection, Monitoring, and Study Commitments to be carried forward to Detail Design
			1.5.2	<ul style="list-style-type: none">Vegetation removal should be scheduled to occur outside of the breeding bird seasons of April 1st to August 31st to avoid disturbance to breeding birds and destroying active nests, including any bird SAR. If vegetation removal must occur within this time period, active nest searches may be conducted prior to vegetation removal by a qualified biologist within ‘simple habitats’ to ensure that no active nests of breeding birds or bird SAR are destroyed, in order to prevent any contravention of the <i>Migratory Birds Convention Act, 1994</i> and / or the <i>ESA 2007</i>
			1.5.3	<ul style="list-style-type: none">It is recommended that nest surveys be undertaken at all affected structures to confirm if nesting birds, particularly Barn Swallow, are breeding or nesting at or on structures. Findings from these surveys will determine whether or not proposed works on the structure require registration under the <i>Endangered Species Act (2007)</i>.
			1.5.4	<ul style="list-style-type: none">In the event a nesting Snapping Turtle is observed, the individual will be permitted to continue nesting and the nest location shall be reported to MTO and MNRF immediately
			1.5.5	<ul style="list-style-type: none">Any SAR observations should be reported to MTO and MNRF and protection should be implemented immediately to ensure compliance with the ESA (2007)
2.0 Fish and Fish Habitat				
2.1	No in-water works are anticipated at the Napanee River, although construction works along Highway 401 will be located within the historical floodplain and directly adjacent to the bridge.	MTO / MNRF / DFO / QCA / CRCA	2.1.1	<ul style="list-style-type: none">Near water works at the Napanee River will be timed to avoid wet and windy conditions;
			2.1.2	<ul style="list-style-type: none">If it is determined during detail design that in-water work at the Napanee River is required, the works will be timed to prevent disruption of vulnerable fish life stages, including eggs and larvae, by adhering to appropriate fisheries timing windows (no in-water work permitted April 1 to June 30)
2.2	Grading adjacent to the Napanee River may result in erosion and sedimentation of the river and adjacent floodplain and ditching.	MTO / MNRF / DFO / QCA / CRCA	2.2.1	<ul style="list-style-type: none">An Erosion and Sediment Control Plan shall be developed, implemented and maintained for the site that minimizes risk of sedimentation of the waterbody during all phases of the project
			2.2.2	<ul style="list-style-type: none">Effective erosion and sediment control measures shall be installed before starting work to prevent sediment from entering the water body
			2.2.3	<ul style="list-style-type: none">Grading shall be carried out in stages and stabilized as soon as possible
			2.2.4	<ul style="list-style-type: none">Grading within 30 m of the Highway 401 bridge over the Napanee River shall be conducted in the appropriate timing window (listed above), as to avoid impacts to sensitive habitat (potential Northern Pike spawning areas south of the Highway 401 bridge)
			2.2.5	<ul style="list-style-type: none">Measures shall be undertaken to contain and stabilize waste material (e.g., construction waste and materials, uprooted or cut plants, accumulated debris) above the high water mark of the Napanee River to prevent entry

Summary of Environmental Concerns, Mitigation Measures and Commitments from this TESR to be confirmed during Detail Design				
ID #	Environmental Element / Concern and Potential Impact	Concerned Agencies	ID#	Mitigation, Protection, Monitoring, and Study Commitments to be carried forward to Detail Design
			2.2.6	<ul style="list-style-type: none">Regular inspection and maintenance of erosion and sediment control measures and structures shall occur during the course of construction, and repairs to erosion and sediment control measures and structures shall be completed promptly if damage occurs;
			2.2.7	<ul style="list-style-type: none">Repairs to erosion and sediment control measures and structures should be completed promptly if damage occurs.
2.3	Operation of machinery adjacent to watercourses may result in debris or spills entering the watercourse.		2.3.1	<ul style="list-style-type: none">Activities near water shall be conducted such that materials such as paint, primers, blasting abrasives, rust, solvents, degreasers, grout or other chemicals do not enter the watercourse
			2.3.2	<ul style="list-style-type: none">A response plan for spills shall be developed before work commences. This plan shall be implemented immediately in the event of a sediment release or spill of a deleterious substance and an emergency spill kit shall be maintained on site
			2.3.3	<ul style="list-style-type: none">Machinery should arrive on site in a clean condition, be washed, refuelled and serviced and fuel and other materials will be stored in such a way as to prevent any deleterious substances from entering the watercourse
			2.3.4	<ul style="list-style-type: none">Refuelling shall be conducted 30 m or further from the watercourse, at a minimum, on a refuelling pad to prevent spills from entering the watercourse
			2.3.5	<ul style="list-style-type: none">Construction materials shall be removed from site upon completion of the project
			2.3.6	<ul style="list-style-type: none">Clearing of riparian vegetation shall be kept to a minimum to avoid disturbance to the riparian vegetation and prevent soil compaction. When practicable, prune or top the vegetation instead of grubbing/uprooting
2.4	De-watering of surface watercourses is not anticipated, however should the proposed works confirmed during Detail Design result in requirement for de-watering, additional mitigation measures will be necessary.		2.4.1	<ul style="list-style-type: none">If de-watering of surface watercourses is confirmed to be required during detail design, a temporary water passage/isolation/containment system should be implemented during construction to isolate the work area from the open area of the watercourse, in order to maintain fish passage and water flow that is both adequate and clean.
			2.4.2	<ul style="list-style-type: none">Any water intakes or outlet pipes shall be screened to prevent entrainment or impingement of fish
			2.4.3	<ul style="list-style-type: none">Screens shall be located away from natural or artificial structures that may attract fish that are migrating, spawning or in rearing habitat;
			2.4.4	<ul style="list-style-type: none">Pumps will be shut down when fish screens are removed for inspection and cleaning
			2.4.5	<ul style="list-style-type: none">Any sediment laden dewatering discharge shall be pumped to a filtering system at least 30 m from the watercourse and allowed to settle and/or filter through riparian vegetation before being discharged downstream of the construction area and controls shall be monitored for their effectiveness
			2.4.6	<ul style="list-style-type: none">A spill management plan (including materials, instructions regarding their use, education of contract personnel, and emergency contact numbers) shall be ensured on site at all times for implementation in event of an accidental spill during construction

Summary of Environmental Concerns, Mitigation Measures and Commitments from this TESR to be confirmed during Detail Design				
ID #	Environmental Element / Concern and Potential Impact	Concerned Agencies	ID#	Mitigation, Protection, Monitoring, and Study Commitments to be carried forward to Detail Design
3.0 Hydrogeology and Groundwater				
3.1	De-watering activities required during construction may affect the local groundwater system	MTO / MECP / QCA/ CRCA	3.1.1	<ul style="list-style-type: none">If dewatering is required during construction:<ul style="list-style-type: none">Dewatering activities shall be conducted in accordance with the control procedures as specified in the OPSS 518 Construction Specification for Control of Water from Dewatering OperationsAs per <i>Ontario Regulation 387/04</i> (water taking regulation) and <i>Ontario Regulation 63/16</i> (water taking registration regulation), the dewatering activities will need to be registered as “prescribed activities” on the EASR, if the amount of water taking exceeds 50 m³/day and is below 400 m³/day. A Category 3 Permit to Take Water (PTTW) must be obtained from the MECP if the amount of water taken exceeds 400 m³/dayA pre-construction door-to-door water well survey is recommended to confirm the presence or absence of existing water wells in the vicinity (within 500 m radius) of the future dewatering locations, if required, and document the baseline conditions (both quality and quantity) of these wells. A water well monitoring program shall be developed and implemented during and after the dewatering activities, if deemed necessary. In addition, any water wells to be removed during the interchange improvement activities will have to be decommissioned properly as per the Ontario Wells Regulation (R.R.O. 1990, Reg. 903)
			3.1.2	<ul style="list-style-type: none">Minimize disturbance to existing vegetation and grassed slopes where re-grading is required (disturbed areas should be re-vegetated as quickly as possible after completion of construction activities)
			3.1.3	<ul style="list-style-type: none">Prepare and implement a stormwater management plan to protect the quality of surface runoff that may infiltrate groundwater resources
			3.1.4	<ul style="list-style-type: none">Minimize groundwater recharge impacts in the area by directing the surface runoff to roadside ditches and improve ditch conditions
			3.1.5	<ul style="list-style-type: none">Prepare and implement a spill prevention and control management plan as per <i>the Plan</i> policies and MTO’s best management practices
			3.1.6	<ul style="list-style-type: none">Minimize salt usage and runoff during road de-icing applications by following <i>the Plan</i> polices and best practices consistent with those used across North America and employ the latest winter maintenance technologies
4.0 Stormwater Management				

Summary of Environmental Concerns, Mitigation Measures and Commitments from this TESR to be confirmed during Detail Design				
ID #	Environmental Element / Concern and Potential Impact	Concerned Agencies	ID#	Mitigation, Protection, Monitoring, and Study Commitments to be carried forward to Detail Design
4.1	Additional paved surfaces associated with the construction works will require drainage modifications and could affect water quality along ditches outletting to the Napanee River	MTO / QCA / CRCA / MECP / MUN	4.1.1	<ul style="list-style-type: none">Grassed swales with check dams will be provided to collector, store, treat and convey storm runoff. The swales will be designed to:<ul style="list-style-type: none">Convey flows up to and including the 100-year storm events;Include mild slopes with check dams to reduce velocity, facilitate attenuation, encourage infiltration and recharge of groundwater; and,Include plantation along the grassed swales to provide dense shading to mitigate thermal impact
5.0 Land Use				
5.1	The recommended improvements will result in direct impacts to residential land use adjacent to the interchange.	MTO / MUN	5.1.1	<ul style="list-style-type: none">Opportunities to minimize impacts will be investigated during Detail Design and consultation will be undertaken with agricultural operations and local businesses to minimize impacts to their operations as much as feasible
6.0 Property				
6.1	The Technically Preferred Alternative will require full buy-out of one residential property, and an additional 0.2 ha of property from two other residential property parcels.	MTO / MUN / Property Owners	6.1.1	<ul style="list-style-type: none">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 forming the basis of negotiations
			6.1.2	<ul style="list-style-type: none">Safe access to private property entrances will be maintained at all times during construction
			6.1.3	<ul style="list-style-type: none">If there are impacts to signs, vegetation, landscaping or driveways of any of the commercial, private or municipal properties, the area of impact will be returned to the conditions of the land prior to construction or better
6.2	Six residential properties on the south side of Palace Road adjacent to the proposed eastbound off-ramp and Highway 401 within the interchange area will require access modifications	MTO / MUN / Property Owners	6.2.1	<ul style="list-style-type: none">A new service road / entrance will be constructed between Palace Road and the six properties to provide access for these properties, with access onto Palace Road west of the proposed ramp terminal intersection. Additional discussions will be held with the Town of Napanee, as the service road/entrance may be transferred to be under municipal jurisdiction.
			6.2.2	<ul style="list-style-type: none">Landscaping treatments will be provided between Palace Road and the six properties to provide shielding from the proposed roadway improvements.
			6.2.3	<ul style="list-style-type: none">The Ministry has offered to purchase the properties from these landowners. The Ministry will continue to implement the mitigation measures noted above for future potential home owners at this location.
6.3	Closure of the north entrance to the Palace Village commercial property from Palace Road will be required.	MTO / MUN / Business Owners	6.3.1	<ul style="list-style-type: none">The southerly entrance to Palace Village will be extended to the realigned Palace Road, and access to Palace Road maintained at all times during and post-construction.
7.0 Landscaping				

Summary of Environmental Concerns, Mitigation Measures and Commitments from this TESR to be confirmed during Detail Design				
ID #	Environmental Element / Concern and Potential Impact	Concerned Agencies	ID#	Mitigation, Protection, Monitoring, and Study Commitments to be carried forward to Detail Design
7.1	The recommended improvements will result in changes to the existing landscape due to edge impacts associated with the increased footprint and construction.	MTO / MECP / MUN / Property Owners	7.1.1	<ul style="list-style-type: none">The preliminary Landscape Opportunities Plan developed during Preliminary Design provides an overview of areas where the existing vegetation will require protection and where there are opportunities to implement landscaping if desired. This plan will be reviewed and refined further during detail design. The plan will consider landscaping treatments required between Palace Road and the six residential properties on the south side of the road.
8.0 Waste and Contamination				
8.1	Contaminated soil and groundwater may be identified during Detail Design or construction which will require further assessment and possible clean-up.	MTO / MECP	8.1.1	<ul style="list-style-type: none">If any contamination is identified during Detail Design or during construction, mitigation measures may need to be developed and implemented which may include environmental site clean-up / remediation and/or risk assessment
8.2	Additional properties not identified as impacted during this study may be identified as impacted during Detail Design	MTO / MECP	8.2.1	<ul style="list-style-type: none">A Preliminary Site Screening will be undertaken on any properties not identified as impacted during this study to determine the need for further environmental site assessments
9.0 Traffic Noise				
9.1	While noise level associated with the Technically Preferred Alternative do not require noise mitigation, significant modifications to the plan during Detail Design may affect projected noise levels	MTO / MECP / MUN	9.1.1	<ul style="list-style-type: none">A revised noise assessment may be required during Detail Design if there are significant modifications to the Technically Preferred Alternative.
10.0 Construction Noise				
10.1	Construction noise impacts for this project may potentially be expected at nearby Noise Sensitive Areas.	MTO / MECP / MUN	10.1.1	<ul style="list-style-type: none">Best management practices for construction noise mitigation shall be employed by the use of standard special provisions in the contract during detail design.
			10.1.2	<ul style="list-style-type: none">The Town of Napanee restricts construction-type activities between the hours of 9:00 p.m. and 7:00 a.m. of the following day under By-Law Number 04-06, as amended by By-Law Number 04-49, Consolidated Noise By-Law. If construction is deemed to be required during these times, then a noise exemption should be sought during detail design.
11.0 Archaeology				
11.1	Archaeological material may be encountered during construction of the proposed improvements.	MTO / MTCS	11.1.1	<ul style="list-style-type: none">If the design changes and there are additional footprint impacts, the additional property shall be subject to a Stage 2 archaeological assessment as per the Standards and Guidelines for Consultant Archaeologists (MTCS, 2011)
			11.1.2	<ul style="list-style-type: none">The Contractor shall comply with all recommendations outlined in the <i>Stage 1-2 Archaeological Assessment</i> (AECOM, September 2018) and any further assessments (i.e. Stage 3 and/or Stage 4 Archaeological Assessments) completed during Detail Design as required
	An Archaeological Assessment carried out on all potentially impacted properties determined that the area can be considered clear of further archaeological concern and no further archaeological assessment is required on those			

Summary of Environmental Concerns, Mitigation Measures and Commitments from this TESR to be confirmed during Detail Design				
ID #	Environmental Element / Concern and Potential Impact	Concerned Agencies	ID#	Mitigation, Protection, Monitoring, and Study Commitments to be carried forward to Detail Design
	lands.		11.1.3	<ul style="list-style-type: none">During construction there is the possibility of encountering deeply buried archaeological material. In the event the following situations are encountered during construction, the Contractor shall stop work immediately and undertake the actions as described below:<ul style="list-style-type: none">Should previously undocumented archaeological resources be discovered, there may be a new archaeological site which would be subject to Section 48 (1) of the <i>Ontario Heritage Act</i>. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licenced consultant archaeologist to carry out archaeological fieldwork.The <i>Cemeteries Act</i>, R.S.O. 1990, c.C 4 and the <i>Funeral, Burial and Cremation Services Act</i>, 2002, S.O. 20002, c33 (when proclaimed in force) require that any person discovering human remains must notify the police or coroner and the Registrar of Cemeteries at the Ministry of Consumer ServicesArchaeological sites recommended for further archaeological fieldwork or protection remain subject to Section 48 (1) of the <i>Ontario Heritage Act</i> and may not be altered, or have artifacts removed from them, except by a person holding an archaeological licence
12.0 Built Heritage				
12.1	The Technically Preferred Alternative results in direct impacts to one property considered to have cultural heritage value or interest according to <i>O. Reg. 9/06</i> .	MTO / MTCS / MUN	12.1.1	<ul style="list-style-type: none">Further assessment shall be undertaken during Detail Design to determine which of the recommendations from the Cultural Heritage Evaluation Report (CHER) undertaken for the property is feasible. In the event that there will be direct impacts to the house, barn or property in question, a Heritage Impact Assessment will be prepared during Detail Design. The HIA will recommend options and mitigation measures in order to reduce negative impacts and help conserve the properties cultural heritage value or interest.
13.0 Community Access & Out of Way Travel				
13.1	Construction activities will result in temporary impacts, such as short-term lane or ramp closures, which will impact traffic operations and require temporary detour plans. Given the relatively low traffic volumes utilizing the Palace Road interchange, incremental traffic delays as a result of the detoured traffic is not anticipated along the detour routes.	MTO / MUN/ Infrastructure Ontario / Emergency Services	13.1.1	<ul style="list-style-type: none">Temporary lane or ramp closures should be minimized during Detail Design to minimize the duration of the closures and out-of-way travel requirements
			13.1.2	<ul style="list-style-type: none">Advance notice and signage will be provided advising of construction activities including lane and ramp closures, and detour requirements. Emergency service providers will also be notified of all lane and road closures.

8. Application of the Class EA Principles and Process

The Class EA and preliminary design for the *Highway 401 Interchange Improvements at Palace Road* followed the study principles and process set forth in the *Class EA for Provincial Transportation Facilities*. This TESR outlines how the transportation, environmental, consultation, environmental, documentation, bump-up, and environmental clearance principles (outlined in **Section 2.1**) were met through the study process undertaken for this project.

List of Reports Available under Separate Cover

AECOM (October 2017) *Contamination Overview Study – Preliminary Design and Class Environmental Assessment Study Highway 401 Interchange Improvements, Palace Road (G.W.P. 4197-13-00)*

AECOM (January 2019) *Drainage and Hydrology Report: Highway 401 / Palace Road Interchange (IC 582) and Median Improvements*

AECOM (April 2018) *Preliminary Structural Design Report: Highway 401 –Palace Road Underpass, Site No. 17-063.*

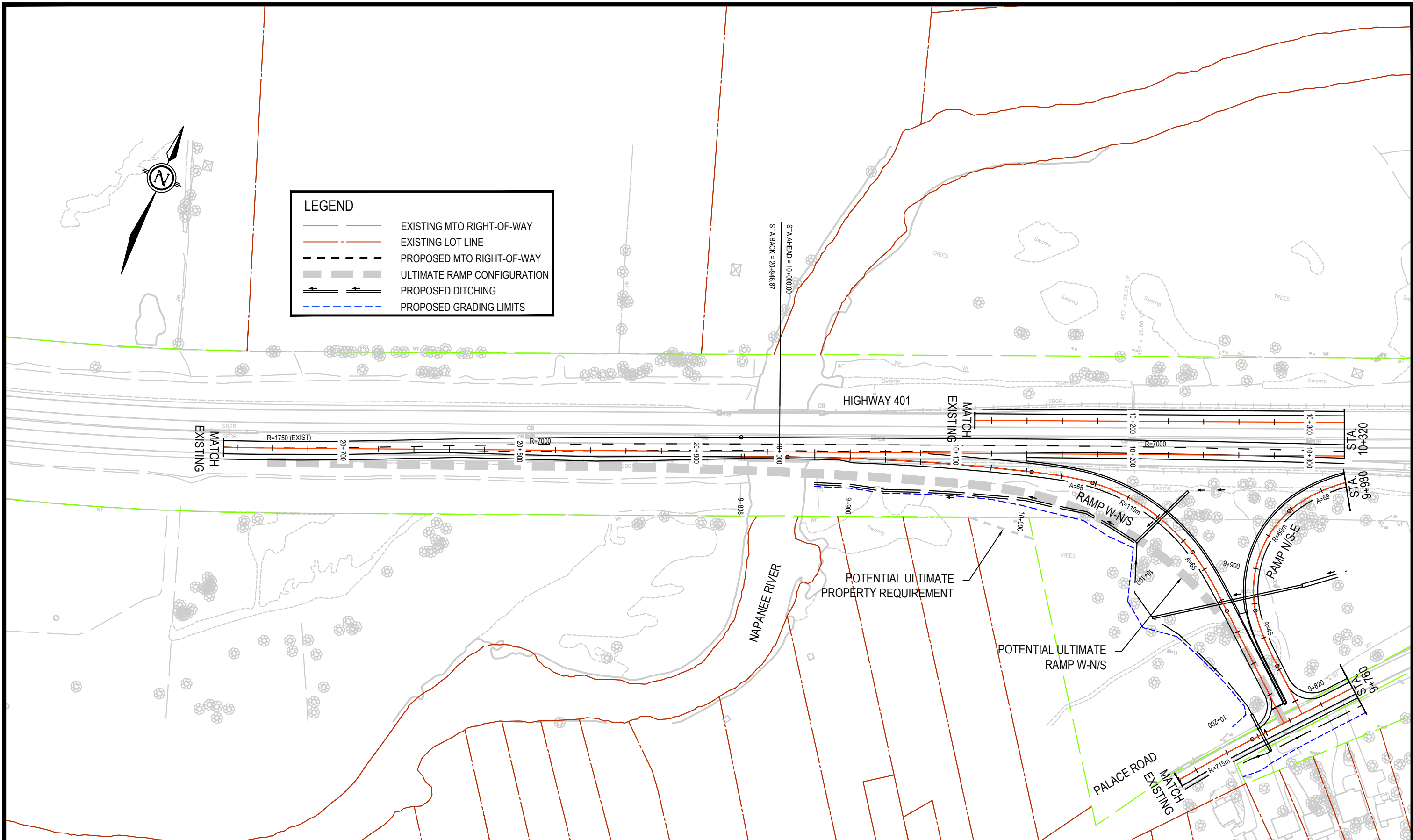
AECOM (July 2016) *Socio-Economic Review Technical Memorandum: Highway 401 Interchange Improvements at Palace Road*

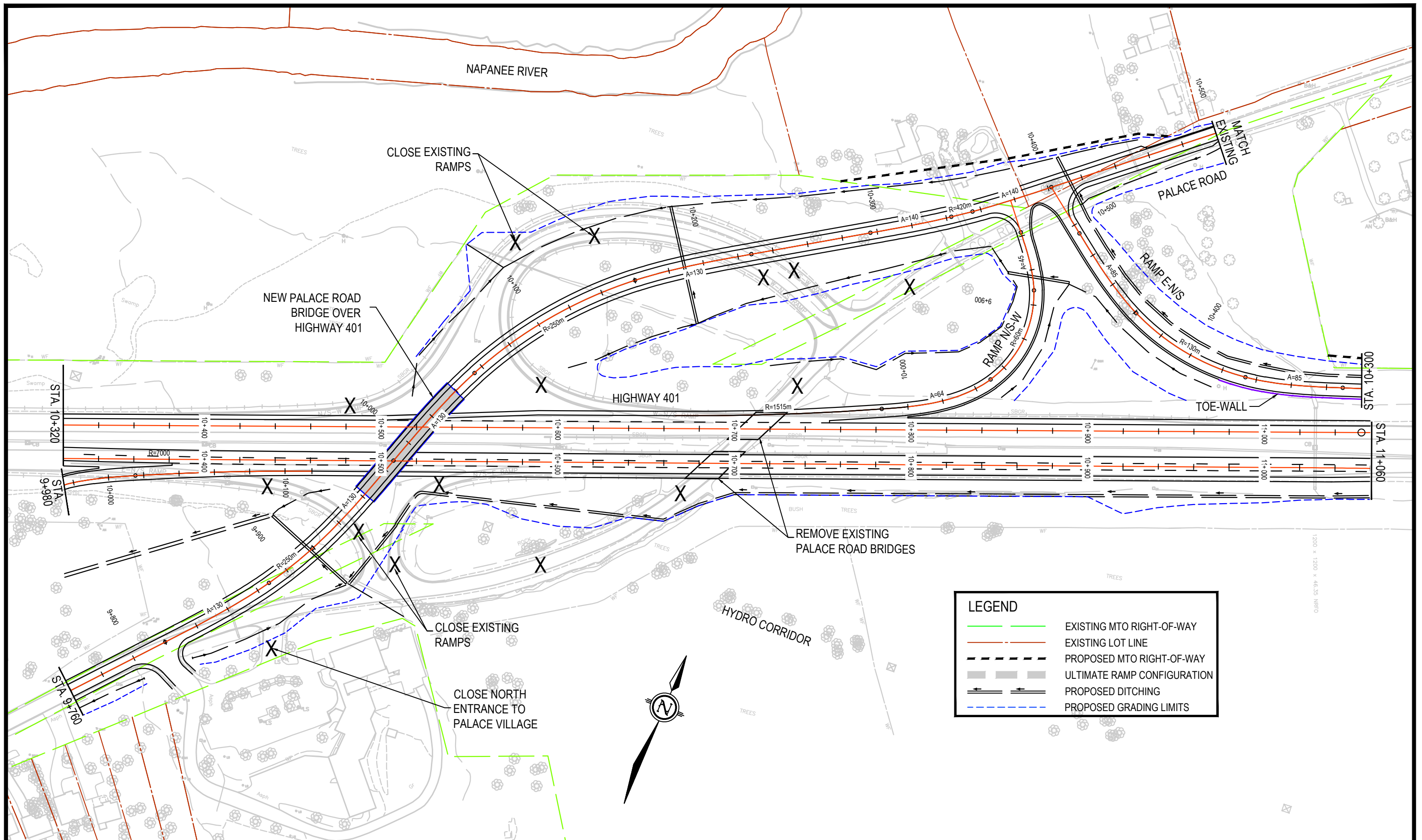
AECOM (August 2018) *Operational Performance Review Report: Highway 401 Interchange Improvements at Palace Road*

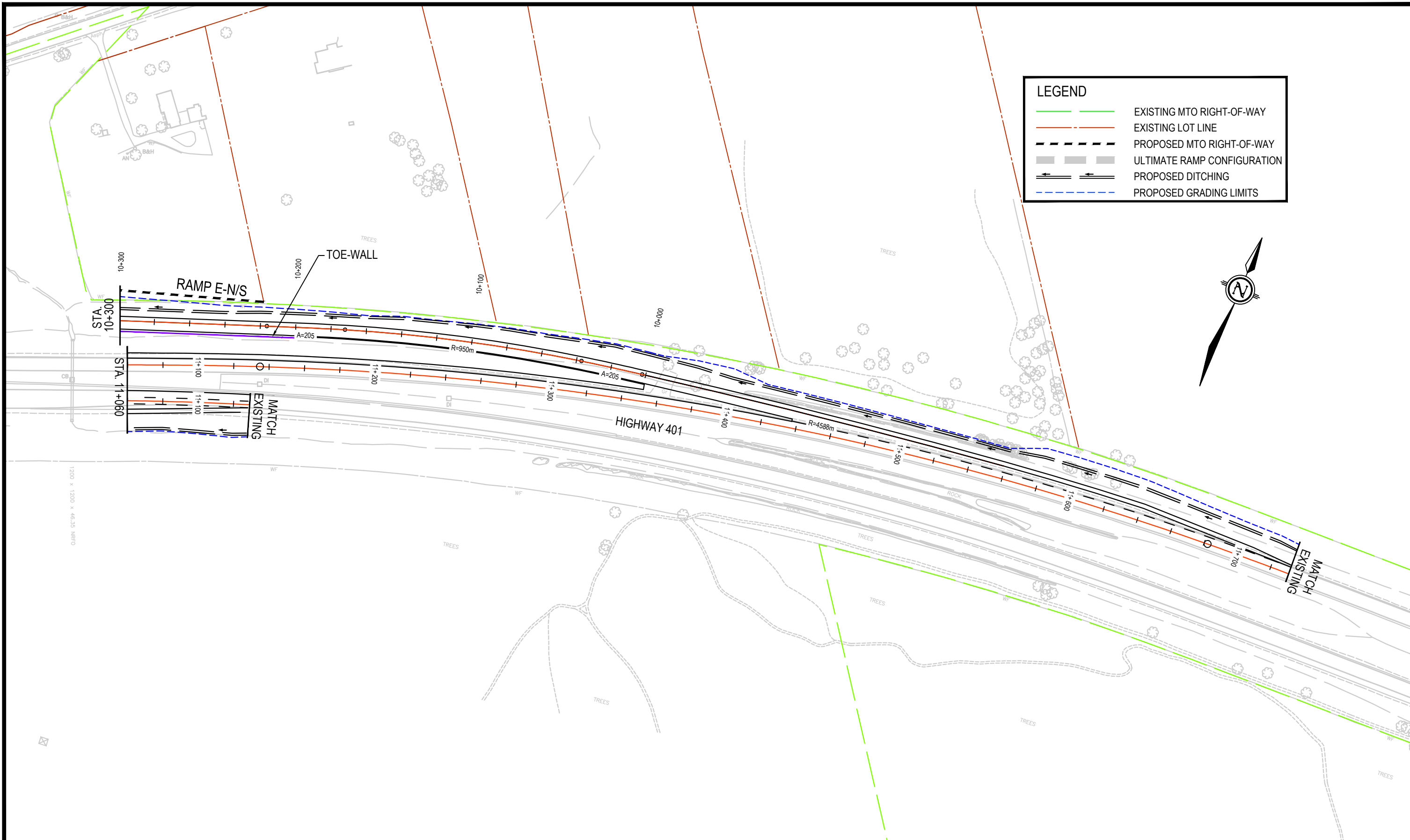
AECOM (September 2018) *Stage 1-2 Archaeological Assessment Report*

AECOM (February 2019) *Traffic Noise Assessment Report*

Appendix A – Recommended Plan







LEGEND

- EXISTING MTO RIGHT-OF-WAY
- EXISTING LOT LINE
- PROPOSED MTO RIGHT-OF-WAY
- ULTIMATE RAMP CONFIGURATION
- PROPOSED DITCHING
- PROPOSED GRADING LIMITS

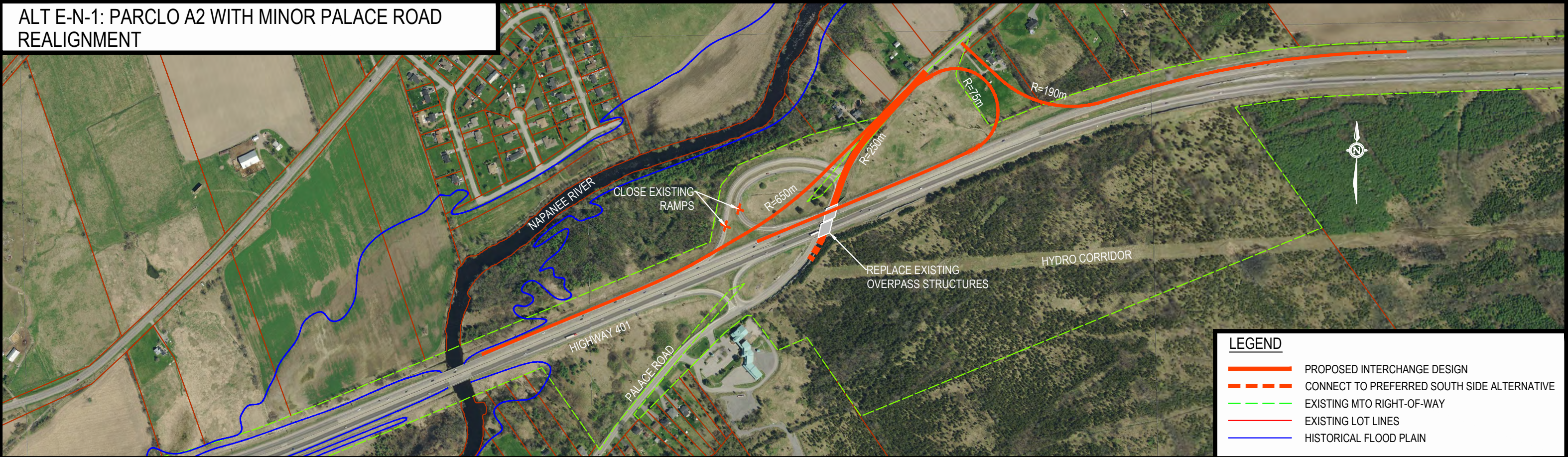


Appendix B – Highway 401 Interchange Improvements Long List of Alternatives

ALT EX-0: DO NOTHING (MAINTAIN EXISTING INTERCHANGE CONFIGURATION BUT REPLACE EXISTING STRUCTURES)



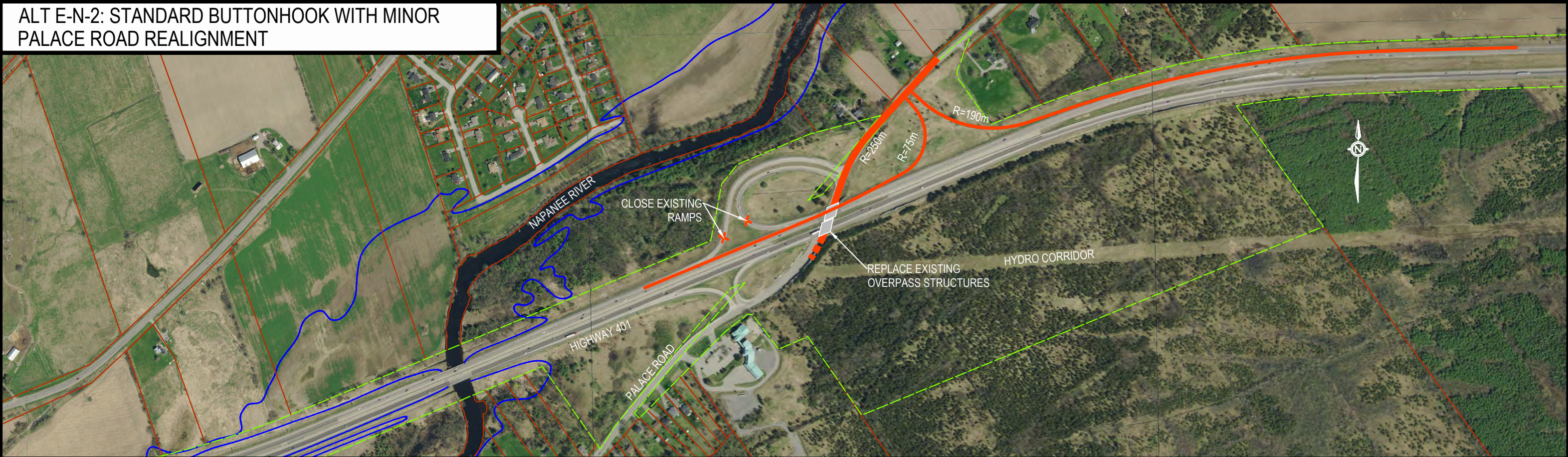
ALT E-N-1: PARCLO A2 WITH MINOR PALACE ROAD REALIGNMENT



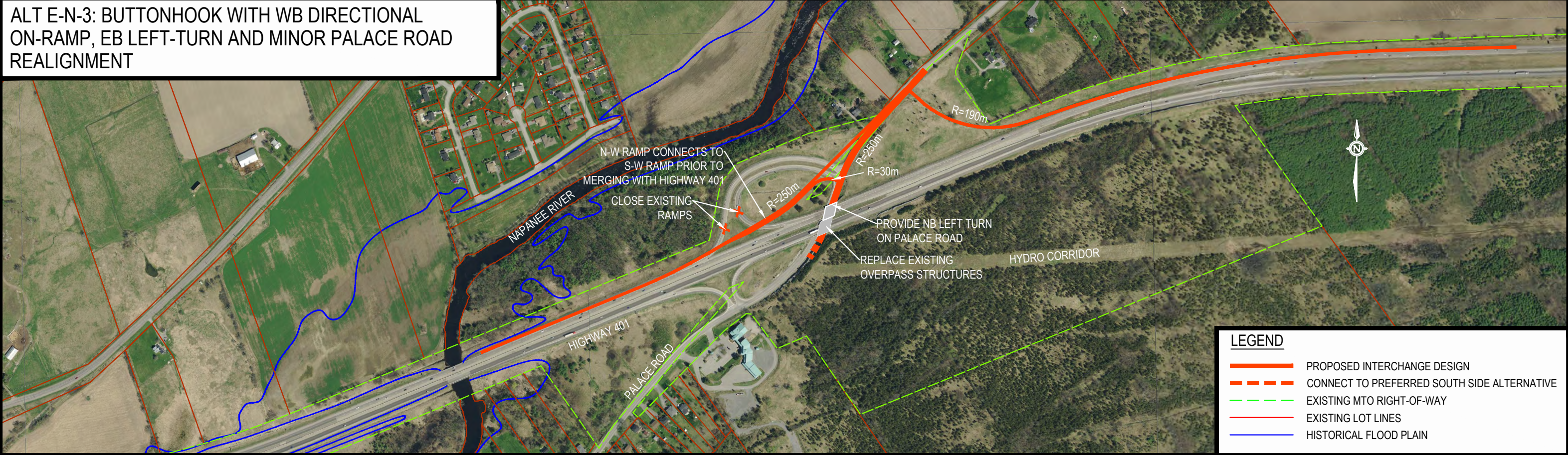
LEGEND

- PROPOSED INTERCHANGE DESIGN
- CONNECT TO PREFERRED SOUTH SIDE ALTERNATIVE
- EXISTING MTO RIGHT-OF-WAY
- EXISTING LOT LINES
- HISTORICAL FLOOD PLAIN

ALT E-N-2: STANDARD BUTTONHOOK WITH MINOR
PALACE ROAD REALIGNMENT



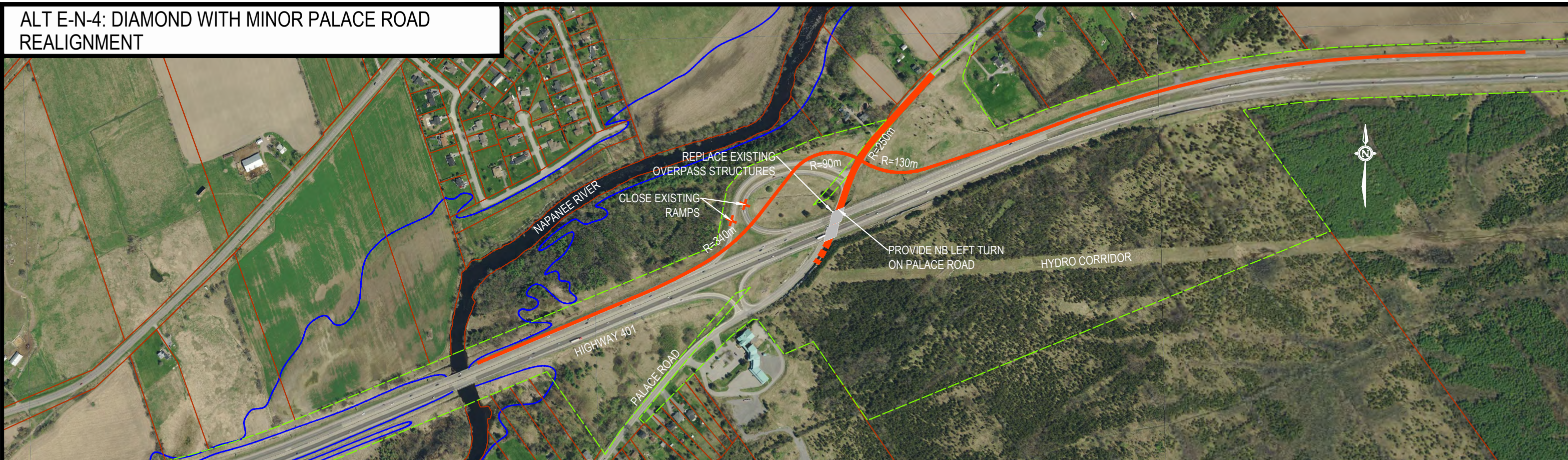
ALT E-N-3: BUTTONHOOK WITH WB DIRECTIONAL
ON-RAMP, EB LEFT-TURN AND MINOR PALACE ROAD
REALIGNMENT



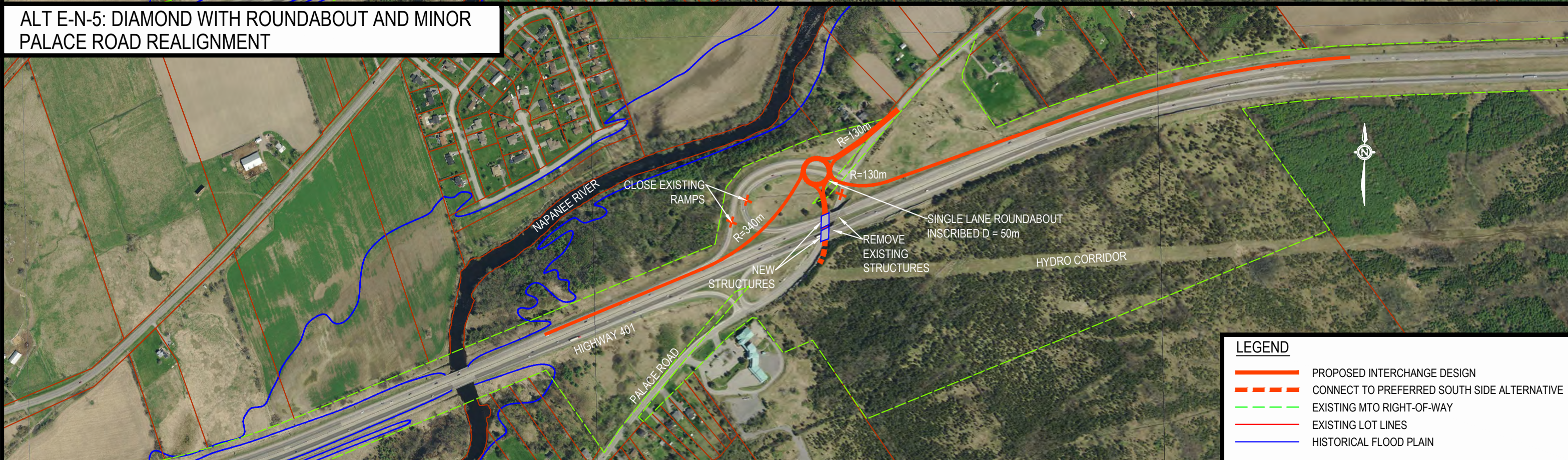
LEGEND

- PROPOSED INTERCHANGE DESIGN
- CONNECT TO PREFERRED SOUTH SIDE ALTERNATIVE
- EXISTING MTO RIGHT-OF-WAY
- EXISTING LOT LINES
- HISTORICAL FLOOD PLAIN

ALT E-N-4: DIAMOND WITH MINOR PALACE ROAD REALIGNMENT



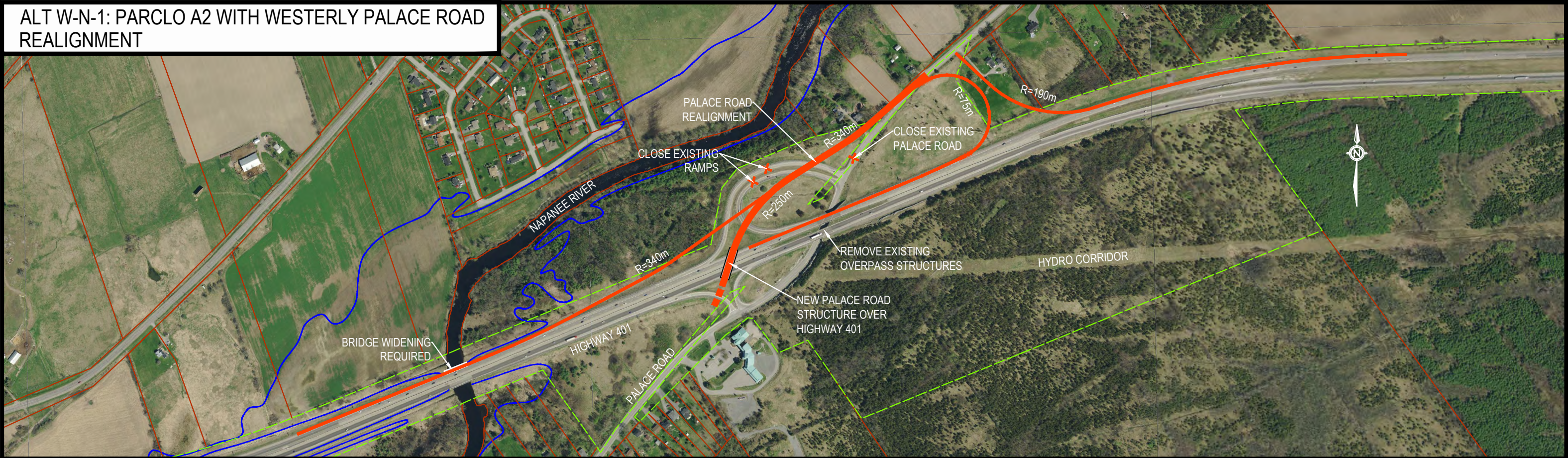
ALT E-N-5: DIAMOND WITH ROUNDABOUT AND MINOR PALACE ROAD REALIGNMENT



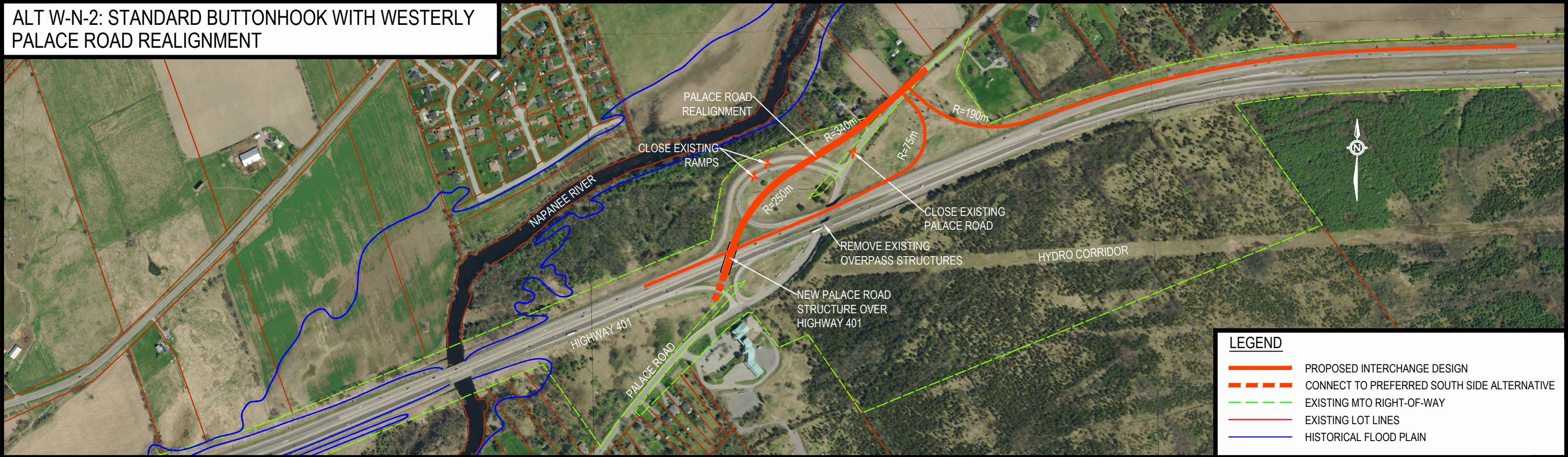
LEGEND

- PROPOSED INTERCHANGE DESIGN
- CONNECT TO PREFERRED SOUTH SIDE ALTERNATIVE
- EXISTING MTO RIGHT-OF-WAY
- EXISTING LOT LINES
- HISTORICAL FLOOD PLAIN

ALT W-N-1: PARCLO A2 WITH WESTERLY PALACE ROAD REALIGNMENT



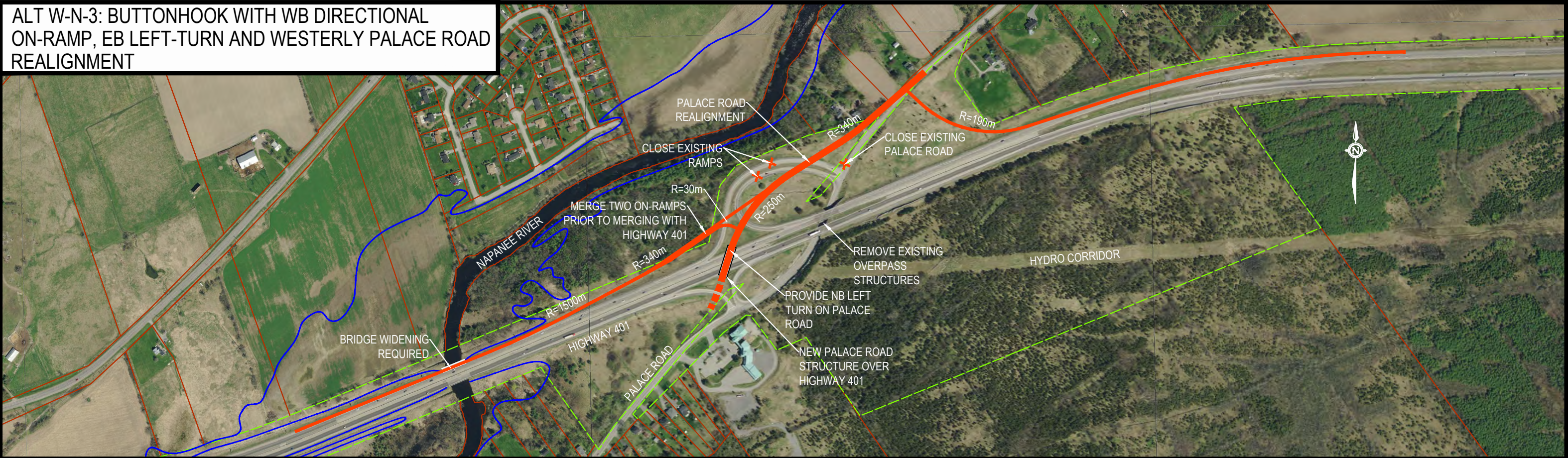
ALT W-N-2: STANDARD BUTTONHOOK WITH WESTERLY PALACE ROAD REALIGNMENT



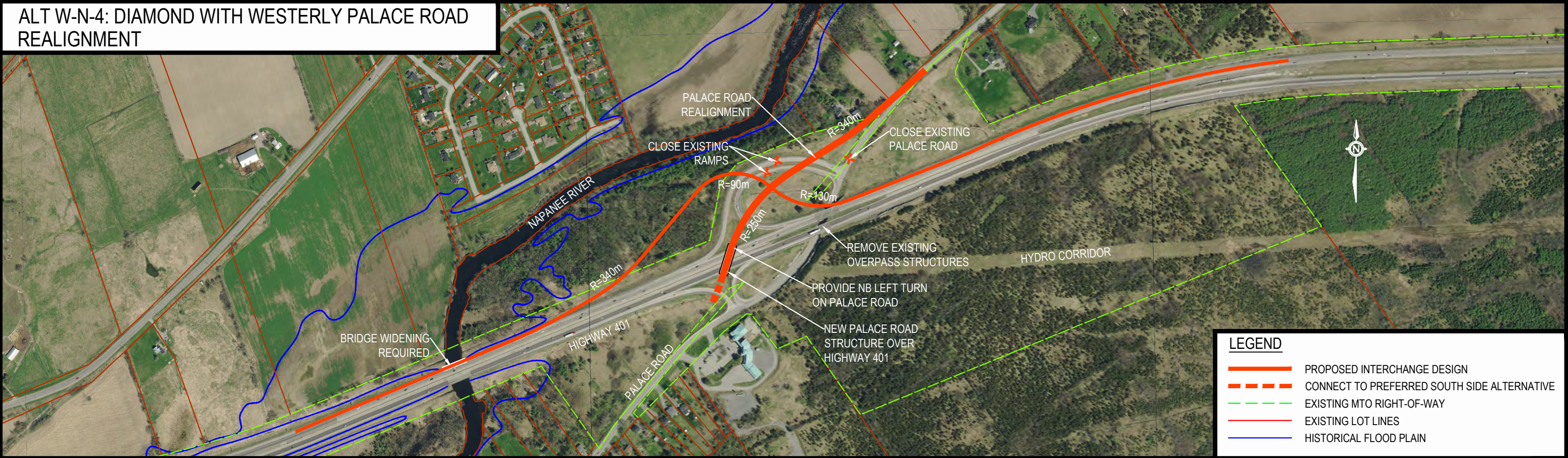
LEGEND

- PROPOSED INTERCHANGE DESIGN
- CONNECT TO PREFERRED SOUTH SIDE ALTERNATIVE
- EXISTING MTO RIGHT-OF-WAY
- EXISTING LOT LINES
- HISTORICAL FLOOD PLAIN

ALT W-N-3: BUTTONHOOK WITH WB DIRECTIONAL ON-RAMP, EB LEFT-TURN AND WESTERLY PALACE ROAD REALIGNMENT



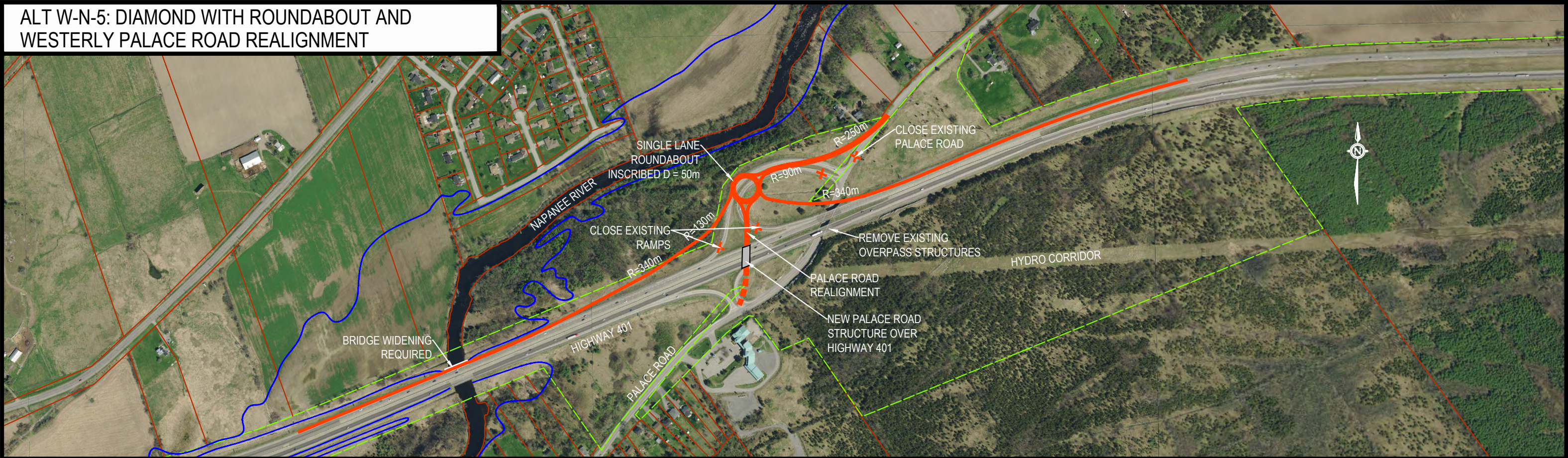
ALT W-N-4: DIAMOND WITH WESTERLY PALACE ROAD REALIGNMENT



LEGEND

- PROPOSED INTERCHANGE DESIGN
- CONNECT TO PREFERRED SOUTH SIDE ALTERNATIVE
- EXISTING MTO RIGHT-OF-WAY
- EXISTING LOT LINES
- HISTORICAL FLOOD PLAIN

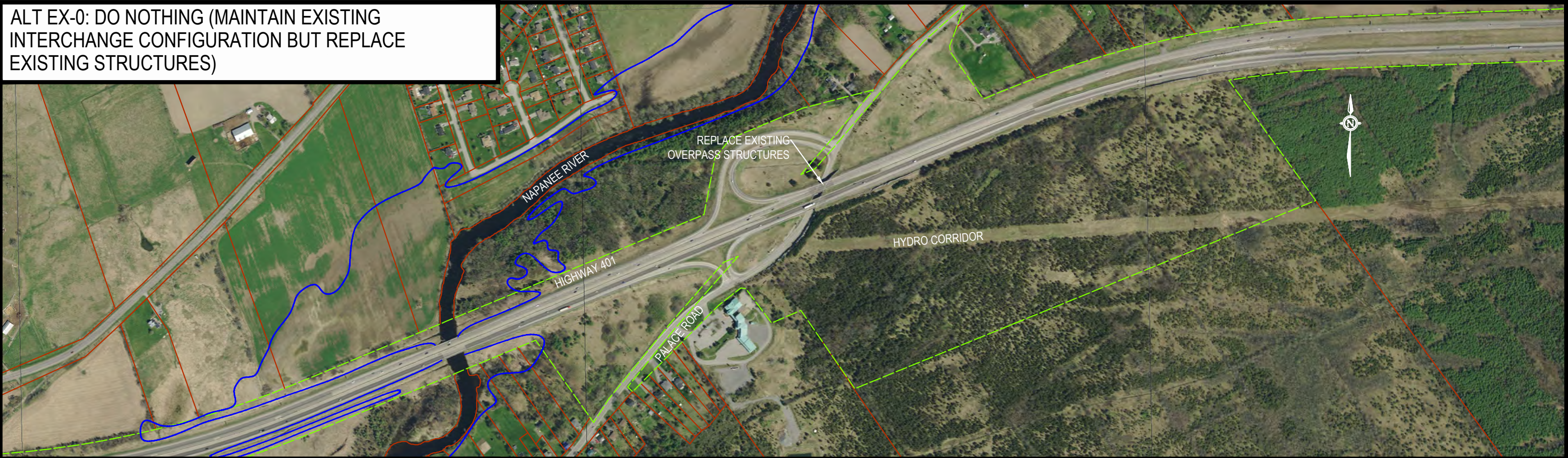
ALT W-N-5: DIAMOND WITH ROUNDABOUT AND WESTERLY PALACE ROAD REALIGNMENT



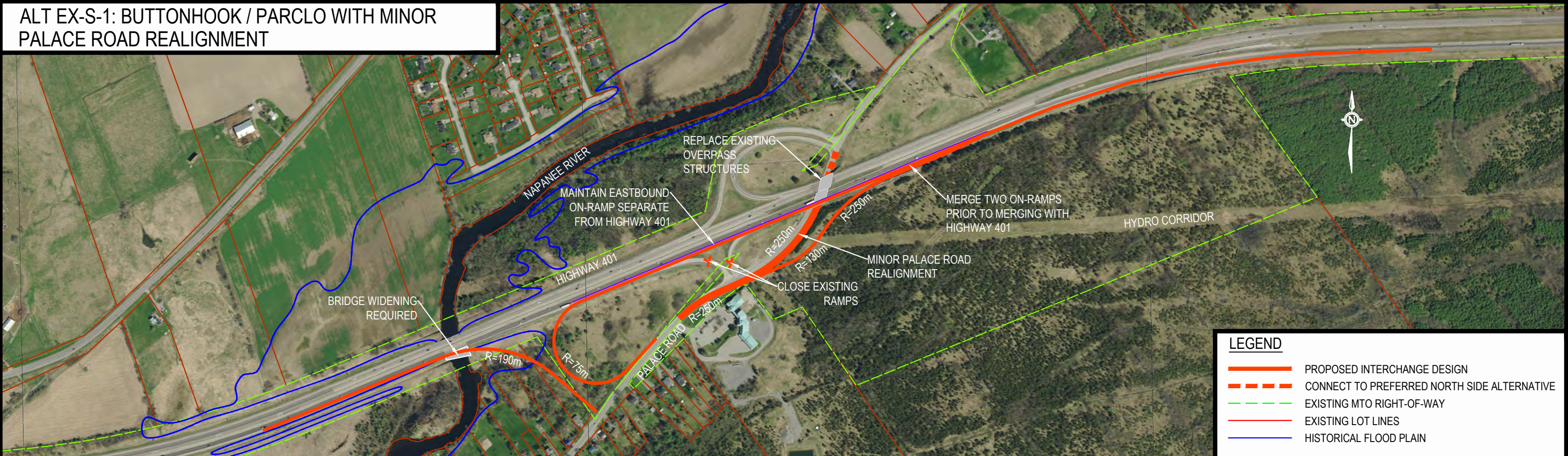
LEGEND

- PROPOSED INTERCHANGE DESIGN
- CONNECT TO PREFERRED SOUTH SIDE ALTERNATIVE
- EXISTING MTO RIGHT-OF-WAY
- EXISTING LOT LINES
- HISTORICAL FLOOD PLAIN

ALT EX-0: DO NOTHING (MAINTAIN EXISTING INTERCHANGE CONFIGURATION BUT REPLACE EXISTING STRUCTURES)



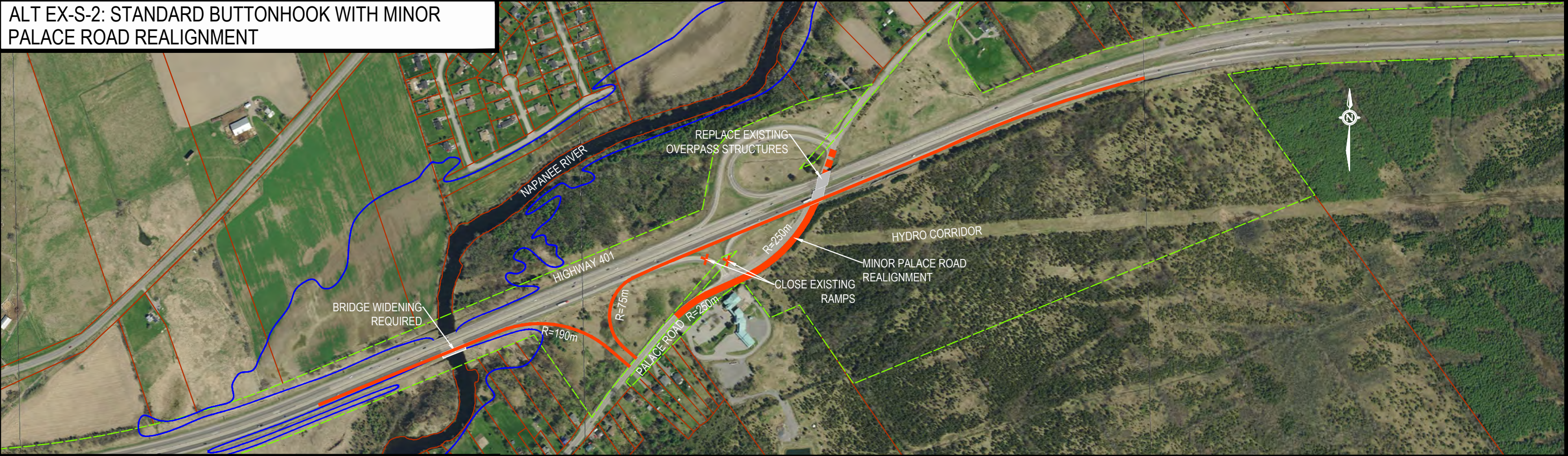
ALT EX-S-1: BUTTONHOOK / PARCLO WITH MINOR PALACE ROAD REALIGNMENT



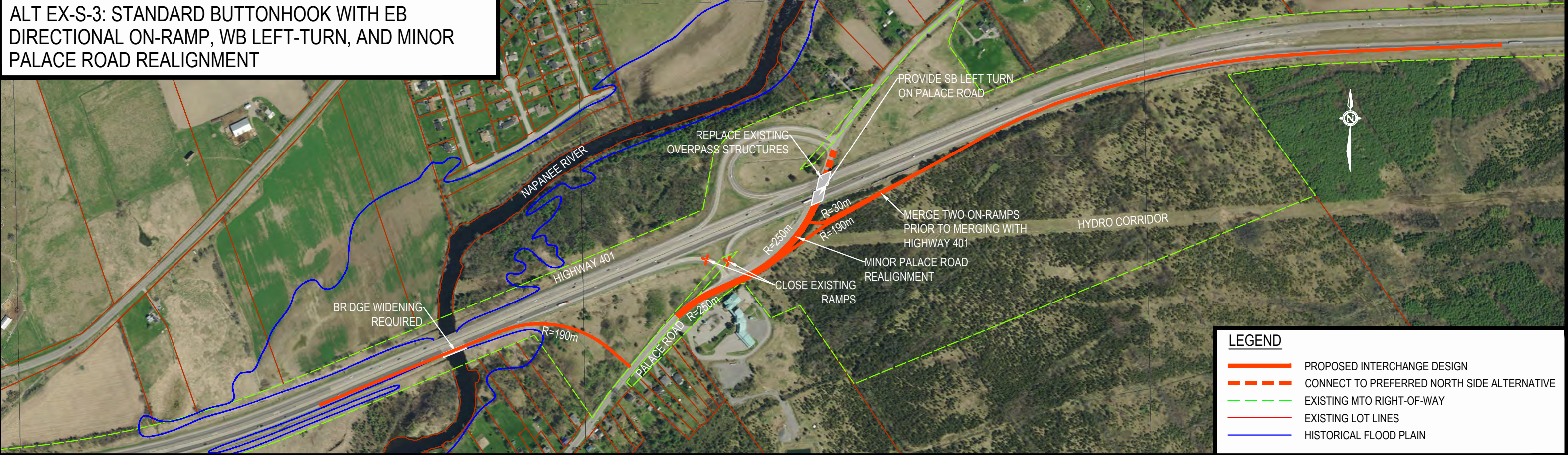
LEGEND

- PROPOSED INTERCHANGE DESIGN
- CONNECT TO PREFERRED NORTH SIDE ALTERNATIVE
- EXISTING MTO RIGHT-OF-WAY
- EXISTING LOT LINES
- HISTORICAL FLOOD PLAIN

ALT EX-S-2: STANDARD BUTTONHOOK WITH MINOR
PALACE ROAD REALIGNMENT



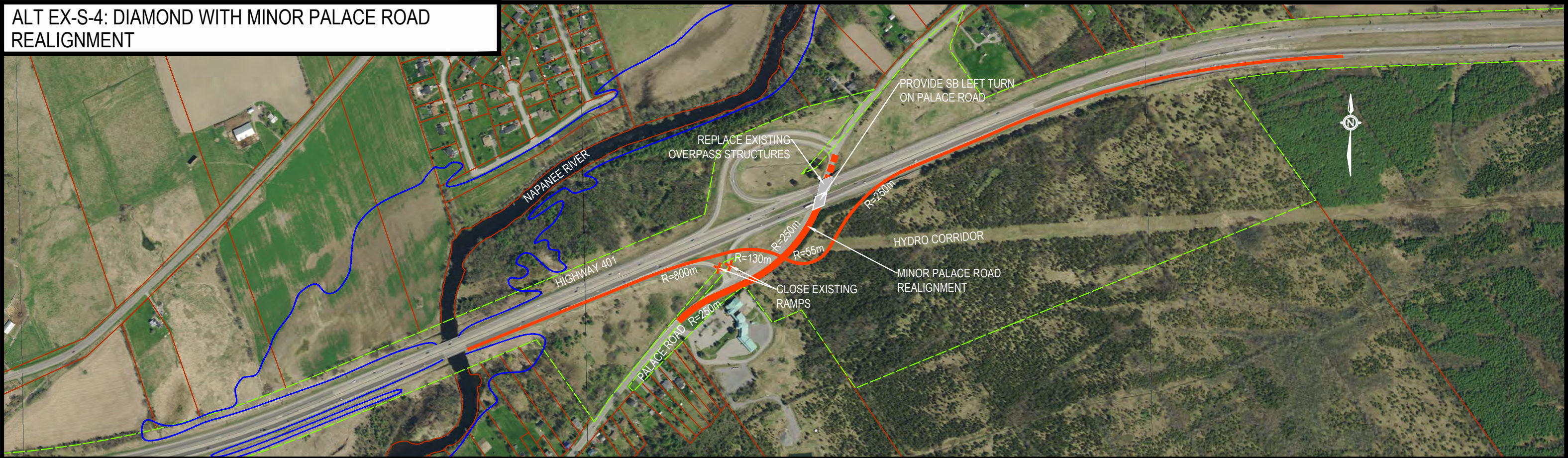
ALT EX-S-3: STANDARD BUTTONHOOK WITH EB
DIRECTIONAL ON-RAMP, WB LEFT-TURN, AND MINOR
PALACE ROAD REALIGNMENT



LEGEND

- PROPOSED INTERCHANGE DESIGN
- CONNECT TO PREFERRED NORTH SIDE ALTERNATIVE
- EXISTING MTO RIGHT-OF-WAY
- EXISTING LOT LINES
- HISTORICAL FLOOD PLAIN

ALT EX-S-4: DIAMOND WITH MINOR PALACE ROAD REALIGNMENT



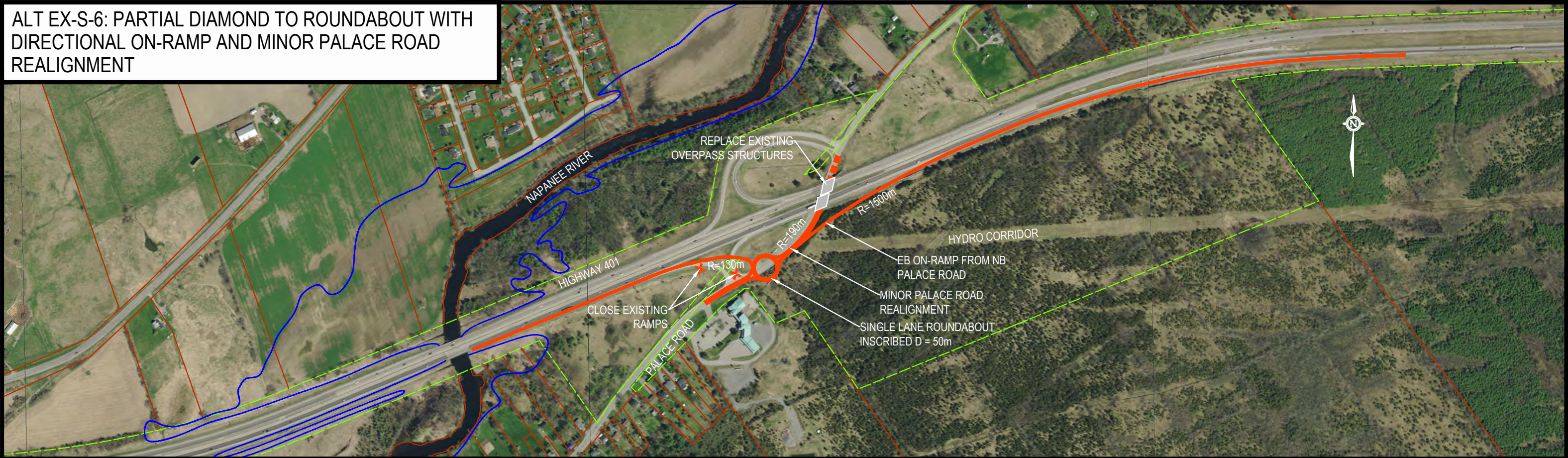
ALT EX-S-5: DIAMOND WITH ROUNDABOUT AND MINOR PALACE ROAD REALIGNMENT



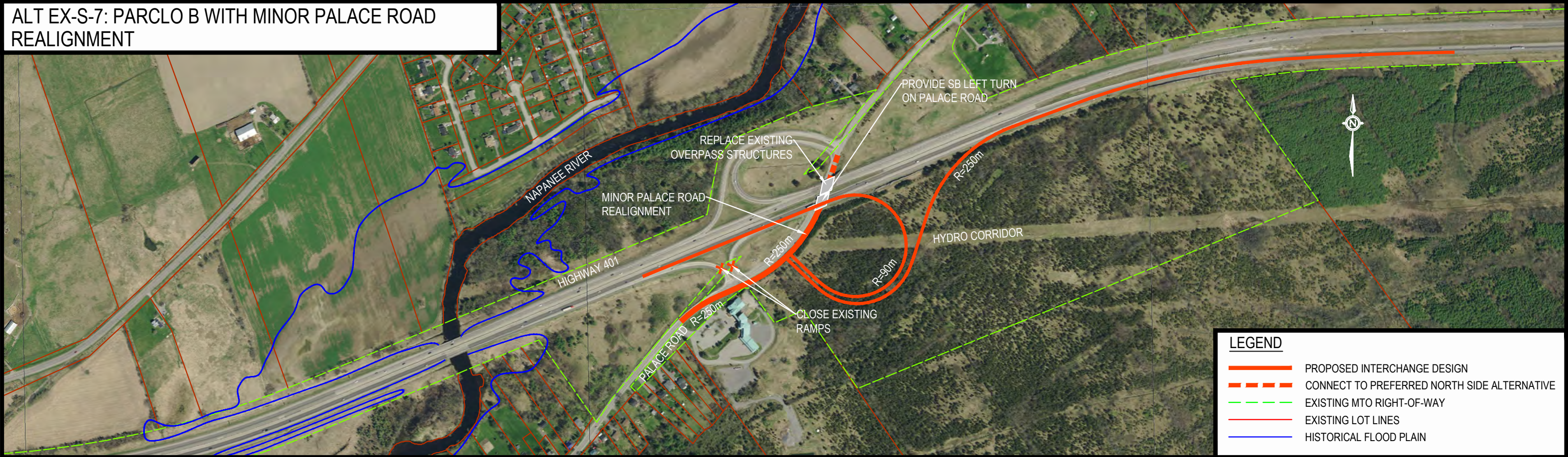
LEGEND

- PROPOSED INTERCHANGE DESIGN
- CONNECT TO PREFERRED NORTH SIDE ALTERNATIVE
- EXISTING MTO RIGHT-OF-WAY
- EXISTING LOT LINES
- HISTORICAL FLOOD PLAIN

ALT EX-S-6: PARTIAL DIAMOND TO ROUNDABOUT WITH DIRECTIONAL ON-RAMP AND MINOR PALACE ROAD REALIGNMENT



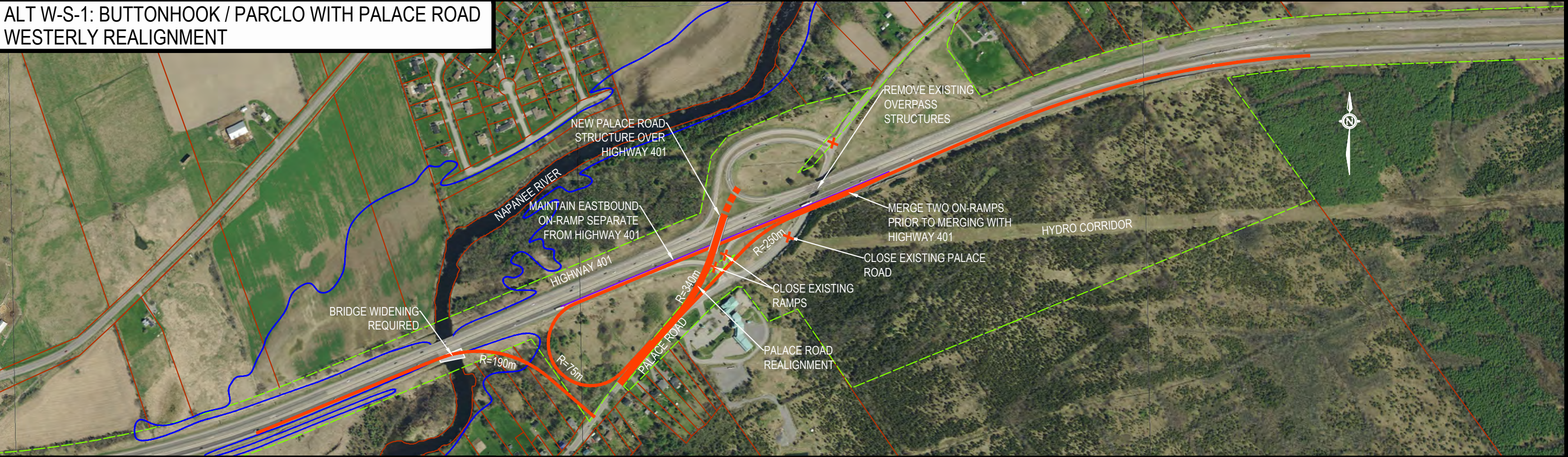
ALT EX-S-7: PARCLO B WITH MINOR PALACE ROAD REALIGNMENT



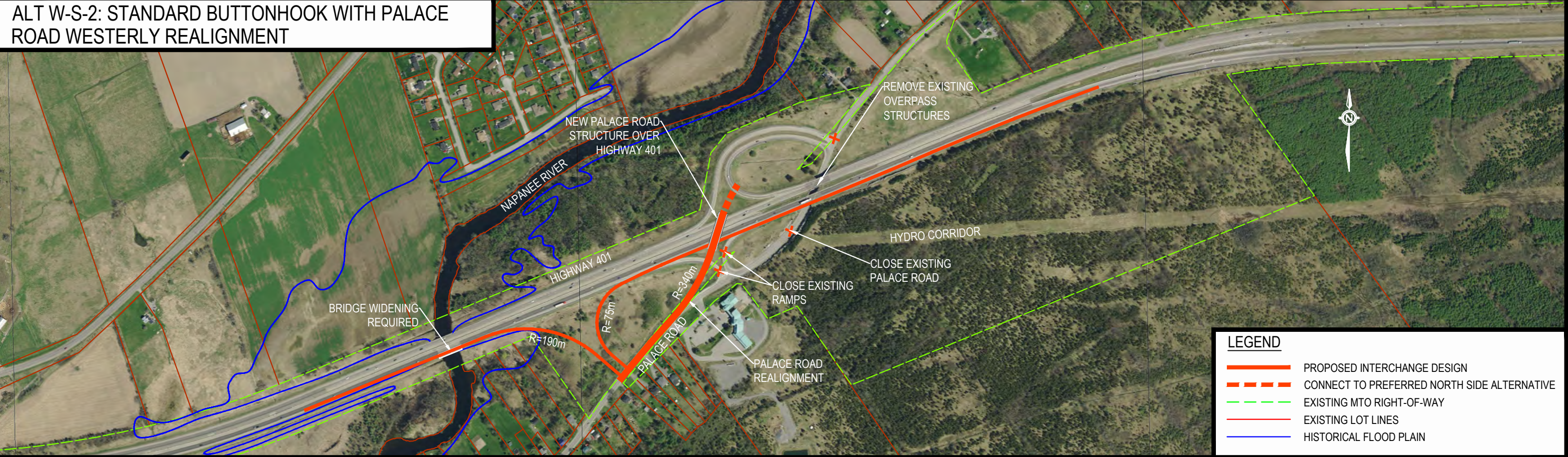
LEGEND

- PROPOSED INTERCHANGE DESIGN
- CONNECT TO PREFERRED NORTH SIDE ALTERNATIVE
- EXISTING MTO RIGHT-OF-WAY
- EXISTING LOT LINES
- HISTORICAL FLOOD PLAIN

ALT W-S-1: BUTTONHOOK / PARCLO WITH PALACE ROAD
WESTERLY REALIGNMENT



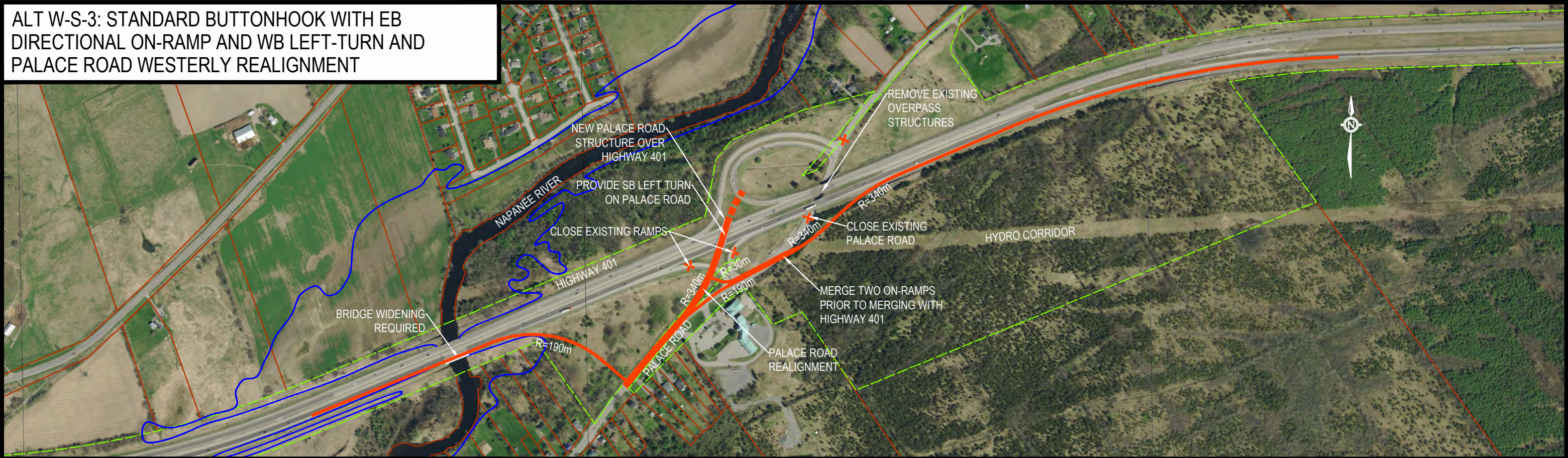
ALT W-S-2: STANDARD BUTTONHOOK WITH PALACE
ROAD WESTERLY REALIGNMENT



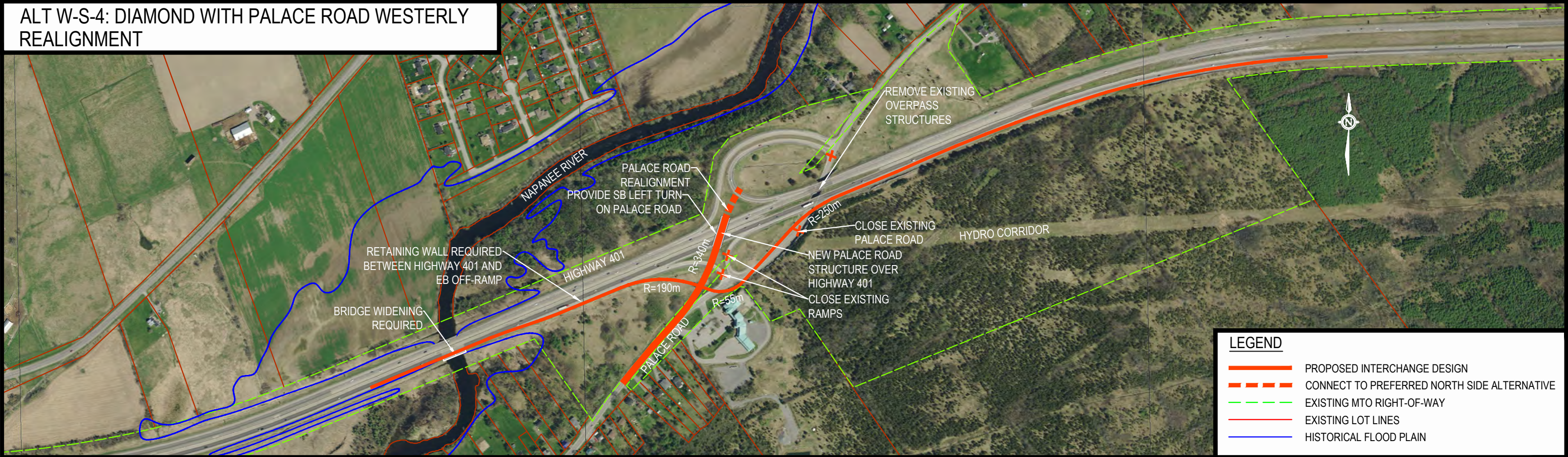
LEGEND

- PROPOSED INTERCHANGE DESIGN
- CONNECT TO PREFERRED NORTH SIDE ALTERNATIVE
- EXISTING MTO RIGHT-OF-WAY
- EXISTING LOT LINES
- HISTORICAL FLOOD PLAIN

ALT W-S-3: STANDARD BUTTONHOOK WITH EB
DIRECTIONAL ON-RAMP AND WB LEFT-TURN AND
PALACE ROAD WESTERLY REALIGNMENT



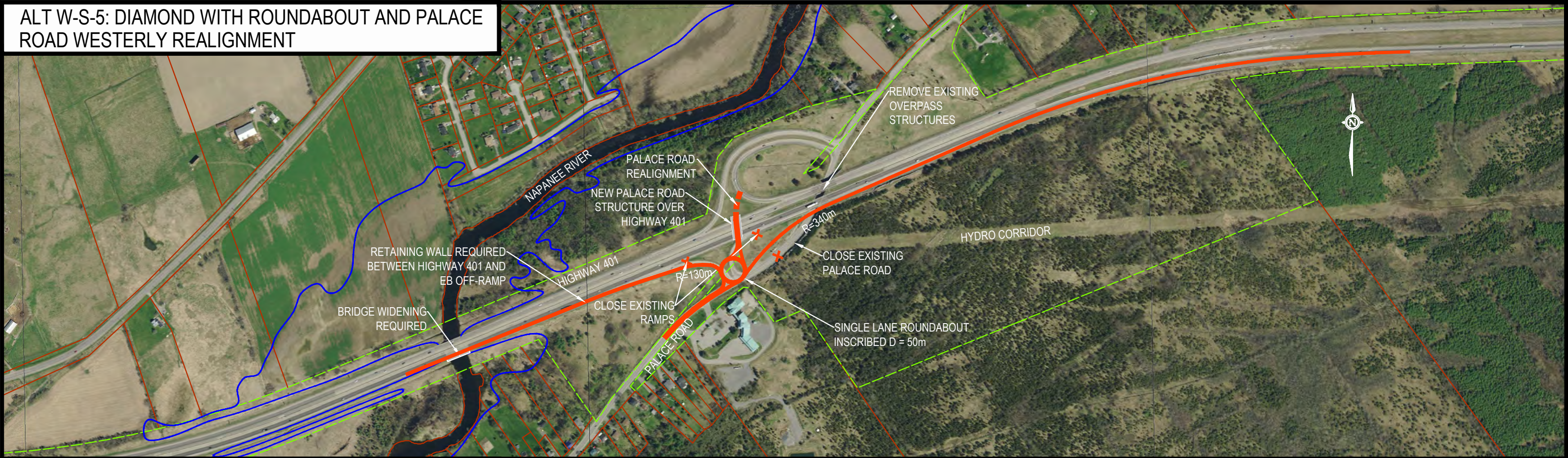
ALT W-S-4: DIAMOND WITH PALACE ROAD WESTERLY
REALIGNMENT



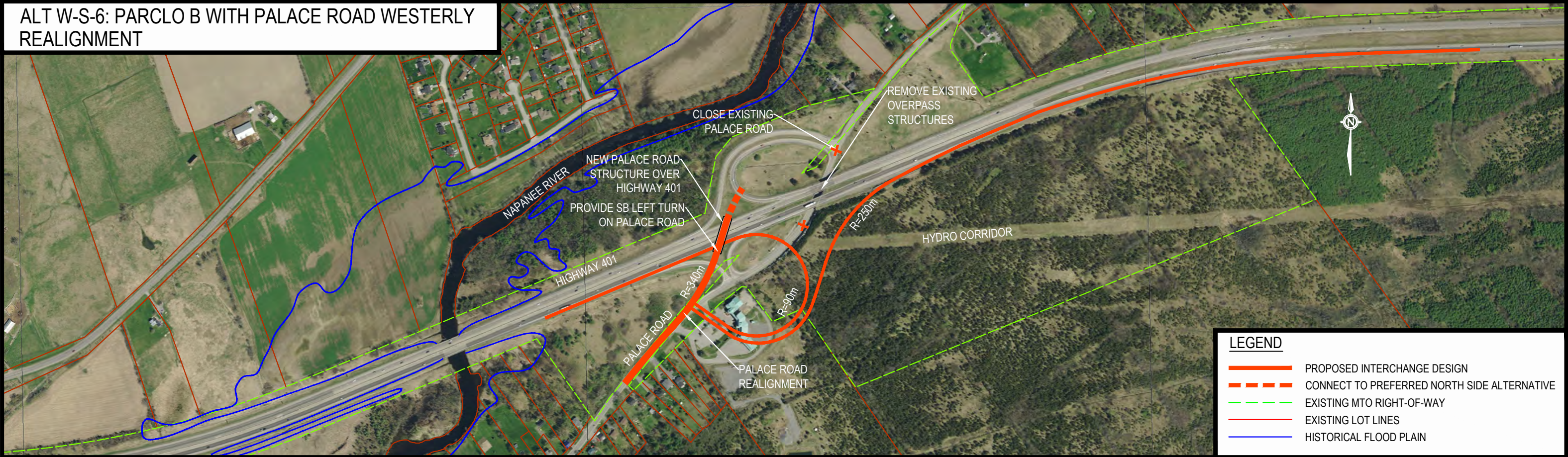
LEGEND

- PROPOSED INTERCHANGE DESIGN
- CONNECT TO PREFERRED NORTH SIDE ALTERNATIVE
- EXISTING MTO RIGHT-OF-WAY
- EXISTING LOT LINES
- HISTORICAL FLOOD PLAIN

ALT W-S-5: DIAMOND WITH ROUNDABOUT AND PALACE ROAD WESTERLY REALIGNMENT



ALT W-S-6: PARCLO B WITH PALACE ROAD WESTERLY REALIGNMENT



LEGEND

- PROPOSED INTERCHANGE DESIGN
- CONNECT TO PREFERRED NORTH SIDE ALTERNATIVE
- EXISTING MTO RIGHT-OF-WAY
- EXISTING LOT LINES
- HISTORICAL FLOOD PLAIN

ALT W-S-7: PARCLO B WITH ROUNDABOUT AND PALACE ROAD WESTERLY REALIGNMENT







LEGEND

- PROPOSED INTERCHANGE DESIGN
- CONNECT TO PREFERRED NORTH SIDE ALTERNATIVE
- EXISTING MTO RIGHT-OF-WAY
- EXISTING LOT LINES
- HISTORICAL FLOOD PLAIN

Appendix C – Long List of Alternatives Evaluation Tables





Highway 401 Interchange Improvements at Palace Road
Palace Road Interchange North Side Improvement Alternatives (Long-List) – Coarse Screening

	CATEGORY	Palace Road Interchange Alternatives – North (Table 1: Do Nothing, Alternative E-N-1 to E-N-3)			
		Do Nothing (Maintain existing interchange configuration, but replace existing overpass structures)	Alternative E-N-1 (Parclo A2 with Minor Palace Road Realignment and New Overpass Structures)	Alternative E-N-2 (Standard Buttonhook with Minor Palace Road Realignment and New Overpass Structures)	Alternative E-N-3 (Buttonhook with WB Directional On-Ramp, NB Left-Turn, Minor Palace Road Realignment and New Overpass Structures)
ALTERNATIVE OVERVIEW	Description	<ul style="list-style-type: none">• No change to existing interchange ramps• Replace existing bridges with new bridges at same location (when required)	<ul style="list-style-type: none">• Standard westbound buttonhook off-ramp• Directional on-ramp (southbound Palace Road to westbound Hwy 401)• Inner-loop on-ramp (northbound Palace Road to westbound Hwy 401)• Maintain same general alignment of Palace Road (slight correction in skew angle)• Replace existing bridges with new overpass structures at same general location (reduce skew angle)	<ul style="list-style-type: none">• Westbound buttonhook off-ramp• Westbound buttonhook on-ramp (southbound and northbound Palace Road to westbound Hwy 401)• Left-turn from southbound Palace Road to westbound on-ramp• Replace existing bridges with new overpass structures either west of existing alignment or at same general location as existing (reduce skew angle)	<ul style="list-style-type: none">• Standard westbound buttonhook off-ramp• Directional on-ramp (southbound Palace Road to westbound Hwy 401)• Left-turn from northbound Palace Road to westbound on-ramp• Maintain same general alignment of Palace Road (slight correction in skew angle)• Replace existing bridges with new overpass structures at same general location (reduce skew angle)
	Schematic				
	Recommendation	CARRY FORWARD FOR COMPARISON PURPOSES	DO NOT CARRY FORWARD	CARRY FORWARD	DO NOT CARRY FORWARD
TECHNICAL SCREENING CRITERIA	Construction Staging	<ul style="list-style-type: none">• Moderate complexity of staging to replace structures at same approximate location<ul style="list-style-type: none">○ Structure replacement requires Hwy 401 median cross-overs and temporary overbuild of one existing structure (which becomes ‘throw-away’)○ Reduction to single lane along Palace Road anticipated during construction (with temporary signals)• Ramp and/or Hwy 401 lane closures required to facilitate structure replacement	<ul style="list-style-type: none">• Moderate complexity of staging to replace structures at same approximate location<ul style="list-style-type: none">○ Structure replacement requires Hwy 401 median cross-overs and temporary overbuild of one existing structure (which becomes ‘throw-away’)○ Reduction to single lane along Palace Road anticipated during construction (with temporary signals)○ New westbound off-ramp can be utilized for staging during closure of existing westbound off-ramp	<ul style="list-style-type: none">• Moderate complexity of staging to replace structures at same approximate location:<ul style="list-style-type: none">○ Structure replacement requires Hwy 401 median cross-overs and temporary overbuild of one existing structure (which becomes ‘throw-away’)○ Reduction to single lane along Palace Road anticipated during construction (with temporary signals)○ New westbound off-ramp can be utilized for staging during closure of existing westbound off-ramp	<ul style="list-style-type: none">• Moderate complexity of staging to replace structures at same approximate location<ul style="list-style-type: none">○ Structure replacement requires Hwy 401 median cross-overs temporary overbuild of one existing structure (which becomes ‘throw-away’)○ Reduction to single lane along Palace Road anticipated during construction (with temporary signals)○ New westbound off-ramp can be utilized for staging during closure of existing westbound off-ramp
	Traffic Operations (including Geometrics and Safety)	<ul style="list-style-type: none">• Good overall traffic Level of Service (existing and future), however existing geometric deficiencies result in potential operational concerns and increased collision risk (e.g. traffic decelerating on Highway 401 mainline approaching tight horizontal curvature on exit ramp).	<ul style="list-style-type: none">• Good traffic Level of Service operations anticipated including LOS ‘A’ or ‘B’ for all movements• Addresses geometric and operational concerns associated with existing ramps• Directional ramps for all movements (no left-turns required)	<ul style="list-style-type: none">• Good traffic Level of Service operations anticipated including LOS ‘A’ or ‘B’ for all movements• Addresses geometric and operational concerns associated with existing ramps• Left-turn from southbound Palace Road to westbound Hwy 401 required	<ul style="list-style-type: none">• Good traffic Level of Service operations anticipated including LOS ‘A’ or ‘B’ for all movements• Addresses geometric and operational concerns associated with existing ramps• Left-turn from northbound Palace Road to westbound Hwy 401 required with potential sight distance concerns to ramp terminal• Merge along westbound on-ramp may be unfamiliar condition for some drivers

Highway 401 Interchange Improvements at Palace Road
Palace Road Interchange North Side Improvement Alternatives (Long-List) – Coarse Screening

	CATEGORY	Palace Road Interchange Alternatives – North (Table 1: Do Nothing, Alternative E-N-1 to E-N-3)			
		Do Nothing (Maintain existing interchange configuration, but replace existing overpass structures)	Alternative E-N-1 (Parclo A2 with Minor Palace Road Realignment and New Overpass Structures)	Alternative E-N-2 (Standard Buttonhook with Minor Palace Road Realignment and New Overpass Structures)	Alternative E-N-3 (Buttonhook with WB Directional On-Ramp, NB Left-Turn, Minor Palace Road Realignment and New Overpass Structures)
	Structure Requirements	<ul style="list-style-type: none">Replace existing Palace Road structures with twin structures at same locationMaintain existing skew angle of approximately 45 degrees	<ul style="list-style-type: none">Replace existing Palace Road structures with twin structures at same approximate locationSkew angle of approximately 35 degrees anticipated for twin overpass structures	<ul style="list-style-type: none">Replace existing Palace Road structures with twin structures at same approximate location.Skew angle of approximately 35 degrees anticipated for twin overpass structures	<ul style="list-style-type: none">Replace existing Palace Road structures with twin structures at same approximate locationSkew angle of approximately 35 degrees anticipated for twin overpass structures
	Construction Cost (Qualitative)	<ul style="list-style-type: none">Low construction cost relative to other alternatives (replacement cost of skewed bridges only)	<ul style="list-style-type: none">High construction cost (long length of new ramps / speed change lanes, skewed/larger Palace Road bridges, temporary widening of existing Palace Rd bridge for staging, speed change lane on WB Palace Road bridge)	<ul style="list-style-type: none">Low-Moderate construction cost (skewed/larger Palace Road bridges, temporary widening of existing Palace Rd bridge for staging, speed change lane on WB Palace Road bridge)	<ul style="list-style-type: none">Low-Moderate construction cost (skewed/larger Palace Road bridges, temporary widening of existing Palace Rd bridge for staging, northbound left-turn beneath Palace Road bridges)
ENVIRONMENTAL CRITERIA (FOOTPRINT IMPACTS)	Socio-Economic Impacts	<ul style="list-style-type: none">No socio-economic impacts	<ul style="list-style-type: none">Significant impacts to residential property adjacent to WB off-ramp (potential displacement)	<ul style="list-style-type: none">Ramp terminal located adjacent to residential properties, resulting in potential property impacts including noise and driveway impacts	<ul style="list-style-type: none">Ramp terminal located adjacent to residential properties, resulting in potential property impacts including noise and driveway impacts
	Natural Environment Impacts	<ul style="list-style-type: none">No natural environment impacts	<ul style="list-style-type: none">Minor vegetation removal in northeast quadrant	<ul style="list-style-type: none">Minor vegetation removal in northeast quadrant	<ul style="list-style-type: none">Minor vegetation removal in northeast quadrant
	Cultural Heritage Impacts	<ul style="list-style-type: none">No cultural heritage impacts	<ul style="list-style-type: none">Low potential for archaeological impacts	<ul style="list-style-type: none">Low potential for archaeological impacts	<ul style="list-style-type: none">Low potential for archaeological impacts
SCREENING SUMMARY	KEY ADVANTAGES	<ul style="list-style-type: none">Low construction costNo environmental or property impacts	<ul style="list-style-type: none">Avoids widening of Napanee River bridgeMinimizes impacts to natural environmentNo left-turns required to access Hwy 401 - directional ramps for all movements (although directional on-ramps not necessary to provide adequate operations)New WB off-ramp can be utilized for staging purposes	<ul style="list-style-type: none">Avoids widening of Napanee River bridgeMinimizes impacts to natural environmentNew WB off-ramp can be utilized for staging purposesLow to Moderate construction cost	<ul style="list-style-type: none">Avoids widening of Napanee River bridgeMinimizes impacts to natural environmentNew WB off-ramp can be utilized for staging purposesLow-Moderate construction cost
	KEY DISADVANTAGES	<ul style="list-style-type: none">Does not address existing geometric and corresponding safety concerns associated with existing interchange configurationDoes not improve skew angle of Palace Road structuresRamp closures required during construction	<ul style="list-style-type: none">High construction costRelatively high skew angle required for Palace Road replacement structuresModerate complexity of construction stagingSignificant residential property impacts (one likely displacement)	<ul style="list-style-type: none">Relatively high skew angle required for Palace Road replacement structuresModerate complexity of construction stagingPotential residential property impacts	<ul style="list-style-type: none">Moderate complexity of construction stagingRelatively high skew angle required for Palace Road replacement structuresPotential residential property impactsMerge along WB on-ramps may be unfamiliar condition for some drivers and pose increased collision riskPotential sight distance concerns to left-turn from northbound Palace Rd to WB Hwy 401
	Recommendation	CARRY FORWARD FOR COMPARISON PURPOSES	DO NOT CARRY FORWARD	CARRY FORWARD	DO NOT CARRY FORWARD
	Rationale	Alternative will be carried forward for comparison purposes only	While alternative addresses geometric and operational concerns associated with existing ramps, other alternatives provide the same or similar level of service and operations with lower overall impacts and at a lower cost	Addresses geometric and operational concerns associated with existing ramps, avoiding impacts to the Napanee River bridge, with a relatively low to moderate construction cost and minor environmental impacts	While alternative addresses geometric and operational concerns associated with existing ramps, merge condition and geometrics along westbound on-ramps are not ideal and may pose increased collision risk for unfamiliar drivers

Highway 401 Interchange Improvements at Palace Road
Palace Road Interchange North Side Improvement Alternatives (Long-List) – Coarse Screening

	CATEGORY	Palace Road Interchange Alternatives – North (Table 2: Alternative E-N-4 and E-N-5, W-N-1 and W-N-2)			
		Alternative E-N-4 (Diamond with Minor Palace Road Realignment and New Overpass Structures)	Alternative E-N-5 (Diamond with Roundabout, Minor Palace Road Realignment and New Overpass Structures)	Alternative W-N-1 (Parclo A2 with Westerly Palace Road Realignment and New Underpass Structure)	Alternative W-N-2 (Standard Buttonhook with Westerly Palace Road Realignment and New Underpass Structure)
ALTERNATIVE OVERVIEW	Description	<ul style="list-style-type: none">Westbound diamond off and on-rampsLeft-turn from northbound Palace Road to westbound on-rampMaintain same general alignment of Palace Road (slight correction in skew angle)Replace existing bridges with new overpass structures at same general location (reduce skew angle)	<ul style="list-style-type: none">Westbound diamond off-ramp into roundaboutWestbound on-ramp from roundaboutPartial realignment of Palace Road approaching roundaboutReplace existing bridges with new overpass structures slightly to east of existing bridges, with reduced skew angle	<ul style="list-style-type: none">Standard westbound buttonhook off-rampDirectional on-ramp (southbound Palace Road to westbound Hwy 401)Inner-loop on-ramp (northbound Palace Road to westbound Hwy 401)Realign Palace Road to the west at Highway 401 crossing and construct new underpass structureRemove existing Palace Road structures	<ul style="list-style-type: none">Westbound buttonhook off-rampWestbound buttonhook on-ramp (southbound and northbound Palace Road to westbound Hwy 401)Left-turn from southbound Palace Road to westbound on-rampRealign Palace Road to the west at Highway 401 crossing and construct new underpass structureRemove existing Palace Road structures
	Schematic				
	Recommendation	CARRY FORWARD	DO NOT CARRY FORWARD	DO NOT CARRY FORWARD	CARRY FORWARD
TECHNICAL SCREENING CRITERIA	Construction Staging	<ul style="list-style-type: none">Moderate complexity of staging to replace structures at same approximate location<ul style="list-style-type: none">Structure replacement requires Hwy 401 median cross-overs and temporary overbuild of one existing structure (which becomes ‘throw-away’)Reduction to single lane along Palace Road anticipated during construction (with temporary signals)New westbound off-ramp can be utilized for staging during closure of existing westbound off-ramp	<ul style="list-style-type: none">Moderate complexity of staging to replace structures at same approximate location<ul style="list-style-type: none">Structure replacement requires Hwy 401 median cross-overs temporary overbuild of one existing structure (which becomes ‘throw-away’)Reduction to single lane along Palace Road anticipated during construction (with temporary signals)New westbound off-ramp can be utilized for staging during closure of existing westbound off-ramp	<ul style="list-style-type: none">Low-Moderate complexity of staging<ul style="list-style-type: none">New structure can be constructed over Hwy 401 with relatively minor impacts to trafficNew westbound off-ramp can be utilized for staging during closure of existing westbound off-ramp	<ul style="list-style-type: none">Low-Moderate complexity of staging<ul style="list-style-type: none">New structure can be constructed over Hwy 401 with relatively minor impacts to trafficNew westbound off-ramp can be utilized for staging during closure of existing westbound off-ramp
	Traffic Operations (including Geometrics and Safety)	<ul style="list-style-type: none">Good traffic Level of Service operations anticipated including LOS ‘A’ or ‘B’ for all movementsAddresses geometric and operational concerns associated with existing rampsLeft-turn from northbound Palace Road to westbound Hwy 401 required	<ul style="list-style-type: none">Good traffic Level of Service operations anticipated through roundabout in short and long-term, with no notable operational concerns anticipatedAddresses geometric and operational concerns associated with existing rampsPotential sight distance concerns and signage challenges approaching roundabout beneath Hwy 401	<ul style="list-style-type: none">Good traffic Level of Service operations anticipated including LOS ‘A’ or ‘B’ for all movementsAddresses geometric and operational concerns associated with existing rampsDirectional ramps for all movements (no left-turns required)	<ul style="list-style-type: none">Good traffic Level of Service operations anticipated including LOS ‘A’ or ‘B’ for all movementsAddresses geometric and operational concerns associated with existing rampsLeft-turn from southbound Palace Road to westbound Hwy 401 required
	Structure Requirements	<ul style="list-style-type: none">Replace existing Palace Road structures with twin structures at same approximate locationSkew angle of approximately 35 degrees	<ul style="list-style-type: none">Replace existing Palace Road structures with twin structures at same approximate locationSkew angle of approximately 20 degrees	<ul style="list-style-type: none">Construct new structure over Hwy 401 west of existing structuresSkew angle of approximately 35-40 degrees	<ul style="list-style-type: none">Construct new structure over Hwy 401 west of existing structuresSkew angle of approximately 35-40 degrees




Highway 401 Interchange Improvements at Palace Road
Palace Road Interchange North Side Improvement Alternatives (Long-List) – Coarse Screening

	CATEGORY	Palace Road Interchange Alternatives – North (Table 2: Alternative E-N-4 and E-N-5, W-N-1 and W-N-2)			
		Alternative E-N-4 (Diamond with Minor Palace Road Realignment and New Overpass Structures)	Alternative E-N-5 (Diamond with Roundabout, Minor Palace Road Realignment and New Overpass Structures)	Alternative W-N-1 (Parclo A2 with Westerly Palace Road Realignment and New Underpass Structure)	Alternative W-N-2 (Standard Buttonhook with Westerly Palace Road Realignment and New Underpass Structure)
		anticipated for twin overpass structures	anticipated for twin overpass structures	anticipated for underpass structure • Widening of Napanee River bridge required	anticipated for underpass structure
	Construction Cost (Qualitative)	• Low-Moderate construction cost (skewed/larger Palace Road bridges, temporary widening of existing Palace Rd bridge for staging, northbound left-turn beneath Palace Road bridges)	• Low-Moderate construction cost (partial Palace Road realignment and construction of roundabout, temporary widening of existing Palace Rd bridge for staging, reduced skew angle of Palace Road bridges relative to other alternatives).	• High construction cost (long length of new ramps / speed change lanes, skewed/larger Palace Road structure, widening of Napanee River bridge, speed change lane beneath Palace Road bridge, Palace Road realignment, impacts to hydro corridor due to new Palace Rd alignment/profile).	• Moderate construction cost (skewed/larger Palace Road bridges, speed change beneath Palace Road bridge, Palace Road realignment, impacts to hydro corridor due to new Palace Rd alignment/profile)
ENVIRONMENTAL CRITERIA (FOOTPRINT IMPACTS)	Socio-Economic Impacts	• No significant socio-economic impacts anticipated	• Minor residential property impacts anticipated north of roundabout location (Palace Road realignment)	• Significant impacts to residential property adjacent to WB off-ramp (potential displacement), and impacts to residential properties north of Palace Road	• Ramp terminal located adjacent to residential properties, resulting in potential property impacts including noise and driveway impacts
	Natural Environment Impacts	• Minor vegetation removal in northeast quadrant	• Minor vegetation removal in northeast quadrant	• Westbound on-ramp across Napanee River results in minor floodplain and potential fisheries impacts • Minor impacts to woodlot in northwest quadrant and vegetation removal in northeast quadrant	• Minor vegetation removal in northeast quadrant
	Cultural Heritage Impacts	• Low potential for archaeological impacts	• Low potential for archaeological impacts	• Moderate to high potential for archaeological impacts given impacts to woodlot and widening across Napanee River	• Low potential for archaeological impacts
SCREENING SUMMARY	KEY ADVANTAGES	• Avoids widening of Napanee River bridge • Minimizes impacts to natural environment • New WB off-ramp can be utilized for staging purposes • Low-Moderate construction	• Avoids widening of Napanee River bridge • Minimizes impacts to natural environment • Improved skew angle of replacement structures • Reduced risk of severe collisions through roundabout • New WB off-ramp can be utilized for staging purposes • Low-Moderate construction	• No left-turns required to access Hwy 401 - directional ramps for all movements (although directional on-ramps not necessary to provide adequate operations) • Low-Moderate complexity of construction staging • New WB off-ramp can be utilized for staging purposes	• Avoids widening of Napanee River bridge • Low-Moderate complexity of construction staging • New WB off-ramp can be utilized for staging purposes • Minimizes impacts to natural environment • Moderate construction cost
	KEY DISADVANTAGES	• Moderate complexity of construction staging • Relatively high skew angle required for Palace Road replacement structures	• Moderate complexity of construction staging • Roundabouts less compatible with LCVs as compared with traditional intersections • Potential sight distance concerns and signage challenges approaching roundabout beneath Highway 401	• Widening of Napanee River bridge • Significant residential property impacts (one likely displacement) • Relatively high skew angle required for Palace Road replacement structure. • High skew angle for underpass requires post tensioned structure which increases cost and vertical clearance requirements during construction. • Potential impacts to hydro corridor due to new Palace Rd alignment/profile • High construction cost	• Relatively high skew angle required for Palace Road replacement structure. • High skew angle for underpass requires post tensioned structure which increases cost and vertical clearance requirements during construction. • Potential impacts to hydro corridor due to new Palace Rd alignment/profile • Potential residential property impacts
	Recommendation	CARRY FORWARD	DO NOT CARRY FORWARD	DO NOT CARRY FORWARD	CARRY FORWARD

Highway 401 Interchange Improvements at Palace Road
Palace Road Interchange North Side Improvement Alternatives (Long-List) – Coarse Screening

		Palace Road Interchange Alternatives – North (Table 2: Alternative E-N-4 and E-N-5, W-N-1 and W-N-2)			
	CATEGORY	Alternative E-N-4 (Diamond with Minor Palace Road Realignment and New Overpass Structures)	Alternative E-N-5 (Diamond with Roundabout, Minor Palace Road Realignment and New Overpass Structures)	Alternative W-N-1 (Parclo A2 with Westerly Palace Road Realignment and New Underpass Structure)	Alternative W-N-2 (Standard Buttonhook with Westerly Palace Road Realignment and New Underpass Structure)
	Rationale	Addresses geometric and operational concerns associated with existing ramps, avoiding impacts to the Napanee River bridge, with a relatively low to moderate construction cost and minor property and environmental impacts	While alternative addresses geometric and operational concerns associated with existing ramps and reduces the skew angle of the replacement structures, there are potential sight distance concerns and signage challenges approaching the roundabout beneath Highway 401	While alternative addresses geometric and operational concerns associated with existing ramps, other alternatives provide the same or similar level of service and operations with lower overall impacts and at a lower cost	Addresses geometric and operational concerns associated with existing ramps, avoiding impacts to the Napanee River bridge, with a moderate construction cost and minor environmental impacts





Highway 401 Interchange Improvements at Palace Road
Palace Road Interchange North Side Improvement Alternatives (Long-List) – Coarse Screening

	CATEGORY	Palace Road Interchange Alternatives – North (Table 3: Alternatives W-N-3 to W-N-5)		
		Alternative W-N-3 (Buttonhook with WB Directional On-Ramp, NB Left-Turn, Westerly Palace Road Realignment and New Underpass Structure)	Alternative W-N-4 (Diamond with Westerly Palace Road Realignment and New Underpass Structure)	Alternative W-N-5 (Diamond with Roundabout, Westerly Palace Road Realignment and New Underpass Structure)
ALTERNATIVE OVERVIEW	Description	<ul style="list-style-type: none">• Standard westbound buttonhook off-ramp• Directional on-ramp (southbound Palace Road to westbound Hwy 401)• Left-turn from northbound Palace Road to westbound on-ramp• Realign Palace Road to the west at Highway 401 crossing and construct new underpass structure• Remove existing Palace Road structures	<ul style="list-style-type: none">• Westbound diamond off and on-ramps• Left-turn from northbound Palace Road to westbound on-ramp• Realign Palace Road to the west at Highway 401 crossing and construct new underpass structure• Remove existing Palace Road structures	<ul style="list-style-type: none">• Westbound diamond off-ramp into roundabout• Westbound on-ramp from roundabout• Realign Palace Road to the west at Highway 401 crossing and construct new underpass structure with reduced skew angle• Remove existing Palace Road structures
	Schematic			
	Recommendation	DO NOT CARRY FORWARD	CARRY FORWARD	CARRY FORWARD
TECHNICAL SCREENING CRITERIA	Construction Staging	<ul style="list-style-type: none">• Low-Moderate complexity of staging<ul style="list-style-type: none">○ New structure can be constructed over Hwy 401 with relatively minor impacts to traffic○ New westbound off-ramp can be utilized for staging during closure of existing westbound off-ramp	<ul style="list-style-type: none">• Low-Moderate complexity of staging<ul style="list-style-type: none">○ New structure can be constructed over Hwy 401 with relatively minor impacts to traffic○ New westbound off-ramp can be utilized for staging during closure of existing westbound off-ramp	<ul style="list-style-type: none">• Moderate complexity of staging<ul style="list-style-type: none">○ Grade raise requirements along Palace Road approaching roundabout and new structure (temporary closure / realignment of existing ramps potentially required)○ New structure can be constructed over Hwy 401 with relatively minor impacts to highway traffic
	Traffic Operations (including Geometrics and Safety)	<ul style="list-style-type: none">• Good traffic Level of Service operations anticipated including LOS 'A' or 'B' for all movements• Addresses geometric and operational concerns associated with existing ramps• Left-turn from northbound Palace Road to westbound Hwy 401 required, with less than desirable sight distance given Palace Rd profile• Merge along westbound on-ramp may be unfamiliar condition for some drivers	<ul style="list-style-type: none">• Good traffic Level of Service operations anticipated including LOS 'A' or 'B' for all movements• Addresses geometric and operational concerns associated with existing ramps• Left-turn from northbound Palace Road to westbound Hwy 401 required	<ul style="list-style-type: none">• Good traffic Level of Service operations anticipated through roundabout in short and long-term, with no notable operational concerns anticipated• Addresses geometric and operational concerns associated with existing ramps
	Structure Requirements	<ul style="list-style-type: none">• Construct new structure over Hwy 401 west of existing structures• Skew angle of approximately 35-40 degrees anticipated for underpass structure• Widening of Napanee River bridge required	<ul style="list-style-type: none">• Construct new structure over Hwy 401 west of existing structures• Skew angle of approximately 35-40 degrees anticipated for underpass structure• Widening of Napanee River bridge required	<ul style="list-style-type: none">• Construct new structure over Hwy 401 west of existing structures• Skew angle of approximately 25 degrees anticipated for underpass structure• Widening of Napanee River bridge required
	Construction Cost (Qualitative)	<ul style="list-style-type: none">• Moderate-High construction cost (skewed/larger Palace Road structure, widening of Napanee River bridge, northbound left-turn on Palace Road bridge,	<ul style="list-style-type: none">• Moderate-High construction cost (skewed/larger Palace Road structure, widening of Napanee River bridge, northbound left-turn on Palace Road bridge,	<ul style="list-style-type: none">• Moderate construction cost (reduced skew angle of Palace Road structure relative to other options, widening of Napanee River bridge, Palace Road realignment,

Highway 401 Interchange Improvements at Palace Road
Palace Road Interchange North Side Improvement Alternatives (Long-List) – Coarse Screening

	CATEGORY	Palace Road Interchange Alternatives – North (Table 3: Alternatives W-N-3 to W-N-5)		
		Alternative W-N-3 (Buttonhook with WB Directional On-Ramp, NB Left-Turn, Westerly Palace Road Realignment and New Underpass Structure)	Alternative W-N-4 (Diamond with Westerly Palace Road Realignment and New Underpass Structure)	Alternative W-N-5 (Diamond with Roundabout, Westerly Palace Road Realignment and New Underpass Structure)
		Palace Road realignment, impacts to hydro corridor due to new Palace Rd alignment/profile)	Palace Road realignment, impacts to hydro corridor due to new Palace Rd alignment/profile)	impacts to hydro corridor due to new Palace Rd alignment/profile)
ENVIRONMENTAL CRITERIA (FOOTPRINT IMPACTS)	Socio-Economic Impacts	• Ramp terminal located adjacent to residential properties, resulting in potential property impacts including noise and driveway impacts	• Residential property impacts anticipated north of Palace Road location (Palace Road realignment)	• Minor residential property impacts anticipated north of roundabout location (Palace Road realignment)
	Natural Environment Impacts	• Westbound on-ramp across Napanee River results in minor floodplain and potential fisheries impacts • Minor impacts to woodlot in northwest quadrant and vegetation removal in northeast quadrant	• Westbound on-ramp across Napanee River results in minor floodplain and potential fisheries impacts • Impacts to woodlot in northwest quadrant	• Westbound on-ramp across Napanee River results in minor floodplain and potential fisheries impacts • Minor impacts to woodlot in northwest quadrant and vegetation removal in northeast quadrant
	Cultural Heritage Impacts	• Moderate to high potential for archaeological impacts given impacts to woodlot and widening across Napanee River	• Moderate to high potential for archaeological impacts given impacts to woodlot and widening across Napanee River	• Moderate to high potential for archaeological impacts given impacts to woodlot and widening across Napanee River
SCREENING SUMMARY	KEY ADVANTAGES	• Low-Moderate complexity of construction staging • New WB off-ramp can be utilized for staging purposes	• Low-Moderate complexity of construction staging • New WB off-ramp can be utilized for staging purposes	• Improved skew angle of replacement structures • Reduced risk of severe collisions through roundabout • Moderate construction cost
	KEY DISADVANTAGES	• Widening of Napanee River bridge • Potential residential property impacts • Relatively high skew angle required for Palace Road replacement structure and less than desirable sight distance to northbound left-turn • High skew angle for underpass requires post tensioned structure which increases cost and vertical clearance requirements during construction. • Potential impacts to hydro corridor due to new Palace Rd alignment/profile • Merge along WB on-ramps may be unfamiliar condition for some drivers • Moderate-High construction cost	• Widening of Napanee River bridge • Potential residential property impacts • Relatively high skew angle required for Palace Road replacement structure. • High skew angle for underpass requires post tensioned structure which increases cost and vertical clearance requirements during construction. • Potential impacts to hydro corridor due to new Palace Rd alignment/profile • Moderate-High construction cost	• Widening of Napanee River bridge • Minor residential property impacts anticipated • Moderate complexity of construction staging • Roundabouts less compatible with LCVs as compared with traditional intersections • Potential impacts to hydro corridor due to new Palace Rd alignment/profile
	Recommendation	DO NOT CARRY FORWARD	CARRY FORWARD	CARRY FORWARD
	Rationale	While alternative addresses geometric and operational concerns associated with existing ramps, merge condition and geometrics along westbound on-ramps are not ideal and may pose increased collision risk for unfamiliar drivers	Addresses geometric and operational concerns associated with existing ramps with low-moderate complexity of construction	Reduced skew angle of structure simplifies construction and reduces cost, with acceptable operations anticipated through roundabout and minor property impacts

Highway 401 Interchange Improvements at Palace Road
Palace Road Interchange South Side Improvement Alternatives (Long-List) – Coarse Screening

	Palace Road Interchange Alternatives – South (Table 1: Do Nothing, Alternatives E-S-1 to E-S-3)				
	CATEGORY	Do Nothing (Maintain existing interchange configuration, but replace existing overpass structures)	Alternative E-S-1 (Buttonhook/Parclo with Minor Palace Road Realignment and New Overpass Structures)	Alternative E-S-2 (Standard Buttonhook with Minor Palace Road Realignment and New Overpass Structures)	Alternative E-S-3 (Standard Buttonhook with EB Directional On-Ramp, SB Left-Turn and Minor Palace Road Realignment and new overpass structures)
ALTERNATIVE OVERVIEW	Description	<ul style="list-style-type: none">• No change to existing interchange ramps• Replace existing bridges with new overpass structures at same location (when required)	<ul style="list-style-type: none">• Standard eastbound buttonhook off-ramp• Directional on-ramp (northbound Palace Road to eastbound Hwy 401)• Inner-loop on-ramp (southbound Palace Road to eastbound Hwy 401)• Maintain same general alignment of Palace Road (slight correction in skew angle)• Replace existing bridges with new overpass structures at same general location (reduce skew angle)	<ul style="list-style-type: none">• Standard eastbound buttonhook off-ramp• Eastbound buttonhook on-ramp (northbound and southbound Palace Road to eastbound Hwy 401)• Left-turn from northbound Palace Road to eastbound on-ramp• Maintain same general alignment of Palace Road (slight correction in skew angle)• Replace existing bridges with new overpass structures at same general location (reduce skew angle)	<ul style="list-style-type: none">• Standard eastbound buttonhook off-ramp• Directional on-ramp (northbound Palace Road to eastbound Hwy 401)• Left-turn from southbound Palace Road to eastbound on-ramp• Maintain same general alignment of Palace Road (slight correction in skew angle)• Replace existing bridges with new overpass structures at same general location (reduce skew angle)
	Schematic				
	Recommendation	CARRY FORWARD FOR COMPARISON PURPOSES	DO NOT CARRY FORWARD	CARRY FORWARD	DO NOT CARRY FORWARD
TECHNICAL SCREENING CRITERIA	Construction Staging	<ul style="list-style-type: none">• Moderate complexity of staging to replace structures at same location<ul style="list-style-type: none">○ Structure replacement requires Hwy 401 median cross-overs and temporary overbuild of one existing structure (which becomes ‘throw-away’)○ Reduction to single lane along Palace Road anticipated during construction (with temporary signals)• Ramp and/or Hwy 401 lane closures required to facilitate structure replacement	<ul style="list-style-type: none">• Moderate complexity of staging to replace structures at same approximate location<ul style="list-style-type: none">○ Structure replacement requires Hwy 401 median cross-overs and temporary overbuild of one existing structure (which becomes ‘throw-away’)○ Reduction to single lane along Palace Road anticipated during construction (with temporary signals)○ New directional eastbound on-ramp can be utilized for staging during closure of existing eastbound on-ramp○ Some rock cut required for on-ramp	<ul style="list-style-type: none">• Moderate complexity of staging to replace structures at same approximate location<ul style="list-style-type: none">○ Structure replacement requires Hwy 401 median cross-overs and temporary overbuild of one existing structure (which becomes ‘throw-away’)○ Reduction to single lane along Palace Road anticipated during construction (with temporary signals)○ Potential closure of Palace Rd access to eastbound Hwy 401 during construction	<ul style="list-style-type: none">• Moderate complexity of staging to replace structures at same approximate location<ul style="list-style-type: none">○ Structure replacement requires Hwy 401 median cross-overs and temporary overbuild of one existing structure (which becomes ‘throw-away’)○ Reduction to single lane along Palace Road anticipated during construction (with temporary signals)○ New eastbound on-ramp can be utilized for staging during closure of existing eastbound on-ramp○ Some rock cut required for on-ramp
	Traffic Operations (including Geometrics and Safety)	<ul style="list-style-type: none">• Good overall traffic Level of Service (existing and future), however existing geometric deficiencies result in potential operational concerns and increased collision risk (e.g. traffic decelerating on Highway 401 mainline approaching exit, merging traffic along eastbound on-ramp).	<ul style="list-style-type: none">• Good traffic Level of Service operations anticipated including LOS ‘A’ or ‘B’ for all movements• Addresses geometric and operational concerns associated with existing ramps• Directional ramps for all movements (no left-turns required)• Two on-ramp speed change lanes required, with speed change lanes to merge prior to merging	<ul style="list-style-type: none">• Good traffic Level of Service operations anticipated including LOS ‘A’ or ‘B’ for all movements• Addresses geometric and operational concerns associated with existing ramps• Left-turn from northbound Palace Road to eastbound Hwy 401 required	<ul style="list-style-type: none">• Good traffic Level of Service operations anticipated including LOS ‘A’ or ‘B’ for all movements• Addresses geometric and operational concerns associated with existing ramps• Left-turn from southbound Palace Road to eastbound Hwy 401 required with less than desirable sight distance to ramp terminal• Merge along eastbound on-ramp may be

Highway 401 Interchange Improvements at Palace Road
Palace Road Interchange South Side Improvement Alternatives (Long-List) – Coarse Screening

	Palace Road Interchange Alternatives – South (Table 1: Do Nothing, Alternatives E-S-1 to E-S-3)				
	CATEGORY	Do Nothing (Maintain existing interchange configuration, but replace existing overpass structures)	Alternative E-S-1 (Buttonhook/Parclo with Minor Palace Road Realignment and New Overpass Structures)	Alternative E-S-2 (Standard Buttonhook with Minor Palace Road Realignment and New Overpass Structures)	Alternative E-S-3 (Standard Buttonhook with EB Directional On- Ramp, SB Left-Turn and Minor Palace Road Realignment and new overpass structures)
			with Highway 401 in order to reduce total length		unfamiliar condition for some drivers and pose increased collision risk
	Structure Requirements	<ul style="list-style-type: none">• Replace existing Palace Road structures with twin structures at same location• Maintain existing skew angle of approximately 45 degrees	<ul style="list-style-type: none">• Replace existing Palace Road structures with twin structures at same approximate location• Skew angle of approximately 35 degrees anticipated for twin overpass structures• Widening of Napanee River bridge required	<ul style="list-style-type: none">• Replace existing Palace Road structures with twin structures at same approximate location• Skew angle of approximately 35 degrees anticipated for twin overpass structures• Widening of Napanee River bridge required	<ul style="list-style-type: none">• Replace existing Palace Road structures with twin structures at same approximate location• Skew angle of approximately 35 degrees anticipated for twin overpass structures• Widening of Napanee River bridge required
	Construction Cost (Qualitative)	<ul style="list-style-type: none">• Low construction cost relative to other alternatives (replacement cost of skewed bridges only)	<ul style="list-style-type: none">• High construction cost (long length of new ramps / speed change lanes, skewed/larger Palace Road bridges, temporary widening of existing Palace Rd bridge for staging, widening of Napanee River bridge, barrier separated speed change lane on Palace Road EB bridge, some rock cut).	<ul style="list-style-type: none">• Moderate construction cost (skewed/larger Palace Road bridges, temporary widening of existing Palace Rd bridge for staging, widening of Napanee River bridge, speed change lane on EB Palace Road bridge)	<ul style="list-style-type: none">• Moderate construction cost (skewed/larger Palace Road bridges, southbound left-turn beneath Palace Road bridges, temporary widening of existing Palace Rd bridge for staging, widening of Napanee River bridge, some rock cut)
ENVIRONMENTAL CRITERIA (FOOTPRINT IMPACTS)	Socio-Economic Impacts	<ul style="list-style-type: none">• No socio-economic impacts	<ul style="list-style-type: none">• Significant impacts to residential property adjacent to EB off-ramp (potential displacement)• Minor property encroachment south of Palace Road	<ul style="list-style-type: none">• Ramp terminal located adjacent to residential properties, resulting in potential property impacts including noise and driveway impacts• Minor property encroachment south of Palace Road	<ul style="list-style-type: none">• Ramp terminal located adjacent to residential properties, resulting in potential property impacts including noise and driveway impacts• Minor property encroachment south of Palace Road
	Natural Environment Impacts	<ul style="list-style-type: none">• No natural environment impacts	<ul style="list-style-type: none">• Eastbound off-ramp across Napanee River results in minor floodplain and potential fisheries impacts• Impacts to woodlot in southeast quadrant• Minor vegetation removal in southwest quadrant	<ul style="list-style-type: none">• Eastbound off-ramp across Napanee River results in minor floodplain and potential fisheries impacts• Minor vegetation removal in southwest quadrant	<ul style="list-style-type: none">• Eastbound off-ramp across Napanee River results in minor floodplain and potential fisheries impacts• Impacts to woodlot in southeast quadrant• Minor vegetation removal in southwest quadrant
	Cultural Heritage Impacts	<ul style="list-style-type: none">• No cultural heritage impacts	<ul style="list-style-type: none">• Moderate to high potential for archaeological impacts given impacts to woodlot and widening across Napanee River	<ul style="list-style-type: none">• Moderate potential for archaeological impacts given widening across Napanee River	<ul style="list-style-type: none">• Moderate to high potential for archaeological impacts given impacts to woodlot and widening across Napanee River
SCREENING SUMMARY	KEY ADVANTAGES	<ul style="list-style-type: none">• Low construction cost• No environmental or property impacts	<ul style="list-style-type: none">• No left-turns required to access Hwy 401 - directional ramps for all movements (although directional on-ramps not necessary to provide adequate operations)• Directional EB on-ramp can be utilized for staging purposes	<ul style="list-style-type: none">• Minimizes impacts to woodlot and rock cut in SE quadrant• Moderate construction cost	<ul style="list-style-type: none">• New EB on-ramp can be utilized for staging purposes• Moderate construction cost
	KEY DISADVANTAGES	<ul style="list-style-type: none">• Does not address existing geometric and corresponding safety concerns associated with existing interchange configuration• Does not improve skew angle of Palace Road structures• Moderate complexity of construction staging including temporary structure overbuild which becomes ‘throw-away’• Ramp closures required during construction	<ul style="list-style-type: none">• Widening of Napanee River bridge• Impacts to woodlot and rock cut in SE quadrant• Two on-ramp speed change lanes required (with increased length given upgrades along Highway 401)• Moderate complexity of construction staging including temporary structure overbuild which becomes ‘throw-away’• Significant residential property impacts	<ul style="list-style-type: none">• Widening of Napanee River bridge• Moderate complexity of construction staging including temporary structure overbuild which becomes ‘throw-away’• Relatively high skew angle required for Palace Road replacement structures• Minor property encroachment south of Palace Road	<ul style="list-style-type: none">• Widening of Napanee River bridge• Impacts to woodlot and rock cut in SE quadrant• Minor property encroachment south of Palace Road• Moderate complexity of construction staging including temporary structure overbuild which becomes ‘throw-away’• Relatively high skew angle required for Palace Road replacement structures

Highway 401 Interchange Improvements at Palace Road
Palace Road Interchange South Side Improvement Alternatives (Long-List) – Coarse Screening

	Palace Road Interchange Alternatives – South (Table 1: Do Nothing, Alternatives E-S-1 to E-S-3)				
	CATEGORY	Do Nothing (Maintain existing interchange configuration, but replace existing overpass structures)	Alternative E-S-1 (Buttonhook/Parclo with Minor Palace Road Realignment and New Overpass Structures)	Alternative E-S-2 (Standard Buttonhook with Minor Palace Road Realignment and New Overpass Structures)	Alternative E-S-3 (Standard Buttonhook with EB Directional On- Ramp, SB Left-Turn and Minor Palace Road Realignment and new overpass structures)
			<ul style="list-style-type: none">• Relatively high skew angle required for Palace Road replacement structures• High construction cost		<ul style="list-style-type: none">• Merge along EB on-ramps may be unfamiliar condition for some drivers and pose increased collision risk• Potential sight distance concerns to left-turn from southbound Palace Rd to EB Hwy 401
	Recommendation	CARRY FORWARD FOR COMPARISON PURPOSES	DO NOT CARRY FORWARD	CARRY FORWARD	DO NOT CARRY FORWARD
	Rationale	Alternative will be carried forward for comparison purposes only	While alternative addresses geometric and operational concerns associated with existing ramps, other alternatives provide the same or similar level of service and operations with lower overall impacts and at a lower cost	Addresses geometric and operational concerns associated with existing ramps at a moderate construction cost and with relatively minor property and environmental impacts	While alternative addresses geometric and operational concerns associated with existing ramps, merge condition and geometrics along eastbound on-ramps are not ideal and may pose increased collision risk for unfamiliar drivers

Highway 401 Interchange Improvements at Palace Road

Palace Road Interchange South Side Improvement Alternatives (Long-List) – Coarse Screening

		Palace Road Interchange Alternatives – South (<i>Table 2: Alternatives E-S-4 to E-S-7</i>)			
CATEGORY		Alternative E-S-4 (Diamond with Minor Palace Road Realignment and New Overpass Structures)	Alternative E-S-5 (Diamond with Roundabout and Minor Palace Road Realignment and New Overpass Structures)	Alternative E-S-6 (Partial Diamond to Roundabout with Directional On-Ramp and Minor Palace Road Realignment and New Overpass Structures)	Alternative E-S-7 (Parclo B with Minor Palace Road Realignment and New Overpass Structures)
ALTERNATIVE OVERVIEW	Description	<ul style="list-style-type: none">• Eastbound diamond/buttonhook off-ramp• Eastbound diamond on-ramp (northbound and southbound Palace Road to eastbound Hwy 401)• Left-turn from southbound Palace Road to eastbound on-ramp• Maintain same general alignment of Palace Road (slight correction in skew angle)• Replace existing bridges with new overpass structures at same general location (reduce skew angle)	<ul style="list-style-type: none">• Eastbound diamond off-ramp into roundabout• Eastbound on-ramp from roundabout• Partial realignment of Palace Road approaching roundabout• Replace existing bridges with new overpass structures slightly to west, with reduced skew angle	<ul style="list-style-type: none">• Eastbound diamond off-ramp into roundabout• Eastbound directional on-ramp from Palace Road (U-turn required through roundabout for traffic from southbound Palace Road)• Maintain same general alignment of Palace Road (slight correction in skew angle)• Replace existing bridges with new overpass structures at same general location (reduce skew angle)	<ul style="list-style-type: none">• Eastbound Parclo B off-ramp east of Palace Road• Eastbound on-ramp from Palace Road (Left-turn from southbound Palace Road)• Maintain same general alignment of Palace Road (slight correction in skew angle)• Replace existing bridges with new overpass structures at same general location (reduce skew angle)
	Schematic				
	Recommendation	CARRY FORWARD	DO NOT CARRY FORWARD	DO NOT CARRY FORWARD	CARRY FORWARD
TECHNICAL SCREENING CRITERIA	Construction Staging	<ul style="list-style-type: none">• Moderate complexity of staging to replace structures at same approximate location<ul style="list-style-type: none">○ Structure replacement requires Hwy 401 median cross-overs and temporary overbuild of one existing structure (which becomes ‘throw-away’)○ Reduction to single lane along Palace Road anticipated during construction (with temporary signals)○ New eastbound on-ramp can be utilized for staging during closure of existing eastbound on-ramp○ Some rock cut required for eastbound on-ramp	<ul style="list-style-type: none">• Moderate complexity of staging to replace structures at same approximate location<ul style="list-style-type: none">○ Structure replacement requires Hwy 401 median cross-overs and temporary overbuild of one existing structure (which becomes ‘throw-away’)○ Reduction to single lane along Palace Road anticipated during construction (with temporary signals)○ New directional eastbound on-ramp and roundabout can be utilized for staging during closure of existing eastbound on-ramp○ Some rock cut required for roundabout and eastbound on-ramp	<ul style="list-style-type: none">• Moderate complexity of staging to replace structures at same approximate location and construct roundabout<ul style="list-style-type: none">○ Structure replacement requires Hwy 401 median cross-overs and temporary overbuild of one existing structure (which becomes ‘throw-away’)○ Reduction to single lane along Palace Road anticipated during construction (with temporary signals)○ New directional eastbound on-ramp can be utilized for staging during closure of existing eastbound on-ramp○ Some rock cut required for roundabout and eastbound on-ramp	<ul style="list-style-type: none">• Moderate complexity of staging to replace structures at same approximate location<ul style="list-style-type: none">○ Structure replacement requires Hwy 401 median cross-overs and temporary overbuild of one existing structure (which becomes ‘throw-away’)○ Reduction to single lane along Palace Road anticipated during construction (with temporary signals)○ New eastbound on-ramp can be utilized for staging during closure of existing on-ramp○ Major rock cut required for eastbound off and on-ramps
	Traffic Operations (including Geometrics and Safety)	<ul style="list-style-type: none">• Good traffic Level of Service operations including LOS ‘A’ or ‘B’ for all movements anticipated.• Addresses geometric and operational concerns associated with existing ramps• Left-turn from southbound Palace Road to eastbound Hwy 401 required	<ul style="list-style-type: none">• Good traffic Level of Service operations anticipated through roundabout in short and long-term• Addresses geometric and operational concerns associated with existing ramps• Potential sight distance concerns and signage	<ul style="list-style-type: none">• Good traffic Level of Service operations anticipated through roundabout in short and long-term• Addresses geometric and operational concerns associated with existing ramps• U-Turn required through roundabout for vehicles	<ul style="list-style-type: none">• Good traffic Level of Service operations including LOS ‘A’ or ‘B’ for all movements anticipated. Addresses geometric and operational concerns associated with existing ramps• Left-turn from southbound Palace Road to eastbound Hwy 401 required





Highway 401 Interchange Improvements at Palace Road
 Palace Road Interchange South Side Improvement Alternatives (Long-List) – Coarse Screening

	Palace Road Interchange Alternatives – South (Table 2: Alternatives E-S-4 to E-S-7)				
	CATEGORY	Alternative E-S-4 (Diamond with Minor Palace Road Realignment and New Overpass Structures)	Alternative E-S-5 (Diamond with Roundabout and Minor Palace Road Realignment and New Overpass Structures)	Alternative E-S-6 (Partial Diamond to Roundabout with Directional On-Ramp and Minor Palace Road Realignment and New Overpass Structures)	Alternative E-S-7 (Parclo B with Minor Palace Road Realignment and New Overpass Structures)
			challenges approaching roundabout beneath Highway 401	from SB Palace Rd to EB Hwy 401 • Potential sight distance concerns and signage challenges approaching roundabout beneath Hwy 401	• Ramp terminal intersection located on a horizontal curve with less than desirable sight distance given proximity to structures
	Structure Requirements	• Replace existing Palace Road structures with twin structures at same approximate location • Skew angle of approximately 35 degrees anticipated for twin overpass structures	• Replace existing Palace Road structures with twin structures at same approximate location • Skew angle of approximately 20 degrees anticipated for twin overpass structures	• Replace existing Palace Road structures with twin structures at same approximate location • Skew angle of approximately 35 degrees anticipated for twin overpass structure	• Replace existing Palace Road structures with twin structures at same approximate location • Skew angle of approximately 35 degrees anticipated for twin overpass structures
	Construction Cost (Qualitative)	• Low-Moderate construction cost (skewed/larger Palace Road bridges, temporary widening of existing Palace Rd bridge for staging, southbound left-turn beneath Palace Road bridges, some rock cut)	• Low-Moderate construction cost (partial Palace Road realignment and construction of roundabout, temporary widening of existing Palace Rd bridge for staging, reduced skew angle of Palace Road bridges, some rock cut, potential relocation of hydro tower).	• Low-Moderate construction cost (reduced skew angle of Palace Road bridges, temporary widening of existing Palace Rd bridge for staging, some rock cut, potential relocation of hydro tower).	• High construction cost (long length of new ramps, skewed/larger Palace Road bridges, temporary widening of existing Palace Rd bridge for staging, off-ramp speed change lane on Palace Road eastbound bridge, major rock cut, potential relocation of hydro tower)
ENVIRONMENTAL CRITERIA (FOOTPRINT)	Socio-Economic Impacts	• Minor property encroachment south of Palace Road	• Minor property encroachment south of Palace Road	• Minor property encroachment south of Palace Road	• Minor property encroachment south of Palace Road
	Natural Environment Impacts	• Impacts to woodlot in southeast quadrant • Minor vegetation removal in southwest quadrant	• Impacts to woodlot in southeast quadrant	• Impacts to woodlot in southeast quadrant	• Significant impacts to woodlot in southeast quadrant
	Cultural Heritage Impacts	• Moderate potential for archaeological impacts given impacts to woodlot	• Moderate potential for archaeological impacts given impacts to woodlot	• Moderate potential for archaeological impacts given impacts to woodlot	• Moderate to high potential for archaeological impacts given encroachment into southeast quadrant woodlot
SCREENING SUMMARY	KEY ADVANTAGES	• Avoids widening of Napanee River bridge • New EB on-ramp can be utilized for staging purposes • Low-moderate construction cost	• Avoids widening of Napanee River bridge • Improved skew angle of replacement structures • Reduced risk of severe collisions through roundabout • Low-Moderate construction cost	• Avoids widening of Napanee River bridge • Improved skew angle of replacement structures • Reduced risk of severe collisions through roundabout • Low-moderate construction cost	• Avoids widening of Napanee River bridge • New EB on-ramp can be utilized for staging purposes
	KEY DISADVANTAGES	• Impacts to woodlot and some rock cut in SE quadrant • Minor property encroachment south of Palace Road • Moderate complexity of construction staging including temporary structure overbuild which becomes ‘throw-away’ • Relatively high skew angle required for Palace Road replacement structures	• Impacts to woodlot and some rock cut in SE quadrant • Minor property encroachment south of Palace Road • Moderate complexity of construction staging including temporary structure overbuild which becomes ‘throw-away’ • Roundabouts less compatible with LCVs as compared with traditional intersections • Potential sight distance concerns and signage challenges approaching roundabout beneath Highway 401	• Impacts to woodlot and some rock cut in SE quadrant • Minor property encroachment south of Palace Road • Moderate complexity of construction staging including temporary structure overbuild which becomes ‘throw-away’ • U-Turn required through roundabout for vehicles from southbound Palace Road to eastbound Hwy 401 may be unfamiliar condition for some drivers • Roundabouts less compatible with LCVs as	• High construction cost including potential relocation of hydro tower • Minor property encroachment south of Palace Road • Significant impacts to woodlot and major rock cut in SE quadrant • Moderate complexity of construction staging including temporary structure overbuild which becomes ‘throw-away’ • B-loop off-ramp less desirable than other ramps

Highway 401 Interchange Improvements at Palace Road
Palace Road Interchange South Side Improvement Alternatives (Long-List) – Coarse Screening

	Palace Road Interchange Alternatives – South (Table 2: Alternatives E-S-4 to E-S-7)				
	CATEGORY	Alternative E-S-4 (Diamond with Minor Palace Road Realignment and New Overpass Structures)	Alternative E-S-5 (Diamond with Roundabout and Minor Palace Road Realignment and New Overpass Structures)	Alternative E-S-6 (Partial Diamond to Roundabout with Directional On-Ramp and Minor Palace Road Realignment and New Overpass Structures)	Alternative E-S-7 (Parclo B with Minor Palace Road Realignment and New Overpass Structures)
				compared with traditional intersections • Potential sight distance concerns and signage challenges approaching roundabout beneath Highway 401	
	Recommendation	CARRY FORWARD	DO NOT CARRY FORWARD	DO NOT CARRY FORWARD	CARRY FORWARD
	Rationale	Addresses geometric and operational concerns associated with existing ramps, avoiding impacts to the Napanee River bridge, with a relatively low to moderate construction cost and minor property and environmental impacts	While alternative addresses geometric and operational concerns associated with existing ramps and reduces the skew angle of the replacement structures, there are potential sight distance concerns and signage challenges approaching the roundabout beneath Highway 401	While alternative addresses geometric and operational concerns associated with existing ramps and allows for improved skew angle of replacement structures, the U-turn required through the roundabout for vehicles from southbound Palace Road to eastbound Hwy 401 may be unfamiliar condition for drivers and is anticipated to result in increased collision risk. In addition, there are potential sight distance concerns and signage challenges approaching the roundabout beneath Highway 401.	While alternative has a higher construction cost and a B-loop off-ramp is less desirable than other ramps, the alternative addresses geometric and operational concerns associated with existing ramps and avoids widening of the Napanee River bridge

Highway 401 Interchange Improvements at Palace Road
Palace Road Interchange South Side Improvement Alternatives (Long-List) – Coarse Screening

	Palace Road Interchange Alternatives – South (Table 3: Alternatives W-S-1 to W-S-4)				
	CATEGORY	Alternative W-S-1 (Buttonhook/Parclo with Palace Road Westerly Realignment and New Underpass Structure)	Alternative W-S-2 (Standard Buttonhook with Palace Road Westerly Realignment and New Underpass Structure)	Alternative W-S-3 (Standard Buttonhook with EB Directional On- Ramp, SB Left-Turn and Palace Road Westerly Realignment and New Underpass Structure)	Alternative W-S-4 (Diamond with Palace Road Westerly Realignment and New Underpass Structure)
ALTERNATIVE OVERVIEW	Description	<ul style="list-style-type: none">• Standard eastbound buttonhook off-ramp• Directional on-ramp (northbound Palace Road to eastbound Hwy 401)• Inner-loop on-ramp (southbound Palace Road to eastbound Hwy 401)• Realign Palace Road to the west at Highway 401 crossing and construct new underpass structure• Merge two eastbound on-ramps prior to merging with Hwy 401• Remove existing Palace Road structures	<ul style="list-style-type: none">• Standard eastbound buttonhook off-ramp• Eastbound buttonhook on-ramp (northbound and southbound Palace Road to eastbound Hwy 401)• Left-turn from northbound Palace Road to eastbound on-ramp• Realign Palace Road to the west at Highway 401 crossing and construct new underpass structure• Remove existing Palace Road structures	<ul style="list-style-type: none">• Standard eastbound buttonhook off-ramp• Directional on-ramp (northbound Palace Road to eastbound Hwy 401)• Left-turn from southbound Palace Road to eastbound on-ramp• Realign Palace Road to the west at Highway 401 crossing and construct new underpass structure• Remove existing Palace Road structures	<ul style="list-style-type: none">• Eastbound diamond off-ramp• Eastbound diamond on-ramp (northbound and southbound Palace Road to eastbound Hwy 401)• Left-turn from southbound Palace Road to eastbound on-ramp• Realign Palace Road to the west at Highway 401 crossing and construct new underpass structure• Remove existing Palace Road structures
	Schematic				
	Recommendation	DO NOT CARRY FORWARD	CARRY FORWARD	DO NOT CARRY FORWARD	CARRY FORWARD
TECHNICAL SCREENING CRITERIA	Construction Staging	<ul style="list-style-type: none">• Low-Moderate complexity of staging<ul style="list-style-type: none">○ New structure can be constructed over Hwy 401 with relatively minor impacts to traffic○ Grade raise required along Palace Road approaching new structure may require temporary closures or temporary realignment of Palace Road	<ul style="list-style-type: none">• Low-Moderate complexity of staging<ul style="list-style-type: none">○ New structure can be constructed over Hwy 401 with relatively minor impacts to traffic○ Grade raise required along Palace Road approaching new structure may require temporary closure / realignment of existing ramps and Palace Road	<ul style="list-style-type: none">• Low-Moderate complexity of staging<ul style="list-style-type: none">○ New structure can be constructed over Hwy 401 with relatively minor impacts to traffic○ Grade raise required along Palace Road approaching new structure may require temporary closure / realignment of existing ramps and Palace Road○ Some rock cut required for eastbound on-ramp	<ul style="list-style-type: none">• Low-Moderate complexity of staging<ul style="list-style-type: none">○ New structure can be constructed over Hwy 401 with relatively minor impacts to traffic○ Grade raise required along Palace Road approaching new structure may require temporary closure / realignment of existing ramps and Palace Road
	Traffic Operations (including Geometrics and Safety)	<ul style="list-style-type: none">• Good traffic Level of Service operations including LOS 'A' or 'B' for all movements anticipated.• Two on-ramp speed change lanes required, with speed change lanes to merge prior to merging with Highway 401 in order to reduce total length	<ul style="list-style-type: none">• Good traffic Level of Service operations including LOS 'A' or 'B' for all movements anticipated. Addresses geometric and operational concerns associated with existing ramps• Left-turn from northbound Palace Road to eastbound Hwy 401 required	<ul style="list-style-type: none">• Good traffic Level of Service operations including LOS 'A' or 'B' for all movements anticipated. Addresses geometric and operational concerns associated with existing ramps• Left-turn from southbound Palace Road to eastbound Hwy 401 required, with less than desirable sight distance given Palace Rd profile• Merge along eastbound on-ramp may be unfamiliar condition for some drivers and pose increased collision risk	<ul style="list-style-type: none">• Good traffic Level of Service operations including LOS 'A' or 'B' for all movements anticipated. Addresses geometric and operational concerns associated with existing ramps• Left-turn from southbound Palace Road to eastbound Hwy 401 required, with less than desirable sight distance given Palace Rd profile (although improved sight distance relative to Alt W-S-3)
	Structure Requirements	<ul style="list-style-type: none">• Construct new structure over Hwy 401 west of existing structures• Skew angle of approximately 35-40 degrees	<ul style="list-style-type: none">• Construct new structure over Hwy 401 west of existing structures• Skew angle of approximately 35-40 degrees	<ul style="list-style-type: none">• Construct new structure over Hwy 401 west of existing structures• Skew angle of approximately 35-40 degrees	<ul style="list-style-type: none">• Construct new structure over Hwy 401 west of existing structures• Skew angle of approximately 35-40 degrees




Highway 401 Interchange Improvements at Palace Road
Palace Road Interchange South Side Improvement Alternatives (Long-List) – Coarse Screening

	Palace Road Interchange Alternatives – South (Table 3: Alternatives W-S-1 to W-S-4)				
	CATEGORY	Alternative W-S-1 (Buttonhook/Parclo with Palace Road Westerly Realignment and New Underpass Structure)	Alternative W-S-2 (Standard Buttonhook with Palace Road Westerly Realignment and New Underpass Structure)	Alternative W-S-3 (Standard Buttonhook with EB Directional On- Ramp, SB Left-Turn and Palace Road Westerly Realignment and New Underpass Structure)	Alternative W-S-4 (Diamond with Palace Road Westerly Realignment and New Underpass Structure)
		anticipated for underpass structure • Widening of Napanee River bridge required	anticipated for underpass structure • Widening of Napanee River bridge required	anticipated for underpass structure • Widening of Napanee River bridge required	anticipated for underpass structure • Widening of Napanee River bridge required
	Construction Cost (Qualitative)	• High construction cost (long length of new ramps / speed change lanes, skewed/larger Palace Rd structure, widening of Napanee River bridge, barrier separated speed change lane beneath Palace Road eastbound bridge, Palace Rd realignment, some rock cut, impacts to hydro corridor due to new Palace Rd alignment/profile).	• Moderate construction cost (skewed/larger Palace Rd structure, widening of Napanee River bridge, speed change lane beneath Palace Road bridge, Palace Rd realignment, impacts to hydro corridor due to new Palace Rd alignment/profile)	• Moderate construction cost (skewed/larger Palace Road structure, widening of Napanee River bridge, southbound left-turn on Palace Road bridge, Palace Rd realignment, impacts to hydro corridor due to new Palace Rd alignment/profile)	• Moderate construction cost (skewed/larger Palace Road structures, widening of Napanee River bridge, southbound left-turn on Palace Road bridge, Palace Rd realignment, impacts to hydro corridor due to new Palace Rd alignment/profile)
ENVIRONMENTAL CRITERIA (FOOTPRINT IMPACTS)	Socio-Economic Impacts	• Impacts / partial re-construction of Palace Village driveway and residential entrances • Significant impacts to residential property adjacent to EB off-ramp (potential displacement)	• Impacts / partial re-construction of Palace Village driveway and residential entrances • Ramp terminal located adjacent to residential properties	• Impacts / partial re-construction of Palace Village driveway and residential entrances • Ramp terminal located adjacent to residential properties	• Impacts / partial re-construction of Palace Village driveway and residential entrances Minor property encroachment south of Palace Road
	Natural Environment Impacts	• Eastbound off-ramp across Napanee River results in minor floodplain and potential fisheries impacts • Impacts to woodlot in southeast quadrant • Minor vegetation removal in southwest quadrant	• Eastbound off-ramp across Napanee River results in minor floodplain and potential fisheries impacts • Minor vegetation removal in southwest quadrant	• Eastbound off-ramp across Napanee River results in minor floodplain and potential fisheries impacts • Impacts to woodlot in southeast quadrant • Minor vegetation removal in southwest quadrant	• Eastbound off-ramp across Napanee River results in minor floodplain and potential fisheries impacts
	Cultural Heritage Impacts	• Moderate to high potential for archaeological impacts given impacts to woodlot and widening across Napanee River	• Moderate potential for archaeological impacts given widening across Napanee River	• Moderate potential for archaeological impacts given widening across Napanee River	• Moderate potential for archaeological impacts given widening across Napanee River
SCREENING SUMMARY	KEY ADVANTAGES	• No left-turns required to access Hwy 401 - directional ramps for all movements (although directional on-ramps not necessary to provide adequate operations) • Minimizes impacts to woodlot and rock cut in SE quadrant • Low-Moderate complexity of construction staging	• Minimizes impacts to woodlot and rock cut in SE quadrant • Low-Moderate complexity of construction staging • Moderate construction cost	• Minimizes impacts to woodlot and rock cut in SE quadrant • Low-Moderate complexity of construction staging • Moderate construction cost	• Minimizes impacts to woodlot and rock cut in SE quadrant • Low-Moderate complexity of construction staging • Moderate construction cost
	KEY DISADVANTAGES	• Widening of Napanee River bridge • Two on-ramp speed change lanes required (with increased length given upgrade along Highway 401) • Impacts to existing residential and commercial entrances • Relatively high skew angle required for Palace Road replacement structures • High skew angle for underpass requires post tensioned structure which increases cost and vertical clearance requirements during	• Widening of Napanee River bridge • Impacts to existing residential and commercial entrances • Relatively high skew angle required for Palace Road replacement structures • High skew angle for underpass requires post tensioned structure which increases cost and vertical clearance requirements during construction • Potential impacts to hydro corridor due to new Palace Rd alignment/profile	• Widening of Napanee River bridge • Merge along EB on-ramps may be unfamiliar condition for some drivers and pose increased collision risk • Less than desirable sight distance to southbound left-turn • Impacts to existing residential and commercial entrances • Relatively high skew angle required for Palace Road replacement structures • High skew angle for underpass requires post	• Widening of Napanee River bridge • Impacts to existing residential and commercial entrances and minor property encroachment south of Palace Road • Relatively high skew angle required for Palace Road replacement structures • High skew angle for underpass requires post tensioned structure which increases cost and vertical clearance requirements during construction • Potential impacts to hydro corridor due to new

Highway 401 Interchange Improvements at Palace Road
Palace Road Interchange South Side Improvement Alternatives (Long-List) – Coarse Screening

	Palace Road Interchange Alternatives – South (Table 3: Alternatives W-S-1 to W-S-4)				
	CATEGORY	Alternative W-S-1 (Buttonhook/Parclo with Palace Road Westerly Realignment and New Underpass Structure)	Alternative W-S-2 (Standard Buttonhook with Palace Road Westerly Realignment and New Underpass Structure)	Alternative W-S-3 (Standard Buttonhook with EB Directional On- Ramp, SB Left-Turn and Palace Road Westerly Realignment and New Underpass Structure)	Alternative W-S-4 (Diamond with Palace Road Westerly Realignment and New Underpass Structure)
		construction. • Potential impacts to hydro corridor due to new Palace Rd alignment/profile • High construction cost		tensioned structure which increases cost and vertical clearance requirements during construction. • Potential impacts to hydro corridor due to new Palace Rd alignment/profile	Palace Rd alignment/profile
	Recommendation	DO NOT CARRY FORWARD	CARRY FORWARD	DO NOT CARRY FORWARD	CARRY FORWARD
	Rationale	While alternative addresses geometric and operational concerns associated with existing ramps, other alternatives provide the same or similar level of service and operations with lower overall impacts and at a lower cost	Addresses geometric and operational concerns associated with existing ramps at a moderate construction cost and with relatively minor property impacts	While alternative addresses geometric and operational concerns associated with existing ramps, merge condition and geometrics along eastbound on-ramps are not ideal and may pose increased safety and collision risk	Addresses geometric and operational concerns associated with existing ramps at a moderate construction cost and with relatively minor property and environmental impacts

Highway 401 Interchange Improvements at Palace Road
Palace Road Interchange South Side Improvement Alternatives (Long-List) – Coarse Screening

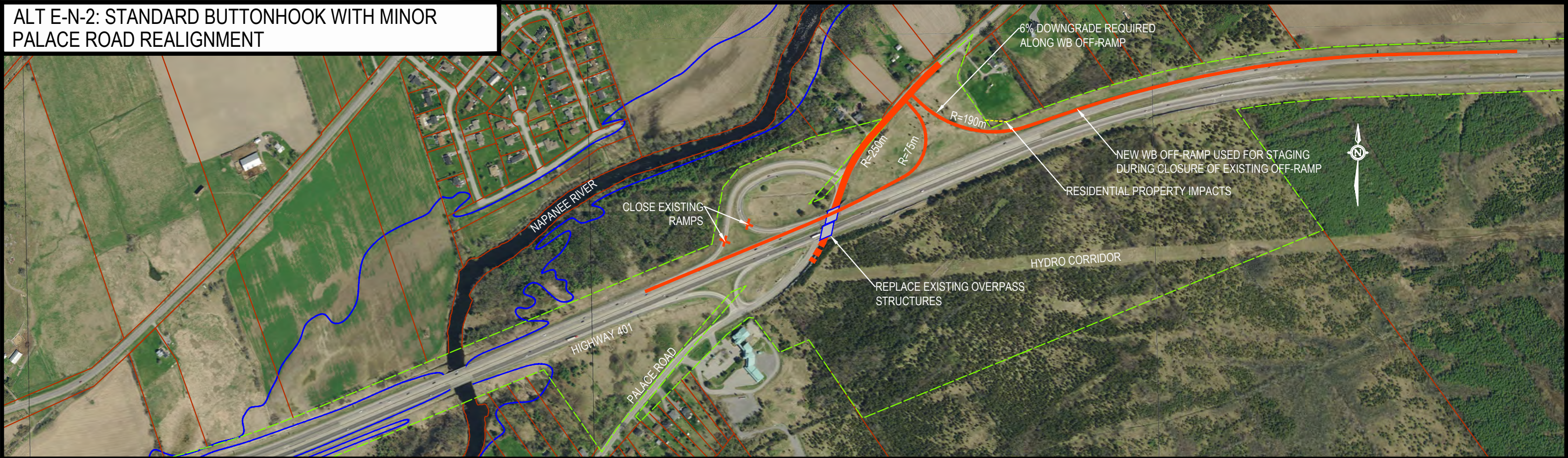
	Palace Road Interchange Alternatives – South (Table 4: Alternatives W-S-5 to W-S-7)			
	CATEGORY	Alternative W-S-5 (Diamond with Roundabout and Palace Road Westerly Realignment and New Underpass Structure)	Alternative W-S-6 (Parclo B with Palace Road Westerly Realignment and New Underpass Structure)	Alternative W-S-7 (Parclo B with Roundabout and Palace Road Westerly Realignment and New Underpass Structure)
ALTERNATIVE OVERVIEW	Description	<ul style="list-style-type: none">• Eastbound diamond off-ramp into roundabout• Eastbound on-ramp from roundabout• Realign Palace Road to the west at Highway 401 crossing and construct new underpass structure with reduced skew angle• Remove existing Palace Road structures	<ul style="list-style-type: none">• Eastbound Parclo B off-ramp to westerly realignment of Palace Road• Eastbound on-ramp from Palace Road (Left-turn from southbound Palace Road)• Left-turn from southbound Palace Road to eastbound on-ramp• Realign Palace Road to the west at Highway 401 crossing and construct new underpass structure• Remove existing Palace Road structures	<ul style="list-style-type: none">• Eastbound Parclo B off-ramp into roundabout• Eastbound on-ramp from roundabout• Realign Palace Road to the west at Highway 401 crossing and construct new underpass structure with reduced skew angle• Remove existing Palace Road structures
	Schematic			
	Recommendation	CARRY FORWARD	DO NOT CARRY FORWARD	CARRY FORWARD
TECHNICAL SCREENING CRITERIA	Construction Staging	<ul style="list-style-type: none">• Moderate complexity of staging<ul style="list-style-type: none">○ Grade raise required along Palace Road approaching roundabout and new structure (temporary closure / realignment of existing ramps and Palace Road potentially required)○ New structure can be constructed over Hwy 401 with relatively minor impacts to highway traffic	<ul style="list-style-type: none">• Low-Moderate complexity of staging<ul style="list-style-type: none">○ New structure can be constructed over Hwy 401 with relatively minor impacts to traffic○ Grade raise required along Palace Road approaching new structure may require temporary closure / realignment of existing ramps and Palace Road○ Rock cut required for eastbound off and on-ramps	<ul style="list-style-type: none">• Moderate complexity of staging<ul style="list-style-type: none">○ Grade raise required along Palace Road approaching roundabout and new structure (temporary closure / realignment of existing ramps and Palace Road potentially required)○ New structure can be constructed over Hwy 401 with relatively minor impacts to highway traffic○ Major rock cut required for eastbound off and on-ramps
	Traffic Operations (including Geometrics and Safety)	<ul style="list-style-type: none">• Good traffic Level of Service operations anticipated through roundabout in short and long-term, with no notable operational concerns anticipated• Addresses geometric and operational concerns associated with existing ramps	<ul style="list-style-type: none">• Good interchange operations anticipated• Addresses geometric and operational concerns associated with existing ramps• Left-turn from southbound Palace Road to eastbound Hwy 401 required• Ramp terminal intersection located on a horizontal curve with less than desirable sight distance given proximity to structures	<ul style="list-style-type: none">• Good traffic Level of Service operations anticipated through roundabout in short and long-term, with no notable operational concerns anticipated• Addresses geometric and operational concerns associated with existing ramps
	Structure Requirements	<ul style="list-style-type: none">• Construct new structure over Hwy 401 west of existing structures• Skew angle of approximately 20 degrees anticipated for underpass structure• Widening of Napanee River bridge required	<ul style="list-style-type: none">• Construct new structure over Hwy 401 west of existing structures• Skew angle of approximately 35-40 degrees anticipated for underpass structure	<ul style="list-style-type: none">• Construct new structure over Hwy 401 west of existing structures• Skew angle of approximately 20 degrees anticipated for underpass structure

Highway 401 Interchange Improvements at Palace Road
Palace Road Interchange South Side Improvement Alternatives (Long-List) – Coarse Screening

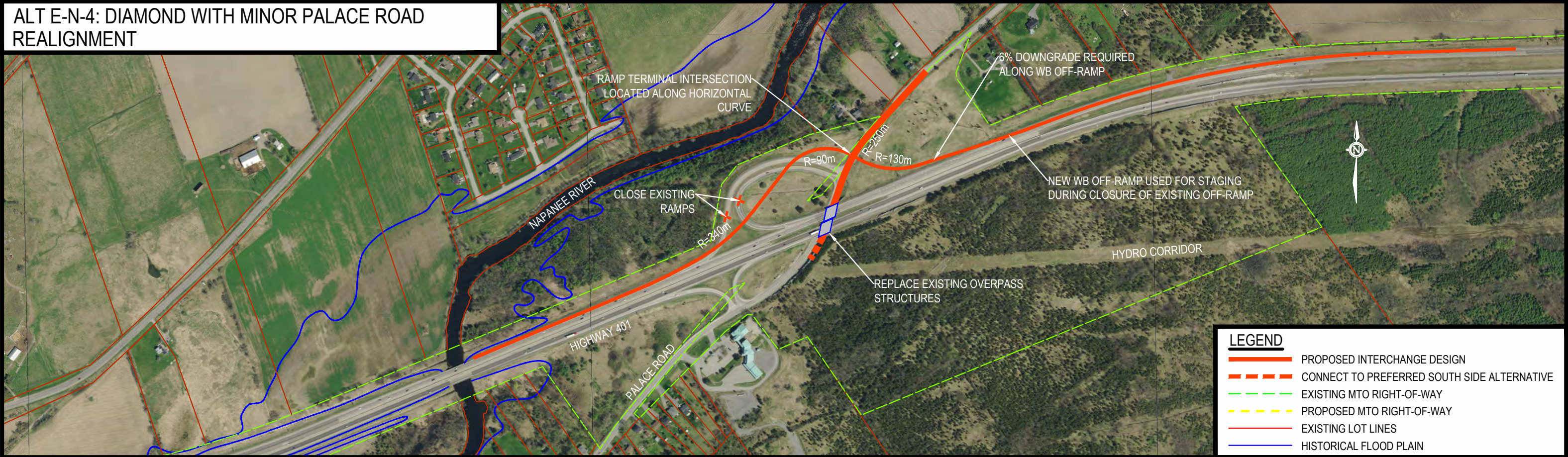
	Palace Road Interchange Alternatives – South (Table 4: Alternatives W-S-5 to W-S-7)			
	CATEGORY	Alternative W-S-5 (Diamond with Roundabout and Palace Road Westerly Realignment and New Underpass Structure)	Alternative W-S-6 (Parclo B with Palace Road Westerly Realignment and New Underpass Structure)	Alternative W-S-7 (Parclo B with Roundabout and Palace Road Westerly Realignment and New Underpass Structure)
	Construction Cost (Qualitative)	<ul style="list-style-type: none">• Low-Moderate construction cost (reduced skew angle of Palace Road structure relative to other options, widening of Napanee River bridge, southbound left-turn on Palace Road bridge, Palace Rd realignment, impacts to hydro corridor due to new Palace Rd alignment/profile)	<ul style="list-style-type: none">• High construction cost (long length of new ramps, skewed/larger Palace Road structure, off-ramp speed change lane beneath new structure, Palace Rd realignment, some rock cut, impacts to hydro corridor due to new Palace Rd alignment/profile)	<ul style="list-style-type: none">• Moderate construction cost (long length of new ramps, reduced skew angle of Palace Road structure relative to other options, off-ramp speed change lane beneath new structure, Palace Rd realignment, major rock cut, potential impacts to hydro corridor due to new Palace Rd alignment/profile)
ENVIRONMENTAL CRITERIA (FOOTPRINT)	Socio-Economic Impacts	<ul style="list-style-type: none">• Impacts / partial re-construction of Palace Village driveway and residential entrances• Minor property encroachment south of Palace Road	<ul style="list-style-type: none">• Displacement of Palace Village and impacts to residential entrances	<ul style="list-style-type: none">• Impacts / partial re-construction of Palace Village driveway and residential entrances• Property encroachment south of Palace Road
	Natural Environment Impacts	<ul style="list-style-type: none">• Eastbound off-ramp across Napanee River results in minor floodplain and potential fisheries impacts	<ul style="list-style-type: none">• Impacts to woodlot in southeast quadrant	<ul style="list-style-type: none">• Significant impacts to woodlot in southeast quadrant
	Cultural Heritage Impacts	<ul style="list-style-type: none">• Moderate potential for archaeological impacts given widening across Napanee River	<ul style="list-style-type: none">• Moderate to high potential for archaeological impacts given encroachment into southeast quadrant woodlot	<ul style="list-style-type: none">• Moderate to high potential for archaeological impacts given encroachment into southeast quadrant woodlot
SCREENING SUMMARY	KEY ADVANTAGES	<ul style="list-style-type: none">• Minimizes impacts to woodlot and rock cut in SE quadrant• Reduced skew angle of replacement structure (shorter bridge)• Reduced risk of severe collisions through roundabout• Low-moderate construction cost	<ul style="list-style-type: none">• Avoids widening of Napanee River bridge• Low-Moderate complexity of construction staging	<ul style="list-style-type: none">• Avoids widening of Napanee River bridge• Reduced skew angle of replacement structure (shorter bridge)• Reduced risk of severe collisions through roundabout• Moderate construction cost
	KEY DISADVANTAGES	<ul style="list-style-type: none">• Widening of Napanee River bridge• Moderate complexity of construction staging• Roundabouts less compatible with LCVs as compared with traditional intersections• Impacts to existing residential and commercial entrances and minor property encroachment south of Palace Road• Potential impacts to hydro corridor due to new Palace Rd alignment/profile	<ul style="list-style-type: none">• High construction cost• Displaces Palace Village• Impacts to woodlot and some rock cut in SE quadrant• Impacts to existing residential entrances• Relatively high skew angle required for Palace Road replacement structures• High skew angle for underpass requires post tensioned structure which increases cost and vertical clearance requirements during construction.• Potential impacts to hydro corridor due to new Palace Rd alignment/profile• B-loop off-ramp less desirable than other ramps	<ul style="list-style-type: none">• Significant impacts to woodlot and major rock cut in SE quadrant• Moderate complexity of construction staging• Roundabouts less compatible with LCVs as compared with traditional intersections• Impacts to existing residential and commercial entrances and property encroachment south of Palace Road• Potential impacts to hydro corridor due to new Palace Rd alignment/profile• B-loop off-ramp less desirable than other ramps
	Recommendation	CARRY FORWARD	DO NOT CARRY FORWARD	CARRY FORWARD
	Rationale	Reduced skew angle of structure simplifies construction and reduces cost, with acceptable operations anticipated through roundabout	While alternative addresses geometric and operational concerns associated with existing ramps and avoids widening of the Napanee River bridge, other alternatives achieve the same objectives with lower overall impacts and at a lower cost	While a B-loop off-ramp is less desirable than other ramps, the reduced skew angle of structure simplifies construction and reduces cost, while the alternative avoids impacts to the Napanee River and addresses geometric and operational concerns associated with existing ramps

Appendix D - Highway 401 Interchange Improvements Short List of Alternatives

ALT E-N-2: STANDARD BUTTONHOOK WITH MINOR
PALACE ROAD REALIGNMENT



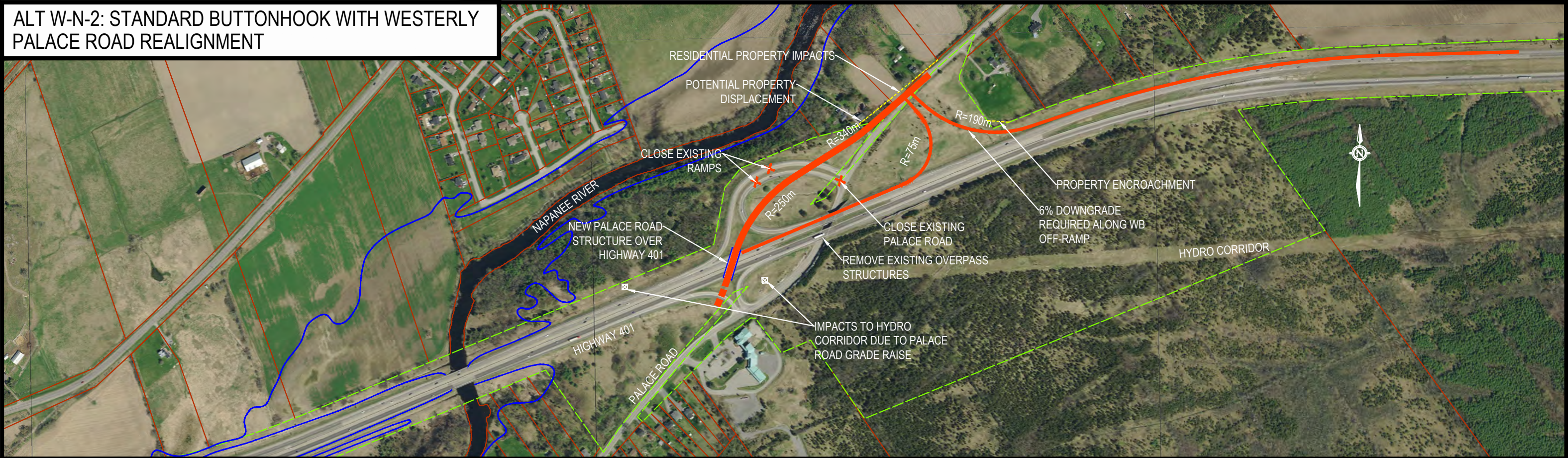
ALT E-N-4: DIAMOND WITH MINOR PALACE ROAD
REALIGNMENT



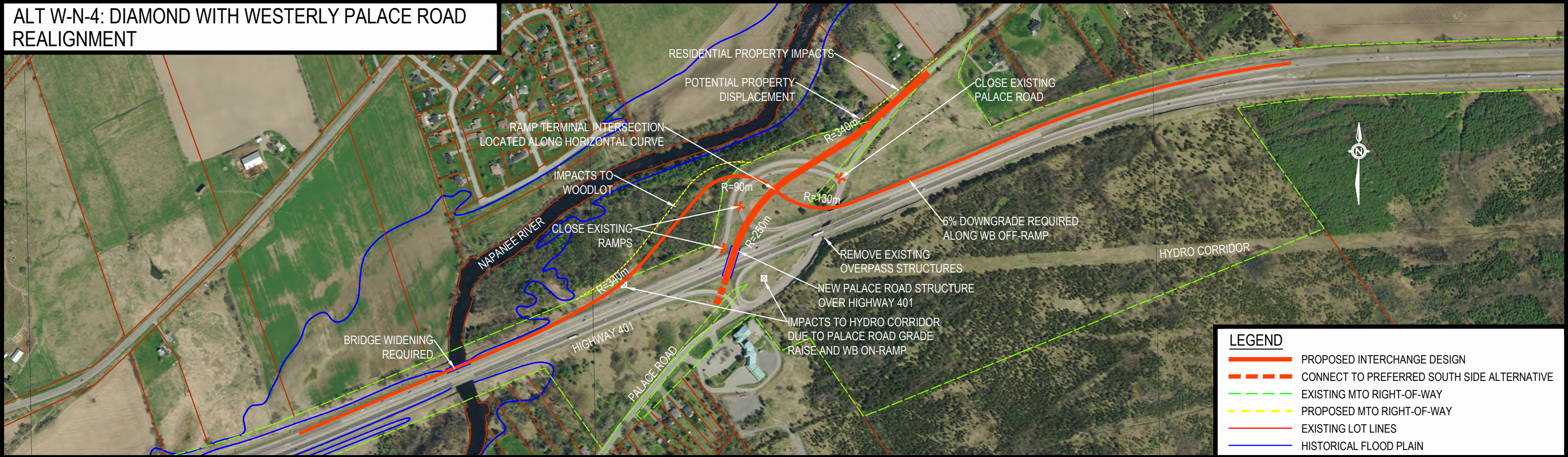
LEGEND

- PROPOSED INTERCHANGE DESIGN
- CONNECT TO PREFERRED SOUTH SIDE ALTERNATIVE
- EXISTING MTO RIGHT-OF-WAY
- PROPOSED MTO RIGHT-OF-WAY
- EXISTING LOT LINES
- HISTORICAL FLOOD PLAIN

ALT W-N-2: STANDARD BUTTONHOOK WITH WESTERLY
PALACE ROAD REALIGNMENT



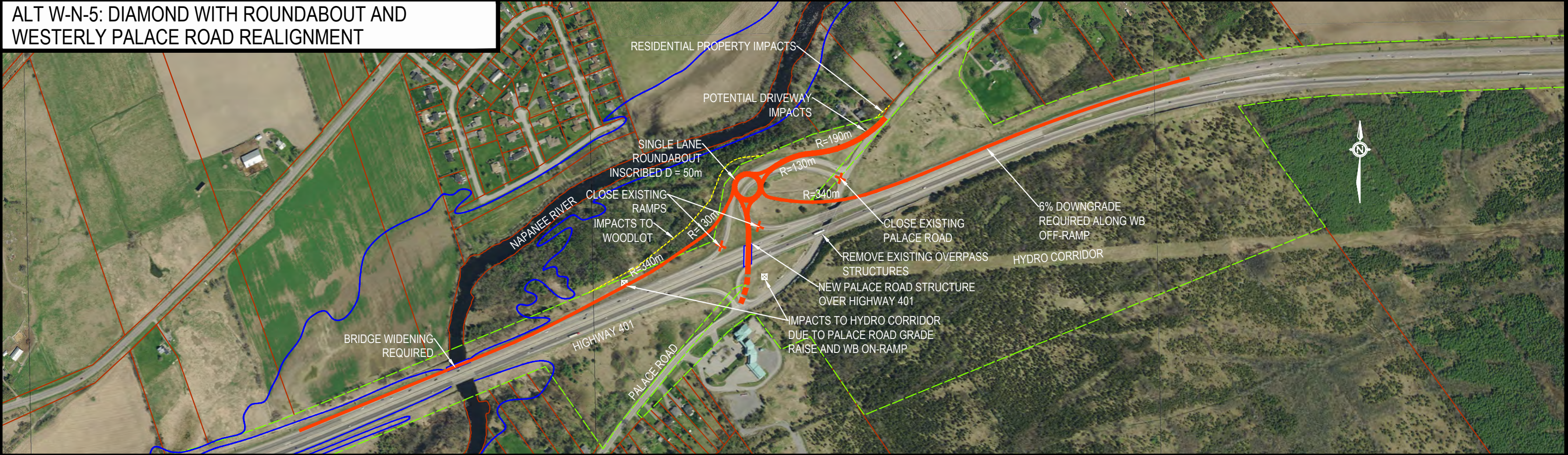
ALT W-N-4: DIAMOND WITH WESTERLY PALACE ROAD
REALIGNMENT



LEGEND

- PROPOSED INTERCHANGE DESIGN
- CONNECT TO PREFERRED SOUTH SIDE ALTERNATIVE
- EXISTING MTO RIGHT-OF-WAY
- PROPOSED MTO RIGHT-OF-WAY
- EXISTING LOT LINES
- HISTORICAL FLOOD PLAIN

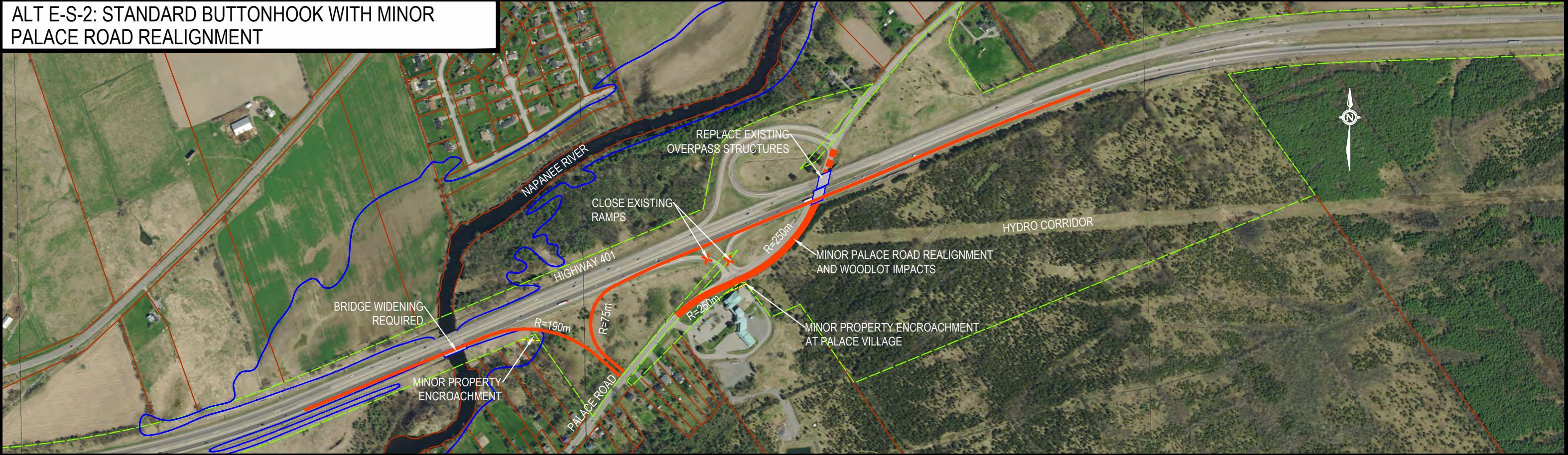
ALT W-N-5: DIAMOND WITH ROUNDABOUT AND WESTERLY PALACE ROAD REALIGNMENT



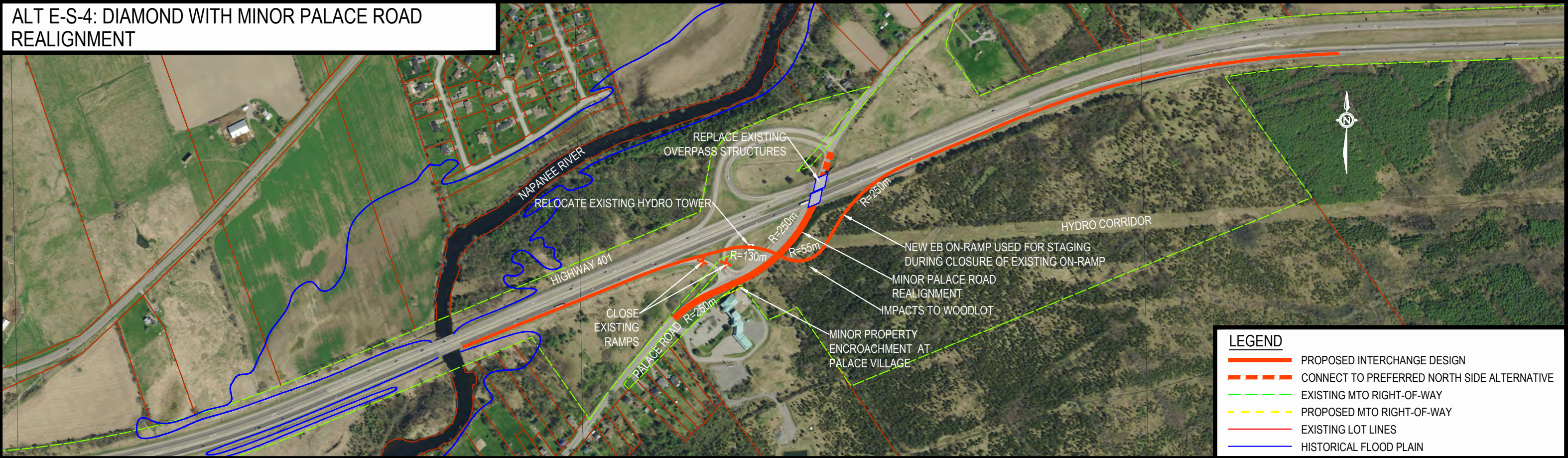
LEGEND

- PROPOSED INTERCHANGE DESIGN
- CONNECT TO PREFERRED SOUTH SIDE ALTERNATIVE
- EXISTING MTO RIGHT-OF-WAY
- PROPOSED MTO RIGHT-OF-WAY
- EXISTING LOT LINES
- HISTORICAL FLOOD PLAIN

ALT E-S-2: STANDARD BUTTONHOOK WITH MINOR
PALACE ROAD REALIGNMENT



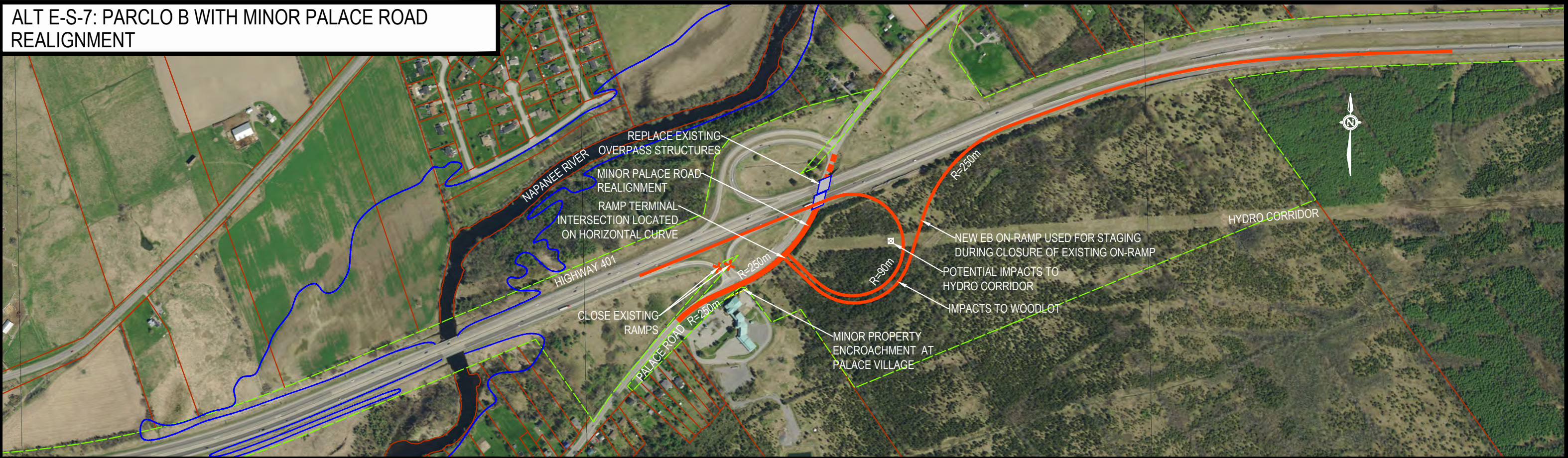
ALT E-S-4: DIAMOND WITH MINOR PALACE ROAD
REALIGNMENT



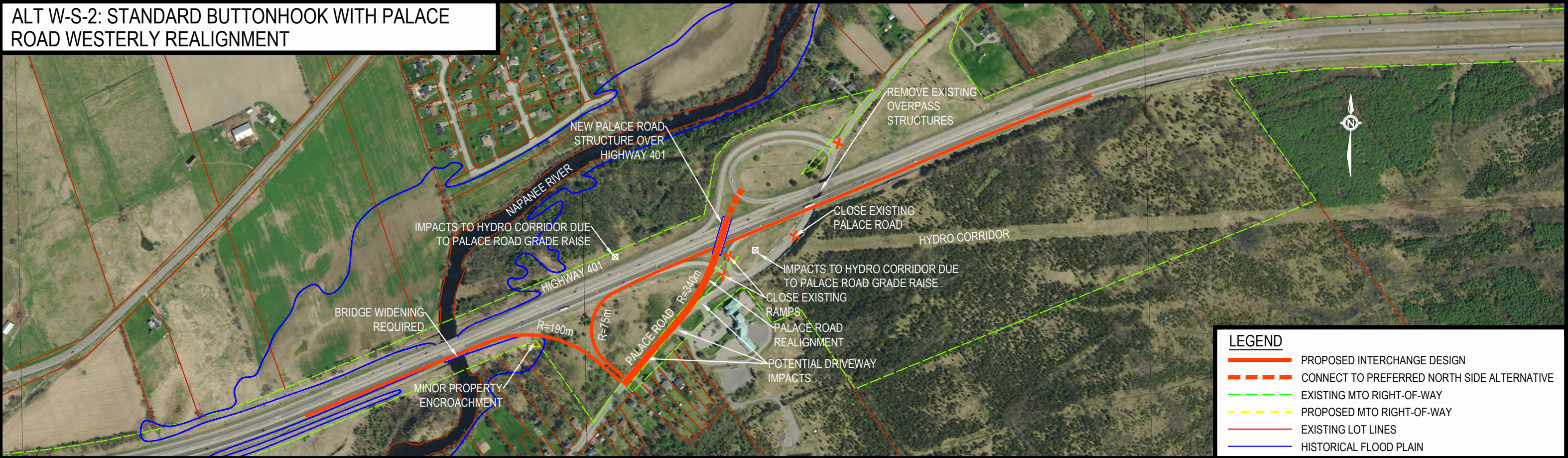
LEGEND

- PROPOSED INTERCHANGE DESIGN
- CONNECT TO PREFERRED NORTH SIDE ALTERNATIVE
- EXISTING MTO RIGHT-OF-WAY
- PROPOSED MTO RIGHT-OF-WAY
- EXISTING LOT LINES
- HISTORICAL FLOOD PLAIN

ALT E-S-7: PARCLO B WITH MINOR PALACE ROAD REALIGNMENT



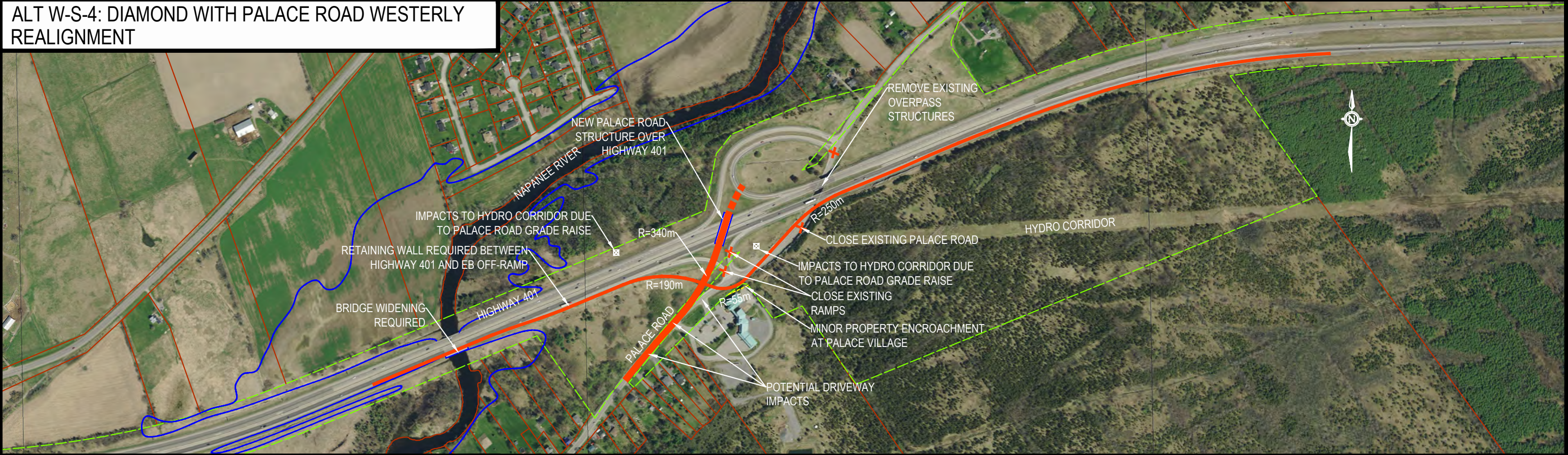
ALT W-S-2: STANDARD BUTTONHOOK WITH PALACE ROAD WESTERLY REALIGNMENT



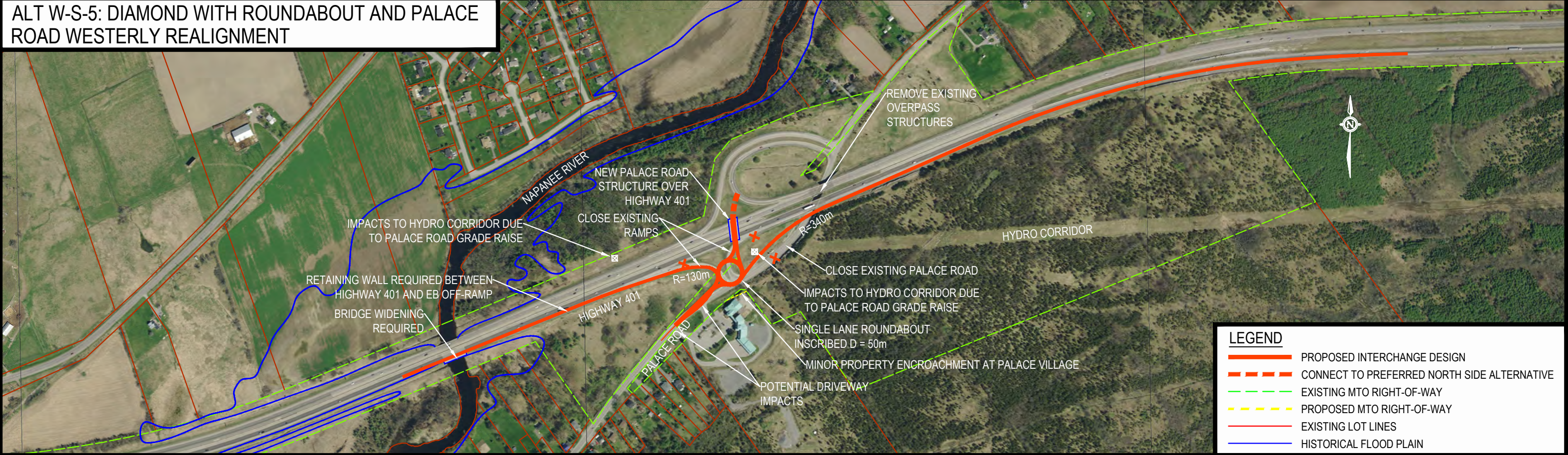
LEGEND

- PROPOSED INTERCHANGE DESIGN
- CONNECT TO PREFERRED NORTH SIDE ALTERNATIVE
- EXISTING MTO RIGHT-OF-WAY
- PROPOSED MTO RIGHT-OF-WAY
- EXISTING LOT LINES
- HISTORICAL FLOOD PLAIN

ALT W-S-4: DIAMOND WITH PALACE ROAD WESTERLY REALIGNMENT



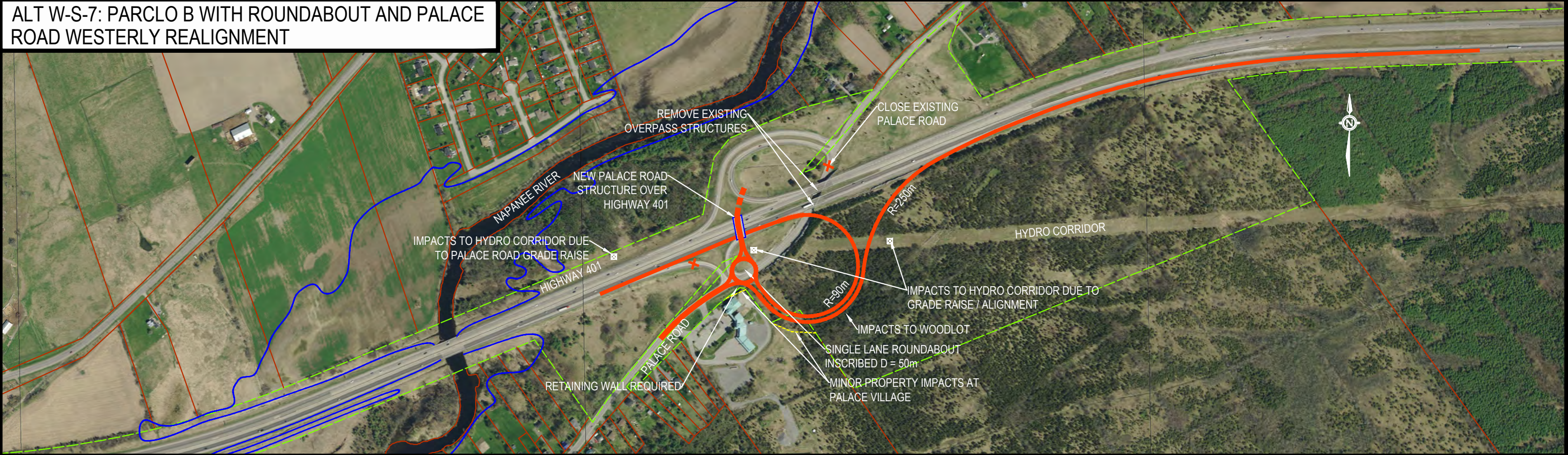
ALT W-S-5: DIAMOND WITH ROUNDABOUT AND PALACE ROAD WESTERLY REALIGNMENT



LEGEND

- PROPOSED INTERCHANGE DESIGN
- CONNECT TO PREFERRED NORTH SIDE ALTERNATIVE
- EXISTING MTO RIGHT-OF-WAY
- PROPOSED MTO RIGHT-OF-WAY
- EXISTING LOT LINES
- HISTORICAL FLOOD PLAIN

ALT W-S-7: PARCLO B WITH ROUNDABOUT AND PALACE ROAD WESTERLY REALIGNMENT



LEGEND

- PROPOSED INTERCHANGE DESIGN
- CONNECT TO PREFERRED NORTH SIDE ALTERNATIVE
- EXISTING MTO RIGHT-OF-WAY
- PROPOSED MTO RIGHT-OF-WAY
- EXISTING LOT LINES
- HISTORICAL FLOOD PLAIN

Appendix E – Short List of Alternatives Evaluation Tables

<div><div><div>5</div><div>3</div><div>1</div></div><div>→</div></div> <div>Very Good Low Complexity No/Low Impacts</div>		<div>Very Poor High Complexity High Impacts</div>		Indicator not Decision Relevant			Alt E-N-2 - Standard Buttonhook with Minor Palace Road Realignment	Alt E-N-4 - Diamond with Minor Palace Road Realignment	Alt W-N-2 - Standard Buttonhook with Westerly Palace Road Realignment	Alt W-N-4 - Diamond with Westerly Palace Road Realignment	Alt W-N-5 - Diamond with Roundabout and Westerly Palace Road Realignment
Factor	Indicator	Measure	Weighting		Description						
			Weighting By Category	Overall Weighting							
CATEGORY - TRANSPORTATION (55%)											
Traffic Operations (60%)	Critical Intersection Delays and Queuing in Peak Periods (2038 Horizon Year) (30%)	30%	Critical delays, 95th Percentile Queue Lengths, etc.	18.0%	9.9%	Description	Average intersection delay along Palace Road < 10 seconds with minimal queue lengths for all moves.	Average intersection delay along Palace Road < 10 seconds with minimal queue lengths for all moves.	Average intersection delay along Palace Road < 10 seconds with minimal queue lengths for all moves.	Average intersection delay along Palace Road < 10 seconds with minimal queue lengths for all moves.	Average intersection delay along Palace Road < 10 seconds with minimal queue lengths for all moves.
						Measure	Delay < 10 s, Queues < 10 m	Delay < 10 s, Queues < 10 m	Delay < 10 s, Queues < 10 m	Delay < 10 s, Queues < 10 m	Delay < 10 s, Queues < 10 m
						Score (/5)	5	5	5	5	5
						Weighted Score	9.9	9.9	9.9	9.9	9.9
	Truck Operations (including Long Combination Vehicles) through Interchange (10%)	10%	Very Poor (1) to Very Good (5)	6.0%	3.3%	Description	No notable operational concerns anticipated with truck traffic (including Long Combination Vehicles) at interchange.	No notable operational concerns anticipated with truck traffic (including Long Combination Vehicles) at interchange.	No notable operational concerns anticipated with truck traffic (including Long Combination Vehicles) at interchange.	No notable operational concerns anticipated with truck traffic (including Long Combination Vehicles) at interchange.	Truck traffic (including potential for Long Combination Vehicles) for northbound left-turn movement to enter WB Hwy 401 and other maneuvers may result in additional delays through roundabout.
						Measure	Very Good	Very Good	Very Good	Very Good	Moderate
						Score (/5)	5	5	5	5	3
						Weighted Score	3.3	3.3	3.3	3.3	2.0
	Impacts to Existing Traffic during Construction (15%)	15%	High Impacts (1) to Low Impacts (5)	9.0%	5.0%	Description	Reduction to single lane anticipated along Palace Road during construction/bridge replacements (with temporary traffic signals). Two westbound lanes can be maintained along Highway 401 but minor temporary widening of Palace Road structure and median cross-overs required. New westbound off-ramp can be utilized for staging during closure of existing westbound off-ramp.	Reduction to single lane anticipated along Palace Road during construction/bridge replacements (with temporary traffic signals). Two westbound lanes can be maintained along Highway 401 but minor temporary widening of Palace Road structure and median cross-overs required. New westbound off-ramp can be utilized for staging during closure of existing westbound off-ramp.	New structure can be constructed over Hwy 401 with relatively minor impacts to Highway 401 and Palace Road traffic. New westbound off-ramp and on-ramps can be utilized for staging during closure of existing ramps.	New structure can be constructed over Hwy 401 with relatively minor impacts to Highway 401 and Palace Road traffic. Temporary closure of westbound on and off-ramps anticipated during construction.	New structure can be constructed over Hwy 401 with relatively minor impacts to Highway 401 and Palace Road traffic. Temporary closure of westbound on and off-ramps anticipated during construction.
						Measure	Moderate	Moderate	Low	Low-Moderate	Low-Moderate
						Score (/5)	3	3	5	3.5	3.5
						Weighted Score	3.0	3.0	5.0	3.5	3.5
	Impacts to Future Traffic during Construction (e.g. Future Bridge Replacement or Rehabilitations) (35%)	35%	High Impacts (1) to Low Impacts (5)	21.0%	11.6%	Description	Future rehabilitations of Palace Road structures and/or widening of Highway 401 (anticipated within 20-25 years) may require temporary lane reductions along Highway 401 and ramp closures.	Future rehabilitations of Palace Road structures and/or widening of Highway 401 (anticipated within 20-25 years) may require temporary lane reductions along Highway 401 and ramp closures.	Future rehabilitations of Palace Road structure over Highway 401 and/or widening of Highway 401 (anticipated within 20-25 years) can generally be undertaken with minimal lane reductions or impacts to Highway 401 traffic operations	Future rehabilitations of Palace Road structure over Highway 401 and/or widening of Highway 401 (anticipated within 20-25 years) can generally be undertaken with minimal lane reductions or impacts to Highway 401 traffic operations. Future rehabilitation of Napanee River bridge will likely require closure of westbound on-ramp.	Future rehabilitations of Palace Road structure over Highway 401 and/or widening of Highway 401 (anticipated within 20-25 years) can generally be undertaken with minimal lane reductions or impacts to Highway 401 traffic operations. Future rehabilitation of Napanee River bridge will likely require closure of westbound on-ramp.
						Measure	Moderate-High	Moderate-High	Low	Low-Moderate	Low-Moderate
						Score (/5)	2.0	2.0	5.0	4.0	4.0
						Weighted Score	4.6	4.6	11.6	9.2	9.2
	Flexibility for Future Interchange Expansion/Upgrades (10%)	10%	Very Poor (1) to Very Good (5)	6.0%	3.3%	Description	Interchange can be modified in future to accommodate future growth and expansion (beyond 25-year horizon period) if necessary, including signalization of intersection.	Future interchange upgrades or expansion to accommodate future growth (beyond 25-year horizon period) if necessary would likely require re-construction of westbound ramps, and installation of traffic signals at later date undesirable given intersection location along horizontal curve and proximity to Highway 401 structure.	Interchange can be modified in future to accommodate future growth and expansion (beyond 25-year horizon period) if necessary, including signalization of intersection.	Future interchange upgrades or expansion to accommodate future growth (beyond 25-year horizon period) if necessary would likely require re-construction of westbound ramps, and installation of traffic signals at later date undesirable given intersection location along horizontal curve and proximity to Highway 401 structure.	Future interchange upgrades or expansion to accommodate future growth (beyond 25-year horizon period) if necessary would likely require partial re-construction of roundabout and interchange ramps
						Measure	Good	Poor	Good	Poor	Poor
						Score (/5)	4	2	4	2	2
						Weighted Score	2.6	1.3	2.6	1.3	1.3
Safety and Geometrics (40%)	Conflicts due to Turning and Weaving Traffic (45%)	45%	High Impacts (1) to Low Impacts (5)	18.0%	9.9%	Description	Southbound left-turn to access westbound Highway 401 increases potential collision risk relative to directional movements.	Northbound left-turn to access westbound Highway 401 increases potential collision risk relative to directional movements.	Southbound left-turn to access westbound Highway 401 increases potential collision risk relative to directional movements.	Northbound left-turn to access westbound Highway 401 increases potential collision risk relative to directional movements.	Roundabouts considered to minimize potential conflict points and reduce severity of collisions relative to standard intersection.
						Measure	Low-Moderate	Low-Moderate	Low-Moderate	Low-Moderate	Low
						Score (/5)	4	4	4	4	5
						Weighted Score	7.9	7.9	7.9	7.9	9.9
	Horizontal/Vertical Geometrics and Sight Distance (40%)	40%	Very Poor (1) to Very Good (5)	16.0%	8.8%	Description	Good overall interchange geometrics with adequate sight distances at ramp terminal intersection. Westbound off- ramp requires 6% downgrade approaching Palace Road.	Good overall interchange geometrics, although ramp terminal intersection located on a horizontal curve with less than desirable turning sight distance (approx. 200m) given proximity to Highway 401 structures. Westbound off-ramp requires 6% downgrade approaching Palace Road.	Good overall interchange geometrics with adequate sight distances at ramp terminal intersection. Westbound off- ramp requires 6% downgrade approaching Palace Road.	Good overall interchange geometrics. North ramp terminal intersection located on horizontal curve and in proximity to vertical crest curve over Highway 401 is undesirable and reduces available turning sight distance at ramp terminal intersection.	Good overall interchange geometrics, though unequal distribution of four approach legs through roundabout is less than ideal and may result in unequal speed distribution and line of sight concerns through the roundabout.
						Measure	Good	Fair	Good	Fair	Fair
						Score (/5)	4	3	4	3	3
						Weighted Score	7.0	5.3	7.0	5.3	5.3
	Driver Expectation (e.g. Intuitive directions and signage through interchange/intersection) (15%)	15%	Very Poor (1) to Very Good (5)	6.0%	3.3%	Description	Standard interchange configuration with relatively intuitive directions and signage	Standard interchange configuration with relatively intuitive directions and signage	Standard interchange configuration with relatively intuitive directions and signage	Standard interchange configuration with relatively intuitive directions and signage	Roundabouts at ramp terminal intersections relatively unique condition for drivers on MTO freeway facilities, with slightly more complex signage (driver perception and processing) and less intuitive design
						Measure	Good	Good	Good	Good	Fair
						Score (/5)	4	4	4	4	3
						Weighted Score	2.64	2.64	2.64	2.64	1.98
Score for Transportation Category (Out of 5)							3.73	3.45	4.54	3.92	3.92
Overall Weighted Score for Transportation Category (Out of 50)							41.03	37.95	49.94	43.07	43.07
CATEGORY - NATURAL ENVIRONMENT (15%)											
Fish and Fish Habitat (35%)	Impacts to fish and fisheries habitat (100%)	100%	High Impacts (1) to Low Impacts (5)	35.0%	5.3%	Description	No impacts to fish and fish habitat anticipated	No impacts to fish and fish habitat anticipated	No impacts to fish and fish habitat anticipated. Palace Road realignment crosses over seasonal ditch / watercourse located in northwest quadrant of existing interchange.	Westbound on-ramp extends across Napanee River bridge and requires widening of structure. Potential fisheries impacts include increased erosion potential, sedimentation of the watercourse, temporary loss of riparian vegetation, change in contaminant concentrations and temporary displacement of fish. Residual impacts can likely be avoided using appropriate mitigation measures however DFO review and approvals under the Endangered Species Act likely required due to in-water works and the potential presence of American Eel in the Napanee River. Palace Road realignment and new ramps also cross over seasonal ditch / watercourse located in northwest quadrant of existing interchange, as well as edge impacts to existing wetland.	Westbound on-ramp extends across Napanee River bridge and requires widening of structure. Potential fisheries impacts include increased erosion potential, sedimentation of the watercourse, temporary loss of riparian vegetation, change in contaminant concentrations and temporary displacement of fish. Residual impacts can likely be avoided using appropriate mitigation measures however DFO review and approvals under the Endangered Species Act likely required due to in-water works and the potential presence of American Eel in the Napanee River. Palace Road realignment and new ramps also cross over seasonal ditch / watercourse located in northwest quadrant of existing interchange.
						Measure	Low Impacts	Low Impacts	Low Impacts	Moderate Impacts	Moderate Impacts
						Score (/5)	5	5	4.5	3	3
						Weighted Score	5.3	5.3	4.7	3.2	3.2

5 Very Good Low Complexity No/Low Impacts		3	1 Very Poor High Complexity High Impacts		Indicator not Decision Relevant		Alt E-N-2 - Standard Buttonhook with Minor Palace Road Realignment	Alt E-N-4 - Diamond with Minor Palace Road Realignment	Alt W-N-2 - Standard Buttonhook with Westerly Palace Road Realignment	Alt W-N-4 - Diamond with Westerly Palace Road Realignment	Alt W-N-5 - Diamond with Roundabout and Westerly Palace Road Realignment
Factor	Indicator		Measure	Weighting Weighting By CategoryOverall Weighting		Description					
Terrestrial Habitat (40%)	Area of woodlot / forest community impacts (70%)	70%	ha	28.0%	4.2%	Description	Minor edge impact to approx. 0.5 ha of existing Mixed Forest Community in northeast quadrant of interchange which may provide suitable Bat Species at Risk habitat.	No impact to woodlots anticipated	Minor edge impact to approx. 0.5 ha of existing Mixed Forest Community in northeast quadrant of interchange which may provide suitable Bat Species at Risk habitat.	Impacts to approx. 1.7 ha of woodlot in northwest quadrant that is part of the Mixed Forest community and has potential to provide habitat for Eastern Wood-Pewee, Eastern Whip-Poor-Will and Wood Thrush (SAR) although none were observed during field investigations. Woodlot may also provide suitable Bat Species at Risk habitat.	Impacts to approx. 0.6 ha of woodlot in northwest quadrant that is part of the Mixed Forest community and has potential to provide habitat for Eastern Wood-Pewee, Eastern Whip-Poor-Will and Wood Thrush (SAR) although none were observed during field investigations. Woodlot may also provide suitable Bat Species at Risk habitat.
						Measure	0.5 ha	0 ha	0.5 ha	1.7 ha	0.6 ha
						Score (/5)	4	5	4	3	4
						Weighted Score	3.4	4.2	3.4	2.5	3.4
	Area of non-woodlot vegetation impacts (30%)	30%	ha	12.0%	1.8%	Description	Approx. 2.8 ha vegetation removal in northeast quadrant which includes a Cultural Meadow community and has potential to provide habitat for Bobolink and Eastern Meadowlark (SAR) although none were observed during field investigations.	Approx. 1.8 ha vegetation removal in northeast and northwest quadrant which includes a Cultural Meadow community and has potential to provide habitat for Bobolink and Eastern Meadowlark (SAR) although none were observed during field investigations.	Approx. 3.3 ha vegetation removal in northeast quadrant including vegetation adjacent to the existing roadway and a Cultural Meadow community with potential to provide habitat for Bobolink and Eastern Meadowlark (SAR), although none were observed during field investigations.	Approx. 1.2 ha vegetation removal in northeast quadrant including vegetation / Cultural Meadow community adjacent to the existing roadway.	Approx. 1.0 ha vegetation removal in northeast quadrant which includes a Cultural Meadow community and has potential to provide habitat for Bobolink and Eastern Meadowlark (SAR) although none were observed during field investigations.
						Measure	2.8 ha	1.8 ha	3.3 ha	1.2 ha	1.0 ha
						Score (/5)	3	4	3	4	4
						Weighted Score	1.1	1.4	1.1	1.4	1.4
Groundwater (25%)	Susceptibility to construction activities (100%)	100%	High Impacts (1) to Low Impacts (5)	25.0%	3.8%	Description	This alternative has the potential to impact three domestic water wells in the northeast quadrant of the interchange	This alternative has the potential to impact one domestic water well in the northeast quadrant of the interchange	This alternative has the potential to impact three domestic water wells in the northeast quadrant of the interchange.	This alternative has potential to impact one domestic water well in the northeast quadrant of the interchange, while construction of westbound on-ramp across Napanee River may result in additional impacts groundwater resources.	This alternative has potential to impact one domestic water well in the northeast quadrant of the interchange, while construction of westbound on-ramp across Napanee River may result in additional impacts groundwater resources.
						Measure	Low-Moderate Impacts	Low Impacts	Low-Moderate Impacts	Moderate Impacts	Moderate Impacts
						Score (/5)	4	4.5	4	3	3
						Weighted Score	3.0	3.4	3.0	2.3	2.3
Score for Natural Environment Category (Out of 5)							4.23	4.76	4.06	3.12	3.40
Overall Weighted Score for Natural Environment Category (Out of 15)							12.69	14.27	12.17	9.36	10.20
CATEGORY - SOCIO-ECONOMIC ENVIRONMENT (12.5%)											
Noise (10%)	Impact to noise sensitive receivers (100%)	100%	High Impacts (1) to Low Impacts (5)	10.0%	1.5%	Description	Ramp terminal intersection located adjacent to residential properties, resulting in potential increased noise levels at nearby residences	Ramp realignment and new ramp terminal intersection located closer to residential properties, resulting in slight potential for increased noise levels at nearby residences	Ramp terminal intersection located adjacent to residential properties, resulting in potential increased noise levels at nearby residences	No notable increases in noise levels to nearby residences anticipated	Palace Road and ramp realignment located closer to residential properties, resulting in slight potential for increased noise levels at nearby residences
						Measure	Moderate Impacts	Low-Moderate	Moderate Impacts	Low Impacts	Low-Moderate Impacts
						Score (/5)	3	4.5	3	5	4.5
						Weighted Score	0.9	1.4	0.9	1.5	1.4
Air Quality (10%)	Impacts to air quality receivers (100%)	100%	High Impacts (1) to Low Impacts (5)	10.0%	1.5%	Description	No long-term impacts to air quality anticipated as Highway 401 capacity changes are not proposed.	No long-term impacts to air quality anticipated as Highway 401 capacity changes are not proposed.	No long-term impacts to air quality anticipated as Highway 401 capacity changes are not proposed.	No long-term impacts to air quality anticipated as Highway 401 capacity changes are not proposed.	No long-term impacts to air quality anticipated as Highway 401 capacity changes are not proposed.
						Measure	Low Impacts	Low Impacts	Low Impacts	Low Impacts	Low Impacts
						Score (/5)	5	5	5	5	5
						Weighted Score	1.5	1.5	1.5	1.5	1.5
Community Effects (70%)	Number of residential or commercial properties displaced (50%)	50%	#	35.0%	5.3%	Description	No displacements anticipated	No displacements anticipated	Displacement of 1 residential property north of interchange	Displacement of 1 residential property north of interchange	No displacements anticipated
						Measure	0 Displacements	0 Displacements	1 residential property	1 residential property	0 Displacements
						Score (/5)	5	5	3	3	5
						Weighted Score	5.3	5.3	3.2	3.2	5.3
	Area of residential property impacted (excluding displacements) (15%)	15%	Area (ha)	10.5%	1.6%	Description	Approx. 0.03 ha of residential property impacts anticipated due to westbound off-ramp	No permanent impacts to residential properties anticipated	Approx. 0.17 ha of residential property impacts anticipated due to Palace Road realignment and westbound off-ramp (excluding displacement)	Approx. 0.16 ha of residential property impacts anticipated due to Palace Road realignment (excluding displacement)	Approx. 0.01 ha of residential property impacts anticipated due to Palace Road realignment
						Measure	0.03 ha	0 ha	0.17 ha	0.16 ha	0.01 ha
						Score (/5)	4	5	3	3	4
						Weighted Score	1.3	1.6	0.9	0.9	1.3
	Impacts to commercial properties (excluding displacements) (15%)	15%	Area (ha)	10.5%	1.6%	Description	No long-term impacts to commercial properties anticipated	No long-term impacts to commercial properties anticipated	No long-term impacts to commercial properties anticipated	No long-term impacts to commercial properties anticipated	No long-term impacts to commercial properties anticipated
						Measure	0 ha	0 ha	0 ha	0 ha	0 ha
						Score (/5)	5	5	5	5	5
						Weighted Score	1.6	1.6	1.6	1.6	1.6
	Active Transportation Safety (10%)	10%	Very Poor (1) to Very Good (5)	7.0%	1.1%	Description	No notable concerns for pedestrian and cyclist crossings of ramp terminal intersection, though no sidewalks are present within the study area and Lennox & Addington 'Newburgh' County Trail located along Palace Road within the study area.	No notable concerns for pedestrian and cyclist crossings of ramp terminal intersection, though no sidewalks are present within the study area and Lennox & Addington 'Newburgh' County Trail located along Palace Road within the study area.	No notable concerns for pedestrian and cyclist crossings of ramp terminal intersection, though no sidewalks are present within the study area and Lennox & Addington 'Newburgh' County Trail located along Palace Road within the study area.	Geometrics of roundabout approaches can promote a slowing down of entering traffic to ensure appropriate yielding, although there are a number of free flow moves and driver familiarity may be a concern to pedestrians and cyclists trying to cross the roundabout. No sidewalks are present within the study area and Lennox & Addington 'Newburgh' County Trail located along Palace Road within the study area.	Geometrics of roundabout approaches can promote a slowing down of entering traffic to ensure appropriate yielding, although there are a number of free flow moves and driver familiarity may be a concern to pedestrians and cyclists trying to cross the roundabout. No sidewalks are present within the study area and Lennox & Addington 'Newburgh' County Trail located along Palace Road within the study area.
						Measure	Good	Good	Good	Fair-Good	Fair-Good
						Score (/5)	4	4	4	3	3
						Weighted Score	0.8	0.8	0.8	0.6	0.6

5 Very Good Low Complexity No/Low Impacts		3	1 Very Poor High Complexity High Impacts		Indicator not Decision Relevant		Alt E-N-2 - Standard Buttonhook with Minor Palace Road Realignment	Alt E-N-4 - Diamond with Minor Palace Road Realignment	Alt W-N-2 - Standard Buttonhook with Westerly Palace Road Realignment	Alt W-N-4 - Diamond with Westerly Palace Road Realignment	Alt W-N-5 - Diamond with Roundabout and Westerly Palace Road Realignment
Factor	Indicator		Measure	Weighting Weighting By CategoryOverall Weighting		Description					
	Aesthetic Impacts to Sensitive Viewers (10%)	10%	High Impacts (1) to Low Impacts (5)	7.0%	1.1%	Description	Ramp terminal located adjacent to residential properties, resulting in some impacts to aesthetic views and potential light glare. Landscaping treatments (e.g. plantings) can be applied to reduce severity of impacts.	No notable impacts to aesthetic views anticipated	Ramp terminal located adjacent to residential properties, resulting in some impacts to aesthetic views and potential light glare. Landscaping treatments (e.g. plantings) can be applied to reduce severity of impacts.	No notable impacts to aesthetic views anticipated	No notable impacts to aesthetic views anticipated
						Measure	Moderate Impacts	Low Impacts	Moderate Impacts	Low Impacts	Low Impacts
						Score (/5)	3	5	3	5	5
						Weighted Score	0.6	1.1	0.6	1.1	1.1
Waste and Contamination (10%)	Impact to potentially contaminated soils due to spills (100%)	100%	#	10.0%	1.5%	Description	No impacts anticipated to potentially contaminated soils due to spills	No impacts anticipated to potentially contaminated soils due to spills	No impacts anticipated to potentially contaminated soils due to spills	Proposed westbound off-ramp crosses two confirmed locations of contaminated soil due to spills (in northwest quadrant of existing interchange).	Proposed westbound off-ramp crosses two confirmed locations of contaminated soil due to spills (in northwest quadrant of existing interchange).
						Measure	No Impacts	No Impacts	No Impacts	2 locations	2 locations
						Score (/5)	5	5	5	3	3
						Weighted Score	1.5	1.5	1.5	0.9	0.9
Score for Socio-Economic Environment Category (Out of 5)							4.49	4.88	3.68	3.75	4.505
Overall Weighted Score for Socio-Economic Environment Category (Out of 20)							13.5	14.6	11.0	11.3	13.5
CATEGORY - CULTURAL ENVIRONMENT (5%)											
Archaeological Resources (50%)	Impact to land with archaeological potential (100%)	100%	High Impacts (1) to Low Impacts (5)	50.0%	2.5%	Description	Low potential for archaeological impacts given that construction activities are generally located on previously disturbed areas	Low potential for archaeological impacts given that construction activities are generally located on previously disturbed areas	Low potential for archaeological impacts given that construction activities are generally located on previously disturbed areas	Moderate potential for archaeological impacts given impacts to woodlot and widening across Napanee River	Moderate potential for archaeological impacts given impacts to woodlot and widening across Napanee River
						Measure	Low Impacts	Low Impacts	Low Impacts	Moderate Impacts	Moderate Impacts
						Score (/5)	5	5	5	3	3
						Weighted Score	2.5	2.5	2.5	1.5	1.5
Built Heritage Features and Cultural Heritage Landscapes (50%)	Impacts to built heritage features and cultural heritage landscapes (100%)	100%	High Impacts (1) to Low Impacts (5)	50.0%	2.5%	Description	No impacts to built heritage features and cultural heritage landscapes anticipated	No impacts to built heritage features and cultural heritage landscapes anticipated	Displacement of one property considered to have local cultural heritage value (non-designated)	Displacement of one property considered to have local cultural heritage value (non-designated)	Minor property encroachment on one property considered to have heritage value (non-designated)
						Measure	Low Impacts	Low Impacts	Moderate Impacts	Moderate Impacts	Low-Moderate Impacts
						Score (/5)	5	5	3	3	4.5
						Weighted Score	2.5	2.5	1.5	1.5	2.3
Score for Cultural Environment Category (Out of 5)							5	5	4.0	3.0	3.75
Overall Weighted Score for Cultural Environment Category (Out of 5)							5.0	5.0	4.0	3.0	3.8
CATEGORY - COST (10%)											
Cost (70%)	Capital Cost (\$) (80%)	80%	Proportional to Lowest Cost (5)	56.0%	5.6%	Description	Construction cost includes replacement of westbound Palace Road structure, speed change lane on bridge, new ramp and speed change lane construction, and Hwy 401 median cross-overs and temporary widening of existing Palace Rd bridge for construction staging purposes.	Construction cost includes replacement of westbound Palace Road structure including provisions for potential future northbound left-turn lane beneath bridge, new ramp and speed change lane construction, and Hwy 401 median cross-overs and temporary widening of existing Palace Rd bridge for construction staging purposes.	Construction cost includes new Palace Road structure over Highway 401, speed change lane beneath Palace Road bridge, Palace Road realignment including additional earth grading requirements, new ramp and speed change lane construction.	Construction cost includes new Palace Road structure over Highway 401 with provisions for potential future northbound left-turn lane on bridge, widening of Napanee River bridge, Palace Road realignment including additional earth grading requirements, new ramp and speed change lane construction.	Construction cost includes new Palace Road structure over Highway 401 (with reduced bridge skew angle relative to other options), widening of Napanee River bridge, Palace Road realignment including additional earth grading requirements, new ramp and speed change lane construction, and additional pavement cost of roundabout
						Measure	\$5,120,000	\$5,740,000	\$5,700,000	\$7,760,000	\$7,080,000
						Score (/5)	5.00	4.46	4.49	3.30	3.62
						Weighted Score	5.6	5.0	5.0	3.7	4.0
	Life Cycle / Maintenance Cost (20%)	20%	High Cost / Maintenance (1) to Low Cost / Maintenance (5)	14.0%	1.4%	Description	Highway 401 bridge crossing over Palace Road will result in higher long-term maintenance costs (e.g. future bridge rehabilitation staging requirements)	Highway 401 bridge crossing over Palace Road will result in higher long-term maintenance costs (e.g. future bridge rehabilitation staging requirements)	Palace Road bridge crossing over Highway 401 will result in lower long-term maintenance costs (e.g. future bridge rehabilitation staging requirements)	Palace Road bridge crossing over Highway 401 will result in slightly lower long-term maintenance costs (e.g. future bridge rehabilitation staging requirements), though additional lane on Napanee River bridge increases future rehabilitation costs.	Palace Road bridge crossing over Highway 401 will result in slightly lower long-term maintenance costs (e.g. future bridge rehabilitation staging requirements), though maintenance costs of roundabout are higher and additional lane on Napanee River bridge structure increases future rehabilitation costs.
						Measure	Moderate-High	Moderate-High	Low	Low-Moderate	Moderate
						Score (/5)	2	2	5	4	3
						Weighted Score	0.6	0.6	1.4	1.1	0.8
Utilities (30%)	Impacts to existing and planned utilities (100%)	100%	High Impacts (1) to Low Impacts (5)	30.0%	3.0%	Description	Anticipated minor impacts to underground Bell on east side of Palace Road (south of Highway 401).	Anticipated minor impacts to underground Bell on east side of Palace Road (south of Highway 401).	Anticipated impacts to overhead hydro transmission corridor (relocation or modifications to two hydro towers) due to realignment of Palace Road and grade raise over Highway 401	Anticipated impacts to overhead hydro transmission corridor crossing of Highway 401 (relocation or modifications to two hydro towers) due to Palace Road grade raise over Highway 401, and to overhead Bell/Hydro lines due to realignment of Palace Road.	Anticipated impacts to overhead hydro transmission corridor crossing of Highway 401 (relocation or modifications to two hydro towers) due to Palace Road grade raise over Highway 401, and to overhead Bell/Hydro lines due to realignment of Palace Road.
						Measure	Low-Moderate Impacts	Low-Moderate Impacts	Moderate Impacts	Moderate-High Impacts	Moderate-High Impacts
						Score (/5)	4	4	3	2	2
						Weighted Score	2.4	2.4	1.8	1.2	1.2
Score for Cost and Constructability Category (Out of 5)							4.28	3.98	4.12	3.01	3.04
Overall Weighted Score for Cost and Constructability Category (Out of 10)							8.56	7.96	8.23	6.01	6.09
Total Weighted Average Score						/5	4.04	3.99	4.27	3.63	3.83
Overall Total Score						/100	80.74	79.81	85.38	72.69	76.62

Category		Alt E-N-2 - Standard Buttonhook with Minor Palace Road Realignment	Alt E-N-4 - Diamond with Minor Palace Road Realignment	Alt W-N-2 - Standard Buttonhook with Westerly Palace Road Realignment	Alt W-N-4 - Diamond with Westerly Palace Road Realignment	Alt W-N-5 - Diamond with Roundabout and Westerly Palace Road Realignment	EVALUATION SUMMARY	
Transportation (55% Weight)							All alternatives are anticipated to operate well with relatively minor intersection delays and queuing in the short and long-term and have generally good overall geometrics. The existing alignment alternatives (Alts E-N-2 and E-N-4) can be staged to maintain all existing ramp movements open during construction, however temporary widening of one existing Palace Road structure and a Highway 401 median cross-over is required. In addition, future rehabilitations of the new structures along the existing alignment will have significantly greater impacts to Highway 401 traffic operations including likely lane reductions. Conversely, future bridge rehabilitations for the three westerly realignment alternatives can generally be undertaken with minimal impacts to Highway 401. The Alternative E-N-4 and W-N-4 ramp terminal intersections are located on a horizontal curve and result in less than desirable turning sight distance to and from the intersections, resulting in less than desirable safety conditions. While the roundabout alternative (W-N-5) eliminates direct left-turns which is anticipated to reduce the severity of collisions, it also is considered less compatible with truck traffic including Long Combination Vehicles (LCV's) and is an unfamiliar configuration for many drivers resulting in potentially increased collision risk. Alternative W-N-2 can also be staged to maintain existing ramp movements open during construction and minimizes impacts to Palace Road and Highway 401 both during short term and long term bridge work. Alternative W-N-2 is therefore preferred from a Transportation perspective.	
		41.0	38.0	49.9	43.1	43.1		
Natural Environment (15% Weight)							Alternatives W-N-4 and W-N-5 require widening of the Napanee River bridge which results in greater potential for impacts to fish and fish habitat and groundwater resources. These alternatives also result in the greatest impact to the woodlot in the northwest quadrant of the interchange. While Alternatives E-N-2 and W-N-2 have the greatest area of impact to non-woodlot vegetation, these impacts are generally to Cultural Meadow communities and are considered less significant. Alternative E-N-4 has a lower area of impact to non-woodlot vegetation and less potential to impact domestic water wells, and is therefore slightly preferred from a Natural Environmental perspective.	
		12.7	14.3	12.2	9.4	10.2		
Socio-Economic Environment (15% Weight)							Alternatives W-N-2 and W-N-4 are anticipated to displace one residential property and are therefore least preferred from a Socio-Economic perspective. Alternatives W-N-4 and W-N-5 also have greater potential to impact contaminated soils due to spills. The ramp terminal intersections for Alternatives E-N-2 and W-N-2 are located adjacent to residential properties, which results in the greatest potential for increased noise levels and greater aesthetic impacts to sensitive viewers, although these impacts can be partially mitigated through landscaping treatments (e.g. plantings). Alternative E-N-4 avoids the residential displacement and minimizes encroachment onto residential property, and is therefore slightly preferred from a Socio-Economic perspective.	
		13.5	14.6	11.0	11.3	13.5		
Cultural Environment (5% Weight)							Alternatives W-N-2 and W-N-4 are anticipated to displace one residential property with local cultural heritage value, though the property is not a formally designated heritage feature. The woodlot impacts and widening of the Napanee River bridge required for Alternatives W-N-4 and W-N-5 result in the highest potential for archaeological impacts. Alternatives E-N-2 and E-N-4 have low potential for archaeological and built heritage feature / cultural heritage landscape impacts and are therefore equally preferred from a Cultural Environment perspective, while Alternative W-N-4 is least preferred.	
		5.0	5.0	4.0	3.0	3.8		
Cost (10% Weight)							Construction of a new Palace Road structure over Highway 401 with the three realignment to west options will simplify future construction staging requirements and therefore reduce long-term maintenance and life-cycle costs. The Palace Road grade raise associated with the westerly realignment alternatives is anticipated to directly impact the existing hydro transmission corridor crossing Highway 401, while Alternatives W-N-4 and W-N-5 are also anticipated to impact overhead hydro lines. Alternative E-N-2 has a lower overall construction cost than the other alternatives (approx. 10% lower than Alternative E-N-4 and W-N-2, and 30% lower than Alternatives W-N-4 and W-N-5), which require widening of the Napanee River bridge, greater length of Palace Road and ramp construction including higher grading costs, and a more expensive bridge structure over Highway 401. Alternative E-N-2 is therefore considered slightly preferred from a Cost and Constructability perspective, followed by Alternatives W-N-2 and E-N-4.	
		8.6	8.0	8.2	6.0	6.1		
OVERALL ASSESSMENT		TOTAL SCORE	80.7	79.8	85.4	72.7	76.6	The alternatives on the existing alignment (Alts E-N-2 and E-N-4) require temporary widening of one existing Palace Road structure and a Highway 401 median cross-over to facilitate construction staging requirements, and require reduction to single lane along Palace Road during construction/bridge replacements (with temporary traffic signals). Future rehabilitations of these structures (with Highway 401 over Palace Road) will also have significantly greater impacts to Highway 401 traffic operations including likely lane reductions, whereas future bridge rehabilitations for the three westerly realignment alternatives can generally be undertaken with minimal impacts to Highway 401 and lower life-cycle costs. Alternative W-N-2 can also be staged to maintain all ramp movements open during construction. All three westerly realignment alternatives likely impact the existing hydro corridor crossing Highway 401. Alternatives W-N-4 and W-N-5 result in the greatest impacts to the Natural and Cultural Environments and have the highest construction cost due to the widening of the Napanee River bridge, while Alternative W-N-2 avoids widening of this bridge. While Alternative W-N-2 (as well as W-N-4) displaces one residential property which is also considered to have local cultural heritage value, the short and long-term staging benefits associated with constructing the new structure over Highway 401 are considered to outweigh this impact. As such, Alternative W-N-2 (Buttonhook with Westerly Realignment) is the preferred overall north-side interchange alternative.
		RANK	2	3	1	5	4	
		RECOMMENDATION	NOT RECOMMENDED	NOT RECOMMENDED	TECHNICALLY PREFERRED ALTERNATIVE	NOT RECOMMENDED	NOT RECOMMENDED	
Legend								
	Highest Category Weighting → Lowest Category Weighting							
		Most Preferred Alternative → Least Preferred Alternative						

<div><div><div>5</div><div>3</div><div>1</div></div><div><div>Very Good</div><div>Low Complexity</div><div>No/Low Impacts</div></div><div><div>Very Poor</div><div>High Complexity</div><div>High Impacts</div></div></div> <div>Indicator not Decision Relevant</div> <div></div>							Alt E-S-2 - Standard Buttonhook with Minor Palace Road Realignment		Alt E-S-4 - Diamond with Minor Palace Road Realignment		Alt E-S-7 - Parclo B with Minor Palace Road Realignment		Alt W-S-2 - Standard Buttonhook with Palace Road Westerly Realignment		Alt W-S-4 - Diamond with Palace Road Westerly Realignment		Alt W-S-5 - Diamond with Roundabout and Palace Road Westerly Realignment		Alt W-S-7 - Parclo B with Roundabout and Palace Road Westerly Realignment	
Factor	Indicator	Measure	Weighting		Description															
			Weighting By Category	Overall Weighting																
CATEGORY - TRANSPORTATION (55%)																				
Traffic Operations (60%)	Critical Intersection Delays and Queuing in Peak Periods (2038 Horizon Year) (30%)	30%	Critical delays, 95th Percentile Queue Lengths, etc.	18.0%	9.9%	Description	Average intersection delay along Palace Road < 10 seconds with minimal queue lengths for all moves	Average intersection delay along Palace Road < 10 seconds with minimal queue lengths for all moves	Average intersection delay along Palace Road < 10 seconds with minimal queue lengths for all moves	Average intersection delay along Palace Road < 10 seconds with minimal queue lengths for all moves	Average intersection delay along Palace Road < 10 seconds with minimal queue lengths for all moves	Average intersection delay along Palace Road < 10 seconds with minimal queue lengths for all moves	Average intersection delay along Palace Road < 10 seconds with minimal queue lengths for all moves	Average intersection delay along Palace Road < 10 seconds with minimal queue lengths for all moves						
						Measure	Delay < 10 s, Queues < 10 m	Delay < 10 s, Queues < 10 m	Delay < 10 s, Queues < 10 m	Delay < 10 s, Queues < 10 m	Delay < 10 s, Queues < 10 m	Delay < 10 s, Queues < 10 m	Delay < 10 s, Queues < 10 m							
						Score (/5)	5	5	5	5	5	5	5							
						Weighted Score	9.9	9.9	9.9	9.9	9.9	9.9	9.9							
	Truck Operations (including Long Combination Vehicles) through Interchange (10%)	10%	Very Poor (1) to Very Good (5)	6.0%	3.3%	Description	No notable operational concerns anticipated with truck traffic (including Long Combination Vehicles) at interchange.	No notable operational concerns anticipated with truck traffic (including Long Combination Vehicles) at interchange.	No notable operational concerns anticipated with truck traffic (including Long Combination Vehicles) at interchange.	No notable operational concerns anticipated with truck traffic (including Long Combination Vehicles) at interchange.	No notable operational concerns anticipated with truck traffic (including Long Combination Vehicles) at interchange.	No notable operational concerns anticipated with truck traffic (including Long Combination Vehicles) at interchange.	Truck traffic (including potential for Long Combination Vehicles) for southbound left-turn movement to enter EB Hwy 401 and other maneuvers may result in additional delays through roundabout.	Truck traffic (including potential for Long Combination Vehicles) for southbound left-turn movement to enter EB Hwy 401 and other maneuvers may result in additional delays through roundabout.						
						Measure	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good	Moderate	Moderate						
						Score (/5)	5	5	5	5	5	5	3	3						
						Weighted Score	3.3	3.3	3.3	3.3	3.3	3.3	2.0	2.0						
	Impacts to Existing Traffic during Construction (15%)	15%	High Impacts (1) to Low Impacts (5)	9.0%	5.0%	Description	Reduction to single lane anticipated along Palace Road during construction/bridge replacements (with temporary traffic signals). Two eastbound lanes can be maintained along Highway 401 but minor temporary widening of Palace Road structure and median cross-overs required. Temporary closure of eastbound on-ramp anticipated during construction.	Reduction to single lane anticipated along Palace Road during construction/bridge replacements (with temporary traffic signals). Two eastbound lanes can be maintained along Highway 401 but minor temporary widening of Palace Road structure and median cross-overs required. New eastbound on-ramp can be utilized for staging during closure of existing eastbound on-ramp.	Reduction to single lane anticipated along Palace Road during construction/bridge replacements (with temporary traffic signals). Two eastbound lanes can be maintained along Highway 401 but minor temporary widening of Palace Road structure and median cross-overs required. New eastbound on-ramp can be utilized for staging during closure of existing eastbound on-ramp.	New structure can be constructed over Hwy 401 with relatively minor impacts to Highway 401. Grade raise along Palace Road approaching new structure may require short-duration closure of Palace Road. New eastbound off and on-ramps can be utilized for staging during closure of existing ramps.	Two eastbound lanes can generally be maintained along Highway 401. Grade raise required along Palace Road approaching new structure anticipated to require temporary closure of existing off and on-ramps and Palace Road crossing of Highway 401.	Two eastbound lanes can generally be maintained along Highway 401. Grade raise required along Palace Road approaching new structure anticipated to require temporary closure of existing off and on-ramps and Palace Road crossing of Highway 401.	Two eastbound lanes can generally be maintained along Highway 401. Grade raise required along Palace Road approaching new structure anticipated to require temporary closure of existing off and on-ramps and Palace Road crossing of Highway 401.							
						Measure	Moderate-High	Moderate	Moderate	Low	Moderate-High	Moderate-High	Moderate-High							
						Score (/5)	2.5	3	3	4.5	2.5	2.5	2.5	2.5						
						Weighted Score	2.5	3.0	3.0	4.5	2.5	2.5	2.5	2.5						
	Impacts to Future Traffic during Construction (e.g. Future Bridge Replacement or Rehabilitations) (35%)	35%	High Impacts (1) to Low Impacts (5)	21.0%	11.6%	Description	Future rehabilitations of Palace Road structures and/or widening of Highway 401 (anticipated within 20-25 years) may require temporary lane reductions along Highway 401 and ramp closures. Future rehabilitation of Napanee River bridge will likely require closure of eastbound off-ramp.	Future rehabilitations of Palace Road structures and/or widening of Highway 401 (anticipated within 20-25 years) may likely require temporary lane reductions along Highway 401 and ramp closures.	Future rehabilitations of Palace Road structures and/or widening of Highway 401 (anticipated within 20-25 years) may likely require temporary lane reductions along Highway 401 and ramp closures.	Future rehabilitations of Palace Road structure over Highway 401 and/or widening of Highway 401 (anticipated within 20-25 years) can generally be undertaken with minimal lane reductions or impacts to Highway 401 traffic operations. Future rehabilitation of Napanee River bridge will likely require closure of eastbound off-ramp.	Future rehabilitations of Palace Road structure over Highway 401 and/or widening of Highway 401 (anticipated within 20-25 years) can generally be undertaken with minimal lane reductions or impacts to Highway 401 traffic operations. Future rehabilitation of Napanee River bridge will likely require closure of eastbound off-ramp.	Future rehabilitations of Palace Road structure over Highway 401 and/or widening of Highway 401 (anticipated within 20-25 years) can generally be undertaken with minimal lane reductions or impacts to Highway 401 traffic operations, though impacts to County Road 41 traffic through roundabout considered more significant than standard intersection. Future rehabilitation of Napanee River bridge will likely require closure of eastbound off-ramp.	Future rehabilitations of Palace Road structure over Highway 401 and/or widening of Highway 401 (anticipated within 20-25 years) can generally be undertaken with minimal lane reductions or impacts to Highway 401 traffic operations, though impacts to County Road 41 traffic through roundabout considered more significant than standard intersection							
						Measure	Moderate-High	Moderate-High	Moderate-High	Low-Moderate	Low-Moderate	Moderate	Low							
						Score (/5)	2.0	2.0	2.0	4.0	4.0	3.5	4.5							
						Weighted Score	4.6	4.6	4.6	9.2	9.2	8.1	10.4							
	Flexibility for Future Interchange Expansion/Upgrades (10%)	10%	Very Poor (1) to Very Good (5)	6.0%	3.3%	Description	Interchange can be modified in future to accommodate future growth and expansion (beyond 25-year horizon period) if necessary, including signalization of intersection.	Future interchange upgrades or expansion to accommodate future growth (beyond 25-year horizon period) if necessary would likely require re-construction of eastbound ramps, and installation of traffic signals at a later date undesirable given intersection location along horizontal curve and proximity to Highway 401 structure.	Future interchange upgrades or expansion to accommodate future growth (beyond 25-year horizon period) if necessary would likely require re-construction of eastbound ramps, and installation of traffic signals at a later date undesirable given intersection location along horizontal curve and proximity to Highway 401 structure.	Interchange can be modified in future to accommodate future growth and expansion (beyond 25-year horizon period) if necessary, including signalization of intersection.	Future interchange upgrades or expansion to accommodate future growth (beyond 25-year horizon period) if necessary would likely require re-construction of eastbound ramps, and installation of traffic signals at a later date undesirable given intersection location along horizontal curve and proximity to Highway 401 structure.	Future interchange upgrades or expansion to accommodate future growth (beyond 25-year horizon period) if necessary can be completed but would require re-construction of roundabout and interchange ramps	Future interchange upgrades or expansion to accommodate future growth (beyond 25-year horizon period) if necessary can be completed but would require re-construction of roundabout and interchange ramps							
						Measure	Good	Poor	Poor	Good	Poor	Poor	Poor							
						Score (/5)	4	2	2	4	2	2	2							
						Weighted Score	2.6	1.3	1.3	2.6	1.3	1.3	1.3							
Safety and Geometrics (40%)	Conflicts due to Turning and Weaving Traffic (45%)	45%	High Impacts (1) to Low Impacts (5)	18.0%	9.9%	Description	Northbound left-turn to access eastbound Highway 401 increases potential collision risk relative to directional movements.	Southbound left-turn to access eastbound Highway 401 increases potential collision risk relative to directional movements.	Southbound left-turn to access eastbound Highway 401 increases potential collision risk relative to directional movements.	Northbound left-turn to access eastbound Highway 401 increases potential collision risk relative to directional movements.	Southbound left-turn to access eastbound Highway 401 increases potential collision risk relative to directional movements.	Roundabouts considered to minimize potential conflict points and reduce severity of collisions relative to standard intersection.	Roundabouts considered to minimize potential conflict points and reduce severity of collisions relative to standard intersection.							
						Measure	Low-Moderate	Low-Moderate	Low-Moderate	Low-Moderate	Low-Moderate	Low	Low							
						Score (/5)	4	4	4	4	4	5	5							
						Weighted Score	7.9	7.9	7.9	7.9	7.9	9.9	9.9							
	Horizontal/Vertical Geometrics and Sight Distance (40%)	40%	Very Poor (1) to Very Good (5)	16.0%	8.8%	Description	Good overall interchange geometrics with adequate sight distances at ramp terminal intersection.	Acceptable overall interchange geometrics, although ramp terminal intersection is located on a horizontal curve with less than desirable turning sight distance (approx. 160m) given proximity to Highway 401 structures. Vertical incline along eastbound on-ramp and speed change lane slows down acceleration of vehicles entering highway and may create safety concern with merging traffic.	Acceptable overall interchange geometrics, although B-loop off-ramp is less desirable than other configurations and ramp terminal intersection is located on a horizontal curve with less than desirable turning sight distance (approx. 150m) given proximity to Highway 401 structures. Vertical incline along eastbound on-ramp and speed change lane slows down acceleration of vehicles entering highway and may create safety concern with merging traffic.	Good overall interchange geometrics with adequate sight distances at ramp terminal intersection.	Acceptable overall interchange geometrics, although ramp terminal intersection located along a horizontal curve and in proximity to vertical crest curve over Highway 401 results in less than desirable sight distance (approx. 150m). Grade differential between eastbound off-ramp and Highway 401 may require retaining wall.	Good overall interchange geometrics, though unequal distribution of four approach legs through roundabout is less than ideal and may result in unequal speed distribution and line of sight concerns through the roundabout. Grade differential between eastbound off-ramp and Highway 401 may require retaining wall.	Acceptable overall interchange geometrics, although B-loop off-ramp is less desirable than other configurations and exit into roundabout may result in sight distance concerns.							
						Measure	Good	Poor	Poor	Good	Fair	Fair	Poor							
						Score (/5)	4.5	2	2	4.5	3	3	2							
						Weighted Score	7.9	3.5	3.5	7.9	5.3	5.3	3.5							
	Driver Expectation (e.g. Intuitive directions and signage through interchange/intersection) (15%)	15%	Very Poor (1) to Very Good (5)	6.0%	3.3%	Description	Standard interchange configuration with relatively intuitive directions and signage	Standard interchange configuration with relatively intuitive directions and signage	Relatively standard interchange configuration, though B-loop off-ramp associated with less intuitive directions and signage	Standard interchange configuration with relatively intuitive directions and signage	Standard interchange configuration with relatively intuitive directions and signage	Roundabouts at ramp terminal intersections relatively unique condition for drivers on MTO freeway facilities, with slightly more complex signage (driver perception and processing) and less intuitive design	Roundabouts at ramp terminal intersections relatively unique for MTO freeway facilities, and combined with B-loop off-ramp results in more complex signage (driver perception and processing) and less intuitive design							
						Measure	Good	Good	Fair-Good	Good	Good	Fair	Poor							
						Score (/5)	4	4	3.5	4	4	3	2							
						Weighted Score	2.64	2.64	2.31	2.64	2.64	1.98	1.32							
Score for Transportation Category (Out of 5)							2.58	2.18	2.15	2.58	2.34	2.46	2.24							
Overall Weighted Score for Transportation Category (Out of 50)							41.42	36.19	35.86	48.02	42.08	40.92	40.81							

<div><div><div>5</div><div>3</div><div>1</div></div><div><div>Very Good</div><div>Low Complexity</div><div>No/Low Impacts</div></div><div><div>Very Poor</div><div>High Complexity</div><div>High Impacts</div></div></div> <div>Indicator not Decision Relevant</div>						Alt E-S-2 - Standard Buttonhook with Minor Palace Road Realignment	Alt E-S-4 -Diamond with Minor Palace Road Realignment	Alt E-S-7 - Parclo B with Minor Palace Road Realignment	Alt W-S-2 - Standard Buttonhook with Palace Road Westerly Realignment	Alt W-S-4 - Diamond with Palace Road Westerly Realignment	Alt W-S-5 - Diamond with Roundabout and Palace Road Westerly Realignment	Alt W-S-7 - Parclo B with Roundabout and Palace Road Westerly Realignment		
Factor	Indicator	Measure	Weighting		Description									
			Weighting By Category	Overall Weighting										
CATEGORY - NATURAL ENVIRONMENT (15%)														
Fish and Fish Habitat (35%)	Impacts to fish and fisheries habitat (100%)	100%	High Impacts (1) to Low Impacts (5)	35.0%	5.3%	Description	Eastbound off-ramp extends across Napanee River bridge and requires widening of structure. Off-ramp speed change lane may also impact ditch connecting river and floodplain which may provide potential Pike spawning habitat. Potential fisheries impacts include increased erosion potential, sedimentation of the watercourse, temporary loss of riparian vegetation, change in contaminant concentrations and temporary displacement of fish. Residual negative impacts can likely be avoided using appropriate mitigation measures however DFO review and approvals under the Endangered Species Act may be required due to in-water works and the potential presence of American Eel in the Napanee River.	Off-ramp speed change lane may result in minor impacts to existing ditch outletting to Napanee River south of Highway 401, although potential impacts to fish habitat is considered minor.	No impacts to fish and fish habitat anticipated	Eastbound off-ramp extends across Napanee River bridge and requires widening of structure. Off-ramp speed change lane may also impact ditch connecting river and floodplain which may provide potential Pike spawning habitat. Potential fisheries impacts include increased erosion potential, sedimentation of the watercourse, temporary loss of riparian vegetation, change in contaminant concentrations and temporary displacement of fish. Residual negative impacts can likely be avoided using appropriate mitigation measures however DFO review and approvals under the Endangered Species Act may be required due to in-water works and the potential presence of American Eel in the Napanee River.	Eastbound off-ramp extends across Napanee River bridge and requires widening of structure. Off-ramp speed change lane may also impact ditch connecting river and floodplain which may provide potential Pike spawning habitat. Potential fisheries impacts include increased erosion potential, sedimentation of the watercourse, temporary loss of riparian vegetation, change in contaminant concentrations and temporary displacement of fish. Residual negative impacts can likely be avoided using appropriate mitigation measures however DFO review and approvals under the Endangered Species Act may be required due to in-water works and the potential presence of American Eel in the Napanee River.	Eastbound off-ramp extends across Napanee River bridge and requires widening of structure. Off-ramp speed change lane may also impact ditch connecting river and floodplain which may provide potential Pike spawning habitat. Potential fisheries impacts include increased erosion potential, sedimentation of the watercourse, temporary loss of riparian vegetation, change in contaminant concentrations and temporary displacement of fish. Residual negative impacts can likely be avoided using appropriate mitigation measures however DFO review and approvals under the Endangered Species Act may be required due to in-water works and the potential presence of American Eel in the Napanee River.	No impacts to fish and fish habitat anticipated	
						Measure	Moderate Impacts	Low-Moderate	Low Impacts	Moderate Impacts	Moderate Impacts	Moderate Impacts	Low Impacts	
						Score (/5)	3	4.5	5	3	3	3	5	
						Weighted Score	3.2	4.7	5.3	3.2	3.2	3.2	5.3	
Terrestrial Habitat (40%)	Area of woodlot / forest community impacts (70%)	70%	ha	28.0%	4.2%	Description	Minor edge impacts to approx. 0.3 ha of woodlot (Coniferous Plantation Community) in the southeast quadrant of the existing interchange and 0.3 ha of Deciduous Forest Community in southwest quadrant which may provide suitable Bat Species at Risk habitat	Impacts to approx. 2.3 ha of woodlot in southeast quadrant that is part of a Coniferous Plantation Community and has potential to provide habitat for Eastern Wood Pe-wee, Eastern Whip-Poor-Will and Wood Thrush (SAR) although none were observed during field investigations. Woodlot may also provide suitable Bat Species at Risk habitat.	Impacts to approx. 6.1 ha of woodlot in southeast quadrant that is part of a Coniferous Plantation Community and has potential to provide habitat for Eastern Wood Pe-wee, Eastern Whip-Poor-Will and Wood Thrush (SAR) although none were observed during field investigations. Woodlot may also provide suitable Bat Species at Risk habitat.	Minor edge impacts to approx. 0.3 ha of Deciduous Forest Community in southwest quadrant which may provide suitable Bat Species at Risk habitat.	No impact to woodlots anticipated	No impact to woodlots anticipated	Impacts to approx. 5.2 ha of woodlot in southeast quadrant that is part of a Coniferous Plantation Community and has potential to provide habitat for Eastern Wood Pe-wee, Eastern Whip-Poor-Will and Wood Thrush (SAR) although none were observed during field investigations. Woodlot may also provide suitable Bat Species at Risk habitat.	
						Measure	0.6 ha	2.3 ha	6.1 ha	0.3 ha	0 ha	0 ha	5.2 ha	
						Score (/5)	4	3	1	4.5	5	5	1	
						Weighted Score	3.4	2.5	0.8	3.8	4.2	4.2	0.8	
	Area of non-woodlot vegetation impacts (30%)	30%	ha	12.0%	1.8%	Description	Approx. 2.2 ha vegetation removal in southwest quadrant which includes a Cultural Meadow community and has potential to provide habitat for Bobolink and Eastern Meadowlark (SAR) although none were observed during field investigations.	Approx. 0.3 ha vegetation removal in southwest quadrant which includes a Cultural Meadow community and has potential to provide habitat for Bobolink and Eastern Meadowlark (SAR) although none were observed during field investigations.	Relatively minor non-woodlot vegetation impacts anticipated, other than minimal Cultural Meadow communities adjacent to the existing paved roadway.	Approx. 2.5 ha vegetation removal in southwest quadrant which includes a Cultural Meadow community and has potential to provide habitat for Bobolink and Eastern Meadowlark (SAR) although none were observed during field investigations.	Approx. 1.1 ha vegetation removal in southwest quadrant which includes a Cultural Meadow community and has potential to provide habitat for Bobolink and Eastern Meadowlark (SAR) although none were observed during field investigations.	Approx. 0.4 ha vegetation removal in southwest quadrant which includes a Cultural Meadow community and has potential to provide habitat for Bobolink and Eastern Meadowlark (SAR) although none were observed during field investigations.	Relatively minor non-woodlot vegetation impacts anticipated, other than minimal Cultural Meadow communities adjacent to the existing paved roadway.	
						Measure	2.2 ha	0.3 ha	0 ha	2.5 ha	1.1 ha	0.4 ha	0 ha	
						Score (/5)	3	4	5	3	4	4	5	
						Weighted Score	1.1	1.4	1.8	1.1	1.4	1.4	1.8	
	Groundwater (25%)	Susceptibility to construction activities (100%)	100%	High Impacts (1) to Low Impacts (5)	25.0%	3.8%	Description	This alternative is not anticipated to directly impact water wells, although construction of eastbound off-ramp across Napanee River may result in impacts to groundwater resources.	Vibrations from rock blasting in southeast quadrant may result in temporary impacts to groundwater quality and/or quantity, although no direct impacts to water wells are anticipated.	Vibrations from rock blasting in southeast quadrant may result in temporary impacts to groundwater quality and/or quantity, although no direct impacts to water wells are anticipated.	This alternative is not anticipated to directly impact water wells, although construction of eastbound off-ramp across Napanee River may result in impacts to groundwater resources.	This alternative is not anticipated to directly impact water wells, although construction of eastbound off-ramp across Napanee River may result in impacts to groundwater resources.	This alternative is not anticipated to directly impact water wells, although construction of eastbound off-ramp across Napanee River may result in impacts to groundwater resources.	Vibrations from rock blasting in southeast quadrant may result in temporary impacts to groundwater quality and/or quantity, although no direct impacts to water wells are anticipated.
							Measure	Moderate Impacts	Low-Moderate Impacts	Low-Moderate Impacts	Moderate Impacts	Moderate Impacts	Moderate Impacts	Low-Moderate Impacts
Score (/5)							3	4	4	3	3	3	4	
Weighted Score							2.3	3.0	3.0	2.3	2.3	2.3	3.0	
Score for Natural Environment Category (Out of 5)							3.28	3.90	3.63	3.42	3.68	3.68	3.63	
Overall Weighted Score for Natural Environment Category (Out of 15)							9.84	11.69	10.89	10.26	11.04	11.04	10.89	
CATEGORY - SOCIO-ECONOMIC ENVIRONMENT (15%)														
Noise (10%)	Impact to noise sensitive receivers (100%)	100%	High Impacts (1) to Low Impacts (5)	10.0%	1.5%	Description	Ramp terminal intersection located adjacent to residential properties, resulting in potential increased noise levels at nearby residences	No notable impact to noise sensitive receivers anticipated	No notable impact to noise sensitive receivers anticipated	Ramp terminal intersection located adjacent to residential properties, resulting in potential increased noise levels at nearby residences	No notable impact to noise sensitive receivers anticipated	No notable impact to noise sensitive receivers anticipated	No notable impact to noise sensitive receivers anticipated	
						Measure	Moderate Impacts	Low Impacts	Low Impacts	Moderate Impacts	Low Impacts	Low Impacts	Low Impacts	
						Score (/5)	3	5	5	3	5	5	5	
						Weighted Score	0.9	1.5	1.5	0.9	1.5	1.5	1.5	
Air Quality (10%)	Impacts to air quality receivers (100%)	100%	High Impacts (1) to Low Impacts (5)	10.0%	1.5%	Description	No long-term impacts to air quality anticipated as Highway 401 capacity changes are not proposed.	No long-term impacts to air quality anticipated as Highway 401 capacity changes are not proposed.	No long-term impacts to air quality anticipated as Highway 401 capacity changes are not proposed.	No long-term impacts to air quality anticipated as Highway 401 capacity changes are not proposed.	No long-term impacts to air quality anticipated as Highway 401 capacity changes are not proposed.	No long-term impacts to air quality anticipated as Highway 401 capacity changes are not proposed.	No long-term impacts to air quality anticipated as Highway 401 capacity changes are not proposed.	
						Measure	Low Impacts	Low Impacts	Low Impacts	Low Impacts	Low Impacts	Low Impacts	Low Impacts	
						Score (/5)	5	5	5	5	5	5	5	
						Weighted Score	1.5	1.5	1.5	1.5	1.5	1.5	1.5	
Community Effects (70%)	Number of residential or commercial properties displaced (50%)	50%	#	35.0%	5.3%	Description	No displacements anticipated	No displacements anticipated	No displacements anticipated	No displacements anticipated	No displacements anticipated	No displacements anticipated	No displacements anticipated	
						Measure	0 Displacements	0 Displacements	0 Displacements	0 Displacements	0 Displacements	0 Displacements	0 Displacements	
						Score (/5)	5	5	5	5	5	5	5	
	Residential property impacts (excluding displacements) (15%)	15%	High Impacts (1) to Low Impacts (5)	10.5%	1.6%	Description	No permanent impacts to residential properties anticipated	No permanent impacts to residential properties anticipated	No permanent impacts to residential properties anticipated	Potential minor driveway impacts to residential properties due to Palace Road realignment	Potential minor driveway impacts to residential properties due to Palace Road realignment	Potential minor driveway impacts to residential properties due to Palace Road realignment	Potential minor driveway impacts to residential properties due to Palace Road realignment	
						Measure	Low Impacts	Low Impacts	Low Impacts	Low-Moderate	Low-Moderate	Low-Moderate	Low-Moderate	
						Score (/5)	5	5	5	4	4	4	4	
	Impacts to commercial properties (excluding displacements) (15%)	15%	Area (ha)	10.5%	1.6%	Description	Minor property impacts anticipated to Palace Village due to Palace Road realignment, including minor impacts / partial re-construction of Palace Village north entrance	Minor property impacts anticipated to Palace Village due to Palace Road realignment, including minor impacts / partial re-construction of Palace Village north entrance	Minor property impacts anticipated to Palace Village due to Palace Road realignment, including minor impacts / partial re-construction of Palace Village north entrance	No commercial property requirements anticipated, however impacts / partial re-construction of Palace Village entrances including potential closure of north entrance due to Palace Road realignment and grade raise	Minor property impacts anticipated to Palace Village due to Palace Road realignment and grade raise, including potential closure of Palace Village north entrance	Minor property impacts anticipated to Palace Village due to Palace Road realignment and grade raise, including potential closure of Palace Village north entrance	Approx. 0.18 ha of property impacts anticipated to Palace Village due to proposed eastbound loop ramps, although impacts are not anticipated to directly impact commercial operations. Impacts / partial re-construction of Palace Village entrances including potential closure of north entrance due to Palace Road realignment and grade raise.	
						Measure	0.01 ha (Low-Moderate)	0.01 ha (Low-Moderate)	0.01 ha (Low-Moderate)	0.0 ha (Moderate Impacts)	0.01 ha (Moderate Impacts)	0.01 ha (Moderate Impacts)	0.18 ha (Moderate Impacts)	
						Score (/5)	4	4	4	3	3	3	3	
						Weighted Score	1.3	1.3	1.3	0.9	0.9	0.9	0.9	

<div><div><div>5</div><div>3</div><div>1</div></div><div><div>Very Good</div><div>Low Complexity</div><div>No/Low Impacts</div></div><div><div>Very Poor</div><div>High Complexity</div><div>High Impacts</div></div></div> <div>Indicator not Decision Relevant</div> <div></div>						Alt E-S-2 - Standard Buttonhook with Minor Palace Road Realignment		Alt E-S-4 -Diamond with Minor Palace Road Realignment		Alt E-S-7 - Parclo B with Minor Palace Road Realignment		Alt W-S-2 - Standard Buttonhook with Palace Road Westerly Realignment		Alt W-S-4 - Diamond with Palace Road Westerly Realignment		Alt W-S-5 - Diamond with Roundabout and Palace Road Westerly Realignment		Alt W-S-7 - Parclo B with Roundabout and Palace Road Westerly Realignment	
Factor	Indicator		Measure	Weighting		Description													
				Weighting By Category	Overall Weighting														
	Active Transportation Safety (10%)	10%	Very Poor (1) to Very Good (5)	7.0%	1.1%	Description	No notable concerns for pedestrian and cyclist crossings of ramp terminal intersection, though no sidewalks are present within the study area and Lennox & Addington 'Newburgh' County Trail located along Palace Road within the study area.	No notable concerns for pedestrian and cyclist crossings of ramp terminal intersection, though no sidewalks are present within the study area and Lennox & Addington 'Newburgh' County Trail located along Palace Road within the study area.	No notable concerns for pedestrian and cyclist crossings of ramp terminal intersection, though no sidewalks are present within the study area and Lennox & Addington 'Newburgh' County Trail located along Palace Road within the study area.	No notable concerns for pedestrian and cyclist crossings of ramp terminal intersection, though no sidewalks are present within the study area and Lennox & Addington 'Newburgh' County Trail located along Palace Road within the study area.	No notable concerns for pedestrian and cyclist crossings of ramp terminal intersection, though no sidewalks are present within the study area and Lennox & Addington 'Newburgh' County Trail located along Palace Road within the study area.	Geometrics of roundabout approaches can promote a slowing down of entering traffic to ensure appropriate yielding, although there are a number of free flow moves and driver familiarity may be a concern to pedestrians and cyclists trying to cross the roundabout. No sidewalks are present within the study area and Lennox & Addington 'Newburgh' County Trail located along Palace Road within the study area.	Geometrics of roundabout approaches can promote a slowing down of entering traffic to ensure appropriate yielding, although there are a number of free flow moves and driver familiarity may be a concern to pedestrians and cyclists trying to cross the roundabout. No sidewalks are present within the study area and Lennox & Addington 'Newburgh' County Trail located along Palace Road within the study area.						
						Measure	Good	Good	Good	Good	Fair-Good	Fair-Good							
						Score (/5)	4	4	4	4	3	3							
	Aesthetic Impacts to Sensitive Viewers (10%)	10%	High Impacts (1) to Low Impacts (5)	7.0%	1.1%	Weighted Score	0.8	0.8	0.8	0.8	0.6	0.6							
						Description	Ramp terminal located adjacent to residential properties, resulting in some impacts to aesthetic views and potential light glare. Landscaping treatments (e.g. plantings) can be applied to reduce severity of impacts.	No notable aesthetic impacts to sensitive viewers anticipated	No notable aesthetic impacts to sensitive viewers anticipated	Ramp terminal located adjacent to residential properties, resulting in some impacts to aesthetic views and potential light glare. Landscaping treatments (e.g. plantings) can be applied to reduce severity of impacts.	Palace Road profile modifications results in minor aesthetic impacts to residential viewers. Landscaping treatments (e.g. plantings) can be applied to reduce severity of impacts.	Palace Road profile modifications results in minor aesthetic impacts to residential viewers. Landscaping treatments (e.g. plantings) can be applied to reduce severity of impacts.							
						Measure	Moderate Impacts	Low Impacts	Low Impacts	Moderate Impacts	Low-Moderate	Low-Moderate							
	Waste and Contamination (10%)	100%	#	10.0%	1.5%	Score (/5)	3	5	5	3	4	4							
						Weighted Score	0.6	1.1	1.1	0.6	0.8	0.8							
						Description	Proposed Palace Road realignment crosses one possible location of contaminated soil. Soil contamination with gasoline found across from the south ramp terminal intersection during tank excavation	Proposed Palace Road realignment crosses one possible location of contaminated soil. Soil contamination with gasoline found across from the south ramp terminal intersection during tank excavation	Proposed Palace Road realignment crosses one possible location of contaminated soil. Soil contamination with gasoline found across from the south ramp terminal intersection during tank excavation	No impacts anticipated to potentially contaminated soils due to spills	Proposed eastbound on-ramp crosses one possible location of contaminated soil. Soil contamination with gasoline found across from the south ramp terminal intersection during tank excavation	No impacts anticipated to potentially contaminated soils due to spills							
						Measure	1 spill location	1 spill location	1 spill location	No Impacts	1 spill location	1 spill location							
						Score (/5)	4.5	4.5	4.5	5	4.5	5							
						Weighted Score	1.4	1.4	1.4	1.5	1.4	1.4							
Score for Socio-Economic Environment Category (Out of 5)							4.44	4.78	4.78	4.28	4.50	4.48							
Overall Weighted Score for Socio-Economic Environment Category (Out of 20)							13.3	14.3	14.3	12.8	13.5	13.4							
CATEGORY - CULTURAL ENVIRONMENT (5%)																			
Archaeological Resources (50%)	Impact to land with archaeological potential (100%)	100%	High Impacts (1) to Low Impacts (5)	50.0%	2.5%	Description	Moderate potential for archaeological impacts given widening across Napanee River	Low to moderate potential for archaeological impacts given impacts to woodlot	Low to moderate potential for archaeological impacts given encroachment into southeast quadrant woodlot	Moderate potential for archaeological impacts given widening across Napanee River	Moderate potential for archaeological impacts given widening across Napanee River	Moderate potential for archaeological impacts given widening across Napanee River	Low to moderate potential for archaeological impacts given encroachment into southeast quadrant woodlot						
						Measure	Moderate Impacts	Low-Moderate Impacts	Low-Moderate Impacts	Moderate Impacts	Moderate Impacts	Low-Moderate Impacts							
						Score (/5)	3	4	4	3	3	4							
						Weighted Score	1.5	2.0	2.0	1.5	1.5	2.0							
Built Heritage Features and Cultural Heritage Landscapes (50%)	Impacts to built heritage features and cultural heritage landscapes (100%)	100%	High Impacts (1) to Low Impacts (5)	50.0%	2.5%	Description	No impacts to built heritage features and cultural heritage landscapes anticipated	No impacts to built heritage features and cultural heritage landscapes anticipated	No impacts to built heritage features and cultural heritage landscapes anticipated	No impacts to built heritage features and cultural heritage landscapes anticipated	No impacts to built heritage features and cultural heritage landscapes anticipated	No impacts to built heritage features and cultural heritage landscapes anticipated							
						Measure	Low Impacts	Low Impacts	Low Impacts	Low Impacts	Low Impacts	Low Impacts							
						Score (/5)	5	5	5	5	5	5							
						Weighted Score	2.5	2.5	2.5	2.5	2.5	2.5							
Score for Cultural Environment Category (Out of 5)							4	4.5	4.5	4.0	4.0	4.5							
Overall Weighted Score for Cultural Environment Category (Out of 5)							4.0	4.5	4.5	4.0	4.0	4.5							
CATEGORY - COST (10%)																			
Cost (70%)	Capital Cost (\$) (80%)	80%	Proportional to Lowest Cost (5)	56.0%	5.6%	Description	Construction cost includes replacement of eastbound Palace Road structure, speed change lane on bridge, widening of Napanee River bridge, new ramp and speed change lane construction, Hwy 401 median cross-overs and temporary widening of existing Palace Rd bridge for construction staging purposes.	Construction cost includes replacement of eastbound Palace Road structure including provisions for potential future southbound left-turn lane beneath bridge, new ramp and speed change lane construction, rock excavation in southeast quadrant, Hwy 401 median cross-overs and temporary widening of existing Palace Rd bridge for construction staging purposes.	Construction cost includes replacement of eastbound Palace Road structure including provisions for potential future southbound left-turn lane beneath bridge and off-ramp speed change lane on bridge, long length of new ramps and speed change lane construction, major rock excavation in southeast quadrant, Hwy 401 median cross-overs and temporary widening of existing Palace Rd bridge for construction staging purposes.	Construction cost includes new Palace Road structure over Highway 401, speed change lane beneath Palace Road bridge, widening of Napanee River bridge, Palace Road realignment including additional earth grading requirements, new ramp and speed change lane construction.	Construction cost includes new Palace Road structure over Highway 401 including provisions for potential future southbound left-turn lane on bridge, widening of Napanee River bridge, Palace Road realignment including additional earth grading requirements, new ramp and speed change lane construction.	Construction cost includes new Palace Road structure over Highway 401 (with reduced bridge skew angle relative to other options), widening of Napanee River bridge, Palace Road realignment including additional earth grading requirements, new ramp and speed change lane construction, and additional pavement cost of roundabout							
						Measure	\$6,960,000	\$6,500,000	\$8,350,000	\$6,330,000	\$6,920,000	\$6,950,000							
						Score (/5)	4.55	4.87	3.79	5.00	4.57	4.55							
						Weighted Score	5.1	5.5	4.2	5.6	5.1	5.5							
	Life Cycle / Maintenance Cost (20%)	20%	High Cost / Maintenance (1) to Low Cost / Maintenance (5)	14.0%	1.4%	Description	Highway 401 bridge crossing over Palace Road will result in higher long-term maintenance costs (e.g. future bridge rehabilitation staging requirements)	Highway 401 bridge crossing over Palace Road will result in higher long-term maintenance costs (e.g. future bridge rehabilitation staging requirements)	Highway 401 bridge crossing over Palace Road will result in higher long-term maintenance costs (e.g. future bridge rehabilitation staging requirements)	Palace Road bridge crossing over Highway 401 will result in slightly lower long-term maintenance costs (e.g. future bridge rehabilitation staging requirements), though additional lane on Napanee River bridge increases future rehabilitation costs.	Palace Road bridge crossing over Highway 401 will result in slightly lower long-term maintenance costs (e.g. future bridge rehabilitation staging requirements), though additional lane on Napanee River bridge increases future rehabilitation costs.	Palace Road bridge crossing over Highway 401 will result in slightly lower long-term maintenance costs (e.g. future bridge rehabilitation staging requirements), though maintenance costs of roundabout are higher and additional lane on Napanee River bridge increases future rehabilitation costs.							
						Measure	Moderate-High	Moderate-High	Moderate-High	Low-Moderate	Low-Moderate	Moderate							
						Score (/5)	2	2	2	4	4	3							
						Weighted Score	0.6	0.6	0.6	1.1	1.1	0.8							
Utilities (30%)	Impacts to existing and planned utilities (100%)	100%	High Impacts (1) to Low Impacts (5)	30.0%	3.0%	Description	Anticipated minor impacts to underground Bell on east side of Palace Road and overhead hydro line	Anticipated impacts to overhead hydro transmission corridor crossing of Highway 401 (relocation or modification of one hydro tower), and to underground Bell on east side of Palace Road	Anticipated impacts to overhead hydro transmission corridor crossing of Highway 401 (relocation or modification of one hydro tower), and to underground Bell on east side of Palace Road	Anticipated impacts to overhead hydro transmission corridor crossing of Highway 401 (relocation or modifications to two hydro towers) due to Palace Road grade raise, underground watermain and gas mains, and underground and overhead Bell and hydro lines along Palace Road	Anticipated impacts to overhead hydro transmission corridor crossing of Highway 401 (relocation or modifications to two hydro towers) due to Palace Road grade raise, underground watermain and gas mains, and underground and overhead Bell and hydro lines along Palace Road	Anticipated impacts to overhead hydro transmission corridor crossing of Highway 401 (relocation or modifications to two hydro towers) due to Palace Road grade raise, underground watermain and gas mains, and underground and overhead Bell and hydro lines along Palace Road							
						Measure	Low-Moderate Impacts	Moderate Impacts	Moderate Impacts	High Impacts	High Impacts	High Impacts							
						Score (/5)	4	3	3	1	1	1							
						Weighted Score	2.4	1.8	1.8	0.6	0.6	0.6							
Score for Cost and Constructability Category (Out of 5)							4.03	3.91	3.30	3.66	3.42	3.56							
Overall Weighted Score for Cost and Constructability Category (Out of 10)							8.05	7.81	6.61	7.32	6.84	7.11							
Total Weighted Average Score						/5	3.18	3.12	3.00	3.14	3.06	3.10							
Overall Total Score						/100	76.61	74.51	72.18	82.42	77.44	75.93							

EVALUATION SUMMARY - PALACE ROAD INTERCHANGE, SOUTH SIDE

Category		Alt E-S-2 - Standard Buttonhook with Minor Palace Road Realignment	Alt E-S-4 -Diamond with Minor Palace Road Realignment	Alt E-S-7 - Parclo B with Minor Palace Road Realignment	Alt W-S-2 - Standard Buttonhook with Palace Road Westerly Realignment	Alt W-S-4 - Diamond with Palace Road Westerly Realignment	Alt W-S-5 - Diamond with Roundabout and Palace Road Westerly Realignment	Alt W-S-7 - Parclo B with Roundabout and Palace Road Westerly Realignment	EVALUATION SUMMARY
Transportation (55% Weight)									All alternatives are anticipated to operate well with relatively minor intersection delays and queuing in the short and long-term and have generally good overall geometrics. The existing alignment alternatives (Alts E-S-2, E-S-4 and E-S-7) will require reduction to single lane along Palace Road during construction/bridge replacements (with temporary traffic signals), as well as a temporary widening of one existing Palace Road structure and a Highway 401 median cross-over. In addition, future rehabilitations of the new structures along the existing alignment will have significantly greater impacts to Highway 401 traffic operations including likely lane reductions. Conversely, future bridge rehabilitations for the westerly realignment alternatives can generally be undertaken with minimal impacts to Highway 401. Alternatives E-S-4 and E-S-7 have on-ramps which require a steep vertical incline that may slow down the acceleration of vehicles and create safety concerns with merging traffic, while Alternatives W-S-4 and W-S-5 are anticipated to require retaining walls between Highway 401 and the off-ramps given the grade differential. In addition, the ramp terminal intersections for Alternatives E-S-4, E-S-7 and W-S-4 are located on horizontal curves which result in less than desirable turning sight distance to and from the intersections. While the roundabout alternatives (W-S-5 and W-S-7) eliminate direct left-turns which is anticipated to reduce the severity of collisions, they also are considered less compatible with truck traffic including Long Combination Vehicles (LCV's) and represent an unfamiliar configuration for many drivers resulting in potentially increased collision risk. Alternative W-S-2 has the best overall geometrics including adequate sight distance to and from the ramp terminal intersection and is preferred for both short term construction impacts and long-term traffic disruption during future construction works, and is therefore preferred from a Transportation perspective.
		41.4	36.2	35.9	48.0	42.1	40.9	40.8	
Natural Environment (15% Weight)									Alternatives E-S-2, W-S-2, W-S-4 and W-S-5 require widening of the Napanee River bridge which results in greater potential for impacts to fish and fish habitat and groundwater resources, while Alternative E-S-4 may result in minor impacts to the existing ditch outletting to the Napanee River south of Highway 401. While Alternatives E-S-7 and W-S-7 result in low potential for impacts to fish and fish habitat, they also impact a large area of existing woodlot / forest community in the southeast quadrant of the interchange. All other options also impact a smaller portion of this woodlot. Alternatives E-S-2 and W-S-2 also impact a larger area of Cultural Meadow communities (non-woodlot vegetation). All alternatives have some potential to impact groundwater due to construction activities. The relative impacts to fish and fish habitat are considered more significant than impacts to the woodlot in the southeast quadrant, and Alternative E-S-4 is therefore slightly preferred from a Natural Environment perspective, followed closely by all other alternatives.
		9.8	11.7	10.9	10.3	11.0	11.0	10.9	
Socio-Economic Environment (15% Weight)									The ramp terminal intersections for Alternatives E-S-2 and W-S-2 are located adjacent to residential properties, which results in the greatest potential for increased noise levels and greater aesthetic impacts and light glare to sensitive viewers, although these impacts can be partially mitigated through landscaping treatments (e.g. plantings). All options except Alternatives W-S-2 and W-S-5 cross one possible location of contaminated soils due to spills. No temporary or permanent residential property impacts are anticipated with the existing alignment alternatives (E-S-2, E-S-4 and E-S-7), while the four realignment to west alternatives (W-S-2, W-S-4, W-S-5 and W-S-7) are each anticipated to result in minor residential driveway impacts due to Palace Road profile modifications. All alternatives are anticipated to have some impact to Palace Village (property encroachment not impacting operations and/or driveway impacts), however the realignment to west options are anticipated to require closure of the north entrance. Given the above impacts, Alternatives E-S-4 and E-S-7 are slightly preferred from a Socio-Economic perspective.
		13.3	14.3	14.3	12.8	13.5	13.4	13.3	
Cultural Environment (5% Weight)									All of the alternatives have low potential to impact built heritage features / cultural heritage landscapes, while they all have some potential to impact archaeological resources given either the widening of the Napanee River bridge (E-S-2, W-S-2 , W-S-4 and W-S-5) or encroachment into one woodlot (E-S-4, E-S-7 and W-S-7). The potential archaeological impacts associated with encroachment into the woodlot in the southeast quadrant of the interchange are considered less significant than the impacts associated with widening of the Napanee River bridge structure. As such, Alternatives E-S-4, E-S-7 and W-S-7 are considered slightly preferred from a Cultural Environment perspective.
		4.0	4.5	4.5	4.0	4.0	4.0	4.5	
Cost (10% Weight)									The existing alignment alternatives (E-S-2, E-S-4 and E-S-7) require temporary widening of one existing Palace Road structure and a Highway 401 median cross-over to facilitate construction staging requirements, and are also anticipated to have slightly higher long-term maintenance and life-cycle costs. However, the cost of these staging works are somewhat offset by a more expensive bridge structure over Highway 401 and the greater length of new road construction including higher grading costs required for the realignment to the west alternatives (W-S-2, W-S-4, W-S-5 and W-S-7), along with impacts to the hydro transmission corridor with the westerly realignment options. Of the existing alignment alternatives, the slightly higher construction cost of Alternative E-S-2 offsets the impacts to the hydro transmission corridor with Alternative E-S-4 and these options are considered equally preferred from a Cost and Constructability perspective.
		8.1	7.8	6.6	7.3	6.8	6.5	7.1	
OVERALL ASSESSMENT	TOTAL SCORE	76.6	74.5	72.2	82.4	77.4	75.9	76.6	Alternatives E-S-4 and E-S-7 avoid widening of the Napanee River bridge and locate the ramp terminal intersection away from existing residential properties, reducing potential noise and aesthetic impacts to sensitive receivers. However, both alternatives impact the existing woodlot in the southeast quadrant of the interchange, while Alternative E-S-4 directly impacts the existing overhead hydro transmission corridor crossing of Highway 401 and E-S-7 is the most costly alternative. These two options will also result in significant long-term traffic disruption during future bridge rehabilitations, the ramp terminal intersection for both options is located on a horizontal curve with less than desirable sight distance, and the eastbound on-ramp requires a steep vertical incline to enter Highway 401. These options are therefore not preferred. The two roundabout options (Alternatives W-S-5 and W-S-7) eliminate left-turn maneuvers at the intersection and reduce the size of the structure over Highway 401. However, they also have a high complexity of signage, impact the existing hydro transmission corridor over Highway 401, result in major impacts to Palace Road and ramp access during construction, and impact Palace Village and residential driveways due to the required grade raise. Alternative W-S-4 has similar disadvantages associated with the grade raise over Highway 401, and also results in the ramp terminal intersection located along a horizontal curve and in proximity to a vertical crest curve over Highway 401 which results in less than desirable sight distance. For these reasons, these three options are not preferred. Alternatives E-S-2 and W-S-2 require widening of the Napanee River bridge and place the ramp terminal intersection adjacent to existing residential properties, which can be partially mitigated through landscaping treatments (e.g. plantings). Alternative E-S-2 results in minor encroachment into the woodlot in the southeast quadrant of the interchange and has a slightly higher overall construction cost. The vertical grade raise of Palace Road over Highway 401 with Alternative W-S-2 impacts the existing overhead hydro transmission corridor crossing of Highway 401, and also impacts other utilities including hydro, water and gas lines. However, Alternative E-S-2 will require reduction to single lane along Palace Road during construction/bridge replacements (with temporary traffic signals), as well as a temporary widening of one existing Palace Road structure and construction of a Highway 401 median cross-over. In addition, future rehabilitations of the new structures along the existing alignment will have significantly greater impacts to Highway 401 traffic operations. Conversely, future bridge rehabilitations for Alternative W-S-2 can generally be undertaken with minimal impacts to Highway 401 and may result in lower life-cycle costs / maintenance costs due to reduced staging impacts to Highway 401 traffic. Existing ramp operations can also be maintained during construction with the exception of short-duration closures, whereas Alternative E-S-2 requires temporary closure of the eastbound on-ramp. As such, Alternative W-S-2 (Buttonhook with Palace Road Realignment) is the preferred overall south-side interchange alternative.
	RANK	3	6	7	1	2	5	4	
	RECOMMENDATION	NOT RECOMMENDED	NOT RECOMMENDED	NOT RECOMMENDED	TECHNICALLY PREFERRED ALTERNATIVE	NOT RECOMMENDED	NOT RECOMMENDED	NOT RECOMMENDED	
Legend									

Appendix F – Public Notification and Correspondence

**Notice of Study Commencement
January 2016**

ONTARIO GOVERNMENT NOTICE NOTICE OF STUDY COMMENCEMENT

Preliminary Design and Class Environmental Assessment Studies

Highway 401 Interchange Improvements at County Road 41 (G.W.P. 4459-04-00) and at Palace Road (G.W.P. 4197-13-00)

THE PROJECTS

The Ontario Ministry of Transportation (MTO) has retained AECOM to undertake two separate Preliminary Design and Class Environmental Assessment Studies for improvements to the Highway 401 / County Road 41 interchange (G.W.P. 4459-04-00) and the Highway 401 / Palace Road interchange (G.W.P. 4197-13-00). Both projects are located in the Town of Greater Napanee within the County of Lennox and Addington.

These studies will examine interim and long-term interchange operational improvements, median improvements on Highway 401, replacement and/or widening of the Highway 401 bridges, pavement rehabilitation, drainage improvements, traffic signals, illumination, and traffic staging (including potential detours on County Road 41 and Palace Road) during construction.

THE PROCESS

Both studies will follow the approved planning process for a Group 'B' project under the MTO *Class Environmental Assessment for Provincial Transportation Facilities (2000)*.

Alternatives will be generated and evaluated based on technical and environmental factors and in consultation with public stakeholders, municipalities and government agencies. Two Public Information Centres (PICs) will be held for the Highway 401 / County Road 41 interchange (G.W.P. 4459-04-00) and two PICs will be held for the Highway 401 / Palace Road interchange (G.W.P. 4197-13-00) to provide interested parties with the opportunity to discuss the project and provide input to the Project Team.

A Transportation Environmental Study Report (TESR) will be prepared for each study and made available for public review at the completion of each study which will document:

- The need and justification for the project;
- Existing environmental conditions;
- The generation, assessment and evaluation of alternatives;
- The preferred alternative;
- A summary of potential environmental issues and mitigation measures; and,
- A summary of consultation undertaken throughout the study

Notification, advising of the times and locations of the PICs and of the availability of the TESRs for review, will be published in this newspaper.

COMMENTS

To obtain additional information, provide initial comments, or to be placed on the mailing list for either of these studies, please contact the Project Team as follows:

Tina White

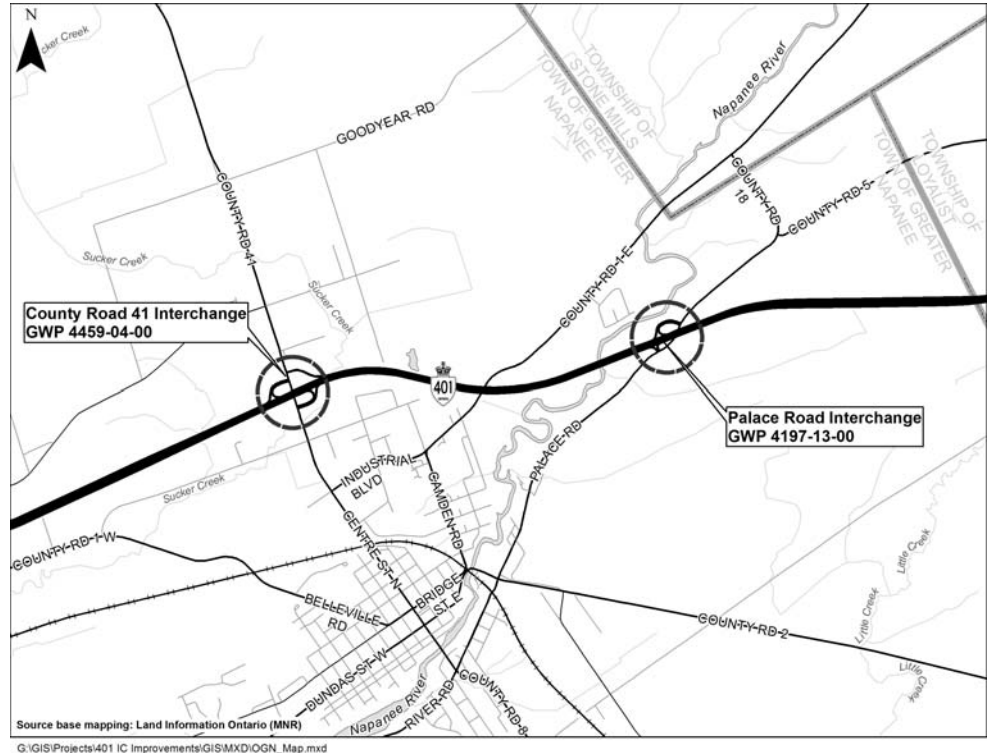
Senior Project Manager
Planning and Design
Ministry of Transportation, Eastern Region
1355 John Counter Boulevard, Postal Bag 4000
Kingston, ON K7L 5A3
Tel: 613-545-4871
Toll Free: 1-800-267-0295
Fax: 613-540-5106
Email: tina.white@ontario.ca

Tim Sorochinsky, P.Eng.

Consultant Project Manager
AECOM
4th Floor, 30 Leek Crescent
Richmond Hill, ON L4B 4N4
Tel: 905-882-3522
Fax: 905-882-4399
E-mail: tim.sorochinsky@aecom.com

Fred Leech

Consultant Environmental Planner
AECOM
201-45 Goderich Road
Hamilton, ON L8E 4W8
Tel: 905.578.3040
Fax: 905.578.4129
Email: fred.leech@aecom.com



Comments are being collected to assist MTO in meeting the requirements of the *Environmental Assessment Act*. This material will be maintained on file for use during the study 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.

January 18, 2016

External Agency Letter

«Name»

«Organization»

«Address»

Dear «Greeting»:

RE: Notice of Study Commencement

Preliminary Design and Class Environmental Assessment Studies:

- **Highway 401 Interchange Improvements at County Road 41, G.W.P. 4459-04-00; and**
- **Highway 401 Interchange Improvements at Palace Road, G.W.P. 4197-13-00**

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These studies will examine interim and long-term interchange operational improvements, median improvements on Highway 401, replacement and/or widening of the Highway 401 bridges, pavement rehabilitation, drainage improvements, traffic signals, illumination, and traffic staging (including potential detours on County Road 41 and Palace Road) during construction.

Both studies will follow the approved planning process for a Group 'B' project under the MTO *Class Environmental Assessment for Provincial Transportation Facilities (2000)*.

Alternatives will be generated and evaluated based on technical and environmental factors and in consultation with public stakeholders, municipalities and government agencies. Two Public Information Centres (PICs) will be held the Highway 401 / County Road 41 interchange (G.W.P. 4459-04-00) and two PICs will be held for the Highway 401 / Palace Road interchange (G.W.P. 4197-13-00) to provide interested parties with the opportunity to discuss the project and provide input to the Project Team.

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Notification, advising of the times and locations of the PICs and of the availability of the TESRs for review, will be published in local newspapers and mailed to those on the study mailing list.

The purpose of this letter is to notify your organization of the study commencement (refer to the enclosed "Notice of Study Commencement"). On the attached Contact Information Form, please indicate whether your organization has an interest in either of these studies and who will act as



your organization's contact for this project. In order to assist us with our planning process, please also indicate if the above noted project will affect the delivery of your organization's programs or services. A reply by Friday February 19, 2016 would be appreciated.

If you would like to provide comments, or require further information regarding this study, please feel free to contact the undersigned at 905-390-2030 or Fred.Leech@aecom.com.

Thank you for your cooperation and assistance.

Yours truly,
AECOM

A handwritten signature in black ink, appearing to read "Fred Leech". The signature is fluid and cursive, with the first and last names being clearly legible.

Fred Leech
Senior Environmental Planner

Cc. T. White - Ministry of Transportation Project Manager
 L. Skoblenick - Ministry of Transportation Environmental Planner
 T. Sorochinsky - AECOM Project Manager
 M. Weldon - AECOM Deputy Project Manager

Encl. Notice of Study Commencement

Ministry of Transportation

Planning and Design Section
1355 John Counter Boulevard
Postal Bag 4000
Kingston, Ontario K7L 5A3
Tel.: 613 545-4871
Fax: 613-540-5106

Ministère des Transports

Section de la planification et de la conception
1355, boulevard John Counter
CP/Service de sacs 4000
Kingston (Ontario) K7L 5A3
Tél.: 613 545-4871
Téléc.: 613 540-5106



January 18, 2016

MP/MPP Letter

«Name»

«Organization»

«Address»

Dear «Greeting»:

RE: Notice of Study Commencement**Preliminary Design and Class Environmental Assessment Studies:**

- **Highway 401 Interchange Improvements at County Road 41, G.W.P. 4459-04-00; and**
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The purpose of this letter is to notify you of the study commencement. The enclosed Notice of Study Commencement will appear in the Napanee Beaver and the Napanee Guide on Thursday January 21, 2016. The enclosed notice will also appear on NapaneeGuide.com.

If you would like to provide comments, or if you require further information regarding this study, please feel free to contact the undersigned at 613-545-4871 (toll free: 1-800-267-0295, ext. 4871).

Thank you for your cooperation and assistance.

Yours truly,
Ministry of Transportation

Tina White
Senior Project Manager
tina.white@ontario.ca

cc.	L. Skoblenick	- Ministry of Transportation, Environmental Planner
	T. Sorochinsky	- AECOM Consultant Project Manager
	M. Weldon	- AECOM Consultant Deputy Project Manager
	F. Leech	- AECOM Senior Environmental Planner

Encl. Notice of Study Commencement

January 18, 2016

Indigenous and Northern Affairs Canada Letter

«Name»

«Organization»

«Address»

Dear «Greeting»:

RE: Notice of Study Commencement

Preliminary Design and Class Environmental Assessment Studies:

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Aboriginal consultation is a key component of the project. **The purpose of this letter is to seek your assistance in identifying any Aboriginal Communities who may have an interest in either of these projects, so that we may engage them in constructive consultation. A reply by Friday February**

19, 2016 would be appreciated. To create a comprehensive Aboriginal consultation program, the following Aboriginal Communities have been identified and will be contacted:

- Aamjiwnaang
- Alderville First Nation
- Aundeck-Omni-Kaning
- Beausoleil
- Chippewas of Georgina Island
- Chippewas of Kettle and Stony Point
- Chippewas of Nawash First Nation
- Chippewas of Rama First Nation
- Chippewas of the Thames First Nation
- Curve Lake
- Hiawatha First Nation
- M'Chigeeng First Nation
- Mississauga's of Scugog Island First Nation
- Mississaugas of the Credit
- Mohawks of Akwesasne
- Mohawks of the Bay of Quinte
- Metis Nation of Ontario
- Saugeen
- Sheguiandah
- Six Nations of the Grand River
- Walpole Island
- Zhiibaahaasing First Nation

An initial contact letter is also being provided to the Ontario Ministry of Aboriginal Affairs for further review and response.

If you would like to provide comments, or require further information regarding this study, please feel free to contact the undersigned at 905-390-2030 or Fred.Leech@aecom.com.

Thank you for your cooperation and assistance.

Yours truly,
AECOM



Fred Leech
Senior Environmental Planner

Cc.	T. White	- Ministry of Transportation Project Manager
	L. Skoblenick	- Ministry of Transportation Environmental Planner
	T. Sorochinsky	- AECOM Project Manager
	M. Weldon	- AECOM Deputy Project Manager

Encl. Notice of Study Commencement

January 18, 2016

Ministry of Aboriginal Affairs Letter

«Name»

«Organization»

«Address»

Dear «Greeting»:

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- Mississaugas of the Credit
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	L. Skoblenick	- Ministry of Transportation Environmental Planner
	T. Sorochinsky	- AECOM Project Manager
	M. Weldon	- AECOM Deputy Project Manager

Encl. Notice of Study Commencement

January 18, 2016

Public Letter

«Name»

«Organization»

«Address»

Dear «Greeting»:

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Encl. Notice of Study Commencement

Preliminary Design and Class EA Studies
Highway 401 Interchange Improvements at County Road 41 (G.W.P. 4459-04-00)
Highway 401 Interchange Improvements at Palace Road (G.W.P. 4197-13-00)

Contact Information Form

1.) Does your organization wish to participate in the studies and continue to receive notices of project activities and information as these studies progress?

- | | | | | |
|--|-----|--------------------------|----|--------------------------|
| • Hwy 401 / County Rd 41 Interchange (G.W.P. 4459-04-00) | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> |
| • Hwy 401 / Palace Rd Interchange (G.W.P. 4197-13-00) | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> |

2.) If your organization wishes to participate in these studies, please specify who will act as the Project Team's contact.

NAME: _____

TITLE: _____

DEPARTMENT: _____

ORGANIZATION: _____

MAILING ADDRESS: _____

PHONE NUMBER: _____

FAX: _____

E-MAIL ADDRESS: _____

3.) Please indicate if either of the above noted projects will affect the delivery of your organization's programs or services, and/or any other relevant information in this regard.

Submitted By: _____

Your information and comments will be kept on file for use during the study. Please submit this form by **Friday February 19, 2016** to:

Fred Leech
Consultant Environmental Planner
AECOM
201-45 Goderich Road
Hamilton, ON L8E 4W8
Tel. 905.578.3040
Fax: 905.578.4129
Email: fred.leech@aecom.com

Public Information Centre #1
July 2016

ONTARIO GOVERNMENT NOTICE

NOTICE OF PUBLIC INFORMATION CENTRE #1

Preliminary Design and Class Environmental Assessment Studies

Highway 401 Interchange Improvements at County Road 41 (G.W.P. 4459-04-00) and at Palace Road (G.W.P. 4197-13-00)

THE PROJECTS

The Ontario Ministry of Transportation (MTO) has retained AECOM to undertake two separate Preliminary Design and Class Environmental Assessment Studies for improvements to the Highway 401 / County Road 41 interchange (G.W.P. 4459-04-00) and the Highway 401 / Palace Road interchange (G.W.P. 4197-13-00). Both projects are located in the Town of Greater Napanee within the County of Lennox and Addington.

THE PROCESS

Both studies are following the approved planning process for a Group 'B' project under the MTO Class Environmental Assessment for Provincial Transportation Facilities (2000). Two Public Information Centres (PICs) will be held for each study to provide interested parties with the opportunity to discuss the projects and provide input to the Project Team. A Transportation Environmental Study Report (TESR) will be prepared for each study and made available for public review at the completion of each study.

PUBLIC INFORMATION CENTRE #1

The first of two PICs has been arranged for each study to introduce the studies and present the following for comment: existing conditions, need for improvements, alternatives being considered, criteria proposed to evaluate the alternatives, and next steps. The second PIC for each project will occur early 2017 and will present the evaluation of the alternatives, the Technically Preferred Plan, potential environmental impacts and proposed mitigation measures. Members of the public, residents and stakeholders are invited to attend the first PIC as follows:

County Road 41 (G.W.P. 4459-04-00)

Wednesday July 27, 2016
4:00 p.m. to 8:00 p.m.

Strathcona Paper Centre, Lafarge Banquet Hall
16 McPherson Drive, Greater Napanee

Palace Road (G.W.P. 4197-13-00)

Thursday July 28, 2016
4:00 p.m. to 8:00 p.m.

Strathcona Paper Centre, Lafarge Banquet Hall
16 McPherson Drive, Greater Napanee

The PIC will be an informal drop-in centre and representatives from the MTO and the Consultant Team will be available to answer questions and discuss the studies.

COMMENTS

To obtain additional information, provide comments, or to be placed on the mailing list for either of these studies, please contact the Project Team as follows:

Tina White

Senior Project Manager
Ministry of Transportation, Eastern Region
1355 John Counter Boulevard, Postal Bag 4000
Kingston, ON K7L 5A3
Tel: 613-545-4871, Toll Free: 1-800-267-0295
Fax: 613-540-5106
Email: tina.white@ontario.ca

Tim Sorochinsky, P.Eng.

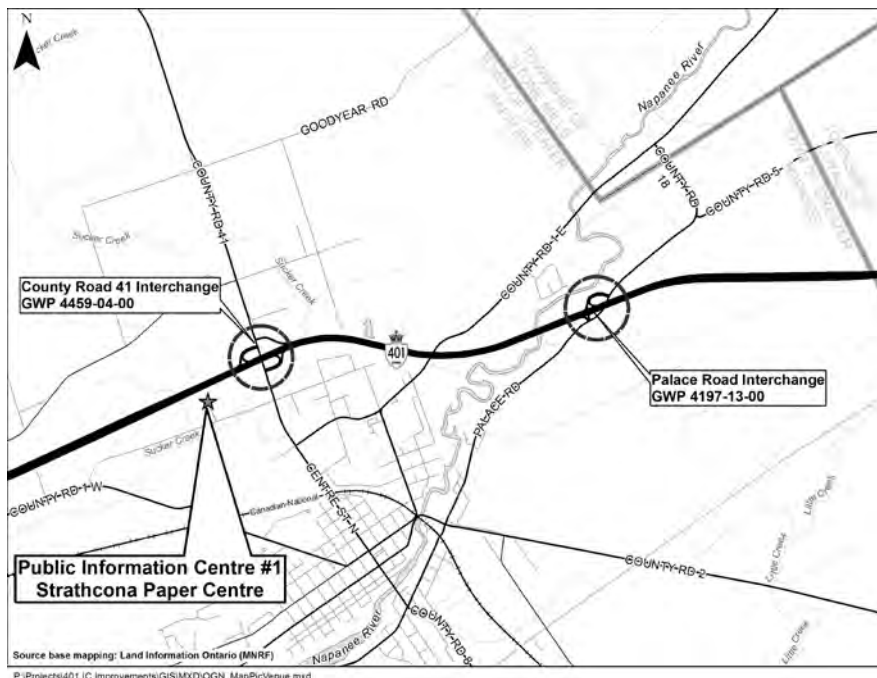
Consultant Project Manager
AECOM
4th Floor, 30 Leek Crescent
Richmond Hill, ON L4B 4N4
Tel: 905-882-3522
Fax: 905-882-4399
E-mail: tim.sorochinsky@aecom.com

Fred Leech

Consultant Environmental Planner
AECOM
201-45 Goderich Road
Hamilton, ON L8E 4W8
Tel: 905.578.3040
Fax: 905.578.4129
Email: fred.leech@aecom.com

If you have any accessibility requirements in order to participate in these projects, please contact one of the Project Team members listed above.

Comments are being collected to assist MTO in meeting the requirements of the *Environmental Assessment Act*. This material will be maintained on file for use during the study 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.



July 11, 2016

External Agency Letter

«Name»

«Organization»

«Address»

Dear «Greeting»:

RE: Notice of Public Information Centre #1**Preliminary Design and Class Environmental Assessment Studies:**

- **Highway 401 Interchange Improvements at County Road 41, G.W.P. 4459-04-00; and**
- **Highway 401 Interchange Improvements at Palace Road, G.W.P. 4197-13-00**

The Ontario Ministry of Transportation (MTO) has retained AECOM to undertake two separate Preliminary Design and Class Environmental Assessment Studies for improvements to the Highway 401 / County Road 41 interchange (G.W.P. 4459-04-00) and the Highway 401 / Palace Road interchange (G.W.P. 4197-13-00). Both projects are located in the Town of Greater Napanee within the County of Lennox and Addington.

Both studies are following the approved planning process for a Group 'B' project under the MTO Class Environmental Assessment for Provincial Transportation Facilities (2000). Two Public Information Centres (PICs) will be held for each study to provide interested parties with the opportunity to discuss the projects and provide input to the Project Team. A Transportation Environmental Study Report (TESR) will be prepared for each study and made available for public review at the completion of each study. Notification, advising of the times and locations of the PICs and of the availability of the TESRs for review, will be published in local newspapers and mailed to those on the study mailing list.

The purpose of this letter is to notify you that the first of the two Public Information Centres (PICs) for each project has been scheduled (refer to the enclosed "Notice of Public Information Centre #1). PIC #1 for each study will present the following for comment: existing conditions, need for improvements, alternatives being considered, criteria proposed to evaluate the alternatives, and next steps. The second PIC for each project will occur early 2017 and will present the evaluation of the alternatives, the Technically Preferred Plan, potential environmental impacts and proposed mitigation measures. Your organization is invited to attend the following sessions:

County Road 41 (G.W.P. 4459-04-00)

Wednesday July 27, 2016

3:00 p.m. to 4:00 p.m.

Strathcona Paper Centre, Lafarge Banquet Hall
16 McPherson Drive, Greater Napanee**Palace Road (G.W.P. 4197-13-00)**

Thursday July 28, 2016

3:00 p.m. to 4:00 p.m.

Strathcona Paper Centre, Lafarge Banquet Hall
16 McPherson Drive, Greater Napanee

The public has been invited to attend the PIC between 4:00 p.m. and 8:00 p.m. at the same venue. The PIC will be an informal drop-in centre and representatives from the MTO and the Consultant Team will be available to answer questions and discuss the studies.

If you would like to provide comments, or require further information regarding these studies, please feel free to contact the undersigned at 905-390-2030 or Fred.Leech@aecom.com.

Thank you for your cooperation and assistance.

Yours truly,
AECOM

A handwritten signature in black ink, appearing to read "Fred Leech".

Fred Leech
Senior Environmental Planner

Cc.	T. White	- Ministry of Transportation Project Manager
	E. Pipe	- Ministry of Transportation Environmental Planner
	T. Sorochinsky	- AECOM Project Manager
	M. Weldon	- AECOM Deputy Project Manager

Encl. Notice of Public Information Centre #1

Ministry of Transportation

Planning and Design Section
1355 John Counter Boulevard
Postal Bag 4000
Kingston, Ontario K7L 5A3
Tel.: 613 545-4871
Fax: 613-540-5106

Ministère des Transports

Section de la planification et de la conception
1355, boulevard John Counter
CP/Service de sacs 4000
Kingston (Ontario) K7L 5A3
Tél.: 613 545-4871
Télééc.: 613 540-5106



July 11, 2016

First Nations Community Letter

«Name»

«Organization»

«Address»

Dear «Greeting»:

RE: Notice of Public Information Centre #1**Preliminary Design and Class Environmental Assessment Studies:**

- **Highway 401 Interchange Improvements at County Road 41, G.W.P. 4459-04-00; and**
- **Highway 401 Interchange Improvements at Palace Road, G.W.P. 4197-13-00**

The Ontario Ministry of Transportation (MTO) has retained AECOM to undertake two separate Preliminary Design and Class Environmental Assessment Studies for improvements to the Highway 401 / County Road 41 interchange (G.W.P. 4459-04-00) and the Highway 401 / Palace Road interchange (G.W.P. 4197-13-00). Both projects are located in the Town of Greater Napanee within the County of Lennox and Addington.

Both studies are following the approved planning process for a Group 'B' project under the MTO Class Environmental Assessment for Provincial Transportation Facilities (2000). Two Public Information Centres (PICs) will be held for each study to provide interested parties with the opportunity to discuss the projects and provide input to the Project Team. A Transportation Environmental Study Report (TESR) will be prepared for each study and made available for public review at the completion of each study. Notification, advising of the times and locations of the PICs and of the availability of the TESRs for review, will be published in local newspapers and mailed to those on the study mailing list.

The purpose of this letter is to notify you that the first of the two Public Information Centres (PICs) for each project has been scheduled (refer to the enclosed "Notice of Public Information Centre #1). PIC #1 for each study will present the following for comment: existing conditions, need for improvements, alternatives being considered, criteria proposed to evaluate the alternatives, and next steps. The second PIC for each project will occur early 2017 and will present the evaluation of the alternatives, the Technically Preferred Plan, potential environmental impacts and proposed mitigation measures. Your council and community members are invited to attend the following sessions:

County Road 41 (G.W.P. 4459-04-00)

Wednesday July 27, 2016

3:00 p.m. to 4:00 p.m.

Strathcona Paper Centre, Lafarge Banquet Hall
16 McPherson Drive, Greater Napanee

Palace Road (G.W.P. 4197-13-00)

Thursday July 28, 2016

3:00 p.m. to 4:00 p.m.

Strathcona Paper Centre, Lafarge Banquet Hall
16 McPherson Drive, Greater Napanee

The public has been invited to attend the PIC between 4:00 p.m. and 8:00 p.m. at the same venue. The PIC will be an informal drop-in centre and representatives from the MTO and the Consultant Team will be available to answer questions and discuss the studies.

Enclosed is a copy of the PIC notice should you wish to post it for members of your community to view. If you would like to provide comments, or if you require further information regarding these studies, please feel free to contact the undersigned at 613-545-4871 (toll free: 1-800-267-0295, ext. 4871). In addition, if you are interested in meeting as a result of receiving this letter, please contact the undersigned to arrange a meeting at your earliest convenience.

Thank you for your cooperation and assistance.

Yours truly,
Ministry of Transportation

Tina White
Senior Project Manager
tina.white@ontario.ca

cc.	E. Pipe	- Ministry of Transportation, Environmental Planner
	T. Sorochinsky	- AECOM Consultant Project Manager
	M. Weldon	- AECOM Consultant Deputy Project Manager
	F. Leech	- AECOM Senior Environmental Planner

Encl. Notice of Public Information Centre #1

Ministry of Transportation

Planning and Design Section
1355 John Counter Boulevard
Postal Bag 4000
Kingston, Ontario K7L 5A3
Tel.: 613 545-4871
Fax: 613-540-5106

Ministère des Transports

Section de la planification et de la conception
1355, boulevard John Counter
CP/Service de sacs 4000
Kingston (Ontario) K7L 5A3
Tél.: 613 545-4871
Télé.: 613 540-5106



July 7, 2016

MP/MPP Letter

«Name»

«Organization»

«Address»

Dear «Greeting»:

RE: Notice of Public Information Centre #1

Preliminary Design and Class Environmental Assessment Studies:

- **Highway 401 Interchange Improvements at County Road 41, G.W.P. 4459-04-00; and**
- **Highway 401 Interchange Improvements at Palace Road, G.W.P. 4197-13-00**

The Ontario Ministry of Transportation (MTO) has retained AECOM to undertake two separate Preliminary Design and Class Environmental Assessment Studies for improvements to the Highway 401 / County Road 41 interchange (G.W.P. 4459-04-00) and the Highway 401 / Palace Road interchange (G.W.P. 4197-13-00). Both projects are located in the Town of Greater Napanee within the County of Lennox and Addington.

Both studies are following the approved planning process for a Group 'B' project under the MTO Class Environmental Assessment for Provincial Transportation Facilities (2000). Two Public Information Centres (PICs) will be held for each study to provide interested parties with the opportunity to discuss the projects and provide input to the Project Team. A Transportation Environmental Study Report (TESR) will be prepared for each study and made available for public review at the completion of each study. Notification, advising of the times and locations of the PICs and of the availability of the TESRs for review, will be published in local newspapers and mailed to those on the study mailing list.

The purpose of this letter is to notify you that the first of the two Public Information Centres (PICs) for each project has been scheduled. The enclosed Notice of Public Information Centre #1 will appear in the *Napanee Beaver* and the *Napanee Guide* on Thursday July 14, 2016. The enclosed notice will also appear on NapaneeGuide.com.

PIC #1 for each study will present the following for comment: existing conditions, need for improvements, alternatives being considered, criteria proposed to evaluate the alternatives, and next steps. The second PIC for each project will occur early 2017 and will present the evaluation of the alternatives, the Technically Preferred Plan, potential environmental impacts and proposed mitigation measures. You are invited to attend the following sessions:

County Road 41 (G.W.P. 4459-04-00)

Wednesday July 27, 2016

3:00 p.m. to 4:00 p.m.

Strathcona Paper Centre, Lafarge Banquet Hall
16 McPherson Drive, Greater Napanee

Palace Road (G.W.P. 4197-13-00)

Thursday July 28, 2016

3:00 p.m. to 4:00 p.m.

Strathcona Paper Centre, Lafarge Banquet Hall
16 McPherson Drive, Greater Napanee

The public has been invited to attend the PIC between 4:00 p.m. and 8:00 p.m. at the same venue. The PIC will be an informal drop-in centre and representatives from the MTO and the Consultant Team will be available to answer questions and discuss the studies.

If you would like to provide comments, or if you require further information regarding these studies, please feel free to contact the undersigned at 613-545-4871 (toll free: 1-800-267-0295, ext. 4871).

Thank you for your cooperation and assistance.

Yours truly,
Ministry of Transportation

Tina White
Senior Project Manager
tina.white@ontario.ca

cc. E. Pipe - Ministry of Transportation, Environmental Planner
T. Sorochinsky - AECOM Consultant Project Manager
M. Weldon - AECOM Consultant Deputy Project Manager
F. Leech - AECOM Senior Environmental Planner

Encl. Notice of Public Information Centre #1

July 11, 2016

Public Letter

«Name»

«Organization»

«Address»

Dear «Greeting»:

RE: Notice of Public Information Centre #1**Preliminary Design and Class Environmental Assessment Studies:**

- **Highway 401 Interchange Improvements at County Road 41, G.W.P. 4459-04-00; and**
- **Highway 401 Interchange Improvements at Palace Road, G.W.P. 4197-13-00**

The Ontario Ministry of Transportation (MTO) has retained AECOM to undertake two separate Preliminary Design and Class Environmental Assessment Studies for improvements to the Highway 401 / County Road 41 interchange (G.W.P. 4459-04-00) and the Highway 401 / Palace Road interchange (G.W.P. 4197-13-00). Both projects are located in the Town of Greater Napanee within the County of Lennox and Addington.

Both studies are following the approved planning process for a Group 'B' project under the MTO Class Environmental Assessment for Provincial Transportation Facilities (2000). Two Public Information Centres (PICs) will be held for each study to provide interested parties with the opportunity to discuss the projects and provide input to the Project Team. A Transportation Environmental Study Report (TESR) will be prepared for each study and made available for public review at the completion of each study. Notification, advising of the times and locations of the PICs and of the availability of the TESRs for review, will be published in local newspapers and mailed to those on the study mailing list.

The purpose of this letter is to notify you that the first of the two Public Information Centres (PICs) for each project has been scheduled (refer to the enclosed "Notice of Public Information Centre #1"). PIC #1 for each study will present the following for comment: existing conditions, need for improvements, alternatives being considered, criteria proposed to evaluate the alternatives, and next steps. The second PIC for each project will occur early 2017 and will present the evaluation of the alternatives, the Technically Preferred Plan, potential environmental impacts and proposed mitigation measures. You are invited to attend the PICs as follows:

County Road 41 (G.W.P. 4459-04-00)

Wednesday July 27, 2016

4:00 p.m. to 8:00 p.m.

Strathcona Paper Centre, Lafarge Banquet Hall
16 McPherson Drive, Greater Napanee**Palace Road (G.W.P. 4197-13-00)**

Thursday July 28, 2016

4:00 p.m. to 8:00 p.m.

Strathcona Paper Centre, Lafarge Banquet Hall
16 McPherson Drive, Greater Napanee

The PIC will be an informal drop-in centre and representatives from the MTO and the Consultant Team will be available to answer questions and discuss the studies.

If you would like to provide comments, require further information regarding these studies, or have any accessibility requirements in order to participate in these projects, please feel free to contact the undersigned at 905-390-2030 or Fred.Leech@aecom.com.

Comments are being collected to assist MTO in meeting the requirements of the *Environmental Assessment Act*. This material will be maintained on file for use during the study 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.

Thank you for your cooperation and assistance.

Yours truly,
AECOM

A handwritten signature in black ink, appearing to read 'Fred Leech', is positioned above the printed name.

Fred Leech
Senior Environmental Planner

Cc.	T. White	- Ministry of Transportation Project Manager
	E. Pipe	- Ministry of Transportation Environmental Planner
	T. Sorochinsky	- AECOM Project Manager
	M. Weldon	- AECOM Deputy Project Manager

Encl. Notice of Public Information Centre #1



AECOM
30 Leek Cres., 4th Floor
Richmond Hill, ON
L4B 4N4
Canada
www.aecom.com

905-882-4401 tel
905-882-4399 fax

September 22, 2016

Sir/Madam
Address
Address

Dear Sir/Madam:

**RE: Preliminary Design and Class Environmental Assessment Study
Highway 401 Interchange Improvements at Palace Road, G.W.P. 4197-13-00**

The Ontario Ministry of Transportation (MTO) has retained AECOM to undertake a Preliminary Design and Class Environmental Assessment Study for improvements to the Highway 401 interchange at Palace Road (G.W.P. 4197-13-00). The study will examine the interim and long-term interchange operational improvements, replacement and/or rehabilitation of the Highway 401 bridge, pavement rehabilitation, drainage improvements, illumination, and traffic staging during construction. The project is located in the Town of Greater Napanee within the County of Lennox and Addington (see enclosed **Key Plan**).

A Public Information Centre (PIC) was held on July 28, 2016 for *the Highway 401 Interchange Improvements at Palace Road (G.W.P. 4197-13-00)*. The PIC provided information on the study area, purpose and scope, details on the timing of the study, an overview of existing conditions, problems and opportunities, the improvement alternatives under consideration and evaluation criteria, and the next steps in the environmental assessment process (**see enclosed displays and plans that were presented at the PIC**).

Based on the identified problems and opportunities at the Palace Road interchange, a number of possible interchange improvement alternatives were developed and were presented at the PIC. This long list of interchange alternatives was subjected to a screening-level assessment. This screening led to the identification of a short list of alternatives, which will be evaluated based on various evaluation criteria. The enclosed drawings illustrate the long-list of alternatives that have been considered and summarize the screening-level assessment.

As the various alternatives being considered may require the addition of lanes and the realignment of the existing highway, on and off-ramps and/or Palace Road, **we would like to advise you that your property may be potentially impacted or is in close proximity to one or more of the long-list of interchange alternatives**. As such the Project Team would like to encourage you to review the enclosed plans outlining the descriptions of the alternatives and potential property impacts so that we can address any questions and/or comments that you may have.

The next steps for this study are to assess and evaluate the short list of interchange alternatives, select a Technically Preferred Alternative and have a second round of public consultation to present to the public the Preliminary Design of the Technically Preferred Alternative. As your name is on the study mailing list, you will continue to receive public notifications on the study including information regarding the next round of consultation. In addition, all property owners impacted by the Technically Preferred Alternative will be notified of the impact in advance of the next round of consultation.

Should you wish to provide comments, or require further information, please feel free to contact the undersigned at 905-747-1783 or michael.weldon@aecom.com. Alternatively, please feel free to contact either the Consultant Senior Project Manager or the MTO Senior Project Manager listed below:

Tim Sorochinsky, P.Eng.

Consultant Senior Project Manager
AECOM
4th Floor, 30 Leek Crescent
Richmond Hill, ON L4B 4N4
Tel: 905-882-3522
Fax: 905-882-4399
Email: tim.sorochinsky@aecom.com

Tina White

Senior Project Manager
Ministry of Transportation, Eastern Region
1355 John Counter Boulevard, Postal Bag 4000
Kingston, ON K7L 5A3
Tel: 613-545-4871, Toll Free: 1-800-267-0295
Fax: 613-540-5106
Email: tina.white@ontario.ca

This study is being carried out in accordance with the approved planning process for Group 'B' undertakings under the *Class Environmental Assessment (Class EA) for Provincial Transportation Facilities (2000)*. Upon completion of the study a Transportation Environmental Study Report (TESR) will be prepared and made available for a 30-day public review period. Newspaper notices will be published and letters will be sent to the study mailing list at that time to explain the review process and identify where the TERS can be reviewed.

Comments are being collected to assist MTO in meeting the requirements of the *Environmental Assessment Act*. This material will be maintained on file for use during the study 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 this project, please contact one of the Project Team members listed above.

Thank you for your cooperation and assistance.

Sincerely,

AECOM



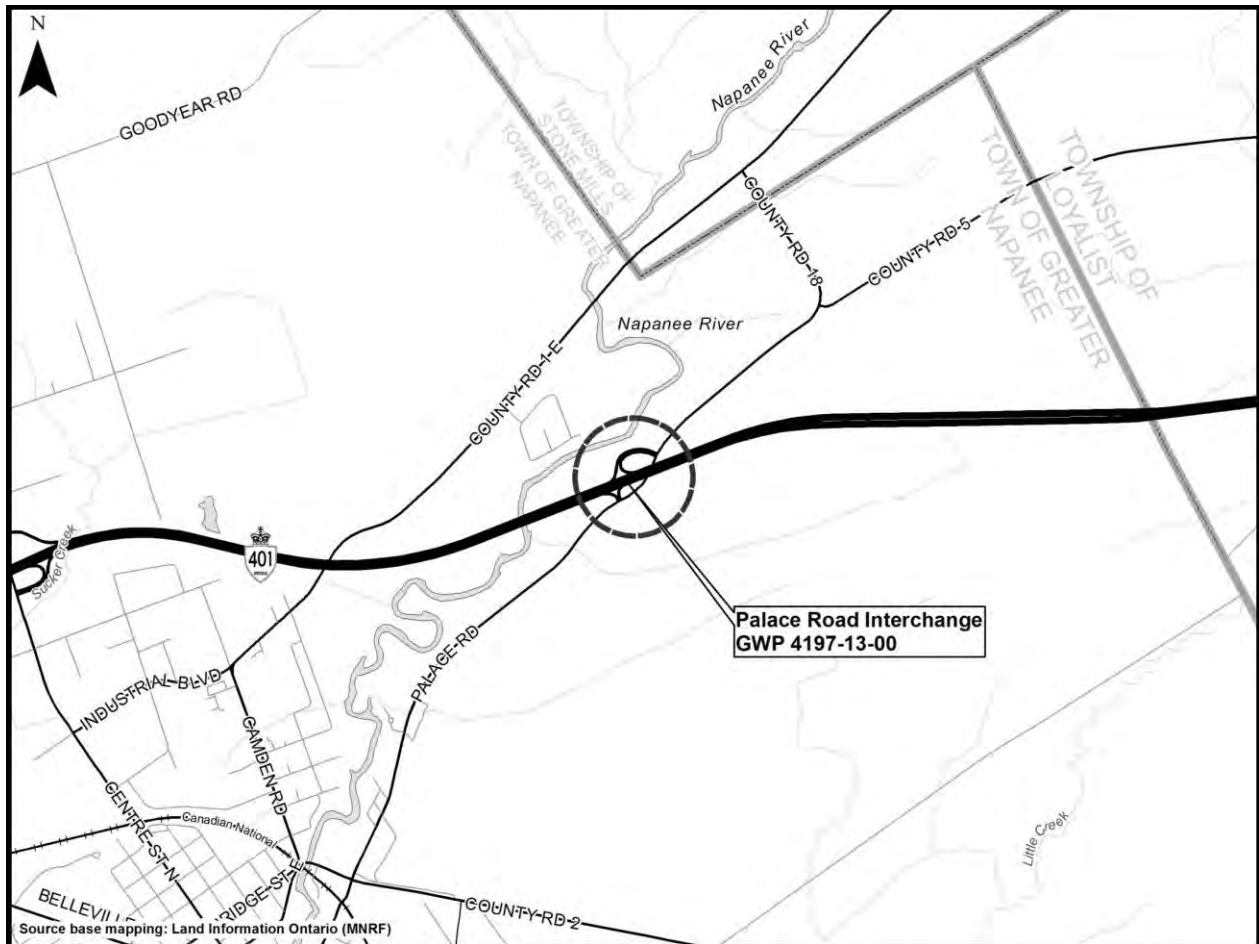
Michael Weldon, P.Eng.

30 Leek Crescent, 4th Floor
Richmond Hill, ON L4B 4N4
Tel: 905-747-1783
Email: Michael.weldon@aecom.com

Cc.	T. White	- Ministry of Transportation Senior Project Manager
	E. Pipe	- Ministry of Transportation Environmental Planner
	T. Sorochinsky	- AECOM Senior Project Manager
	F. Leech	- AECOM Senior Environmental Planner
	S. Schmied	- AECOM Environmental Planner

Encl. Notice of PIC, PIC Displays, Interchange Alternative Plans

Key Plan



Permission to Enter Requests

[Insert Date]

AECOM Reference Number: 60478166

**PROPERTY OWNER
ADDRESS**

Dear Property Owner,

**RE: Request for Permission to Enter Your Property
Highway 401 Interchange Improvements at Palace Road, G.W.P. 4197-13-00**

The Ontario Ministry of Transportation (MTO) has retained AECOM to undertake a Preliminary Design and Class Environmental Assessment Study for improvements to the Highway 401 interchange at Palace Road (G.W.P. 4197-13-00). The project is located in the Town of Greater Napanee within the County of Lennox and Addington (see enclosed **Key Plan**).

As part of this study an assessment of natural, social and cultural impacts is being undertaken within the study area. Impact assessments involve the collection of field data and observations within the study limits on lands that are both publically and privately owned to assess the existing conditions and minimize design and construction related conflicts.

In order to proceed with this study, we respectfully request permission to enter your property at [insert property address]. MTO requests that a “Permission to Enter” form be signed by the property owner or representative which will allow us to enter your property during the study for one or more occasions to complete the accepted following work:

- Collection of field data via topographic and environmental surveys and photographs, or similar activities.
- Environmental investigations which will include archaeology test pitting to uncover archaeologically significant objects. The test pitting survey involves digging 30cm by 30cm holes by hand and screening the topsoil to look for artifacts. The soil is screened over tarps so that all soil is retained, and the test pits are backfilled to grade. If sod was present, it is replaced on top so that there is no visible indication of the survey after completion.

We hope to complete the above investigations in late August or early September. A “Permission to Enter” form for your property is included with this letter. Please review the form, sign one copy and retain a copy for your files, and return a scan or photocopy back to the undersigned as soon as possible via email or mail with the attached postage paid envelope.

If you are tenants of the property noted on the attached “Permission to Enter” form, or are not the property owner, please kindly contact the undersigned, and we will arrange to forward this letter and form to the appropriate contact.

This study is being carried out in accordance with the approved planning process for Group ‘B’ undertakings under the *Class Environmental Assessment (Class EA) for Provincial Transportation Facilities (2000)*. Upon completion of the study a Transportation Environmental Study Report (TESR) will be prepared and made available for a 30-day public review period. Newspaper notices will be published and letters will be sent to the study mailing list at that time to explain the review process and identify where the TESR can be reviewed.

If you require further information about the proposed field work; require assistance in completing the form; would like to submit your form electronically, please contact the undersigned at 905-747-1783 or michael.weldon@aecom.com. Alternatively, please feel free to contact either the Consultant Senior Project Manager or the MTO Senior Project Manager listed below:

Tim Sorochinsky, P.Eng.

Consultant Senior Project Manager
AECOM
4th Floor, 30 Leek Crescent
Richmond Hill, ON L4B 4N4
Tel: 905-882-3522
Fax: 905-882-4399
Email: tim.sorochinsky@aecom.com

Tina White

Senior Project Manager
Ministry of Transportation, Eastern Region
1355 John Counter Boulevard, Postal Bag 4000
Kingston, ON K7L 5A3
Tel: 613-545-4871, Toll Free: 1-800-267-0295
Fax: 613-540-5106
Email: tina.white@ontario.ca

Comments are being collected to assist MTO in meeting the requirements of the *Environmental Assessment Act*. This material will be maintained on file for use during the study 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.

Sincerely,
AECOM Canada Ltd.

Michael Weldon, P.Eng.

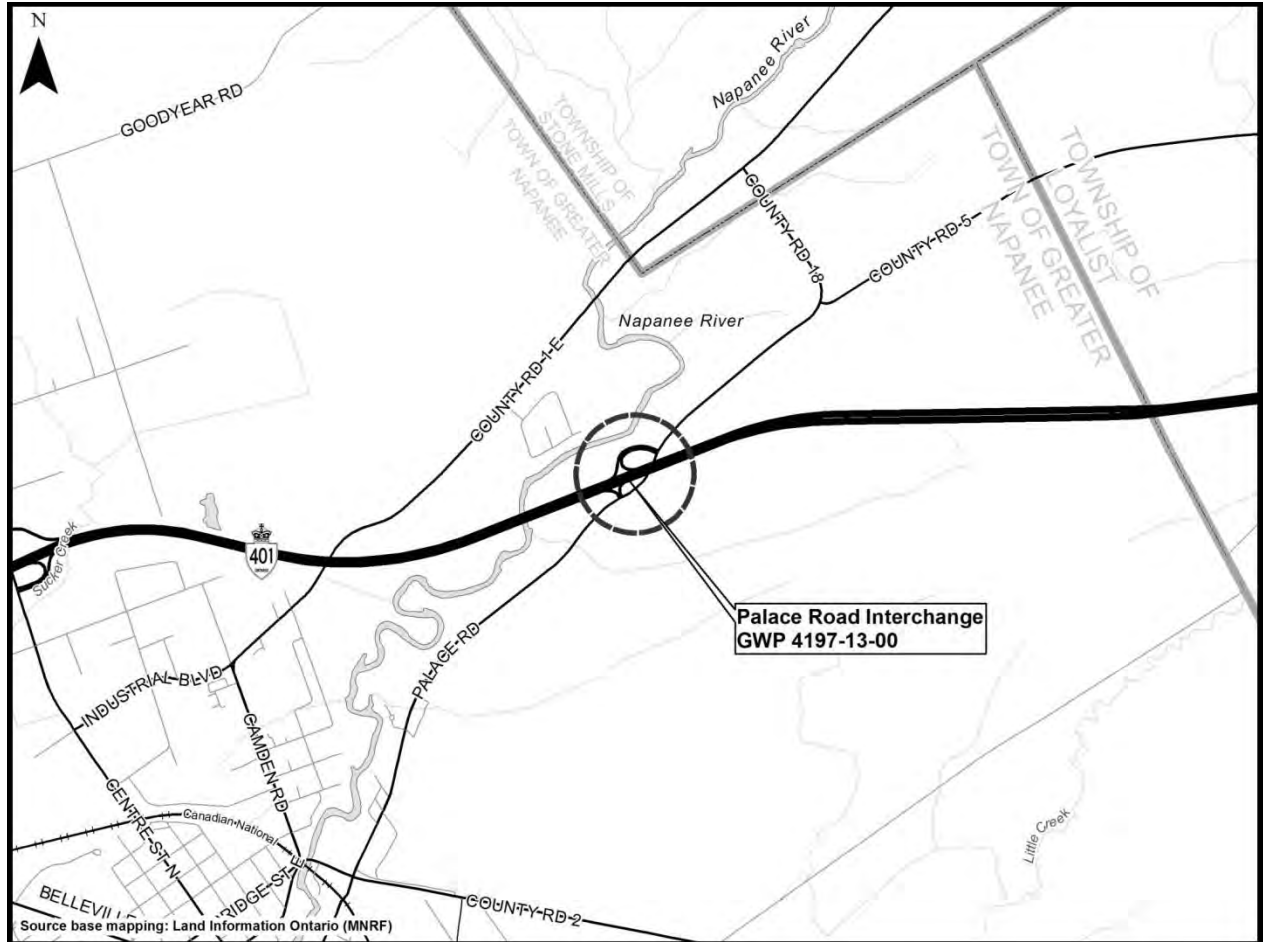
30 Leek Crescent, 4th Floor
Richmond Hill, ON L4B 4N4
Tel: 905-747-1783
Email: Michael.weldon@aecom.com

Cc.	T. White	- Ministry of Transportation Senior Project Manager
	E. Pipe	- Ministry of Transportation Environmental Planner
	T. Sorochinsky	- AECOM Senior Project Manager
	F. Leech	- AECOM Senior Environmental Planner

S. Schmied - AECOM Environmental Planner

Enclosed: Key Plan, Permission to Enter Form (2 copies)

Key Plan (G.W.P 4197-13-00)





PERMISSION TO ENTER

1.1.1 For Internal Use Only	
W.P. No.:	
Highway No.:	
Dist. No.:	Region:
P-Plan:	

Owner(s) Name and Address:

OWNER ADDRESS	PROPERTY LOCATION PROPERTY ROLL NUMBER: LOCATION:
----------------------	--

As owners of:

Lot/Block:	Concession/RP:
Town/Township:	Municipality:
Geographic Township:	Ministry Plan:
Part(s)/Sketched:	Registration #:
PIN:	Registration Division:
Registry Office:	

I/we grant permission to Her Majesty The Queen in Right of Ontario as represented by the Minister of Transportation for the province of Ontario, Her employees, agents, contractors, consultants, etc., to enter my/our property on one or more occasions between the present date and December 31st 2017 (unless otherwise indicated by me in the comments section) for the purpose of carrying out the following work:

- Visual Observations which may include the collection of field data via topographic and environmental surveys and photographs, or similar activities.
- Investigations which may require small test holes dug by hand to uncover archaeologically significant objects or similar activities.

The granting of this permission in no way constitutes a release for damages that may be caused by the work, and I/We reserve the right to file a claim for any injury, loss or damage within two years from the day on which the damage becomes evident.

The Minister assumes the risk of injury or damages, and related reasonable legal fees of the Owner(s) to defend against third party claims, arising out of the Minister’s use of the land except to the extent that the injury or damages are caused by the Owner(s)’ negligence.

Please include the following:

Telephone Number: _____

E-mail Address: _____

Comments: _____

Dated at _____ this _____ day of _____ , _____

Print Name(s) (and position held if corporation)

Print Name(s) (and position held if corporation)

Signature(s)

Signature(s)

Witness (where executing party is not a corporation)

Seal or Authority To Bind (if corporation)



PERMISSION TO ENTER

1.1.2 For Internal Use Only	
W.P. No.:	
Highway No.:	
Dist. No.:	Region:
P-Plan:	

Owner(s) Name and Address:

OWNER ADDRESS	PROPERTY LOCATION
	PROPERTY ROLL NUMBER:
	LOCATION:

As owners of:

Lot/Block:	Concession/RP:
Town/Township:	Municipality:
Geographic Township:	Ministry Plan:
Part(s)/Sketched:	Registration #:
PIN:	Registration Division:
Registry Office:	

I/we grant permission to Her Majesty The Queen in Right of Ontario as represented by the Minister of Transportation for the province of Ontario, Her employees, agents, contractors, consultants, etc., to enter my/our property on one or more occasions between the present date and December 31st 2017 (unless otherwise indicated by me in the comments section) for the purpose of carrying out the following work:

- Visual Observations which may include the collection of field data via topographic and environmental surveys and photographs, or similar activities.
- Investigations which may require small test holes dug by hand to uncover archaeologically significant objects or similar activities.

The granting of this permission in no way constitutes a release for damages that may be caused by the work, and I/We reserve the right to file a claim for any injury, loss or damage within two years from the day on which the damage becomes evident.

The Minister assumes the risk of injury or damages, and related reasonable legal fees of the Owner(s) to defend against third party claims, arising out of the Minister’s use of the land except to the extent that the injury or damages are caused by the Owner(s)’ negligence.

Please include the following:

Telephone Number: _____

E-mail Address: _____

Comments: _____

Dated at _____ this _____ day of _____ , _____

Print Name(s) (and position held if corporation)

Print Name(s) (and position held if corporation)

Signature(s)

Signature(s)

Witness (where executing party is not a corporation)

Seal or Authority To Bind (if corporation)

Public Information Centre #2
November 2017

ONTARIO GOVERNMENT NOTICE

NOTICE OF PUBLIC INFORMATION CENTRE #2

Preliminary Design and Class Environmental Assessment Studies
Highway 401 Interchange Improvements at County Road 41 (G.W.P. 4459-04-00) and at Palace Road (G.W.P. 4197-13-00)

THE PROJECTS

The Ontario Ministry of Transportation (MTO) has retained AECOM to undertake two separate Preliminary Design and Class Environmental Assessment Studies for improvements to the Highway 401 and County Road 41 interchange (G.W.P. 4459-04-00) and the Highway 401 and Palace Road interchange (G.W.P. 4197-13-00). Both projects are located in the Town of Greater Napanee within the County of Lennox and Addington.

THE PROCESS

Both studies are following the approved planning process for a Group 'B' project under the MTO *Class Environmental Assessment for Provincial Transportation Facilities* (2000).

Public Information Centre (PIC) #1 was held for each study in July 2016 to provide the public with the opportunity to discuss the project and comment on the alternatives that were being considered to address bridge requirements and undesirable interchange elements. PIC #2 is being held to provide the public with the opportunity to view and provide comments on the evaluation of alternatives, and the Preliminary Design of the preferred alternative at each interchange.

Following PIC #2, a Transportation Environmental Study Report (TESR) will be prepared for each study to document the Recommended Plan, the potential impacts, and the recommended mitigation measures to minimize environmental impacts. The TESRs will be made available to the public, other interested parties and external agencies for a 30-day public review period at public review locations in close proximity to the study area. A notice of the TESR review opportunities will be provided.

PUBLIC INFORMATION CENTRE #2

Members of the public, residents and stakeholders are invited to attend PIC #2 as follows:

Wednesday November 22, 2017
4:00 p.m. to 8:00 p.m.
Selby Community Hall
114 Pleasant Drive, Selby, ON K0K 2Z0

The PIC will be an informal drop-in centre and representatives from the MTO and the Consultant Team will be available to answer questions and discuss the studies. You are encouraged to attend the PIC and provide the Project Team with your views and comments so that they can be considered as the project progresses.

COMMENTS

To obtain additional information, provide comments, or to be placed on the mailing list for either of these studies, please contact the Project Team as follows:

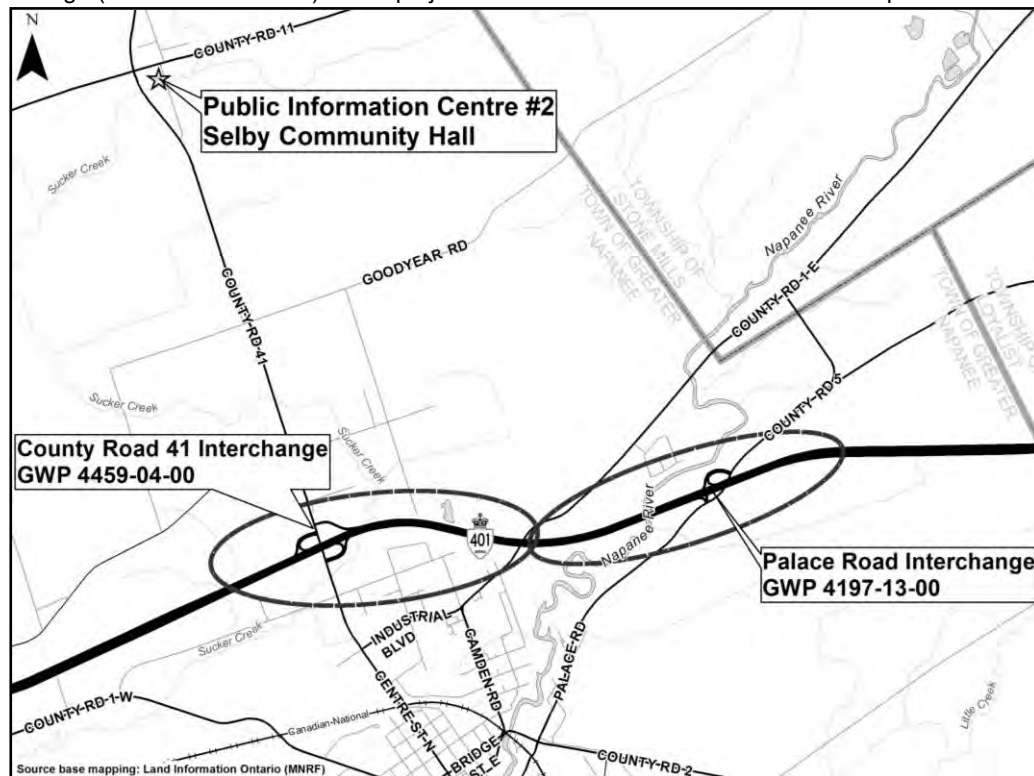
Tina White
Senior Project Manager
Ministry of Transportation, Eastern Region
1355 John Counter Boulevard, Postal Bag 4000
Kingston, ON K7L 5A3
Tel: 613-545-4871,
Toll Free: 1-800-267-0295
Email: tina.white@ontario.ca

Tim Sorochinsky, P.Eng.
Consultant Project Manager
AECOM
4th Floor, 30 Leek Crescent
Richmond Hill, ON L4B 4N4
Tel: 905-882-3522
Fax: 905-882-4399
E-mail: tim.sorochinsky@aecom.com

Fred Leech
Consultant Environmental Planner
AECOM
201-45 Goderich Road
Hamilton, ON L8E 4W8
Tel: 905.578.3040
Fax: 905.578.4129
Email: fred.leech@aecom.com

If you have any accessibility requirements in order to participate in these projects, please contact one of the Project Team members listed above.

Comments are being collected to assist MTO in meeting the requirements of the *Environmental Assessment Act*. This material will be maintained on file for use during the study 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.



November 1, 2017

External Agency Letter

«Name»

«Organization»

«Address»

Dear «Greeting»:

**RE: Notice of Public Information Centre #2
Preliminary Design and Class Environmental Assessment Studies:
Highway 401 Interchange Improvements at County Road 41, G.W.P. 4459-04-00;
Highway 401 Interchange Improvements at Palace Road, G.W.P. 4197-13-00**

The Ontario Ministry of Transportation (MTO) has retained AECOM to undertake two separate Preliminary Design and Class Environmental Assessment Studies for improvements to the Highway 401 and County Road 41 interchange (G.W.P. 4459-04-00) and the Highway 401 and Palace Road interchange (G.W.P. 4197-13-00). Both projects are located in the Town of Greater Napanee within the County of Lennox and Addington.

Both studies are following the approved planning process for a Group 'B' project under the *MTO Class Environmental Assessment for Provincial Transportation Facilities (2000)*. Public Information Centre (PIC) #1 was held for each study in July 2016 to provide the public with the opportunity to discuss the project and comment on the alternatives that were being considered to address bridge requirements and undesirable interchange elements. A second combined PIC #2 is being held for both studies to provide interested parties with the opportunity to discuss the projects and provide input to the Project Team.

The purpose of this letter is to notify you that the second PIC for each project has been scheduled (refer to the enclosed *Notice of Public Information Centre #2*).

The purpose of PIC #2 is to provide the public with the opportunity to view and provide comments on the evaluation of alternatives, the Preliminary Design of the preferred alternative at each interchange, and the next steps.

Your organization is invited to attend the following session in advance of PIC #2:

November 22, 2017
3:00 p.m. to 4:00 p.m.
Selby Community Hall
114 Pleasant Drive, Selby, ON K0K 2Z0

The public has been invited to attend the PIC between 4:00 p.m. and 8:00 p.m. at the same venue. The PIC will be an informal drop-in centre and representatives from the MTO and the Consultant Team will be available to answer questions and discuss the studies. If you are unable to attend PIC #2 and are interested in these studies, enclosed are two brochures, with further information on each of the two projects that will be presented at PIC #2 for your reference. Please also feel free to contact one of the Project Team members listed on the enclosed *Notice of PIC #2* if you would like to discuss anything further.

Following PIC #2, a Transportation Environmental Study Report (TESR) will be prepared for each study and made available for public review at the completion of each study. Notification, advising of the availability of the TESRs for review, will be published in local newspapers and mailed to those on the study mailing list.

If you would like to provide comments, require further information regarding these studies, or have any accessibility requirements in order to participate in these studies, please feel free to contact the undersigned at 905-390-2030 or Fred.Leech@aecom.com.

Thank you for your cooperation and assistance.

Yours truly,
AECOM



Fred Leech

Senior Environmental Planner

Cc.	T. White	- Ministry of Transportation Project Manager
	E. Pipe	- Ministry of Transportation Environmental Planner
	T. Soroichinsky	- AECOM Project Manager
	M. Weldon	- AECOM Deputy Project Manager
	S. Schmied	- AECOM Environmental Planner

Enclosed:

- Notice of Public Information Centre #2
- Highway 401 Interchange Improvements at County Road 41, G.W.P. 4459-04-00 Brochure
- Highway 401 Interchange Improvements at Palace Road, G.W.P. 4197-13-00 Brochure

Ministry of Transportation

Planning and Design Section
1355 John Counter Boulevard
Postal Bag 4000
Kingston, Ontario K7L 5A3
Tel.: 613 545-4871
Fax: 613-540-5106

Ministère des Transports

Section de la planification et de la conception
1355, boulevard John Counter
CP/Service de sacs 4000
Kingston (Ontario) K7L 5A3
Tél.: 613 545-4871
Télé.: 613 540-5106



November 1, 2017

Indigenous Community Letter

«Name»

«Organization»

«Address»

Dear «Greeting»:

RE: Notice of Public Information Centre #2

Preliminary Design and Class Environmental Assessment Studies:

Highway 401 Interchange Improvements at County Road 41, G.W.P. 4459-04-00;

Highway 401 Interchange Improvements at Palace Road, G.W.P. 4197-13-00

The Ontario Ministry of Transportation (MTO) has retained AECOM to undertake two separate Preliminary Design and Class Environmental Assessment Studies for improvements to the Highway 401 / County Road 41 interchange (G.W.P. 4459-04-00) and the Highway 401 / Palace Road interchange (G.W.P. 4197-13-00). Both projects are located in the Town of Greater Napanee within the County of Lennox and Addington.

Both studies are following the approved planning process for a Group 'B' project under the *MTO Class Environmental Assessment for Provincial Transportation Facilities (2000)*. Public Information Centre (PIC) #1 was held for each study in July 2016 to provide the public with the opportunity to discuss the project and comment on the alternatives that were being considered to address bridge requirements and undesirable interchange elements. A second combined PIC is being held for both studies to provide interested parties with the opportunity to discuss the projects and provide input to the Project Team.

The purpose of this letter is to notify you that the second PIC for each project has been scheduled (refer to the enclosed *Notice of Public Information Centre #2*). The purpose of PIC #2 is to provide the public with the opportunity to view and provide comments on the evaluation of alternatives, the Preliminary Design of the preferred alternative at each interchange, and the next steps.

A private session for agencies, municipalities and Indigenous Communities is planned in advance of the public session at:

Wednesday November 22, 2017
3:00 p.m. to 4:00 p.m.
Selby Community Hall
114 Pleasant Drive, Selby, ON K0K 2Z0

The public has been invited to attend the PIC between 4:00 p.m. and 8:00 p.m. at the same venue. The PIC will be an informal drop-in centre and representatives from the MTO and the Consultant Team will be available to answer questions and discuss the studies.

Enclosed is a copy of the *Notice of PIC #2* should you wish to post it for members of your community to view. Also enclosed are two brochures with further information on each of the two projects that will be presented at PIC #2 for your reference.

Following PIC #2, a Transportation Environmental Study Report (TESR) will be prepared for each study and made available for public review at the completion of each study. Notification, advising of the availability of the TESRs for review, will be published in local newspapers and mailed to those on the study mailing list.

If you would like to provide comments, if you require further information regarding these studies, or if you have any accessibility requirements to participate in these studies, please feel free to contact the undersigned at 613-545-4871 (toll free: 1-800-267-0295, ext. 4871). In addition, if you are interested in meeting as a result of receiving this letter, please contact the undersigned to arrange a meeting at your earliest convenience.

Thank you for your cooperation and assistance.

Yours truly,
Ministry of Transportation

Tina White
Senior Project Manager
tina.white@ontario.ca

cc. E. Pipe - Ministry of Transportation, Environmental Planner
T. Sorochinsky - AECOM Consultant Project Manager

Enclosed:

- Notice of Public Information Centre #2
- Highway 401 Interchange Improvements at County Road 41, G.W.P. 4459-04-00 Brochure
- Highway 401 Interchange Improvements at Palace Road, G.W.P. 4197-13-00 Brochure

Ministry of Transportation

Planning and Design Section
1355 John Counter Boulevard
Postal Bag 4000
Kingston, Ontario K7L 5A3
Tel.: 613 545-4871
Fax: 613-540-5106

Ministère des Transports

Section de la planification et de la conception
1355, boulevard John Counter
CP/Service de sacs 4000
Kingston (Ontario) K7L 5A3
Tél.: 613 545-4871
Télééc.: 613 540-5106



November 1, 2017

MP/MPP Letter

«Name»

«Organization»

«Address»

Dear «Greeting»:

RE: Notice of Public Information Centre #2

Preliminary Design and Class Environmental Assessment Studies:

Highway 401 Interchange Improvements at County Road 41, G.W.P. 4459-04-00;

Highway 401 Interchange Improvements at Palace Road, G.W.P. 4197-13-00

The Ontario Ministry of Transportation (MTO) has retained AECOM to undertake two separate Preliminary Design and Class Environmental Assessment Studies for improvements to the Highway 401 and County Road 41 interchange (G.W.P. 4459-04-00) and the Highway 401 and Palace Road interchange (G.W.P. 4197-13-00). Both projects are located in the Town of Greater Napanee within the County of Lennox and Addington.

Both studies are following the approved planning process for a Group 'B' project under the *MTO Class Environmental Assessment for Provincial Transportation Facilities (2000)*. Public Information Centre (PIC) #1 was held for each study in July 2016 to provide the public with the opportunity to discuss the project and comment on the alternatives that were being considered to address bridge requirements and undesirable interchange elements. A second combined PIC is being held for both studies to provide interested parties with the opportunity to discuss the projects and provide input to the Project Team.

The purpose of this letter is to notify you that the second PIC for each project has been scheduled. The enclosed *Notice of Public Information Centre #2* will appear in the *Napanee Beaver* and the *Napanee Guide* on Thursday November 9, 2017.

The purpose of PIC #2 is to provide the stakeholders and the public with the opportunity to view and provide comments on the evaluation of alternatives, the Preliminary Design of the preferred alternative at each interchange, and the next steps.

You are invited to attend the following session in advance of PIC #2:

Wednesday November 22, 2017
3:00 p.m. to 4:00 p.m.
Selby Community Hall
114 Pleasant Drive, Selby, ON K0K 2Z0

The public has been invited to attend the PIC between 4:00 p.m. and 8:00 p.m. at the same venue. The PIC will be an informal drop-in centre and representatives from the MTO and the Consultant Team will be available to answer questions and discuss the studies.

Also enclosed are two brochures with further information on each of the two projects that will be presented at PIC #2 for your reference.

Following PIC #2, a Transportation Environmental Study Report (TESR) will be prepared for each study and made available for public review at the completion of each study. Notification, advising of the availability of the TESRs for review, will be published in local newspapers and mailed to those on the study mailing list.

If you would like to provide comments, if you require further information regarding these studies, or if you have any accessibility requirements in order to participate, please feel free to contact the undersigned at 613-545-4871 (toll free: 1-800-267-0295, ext. 4871).

Thank you for your cooperation and assistance.

Yours truly,
Ministry of Transportation

Tina White
Senior Project Manager
tina.white@ontario.ca

cc.	E. Pipe	- Ministry of Transportation, Environmental Planner
	T. Sorochinsky	- AECOM Consultant Project Manager
	M. Weldon	- AECOM Consultant Deputy Project Manager
	F. Leech	- AECOM Senior Environmental Planner
	S. Schmied	- AECOM Environmental Planner

Enclosed:

- Notice of Public Information Centre #2
- Highway 401 Interchange Improvements at County Road 41, G.W.P. 4459-04-00 Brochure
- Highway 401 Interchange Improvements at Palace Road, G.W.P. 4197-13-00 Brochure



AECOM
30 Leek Cres., 4th Floor
Richmond Hill, ON
L4B 4N4
Canada
www.aecom.com

905-882-4401 tel
905-882-4399 fax

November 1, 2017

Public Letter

«Name»
«Organization»
«Address»

Dear «Greeting»:

**RE: Notice of Public Information Centre #2
Preliminary Design and Class Environmental Assessment Studies:
Highway 401 Interchange Improvements at County Road 41, G.W.P. 4459-04-00;
Highway 401 Interchange Improvements at Palace Road, G.W.P. 4197-13-00**

The Ontario Ministry of Transportation (MTO) has retained AECOM to undertake two separate Preliminary Design and Class Environmental Assessment Studies for improvements to the Highway 401 and County Road 41 interchange (G.W.P. 4459-04-00) and the Highway 401 and Palace Road interchange (G.W.P. 4197-13-00). Both projects are located in the Town of Greater Napanee within the County of Lennox and Addington.

Both studies are following the approved planning process for a Group 'B' project under the *MTO Class Environmental Assessment for Provincial Transportation Facilities (2000)*. Public Information Centre (PIC) #1 was held for each study in July 2016 to provide the public with the opportunity to discuss the project and comment on the alternatives that were being considered to address bridge requirements and undesirable interchange elements. A second combined PIC is being held for both studies to provide interested parties with the opportunity to discuss the projects and provide input to the Project Team.

The purpose of this letter is to notify you that the second PIC for each project has now been scheduled (refer to the enclosed *Notice of Public Information Centre #2*). The purpose of PIC #2 is to provide the public with the opportunity to view and provide comments on the evaluation of alternatives, the Preliminary Design of the preferred alternative at each interchange, and the next steps.

You are invited to attend PIC #2 as follows:

Wednesday November 22, 2017
4:00 p.m. to 8:00 p.m.
Selby Community Hall
114 Pleasant Drive, Selby, ON K0K 2Z0

The PIC will be an informal drop-in centre and representatives from the MTO and the Consultant Team will be available to answer questions and discuss the studies.

If you are unable to attend PIC #2 and are interested in these studies, enclosed are brochures with further information on each project that will be presented at PIC #2 for your reference. Please also feel free to contact one of the Project Team members listed on the enclosed *Notice of PIC #2*.

Following PIC #2, a Transportation Environmental Study Report (TESR) will be prepared for each study and made available for public review at the completion of each study. Notification, advising of the TESRs for review, will be published in local newspapers and mailed to those on the study mailing list.

If you would like to provide comments, require further information regarding these studies, or have any accessibility requirements in order to participate in these studies, please feel free to contact the undersigned at 905-390-2030 or Fred.Leech@aecom.com.

Comments are being collected to assist MTO in meeting the requirements of the *Environmental Assessment Act*. This material will be maintained on file for use during the study 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.

Thank you for your cooperation and assistance.

Yours truly,
AECOM



Fred Leech
Senior Environmental Planner

Cc.	T. White	- Ministry of Transportation Project Manager
	E. Pipe	- Ministry of Transportation Environmental Planner
	T. Sorochinsky	- AECOM Project Manager
	M. Weldon	- AECOM Deputy Project Manager
	S. Schmied	- AECOM Environmental Planner

Enclosed:

- Notice of Public Information Centre #2
- Highway 401 Interchange Improvements at County Road 41, G.W.P. 4459-04-00 Brochure
- Highway 401 Interchange Improvements at Palace Road, G.W.P. 4197-13-00 Brochure



AECOM
30 Leek Cres., 4th Floor
Richmond Hill, ON
L4B 4N4
Canada
www.aecom.com

905-882-4401 tel
905-882-4399 fax

November 1, 2017

Impacted Property Owner Letter

«Name»
«Organization»
«Address»

Dear «Greeting»:

**RE: Notice of Potential Property Impacts and Public Information Centre #2
Preliminary Design and Class Environmental Assessment Study
Highway 401 Interchange Improvements at County Road 41, G.W.P. 4459-04-00**

The Ontario Ministry of Transportation (MTO) has retained AECOM to undertake a Preliminary Design and Class Environmental Assessment Study for improvements to the Highway 401 and County Road 41 interchange (G.W.P. 4459-04-00). This project is located in the Town of Greater Napanee within the County of Lennox and Addington.

This study is following the approved planning process for a Group 'B' project under the *MTO Class Environmental Assessment for Provincial Transportation Facilities (2000)*.

We wish to advise you that your property is potentially impacted by the recommended plan (please refer to the enclosed plan) and would like to invite you to meet with us to review the recommended plan and discuss potential impacts to your property with the Project Team. Please contact me by phone at 905-390-2030 or by email at Fred.Leech@aecom.com to discuss the potential impacts and if you would like to arrange a meeting.

We would also like to inform you that Public Information Centre #2 (PIC) has now been scheduled for this project. You are invited to attend PIC #2 as follows:

Wednesday November 22, 2017
4:00 p.m. to 8:00 p.m.
Selby Community Hall
114 Pleasant Drive, Selby, ON K0K 2Z0

PIC #1 was held in July 2016 to provide the public with the opportunity to discuss the project and comment on the alternatives that were being considered to address bridge requirements and undesirable interchange elements. A second combined PIC is being held to provide interested parties with the opportunity to discuss the project and provide input to the Project Team.

We reached out to you in September 2016 regarding potential impacts to your property. PIC #2 will build on the information in that letter; and will provide a summary of the evaluation of alternatives, the Preliminary Design of the preferred alternative at the interchange and the next steps in the study process, which we can also discuss with you if you would like to meet with the Project Team separately.

The PIC will be an informal drop-in centre and representatives from the MTO and the Consultant Team will be available to answer questions and discuss the study. This PIC

will be held at the same time and at the same venue as PIC #2 for the *Highway 401 Interchange Improvements at Palace Road (G.W.P. 4197-13-00), Preliminary Design and Class Environmental Assessment Study*, please refer to the enclosed Notice of PIC #2 for further details.

If you are unable to attend PIC #2 and are not able to meet with us, enclosed are two brochures with further information on the two projects for your reference. Please feel free to contact us if you would like to discuss anything further.

Following PIC #2, a Transportation Environmental Study Report (TESR) will be prepared for this study and made available for public review at the completion of the study. Notification, advising of the TESR review period, will be published in local newspapers and mailed to those on the study mailing list.

If you would like to provide comments, require further information regarding this study, or have any accessibility requirements in order to participate in this study, please feel free to contact the undersigned, as also noted above, at 905-390-2030 or Fred.Leech@aecom.com.

Comments are being collected to assist MTO in meeting the requirements of the *Environmental Assessment Act*. This material will be maintained on file for use during the study 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.

Thank you for your cooperation and assistance.

Yours truly,
AECOM



Fred Leech
Senior Environmental Planner

Cc.	T. White	- Ministry of Transportation Project Manager
	E. Pipe	- Ministry of Transportation Environmental Planner
	T. Sorochinsky	- AECOM Project Manager
	M. Weldon	- AECOM Deputy Project Manager
	S. Schmied	- AECOM Environmental Planner

Enclosed:

- Notice of Public Information Centre #2
- Plan of Potential Property Impacts
- Highway 401 Interchange Improvements at County Road 41, G.W.P. 4459-04-00 Brochure
- Highway 401 Interchange Improvements at Palace Road, G.W.P. 4197-13-00 Brochure

Proposed Mitigation Measures

Proposed mitigation measures and recommendations for further work include but are not limited to the following:

- Potential interim lane and road closures during construction will be confirmed and notification will be provided to Emergency Services, and adjacent property and business owners.
- To protect wildlife and wildlife habitat, vegetation removals will not take place during the Migratory Breeding Bird timing window between April 15 and August 15 of any year, trees and shrubs will be maintained where possible, and disturbed areas will be restored with seeding, sodding and landscaping.
- Additional Species at Risk surveys will be undertaken in Detail Design prior to construction.
- To protect fish and fish habitat, work at the Napanee River will not take place between March 16 and July 14 of any year during the warmwater fisheries timing window.
- Standard noise mitigation measures and municipal noise control by-law requirements will be used during construction.

How to Contact the Project Team

Tina White

Project Manager

Ontario Ministry of Transportation
Eastern Region
1355 John Counter Blvd.,
Postal Bag 4000
Kingston, ON K7L 5A3
Tel: 613-545-4871
Toll Free: 1-800-267-0295
Email: tina.white@ontario.ca

Tim Sorochinsky, P.Eng.

Project Manager

AECOM

4th Floor, 30 Leek Crescent
Richmond Hill, ON L4B 4N4
Tel: 905-882-3522
Fax: 905-882-4399

Email: tim.sorochinsky@aecom.com

Highway 401 Interchange Improvements at Palace Road

Class Environmental Assessment and
Preliminary Design Study

November 2017

Ontario Ministry of Transportation
G.W.P. 4197-13-00



Next Steps

- Review and respond to comments received regarding this brochure and make revisions where appropriate to finalize the preliminary design plans.
- Finalize mitigation measures to minimize or avoid potential environmental effects.
- Prepare and file the Transportation Environmental Study Report for public and agency review and seek Environmental Assessment clearance.
- Detail Design and Construction to be completed as a future / separate study.

Your Comments

The Project Team welcomes feedback regarding the recommended plan. Please contact one of the contacts listed above by **December 21, 2017** if you have any questions or comments.

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

You are encouraged to contact the Project Team members listed above regarding any project-related questions or concerns, including **any accessibility requirements you may have in order to participate in this study.**



AECOM

Highway 401 and Palace Road Interchange Improvements

Introduction

The Ontario Ministry of Transportation (MTO) has retained AECOM to undertake a Preliminary Design and Class Environmental Assessment (EA) Study for improvements to the Highway 401 and Palace Road interchange, located in the Town of Greater Napanee within the County of Lennox and Addington.

This study is following the approved planning process for a Group 'B' project under the MTO's *Class EA for Provincial Transportation Facilities (2000)*.

The Study

- In early 2016, this study was initiated to review the structural requirements of the two Palace Road bridges, identify interim and long-term improvements to address geometric and operational concerns, and to develop a preliminary design including a staging plan to allow the technically preferred structural works and interchange improvements to be implemented efficiently, minimizing construction costs, traffic disruption and future throwaway.
- Upon completion of this study, a Transportation Environmental Study Report (TESR) will be prepared to document the recommended plan, potential impacts, and recommended mitigation measures to minimize impacts. The TESR will be made available for a 30-day public review period at public review locations in close proximity to the study area. A Notice of TESR review opportunities will be provided.



Study Process

Planning

Preliminary Design

- Generate and Assess Alternatives (PIC #1: July 2016)
- Evaluate and Select Preferred Alternative
- Develop Preferred Alternative (PIC #2: November 2017)
- Notice of Study Completion and TESR Submission

Detail Design and Construction

A full replacement of the Highway 401 and Palace Road bridges is anticipated to be required within five years. Development of an ultimate plan for the interchange is needed to allow the structural work to be staged in a cost effective and efficient manner, minimizing further throwaway.

Generation and Evaluation of Preliminary Design Alternatives

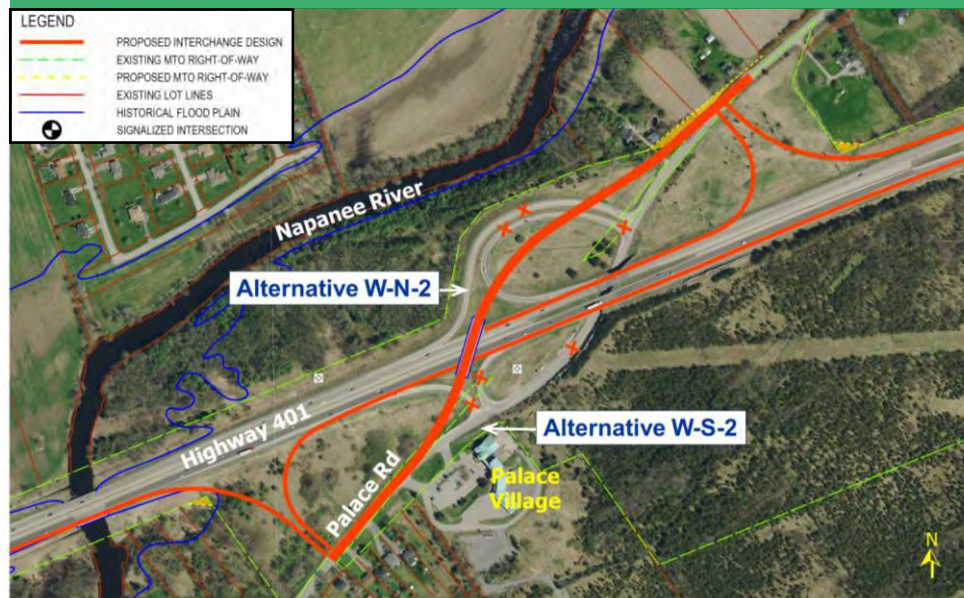
A "long-List" evaluation of alternatives was presented at Public Information Centre (PIC) #1, which led to the identification of a "short-list" of alternatives for the north and south sides of the interchange.

A weighted-score arithmetic evaluation system was used to compare the short-list of alternatives using the following criteria:

- Transportation (e.g. interchange operations, safety, geometrics; construction staging impacts);
- Environmental (e.g. natural, socio-economic, and cultural); and,
- Cost (e.g. capital and life cycle cost, utility impacts).

Out of five north side alternatives and seven south side alternatives, **Alternatives West-North-2 (W-N-2) and West-South-2 (W-S-2) (Buttonhooks with Westerly Realignment)** were selected as the **Technically Preferred Preliminary Design Alternatives**.

TECHNICALLY PREFERRED PRELIMINARY DESIGN ALTERNATIVE



Evaluation Summary

- The westerly realignment alternatives avoid temporary widening of the existing structure and minimize future staging impacts to Highway 401 traffic
- Alternatives W-N-2 and W-S-2 are preferred from a Transportation perspective as they allow existing ramps and Palace Road to remain fully open to traffic during construction (short-term closures only required)
- Alternatives W-N-2 and W-S-2 have the most desirable geometrics and improved sight distance, and lower environmental impacts than most alternatives.



Construction Staging

- Short-term construction will include construction of the new structure over Highway 401, Palace Road realignment and new ramps, and removal of the existing bridges
- Occasional night-time and/or weekend closures of existing interchange ramps, Palace Road and lane closures along Highway 401 will be required to complete the construction activities. Advance notification / signage of all closures will be provided.
- The staging strategy will be confirmed during a future Detail Design assignment in advance of construction, and notification will be provided to adjacent property and business owners at that time.

**Property Owner Follow-Up
Meeting Post-PIC #2**

March 2, 2018

«Name»

«Address»

Dear «Greeting»:

**RE: Preliminary Design and Class Environmental Assessment Study
Highway 401 Interchange Improvements at Palace Road, G.W.P. 4197-13-00
Upcoming Meeting – March 12, 2018**

The Ontario Ministry of Transportation (MTO) has retained AECOM to undertake a Preliminary Design and Class Environmental Assessment Study for improvements to the Highway 401 and Palace Road interchange (G.W.P. 4197-13-00). This project is located in the Town of Greater Napanee within the County of Lennox and Addington.

This study is following the approved planning process for a Group 'B' project under the *MTO Class Environmental Assessment for Provincial Transportation Facilities (2000)*. The first Public Information Centre (PIC) #1 was held in July 2016 to provide the public with the opportunity to discuss the project and comment on the alternatives that were being considered to address bridge requirements and undesirable interchange elements. A second PIC was held in November 2017 to present the evaluation of alternatives and the Recommended Plan, and to provide the opportunity for members of the public to discuss the project and provide input to the Project Team.

As presented at the second PIC, the Recommended Plan for the Highway 401 and Palace Road Interchange includes:

- A westerly realignment of Palace Road with a new bridge constructed over Highway 401 and removal of the existing Palace Road bridges;
- A realignment of the Highway 401 eastbound exit and entrance ramps to the west, and the Highway 401 westbound exit and entrance ramps to the east.

A number of comments and concerns were raised at and subsequent to the PIC regarding the Recommended Plan for the eastbound exit and entrance ramp on the south side of Highway 401. In particular, these included the proximity of the off-ramp adjacent to residential driveways and associated potential safety concerns, the impacts of headlight glare from vehicles along the off-ramp and general privacy concerns, and impacts to property value.

Based on the comments received from landowners, the Project Team initiated a review of the recommended ramp configuration on the south side of the highway in an attempt to mitigate the identified concerns. An option to relocate the off-ramp opposite the south entrance to Palace Village was reviewed. However, it was determined this configuration could not be safely accommodated as it would require tight horizontal curvature along the ramp, and result in additional safety concerns associated with sub-

standard sight distance for turning vehicles from the off-ramp and along the realigned Palace Road approaching the intersection.

While relocation of the intersection off-ramp to the north cannot be safely accommodated, a design has been prepared to help mitigate some of the identified concerns associated with driveway access at the intersection and the impacts of headlight glare. The proposed design refinements include:

- **Adjusting the angle of the eastbound off-ramp intersection at Palace Road to 80 degrees.** This refinement would help to minimize headlight glare impacts as the off-ramp at the stop bar would be angled directly between the homes at 804 and 810 Palace Road. We also note that the homes in this area are generally elevated approximately 5 m above Palace Road and the proposed off-ramp. Based on the existing ground elevation it appears that the headlight glare from vehicles on the off-ramp would not reach the homes directly. Existing traffic volumes utilizing the eastbound off-ramp are approximately 35 vehicles per hour in the evening peak hour, and projected traffic volumes along the ramp are expected to remain less than 50 vehicles per hour by the 2038 horizon year.
- **Realigning the shared driveway at 802 / 804 Palace Road approximately 10 m to the west.** This refinement would improve safety conditions by providing some physical separation between the ramp intersection and driveway itself, and would open up space opposite the ramp terminals to provide some form of landscaping treatment.
- **Landscaping to provide a visual barrier.** There is existing MTO-owned lands located between Palace Road and the homeowner lots. This area can be utilized for landscaping to provide a visual barrier between Palace Road and the homeowners lots.

The Project Team has arranged a meeting for Monday March 12, 2018 to discuss these proposed refinements with the affected property owners on the south side of Highway 401 along Palace Road.

The meeting will be held as follows:

Monday March 12, 2018
4:00 pm to 6:00 pm
Strathcona Paper Centre – Small Lounge
16 McPherson Drive, Napanee, ON K7R 3L1

If you are interested in participating in this meeting, **please RSVP to Tim Soroichinsky, AECOM Project Manager at 905-882-4401 or tim.soroichinsky@aecom.com by Friday March 9, 2018.** If you are unable to attend but would like to discuss this project further please contact us by Friday March 16, 2018.

As a part of the EA process, a Transportation Environmental Study Report (TESR) will be prepared for this study and made available for public review at the completion of the study. Notification, advising of the TESR review period, will be published in local newspapers and mailed to those on the study mailing list.

If you have any accessibility requirements in order to participate in this study, please feel free to contact the undersigned, as noted above.

Comments are being collected to assist MTO in meeting the requirements of the *Environmental Assessment Act*. This material will be maintained on file for use during the study 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.

Thank you.

Yours truly,
AECOM



Tim Soroichinsky

Cc.	T. White	- Ministry of Transportation Project Manager
	E. Pipe	- Ministry of Transportation Environmental Planner
	M. Weldon	- AECOM Deputy Project Manager
	F. Leech	- AECOM Senior Environmental Planner
	S. Schmied	- AECOM Environmental Planner

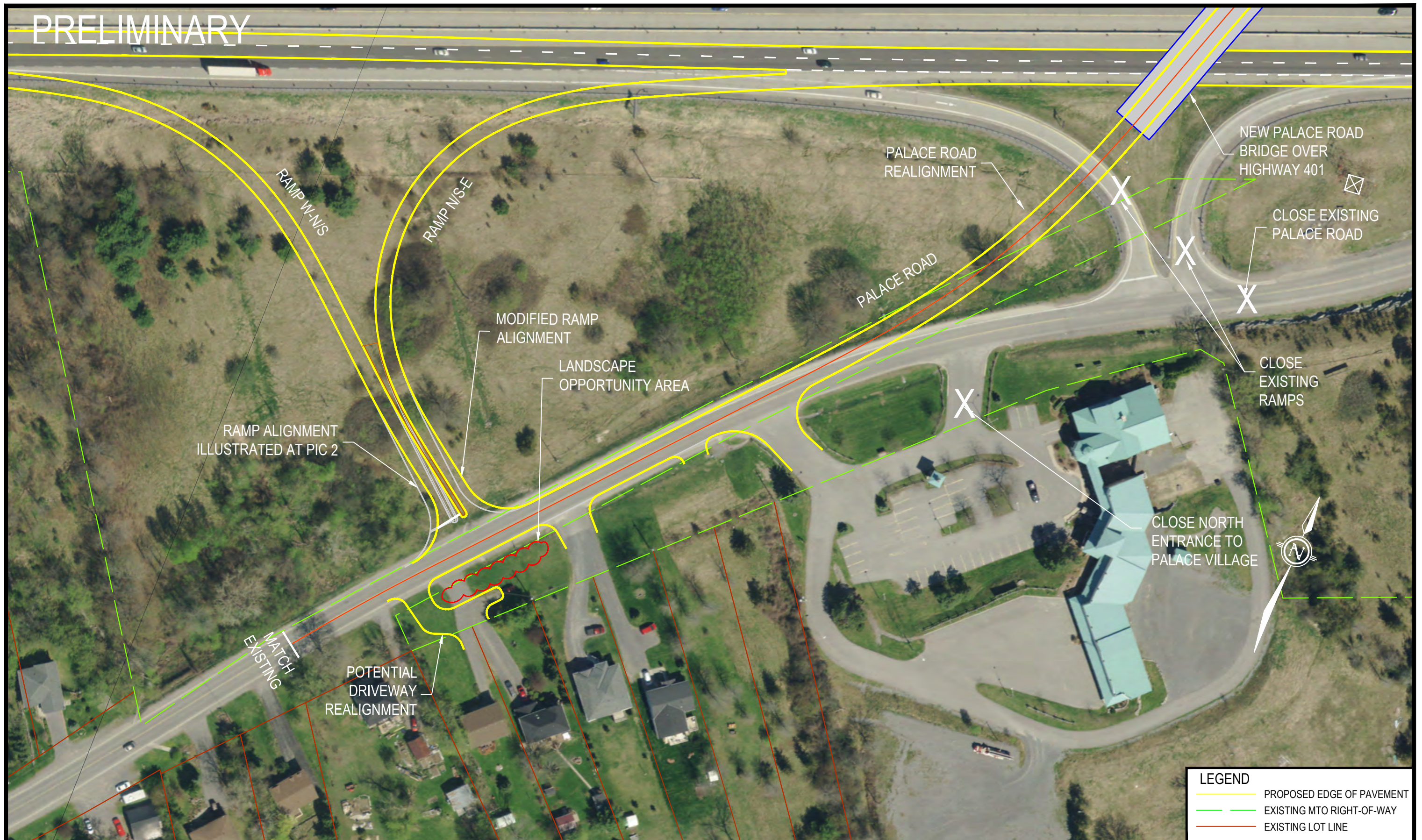
Enclosed:

- Highway 401 / Palace Road Interchange Recommended Plan (Drawing 1)
- Plan of Eastbound Off-Ramp Refinements (Drawing 2)

PRELIMINARY



PRELIMINARY



Municipal Meetings

Meeting Minutes

Project	Hwy 401 Interchange Improvements at County Road 41 Interchange and Palace Road Interchange – PD and EA GWP 4459-04-00 and 4197-13-00, Agreement Number 4015-E-0003	
Subject	Municipal Meeting	
Date	June 9, 2016	
Time	10 – 11:30 am	
Location	County of Lennox and Addington – County Court House	
Attendees	Tina White Erin Pipe Tim Sorochinsky Michael Weldon Steve Roberts Steve Creighton	
	MTO Senior Project Manager MTO Environmental AECOM Project Manager AECOM Assistant Project Manager County of Lennox and Addington (L&A) Town of Napanee	
Prepared by	Michael Weldon, P.Eng.	
Distribution	Meeting attendees Jim Klaver (County of Lennox and Addington) Ron Vankoughnet (Town of Napanee) Lori Brake (MTO) Fred Leech, Joanne Wang, Sarah Schmied (AECOM)	

Item	Description	Action By
	<p>The purpose of this meeting was to provide an overview of the Preliminary Design and Environmental Assessment (EA) studies for the Highway 401/County Road 41 and Highway 401/Palace Road (County Road 5) interchanges. The two interchanges are being reviewed as part of separate EA studies. The following points were discussed:</p> <p><u>Study Overview and General Comments</u></p> <ul style="list-style-type: none">• The focus of these studies is to examine interim and long-term interchange operational improvements, and to develop a plan for the rehabilitation or replacement of the existing structures.• The two studies are following the approved planning process for a Group 'B' project under the MTO Class Environmental Assessment for Provincial Transportation Facilities. At the completion of the studies, separate Transportation Environmental Study Reports (TESRs) will be prepared and made available for public review.• The existing structures cannot accommodate the necessary structural rehabilitation or replacement requirements without significant modifications and/or Highway 401 lane or ramp closures.• The studies will include development of an ultimate plan for the two interchanges. Based on the recommended plan, a staged approach towards implementing the necessary short-term structural improvements will be developed in order to minimize future throwaway and traffic disruption.• Work completed to date has focused on review of existing conditions, identification of the overall study Problems and Opportunities to be addressed, and development of a "long-list" of interchange alternatives for each study.• The first Public Information Centre (PIC) for the two studies is anticipated to be held in the coming months, and will include presentation of the above information as well as an initial screening assessment of the "long-list" interchange alternatives.• Municipal staff noted they would generally be supportive of roundabouts at	

Item	Description	Action By
	the interchange(s), subject to acceptable traffic operations.	
	<ul style="list-style-type: none"> S. Creighton to review the status/ownership of the old CN Rail bridge over Highway 401, given that the bridge may be used as part of a municipal trail system. 	S. Creighton
	<u>County Road 41</u>	
	The following points were discussed specific to the County Road 41 study:	
	<ul style="list-style-type: none"> Municipal staff noted they are unaware of future expansion/development plans associated with the Flying 'J'. Municipal staff noted there are plans for a potential hotel on the north side of Community Road, however they are not aware whether a Traffic Impact Study has been completed. Municipal staff will forward any additional information / studies received on the hotel to MTO/AECOM as it is received. Municipal staff noted there is insufficient room for standard pedestrian facilities beneath the bridge, and they anticipate some increase in pedestrian demand with construction of the hotel along Community Road. County Road 41 is part of the Salmon River cycling trail. S. Roberts noted that their typical cycling facilities include paved shoulders with appropriate signing, and that they would like to see these improvements implemented through the interchange if possible. It was noted that cycling improvements on this type of MTO project are generally subject to cost sharing agreements between the municipality and MTO. These requirements/facilities would be confirmed during a future Detail Design stage. Town of Napanee water and sewer mains are located on the east side of County Rd 41 beneath the Highway 401 overpass. S. Creighton to forward as-builts for this infrastructure in order that the Project Team can review potential impacts with structural footings. S. Roberts noted that the County's Transportation Master Plan was recently updated, and that the next update will likely be 2024 or beyond. Given the long-term planning horizon of the study, it was agreed that the County Road 41 structure requirements should consider long-term municipal requirements. However, S. Roberts noted there are no current plans to widen County Road 41 to 6-lanes. S. Roberts noted that the Richmond Street / County Road 41 intersection can be very busy and the County has existing capacity concerns with the intersection. He noted that impacts to this intersection and associated storage requirements should be considered as part of the study / interchange improvements. County of Lennox and Addington staff (Jim Klaver) to provide AECOM the existing signal timing at the Richmond Street / County Road 41 intersection. It was noted that the ability to accommodate Long Combination Vehicles (LCVs) will be considered at the interchange, especially if a permit for LCV's is already in place. Local businesses have expressed an interest in utilizing LCV's at this location. AECOM will follow-up with the MTO Goods Movement Office to discuss the status of LCV's at this interchange. 	<p>Town of Napanee / County of L&A</p> <p>S. Creighton</p> <p>J. Klaver</p> <p>AECOM</p>

Palace Road (County Road 5)

The following points were discussed specific to the Palace Road study:

- It was noted that there is currently only 1 tenant in the Palace Village, although there have been plans for a Wild Wing at the site.
- Municipal staff noted they agree with the list of transportation problems that have been identified at the interchange.
- Municipal staff noted that pedestrian traffic through the interchange is low. As such, paved shoulders (that could also accommodate cycling) may be sufficient for pedestrians in lieu of a sidewalk.
- Municipal utilities generally end along Palace Road west of the interchange

Item	Description	Action By
	<p>(e.g. water and sewer). S. Creighton noted there is no significant reason to extend these utilities to the north, given the limited development north of Highway 401.</p> <ul style="list-style-type: none">• S. Roberts noted that Palace Road through the interchange will likely be repaved by the County within 5 to 10 years.• It is anticipated that rehabilitation or replacement of the Palace Road structures will be required within 5 to 10 years. It was agreed that future structural works by MTO should be coordinated with the necessary pavement works required by the County.• Requirements for LCV traffic at the interchange are not anticipated, however this will be discussed with the MTO Goods Movement Office.	AECOM



Hwy 401 Interchange Improvements at County Rd 41 & Palace Rd

Highway 401 Interchange Improvements at County Road 41 and Palace Road

Class Environmental Assessment and Preliminary Design Study
G.W.P. 4459-04-00 / 4197-13-00

Municipal Meeting #1

June 9, 2016

AECOM



Hwy 401 Interchange Improvements at County Rd 41 & Palace Rd

Meeting Agenda

- Study Area, Purpose and Scope
- Overall Study Process
- Timing of Study Activities
- Overview of Existing Transportation and Environmental Conditions
- Opportunities
- Identification and Assessment of Long List of Alternatives
- Next Steps
- Open Discussion

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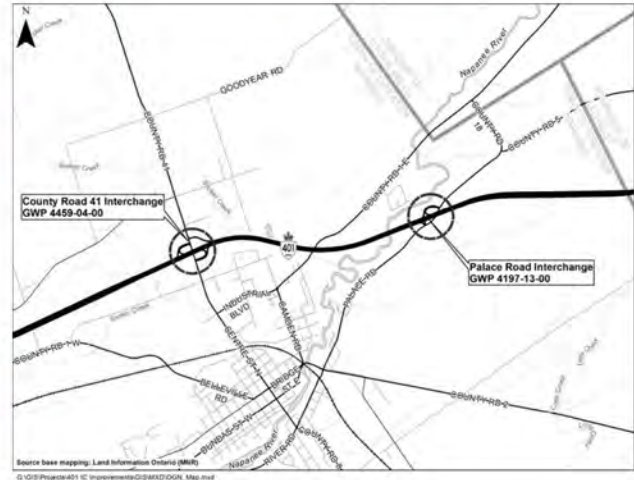




Hwy 401 Interchange Improvements at County Rd 41 & Palace Rd

Study Area, Purpose and Scope

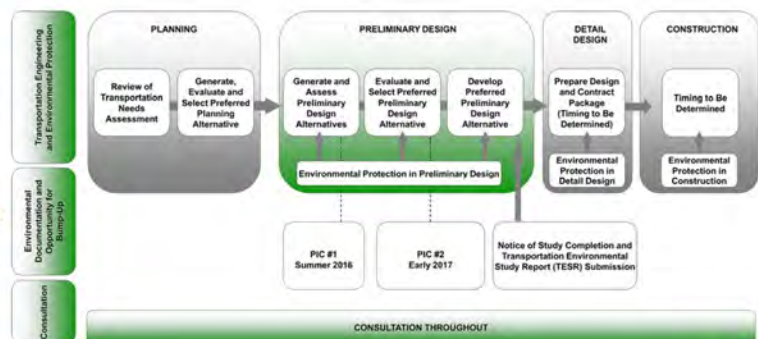
- The Ontario Ministry of Transportation (MTO) has retained AECOM to undertake two separate Preliminary Design and Class Environmental Assessment Studies:
 - Improvements to the Highway 401 / County Road 41 interchange (G.W.P. 4459-04-00)
 - Improvements to the Highway 401 / Palace Road interchange (G.W.P. 4197-13-00)
- The projects are located in the Town of Greater Napanee within the County of Lennox and Addington.
- These studies will examine interim and long-term interchange operational improvements, median improvements on Highway 401, replacement and/or widening of the Highway 401 bridges, pavement rehabilitation, drainage improvements, traffic signals, illumination, and traffic staging during construction.



Hwy 401 Interchange Improvements at County Rd 41 & Palace Rd

Class EA Process for Group 'B' Projects

- These studies will follow the approved planning process for a Group 'B' project under the MTO Class Environmental Assessment for Provincial Transportation Facilities (2000).
- Two Public Information Centres (PICs) will be held for each study to provide interested parties with the opportunity to discuss the project and provide input to the Project Team.
- Separate Transportation Environmental Study Reports (TESRs) will be prepared for each study and made available for public review at the completion of the studies.





Hwy 401 Interchange Improvements at County Rd 41 & Palace Rd

Timing of Study Activities

TASKS	2015			2016												2017							
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG
Study Commencement																							
Data Collection, Field Reviews & Review of Existing Conditions																							
Generate & Assess Alternatives																							
Public Information Centre #1																							
Evaluate Improvement Alternatives & Select Technically Preferred Alternative																							
Preliminary Design of Technically Preferred Alternative																							
Public Information Centre #2																							
Finalize Preliminary Design and Mitigation Measures																							
Transportation Environmental Study Report (TESR) Development																							
Final TESR Submission																							

Schedule subject to change based on study findings and/or input received through consultation

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Highway 401 Interchange Improvements at County Road 41

County Road 41 – Previous Studies

- MTO completed a Preliminary Design Study in 2001 to determine the short-term, mid-term and long-term improvements to the interchange.
 - Recommendation from the 2001 study was to upgrade the interchange to a full Parclo A4 interchange configuration.
- Based on the short-term improvements recommended from the 2001 study, MTO completed the Detail Design and construction of various interchange improvements in 2004, including:
 - Construction of a new interchange ramp for westbound traffic on Highway 401 to go northbound on County Road 41;
 - Widening the Highway 401/Sucker Creek/Selby Creek bridge to the north to accommodate this new interchange ramp;
 - Modifying the old Highway 401 westbound off-ramp for southbound movements only on to County Road 41 (northbound movements accommodated by the new ramp);
 - Replacing the County Road 41 bridge over Sucker Creek, south of Highway 401, with a wider bridge to allow for the widening of County Road 41.



Recommended Plan for County Road 41 Interchange from 2001 Study



Short-Term Improvements Constructed in 2004

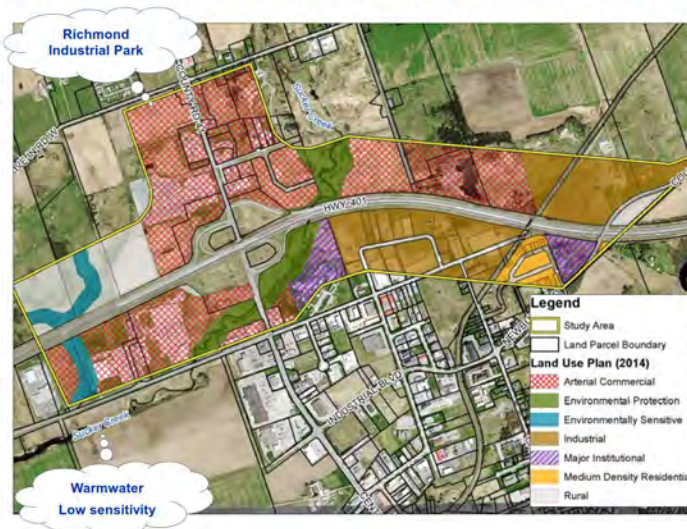
AECOM



Highway 401 Interchange Improvements at County Road 41

County Road 41 Overview of Existing Environmental Conditions and Land Use

- Selby/Sucker Creek is a warmwater watercourse with a low sensitivity.
- No wetlands or ANSIs are located in the proximity of the interchange.
- The southwest quadrant of the County Road 41 and Sucker Creek structure is zoned "Environmental Protection" in the Town of Greater Napanee's Official Plan.
- The Richmond Industrial Park is located immediately north of Highway 401, on County Road 41.
- A number of businesses operate north and south of Highway 401 and on both east and west sides of County Road 41.
- The Salmon River cycling trail crosses Highway 401 via County Road 41 connecting Napanee, Newburgh, Croydon, Roblin and Selby.



Highway 401 Interchange Improvements at County Road 41

County Road 41 – Overview of Existing Transportation Conditions

Structures

- The Highway 401 / County Road 41 overpass was constructed in 1959, and rehabilitated in 1982 and 1987.
- The Highway 401/Sucker Creek/Selby Creek structure was constructed in 1960, rehabilitated in 1987 and 1993, and widened to the north in 2004 to accommodate construction of a new westbound off-ramp to County Road 41.
- Given the age and condition of the structures and the time since the last rehabilitation, a major rehabilitation of the structures is anticipated within the **short-term (5 year)** planning horizon.
- Based on the current structure configurations, these rehabilitations cannot be completed without lane closures along Highway 401 or temporary removal of the existing eastbound and westbound off-ramp speed change lanes from the structure.
- In addition to the short term rehabilitation requirements of the County Road 41 overpass, full replacement of the structure is anticipated to be required within the 20-25 year planning horizon of the study.



County Road 41 Structure



Highway 401/Sucker Creek/Selby Creek Structure



Median Storm Sewer

Drainage

- Temporary concrete barrier of varying type and size is presently provided along the centerline of Highway 401 through the study area.
- The existing median drainage system is not functioning properly and is in need of upgrade or replacement.

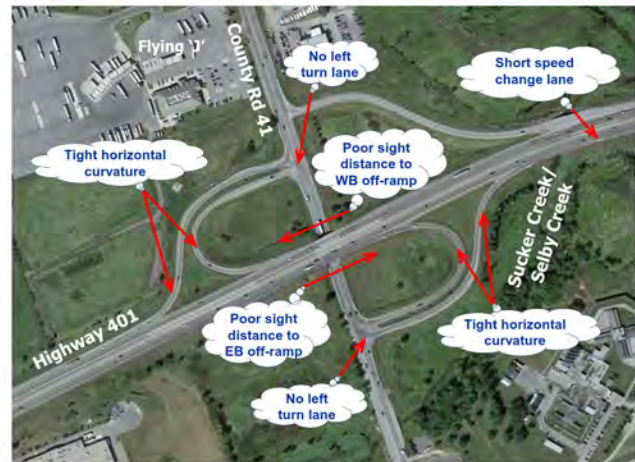


Highway 401 Interchange Improvements at County Road 41

County Road 41 – Overview of Existing Transportation Conditions

Traffic Operations and Geometrics

- Existing traffic Level of Service operations at the interchange are generally considered acceptable (overall Level of Service 'C' or better), however left-turning traffic along County Road 41 to Highway 401 results in some queueing and delay to through traffic given the absence of dedicated left-turn lanes.
- Future increases in traffic volumes will lead to increased delay and deterioration in operations (overall Level of Service 'D' or better).
- A number of undesirable geometric elements or collision-prone areas have been identified, including:
 - Sight distance to the eastbound and westbound off-ramps.
 - Horizontal curvature along four of five interchange ramps.
 - Length of the eastbound on-ramp speed change lane.
 - The absence of dedicated left-turn lanes along County Road 41 for access to Highway 401 (northbound and southbound).



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Highway 401 Interchange Improvements at County Road 41

County Road 41 – Opportunities

- Based on the identified **Problems** at the Highway 401 and County Road 41 interchange, the following **Opportunities** for this study have been identified:
 - Development of a strategy to address the short-term and long-term structural needs at the County Road 41 Overpass and Highway 401/Sucker Creek/Selby Creek is required.
 - Geometric improvements at the interchange would be expected to reduce collision risks, improve overall safety at the interchange, and provide for improved traffic operations along Highway 401, County Road 41 and at the interchange into the future.
 - The development of an ultimate plan for the County Road 41 interchange would allow for the necessary short-term structural rehabilitation requirements to be implemented efficiently and in a cost effective manner, minimizing future throwaway.
 - A staged approach towards implementing the ultimate interchange plan can be developed that would allow for construction of interim improvements that both improve traffic operations and safety and facilitate the structural rehabilitation requirements.
 - Upgrades or replacement of the existing Highway 401 median barrier and storm sewer system would address the existing drainage concerns along the corridor.

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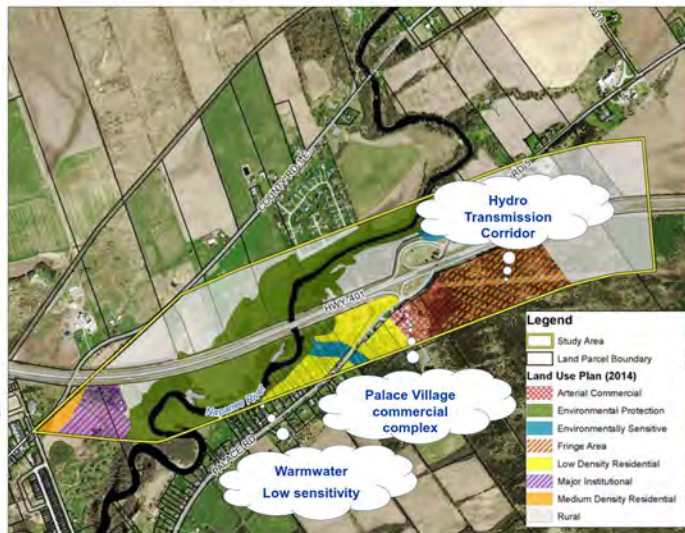




Highway 401 Interchange Improvements at Palace Road

Palace Road Overview of Existing Environmental Conditions and Land Use

- Napanee River is a warmwater watercourse with a low sensitivity.
- No ANSIs are located in the proximity of the interchange. Deciduous forests are identified in the northwest and southeast quadrants. Unevaluated wetlands are identified in the proximity of the interchange.
- This interchange provides access to the east end of Greater Napanee and services industrial uses north (e.g. the Strathcona Paper Plant) and south (e.g. Napanee Quarry) of the highway.
- The Palace Village commercial complex is in the southeast quadrant.
- A major hydro transmission corridor is located in the area southeast of the existing interchange.
- The Newburgh cycling route crosses Highway 401 via Palace Road to connect Napanee with the communities of Newburgh and Camden East.



Highway 401 Interchange Improvements at Palace Road

Palace Road – Overview of Existing Transportation Conditions

Structures

- The Highway 401 / Palace Road twin overpass structures were originally constructed in 1960 (56 years old as of 2016).
- The twin bridges cross beneath Highway 401 at a high skew angle and each carry two lanes of Highway 401 traffic and one ramp lane.
- The eastbound and westbound structures underwent major rehabilitation in 1983 and 1988, respectively.
- Minor rehabilitation was completed on both structures in 2012, which was limited in scope due to Highway 401 lane restrictions.
- A future major rehabilitation or full replacement of the structures is anticipated within the next 5 to 10 years.
- The existing structures cannot accommodate the necessary structural works without long-term lane closures or staging impacts along Highway 401, partial temporary widening of the structures for staging purposes, and/or temporary removal of the existing eastbound and westbound off-ramp speed change lanes from the structure.



Westbound Structure



East Abutment

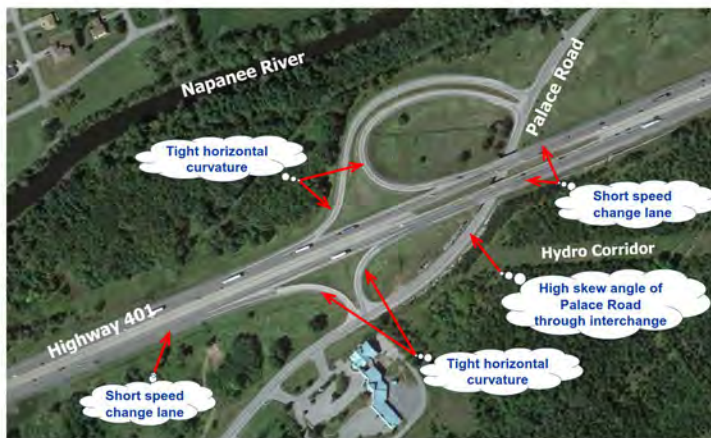


Highway 401 Interchange Improvements at Palace Road

Palace Road – Overview of Existing Transportation Conditions

Traffic Operations and Geometrics

- Existing and future traffic Level of Service operations (e.g. vehicle delay and road capacity) at the interchange are generally considered acceptable (overall Level of Service 'A' or 'B').
- A number of undesirable geometric elements or collision-prone areas have been identified, including:
 - Tight horizontal curvature along all ramps, most notably the two off-ramps from Highway 401;
 - Short length of speed change lanes for the eastbound off-ramp, eastbound on-ramp and westbound off-ramp;
 - High skew angle of Palace Road through the interchange, which restricts available turning sight distance at the ramp terminal intersections;
 - Vertical grade of Highway 401 through the interchange rises to the east, which slows down acceleration of trucks and cars entering eastbound Highway 401 from Palace Road.



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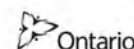


Highway 401 Interchange Improvements at County Road 41

Palace Road – Opportunities

- Based on the identified **Problems** at the Highway 401 and Palace Road interchange, the following **Opportunities** for this study have been identified:
 - Development of a strategy to address the structural rehabilitation or replacement needs of the twin Palace Road overpasses is required.
 - Geometric improvements at the interchange would be expected to reduce collision risks, improve overall safety at the interchange, and provide for good overall traffic operations along Highway 401, Palace Road and at the interchange into the future.
 - The development of an ultimate plan for the Palace Road interchange would allow for the necessary structural rehabilitation or replacement works to be implemented efficiently and in a cost effective manner, minimizing future throwaway.
 - A staged approach towards implementing the ultimate interchange plan can be developed that would allow for construction of interim improvements that both improve traffic operations and safety and facilitate the structural requirements.

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Hwy 401 Interchange Improvements at County Rd 41 & Palace Rd

Identification and Screening of Long List of Alternatives

- Based on the identified Problems and Opportunities for each study, a number of possible interchange improvement alternatives are being developed to reflect the ultimate configuration of both interchanges.
- This **long list** of interchange improvement alternatives for each study will be subject to a screening-level qualitative assessment based on various technical criteria such as:
 - *Geometrics and safety*
 - *Traffic operations*
 - *Construction staging impacts*
 - *Structural requirements*
 - *Construction cost*
 - *Anticipated environmental and property impacts*



Hwy 401 Interchange Improvements at County Rd 41 & Palace Rd

Identification and Screening of Long List of Alternatives (continued)

- Interchange improvement alternatives that will be considered include:
 - **County Road 41:** *various interchange ramp configurations (e.g. Parclo A2, Diamond, Roundabouts) along County Road 41 both north and south of Highway 401.*
 - **Palace Road:** *replacement of the Palace Road structures on the existing or new alignment of Palace Road, with various interchange ramp configurations (e.g. Parclo A2, Buttonhook, Diamond, Roundabouts) considered north and south of Highway 401 for both alignment options.*
- The **long list** interchange alternatives and screening assessment of these alternatives will be presented at PIC #1 for each study.



Hwy 401 Interchange Improvements at County Rd 41 & Palace Rd

Consultation

The following consultation activities will be undertaken throughout the duration of each study:

- Public notices (Study Commencement; PICs and Study Completion & TESR Submission) in *Napanee Beaver* and *Napanee Guide*.
- Two rounds of PICs for each study will be held to present to the public the details of the projects and allow for interaction and dissemination of details on the alternatives and preliminary design. The PICs will be presented as informal drop-in centres.
- Interested stakeholders will be consulted throughout the duration of each project, including:
 - Provincial agencies (e.g. Ministry of the Environment and Climate Change, Ministry of Natural Resources and Forestry, and the Ministry of Tourism, Culture and Sport)
 - Federal departments (e.g. Indigenous and Northern Affairs Canada, Fisheries and Oceans Canada)
 - Aboriginal Communities
 - Municipal departments (emergency services, engineering, planning) and councils
 - Interest groups (e.g. Quinte Conservation, Limestone District School Board)
 - Private property owners and businesses
- Filing of a TESR for public and agency review.



Hwy 401 Interchange Improvements at County Rd 41 & Palace Rd

Next Steps

The following activities will be undertaken for each project following this meeting:

- Continue to document existing conditions.
- Finalize the long list of interchange alternatives, screening assessment and the short list of alternatives to be carried forward.
- Hold PIC #1 (tentatively summer 2016).
- Assess and evaluate the short list of interchange alternatives to select a Technically Preferred Alternative.
- Present the preliminary design of the Technically Preferred Alternative at PIC #2 (anticipated to be held in early 2017).
- Prepare a Transportation Environmental Study Report for public and agency review (anticipated summer 2017).

Consultation Throughout
(with Aboriginal Communities and all stakeholders – property owners, members of the public, municipalities, interest groups, agencies, etc.)



Meeting Minutes

Project:	Highway 401 Interchange Improvements at County Road 41 and Palace Road Preliminary Design and Class Environmental Assessment GWP 4459-04-00 and 4197-13-00, Agreement Number 4015-E-0003																							
Subject:	Municipal Meeting 2																							
Date:	November 22, 2017																							
Time:	1:00 pm – 2:30 pm																							
Location:	County of Lennox and Addington – County Court House																							
Attendees:	<table><tr><td>Tina White</td><td>MTO Senior Project Manager</td></tr><tr><td>Erin Pipe</td><td>MTO Environmental Planner</td></tr><tr><td>Tim Sorochinsky</td><td>AECOM Project Manager</td></tr><tr><td>Michael Weldon</td><td>AECOM Assistant Project Manager</td></tr><tr><td>Fred Leech</td><td>AECOM Senior Environmental Planner</td></tr><tr><td>Sarah Schmied</td><td>AECOM Environmental Planner</td></tr><tr><td>Steve Creighton</td><td>Town of Napanee</td></tr><tr><td>Jeff Cuthill</td><td>Town of Napanee</td></tr><tr><td>Darrel Lott</td><td>County of Lennox and Addington</td></tr><tr><td>Jim Klaven</td><td>County of Lennox and Addington</td></tr><tr><td>Stephen Paul</td><td>County of Lennox and Addington</td></tr></table>		Tina White	MTO Senior Project Manager	Erin Pipe	MTO Environmental Planner	Tim Sorochinsky	AECOM Project Manager	Michael Weldon	AECOM Assistant Project Manager	Fred Leech	AECOM Senior Environmental Planner	Sarah Schmied	AECOM Environmental Planner	Steve Creighton	Town of Napanee	Jeff Cuthill	Town of Napanee	Darrel Lott	County of Lennox and Addington	Jim Klaven	County of Lennox and Addington	Stephen Paul	County of Lennox and Addington
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Stephen Paul	County of Lennox and Addington																							
Prepared by:	Sarah Schmied																							
Distribution:	Meeting attendees MTO and AECOM Project Team																							

Item	Description	Action By
	<p>The Project Team met with the municipalities in June 2016. The purpose of this meeting is to present an overview of the project, a summary of the first Public Information Centres(PIC) (July 2016), an update on what the Project Team has been working on since the first PICs and the Preliminary Design of the Technically Preferred Alternative for each interchange. The two interchanges are being reviewed as part of separate Environmental Assessment (EA) studies.</p> <p>A copy of the presentation slides is attached to these minutes for reference.</p> <p>The following points were discussed:</p> <p><u>Consultation Overview</u></p> <p>PIC #1 for each study presented an overview of the studies, existing conditions, the long-list of interchange alternatives and the evaluation approach.</p> <p>Discussions with potentially impacted property owners and other stakeholders has been ongoing throughout the study as required and as requested. Notable comments have pertained to property acquisition requirements, comments on the existing conditions / concerns and alternatives / recommendations for improvement, and anticipated timing of the construction works.</p> <p>PIC #2 is being held after this meeting on November 22, 2017 from 4:00 pm to 8:00 pm at Selby Community Hall. An External Agency viewing opportunity is being held at the same venue from 3:00 pm to 4:00 pm. The purpose of the PIC is to provide the public with the opportunity to view and comment on the evaluation of alternatives and the Preliminary Design the Technically Preferred</p>	

Item	Description	Action By
	<p>Alternative of each interchange.</p> <p><u><i>Generation and Evaluation of Preliminary Design Alternatives</i></u></p> <p>Since the last meeting the “Short-List” of interchange alternatives was evaluated utilizing an “Arithmetic Evaluation” approach. Alternatives were developed and assessed separately for the north and south sides of the two interchanges.</p> <p>The Arithmetic Evaluation methodology involves assigning relative weightings to each of the evaluation categories and criteria based on their level of importance. Impacts are measured either quantitatively or qualitatively, and then these scores are multiplied by the relative weight to determine an overall score for each alternative.</p> <p><u><i>County Road 41 Overview</i></u></p> <p>Major rehabilitation of the Highway 401 and County Road 41 and Sucker Creek bridges is anticipated to be needed within 5 years (in addition to the minor rehabilitation works currently in progress).</p> <p>Development of an ultimate plan for the interchange is needed to allow the structural work to be staged in a cost effective and efficient manner, minimizing future throwaway.</p> <p>A number of undesirable geometric elements impacting safety are present.</p> <p>Based on the evaluation of both the north and south sides of the interchange, the Technically Preferred Preliminary Design Alternatives for the interchange are Alternatives N-1 and S-1 (full Parclo A4):</p> <ul style="list-style-type: none"> • Widening of the Highway 401 / Sucker Creek structure to the south required for realigned South-East on-ramp; • Minor property impacts to commercial property in the southwest quadrant of the interchange; • New traffic signals at the north ramp terminal intersection; • Anticipated impacts to two hydro poles west of County Road 41; and, • Anticipated impacts to sanitary sewer, watermain, and underground Bell on east side of County Road 41. <p><u><i>Palace Road Overview</i></u></p> <p>Minor bridge rehabilitation was completed in 2012 (limited in scope due to limitations on Highway 401 lane closures).</p> <p>Full replacement of the Highway 401 bridges is anticipated to be required within 5 years.</p> <p>To address the bridge requirements, interchange alternatives on both the existing alignment and realigned Palace Road were considered.</p> <p>Development of an ultimate plan for the interchange is needed to allow the structural work to be staged in a cost-effective and efficient manner, minimizing future throwaway costs.</p> <p>A number of undesirable interchange geometric elements impacting safety and operations are present.</p> <p>Based on the evaluation of both the north and south sides of the interchange, the Technically Preferred Preliminary Design Alternatives for the interchange are Alternatives W-N-2 and W-S-2 (Buttonhooks with Westerly Realignment):</p> <ul style="list-style-type: none"> • New Palace Road structure over Highway 401, Palace Road realignment and removal of existing structures; • Displacement of one (1) residential property north of Highway 401, and minor property acquisition from two (2) other residential properties; • Minor residential driveway re-constructions, and closure of north Palace Village driveway; 	

Item	Description	Action By
	<ul style="list-style-type: none"> Anticipated impacts to hydro transmission corridor / towers due to Palace Road realignment / grade raise; and, Anticipated impacts to watermain, gas main, overhead / underground Bell and overhead hydro due to Palace Road realignment / grade raise. 	

Next Steps

The following activities will be undertaken for each project following this meeting and PIC #2:

- Review comments received at this meeting and the PIC and respond to any questions;
- Incorporate any revisions where appropriate and finalize the preliminary design plans;
- Finalize mitigation measures to minimize or avoid potential environmental effects;
- Prepare and file the Transportation Environmental Study Report (TESR) for public and agency review;
- Seek Environmental Assessment clearance; and,
- Detail Design and Construction to be completed as a future separate study.

Open Discussion

- The County noted that sight-distances along East-bound on Highway 401 are important as the Ontario Provincial Police (OPP) is seeing secondary collisions in winter weather between County Road 41 and Palace Road.
- The Project Team noted there are a few utility impacts associated with the Technically Preferred alternative at County Road 41.
- The Town of Napanee has a watermain that they would like to replace before the construction of the County Road 41 interchange. MTO inquired who the Town's main contact is at MTO and suggested that they speak with **Lloyd Pecceco**. The Town noted that they prefer that the watermain goes right under the Highway 401 overpass as right now it goes under the embankment. MTO noted that it would need to be reviewed so it is not a structural issue. The Town will speak with MTO Corridor Management.
- The County Road 41 interchange is not currently on MTO's Southern Highways Program (5-year plan) and therefore there is no funding for it currently. After the election funding priorities may change.
- MTO noted that a comment was received regarding a Napanee by-pass; however, if this were to be undertaken it would have to be initiated by the Town or the County. The County noted that any further questions about a by-pass should be referred to **Chris Wagar**, the County Roads Manager.
- It was noted that there are cost-sharing opportunities if the municipalities want to include sidewalks or multi-use paths as part of these improvements.
- It was noted that if there is an undertaking being completed (or that is recommended) by the Town or County that would require a wider structure, then the municipality should approach MTO about cost-sharing to not preclude the wider structure in their design.
- The Palace Road interchange is currently on MTO's Southern Highways Program and there is funding for it to move forward to construction.
- Utility relocation typically takes place during detail design; however, for Palace Road the utility discussion can start now.
- It was asked if MTO would consider putting closure gates at all ramps.

Item	Description	Action By
	MTO noted that would be considered during detail design.	
	<ul style="list-style-type: none">• MTO noted that with the improvements, MTO typically would change their limits of restricted access to where the new ramps are.	



Hwy 401 Interchange Improvements at County Rd 41 & Palace Rd

Highway 401 Interchange Improvements at County Road 41 and Palace Road

Class Environmental Assessment and Preliminary Design Study
G.W.P. 4459-04-00 / 4197-13-00

Municipal Meeting #2

November 22, 2017

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Hwy 401 Interchange Improvements at County Rd 41 & Palace Rd

Meeting Agenda

- Study Area and Overview
- Consultation to Date
- Evaluation Approach
- County Road 41 Interchange
 - *Short-List Alternatives and Evaluation*
 - *Preliminary Design of the Technically Preferred Alternative*
- Palace Road Interchange
 - *Short-List Alternatives and Evaluation*
 - *Preliminary Design of the Technically Preferred Alternative*
- Next Steps
- Open Discussion

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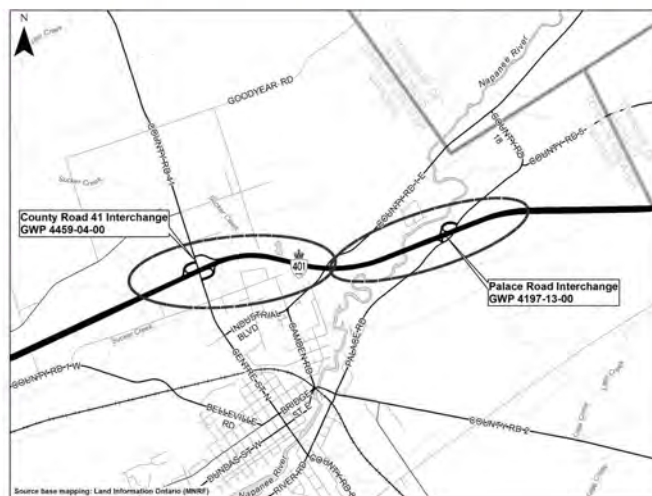




Hwy 401 Interchange Improvements at County Rd 41 & Palace Rd

Study Area, Purpose and Scope

- Two separate Preliminary Design and Class Environmental Assessment Studies:
 - Improvements to the **Highway 401 / County Road 41 interchange** (G.W.P. 4459-04-00)
 - Improvements to the **Highway 401 / Palace Road interchange** (G.W.P. 4197-13-00)
- The primary focus of each study is to:
 - Review the **structural requirements** (e.g. major rehabilitation or replacement) at each interchange;
 - Identify **interim and long-term interchange improvements** to address geometric and operational concerns;
 - Develop a **preliminary design** including a **staging plan** to allow the technically preferred structural works and interchange improvements to be implemented efficiently, minimizing construction costs, traffic disruption and future throwaway.



Hwy 401 Interchange Improvements at County Rd 41 & Palace Rd

Consultation

Notable consultation to date has included:

- Notice of Commencement** (January 2016): public notices placed in Napanee Beaver and Napanee Guide, letters mailed to individuals on the project mailing list, and over 1,500 brochures delivered to adjacent properties;
- Municipal Team Meeting #1** (June 6, 2016);
- PIC #1** (July 27-28, 2016):
 - Overview of the study and existing conditions, long-list interchange alternatives and evaluation;
 - Public notices placed in area newspapers, letters mailed to individuals on mailing list, and letters with plans sent to property owners potentially impacted by one or more of the long-list interchange alternatives.
- Discussions with potentially impacted property owners and other stakeholders has been ongoing throughout the study as required / requested;
 - Notable comments have pertained to property acquisition requirements, comments on the existing conditions/concerns and alternatives/recommendations for improvement, and anticipated timing of the construction works.

PIC #2 is being held on November 22, 2017 from 4 pm to 8 pm at Selby Community Hall (External agency viewing time from 3 pm to 4 pm) to provide the public the opportunity to view and comment on the evaluation of alternatives and the Preliminary Design at each interchange;

- Public notices placed in area newspapers, letters mailed to individuals on mailing list, over 13,500 brochures delivered to area residents and businesses with details on both assignments, and individual letters with plans sent to directly impacted property owners advising of property-specific impacts;



Hwy 401 Interchange Improvements at County Rd 41 & Palace Rd

Generation and Evaluation of Preliminary Design Alternatives

The following process has been followed to select the Technically Preferred Preliminary Design Alternatives

1. Identify existing "Problems" (e.g. structural requirements and associated construction staging needs, interchange geometric deficiencies) and "Opportunities" to address identified problems;
 2. Develop and assess "Long-List" of interchange alternatives to reflect ultimate interchange configuration(s), based on factors such as Traffic Operations, Construction Staging, Geometrics, Cost, and Environmental Impacts (Presented at PIC #1).
 3. Evaluate the remaining "Short-List" of interchange alternatives utilizing an "Arithmetic Evaluation" approach and based on the categories and criteria in the table to the right. (To be presented at PIC #2).
- Alternatives were developed and assessed separately for the north and south sides of the two interchanges:
 - The Arithmetic Evaluation methodology involves assigning relative weightings to each of the evaluation categories and criteria based on their level of importance. Impacts are measured either quantitatively or qualitatively, and then these scores are multiplied by the relative weight to determine an overall score for each alternative.

Evaluation Categories and Criteria	
TRANSPORTATION	
<ul style="list-style-type: none"> • Interchange Operations • Safety and Geometrics 	
ENVIRONMENTAL	
<ul style="list-style-type: none"> • Natural Environment <ul style="list-style-type: none"> ○ Fish and Fish Habitat ○ Terrestrial Ecosystems ○ Groundwater • Socio-Economic Environment <ul style="list-style-type: none"> ○ Noise ○ Air Quality ○ Community Effects ○ Waste and Contamination • Cultural Environment <ul style="list-style-type: none"> ○ Archaeological Resources ○ Built Heritage Features and Cultural Heritage Landscapes 	
COST	
<ul style="list-style-type: none"> • Capital Cost • Utility Impacts 	



Highway 401 Interchange Improvements at County Road 41

County Road 41 – Overview

Background

- In 2001, MTO completed a Preliminary Design Study to determine the short-term, mid-term and long-term improvements to this interchange which recommended upgrading the interchange to a full Parclo A4 interchange
- In 2004, MTO constructed a new westbound off-ramp at County Road 41 and widened the Hwy 401/Sucker Creek bridge to the north as per the 2001 study recommendations.

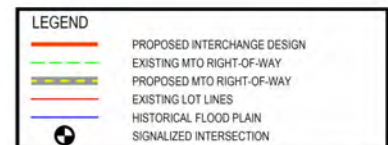
Summary of Problems and Opportunities

- Major rehabilitation of the Hwy 401/CR41 and Sucker Creek bridges is anticipated to be needed within 5 years (in addition to the minor rehabilitation works currently in progress);
- Development of an ultimate plan for the interchange is needed to allow the structural work to be staged in a cost effective and efficient manner, minimizing future throwaway.
- A number of undesirable geometric elements impacting safety and operations are present.





Highway 401 Interchange Improvements at County Road 41 County Road 41 Short-List Alternatives (North Side)



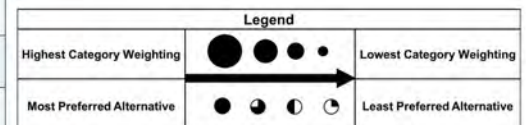
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Highway 401 Interchange Improvements at County Road 41 Short-List Evaluation Summary (North Side)

Factor	Alternative N-1 Parclo A2	Alternative N-2 Parclo A1	Alternative N-3 Diamond	Alternative N-5 Parclo A1 with Roundabout	Alternative N-6 Diamond with Roundabout
Transportation	●	◐	◑	◐	◐
Natural Environment	●	●	●	●	●
Socio-Economic Environment	●	●	◐	◐	◐
Cultural Environment	●	●	●	●	●
Cost	◐	●	●	◐	◐
Recommendation	✓	✗	✗	✗	✗



- Alt N-1 has a higher cost than the other alternatives, similar construction staging and utility impacts and is preferred or equally preferred with the other alternatives from a natural, socio-economical and cultural environment perspective.
- However, Alt N-1 is the preferred alternative from a transportation perspective, with no left-turns required (directional movements provided for all maneuvers) and the most desirable interchange operations.
- As such, Alt N-1 (Parclo A2) is the preferred north side interchange alternative.

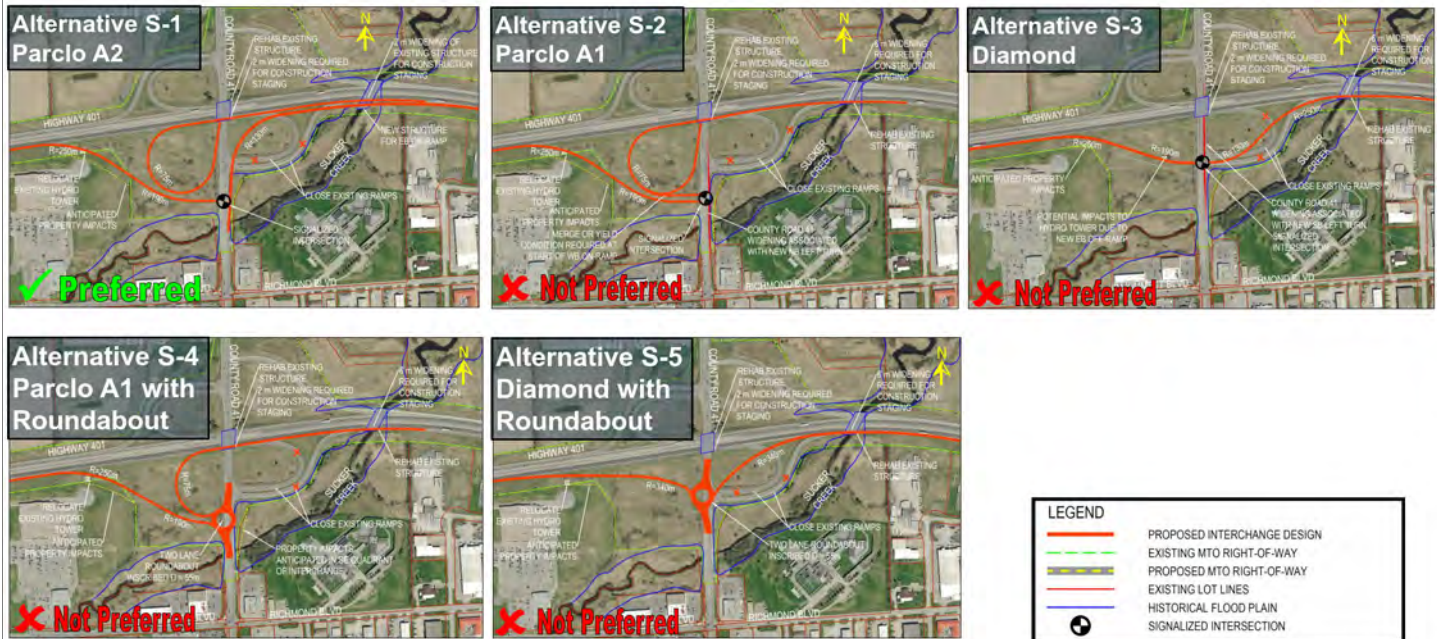
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Highway 401 Interchange Improvements at County Road 41 County Road 41 Short-List Alternatives (South Side)



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Highway 401 Interchange Improvements at County Road 41 Short-List Evaluation Summary (South Side)

Factor	Alternative S-1 Parclo A2	Alternative S-2 Parclo A1	Alternative S-3 Diamond	Alternative S-4 Parclo A1 with Roundabout	Alternative S-5 Diamond with Roundabout
Transportation	●	●	●	●	●
Natural Environment	●	●	●	●	●
Socio-Economic Environment	●	●	●	●	●
Cultural Environment	●	●	●	●	●
Cost	●	●	●	●	●
Recommendation	✓	✗	✗	✗	✗

Legend		
Highest Category Weighting	● ● ● ● ●	Lowest Category Weighting
→		
Most Preferred Alternative	● ● ● ● ●	Least Preferred Alternative

- Alt S-1 requires a new or widened bridge over Sucker / Selby Creek, slightly increasing the natural and socio-economic environment impacts.
- Alt S-1 is the preferred alternative from a transportation perspective, with no left-turns required (directional movements provided for all maneuvers) and the most desirable interchange operations;
- While Alt S-1 has a higher cost than the other alternatives and slightly greater impacts, the short and long-term operational and safety benefits of this configuration are considered to outweigh these impacts.
- As such, Alt S-1 (Parclo A2) is the preferred south side interchange alternative.

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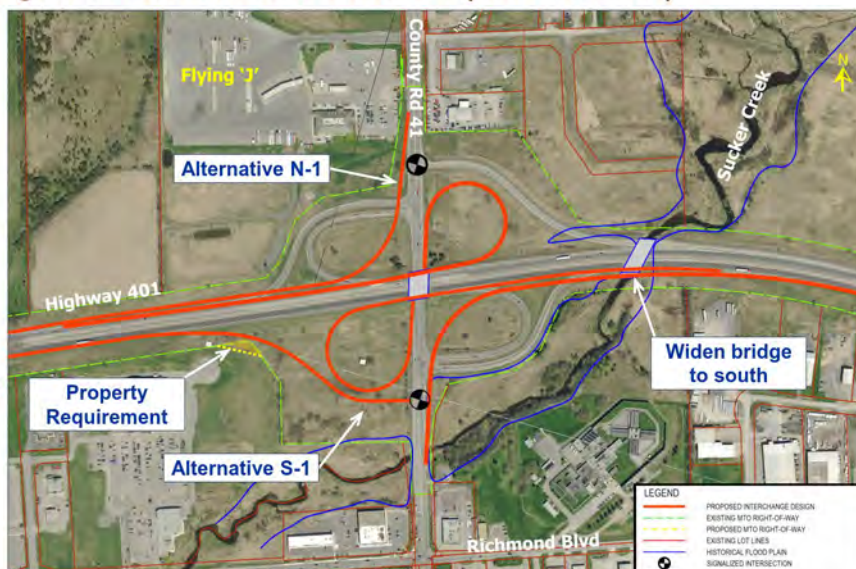


Highway 401 Interchange Improvements at County Road 41

Technically Preferred Alternative

Based on the evaluations of both the north and south sides, the **Technically Preferred Preliminary Design Alternatives** for the interchange are **Alternatives N-1 and S-1 (full Parclo A4)**:

- Widening of Hwy 401/Sucker Creek structure to the south required for realigned S-E on-ramp;
- Minor property impacts to commercial property in southwest quadrant of interchange;
- New traffic signals at north ramp terminal intersection;
- Anticipated impacts to two hydro poles west of County Road 41;
- Anticipated impacts to sanitary sewer, watermain, and underground Bell on east side of County Road 41;



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County Road 41 Technically Preferred Alternative



Highway 401 Interchange Improvements at Palace Road

Palace Road – Overview

- Minor bridge rehabilitation was completed in 2012 (limited in scope due to limitations on Highway 401 lane closures);
- Full replacement of the Hwy 401 – Palace Road bridges is anticipated to be required within 5 years;
- To address the bridge requirements, interchange alternatives on both the existing alignment and realigned Palace Road were considered;
- Development of an ultimate plan for the interchange is needed to allow the structural work to be staged in a cost effective and efficient manner, minimizing future throwaway;
- A number of undesirable interchange geometric elements impacting safety and operations are present.



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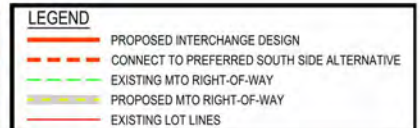




Highway 401 Interchange Improvements at Palace Road

Short-List Alternatives (North Side)

Existing Alignment Alternatives

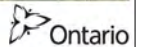


Westerly Realignment Alternatives



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Highway 401 Interchange Improvements at Palace Road

Short-List Evaluation Summary (North Side)

Factor	Existing Alignment Alternatives		Westerly Realignment Alternatives		
	Alternative E-N-2 Buttonhook	Alternative E-N-4 Diamond	Alternative W-N-2 Buttonhook	Alternative W-N-4 Diamond	Alternative W-N-5 Diamond with Roundabout
Transportation	●	●	●	●	●
Natural Environment	●	●	●	●	●
Socio-Economic Environment	●	●	●	●	●
Cultural Environment	●	●	●	●	●
Cost	●	●	●	●	●
Recommendation	✗	✗	✓	✗	✗

Legend		
Highest Category Weighting	● ● ● ● ●	Lowest Category Weighting
Most Preferred Alternative	● ● ● ● ●	Least Preferred Alternative

- The alternatives on the existing alignment (Alt E-N-2 / E-N-4) require temporary widening of one of the existing Palace Road bridges and require reduction to a single lane of traffic (one combined lane for both directions) controlled by signals along Palace Road during construction.
- Future rehabilitation of these bridges (Highway 401 over Palace Road) would have significantly greater impacts to Highway 401 traffic operations including likely lane reductions, whereas future bridge rehabilitations for the westerly realignment alternatives can generally be undertaken with minimal impacts to Highway 401 with lower life-cycle costs.
- While Alt W-N-2 (and W-N-4) has greater property impacts, the short and long-term staging benefits associated with constructing the new structure over Highway 401 are considered to outweigh this impact.

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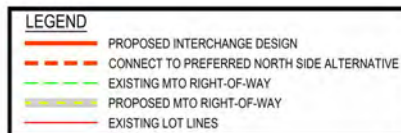
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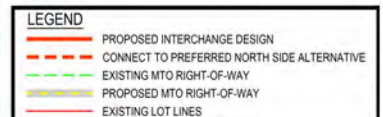
Highway 401 Interchange Improvements at Palace Road

Short-List Alternatives (South Side – Existing Alignment)



Highway 401 Interchange Improvements at Palace Road

Short-List Alternatives (South Side – Westerly Realignment)





Highway 401 Interchange Improvements at Palace Road

Short-List Evaluation Summary (South Side)

Factor	Existing Alignment Alternatives			Westerly Realignment Alternatives			
	Alternative E-S-2 Buttonhook	Alternative E-S-4 Diamond	Alternative E-S-7 Parclo B	Alternative W-S-2 Buttonhook	Alternative W-S-4 Diamond	Alternative W-S-5 Diamond with Roundabout	Alternative W-S-7 Parclo B with Roundabout
Transportation	●	●	●	●	●	●	●
Natural Environment	●	●	●	●	●	●	●
Socio-Economic Environment	●	●	●	●	●	●	●
Cultural Environment	●	●	●	●	●	●	●
Cost	●	●	●	●	●	●	●
Recommendation	✗	✗	✗	✓	✗	✗	✗

- Future rehabilitation of the new bridges along the existing alignment would have significant impacts to Highway 401 traffic operations compared to westerly alignment alternatives.
- Although the vertical grade raise of Palace Road with the westerly alternatives impacts the hydro transmission line and various other utilities, the staging and geometric advantages outweigh these impacts.
- Alt W-S-2 (Buttonhook) is considered the preferred interchange alternative as it has the best overall geometrics, while the other westerly alternatives having potential sight distance concerns at the intersection and less desirable or unconventional configurations.

Legend	
Highest Category Weighting	●
Most Preferred Alternative	●
Least Preferred Alternative	●



Highway 401 Interchange Improvements at Palace Road

Technically Preferred Alternative

Based on the evaluations of both the north and south sides, the **Technically Preferred Preliminary Design Alternatives** for the interchange are **Alternatives W-N-2 and W-S-2** (Buttonhooks with Westerly Realignment):

- New Palace Road structure over Highway 401, Palace Road realignment and removal of existing structures;
- Displacement of 1 residential property north of Highway 401, and minor property acquisition from 2 other residential properties;
- Minor residential driveway re-constructions, and closure of north Palace Village driveway.
- Anticipated impacts to hydro transmission corridor / towers due to Palace Road realignment / grade raise;
- Anticipated impacts to watermain, gas main, overhead / underground Bell, and overhead hydro due to Palace Road realignment / grade raise.



Palace Road Technically Preferred Alternative



Hwy 401 Interchange Improvements at County Rd 41 & Palace Rd

Next Steps

The following activities will be undertaken for each project following this meeting and PIC #2:

- Review comments received at this meeting and the PIC and respond to any questions;
- Incorporate any revisions where appropriate and finalize the preliminary design plans.
- Finalize mitigation measures to minimize or avoid potential environmental effects.
- Prepare and file the Transportation Environmental Study Report for public and agency review.
- Seek Environmental Assessment clearance.
- Detail Design and Construction to be completed as a future / separate study.



Consultation Throughout
(with Aboriginal Communities and all stakeholders – property owners, members of the public, municipalities, interest groups, agencies, etc.)



Hwy 401 Interchange Improvements at County Rd 41 & Palace Rd

Highway 401 Interchange Improvements at County Road 41 and Palace Road

Class Environmental Assessment and Preliminary Design Study
G.W.P. 4459-04-00 / 4197-13-00

Town of Greater Napanee Council Meeting
March 27, 2018

AECOM

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Hwy 401 Interchange Improvements at County Rd 41 & Palace Rd

Meeting Agenda

- Study Area and Overview
- Consultation to Date
- Evaluation Approach
- County Road 41 Interchange
 - Short-List Alternatives and Evaluation
 - Preliminary Design of the Technically Preferred Alternative
- Palace Road Interchange
 - Short-List Alternatives and Evaluation
 - Preliminary Design of the Technically Preferred Alternative
- Next Steps
- Open Discussion

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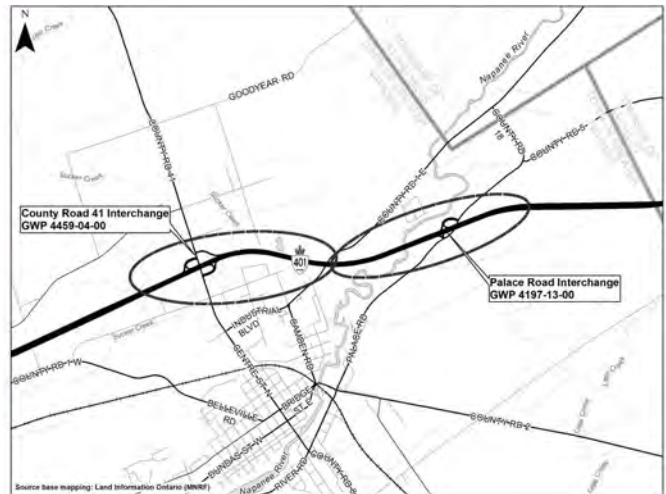




Hwy 401 Interchange Improvements at County Rd 41 & Palace Rd

Study Area, Purpose and Scope

- Two separate Preliminary Design and Class Environmental Assessment Studies:
 - Improvements to the **Highway 401 / County Road 41 interchange** (G.W.P. 4459-04-00)
 - Improvements to the **Highway 401 / Palace Road interchange** (G.W.P. 4197-13-00)
- The primary focus of each study is to:
 - Review the **structural requirements** (e.g. major rehabilitation or replacement) at each interchange;
 - Identify **interim and long-term interchange improvements** to address geometric and operational concerns;
 - Develop a **preliminary design** including a **staging plan** to allow the technically preferred structural works and interchange improvements to be implemented efficiently, minimizing construction costs, traffic disruption and future throwaway.



Hwy 401 Interchange Improvements at County Rd 41 & Palace Rd

Consultation

Consultation to date has included:

- Notice of Commencement** (January 2016): public notices placed in Napanee Beaver and Napanee Guide, letters mailed to individuals on the project mailing list, and over 1,500 brochures delivered to adjacent properties;
- Municipal Team Meeting #1** (June 6, 2016);
- PIC #1** (July 27-28, 2016):
 - Overview of the study and existing conditions, long-list interchange alternatives and evaluation;
 - Public notices placed in area newspapers, letters mailed to individuals on mailing list, and letters with plans sent to property owners potentially impacted by one or more of the long-list interchange alternatives.
- Municipal Team Meeting #2** (November 22, 2017);
- PIC #2** (November 22, 2017):
 - Evaluation of Alternatives and Preliminary Design at each interchange;
 - Public notices placed in area newspapers, letters mailed to individuals on mailing list, over 13,000 brochures were delivered to area residents and businesses with details on both assignments, and individual letters with plans sent to directly impacted property owners advising of property-specific impacts.
- Discussions with potentially impacted property owners and other stakeholders have been ongoing throughout the study as required / requested:
 - Notable comments have pertained to property acquisition requirements, indirect property impacts, comments on the existing conditions/concerns and alternatives/recommendations for improvement, and anticipated timing of the construction works.



Highway 401 Interchange Improvements at County Road 41

County Road 41 – Overview

Background

- In 2001, MTO completed a Preliminary Design Study to determine the short-term, mid-term and long-term improvements to this interchange which recommended upgrading the interchange to a full Parclo A4 interchange
- In 2004, MTO constructed a new westbound off-ramp at County Road 41 and widened the Hwy 401/Sucker Creek bridge to the north as per the 2001 study recommendations.

Summary of Problems and Opportunities

- Major rehabilitation of the Hwy 401/CR41 and Sucker Creek bridges is anticipated to be needed within 5 years (in addition to the minor rehabilitation works currently in progress);
- Development of an ultimate plan for the interchange is needed to allow the structural work to be staged in a cost effective and efficient manner, minimizing future throwaway.
- A number of undesirable interchange geometric elements impacting safety and operations are present.



Highway 401 Interchange Improvements at County Road 41

County Road 41 Short-List Alternatives (North Side)



LEGEND	
	PROPOSED INTERCHANGE DESIGN
	EXISTING MTO RIGHT-OF-WAY
	PROPOSED MTO RIGHT-OF-WAY
	EXISTING LOT LINES
	HISTORICAL FLOOD PLAIN
	SIGNALIZED INTERSECTION



Highway 401 Interchange Improvements at County Road 41

Short-List Evaluation Summary (North Side)

Factor	Alternative N-1 Parclo A2	Alternative N-2 Parclo A1	Alternative N-3 Diamond	Alternative N-5 Parclo A1 with Roundabout	Alternative N-6 Diamond with Roundabout
Transportation	●	◐	◐	◐	◐
Natural Environment	●	●	●	●	●
Socio-Economic Environment	●	●	◐	◐	◐
Cultural Environment	●	●	●	●	●
Cost	◐	●	●	◐	◐
Recommendation	✓	✗	✗	✗	✗

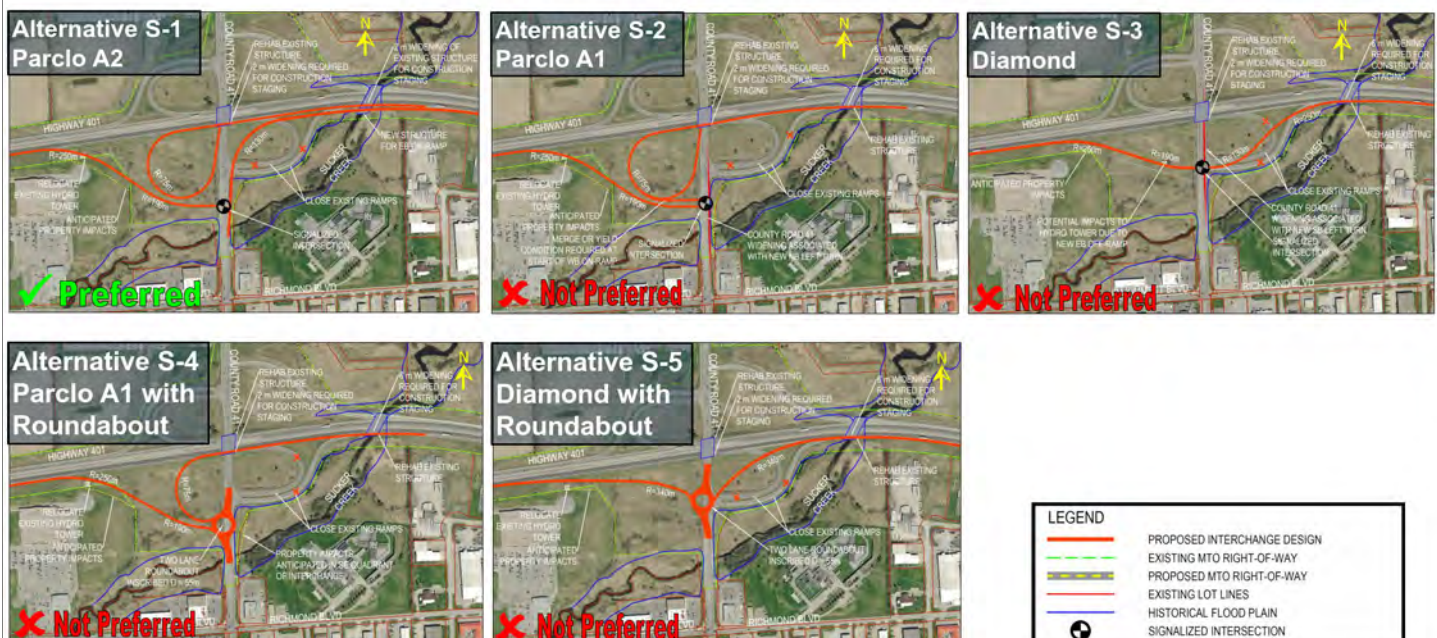
Legend		
Highest Category Weighting	● ● ● ● ●	Lowest Category Weighting
→		
Most Preferred Alternative	● ● ● ● ●	Least Preferred Alternative

- Alt N-1 has a higher cost than the other alternatives, similar construction staging and utility impacts and is preferred or equally preferred with the other alternatives from a natural, socio-economical and cultural environment perspective.
- However, Alt N-1 is the preferred alternative from a transportation perspective, with no left-turns required (directional movements provided for all maneuvers) and the most desirable interchange operations.
- As such, Alt N-1 (Parclo A2) is the preferred north side interchange alternative.



Highway 401 Interchange Improvements at County Road 41

County Road 41 Short-List Alternatives (South Side)





Highway 401 Interchange Improvements at County Road 41

Short-List Evaluation Summary (South Side)

Factor	Alternative S-1 Parclo A2	Alternative S-2 Parclo A1	Alternative S-3 Diamond	Alternative S-4 Parclo A1 with Roundabout	Alternative S-5 Diamond with Roundabout
Transportation	●	●	●	●	●
Natural Environment	●	●	●	●	●
Socio-Economic Environment	●	●	●	●	●
Cultural Environment	●	●	●	●	●
Cost	●	●	●	●	●
Recommendation	✓	✗	✗	✗	✗

Legend	
Highest Category Weighting	● ● ● ● ●
Least Preferred Alternative	● ● ● ● ●

- Alt S-1 requires a new or widened bridge over Sucker / Selby Creek, slightly increasing the natural and socio-economic environment impacts.
- Alt S-1 is the preferred alternative from a transportation perspective, with no left-turns required (directional movements provided for all maneuvers) and the most desirable interchange operations.
- While Alt S-1 has a higher cost than the other alternatives and slightly greater impacts, the short and long-term operational and safety benefits of this configuration are considered to outweigh these impacts.
- As such, Alt S-1 (Parclo A2) is the preferred south side interchange alternative.

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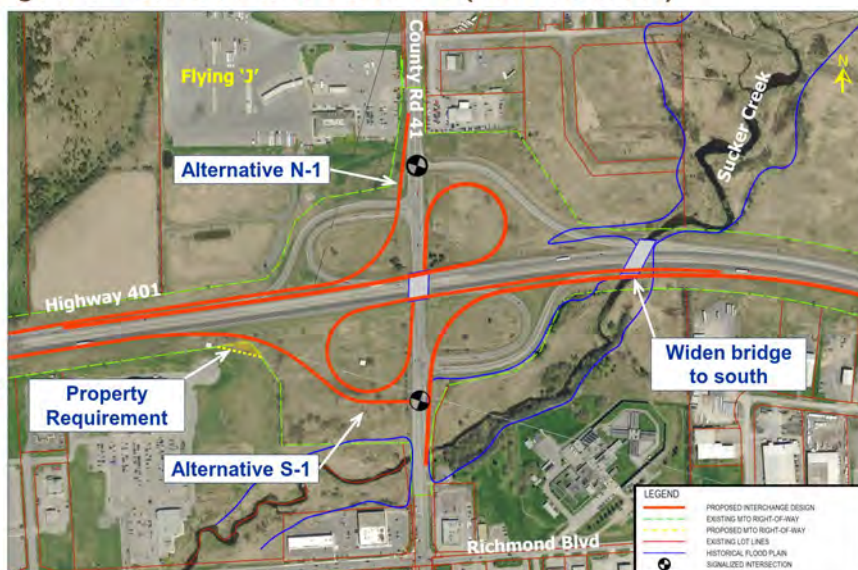


Highway 401 Interchange Improvements at County Road 41

Technically Preferred Alternative

Based on the evaluations of both the north and south sides, the **Technically Preferred Preliminary Design Alternatives** for the interchange are **Alternatives N-1 and S-1 (full Parclo A4)**:

- Widening of Hwy 401/Sucker Creek structure to the south required for realigned S-E on-ramp;
- Minor property impacts to commercial property in southwest quadrant of interchange;
- New traffic signals at north ramp terminal intersection;
- Anticipated impacts to two hydro poles west of County Road 41;
- Anticipated impacts to sanitary sewer, watermain, and underground Bell on east side of County Road 41;



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County Road 41 Technically Preferred Alternative

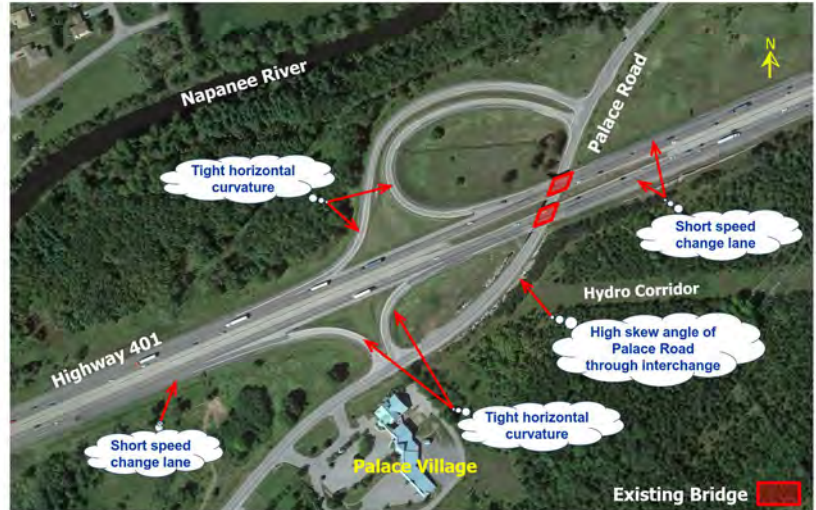




Highway 401 Interchange Improvements at Palace Road

Palace Road – Overview

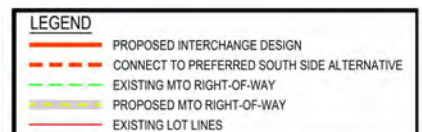
- Minor bridge rehabilitation was completed in 2012 (limited in scope due to limitations on Highway 401 lane closures);
- Full replacement of the Hwy 401 – Palace Road bridges is anticipated to be required within 5 years;
- To address the bridge requirements, interchange alternatives on both the existing alignment and realigned Palace Road were considered;
- Development of an ultimate plan for the interchange is needed to allow the structural work to be staged in a cost effective and efficient manner, minimizing future throwaway;
- A number of undesirable interchange geometric elements impacting safety and operations are present.



Highway 401 Interchange Improvements at Palace Road

Short-List Alternatives (North Side)

Existing Alignment Alternatives



Westerly Realignment Alternatives





Highway 401 Interchange Improvements at Palace Road

Short-List Evaluation Summary (North Side)

Factor	Existing Alignment Alternatives		Westerly Realignment Alternatives		
	Alternative E-N-2 Buttonhook	Alternative E-N-4 Diamond	Alternative W-N-2 Buttonhook	Alternative W-N-4 Diamond	Alternative W-N-5 Diamond with Roundabout
Transportation					
Natural Environment					
Socio-Economic Environment					
Cultural Environment					
Cost					
Recommendation					

Legend		
Highest Category Weighting		Lowest Category Weighting
Most Preferred Alternative		Least Preferred Alternative

- The alternatives on the existing alignment (Alt E-N-2 / E-N-4) require temporary widening of one of the existing Palace Road bridges and require reduction to a single lane of traffic (one combined lane for both directions) controlled by signals along Palace Road during construction.
- Future rehabilitation of these bridges (Highway 401 over Palace Road) would have significantly greater impacts to Highway 401 traffic operations including likely lane reductions, whereas future bridge rehabilitations for the westerly realignment alternatives can generally be undertaken with minimal impacts to Highway 401 with lower life-cycle costs.
- While Alt W-N-2 (and W-N-4) has greater property impacts, the short and long-term staging benefits associated with constructing the new structure over Highway 401 are considered to outweigh this impact.



Highway 401 Interchange Improvements at Palace Road

Short-List Alternatives (South Side – Existing Alignment)

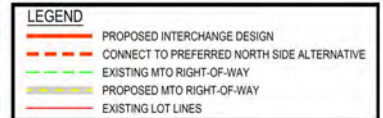


LEGEND	
	PROPOSED INTERCHANGE DESIGN
	CONNECT TO PREFERRED NORTH SIDE ALTERNATIVE
	EXISTING MTO RIGHT-OF-WAY
	PROPOSED MTO RIGHT-OF-WAY
	EXISTING LOT LINES



Highway 401 Interchange Improvements at Palace Road

Short-List Alternatives (South Side – Westerly Realignment)



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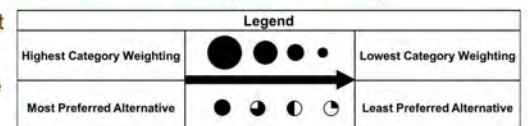


Highway 401 Interchange Improvements at Palace Road

Short-List Evaluation Summary (South Side)

Factor	Existing Alignment Alternatives			Westerly Realignment Alternatives			
	Alternative E-S-2 Buttonhook	Alternative E-S-4 Diamond	Alternative E-S-7 Parclo B	Alternative W-S-2 Buttonhook	Alternative W-S-4 Diamond	Alternative W-S-5 Diamond with Roundabout	Alternative W-S-7 Parclo B with Roundabout
Transportation	●	●	●	●	●	●	●
Natural Environment	●	●	●	●	●	●	●
Socio-Economic Environment	●	●	●	●	●	●	●
Cultural Environment	●	●	●	●	●	●	●
Cost	●	●	●	●	●	●	●
Recommendation	✗	✗	✗	✓	✗	✗	✗

- Future rehabilitation of the new bridges along the existing alignment would have significant impacts to Highway 401 traffic operations compared to westerly alignment alternatives.
- Although the vertical grade raise of Palace Road with the westerly alternatives impacts the hydro transmission line and various other utilities, the staging and geometric advantages outweigh these impacts.
- Despite higher socio-economic impacts, Alt W-S-2 (Buttonhook) is considered the preferred interchange alternative as it has the best overall geometrics and safety conditions, while the other westerly alternatives having potential sight distance concerns at the intersection and less desirable or unconventional configurations.



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Highway 401 Interchange Improvements at Palace Road

Technically Preferred Alternative

Based on the evaluations of both the north and south sides, the **Technically Preferred Preliminary Design Alternatives** for the interchange are **Alternatives W-N-2 and W-S-2** (Buttonhooks with Westerly Realignment):

- New Palace Road structure over Highway 401, Palace Road realignment and removal of existing structures;
- Displacement of 1 residential property north of Highway 401, and minor property acquisition from 2 other residential properties;
- Minor residential driveway re-constructions, and closure of north Palace Village driveway;
- Anticipated impacts to hydro transmission corridor / towers due to Palace Road realignment / grade raise;
- Anticipated impacts to watermain, gas main, overhead / underground Bell, and overhead hydro due to Palace Road realignment / grade raise.



Palace Road Technically Preferred Alternative



Hwy 401 Interchange Improvements at County Rd 41 & Palace Rd

Consultation

Follow-Up Consultation with Impacted Property Owners

- A number of minor refinements were developed to minimize the stakeholder concerns including modifying the off-ramp angle from 90 to 80 degrees, shifting the eastbound off-ramp slightly east, landscaping, driveway realignments, etc.
- A follow-up meeting was held with impacted property owners on the south side of the interchange on March 12, 2018 to discuss these refinements.
- A total of 10 property owners attended the meeting and some of the key concerns expressed at this meeting were regarding the proximity of the eastbound ramp terminal at Palace Road relative to residential properties.
 - Concerns regarding decrease in property value due to proximity of proposed ramps;
 - Concerns regarding safety of the eastbound off-ramp located directly across from residential driveways;
 - Concerns regarding traffic volumes in front of their homes as Palace Road is used as an Emergency Detour Route;
 - Illumination concerns with headlights coming from off-ramp shining into homes at all hours of the night;
 - Noise concerns for on and off-ramps and engine brakes; and
 - Palace Village owners were concerned with the closure of the second entrance / exit onto and from Palace Road;
- The Ministry is currently working through these issues with the impacted property owners.



Hwy 401 Interchange Improvements at County Rd 41 & Palace Rd

Next Steps

The following activities will be undertaken for each project following this meeting:

- Review comments received at this council meeting and respond to any questions;
- Incorporate any revisions where appropriate and finalize the preliminary design plans.
- Finalize mitigation measures to minimize or avoid potential environmental effects.
- Prepare and file the Transportation Environmental Study Report for public and agency review.
- Seek Environmental Assessment clearance for each study.
- Detail Design and Construction to be completed as future / separate studies.



Consultation Throughout
(with Indigenous Communities and all stakeholders – property owners, members of the public, municipalities, interest groups, agencies, etc.)

Appendix G – Public Information Centre Summary Reports and Displays

Public Information Centre #1 Summary Report

Highway 401 Interchange Improvements at Palace Road

Preliminary Design and Class Environmental Assessment Study

August 2016

TABLE OF CONTENTS

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3.0 PIC FORMAT, TIME, AND LOCATION 1

4.0 NOTIFICATION..... 2

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6.0 MATERIALS PRESENTED 2

7.0 ATTENDANCE AND SUMMARY OF COMMENTS 3

APPENDICES

Appendix A Notification Materials

Appendix B Copies of PIC Displays

1.0 INTRODUCTION

The Ontario Ministry of Transportation (MTO) has retained AECOM to undertake a Preliminary Design and Class Environmental Assessment Study for improvements to the Highway 401 interchange at Palace Road (G.W.P. 4197-13-00). The study is examining the interim and long-term interchange operational improvements, replacement and/or rehabilitation of the Highway 401 bridges, pavement rehabilitation, drainage improvements, illumination, and traffic staging during construction. The study is located in the Town of Greater Napanee within the County of Lennox and Addington.

2.0 PURPOSE

The purpose of the first Public Information Centre (PIC) was to provide an overview of the Highway 401 interchange improvements at Palace Road and provide information on the study area, purpose and scope, details on the timing of the study, an overview of existing conditions, problems and opportunities, the identification and screening of the long list of interchange improvement alternatives, the evaluation approach and criteria of the short list of alternatives and the next steps in the environmental assessment process. The information presented at the PIC included:

- Study area, purpose and scope;
- Overall study process;
- Timing of study activities;
- Previous studies;
- Overview of existing transportation and environmental conditions;
- Problems and opportunities;
- Identification and screening assessment of the long list of alternatives;
- Evaluation of the short list of alternatives – approach and criteria; and,
- Next steps in the study process.

3.0 PIC FORMAT, TIME, AND LOCATION

The first PIC was held on Thursday July 28, 2016 at the following location:

Strathcona Paper Centre, Lafarge Banquet Hall
16 McPherson Drive, Napanee, ON K7R 3K6

The PIC was an informal drop-in centre and representatives from the MTO and the Consultant Team were available to answer questions and discuss the study. Members from external government agencies, elected officials and First Nations representatives were invited to attend an advance session between 3:00 p.m. and 4:00 p.m. Members of the public were invited to attend the PIC between 4:00 p.m. and 8:00 p.m.

4.0 NOTIFICATION

A Notice of PIC #1 was published in the following local newspapers on July 14, 2016 to inform the public of the PIC:

- *Napanee Beaver; and,*
- *Napanee Guide.*

Notification letters advising of the study were also mailed and/or emailed to everyone on the study contact list (60 contacts) on July 11, 2016, which included First Nations communities, Members of Parliament (MPs) and Members of Provincial Parliament (MPPs), external government agencies (federal, provincial, municipal), emergency services, utility services, interest groups, and members of the public. Copies of these notification letters can be found in **Appendix A**.

5.0 PROJECT TEAM REPRESENTATIVES

The following representatives from the Project Team including MTO and AECOM were in attendance at the PIC:

- Tina White – MTO Project Manager
- Erin Pipe – MTO Environmental Planner
- Tim Sorochinsky – AECOM Senior Project Manager
- Michael Weldon – AECOM Deputy Project Manager
- Fred Leech – AECOM Senior Environmental Planner
- Sarah Schmied – AECOM Environmental Planner

6.0 MATERIALS PRESENTED

The information presented at the PIC included display boards with information on the following around the room:

- Purpose of PIC #1;

- Study area, purpose and scope;
- Overview of the Class EA process for Group 'B' projects;
- Timing of study activities;
- Overview of existing environmental conditions;
- Overview of existing transportation conditions;
- Overview of transportation conditions and traffic volumes;
- Opportunities for this study;
- Identification and screening of the long list of alternatives;
- Proposed evaluation approach and criteria for the short list of alternatives;
- Next steps in the study process; and,
- Freedom of Information and Protection of Privacy Act.

Additionally there were roll plans available presenting the long list of interchange alternatives and summaries of the screening assessment of alternatives available at the PIC.

Copies of the PIC displays are available in **Appendix B**.

7.0 ATTENDANCE AND SUMMARY OF COMMENTS

A total of 9 individuals chose to sign the visitors register for the PIC. No members of the media attended. No comment sheets were received at the PIC. The Project Team received most comments verbally at the PIC from municipal and emergency service representatives. Feedback received included the following:

- Comment regarding the steep grade for vehicles entering eastbound Highway 401 from northbound Palace Road and the associated difficulties merging with Highway 401 traffic;
- Comment noting that a lot of drivers use Palace Road to by-pass other traffic (at County Road 41);
- Questions regarding property impacts;
- Questions regarding operational highway noise and if there would be enough change as a result of this study to warrant mitigation;
- Preference for roundabouts;

- Preference for alternatives that realign Palace Road over Highway 401;
- Concerns regarding sightlines at the north ramp terminal turning north (looking south beneath existing Highway 401 bridges; and,
- Requests for copies of the alternatives presented at the PIC.

APPENDIX A

Notification Materials

ONTARIO GOVERNMENT NOTICE

NOTICE OF PUBLIC INFORMATION CENTRE #1

Preliminary Design and Class Environmental Assessment Studies

Highway 401 Interchange Improvements at County Road 41 (G.W.P. 4459-04-00) and at Palace Road (G.W.P. 4197-13-00)

THE PROJECTS

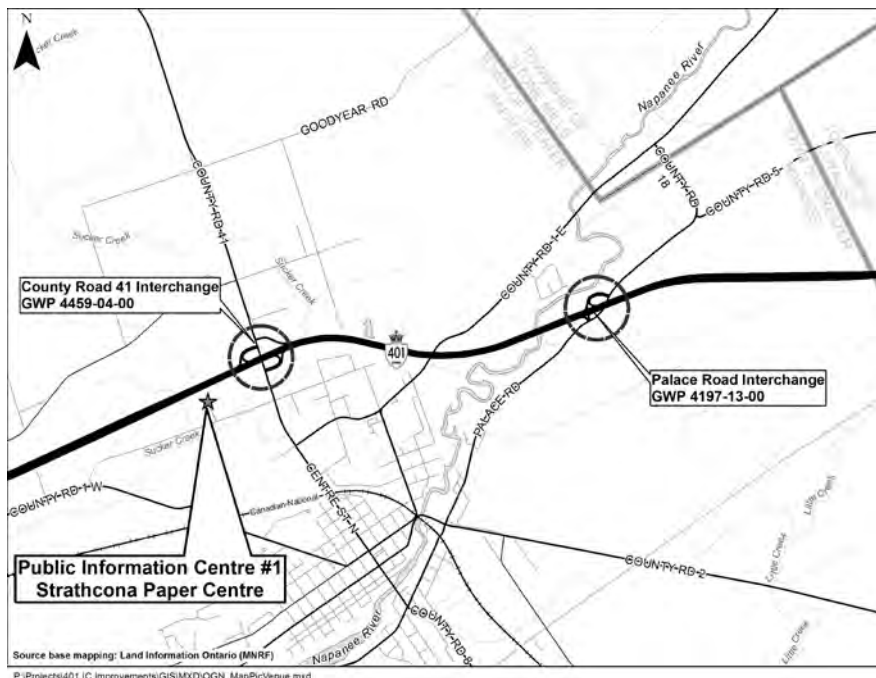
The Ontario Ministry of Transportation (MTO) has retained AECOM to undertake two separate Preliminary Design and Class Environmental Assessment Studies for improvements to the Highway 401 / County Road 41 interchange (G.W.P. 4459-04-00) and the Highway 401 / Palace Road interchange (G.W.P. 4197-13-00). Both projects are located in the Town of Greater Napanee within the County of Lennox and Addington.

THE PROCESS

Both studies are following the approved planning process for a Group 'B' project under the MTO Class Environmental Assessment for Provincial Transportation Facilities (2000). Two Public Information Centres (PICs) will be held for each study to provide interested parties with the opportunity to discuss the projects and provide input to the Project Team. A Transportation Environmental Study Report (TESR) will be prepared for each study and made available for public review at the completion of each study.

PUBLIC INFORMATION CENTRE #1

The first of two PICs has been arranged for each study to introduce the studies and present the following for comment: existing conditions, need for improvements, alternatives being considered, criteria proposed to evaluate the alternatives, and next steps. The second PIC for each project will occur early 2017 and will present the evaluation of the alternatives, the Technically Preferred Plan, potential environmental impacts and proposed mitigation measures. Members of the public, residents and stakeholders are invited to attend the first PIC as follows:



County Road 41 (G.W.P. 4459-04-00)

Wednesday July 27, 2016
4:00 p.m. to 8:00 p.m.

Strathcona Paper Centre, Lafarge Banquet Hall
16 McPherson Drive, Greater Napanee

Palace Road (G.W.P. 4197-13-00)

Thursday July 28, 2016
4:00 p.m. to 8:00 p.m.

Strathcona Paper Centre, Lafarge Banquet Hall
16 McPherson Drive, Greater Napanee

The PIC will be an informal drop-in centre and representatives from the MTO and the Consultant Team will be available to answer questions and discuss the studies.

COMMENTS

To obtain additional information, provide comments, or to be placed on the mailing list for either of these studies, please contact the Project Team as follows:

Tina White

Senior Project Manager
Ministry of Transportation, Eastern Region
1355 John Counter Boulevard, Postal Bag 4000
Kingston, ON K7L 5A3
Tel: 613-545-4871, Toll Free: 1-800-267-0295
Fax: 613-540-5106
Email: tina.white@ontario.ca

Tim Sorochinsky, P.Eng.

Consultant Project Manager
AECOM
4th Floor, 30 Leek Crescent
Richmond Hill, ON L4B 4N4
Tel: 905-882-3522
Fax: 905-882-4399
E-mail: tim.sorochinsky@aecom.com

Fred Leech

Consultant Environmental Planner
AECOM
201-45 Goderich Road
Hamilton, ON L8E 4W8
Tel: 905.578.3040
Fax: 905.578.4129
Email: fred.leech@aecom.com

If you have any accessibility requirements in order to participate in these projects, please contact one of the Project Team members listed above.

Comments are being collected to assist MTO in meeting the requirements of the *Environmental Assessment Act*. This material will be maintained on file for use during the study 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.

July 11, 2016

External Agency Letter

«Name»

«Organization»

«Address»

Dear «Greeting»:

RE: Notice of Public Information Centre #1**Preliminary Design and Class Environmental Assessment Studies:**

- **Highway 401 Interchange Improvements at County Road 41, G.W.P. 4459-04-00; and**
- **Highway 401 Interchange Improvements at Palace Road, G.W.P. 4197-13-00**

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Both studies are following the approved planning process for a Group 'B' project under the MTO Class Environmental Assessment for Provincial Transportation Facilities (2000). Two Public Information Centres (PICs) will be held for each study to provide interested parties with the opportunity to discuss the projects and provide input to the Project Team. A Transportation Environmental Study Report (TESR) will be prepared for each study and made available for public review at the completion of each study. Notification, advising of the times and locations of the PICs and of the availability of the TESRs for review, will be published in local newspapers and mailed to those on the study mailing list.

The purpose of this letter is to notify you that the first of the two Public Information Centres (PICs) for each project has been scheduled (refer to the enclosed "Notice of Public Information Centre #1"). PIC #1 for each study will present the following for comment: existing conditions, need for improvements, alternatives being considered, criteria proposed to evaluate the alternatives, and next steps. The second PIC for each project will occur early 2017 and will present the evaluation of the alternatives, the Technically Preferred Plan, potential environmental impacts and proposed mitigation measures. Your organization is invited to attend the following sessions:

County Road 41 (G.W.P. 4459-04-00)

Wednesday July 27, 2016

3:00 p.m. to 4:00 p.m.

Strathcona Paper Centre, Lafarge Banquet Hall
16 McPherson Drive, Greater Napanee**Palace Road (G.W.P. 4197-13-00)**

Thursday July 28, 2016

3:00 p.m. to 4:00 p.m.

Strathcona Paper Centre, Lafarge Banquet Hall
16 McPherson Drive, Greater Napanee

The public has been invited to attend the PIC between 4:00 p.m. and 8:00 p.m. at the same venue. The PIC will be an informal drop-in centre and representatives from the MTO and the Consultant Team will be available to answer questions and discuss the studies.

If you would like to provide comments, or require further information regarding these studies, please feel free to contact the undersigned at 905-390-2030 or Fred.Leech@aecom.com.

Thank you for your cooperation and assistance.

Yours truly,
AECOM



Fred Leech
Senior Environmental Planner

Cc.	T. White	- Ministry of Transportation Project Manager
	E. Pipe	- Ministry of Transportation Environmental Planner
	T. Sorochinsky	- AECOM Project Manager
	M. Weldon	- AECOM Deputy Project Manager

Encl. Notice of Public Information Centre #1

Ministry of Transportation

Planning and Design Section
1355 John Counter Boulevard
Postal Bag 4000
Kingston, Ontario K7L 5A3
Tel.: 613 545-4871
Fax: 613-540-5106

Ministère des Transports

Section de la planification et de la conception
1355, boulevard John Counter
CP/Service de sacs 4000
Kingston (Ontario) K7L 5A3
Tél.: 613 545-4871
Télééc.: 613 540-5106



July 11, 2016

First Nations Community Letter

«Name»

«Organization»

«Address»

Dear «Greeting»:

RE: Notice of Public Information Centre #1**Preliminary Design and Class Environmental Assessment Studies:**

- **Highway 401 Interchange Improvements at County Road 41, G.W.P. 4459-04-00; and**
- **Highway 401 Interchange Improvements at Palace Road, G.W.P. 4197-13-00**

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The purpose of this letter is to notify you that the first of the two Public Information Centres (PICs) for each project has been scheduled (refer to the enclosed "Notice of Public Information Centre #1). PIC #1 for each study will present the following for comment: existing conditions, need for improvements, alternatives being considered, criteria proposed to evaluate the alternatives, and next steps. The second PIC for each project will occur early 2017 and will present the evaluation of the alternatives, the Technically Preferred Plan, potential environmental impacts and proposed mitigation measures. Your council and community members are invited to attend the following sessions:

County Road 41 (G.W.P. 4459-04-00)

Wednesday July 27, 2016

3:00 p.m. to 4:00 p.m.

Strathcona Paper Centre, Lafarge Banquet Hall
16 McPherson Drive, Greater Napanee

Palace Road (G.W.P. 4197-13-00)

Thursday July 28, 2016

3:00 p.m. to 4:00 p.m.

Strathcona Paper Centre, Lafarge Banquet Hall
16 McPherson Drive, Greater Napanee

The public has been invited to attend the PIC between 4:00 p.m. and 8:00 p.m. at the same venue. The PIC will be an informal drop-in centre and representatives from the MTO and the Consultant Team will be available to answer questions and discuss the studies.

Enclosed is a copy of the PIC notice should you wish to post it for members of your community to view. If you would like to provide comments, or if you require further information regarding these studies, please feel free to contact the undersigned at 613-545-4871 (toll free: 1-800-267-0295, ext. 4871). In addition, if you are interested in meeting as a result of receiving this letter, please contact the undersigned to arrange a meeting at your earliest convenience.

Thank you for your cooperation and assistance.

Yours truly,
Ministry of Transportation

Tina White
Senior Project Manager
tina.white@ontario.ca

cc.	E. Pipe	- Ministry of Transportation, Environmental Planner
	T. Sorochinsky	- AECOM Consultant Project Manager
	M. Weldon	- AECOM Consultant Deputy Project Manager
	F. Leech	- AECOM Senior Environmental Planner

Encl. Notice of Public Information Centre #1

Ministry of Transportation

Planning and Design Section
1355 John Counter Boulevard
Postal Bag 4000
Kingston, Ontario K7L 5A3
Tel.: 613 545-4871
Fax: 613-540-5106

Ministère des Transports

Section de la planification et de la conception
1355, boulevard John Counter
CP/Service de sacs 4000
Kingston (Ontario) K7L 5A3
Tél.: 613 545-4871
Télé.: 613 540-5106



July 7, 2016

MP/MPP Letter

«Name»

«Organization»

«Address»

Dear «Greeting»:

RE: Notice of Public Information Centre #1

Preliminary Design and Class Environmental Assessment Studies:

- **Highway 401 Interchange Improvements at County Road 41, G.W.P. 4459-04-00; and**
- **Highway 401 Interchange Improvements at Palace Road, G.W.P. 4197-13-00**

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Both studies are following the approved planning process for a Group 'B' project under the MTO Class Environmental Assessment for Provincial Transportation Facilities (2000). Two Public Information Centres (PICs) will be held for each study to provide interested parties with the opportunity to discuss the projects and provide input to the Project Team. A Transportation Environmental Study Report (TESR) will be prepared for each study and made available for public review at the completion of each study. Notification, advising of the times and locations of the PICs and of the availability of the TESRs for review, will be published in local newspapers and mailed to those on the study mailing list.

The purpose of this letter is to notify you that the first of the two Public Information Centres (PICs) for each project has been scheduled. The enclosed Notice of Public Information Centre #1 will appear in the *Napanee Beaver* and the *Napanee Guide* on Thursday July 14, 2016. The enclosed notice will also appear on NapaneeGuide.com.

PIC #1 for each study will present the following for comment: existing conditions, need for improvements, alternatives being considered, criteria proposed to evaluate the alternatives, and next steps. The second PIC for each project will occur early 2017 and will present the evaluation of the alternatives, the Technically Preferred Plan, potential environmental impacts and proposed mitigation measures. You are invited to attend the following sessions:

County Road 41 (G.W.P. 4459-04-00)

Wednesday July 27, 2016

3:00 p.m. to 4:00 p.m.

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16 McPherson Drive, Greater Napanee

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The public has been invited to attend the PIC between 4:00 p.m. and 8:00 p.m. at the same venue. The PIC will be an informal drop-in centre and representatives from the MTO and the Consultant Team will be available to answer questions and discuss the studies.

If you would like to provide comments, or if you require further information regarding these studies, please feel free to contact the undersigned at 613-545-4871 (toll free: 1-800-267-0295, ext. 4871).

Thank you for your cooperation and assistance.

Yours truly,
Ministry of Transportation

Tina White
Senior Project Manager
tina.white@ontario.ca

cc. E. Pipe - Ministry of Transportation, Environmental Planner
T. Sorochinsky - AECOM Consultant Project Manager
M. Weldon - AECOM Consultant Deputy Project Manager
F. Leech - AECOM Senior Environmental Planner

Encl. Notice of Public Information Centre #1

July 11, 2016

Public Letter

«Name»

«Organization»

«Address»

Dear «Greeting»:

RE: Notice of Public Information Centre #1**Preliminary Design and Class Environmental Assessment Studies:**

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Both studies are following the approved planning process for a Group 'B' project under the MTO Class Environmental Assessment for Provincial Transportation Facilities (2000). Two Public Information Centres (PICs) will be held for each study to provide interested parties with the opportunity to discuss the projects and provide input to the Project Team. A Transportation Environmental Study Report (TESR) will be prepared for each study and made available for public review at the completion of each study. Notification, advising of the times and locations of the PICs and of the availability of the TESRs for review, will be published in local newspapers and mailed to those on the study mailing list.

The purpose of this letter is to notify you that the first of the two Public Information Centres (PICs) for each project has been scheduled (refer to the enclosed "Notice of Public Information Centre #1"). PIC #1 for each study will present the following for comment: existing conditions, need for improvements, alternatives being considered, criteria proposed to evaluate the alternatives, and next steps. The second PIC for each project will occur early 2017 and will present the evaluation of the alternatives, the Technically Preferred Plan, potential environmental impacts and proposed mitigation measures. You are invited to attend the PICs as follows:

County Road 41 (G.W.P. 4459-04-00)

Wednesday July 27, 2016

4:00 p.m. to 8:00 p.m.

Strathcona Paper Centre, Lafarge Banquet Hall
16 McPherson Drive, Greater Napanee**Palace Road (G.W.P. 4197-13-00)**

Thursday July 28, 2016

4:00 p.m. to 8:00 p.m.

Strathcona Paper Centre, Lafarge Banquet Hall
16 McPherson Drive, Greater Napanee

The PIC will be an informal drop-in centre and representatives from the MTO and the Consultant Team will be available to answer questions and discuss the studies.

If you would like to provide comments, require further information regarding these studies, or have any accessibility requirements in order to participate in these projects, please feel free to contact the undersigned at 905-390-2030 or Fred.Leech@aecom.com.

Comments are being collected to assist MTO in meeting the requirements of the *Environmental Assessment Act*. This material will be maintained on file for use during the study 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.

Thank you for your cooperation and assistance.

Yours truly,
AECOM



Fred Leech
Senior Environmental Planner

Cc.	T. White	- Ministry of Transportation Project Manager
	E. Pipe	- Ministry of Transportation Environmental Planner
	T. Sorochinsky	- AECOM Project Manager
	M. Weldon	- AECOM Deputy Project Manager

Encl. Notice of Public Information Centre #1

APPENDIX B

Copies of PIC Displays



Highway 401 Interchange Improvements at Palace Road

Welcome to the Public Information Centre #1 for the

Highway 401 Interchange Improvements at Palace Road

Class Environmental Assessment and Preliminary Design Study

G.W.P. 4197-13-00

July 28, 2016

Please Sign In Here



Highway 401 Interchange Improvements at Palace Road

Purpose of Public Information Centre #1

The purpose of this Public Information Centre (PIC) is to present and receive feedback on:

- Study Area, Purpose and Scope
- Overall Study Process
- Timing of Study Activities
- Overview of Existing Transportation and Environmental Conditions
- Problems and Opportunities
- Identification and Screening Assessment of Long List of Alternatives
- Evaluation of Short List of Alternatives - Approach and Criteria
- Next Steps

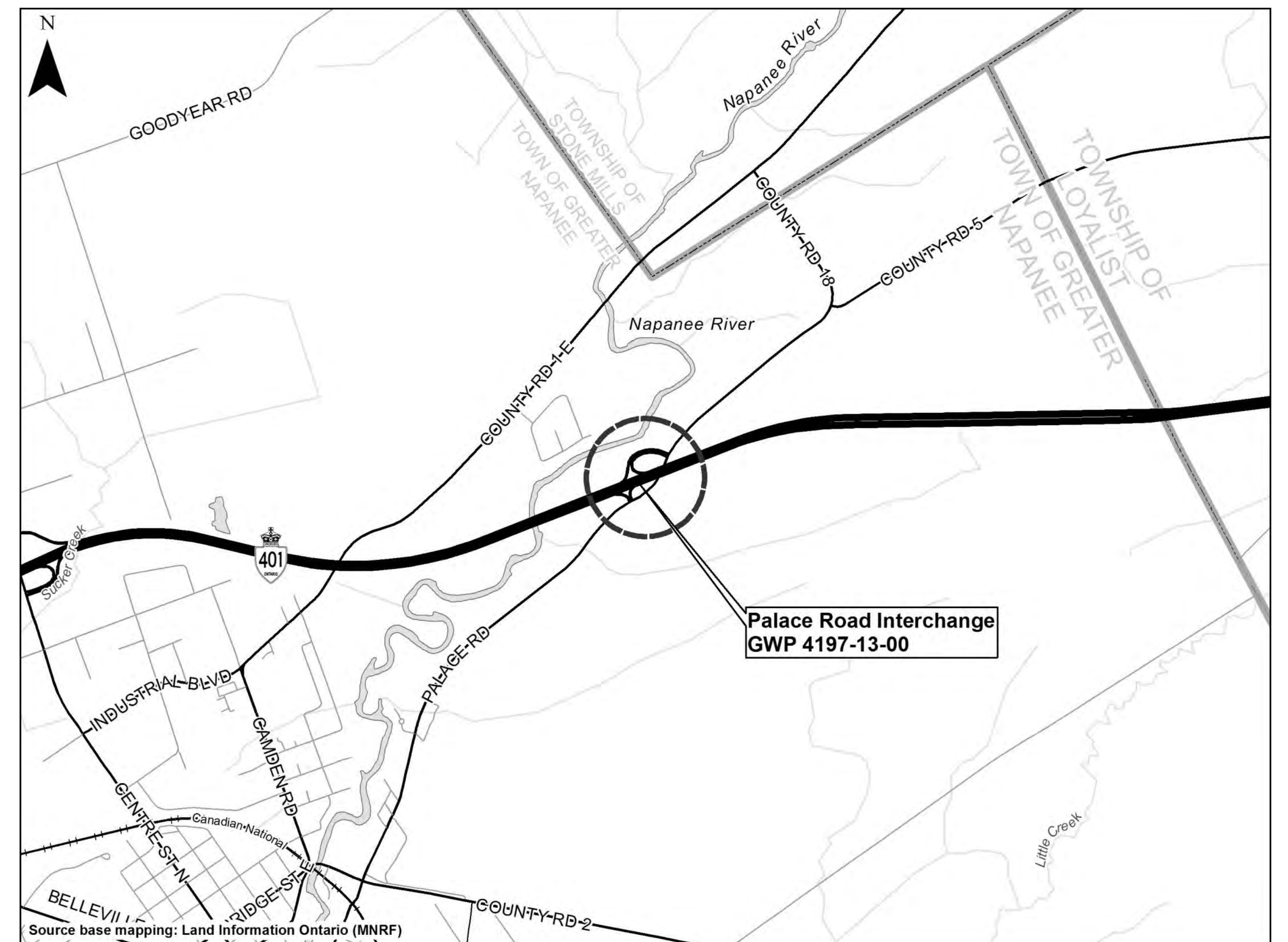
Your input on each of these and other study issues is important to us!



Highway 401 Interchange Improvements at Palace Road

Study Area, Purpose and Scope

- The Ontario Ministry of Transportation (MTO) has retained AECOM to undertake a Preliminary Design and Class Environmental Assessment Study for improvements to the Highway 401 / Palace Road interchange.
- The project is located in the Town of Greater Napanee within the County of Lennox and Addington.
- This study will examine interim and long-term interchange operational improvements, replacement and/or rehabilitation of the Highway 401 bridges, pavement rehabilitation, drainage improvements, illumination, and traffic staging during construction.
- Concurrently MTO is undertaking a separate Preliminary Design and Class Environmental Assessment Study for improvements to the Highway 401 / County Road 41 interchange. Please speak to the Project Team for details.

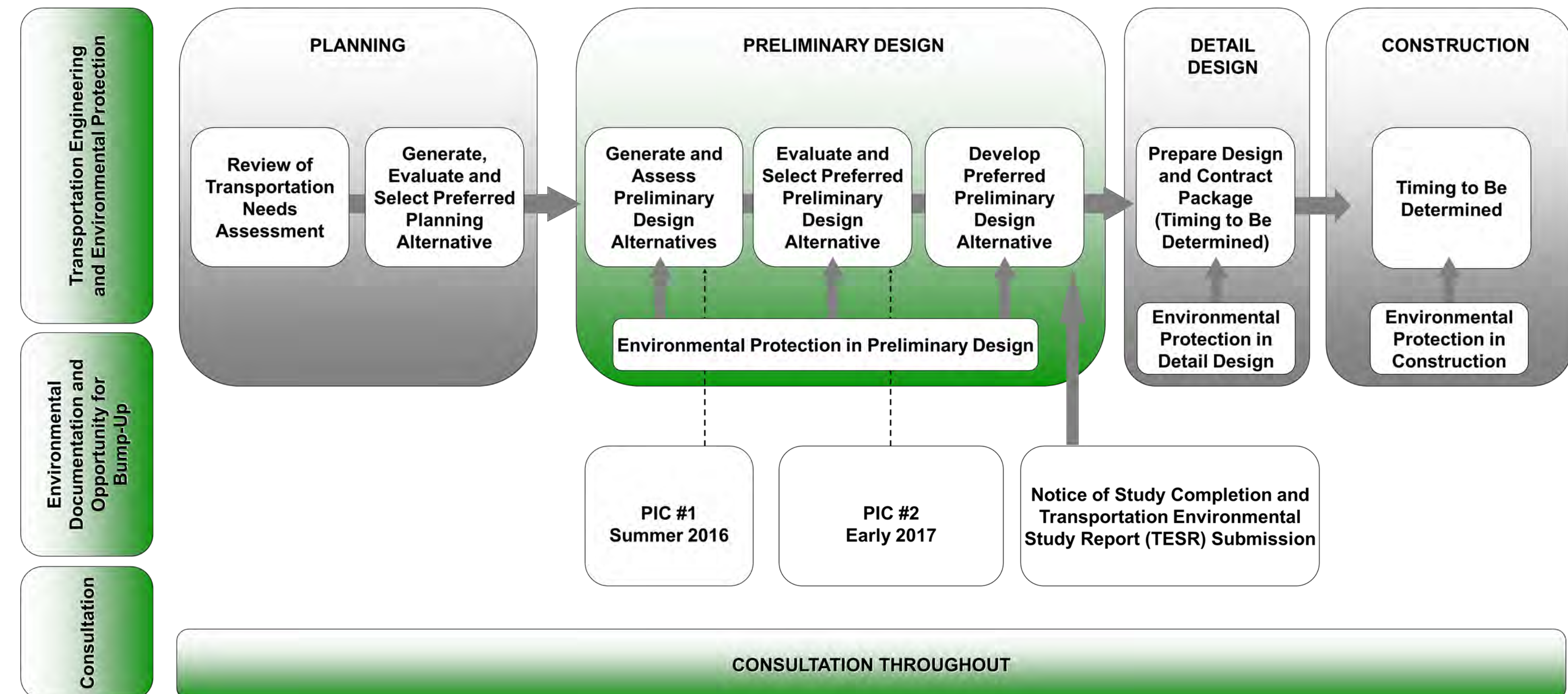




Highway 401 Interchange Improvements at Palace Road

Class EA Process for Group 'B' Projects

- This study is following the approved planning process for a Group 'B' project under the MTO Class Environmental Assessment for Provincial Transportation Facilities (2000).
- This is the first of two Public Information Centres (PICs) that will be held for the project to provide interested parties with the opportunity to discuss it and provide input to the Project Team.
- A Transportation Environmental Study Report (TESR) will be prepared and made available for public review at the completion of the study.





Highway 401 Interchange Improvements at Palace Road

Timing of Study Activities

TASKS	2016				2017			
	WINTER	SPRING	SUMMER	FALL	WINTER	SPRING	SUMMER	FALL
Study Commencement	★							
Data Collection, Field Reviews & Review of Existing Conditions	■	■						
Generate & Assess Alternatives	■	■						
Public Information Centre #1			★					
Evaluate Alternatives & Select Technically Preferred Alternative			■					
Preliminary Design of Technically Preferred Alternative			■	■				
Public Information Centre #2					★			
Finalize Preliminary Design and Mitigation Measures					■	■		
Transportation Environmental Study Report (TESR) Development						■	■	
Final TESR Submission							★	

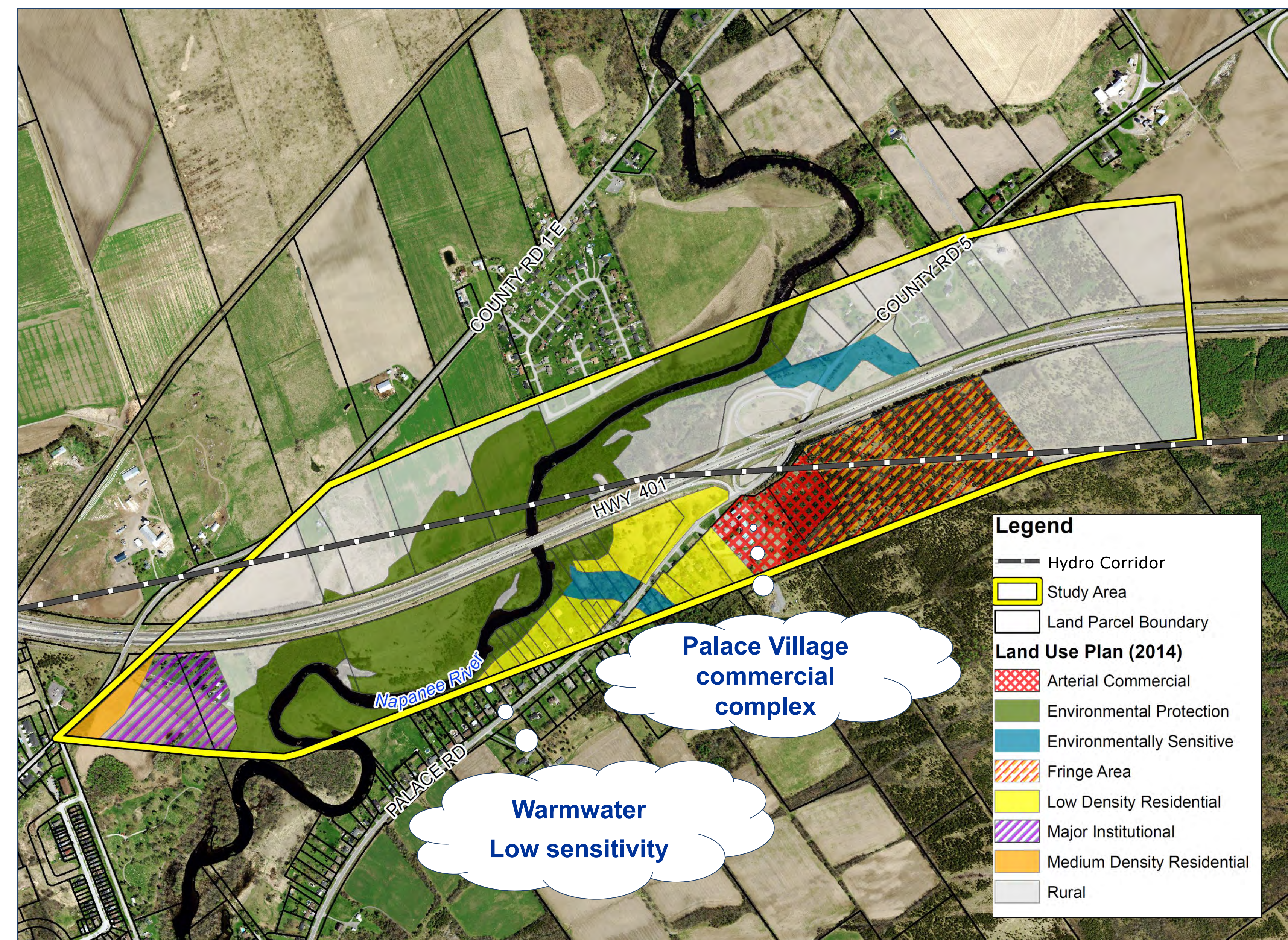
Schedule subject to change based on study findings and/or input received through consultation



Highway 401 Interchange Improvements at Palace Road

Overview of Existing Environmental Conditions

- Napanee River is a warmwater watercourse with a low sensitivity.
- No Areas of Natural and Scientific Interest (ANSIs) are located in the proximity of the interchange. Deciduous forests are identified in the northwest and southeast quadrants. Unevaluated wetlands are identified in the proximity of the interchange.
- This interchange provides access to the east end of Greater Napanee and services industrial uses north (e.g. the Strathcona Paper Plant) and south (e.g. Napanee Quarry) of the highway.
- The Palace Village commercial complex is in the southeast quadrant.
- A major hydro transmission corridor which traverses the interchange, occupying lands both northwest and southeast of the existing interchange.
- The Newburgh cycling route crosses Highway 401 via Palace Road to connect Napanee with the communities of Newburgh and Camden East.



Source: MTO, MNRF, Town of Greater Napanee

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



Highway 401 Interchange Improvements at Palace Road

Overview of Existing Transportation Conditions

Bridges

- The Highway 401 / Palace Road twin overpass bridges were originally constructed in 1960 (56 years old as of 2016).
- The twin bridges cross beneath Highway 401 at a high skew angle and each carries two lanes of Highway 401 traffic and one ramp lane.
- The eastbound and westbound bridges underwent major rehabilitation in 1983 and 1988, respectively.
- Minor rehabilitation was completed on both bridges in 2012, which was limited in scope due to limitations on construction staging imposed by Highway 401 lane restrictions.
- It is anticipated that a future major rehabilitation or full replacement of the bridges will be required within the next 5 to 10 years.
- The existing bridges are too narrow to accommodate the necessary bridge works without long-term lane closures or staging impacts along Highway 401, partial temporary widening of the bridges for staging purposes, and/or temporary removal of the existing eastbound on-ramp and westbound off-ramp speed change lanes from the bridges.



Westbound Bridge



East Abutment

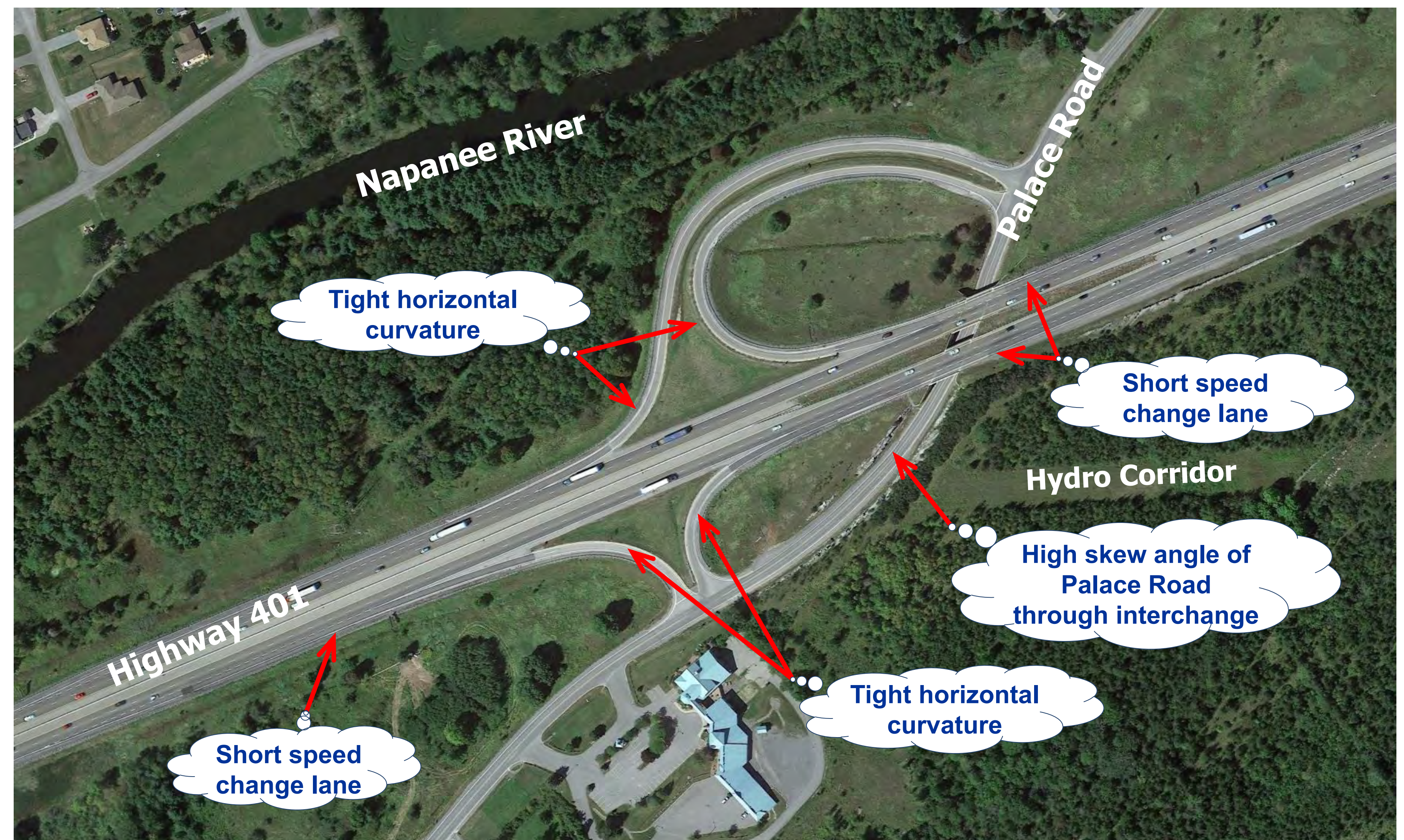


Highway 401 Interchange Improvements at Palace Road

Overview of Existing Transportation Conditions

Geometrics

- A number of undesirable geometric elements or areas of concern have been identified, including:
 - Tight horizontal curvature along all ramps, most notably the two off-ramps from Highway 401, which creates operational concerns along the ramps;
 - Short length of speed change lanes for the eastbound and westbound off-ramps, which causes quick deceleration along off-ramps;
 - Short length of speed change lanes for the eastbound on-ramp, which causes slow moving traffic to merge with freeway traffic;
 - High skew angle of Palace Road through the interchange, which restricts available turning sight distance at the ramp terminal intersections;
 - Vertical grade of Highway 401 through the interchange rises to the east, which slows down acceleration of trucks and cars entering eastbound Highway 401 from Palace Road.



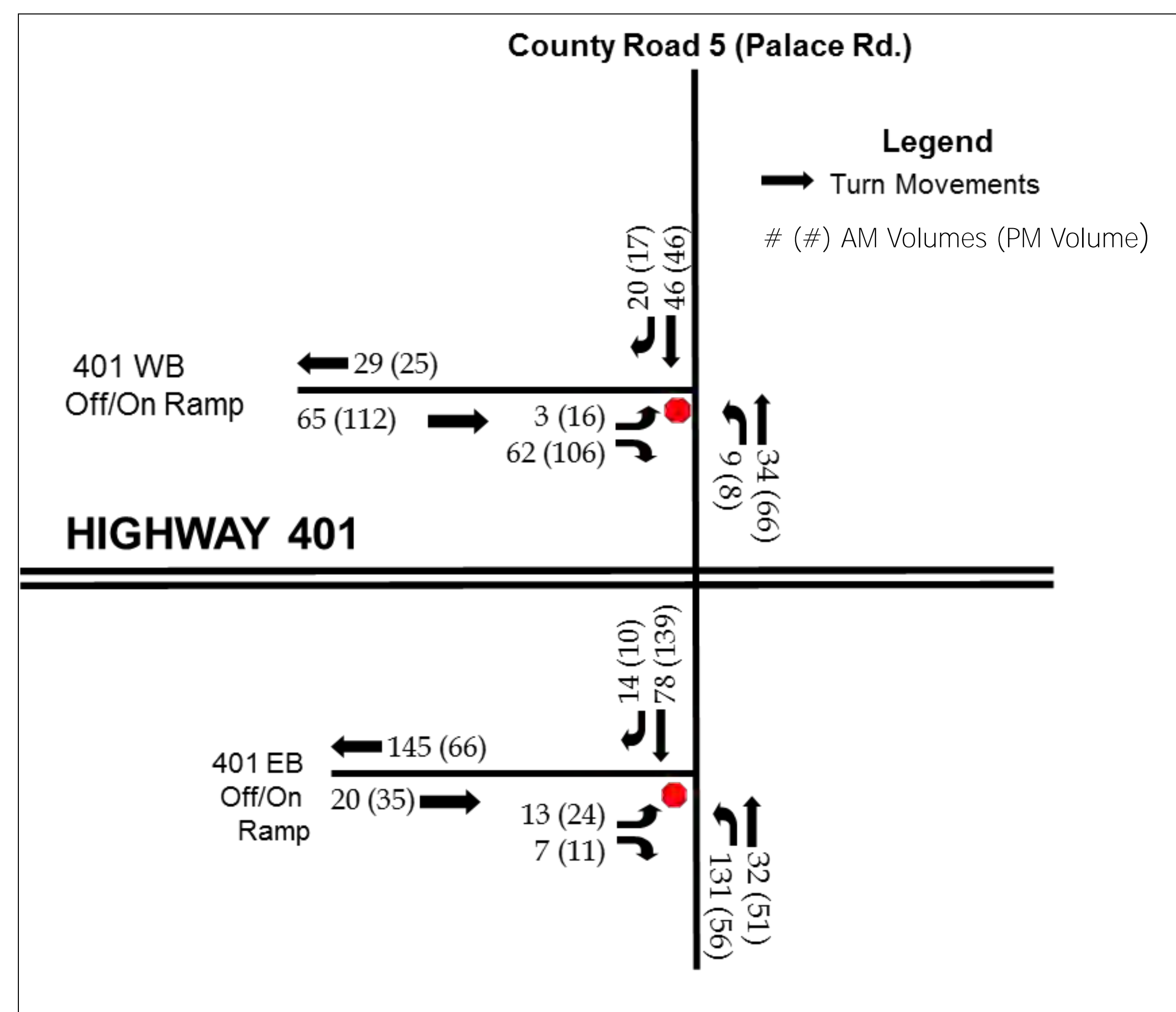


Highway 401 Interchange Improvements at Palace Road

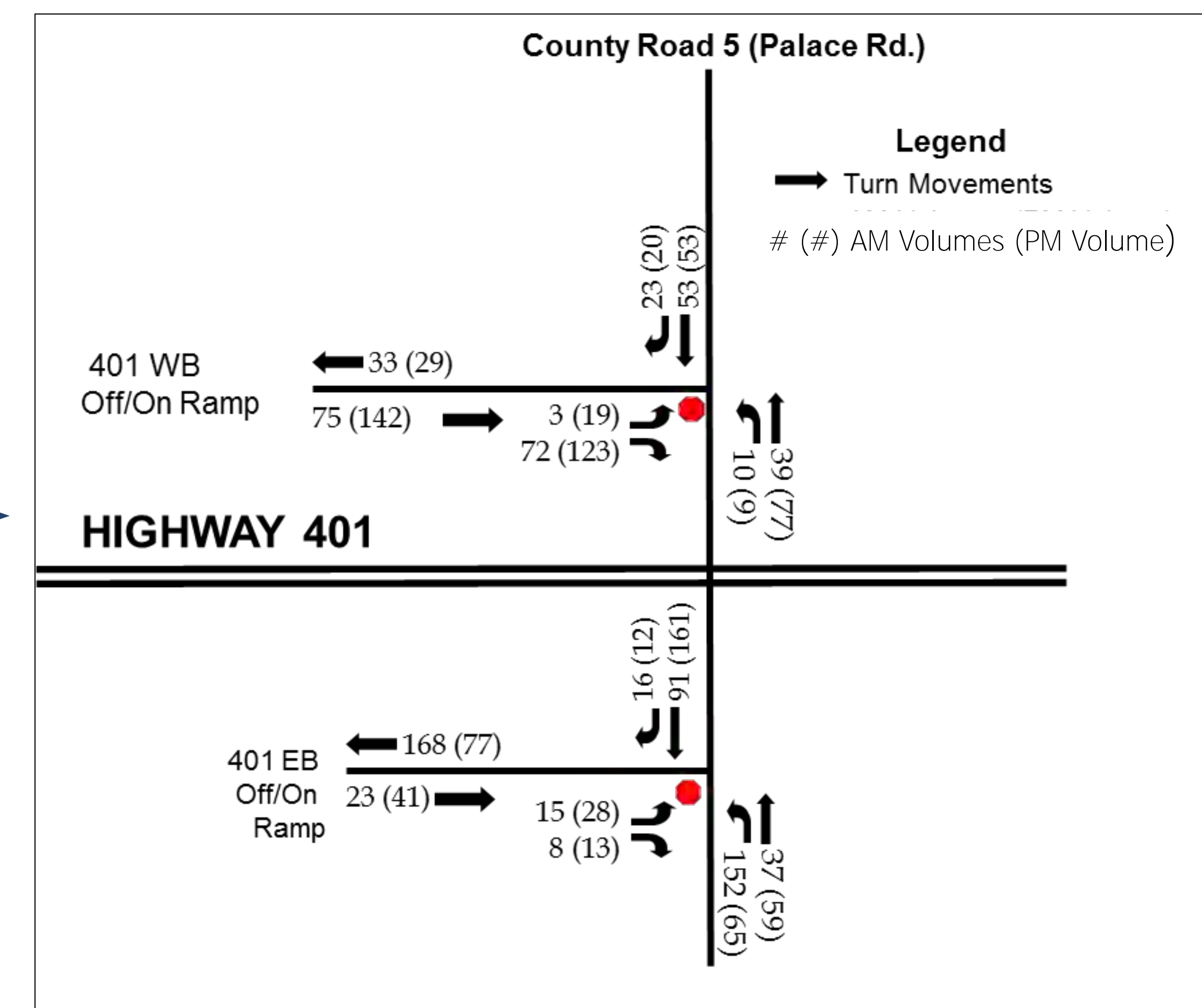
Overview of Transportation Conditions and Traffic Volumes

Traffic Operations

- Level of Service (LOS) is a combined measure of vehicle delay and traffic volume, describing operational conditions within the roadway network, and their perception by motorists and / or passengers.
- Levels of Service 'A' through 'D' typically reflect adequate operations, while LOS 'E' reflects increasing congestion and operations at capacity, and LOS 'F' reflects unstable traffic flows, long delays and, in some cases, severe traffic congestion.
- Existing and future traffic Level of Service operations at the interchange are generally acceptable (overall Level of Service 'A' or 'B').
- Future traffic analysis was undertaken based on a horizon year of **2038**, utilizing growth rates calculated from historical traffic volumes and growth projections



Existing Peak Hour Volumes – Ramp Terminals



Future (2038) Peak Hour Volumes – Ramp Terminals



Highway 401 Interchange Improvements at Palace Road

Opportunities

- Based on the identified **Problems** at the Highway 401 and Palace Road interchange, the following **Opportunities** for this study have been identified:
 - Development of a strategy to address the structural rehabilitation or replacement needs of the twin Palace Road overpasses is required.
 - Geometric improvements such as increased horizontal curvature at ramps, longer speed change lanes, and reduced skew angle of Palace Road through the interchange would be expected to address operational concerns and provide for good overall traffic operations at the interchange.
 - The development of an ultimate plan for the Palace Road interchange would allow for the necessary structural rehabilitation or replacement works to be implemented efficiently and in a cost effective manner, minimizing future throwaway.
 - A staged approach towards implementing the ultimate interchange plan can be developed that would allow for construction of interim improvements that both improve traffic operations and facilitate the structural requirements.
 - Upgrading the existing median shoulder would allow future Highway 401 projects to utilize the median for construction staging purposes.



Highway 401 Interchange Improvements at Palace Road

Identification and Screening of Long List of Alternatives

- Based on the identified Problems and Opportunities and recommended Alternative to the Undertaking (Improvements to Palace Road interchange), a number of possible interchange improvement alternatives have been developed to reflect the ultimate configuration.
- The **long list** of Highway 401 interchange improvement alternatives was subjected to a screening-level qualitative assessment based on the following technical criteria:
 - *Geometrics and safety*
 - *Traffic operations*
 - *Construction staging impacts*
 - *Structural requirements*
 - *Construction cost*
 - *Anticipated environmental and property impacts*
- Alternatives were developed and assessed separately for the north and south sides of the interchange;
- This screening led to the identification of a **short list** of alternatives, which will be evaluated following this PIC based on the criteria on the following slide.

Please refer to the roll plans for the long list interchange alternatives and summary of the screening assessment of alternatives



Highway 401 Interchange Improvements at Palace Road

Short List of Alternatives – Proposed Evaluation Approach and Criteria

A weighted-score arithmetic evaluation system will be used to compare the **short list** of alternatives. This evaluation methodology involves assigning relative weightings to each of the evaluation categories and criteria based on their level of importance.

Impacts are measured either quantitatively or qualitatively, and then these scores are multiplied by a relative weight for that indicator. The weighted scores for each indicator are then summed to arrive at a total score for each alternative. The alternative that produces the highest total weighted score is preferred as it results in the best balance of benefits and impacts to the natural, socio-economic and cultural environments, as well as transportation and cost considerations.

The table to the right identifies the proposed categories and sample criteria to be used to evaluate the short list of alternatives.

Evaluation Category and Sample Criteria
TRANSPORTATION <ul style="list-style-type: none"> Interchange Operations Safety and Geometrics
ENVIRONMENTAL <ul style="list-style-type: none"> Natural Environment <ul style="list-style-type: none"> Fish and Fish Habitat Terrestrial Ecosystems Groundwater Socio-Economic Environment <ul style="list-style-type: none"> Aesthetics Noise Community Effects Waste and Contamination Cultural Environment <ul style="list-style-type: none"> Archaeological Resources Built Heritage Features and Cultural Heritage Landscapes
Cost and Constructability <ul style="list-style-type: none"> Construction Staging Construction Cost Utility Impacts



Highway 401 Interchange Improvements at Palace Road

Next Step

The following activities will be undertaken following this PIC:

- Respond to comments received at this PIC and incorporate them into the study where appropriate
- Finalize the long list of interchange alternatives, its screening, and the short list of alternatives to be carried forward for evaluation.
- Finalize the proposed criteria and weightings to evaluate the short list of alternatives.
- Assess and evaluate the short list of interchange alternatives to select a Technically Preferred Alternative.
- Present the preliminary design of the Technically Preferred Interchange Alternative at PIC #2, which is anticipated to be held in early 2017.
- Prepare a Transportation Environmental Study Report for public and agency review in summer 2017.

Consultation Throughout

(with First Nation & Métis Communities and all stakeholders – property owners, members of the public, municipalities, interest groups, agencies, etc.)



Thank you for attending.

Please feel free to ask questions and fill out a comment sheet before you leave.

If you have any accessibility requirements in order to participate in this project, please contact one of the Project Team members.



Highway 401 Interchange Improvements at Palace Road

Freedom of Information and Protection of Privacy Act

Comments and information regarding this study are being collected to assist the Ministry of Transportation in meeting the requirements of the *Environmental Assessment Act*. This material will be maintained on file for use during the study 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.

You are encouraged to contact members of the Project Team if you have any questions or concerns regarding the above information.

Ontario Ministry of Transportation

Public Information Centre #2

Summary Report

Highway 401 Interchange Improvements at Palace Road

Prepared by:

AECOM Canada Ltd.
30 Leek Crescent, Floor 4
Richmond Hill, ON L4B 4N4
Canada

T: 905 882 4401
F: 905 882 4399
www.aecom.com

Prepared for:

Ontario Ministry of Transportation

Date: December 2017

Project #: G.W.P. 4197-13-00

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Appendices

- Appendix A. Notification Materials
- Appendix B. Copies of PIC Displays

1. Introduction

The Ontario Ministry of Transportation (MTO) retained AECOM to undertake a Preliminary Design and Class Environmental Assessment (EA) Study for improvements to the Highway 401 interchange at Palace Road (G.W.P. 4197-13-00). The study is examining the interim and long-term interchange operational improvements, replacement and/or rehabilitation of the Highway 401 bridges, pavement rehabilitation, drainage improvements, illumination, and traffic staging during construction. The study is located in the Town of Greater Napanee within the County of Lennox and Addington.

The first of two Public Information Centres (PICs) for this project was held on July 28, 2016 at the Strathcona Paper Centre in Greater Napanee, Ontario. A one-hour preview session was held for municipalities, MPs/MPPs, external agencies, and Indigenous communities in advance of the PIC. The first PIC presented and sought input on the following:

- Study area, purpose, and scope;
- Overall process;
- Timing of study activities;
- Previous studies;
- Overview of existing transportation and environmental conditions;
- Problems and opportunities;
- Identification and screening assessment of the long list of alternatives;
- Evaluation of the short list of alternatives – approach and criteria; and,
- Next steps in the study process.

2. Purpose

A second PIC (PIC #2) was held on November 22, 2017 at the Selby Community Hall in Selby, Ontario. The purpose of PIC #2 was to present and receive feedback on the following:

- Study background, purpose, scope;
- Summary of PIC #1 (held July 2016);
- Assessment and evaluation of preliminary design alternatives;
- Preliminary design of the Technically Preferred Alternative for the interchange;
- Potential mitigation strategies to minimize environmental / community impacts; and,
- Next steps in the study process.

3. PIC Format, Time, and Location

PIC #2 was held on November 22, 2017 at the following location:

Selby Community Hall
114 Pleasant Drive
Selby, ON K0K 2Z0

The PIC was an informal drop-in centre and representatives from the MTO and the Consultant Team were available to answer questions and discuss the study. Members from external government agencies, elected officials and Indigenous community representatives were invited to attend an advance session between 3:00 p.m. and 4:00 p.m. Members of the public were invited to attend the PIC between 4:00 p.m. and 8:00 p.m.

4. Notification

A Notice of PIC #2 was published in the following local newspapers on November 9, 2017 to inform the public of the PIC:

- *Napanee Beaver*; and,
- *Napanee Guide*.

In order to reach a larger population in the study area who may not have been familiar with the study, a Project brochure was distributed to properties within a 7 km radius of the study area using Canada Post's Neighbourhood Mail service (6,652 brochures) which included similar information to the PIC displays and Project Team contact information for members of the public to submit comments.

Notification letters advising of the PIC were also mailed and/or emailed to everyone on the study contact list (187 contacts) on November 1, 2017, which included First Nations communities, Members of Parliament (MPs) and Members of Provincial Parliament (MPPs), external government agencies (federal, provincial, municipal), emergency services, utility services, interest groups, and members of the public. Copies of these notification letters can be found in **Appendix A**.

5. Project Team Representatives

The following representatives from the Project Team including MTO and AECOM were in attendance at the PIC:

- Tina White – MTO Project Manager
- Erin Pipe – MTO Environmental Planner
- Charlene Leslie – MTO Property
- Tim Sorochinsky – AECOM Senior Project Manager
- Michael Weldon – AECOM Deputy Project Manager
- Fred Leech – AECOM Senior Environmental Planner
- Sarah Schmied – AECOM Environmental Planner

6. Materials Presented

The information presented at the PIC included display boards with information on the following around the room:

- Purpose of PIC #2;
- Study area, purpose and scope;
- Study process;
- Timing of study activities;
- Study overview and PIC #1;
- Summary of problems and opportunities;
- Generation and evaluation of preliminary design alternatives;
- Overview and summary of the evaluation of the short list of alternatives;
- Conceptual construction staging;
- Other improvements being recommended;
- Proposed mitigation measures and recommendations for further work;
- Next steps in the study process; and,
- Freedom of Information and Protection of Privacy Act.

Additionally there were roll plans available presenting the Technically Preferred Alternative.

Copies of the PIC displays are available in **Appendix B**.

7. Attendance and Summary of Comments

A total of 20 individuals chose to sign the visitors register for the PIC. No members of the media attended. In addition to verbal comments, the Project Team encouraged visitors to express, in writing, all suggestions, comments or concerns that they had regarding the information presented.

A total of two (2) written comment sheets were received at the PIC and the following verbal comments were provided in person:

- Concerns regarding traffic headlights shining into windows of private residences opposite the ramp terminal at the Highway 401 eastbound off-ramp at Palace Road;
- Concerns regarding safety of the Highway 401 eastbound off-ramp at Palace Road being located directly across from residential driveways;
- Questions about driveway access during construction;
- Questions about controlled access highway designation limits and driveway restrictions within these limits;
- General questions about property acquisition;
- Support from the Ontario Provincial Police (OPP) regarding the redesign of the interchange ramps at Palace Road as they felt the changes address a number of operational problems and safety concerns;
- Request from the OPP to consider design enhancements along Highway 401 eastbound and westbound between County Road 41 and Palace Road where they could park a police car either off the shoulder or in the median to monitor traffic;
- Request from the OPP to be involved in the construction staging discussions at the beginning of the detail design process and that they be invited to a pre-construction meeting;
- Request from the OPP that the two interchanges are not under construction at the same time as they each act as emergency detour routes each other;
- Questions regarding the addition of gates at the ramps for highway closures;
- Request for the addition of a queue warning system along Highway 401 during construction;
- Questions about the Environmental Assessment process;
- Questions about timing of construction;
- Questions about a Napanee bypass on the east side of the Town;
- Questions about the County Official Plan;
- Questions about Council and Municipal staff involvement; and,
- Comments about detours during construction putting a stress on Town infrastructure.

APPENDIX A

Notification Materials

ONTARIO GOVERNMENT NOTICE

NOTICE OF PUBLIC INFORMATION CENTRE #2

Preliminary Design and Class Environmental Assessment Studies
Highway 401 Interchange Improvements at County Road 41 (G.W.P. 4459-04-00) and at Palace Road (G.W.P. 4197-13-00)

THE PROJECTS

The Ontario Ministry of Transportation (MTO) has retained AECOM to undertake two separate Preliminary Design and Class Environmental Assessment Studies for improvements to the Highway 401 and County Road 41 interchange (G.W.P. 4459-04-00) and the Highway 401 and Palace Road interchange (G.W.P. 4197-13-00). Both projects are located in the Town of Greater Napanee within the County of Lennox and Addington.

THE PROCESS

Both studies are following the approved planning process for a Group 'B' project under the MTO *Class Environmental Assessment for Provincial Transportation Facilities* (2000).

Public Information Centre (PIC) #1 was held for each study in July 2016 to provide the public with the opportunity to discuss the project and comment on the alternatives that were being considered to address bridge requirements and undesirable interchange elements. PIC #2 is being held to provide the public with the opportunity to view and provide comments on the evaluation of alternatives, and the Preliminary Design of the preferred alternative at each interchange.

Following PIC #2, a Transportation Environmental Study Report (TESR) will be prepared for each study to document the Recommended Plan, the potential impacts, and the recommended mitigation measures to minimize environmental impacts. The TESRs will be made available to the public, other interested parties and external agencies for a 30-day public review period at public review locations in close proximity to the study area. A notice of the TESR review opportunities will be provided.

PUBLIC INFORMATION CENTRE #2

Members of the public, residents and stakeholders are invited to attend PIC #2 as follows:

Wednesday November 22, 2017
4:00 p.m. to 8:00 p.m.
Selby Community Hall
114 Pleasant Drive, Selby, ON K0K 2Z0

The PIC will be an informal drop-in centre and representatives from the MTO and the Consultant Team will be available to answer questions and discuss the studies. You are encouraged to attend the PIC and provide the Project Team with your views and comments so that they can be considered as the project progresses.

COMMENTS

To obtain additional information, provide comments, or to be placed on the mailing list for either of these studies, please contact the Project Team as follows:

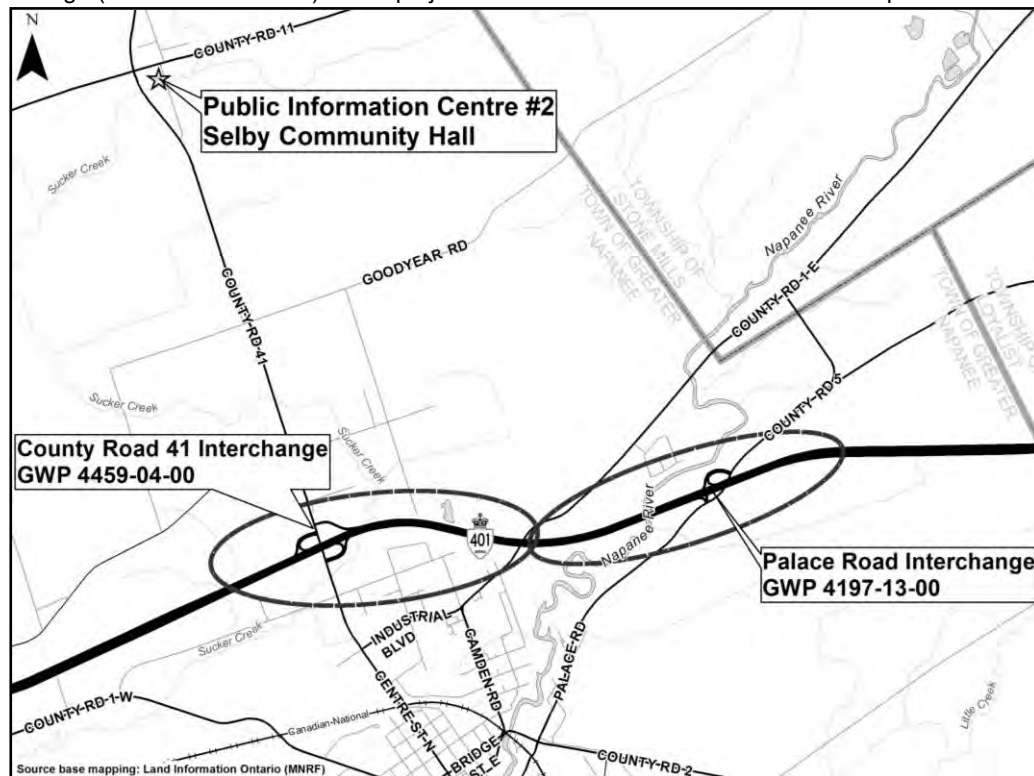
Tina White
Senior Project Manager
Ministry of Transportation, Eastern Region
1355 John Counter Boulevard, Postal Bag 4000
Kingston, ON K7L 5A3
Tel: 613-545-4871,
Toll Free: 1-800-267-0295
Email: tina.white@ontario.ca

Tim Sorochinsky, P.Eng.
Consultant Project Manager
AECOM
4th Floor, 30 Leek Crescent
Richmond Hill, ON L4B 4N4
Tel: 905-882-3522
Fax: 905-882-4399
E-mail: tim.sorochinsky@aecom.com

Fred Leech
Consultant Environmental Planner
AECOM
201-45 Goderich Road
Hamilton, ON L8E 4W8
Tel: 905.578.3040
Fax: 905.578.4129
Email: fred.leech@aecom.com

If you have any accessibility requirements in order to participate in these projects, please contact one of the Project Team members listed above.

Comments are being collected to assist MTO in meeting the requirements of the *Environmental Assessment Act*. This material will be maintained on file for use during the study 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.



November 1, 2017

External Agency Letter

«Name»

«Organization»

«Address»

Dear «Greeting»:

RE: Notice of Public Information Centre #2

Preliminary Design and Class Environmental Assessment Studies:

Highway 401 Interchange Improvements at County Road 41, G.W.P. 4459-04-00;

Highway 401 Interchange Improvements at Palace Road, G.W.P. 4197-13-00

The Ontario Ministry of Transportation (MTO) has retained AECOM to undertake two separate Preliminary Design and Class Environmental Assessment Studies for improvements to the Highway 401 and County Road 41 interchange (G.W.P. 4459-04-00) and the Highway 401 and Palace Road interchange (G.W.P. 4197-13-00). Both projects are located in the Town of Greater Napanee within the County of Lennox and Addington.

Both studies are following the approved planning process for a Group 'B' project under the *MTO Class Environmental Assessment for Provincial Transportation Facilities (2000)*. Public Information Centre (PIC) #1 was held for each study in July 2016 to provide the public with the opportunity to discuss the project and comment on the alternatives that were being considered to address bridge requirements and undesirable interchange elements. A second combined PIC #2 is being held for both studies to provide interested parties with the opportunity to discuss the projects and provide input to the Project Team.

The purpose of this letter is to notify you that the second PIC for each project has been scheduled (refer to the enclosed *Notice of Public Information Centre #2*).

The purpose of PIC #2 is to provide the public with the opportunity to view and provide comments on the evaluation of alternatives, the Preliminary Design of the preferred alternative at each interchange, and the next steps.

Your organization is invited to attend the following session in advance of PIC #2:

November 22, 2017
3:00 p.m. to 4:00 p.m.
Selby Community Hall
114 Pleasant Drive, Selby, ON K0K 2Z0

The public has been invited to attend the PIC between 4:00 p.m. and 8:00 p.m. at the same venue. The PIC will be an informal drop-in centre and representatives from the MTO and the Consultant Team will be available to answer questions and discuss the studies. If you are unable to attend PIC #2 and are interested in these studies, enclosed are two brochures, with further information on each of the two projects that will be presented at PIC #2 for your reference. Please also feel free to contact one of the Project Team members listed on the enclosed *Notice of PIC #2* if you would like to discuss anything further.

Following PIC #2, a Transportation Environmental Study Report (TESR) will be prepared for each study and made available for public review at the completion of each study. Notification, advising of the availability of the TESRs for review, will be published in local newspapers and mailed to those on the study mailing list.

If you would like to provide comments, require further information regarding these studies, or have any accessibility requirements in order to participate in these studies, please feel free to contact the undersigned at 905-390-2030 or Fred.Leech@aecom.com.

Thank you for your cooperation and assistance.

Yours truly,
AECOM



Fred Leech

Senior Environmental Planner

Cc.	T. White	- Ministry of Transportation Project Manager
	E. Pipe	- Ministry of Transportation Environmental Planner
	T. Soroichinsky	- AECOM Project Manager
	M. Weldon	- AECOM Deputy Project Manager
	S. Schmied	- AECOM Environmental Planner

Enclosed:

- Notice of Public Information Centre #2
- Highway 401 Interchange Improvements at County Road 41, G.W.P. 4459-04-00 Brochure
- Highway 401 Interchange Improvements at Palace Road, G.W.P. 4197-13-00 Brochure

Ministry of Transportation

Planning and Design Section
1355 John Counter Boulevard
Postal Bag 4000
Kingston, Ontario K7L 5A3
Tel.: 613 545-4871
Fax: 613-540-5106

Ministère des Transports

Section de la planification et de la conception
1355, boulevard John Counter
CP/Service de sacs 4000
Kingston (Ontario) K7L 5A3
Tél.: 613 545-4871
Télééc.: 613 540-5106



November 1, 2017

Indigenous Community Letter

«Name»

«Organization»

«Address»

Dear «Greeting»:

RE: Notice of Public Information Centre #2

Preliminary Design and Class Environmental Assessment Studies:

Highway 401 Interchange Improvements at County Road 41, G.W.P. 4459-04-00;

Highway 401 Interchange Improvements at Palace Road, G.W.P. 4197-13-00

The Ontario Ministry of Transportation (MTO) has retained AECOM to undertake two separate Preliminary Design and Class Environmental Assessment Studies for improvements to the Highway 401 / County Road 41 interchange (G.W.P. 4459-04-00) and the Highway 401 / Palace Road interchange (G.W.P. 4197-13-00). Both projects are located in the Town of Greater Napanee within the County of Lennox and Addington.

Both studies are following the approved planning process for a Group 'B' project under the *MTO Class Environmental Assessment for Provincial Transportation Facilities (2000)*. Public Information Centre (PIC) #1 was held for each study in July 2016 to provide the public with the opportunity to discuss the project and comment on the alternatives that were being considered to address bridge requirements and undesirable interchange elements. A second combined PIC is being held for both studies to provide interested parties with the opportunity to discuss the projects and provide input to the Project Team.

The purpose of this letter is to notify you that the second PIC for each project has been scheduled (refer to the enclosed *Notice of Public Information Centre #2*). The purpose of PIC #2 is to provide the public with the opportunity to view and provide comments on the evaluation of alternatives, the Preliminary Design of the preferred alternative at each interchange, and the next steps.

A private session for agencies, municipalities and Indigenous Communities is planned in advance of the public session at:

Wednesday November 22, 2017
3:00 p.m. to 4:00 p.m.
Selby Community Hall
114 Pleasant Drive, Selby, ON K0K 2Z0

The public has been invited to attend the PIC between 4:00 p.m. and 8:00 p.m. at the same venue. The PIC will be an informal drop-in centre and representatives from the MTO and the Consultant Team will be available to answer questions and discuss the studies.

Enclosed is a copy of the *Notice of PIC #2* should you wish to post it for members of your community to view. Also enclosed are two brochures with further information on each of the two projects that will be presented at PIC #2 for your reference.

Following PIC #2, a Transportation Environmental Study Report (TESR) will be prepared for each study and made available for public review at the completion of each study. Notification, advising of the availability of the TESRs for review, will be published in local newspapers and mailed to those on the study mailing list.

If you would like to provide comments, if you require further information regarding these studies, or if you have any accessibility requirements to participate in these studies, please feel free to contact the undersigned at 613-545-4871 (toll free: 1-800-267-0295, ext. 4871). In addition, if you are interested in meeting as a result of receiving this letter, please contact the undersigned to arrange a meeting at your earliest convenience.

Thank you for your cooperation and assistance.

Yours truly,
Ministry of Transportation

Tina White
Senior Project Manager
tina.white@ontario.ca

cc. E. Pipe - Ministry of Transportation, Environmental Planner
T. Sorochinsky - AECOM Consultant Project Manager

Enclosed:

- Notice of Public Information Centre #2
- Highway 401 Interchange Improvements at County Road 41, G.W.P. 4459-04-00 Brochure
- Highway 401 Interchange Improvements at Palace Road, G.W.P. 4197-13-00 Brochure

Ministry of Transportation

Planning and Design Section
1355 John Counter Boulevard
Postal Bag 4000
Kingston, Ontario K7L 5A3
Tel.: 613 545-4871
Fax: 613-540-5106

Ministère des Transports

Section de la planification et de la conception
1355, boulevard John Counter
CP/Service de sacs 4000
Kingston (Ontario) K7L 5A3
Tél.: 613 545-4871
Télééc.: 613 540-5106



November 1, 2017

MP/MPP Letter

«Name»

«Organization»

«Address»

Dear «Greeting»:

RE: Notice of Public Information Centre #2

Preliminary Design and Class Environmental Assessment Studies:

Highway 401 Interchange Improvements at County Road 41, G.W.P. 4459-04-00;

Highway 401 Interchange Improvements at Palace Road, G.W.P. 4197-13-00

The Ontario Ministry of Transportation (MTO) has retained AECOM to undertake two separate Preliminary Design and Class Environmental Assessment Studies for improvements to the Highway 401 and County Road 41 interchange (G.W.P. 4459-04-00) and the Highway 401 and Palace Road interchange (G.W.P. 4197-13-00). Both projects are located in the Town of Greater Napanee within the County of Lennox and Addington.

Both studies are following the approved planning process for a Group 'B' project under the *MTO Class Environmental Assessment for Provincial Transportation Facilities (2000)*. Public Information Centre (PIC) #1 was held for each study in July 2016 to provide the public with the opportunity to discuss the project and comment on the alternatives that were being considered to address bridge requirements and undesirable interchange elements. A second combined PIC is being held for both studies to provide interested parties with the opportunity to discuss the projects and provide input to the Project Team.

The purpose of this letter is to notify you that the second PIC for each project has been scheduled. The enclosed *Notice of Public Information Centre #2* will appear in the *Napanee Beaver* and the *Napanee Guide* on Thursday November 9, 2017.

The purpose of PIC #2 is to provide the stakeholders and the public with the opportunity to view and provide comments on the evaluation of alternatives, the Preliminary Design of the preferred alternative at each interchange, and the next steps.

You are invited to attend the following session in advance of PIC #2:

Wednesday November 22, 2017
3:00 p.m. to 4:00 p.m.
Selby Community Hall
114 Pleasant Drive, Selby, ON K0K 2Z0

The public has been invited to attend the PIC between 4:00 p.m. and 8:00 p.m. at the same venue. The PIC will be an informal drop-in centre and representatives from the MTO and the Consultant Team will be available to answer questions and discuss the studies.

Also enclosed are two brochures with further information on each of the two projects that will be presented at PIC #2 for your reference.

Following PIC #2, a Transportation Environmental Study Report (TESR) will be prepared for each study and made available for public review at the completion of each study. Notification, advising of the availability of the TESRs for review, will be published in local newspapers and mailed to those on the study mailing list.

If you would like to provide comments, if you require further information regarding these studies, or if you have any accessibility requirements in order to participate, please feel free to contact the undersigned at 613-545-4871 (toll free: 1-800-267-0295, ext. 4871).

Thank you for your cooperation and assistance.

Yours truly,
Ministry of Transportation

Tina White
Senior Project Manager
tina.white@ontario.ca

cc.	E. Pipe	- Ministry of Transportation, Environmental Planner
	T. Sorochinsky	- AECOM Consultant Project Manager
	M. Weldon	- AECOM Consultant Deputy Project Manager
	F. Leech	- AECOM Senior Environmental Planner
	S. Schmied	- AECOM Environmental Planner

Enclosed:

- Notice of Public Information Centre #2
- Highway 401 Interchange Improvements at County Road 41, G.W.P. 4459-04-00 Brochure
- Highway 401 Interchange Improvements at Palace Road, G.W.P. 4197-13-00 Brochure



AECOM
30 Leek Cres., 4th Floor
Richmond Hill, ON
L4B 4N4
Canada
www.aecom.com

905-882-4401 tel
905-882-4399 fax

November 1, 2017

Public Letter

«Name»
«Organization»
«Address»

Dear «Greeting»:

**RE: Notice of Public Information Centre #2
Preliminary Design and Class Environmental Assessment Studies:
Highway 401 Interchange Improvements at County Road 41, G.W.P. 4459-04-00;
Highway 401 Interchange Improvements at Palace Road, G.W.P. 4197-13-00**

The Ontario Ministry of Transportation (MTO) has retained AECOM to undertake two separate Preliminary Design and Class Environmental Assessment Studies for improvements to the Highway 401 and County Road 41 interchange (G.W.P. 4459-04-00) and the Highway 401 and Palace Road interchange (G.W.P. 4197-13-00). Both projects are located in the Town of Greater Napanee within the County of Lennox and Addington.

Both studies are following the approved planning process for a Group 'B' project under the *MTO Class Environmental Assessment for Provincial Transportation Facilities (2000)*. Public Information Centre (PIC) #1 was held for each study in July 2016 to provide the public with the opportunity to discuss the project and comment on the alternatives that were being considered to address bridge requirements and undesirable interchange elements. A second combined PIC is being held for both studies to provide interested parties with the opportunity to discuss the projects and provide input to the Project Team.

The purpose of this letter is to notify you that the second PIC for each project has now been scheduled (refer to the enclosed *Notice of Public Information Centre #2*). The purpose of PIC #2 is to provide the public with the opportunity to view and provide comments on the evaluation of alternatives, the Preliminary Design of the preferred alternative at each interchange, and the next steps.

You are invited to attend PIC #2 as follows:

Wednesday November 22, 2017
4:00 p.m. to 8:00 p.m.
Selby Community Hall
114 Pleasant Drive, Selby, ON K0K 2Z0

The PIC will be an informal drop-in centre and representatives from the MTO and the Consultant Team will be available to answer questions and discuss the studies.

If you are unable to attend PIC #2 and are interested in these studies, enclosed are brochures with further information on each project that will be presented at PIC #2 for your reference. Please also feel free to contact one of the Project Team members listed on the enclosed *Notice of PIC #2*.

Following PIC #2, a Transportation Environmental Study Report (TESR) will be prepared for each study and made available for public review at the completion of each study. Notification, advising of the TESRs for review, will be published in local newspapers and mailed to those on the study mailing list.

If you would like to provide comments, require further information regarding these studies, or have any accessibility requirements in order to participate in these studies, please feel free to contact the undersigned at 905-390-2030 or Fred.Leech@aecom.com.

Comments are being collected to assist MTO in meeting the requirements of the *Environmental Assessment Act*. This material will be maintained on file for use during the study 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.

Thank you for your cooperation and assistance.

Yours truly,

AECOM



Fred Leech

Senior Environmental Planner

Cc.	T. White	- Ministry of Transportation Project Manager
	E. Pipe	- Ministry of Transportation Environmental Planner
	T. Sorochinsky	- AECOM Project Manager
	M. Weldon	- AECOM Deputy Project Manager
	S. Schmied	- AECOM Environmental Planner

Enclosed:

- Notice of Public Information Centre #2
- Highway 401 Interchange Improvements at County Road 41, G.W.P. 4459-04-00 Brochure
- Highway 401 Interchange Improvements at Palace Road, G.W.P. 4197-13-00 Brochure



AECOM
30 Leek Cres., 4th Floor
Richmond Hill, ON
L4B 4N4
Canada
www.aecom.com

905-882-4401 tel
905-882-4399 fax

November 1, 2017

Impacted Property Owner Letter

«Name»
«Organization»
«Address»

Dear «Greeting»:

**RE: Notice of Potential Property Impacts and Public Information Centre #2
Preliminary Design and Class Environmental Assessment Study
Highway 401 Interchange Improvements at Palace Road, G.W.P. 4197-13-00**

The Ontario Ministry of Transportation (MTO) has retained AECOM to undertake a Preliminary Design and Class Environmental Assessment Study for improvements to the Highway 401 and Palace Road interchange (G.W.P. 4197-13-00). This project is located in the Town of Greater Napanee within the County of Lennox and Addington.

This study is following the approved planning process for a Group 'B' project under the *MTO Class Environmental Assessment for Provincial Transportation Facilities (2000)*.

We wish to advise you that your property is potentially impacted by the recommended plan (please refer to the enclosed plan) and would like to invite you to meet with us to review the recommended plan and discuss potential impacts to your property with the Project Team. Please contact me by phone at 905-390-2030 or by email at Fred.Leech@aecom.com to discuss the potential impacts and if you would like to arrange a meeting.

We would also like to inform you that Public Information Centre #2 (PIC) has now been scheduled for this project. You are invited to attend PIC #2 as follows:

Wednesday November 22, 2017
4:00 p.m. to 8:00 p.m.
Selby Community Hall
114 Pleasant Drive, Selby, ON K0K 2Z0

PIC #1 was held in July 2016 to provide the public with the opportunity to discuss the project and comment on the alternatives that were being considered to address bridge requirements and undesirable interchange elements. A second combined PIC is being held to provide interested parties with the opportunity to discuss the project and provide input to the Project Team.

We reached out to you in September 2016 regarding potential impacts to your property. PIC #2 will build on the information in that letter; and will provide a summary of the evaluation of alternatives, the Preliminary Design of the preferred alternative at the interchange and the next steps in the study process, which we can also discuss with you if you would like to meet with the Project Team separately.

The PIC will be an informal drop-in centre and representatives from the MTO and the Consultant Team will be available to answer questions and discuss the study. This PIC

will be held at the same time and at the same venue as PIC #2 for the *Highway 401 Interchange Improvements at County Road 41 (G.W.P. 4459-04-00), Preliminary Design and Class Environmental Assessment Study*, please refer to the enclosed Notice of PIC #2 for further details.

If you are unable to attend PIC #2 and are not able to meet with us, enclosed are two brochures with further information on the two projects for your reference. Please feel free to contact us if you would like to discuss anything further.

Following PIC #2, a Transportation Environmental Study Report (TESR) will be prepared for this study and made available for public review at the completion of the study. Notification, advising of the TESR review period, will be published in local newspapers and mailed to those on the study mailing list.

If you would like to provide comments, require further information regarding this study, or have any accessibility requirements in order to participate in this study, please feel free to contact the undersigned, as also noted above, at 905-390-2030 or Fred.Leech@aecom.com.

Comments are being collected to assist MTO in meeting the requirements of the *Environmental Assessment Act*. This material will be maintained on file for use during the study 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.

Thank you for your cooperation and assistance.

Yours truly,
AECOM



Fred Leech
Senior Environmental Planner

Cc.	T. White	- Ministry of Transportation Project Manager
	E. Pipe	- Ministry of Transportation Environmental Planner
	T. Soroichinsky	- AECOM Project Manager
	M. Weldon	- AECOM Deputy Project Manager
	S. Schmied	- AECOM Environmental Planner

Enclosed:

- Notice of Public Information Centre #2
- Plan of Potential Property Impacts
- Highway 401 Interchange Improvements at County Road 41, G.W.P. 4459-04-00 Brochure
- Highway 401 Interchange Improvements at Palace Road, G.W.P. 4197-13-00 Brochure

Proposed Mitigation Measures

Proposed mitigation measures and recommendations for further work include but are not limited to the following:

- Potential interim lane and road closures during construction will be confirmed and notification will be provided to Emergency Services, and adjacent property and business owners.
- To protect wildlife and wildlife habitat, vegetation removals will not take place during the Migratory Breeding Bird timing window between April 15 and August 15 of any year, trees and shrubs will be maintained where possible, and disturbed areas will be restored with seeding, sodding and landscaping.
- Additional Species at Risk surveys will be undertaken in Detail Design prior to construction.
- To protect fish and fish habitat, work at the Napanee River will not take place between March 16 and July 14 of any year during the warmwater fisheries timing window.
- Standard noise mitigation measures and municipal noise control by-law requirements will be used during construction.

How to Contact the Project Team

Tina White

Project Manager

Ontario Ministry of Transportation
Eastern Region
1355 John Counter Blvd.,
Postal Bag 4000
Kingston, ON K7L 5A3
Tel: 613-545-4871
Toll Free: 1-800-267-0295
Email: tina.white@ontario.ca

Tim Sorochinsky, P.Eng.

Project Manager

AECOM

4th Floor, 30 Leek Crescent
Richmond Hill, ON L4B 4N4
Tel: 905-882-3522
Fax: 905-882-4399

Email: tim.sorochinsky@aecom.com

Highway 401 Interchange Improvements at Palace Road

Class Environmental Assessment and
Preliminary Design Study

November 2017

Ontario Ministry of Transportation
G.W.P. 4197-13-00



Next Steps

- Review and respond to comments received regarding this brochure and make revisions where appropriate to finalize the preliminary design plans.
- Finalize mitigation measures to minimize or avoid potential environmental effects.
- Prepare and file the Transportation Environmental Study Report for public and agency review and seek Environmental Assessment clearance.
- Detail Design and Construction to be completed as a future / separate study.

Your Comments

The Project Team welcomes feedback regarding the recommended plan. Please contact one of the contacts listed above by **December 21, 2017** if you have any questions or comments.

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

You are encouraged to contact the Project Team members listed above regarding any project-related questions or concerns, including **any accessibility requirements you may have in order to participate in this study.**



AECOM

Highway 401 and Palace Road Interchange Improvements

Introduction

The Ontario Ministry of Transportation (MTO) has retained AECOM to undertake a Preliminary Design and Class Environmental Assessment (EA) Study for improvements to the Highway 401 and Palace Road interchange, located in the Town of Greater Napanee within the County of Lennox and Addington.

This study is following the approved planning process for a Group 'B' project under the MTO's *Class EA for Provincial Transportation Facilities (2000)*.

The Study

- In early 2016, this study was initiated to review the structural requirements of the two Palace Road bridges, identify interim and long-term improvements to address geometric and operational concerns, and to develop a preliminary design including a staging plan to allow the technically preferred structural works and interchange improvements to be implemented efficiently, minimizing construction costs, traffic disruption and future throwaway.
- Upon completion of this study, a Transportation Environmental Study Report (TESR) will be prepared to document the recommended plan, potential impacts, and recommended mitigation measures to minimize impacts. The TESR will be made available for a 30-day public review period at public review locations in close proximity to the study area. A Notice of TESR review opportunities will be provided.



Study Process

Planning

Preliminary Design

- Generate and Assess Alternatives (PIC #1: July 2016)
- Evaluate and Select Preferred Alternative
- Develop Preferred Alternative (PIC #2: November 2017)
- Notice of Study Completion and TESR Submission

Detail Design and Construction

A full replacement of the Highway 401 and Palace Road bridges is anticipated to be required within five years. Development of an ultimate plan for the interchange is needed to allow the structural work to be staged in a cost effective and efficient manner, minimizing further throwaway.

Generation and Evaluation of Preliminary Design Alternatives

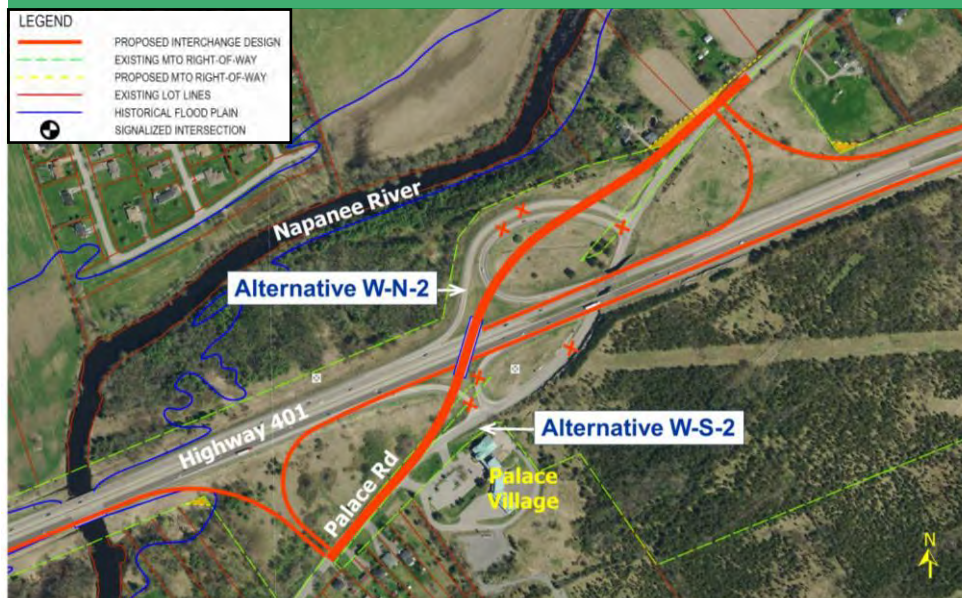
A "long-List" evaluation of alternatives was presented at Public Information Centre (PIC) #1, which led to the identification of a "short-list" of alternatives for the north and south sides of the interchange.

A weighted-score arithmetic evaluation system was used to compare the short-list of alternatives using the following criteria:

- Transportation (e.g. interchange operations, safety, geometrics; construction staging impacts);
- Environmental (e.g. natural, socio-economic, and cultural); and,
- Cost (e.g. capital and life cycle cost, utility impacts).

Out of five north side alternatives and seven south side alternatives, **Alternatives West-North-2 (W-N-2) and West-South-2 (W-S-2) (Buttonhooks with Westerly Realignment)** were selected as the **Technically Preferred Preliminary Design Alternatives**.

TECHNICALLY PREFERRED PRELIMINARY DESIGN ALTERNATIVE



Evaluation Summary

- The westerly realignment alternatives avoid temporary widening of the existing structure and minimize future staging impacts to Highway 401 traffic
- Alternatives W-N-2 and W-S-2 are preferred from a Transportation perspective as they allow existing ramps and Palace Road to remain fully open to traffic during construction (short-term closures only required)
- Alternatives W-N-2 and W-S-2 have the most desirable geometrics and improved sight distance, and lower environmental impacts than most alternatives.



Construction Staging

- Short-term construction will include construction of the new structure over Highway 401, Palace Road realignment and new ramps, and removal of the existing bridges
- Occasional night-time and/or weekend closures of existing interchange ramps, Palace Road and lane closures along Highway 401 will be required to complete the construction activities. Advance notification / signage of all closures will be provided.
- The staging strategy will be confirmed during a future Detail Design assignment in advance of construction, and notification will be provided to adjacent property and business owners at that time.

APPENDIX B

Copies of PIC Displays



Highway 401 Interchange Improvements at Palace Road

Welcome to the Public Information Centre #2 for the

Highway 401 Interchange Improvements at Palace Road

Class Environmental Assessment and Preliminary Design Study

G.W.P. 4197-13-00

November 22, 2017

Please Sign In Here



Highway 401 Interchange Improvements at Palace Road

Purpose of Public Information Centre #2

The purpose of this Public Information Centre (PIC) is to present and receive feedback on:

- Study Background, Purpose and Scope
- Summary of Public Information Centre #1 (held July 2016)
- Assessment and Evaluation of Preliminary Design Alternatives
- Preliminary Design of the Technically Preferred Alternative
- Potential Mitigation Strategies to Minimize Environmental / Community Impacts
- Next Steps

Your input on each of these and other study issues is important to us!



Highway 401 Interchange Improvements at Palace Road

Study Area, Purpose and Scope

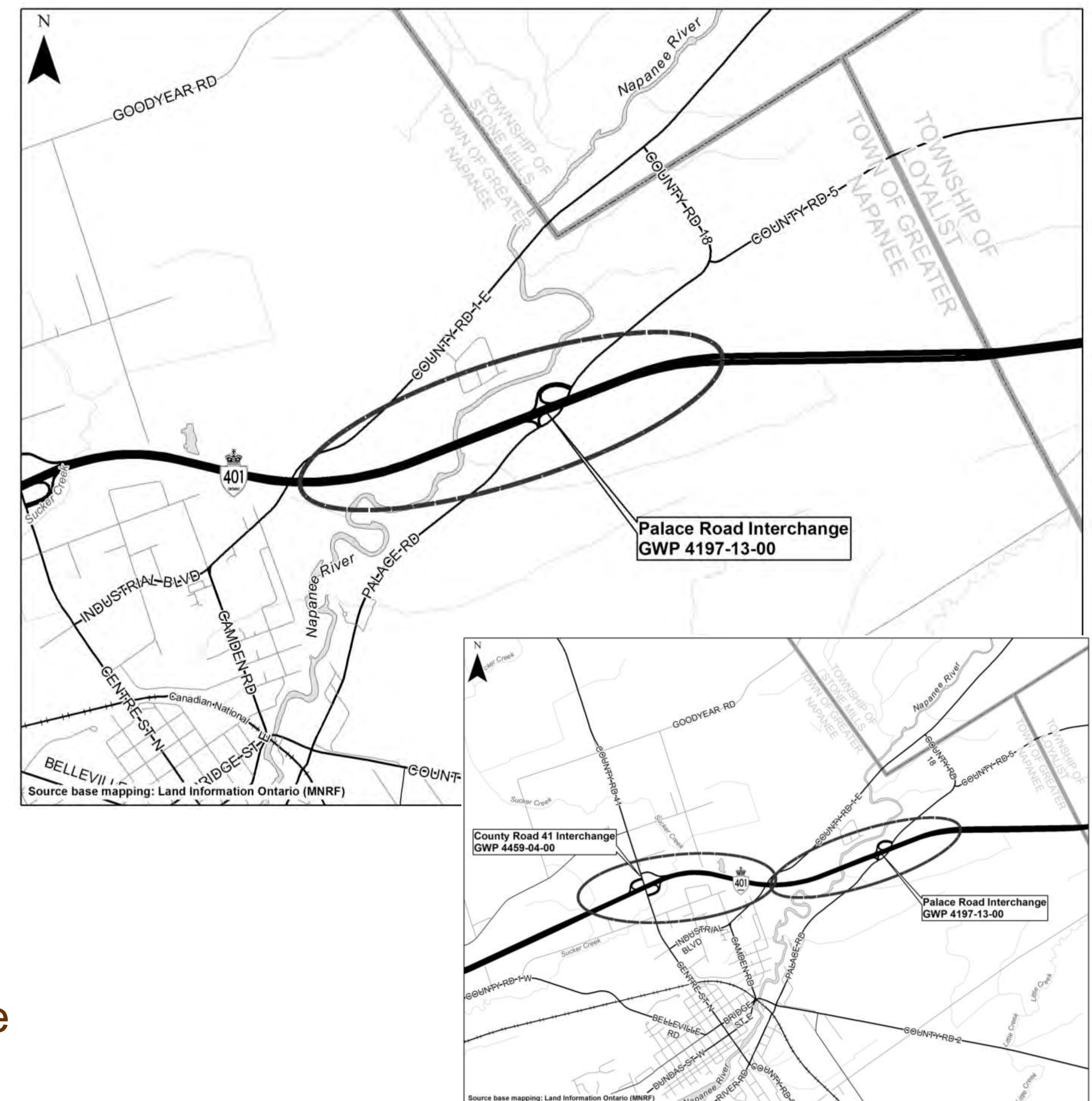
The Ontario Ministry of Transportation (MTO) has retained AECOM to undertake a Preliminary Design and Class Environmental Assessment Study for improvements to the Highway 401 / Palace Road interchange.

The primary focus of this study is to:

- Review the **structural requirements** (e.g. major rehabilitation or replacement) of the two Palace Road bridges;
- Identify **interim and long-term interchange improvements** to address geometric and operational concerns;
- Develop a **preliminary design** including a **staging plan** to allow the technically preferred structural works and interchange improvements to be implemented efficiently, minimizing construction costs, traffic disruption and future throwaway.

Concurrently MTO is undertaking a separate Preliminary Design and Class Environmental Assessment Study for improvements to the Highway 401 / County Road 41 interchange.

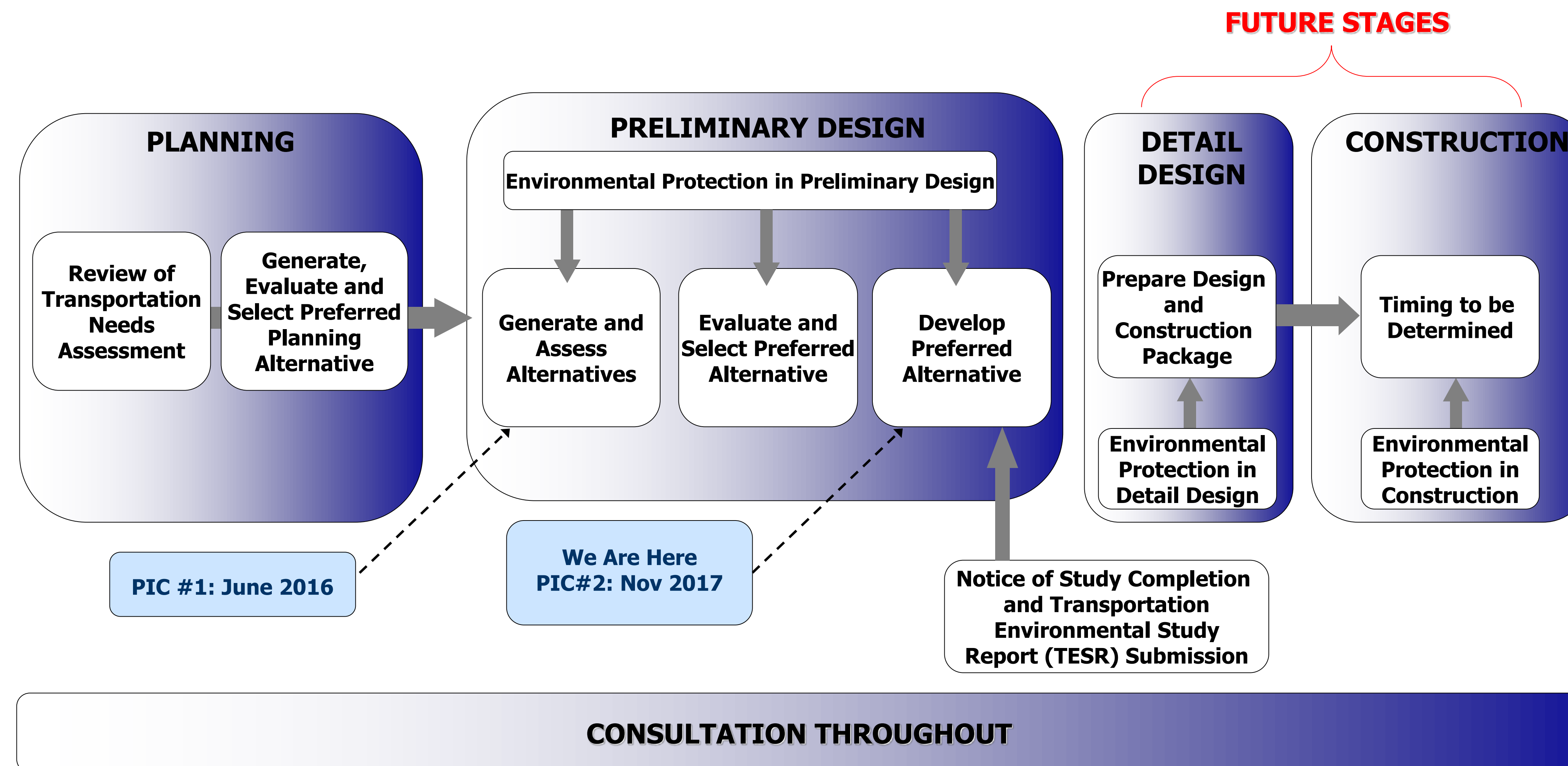
Display material for the Highway 401 / County Road 41 interchange study PIC are presented on the adjacent set of display boards.





Highway 401 Interchange Improvements at Palace Road

Study Process



This study is following the requirements of a Group 'B' project under the MTO Class Environmental Assessment for Provincial Transportation Facilities (2000).

Stakeholder consultation is ongoing, including two rounds of PICs. PIC #2 has been arranged to present the evaluation of alternatives and the Technically Preferred Alternative.

A Transportation Environmental Study Report (TESR) will be prepared and made available for public and agency review for a period of 30 days at the completion of the study.



Highway 401 Interchange Improvements at Palace Road

Timing of Study Activities

TASKS	2016				2017				2018
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
Study Commencement	★								
Data Collection, Field Reviews & Review of Existing Conditions	■	■							
Generate & Assess Long List Alternatives		■	■						
Public Information Centre #1			★						
Assess and Evaluate Short List Alternatives			■	■	■	■			
Preliminary Design of Technically Preferred Alternative						■	■	■	
Public Information Centre #2								★	
Finalize Preliminary Design and Mitigation Measures								■	■
Transportation Environmental Study Report (TESR) Development								■	■
TESR 30-Day Review Period									★

Please note that the schedule is subject to change based on study findings and/or input received through consultation



Highway 401 Interchange Improvements at Palace Road

Study Overview and Public Information Centre #1

- In the winter of 2016, the Class Environmental Assessment and Preliminary Design Study for this interchange was initiated.
- The first PIC for the Class EA Study was held in July 2016 and presented and sought input on:
 - Study background and process
 - Existing conditions (environmental, infrastructure, safety and operations)
 - Identification and screening assessment of a long list of alternatives
 - Proposed evaluation approach and criteria for short list alternatives



Palace Road facing northeast at Highway 401

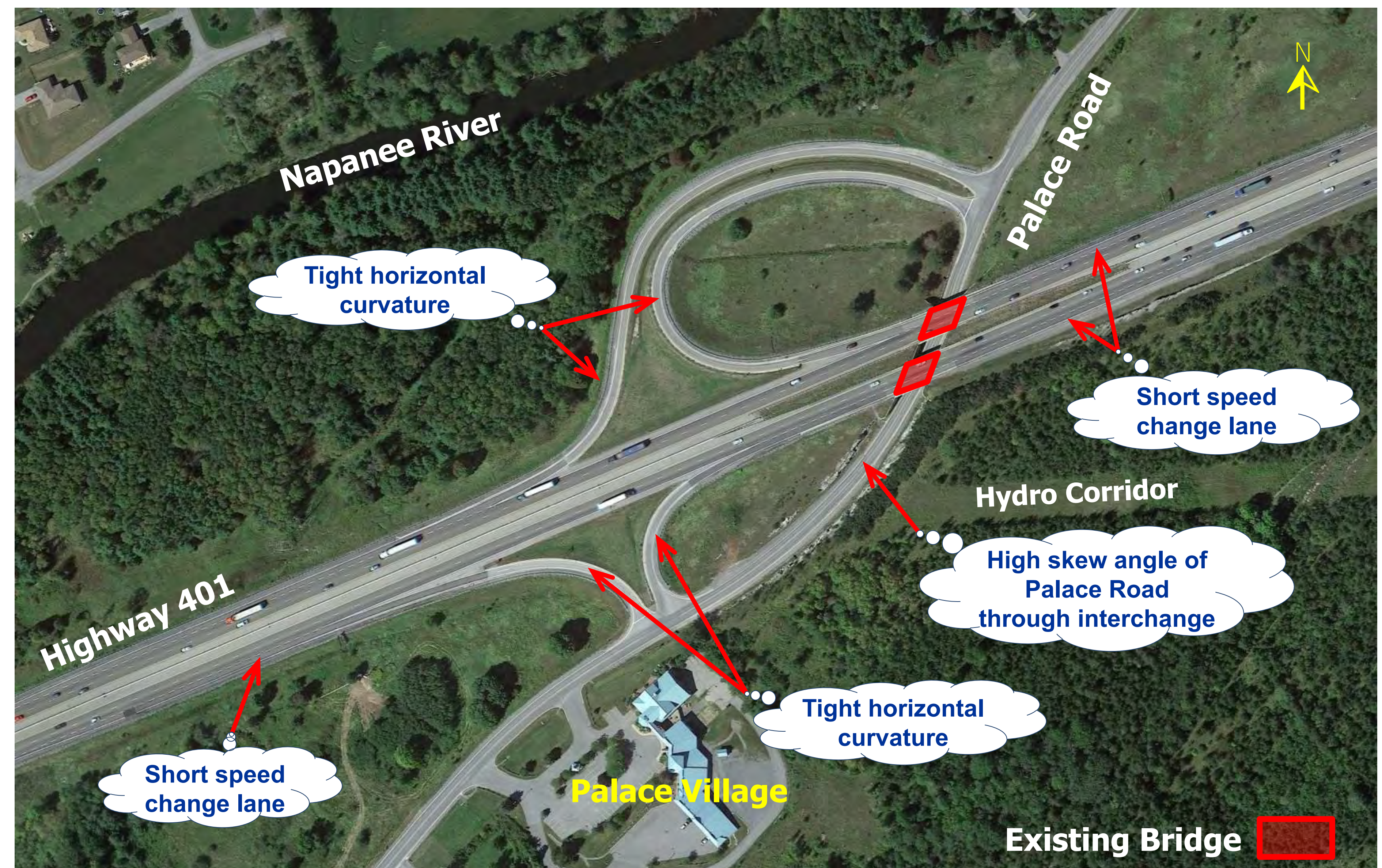
Note: MTO is currently undertaking a minor rehabilitation of the Highway 401 / Napanee River bridge located directly west of the interchange, which includes construction staging along Highway 401 and at the Palace Road interchange ramps. The ongoing construction activities are separate from the current assignment.



Highway 401 Interchange Improvements at Palace Road

Summary of Problems and Opportunities

- Minor bridge rehabilitation was completed in 2012 (limited in scope due to limitations on Highway 401 lane closures);
- Full replacement of the Hwy 401 – Palace Road bridges is anticipated to be required within 5 years;
- Development of an ultimate plan for the interchange is needed to allow the structural work to be staged in a cost effective and efficient manner, minimizing future throwaway;
- Potential issues affecting the structural staging works include:
 - Existing speed change lanes require removal from Palace Road structures to complete bridge work and maintain two Highway 401 lanes in each direction;
 - Replacement of structures on existing Palace Road alignment would require temporary overbuild / widening of one of the bridges.
- A number of undesirable interchange geometric elements impacting safety and operations are present (illustrated on adjacent plan).





Highway 401 Interchange Improvements at Palace Road

Generation and Evaluation of Preliminary Design Alternatives

The following process has been followed to select the Technically Preferred Preliminary Design Alternative:

1. Identify existing “Problems” (e.g. *structural requirements and associated construction staging needs, interchange geometric deficiencies*) and “Opportunities” to address identified problems (e.g. *development of staging approach*);
2. Develop and assess “Long-List” of interchange alternatives to reflect ultimate interchange configuration(s), based on factors such as Traffic Operations, Construction Staging Impacts, Geometrics, Cost, and Environmental Impacts.
3. Evaluate the remaining “Short-List” of interchange alternatives, utilizing an arithmetic evaluation approach and the following criteria:
 - **Transportation** (e.g. *interchange operations, safety and geometrics, construction staging impacts*);
 - **Environmental** (e.g. *Natural, Socio-Economic and Cultural*);
 - **Cost** (e.g. *capital and life cycle cost, utility impacts*);

Alternatives were developed and assessed separately for the north and south sides of the interchange.

- The long list evaluation was presented at PIC #1 which led to the identification of a short list of alternatives;
- Following PIC #1, the short list alternatives were evaluated utilizing an arithmetic evaluation as discussed on the following slides.



Highway 401 Interchange Improvements at Palace Road

Overview of Short List Evaluation

A weighted-score arithmetic evaluation system was used to compare the **short list** of alternatives. This evaluation methodology involved assigning relative weightings to each of the evaluation categories and criteria based on their level of importance.

Impacts were measured either quantitatively or qualitatively, and then these scores were multiplied by a relative weight for that indicator. The weighted scores for each indicator were then summed to arrive at a total score for each alternative. The alternative that produced the highest total weighted score is preferred as it results in the best balance of benefits and impacts to the natural, socio-economic and cultural environments, as well as transportation and cost considerations.

The table to the right identifies the categories and criteria that were used to evaluate the short list of alternatives.

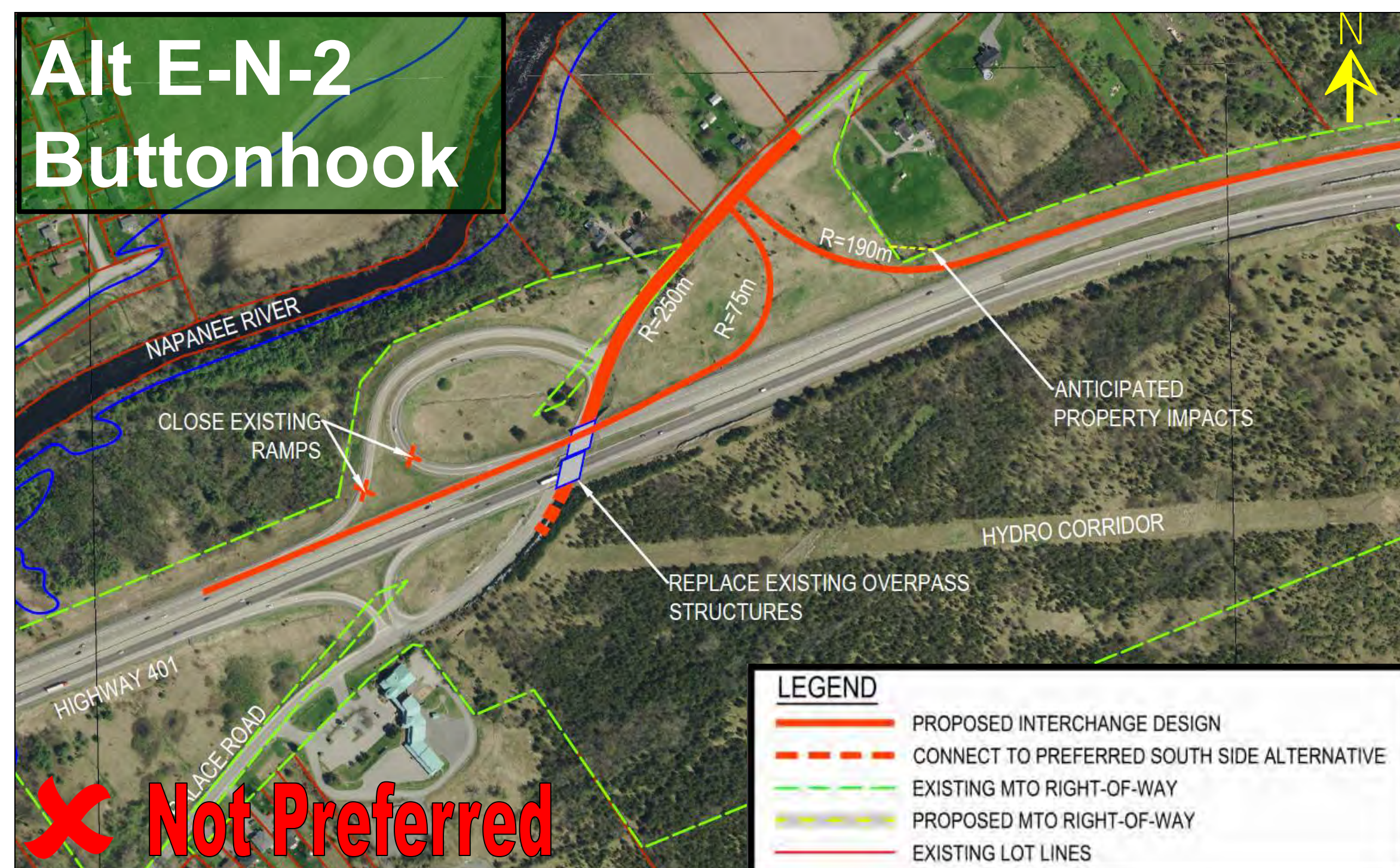
Evaluation Categories and Criteria
TRANSPORTATION <ul style="list-style-type: none"> Interchange Operations Safety and Geometrics
ENVIRONMENTAL <ul style="list-style-type: none"> Natural Environment <ul style="list-style-type: none"> Fish and Fish Habitat Terrestrial Ecosystems Groundwater Socio-Economic Environment <ul style="list-style-type: none"> Noise Air Quality Community Effects Waste and Contamination Cultural Environment <ul style="list-style-type: none"> Archaeological Resources Built Heritage Features and Cultural Heritage Landscapes
COST <ul style="list-style-type: none"> Capital Cost Utility Impacts

The detailed short-list evaluation is available at the reference table.



Highway 401 Interchange Improvements at Palace Road

Short-List Alternatives (North Side – Existing Alignment)

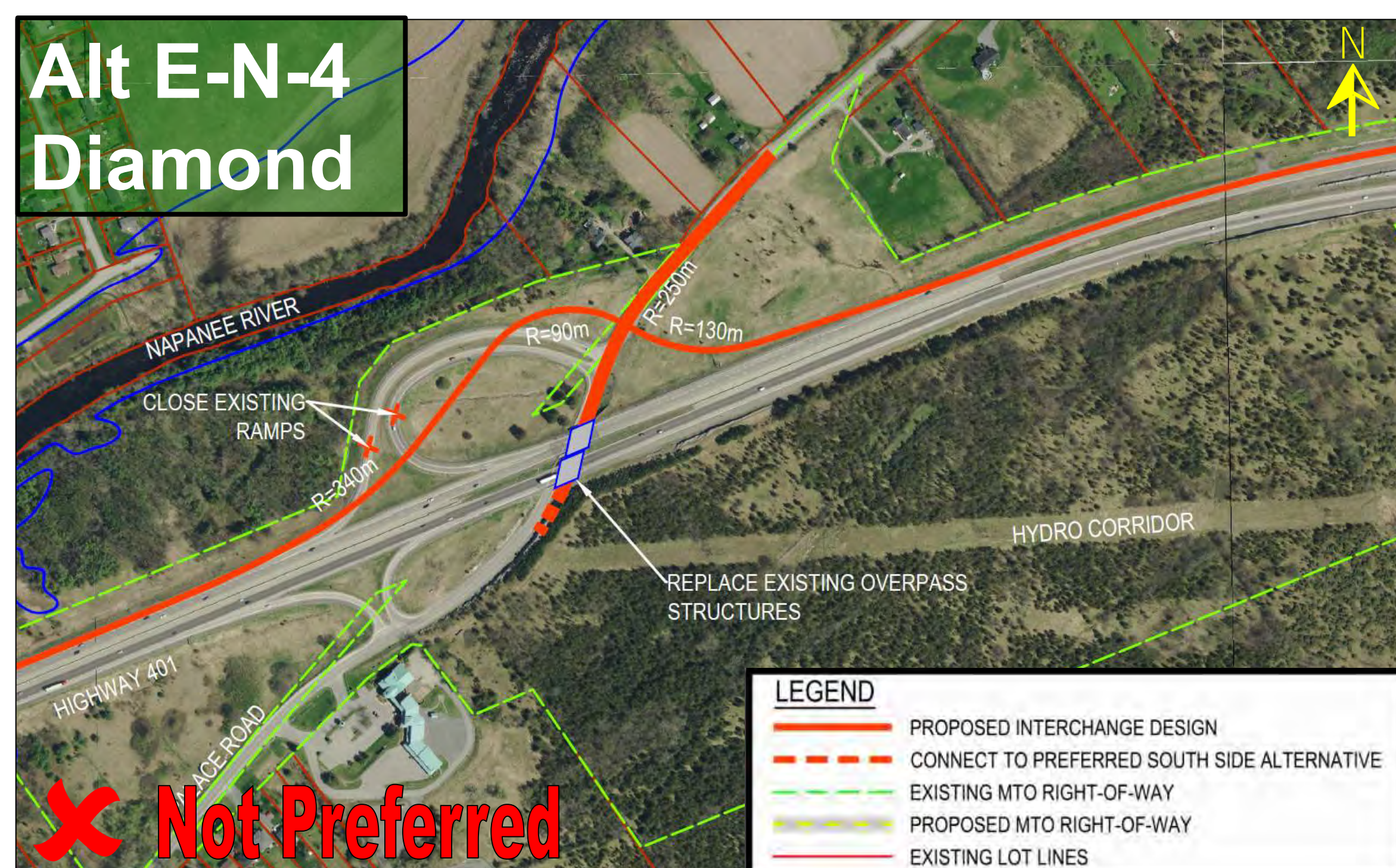


Alt E-N-2: Pros

- Avoids potential displacement of residential property with local cultural heritage value;
- Lowest overall construction cost

Alt E-N-2: Cons

- Requires temporary widening of one existing Palace Road structure and a Highway 401 median cross-over to complete construction;
- Greater impacts to Highway 401 traffic operations during future bridge rehabilitations.



Alt E-N-4: Pros

- Avoids potential displacement of residential property with local cultural heritage value;
- Preferred or equally preferred from natural, socio-economic and cultural environments.

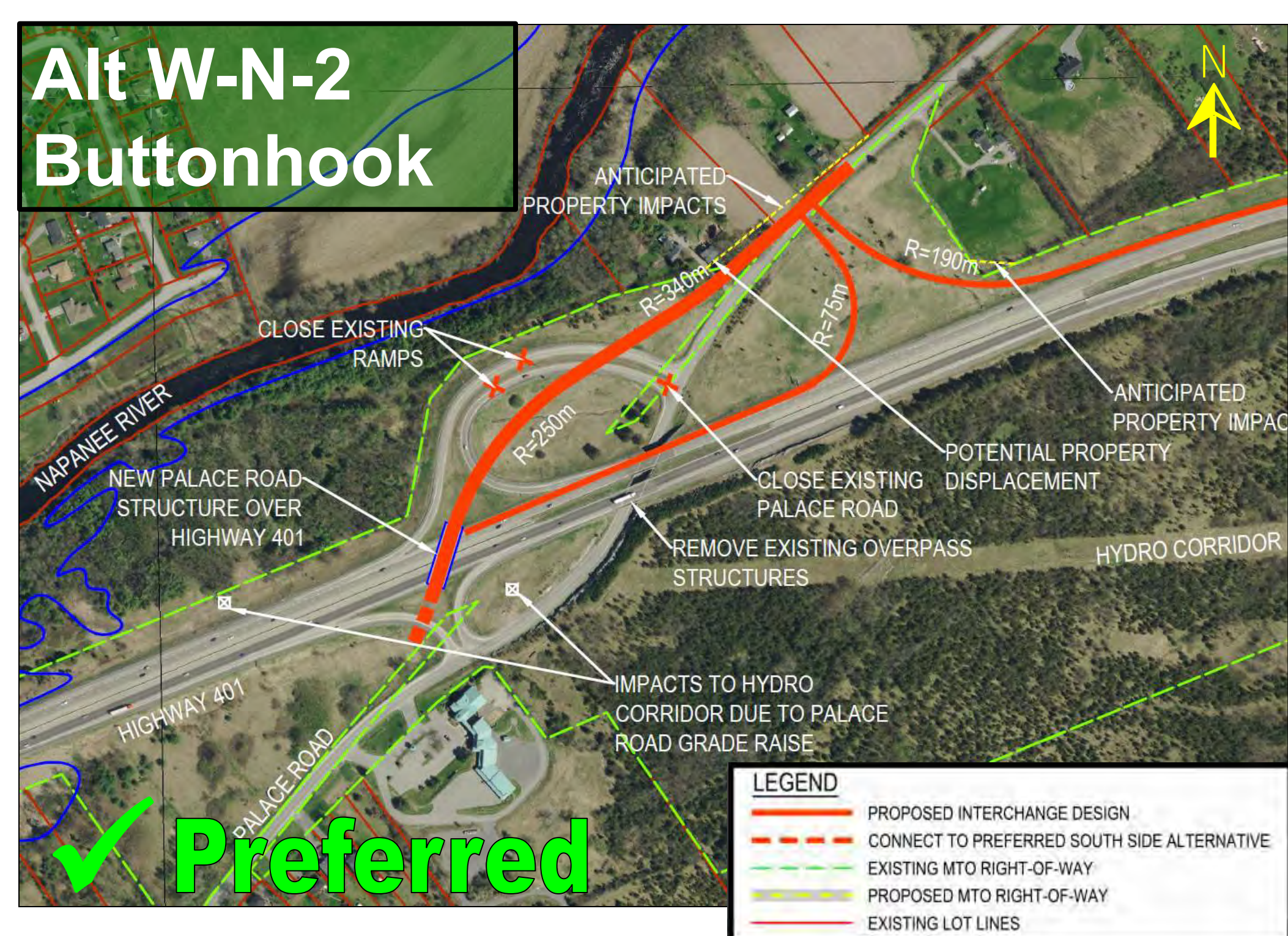
Alt E-N-4: Cons

- Less than desirable turning sight distance to and from ramp terminal intersection (increased collision risk);
- Requires temporary widening of one existing Palace Road structure and a Highway 401 median cross-over to complete construction;
- Greater impacts to Highway 401 traffic operations during future bridge rehabilitations.



Highway 401 Interchange Improvements at Palace Road

Short-List Alternatives (North Side – Westerly Realignment)

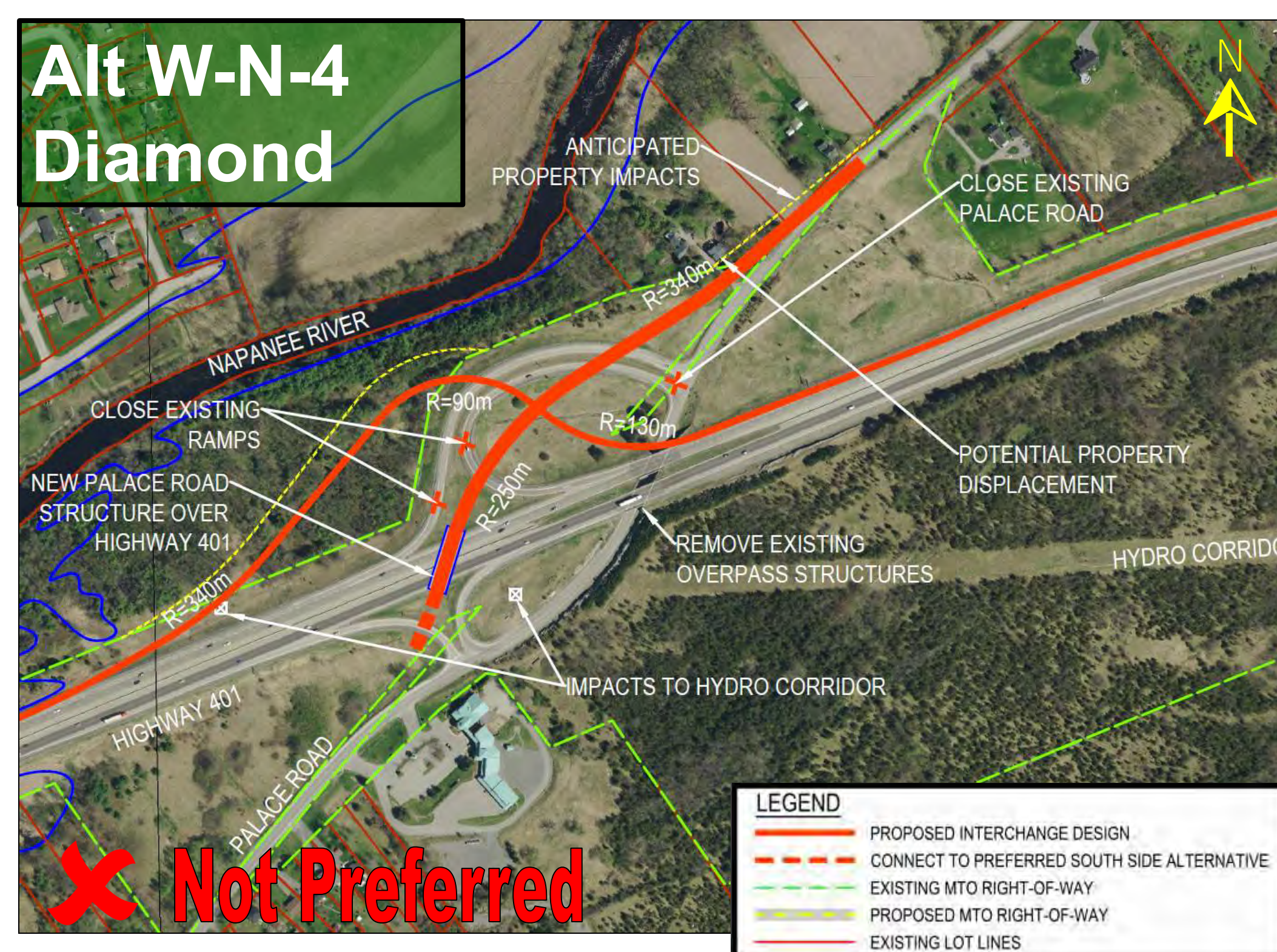


Alt W-N-2: Pros

- Avoids temporary widening of Palace Road structure and Highway 401 median cross-over;
- Reduced impacts to Highway 401 traffic operations during future bridge rehabilitations;

Alt N-2: Cons

- Potential displacement of residential property with local cultural heritage value;
- Impacts to existing hydro transmission corridor

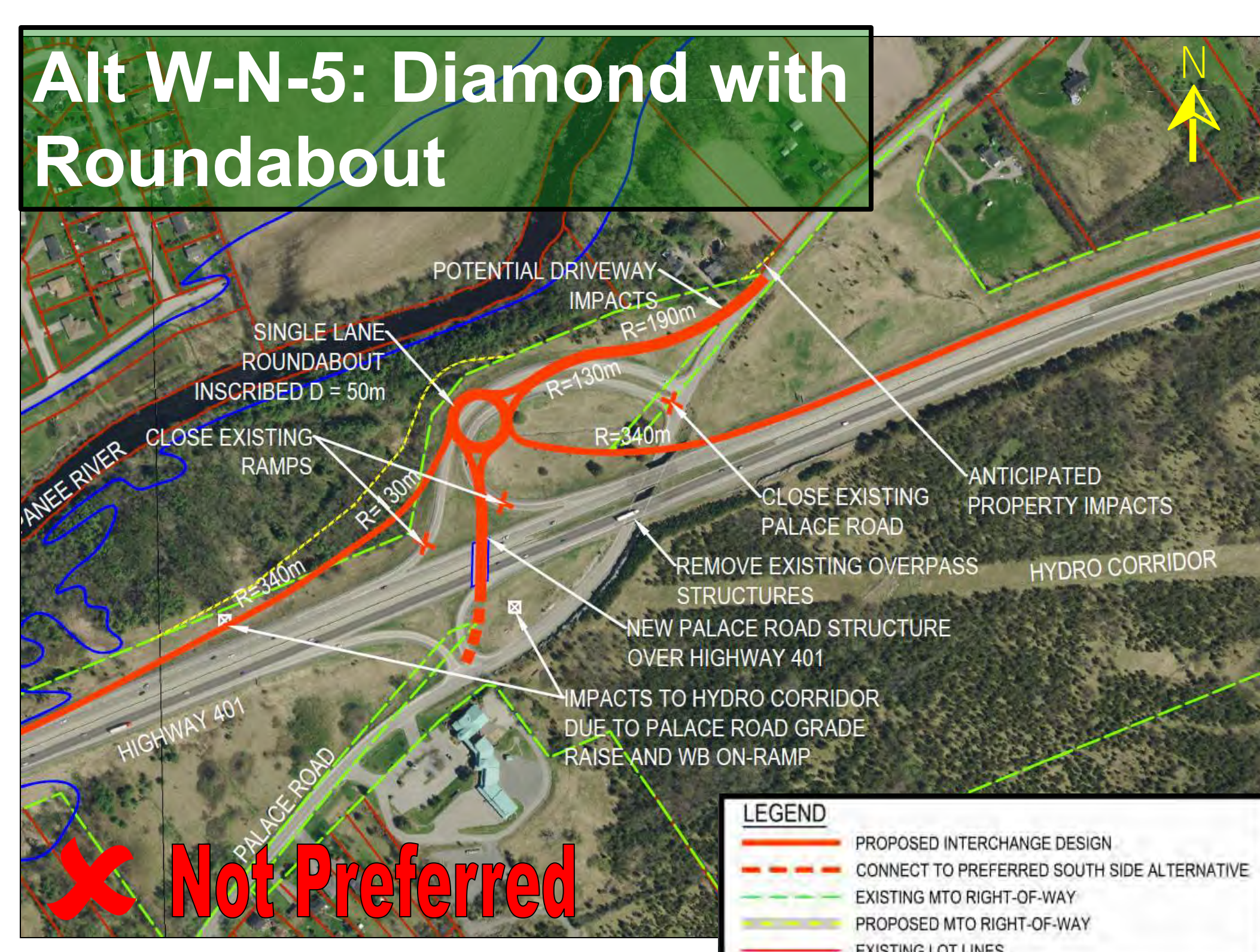


Alt W-N-4: Pros

- Reduced impacts to Palace Road and Highway 401 traffic operations during current and future construction

Alt W-N-4: Cons

- Potential displacement of residential property with local cultural heritage value;
- Less than desirable turning sight distance to and from intersection (increased collision risk);
- Requires widening of Napanee River bridge (increased natural environment impacts)
- Highest construction cost and impacts to existing hydro transmission corridor



Alt W-N-5: Pros

- Avoids potential displacement of residential property with local cultural heritage value;
- Roundabout eliminates direct left-turns which is anticipated to reduce severity of collisions;
- Reduced impacts to Palace Road and Highway 401 traffic operations during current and future construction

Alt W-N-5: Cons

- Unfamiliar configuration and less compatible for trucks
- Requires widening of Napanee River bridge (increased natural environment impacts)
- Highest construction cost and impacts to existing hydro transmission corridor



Highway 401 Interchange Improvements at Palace Road

Short-List Alternatives (North Side)

	Existing Alignment Alternatives		Westerly Realignment Alternatives		
Factor	Alternative E-N-2 Buttonhook	Alternative E-N-4 Diamond	Alternative W-N-2 Buttonhook	Alternative W-N-4 Diamond	Alternative W-N-5 Diamond with Roundabout
Transportation					
Natural Environment					
Socio-Economic Environment					
Cultural Environment					
Cost					
Recommendation					

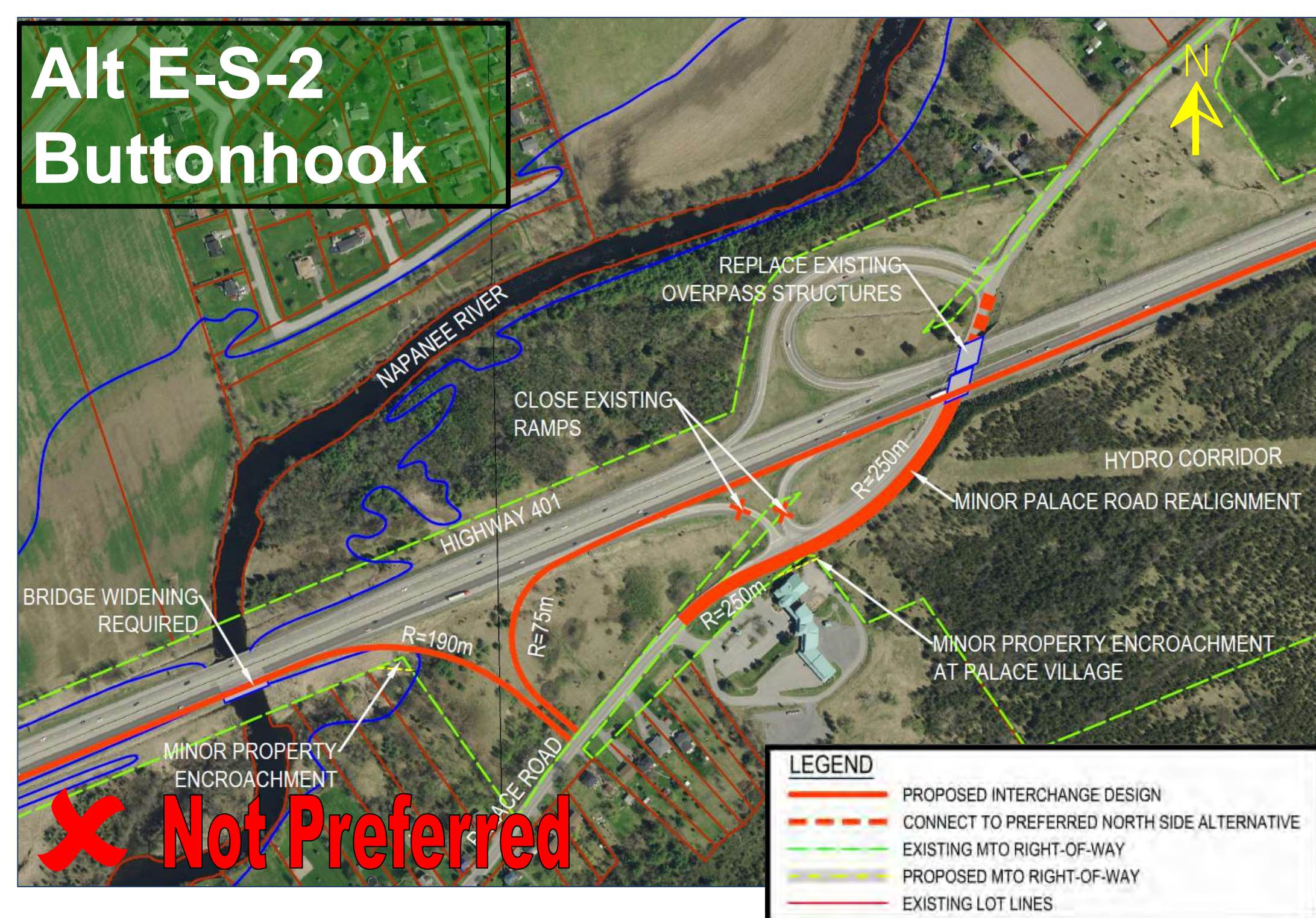
Legend		
Highest Category Weighting		Lowest Category Weighting
Most Preferred Alternative		Least Preferred Alternative

- The alternatives on the existing alignment (Alt E-N-2 / E-N-4) require temporary widening of one of the existing Palace Road bridges and require reduction to a single lane of traffic (one combined lane for both directions) controlled by signals along Palace Road during construction.
- Future rehabilitation of these bridges (Highway 401 over Palace Road) would have significantly greater impacts to Highway 401 traffic operations including likely lane reductions, whereas future bridge rehabilitations for the westerly realignment alternatives can generally be undertaken with minimal impacts to Highway 401 with lower life-cycle costs.
- While Alt W-N-2 (and W-N-4) has greater property impacts, the short and long-term staging benefits associated with constructing the new structure over Highway 401 are considered to outweigh this impact.



Highway 401 Interchange Improvements at Palace Road

Short-List Alternatives (South Side – Existing Alignment)

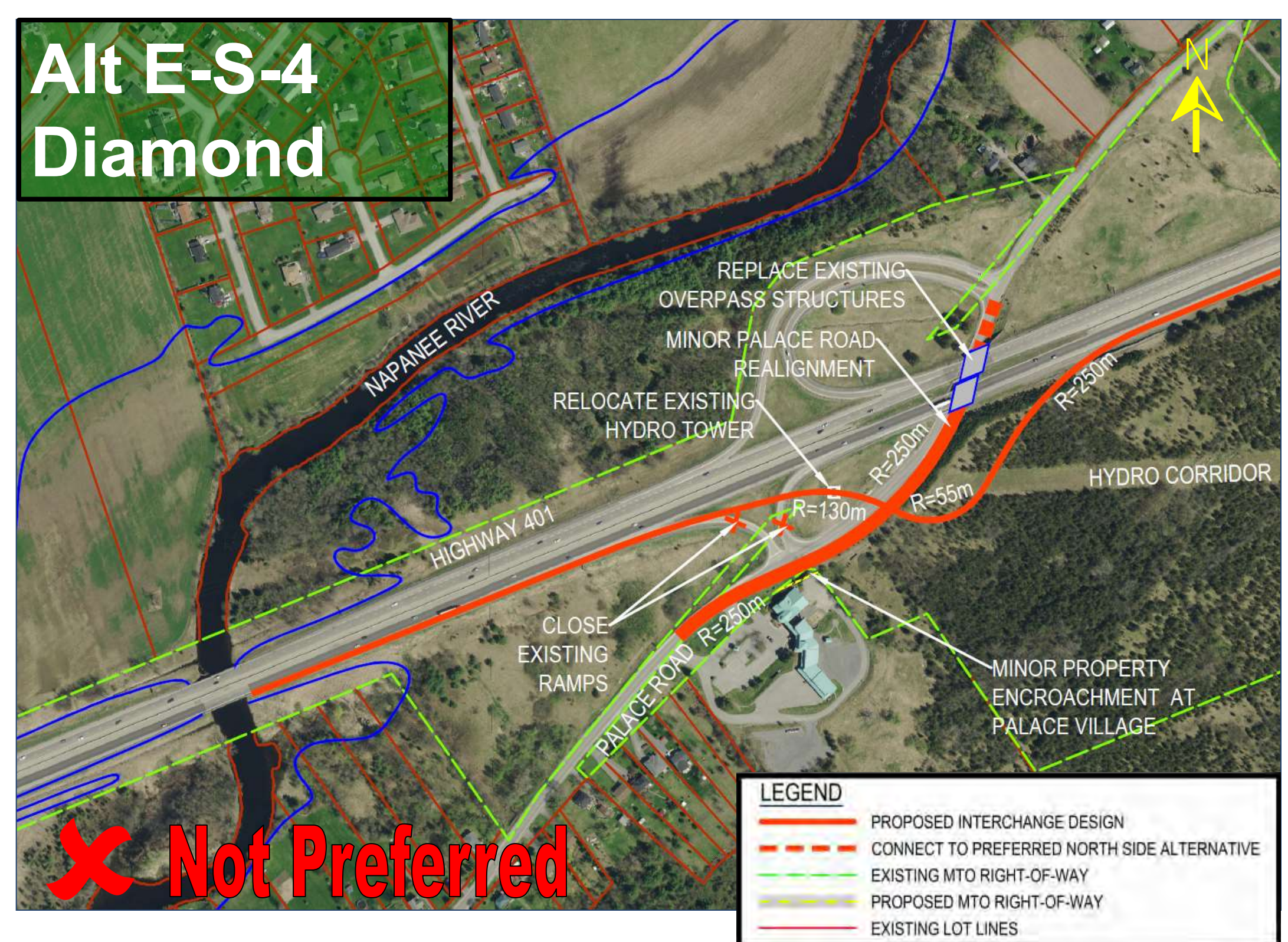


Alt E-S-2: Pros

- Avoids impacts to hydro transmission corridor

Alt E-S-2: Cons

- Requires temporary widening of one existing Palace Road structure and a Highway 401 median cross-over to complete construction;
- Greater impacts to Highway 401 traffic operations during future bridge rehabilitations.
- Requires widening of Napanee River bridge (increased natural environment impacts)

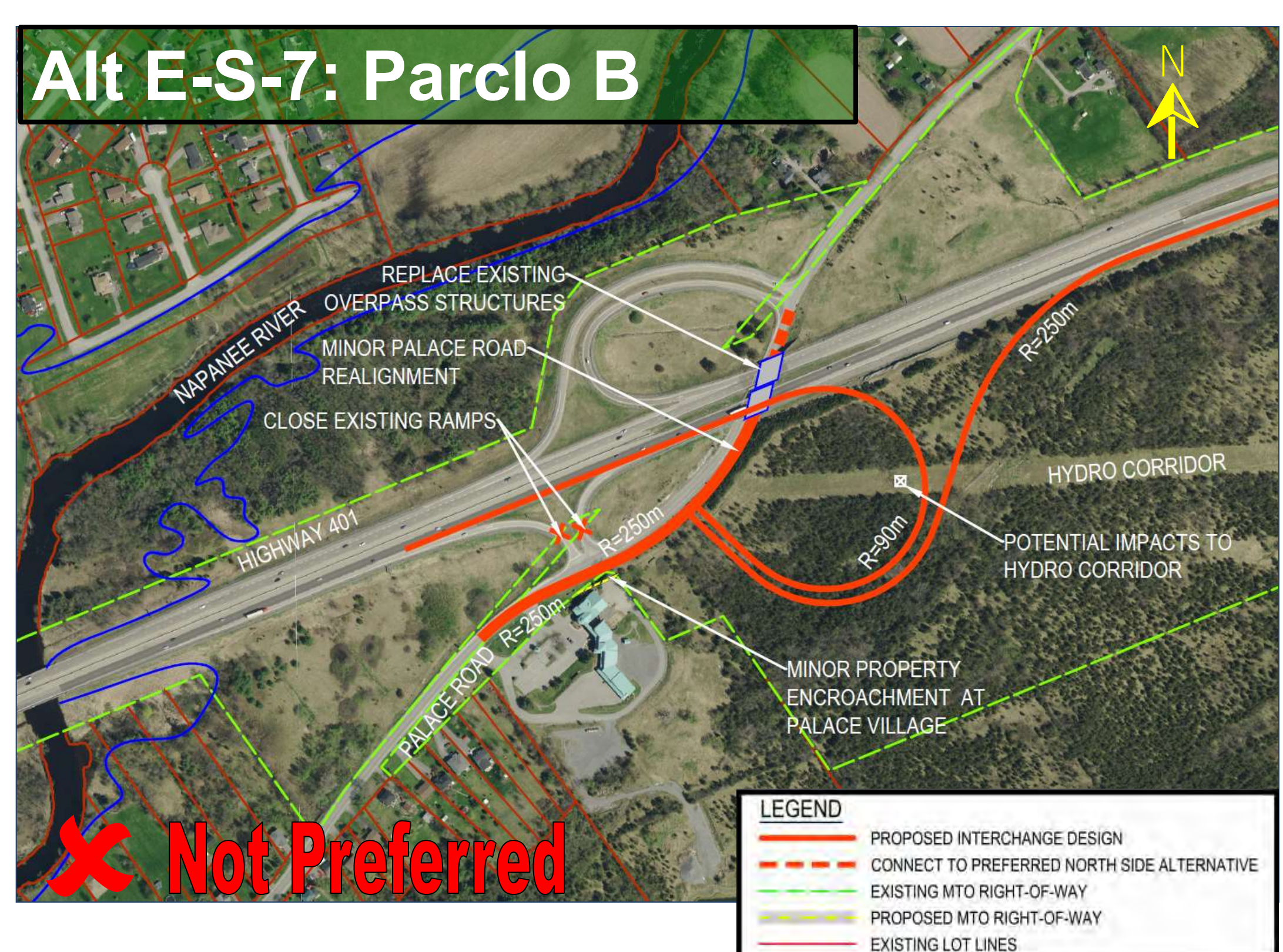


Alt E-S-4: Pros

- Preferred or equally preferred from natural, socio-economic and cultural environments;
- Lower construction cost than other options.

Alt E-S-4: Cons

- Less than desirable turning sight distance at intersection (increased collision risk);
- Requires temporary widening of one existing Palace Road structure and a Highway 401 median cross-over to complete construction;
- Greater impacts to Highway 401 traffic operations during future bridge rehabilitations.



Alt E-S-7: Pros

- Preferred or equally preferred from socio-economic and cultural environments

Alt E-S-7: Cons

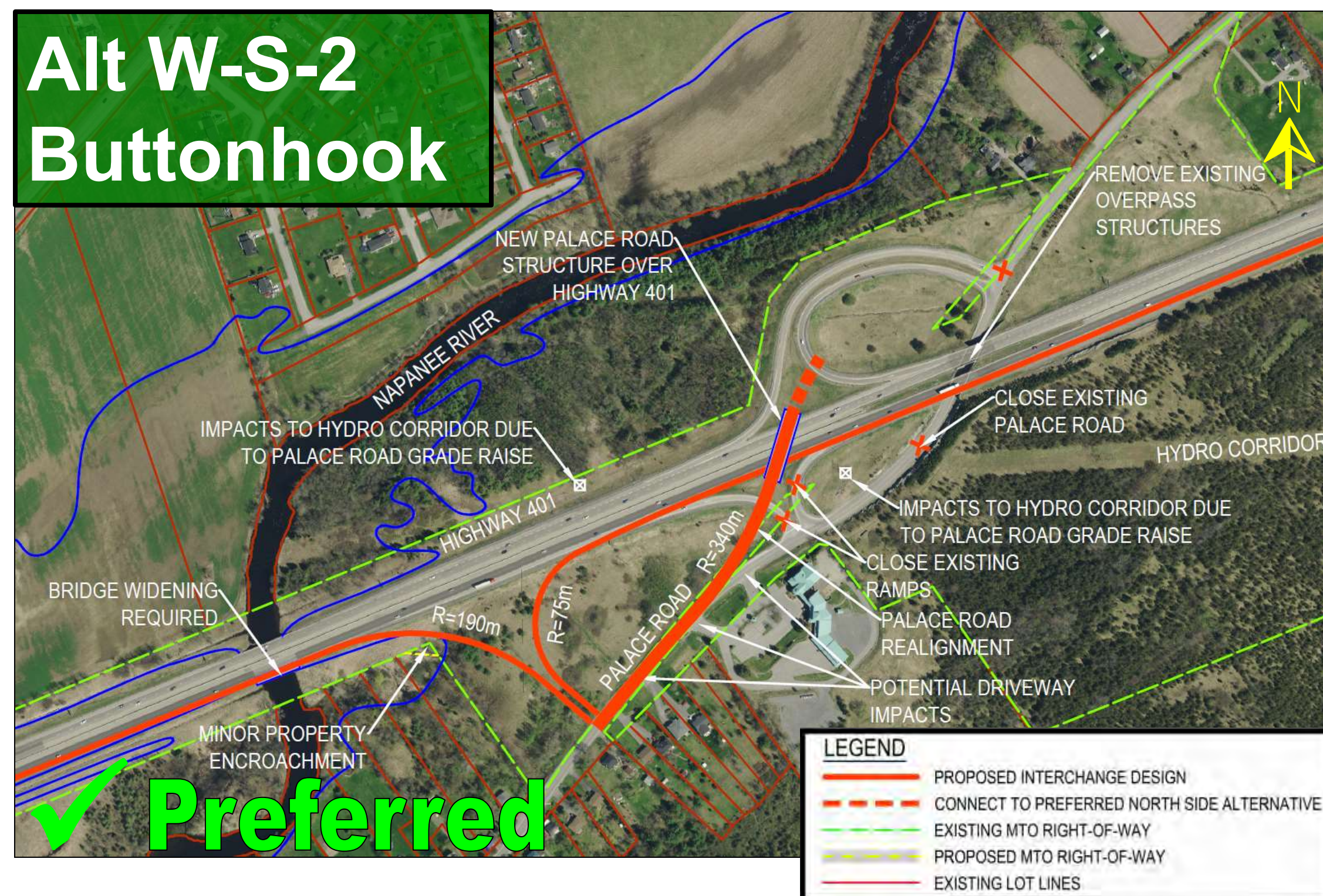
- Less than desirable turning sight distance at intersection (increased collision risk);
- Requires temporary widening of one existing Palace Road structure and a Highway 401 median cross-over to complete construction;
- Greater impacts to Highway 401 traffic operations during future bridge rehabilitations.
- Highest construction cost



Highway 401 Interchange Improvements at Palace Road

Short-List Alternatives (South Side – Westerly Realignment)

Alt W-S-2 Buttonhook



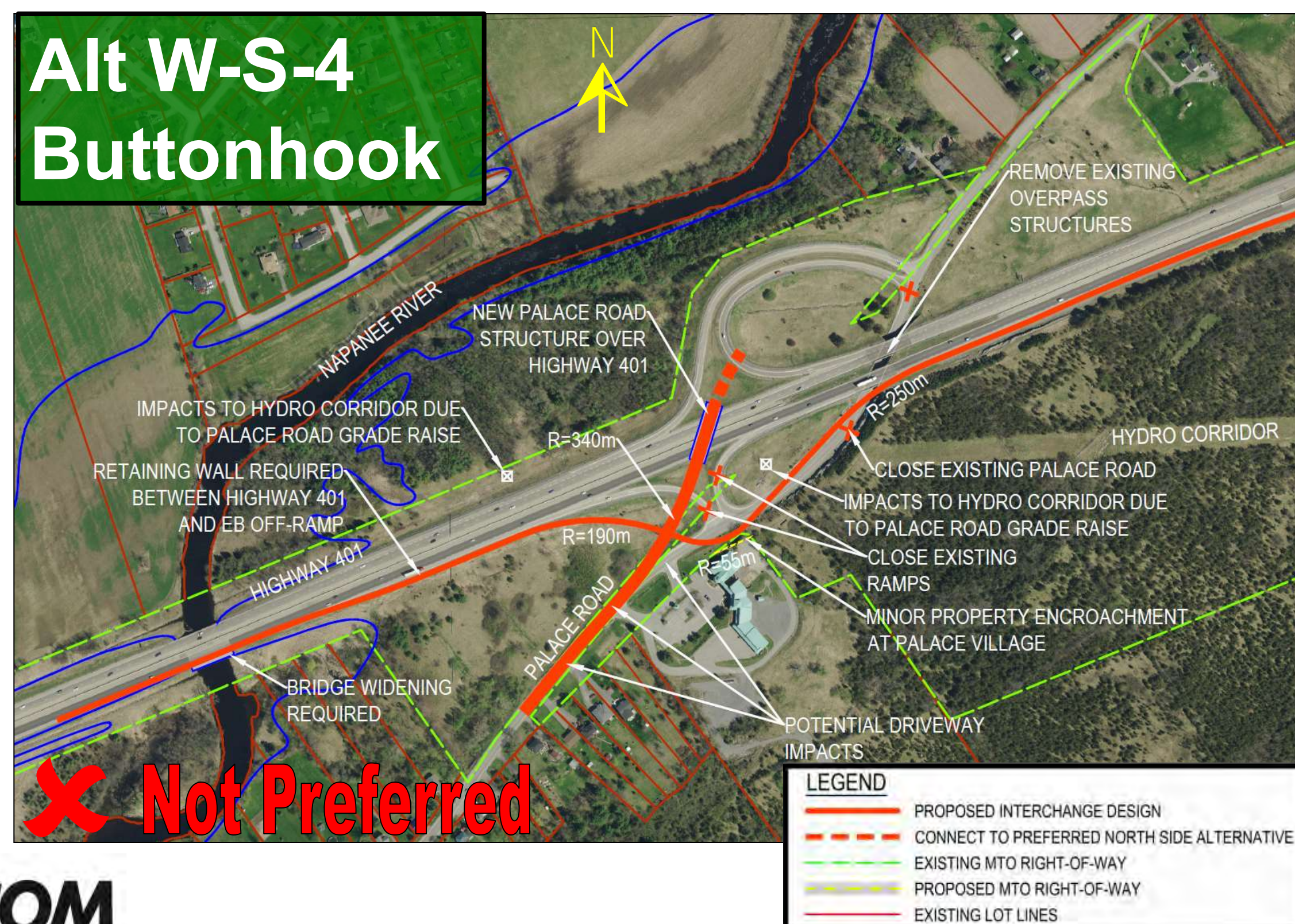
Alt W-S-2: Pros

- Avoids temporary widening of Palace Road structure and Highway 401 median cross-over;
- Reduced impacts to Highway 401 traffic operations during future bridge rehabilitations;
- Provides the most desirable overall geometrics
- Lower construction cost than other options.

Alt W-S-2: Cons

- Requires widening of Napanee River bridge (increased natural environment impacts)
- Impacts to existing hydro transmission corridor
- Minor impacts to residential and commercial driveways

Alt W-S-4 Buttonhook



Alt W-S-4: Pros

- Avoids temporary widening of Palace Road structure and Highway 401 median cross-over;
- Reduced impacts to Highway 401 traffic operations during future bridge rehabilitations;

Alt W-S-4: Cons

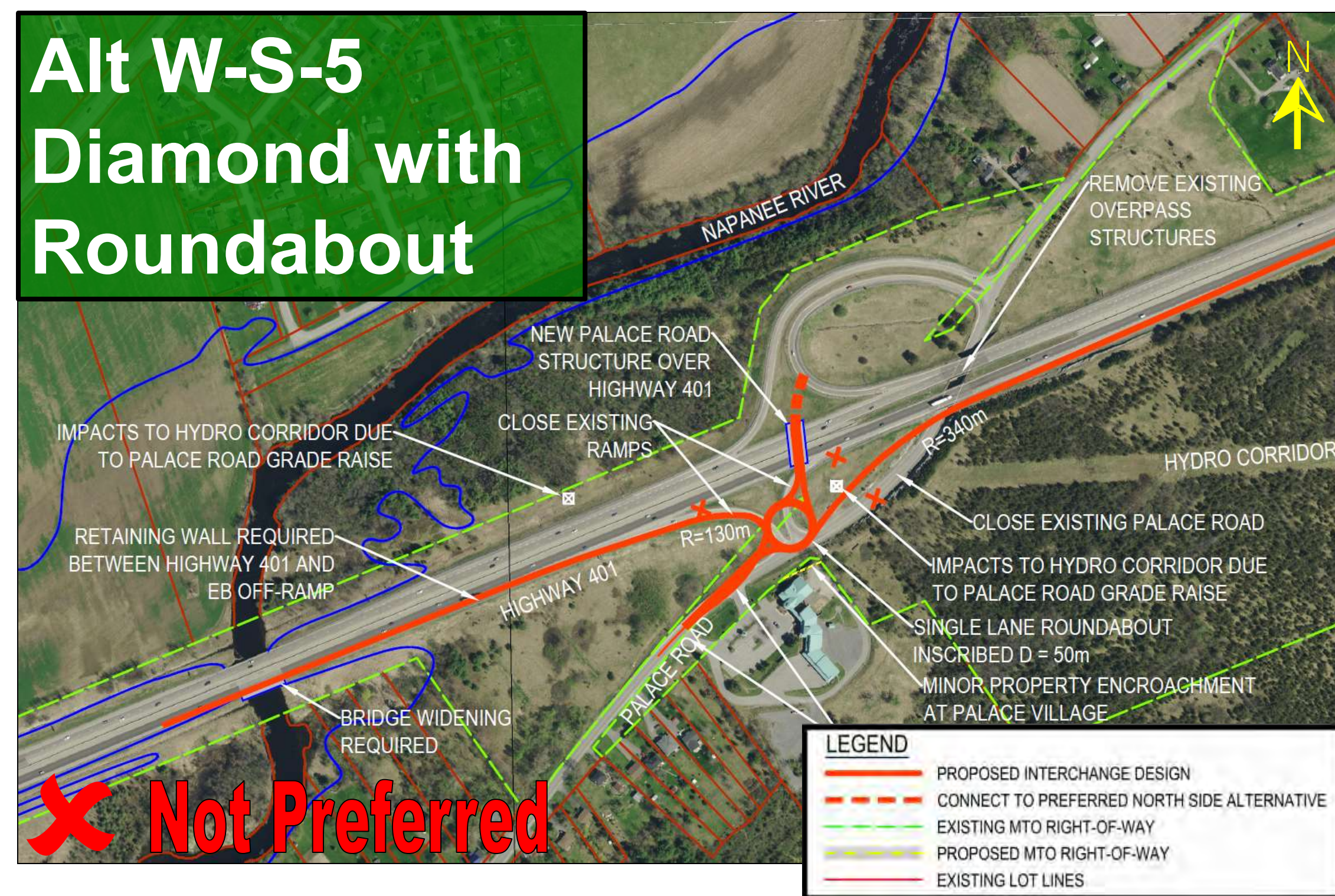
- Less than desirable turning sight distance at intersection (increased collision risk);
- Requires widening of Napanee River bridge (increased natural environment impacts)
- Impacts to existing hydro transmission corridor
- Minor impacts to residential and commercial driveways



Highway 401 Interchange Improvements at Palace Road

Short-List Alternatives (South Side – Westerly Realignment)

Alt W-S-5 Diamond with Roundabout



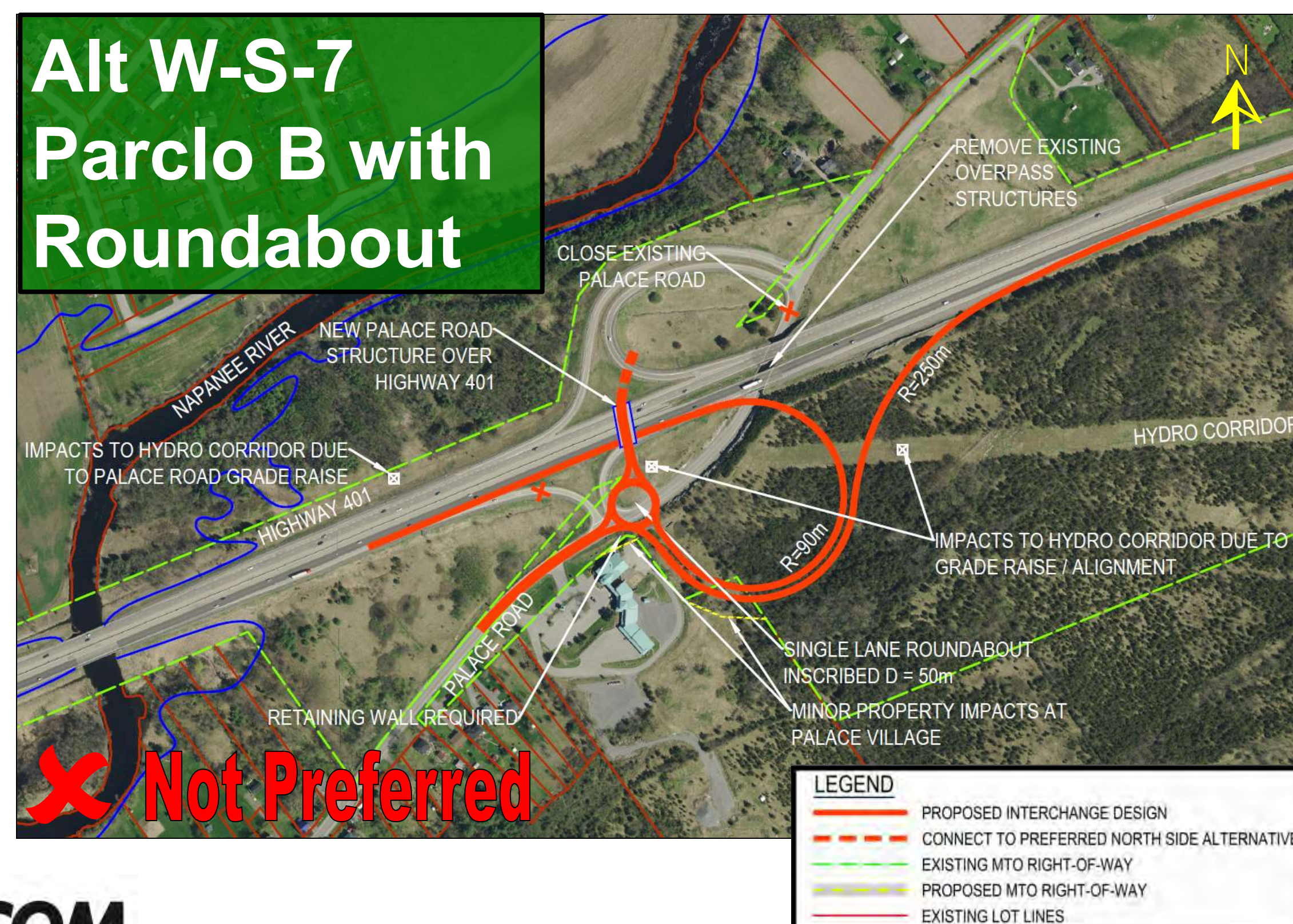
Alt W-S-5: Pros

- Roundabout eliminates direct left-turns which is anticipated to reduce severity of collisions;
- Avoids temporary widening of Palace Road structure and Highway 401 median cross-over;
- Reduced impacts to Highway 401 traffic operations during future bridge rehabilitations;

Alt W-S-5: Cons

- Unfamiliar configuration and less compatible for truck traffic;
- Requires widening of Napanee River bridge (increased natural environment impacts)
- Impacts to existing hydro transmission corridor
- Minor impacts to residential and commercial driveways

Alt W-S-7 Parclo B with Roundabout



Alt W-S-7: Pros

- Roundabout eliminates direct left-turns which is anticipated to reduce severity of collisions;
- Avoids temporary widening of Palace Road structure and Highway 401 median cross-over;
- Reduced impacts to Highway 401 traffic operations during future bridge rehabilitations;
- Lower construction cost than other options.

Alt W-S-7: Cons

- Unfamiliar configuration and less compatible for truck traffic;
- Less than desirable sight distance with off-ramp configuration approaching roundabout (increased collision risk);
- Impacts to existing hydro transmission corridor
- Minor impacts to residential and commercial driveways



Highway 401 Interchange Improvements at Palace Road

Short-List Alternatives (South Side)

Factor	Existing Alignment Alternatives			Westerly Realignment Alternatives			
	Alternative E-S-2 Buttonhook	Alternative E-S-4 Diamond	Alternative E-S-7 Parclo B	Alternative W-S-2 Buttonhook	Alternative W-S-4 Diamond	Alternative W-S-5 Diamond with Roundabout	Alternative W-S-7 Parclo B with Roundabout
Transportation							
Natural Environment							
Socio-Economic Environment							
Cultural Environment							
Cost							
Recommendation							

- Future rehabilitation of the new bridges along the existing alignment would have significant impacts to Highway 401 traffic operations compared to westerly alignment alternatives.
- Although the vertical grade raise of Palace Road with the westerly alternatives impacts the hydro transmission line and various other utilities, the staging and geometric advantages outweigh these impacts.
- Alt W-S-2 (Buttonhook) is considered the preferred interchange alternative as it has the best overall geometrics, while the other westerly alternatives having potential sight distance concerns at the intersection and less desirable or unconventional configurations.

Legend		
Highest Category Weighting		Lowest Category Weighting
Most Preferred Alternative		Least Preferred Alternative

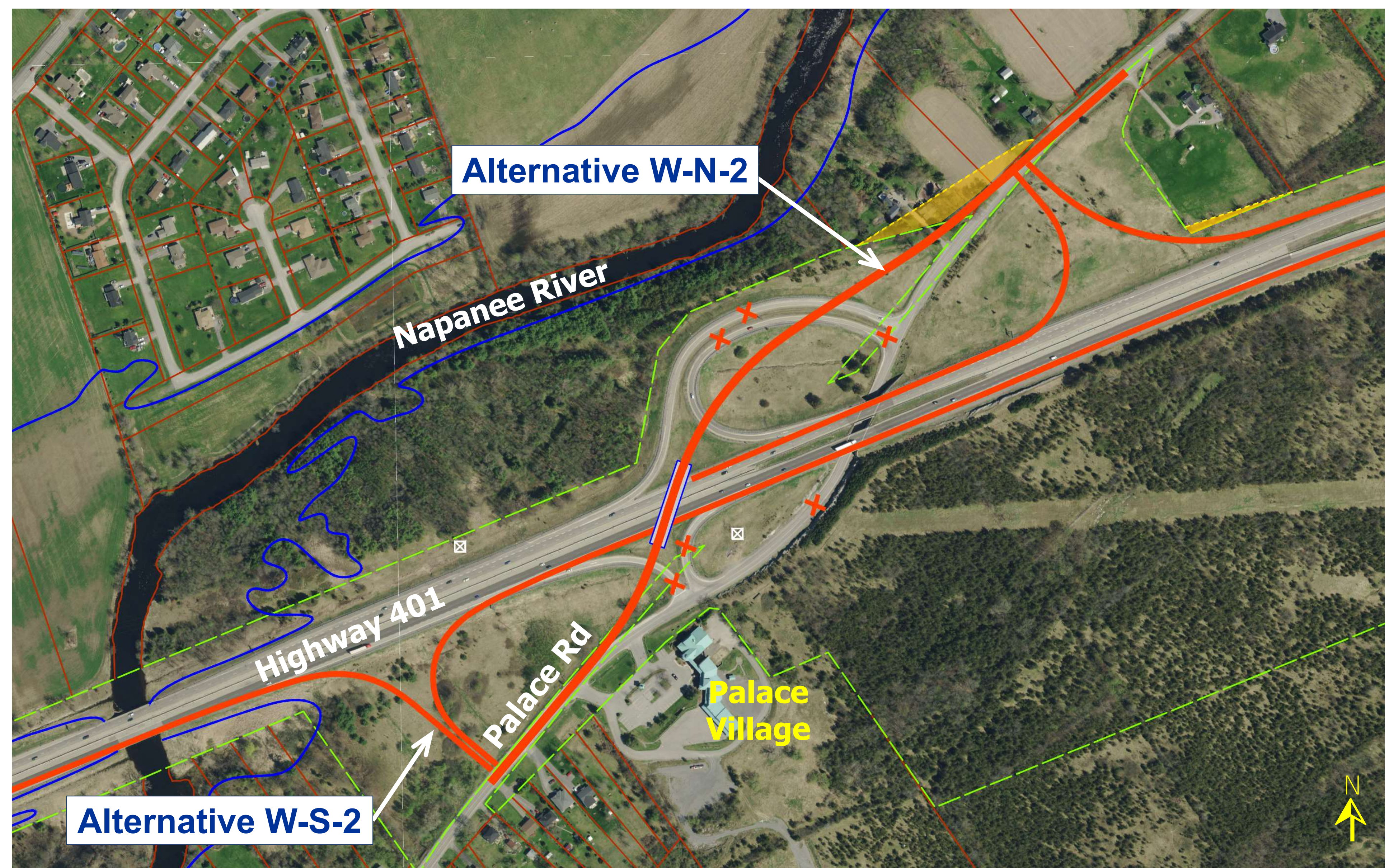


Highway 401 Interchange Improvements at Palace Road

Summary of Evaluation

Based on the evaluations of both the north and south sides, the **Technically Preferred Preliminary Design Alternatives** for the ultimate interchange are **Alternatives W-N-2** and **W-S-2** (Buttonhooks with Westerly Realignment):

- Westerly realignment alternatives (with a new bridge constructed over Highway 401) are preferred based on both short-term and long-term traffic staging impacts (avoid temporary widening of existing structure, and minimize future staging impacts to Highway 401 traffic);
- Alternatives W-N-2 and W-S-2 are preferred from a Transportation perspective, as they also allow existing ramps and Palace Road to remain fully open to traffic during construction (short-term closures only required);
- Alternatives W-N-2 and W-S-2 have the most desirable geometrics and improved sight distance, and lower environmental impacts than most other alternatives.



Palace Road Technically Preferred Alternative

Refer to the roll plans for additional details of the Technically Preferred Alternative.



Highway 401 Interchange Improvements at Palace Road

Construction Staging

- Construction of the new Palace Road structure over Highway 401 and removal of the existing bridges along Highway 401 is required in the short-term.
- In conjunction with the bridge works and to facilitate construction staging requirements, the new interchange ramps and Palace Road realignment identified as the preferred alternative will be constructed.
- A **conceptual construction staging strategy** has been developed to complete the above interchange works, as summarized on the following slide.
- Occasional night-time and/or weekend closures of existing interchange ramps, Palace Road and lane closures along Highway 401 will be required to complete the construction activities. Advance notification/signage of all closures will be provided.
- The staging strategy will be confirmed during a future Detail Design assignment in advance of construction, and notification will be provided to adjacent property and business owners at that time.



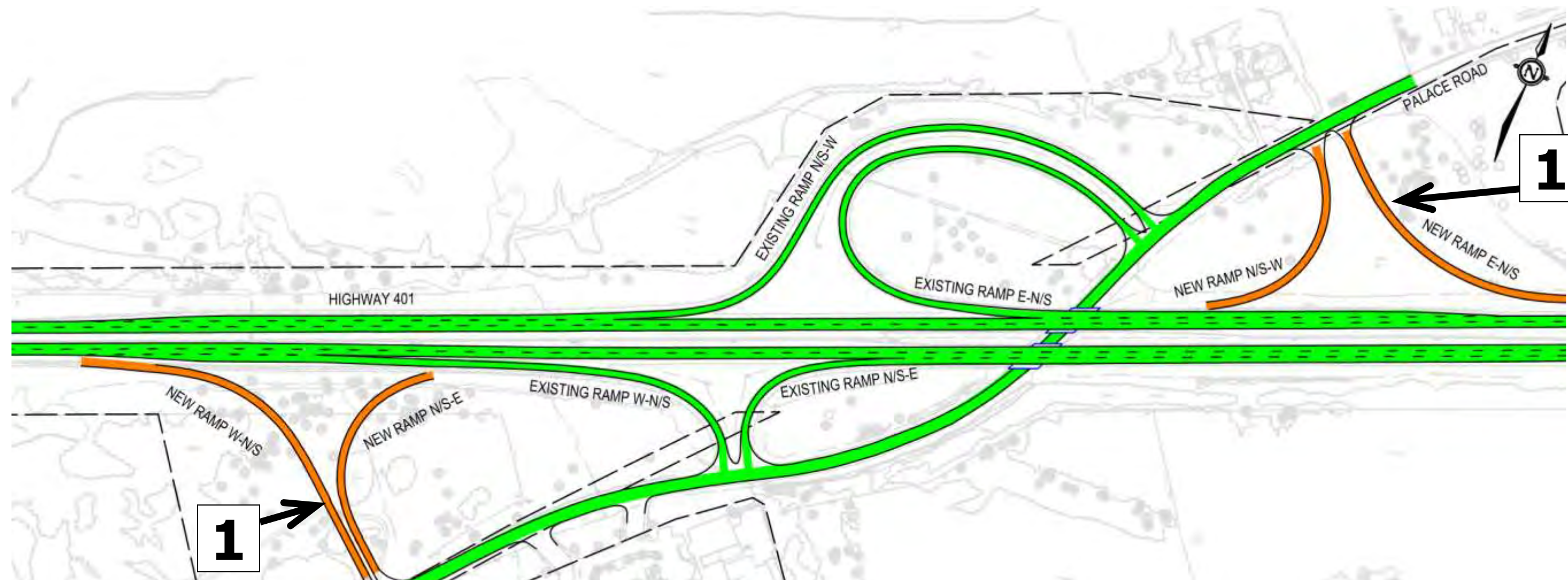


Highway 401 Interchange Improvements at Palace Road

Conceptual Construction Staging

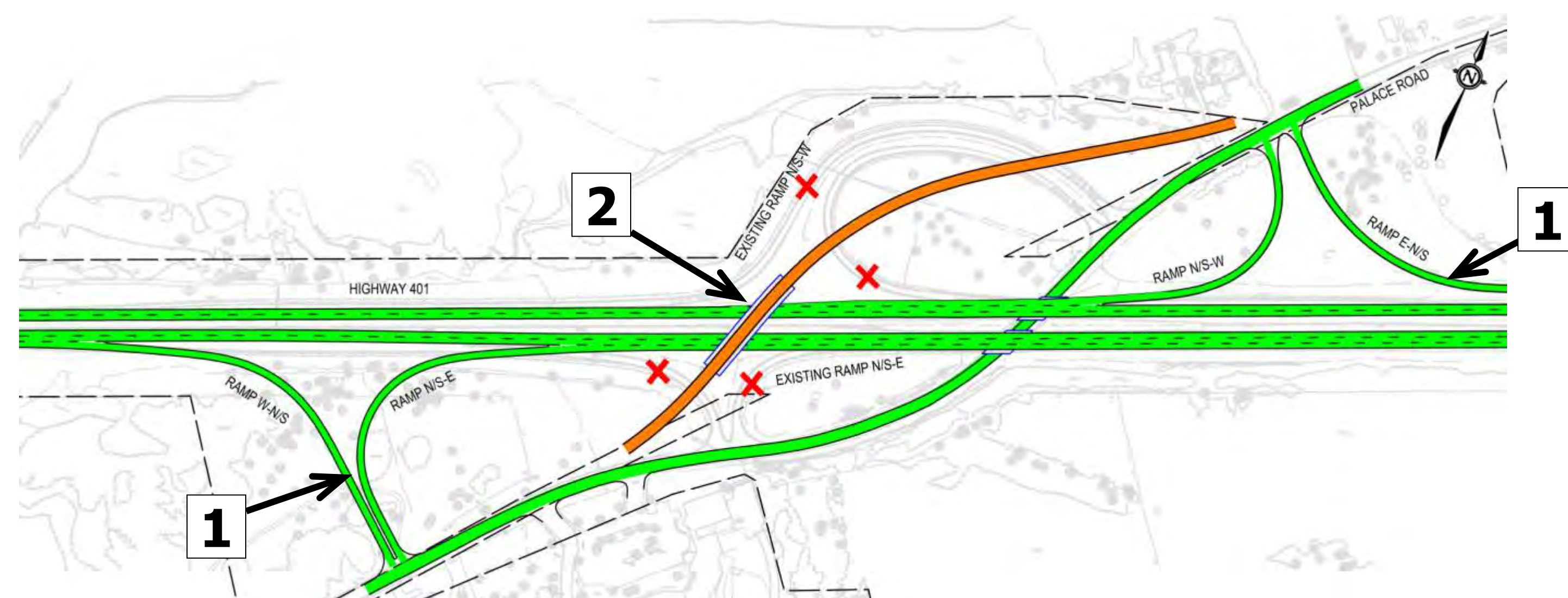
Stage 1

1. Construct new westbound and eastbound on and off-ramps.



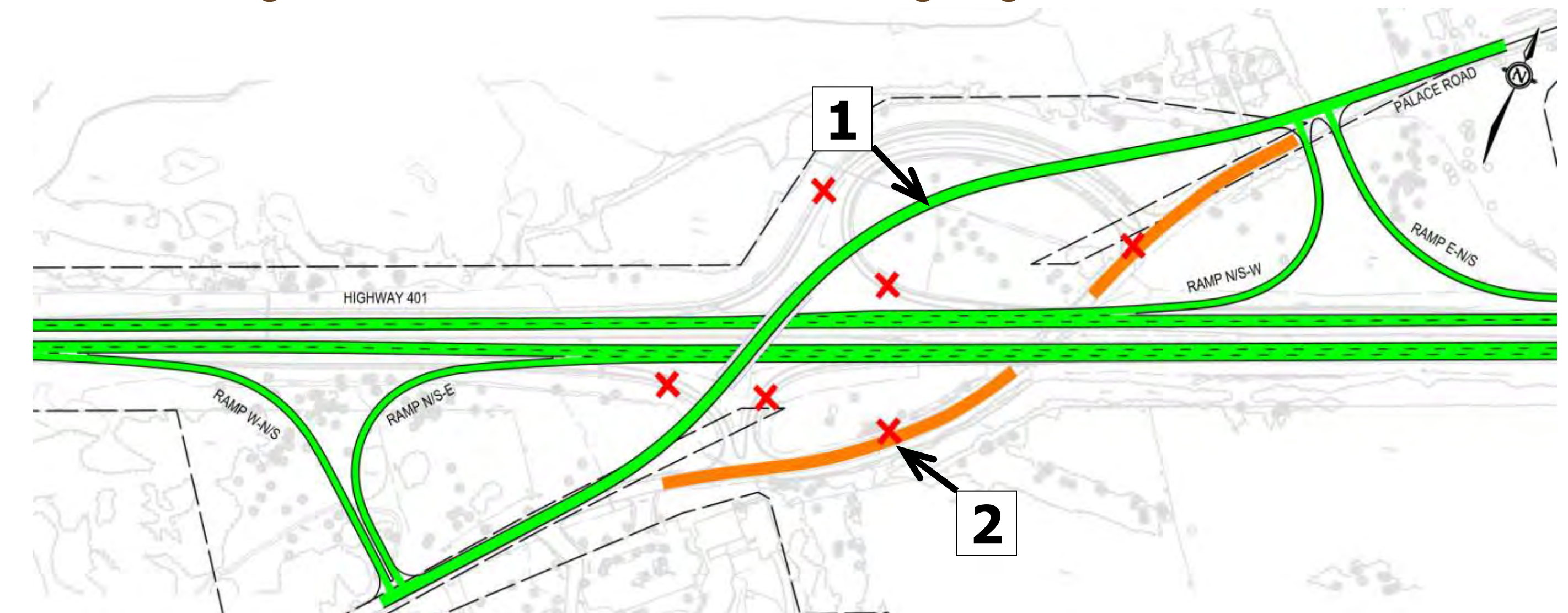
Stage 2

1. Shift traffic to new interchange ramps and close existing ramps;
2. Construct new Palace Road structure over Highway 401 and Palace Road realignment



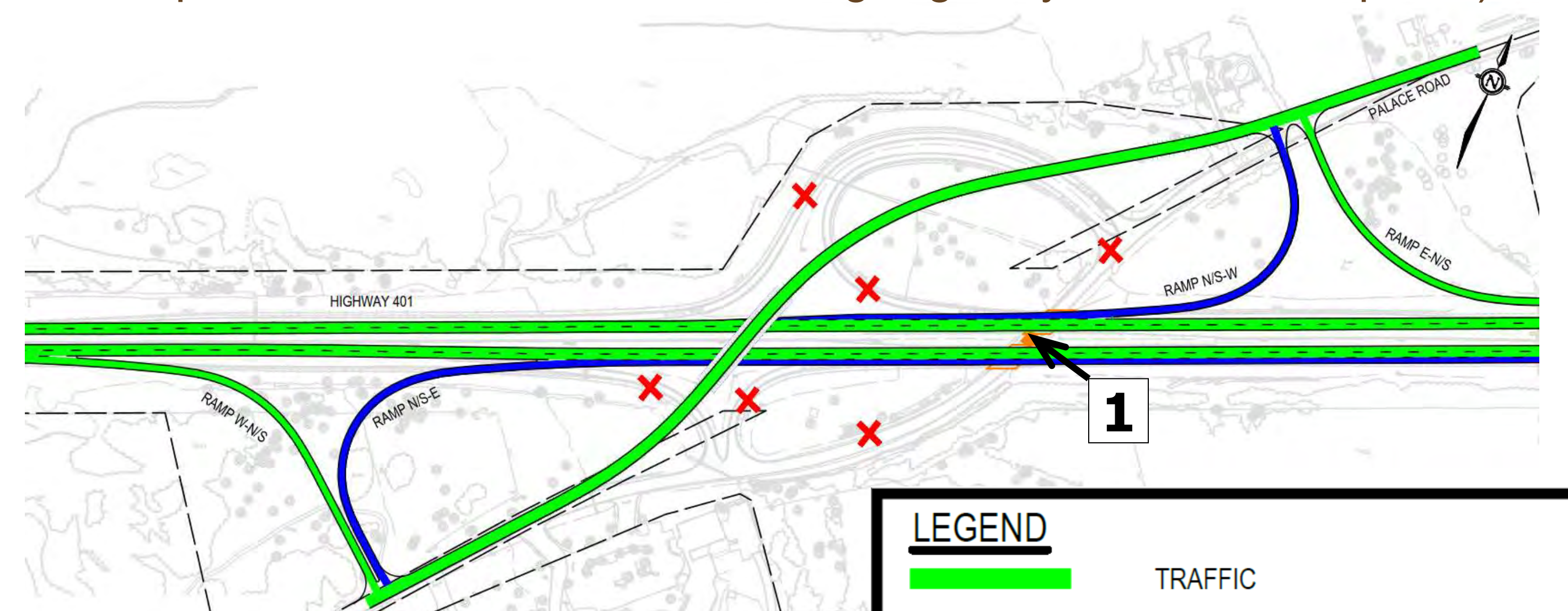
Stage 3A

1. Relocate traffic onto new Palace Road alignment and bridge over Highway 401, and close existing Palace Road;
2. Close existing Palace Road and fill in existing alignment.



Stage 3B

1. Remove existing Palace Road structures and complete fill-in work (night time and potential weekend closures along Highway 401 are anticipated).



LEGEND

- TRAFFIC
- UNDER CONSTRUCTION
- CONSTRUCTED, NO TRAFFIC
- EXISTING MTO RIGHT OF WAY
- X CLOSED / REMOVAL



Highway 401 Interchange Improvements at Palace Road

Other Improvements

Drainage

- Drainage concerns have been identified along Highway 401 within the Study Area;
- Modifications to the drainage layout at Palace Road will be required due to the interchange reconfiguration.

Illumination

- There is no existing illumination at Palace Road and Highway 401;
- As part of the recommended roadway improvements and structural work, new partial illumination will be provided for the interchange.



Existing Palace Road Underpass at Highway 401
without Illumination



Existing Drainage Outlet at Palace Road



Highway 401 Interchange Improvements at Palace Road

Proposed Mitigation Measures and Recommendations for Further Work

Factor	Proposed Mitigation & Commitment to Future Work
Terrestrial Environment	<ul style="list-style-type: none"> • Retain significant trees and shrubs where possible • Restore any disturbed areas with seeding, sodding, and landscaping • Additional species at risk surveys will be undertaken in detail design prior to construction • Invasive species management • Vegetation removals will not be undertaken during the Migratory Breeding Bird Timing window between April 15 and August 15 of any year in compliance with the <i>Migratory Bird Convention Act</i>
Fish and Fish Habitat	<ul style="list-style-type: none"> • Work at the Napanee River will occur between July 15 and March 15 to comply with the warmwater fisheries timing window • Erosion and sediment control measures will be implemented
Construction Noise	<ul style="list-style-type: none"> • Employ standard mitigation measures (i.e. mufflers, engine maintenance, etc.) and utilize municipal noise control by-law requirements during construction
Air Quality	<ul style="list-style-type: none"> • Employ standard mitigation measures and best management practices during construction (i.e. dust suppression, maintenance, etc.)
Groundwater	<ul style="list-style-type: none"> • Pre-construction well monitoring adjacent to proposed construction areas to be conducted.
Erosion & Sedimentation	<ul style="list-style-type: none"> • Employ standard mitigation measures and best management practices (i.e. seeding, erosion control blankets, location of stockpiling materials away from watercourses, etc.) • Sod and composted topsoil • Planting of slopes with shrubs for long term stability
Archaeological Resources	<ul style="list-style-type: none"> • Clear land of archaeological potential prior to construction
Utilities	<ul style="list-style-type: none"> • All utility impacts will be confirmed and utility relocations will be undertaken as required prior to construction
Out-of-Way Travel	<ul style="list-style-type: none"> • Potential interim lane closures and road closures during construction will be confirmed and notification will be provided to adjacent property and business owners • Emergency Services will be notified of all lane and road closures



Highway 401 Interchange Improvements at Palace Road

Next Step

The following activities will be undertaken following this PIC:

- Review the comments received at this PIC and respond to any questions.
- Incorporate any revisions where appropriate and finalize the preliminary design plans.
- Finalize mitigation measures to minimize or avoid potential environmental effects.
- Prepare and file the Transportation Environmental Study Report for public and agency review.
- Seek Environmental Assessment clearance.
- Detail Design and Construction to be completed as a future / separate study.

Consultation Throughout

(with First Nation & Métis Communities and all stakeholders – property owners, members of the public, municipalities, interest groups, agencies, etc.)



Thank you for attending.

Please feel free to ask questions and fill out a comment sheet before you leave.

If you have any accessibility requirements in order to participate in this project, please contact one of the Project Team members.



Highway 401 Interchange Improvements at Palace Road

Freedom of Information and Protection of Privacy Act

Comments and information regarding this study are being collected to assist the Ministry of Transportation in meeting the requirements of the *Environmental Assessment Act*. This material will be maintained on file for use during the study 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.

You are encouraged to contact members of the Project Team if you have any questions or concerns regarding the above information.

Appendix H – Terrestrial Ecosystems Existing Conditions and Impact Assessment Report

Ontario Ministry of Transportation (MTO)

Terrestrial Ecosystems Existing Conditions and Impact Assessment Report

*Highway 401 Interchange Improvements
at Palace Road - GWP 4197-13-00*

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Date: January, 2019

Project #: 60478166

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- may be based on information provided to AECOM which has not been independently verified;
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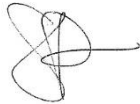


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1. Introduction

The Ontario Ministry of Transportation (MTO) has retained AECOM to undertake a Preliminary Design and Class Environmental Assessment Study (Group 'B' project) for improvements to the Highway 401 / Palace Road interchange (G.W.P. 4197-13-00). The project is located in the Town of Greater Napanee within the County of Lennox and Addington.

The primary focus of this study is to:

- Review the structural requirements (e.g., major rehabilitation or replacement) of the two Palace Road bridges;
- Identify interim and long-term interchange improvements to address geometric and operational concerns;
- Develop a preliminary design including a staging plan to allow the technically preferred structural works and interchange improvements to be implemented efficiently, minimizing construction costs, traffic disruption and future throwaway.

The operational improvements for the interchange are not expected to require widening of the Highway 401 bridge over the Napanee River to provide an extension to the eastbound off ramp and / or westbound on-ramp.

Minor rehabilitation was completed on both bridges in 2012, which was limited in scope due to limitations on construction staging imposed by Highway 401 lane restrictions. It is anticipated that a full replacement of the bridges will be required within the next 5 years.

The development of an ultimate plan for the Palace Road interchange allows for the necessary structural replacement works to be implemented efficiently and in a cost effective manner, minimizing future throwaway.

This project is being conducted in accordance with the approved environmental planning process for Group 'B' projects in accordance with the *Class Environmental Assessment for Provincial Transportation Facilities* (2000).

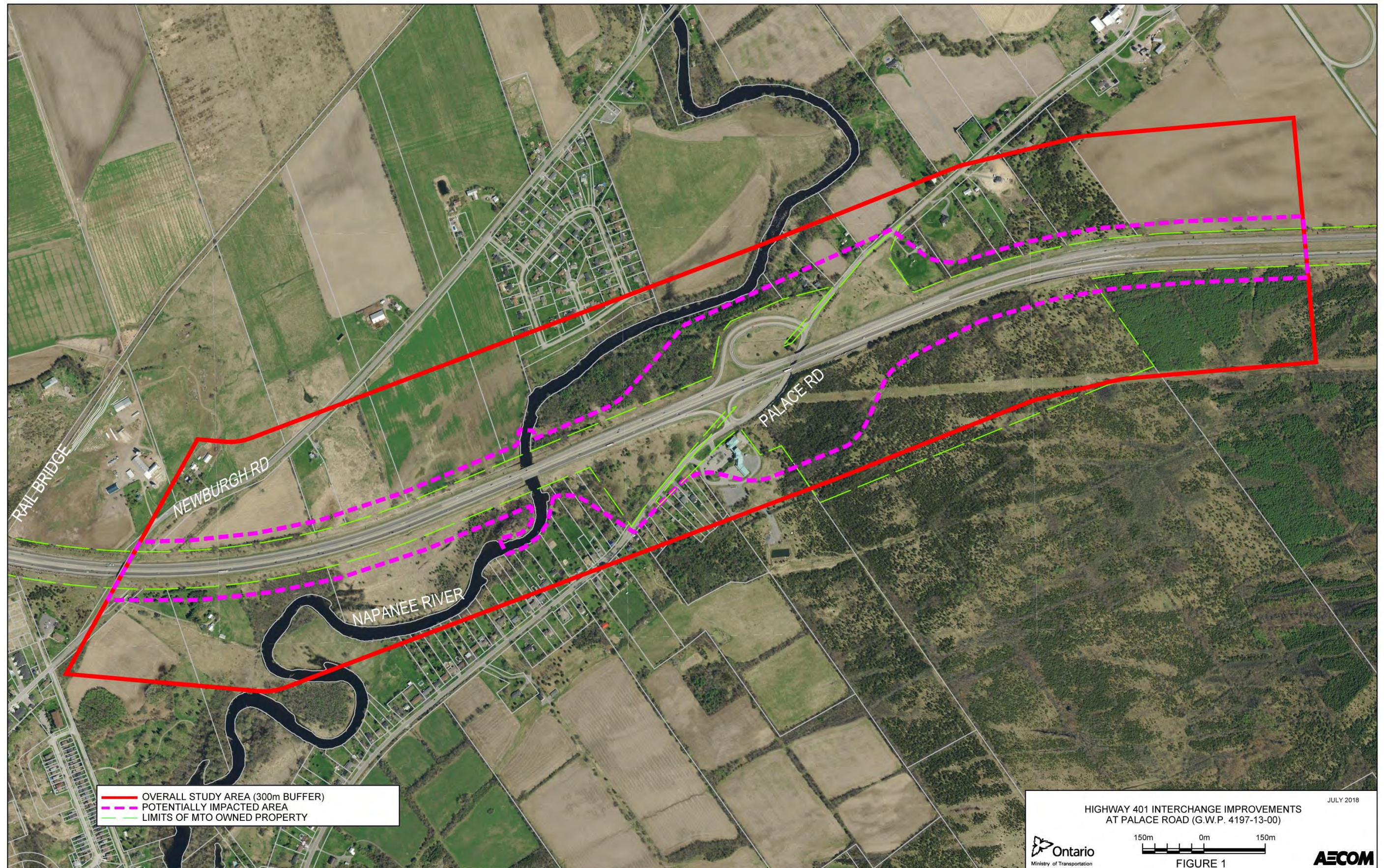
Concurrently, MTO is undertaking a separate Preliminary Design and Class Environmental Assessment Study for improvements to the Highway 401 interchange at County Road 41.

The Recommended Plan includes a westerly realignment of Palace Road and a new interchange configuration with new buttonhook ramps. As part of the realignment, Palace Road will cross over Highway 401 and the existing bridges will be removed. The new interchange ramps will require additional property in both the northeast and northwest quadrants.

The Overall Study Area for this project is 600 m in width, extending along Highway 401 from the Newburgh Road underpass easterly across the Napanee River to 1300 m east of the Palace Road bridges. The Potentially Impacted Area includes the right-of-way (ROW) and adjacent lands. In order to be consistent with the area examined for fish and fish habitat (with respect to riparian vegetation canopy and bank vegetation), the Potentially Impacted Area also extends along the Napanee River 50 m upstream and 200 m downstream of the Highway 401 / MTO ROW. **Figure 1** shows the Overall Study Area and the Potentially Impacted Area considered as part of this report.

This project is being conducted in accordance with the approved environmental planning process for Group 'B' projects in accordance with the *Class Environmental Assessment for Provincial Transportation Facilities* (2000).

Figure 1: Overall Study Area and Potentially Impacted Area



MTO is concurrently undertaking a separate Preliminary Design and Class Environmental Assessment Study for improvements to the Highway 401 interchange at County Road 41.

This 'Terrestrial Ecosystems Existing Conditions and Impact Assessment Report' has been prepared in accordance with the *MTO Environmental Reference for Highway Design* (2013) to provide a summary of the existing terrestrial ecosystem features within the Potentially Impacted Area based on a review of background information and up-to-date field investigations. This report also provides an assessment of impacts and proposed mitigation measures based on the proposed design.

1.1 Project Area and Surrounding Land Use

The Overall Study Area is represented by a mix of urban development and natural areas. The downtown core of Napanee is located southwest of the Highway 401 / Palace Road interchange.

Palace Road is a rural arterial according to the Lennox and Addington Official Plan. It is a two-lane road with a rural cross-section and has a posted speed limit of 60 km/hr in the Overall Study Area, which extends from the West-North/South ramp terminal to the East-North/South ramp terminal of the Highway 401 interchange.

Highway 401 (MacDonald-Cartier Freeway) is an access controlled highway which maintains a four lane cross-section throughout the Overall Study Area. The highway has a posted speed limit of 100 km/hr and is under the jurisdiction of the Ministry of Transportation. The highway connects Napanee to Kingston in the east and Belleville in the west.

2. Environmental Protection Requirements

The following sections outline the legislation, policies and regulations relevant to natural heritage features and functions as they relate to the proposed project.

Migratory Bird Convention Act, 1994

The federal *Migratory Birds Convention Act 1994* (MBCA) is applied through *The Regulations Respecting the Protection of Migratory Birds* that states that “[...] no person shall disturb, destroy or take a nest, egg [...] of a migratory bird.” This law protects all birds aside from the introduced species European Starling (*Sturnus vulgaris*), House Sparrow (*Passer domesticus*), and Rock Pigeon (*Columba livia*). Disturbance or destruction of migratory birds, nests and eggs during the course of construction and other related activities is referred to as “incidental take” and is illegal except under the authority of a permit obtained through the CWS (Canadian Wildlife Service).

In order to remain in compliance with the *Migratory Bird Convention Act* and *Fish and Wildlife Act 1997*, it is recommended that any vegetation removal that may be required take place outside of the breeding bird season for this region (April 15th to August 15th).

In most cases nest searches during the nesting season (April 15th to August 15th) are not recommended within complex habitats, as the ability to detect nests is largely low while the risk of disturbance to active nests is high. Disturbance increases the risk of nest predation and abandonment by adults. Therefore, nest searches are not recommended unless nests are known to be easily located without disturbing them.

As such, all vegetation clearing is recommended outside of the nesting period (April 15th to August 15th) to eliminate the need for nest searches and any potential impacts to nesting birds.

Provincial Policy Statement, 2014

The Provincial Policy Statement (PPS) sets the policy framework for regulating development and use of land and is issued under the authority of the *Planning Act*. The PPS provides direction on provincial matters of interest related to land use planning and development. The revised PPS came into effect on April 30, 2014 and applied to planning decisions made on or after that date. It replaces the Provincial Policy Statement, 2005.

The PPS states that the Province's natural heritage resources, water, agriculture lands, mineral resources, and cultural heritage and archaeological resources provide important environmental, economic and social benefits. The wise use and management of these resources over the long-term is a key provincial interest. Through the PPS, the Province wants to ensure that its resources are managed in a sustainable manner to protect essential ecological processes and public health and safety, minimizing environmental and social impacts to meet long-term needs. MTO considers (“has regard for”) the policies of the PPS in undertaking provincial highways planning but is not required to satisfy these policies as they are directed towards land use planning and development.

Section 1.6.6 of the PPS notes that “when planning for corridors and rights-of-ways for significant transportation infrastructure facilities, consideration will be given to the significant resources in Section 2.0: Wise Use and Management of Resources”. Section 2.0 of the PPS outlines the significant resources including wetland, woodlands, valleylands and wildlife habitat.

The Natural Heritage Reference Manual (2010) was developed to provide technical guidance for implementing the natural heritage policies of the PPS (2005).

The PPS identified several types of natural heritage features to be protected:

1. Significant habitat of endangered and threatened species
2. Significant wetlands in Ecoregions 5E, 6E and 7E1
3. Significant coastal wetlands
4. Significant wetlands in the Canadian Shield north of Ecoregions 5E, 6E and 7E
5. Significant woodlands south and east of the Canadian Shield
6. Significant valleylands south and east of the Canadian Shield
7. Significant wildlife habitat
8. Significant areas of natural and scientific interest

Endangered Species Act, 2007

Ontario contains over 200 flora and fauna species that are at risk. Species at Risk (SAR) are classified into one of four levels of risk (extirpated, endangered, threatened, special concern) through science-based assessment via the Committee on the Status of Species at Risk in Ontario (CASSARO); classification is based on best-available science and Aboriginal Traditional Knowledge. Species classified as Threatened or Endangered on the Species at Risk in Ontario list are then afforded protection under the *Endangered Species Act (ESA)* (2007).

SAR listed as threatened or endangered under the *ESA 2007* are provided both species and habitat protection. It is stated in Sections 9 and 10 of the Act that “*no person shall kill, harm, harass, capture or take a living member or shall damage or destroy the habitat of a species that is listed on the Species at Risk in Ontario List as an extirpated, endangered or threatened.*”

Protection for SAR and their habitats is provided under the *ESA 2007* by restricting activities that may affect them. Where a proposed activity will impact protected species or habitat, changes to timing, location and methods of the proposed activity should be considered, wherever feasible, to avoid impacts to SAR. Where impacts cannot be avoided or mitigated, a permit process can be entered into. The Ministry of Natural Resources and Forestry (MNRF) may grant a permit, or other authorization, for activities that would otherwise not be allowable under the Act. Several permit types are available, depending on the nature of the proposed work and may include conditions for the activity to meet with aid in protection or recovery of the targeted SAR.

Activities which would typically contravene the *ESA 2007* are exempt from the standard permitting process, for certain SAR and their habitat. For the specified species and under certain conditions a Notice of Activity (NOA) form is required to be submitted to the Minister prior to undertaking the activities. In addition to the NOA, a mitigation and compensation plan may also be required. The SAR and SAR habitat eligible under the exemption are identified in *O. Reg. 176/13* along with their species specific mitigation and compensation requirements.

3. Background Information

Prior to field investigations, a background review was completed to obtain information on known natural heritage features and species records within the Overall Study Area. Results of the background information review are discussed as part **Section 4** below. A copy of agency correspondence can be found in **Appendix A**.

Background information was obtained from the following sources:

- Ministry of Transportation Eastern Region (2011). Environmental Screening Document - Palace Road Overpass Rehabilitation, Hwy 401 Town of Greater Napanee, County of Lennox & Addington – W.P. 98-99-00 & W.P. 99-99-00;
- Personal communications with Tim Trustham – Planner/Ecologist - Quinte Conservation Authority on March 30, 2016;
- Personal communications with Catherine Warren – A/District Planner, Peterborough District – Ministry of Natural Resources and Forestry (MNRF) on March 16, 2016;
- MNRF Natural Resources and Values Information System (NRVIS) mapping (2016);
- MNRF Natural Heritage Information Centre (NHIC) Make a Map feature (MNRF, 2016a);
- Atlas of Breeding Birds of Ontario Point Count Records;
- Bat Conservation International (BCI) Species Profiles (2017);
- The Official Plan of the Town of Greater Napanee (2014); and
- Aerial photography.

4. Field Investigations

In order to acquire up-to-date information on the existing terrestrial ecosystems within the Overall Study Area, field investigations were conducted on June 2 and 3 and October 4 and 5, 2016 by AECOM ecologists. Field investigations were completed in accordance with the *Environmental Reference Guide for Highway Design* (2013) to supplement available background information as described in **Section 2** above.

Field investigations were undertaken for the Potentially Impacted Area, where access was granted shown in **Figure 1**. The majority of this area is highway ROW and MTO-owned land. Aerial interpretation was used to determine the vegetation communities located outside of the ROW. A representative photographic log list is provided in **Appendix B**. Based on aerial interpretation, the Overall Study Area is largely represented by an agricultural and cultural landscape.

Field investigations included the following:

- Vegetation community mapping, including dominant species associations, using the Ecological Land Classification (ELC) system for southern Ontario to Ecosite or Vegetation Type;
- Location of wetland boundaries relevant to the proposed undertaking;
- List of plant species observed;
- List of wildlife species observed, and evidence of wildlife habitat on man-made structures including direct observation and incidental evidence;
- Location and species of any bird nests on, under or in any structure or individual trees likely to be affected by construction;
- Assessment of habitat potential based on wildlife observations and site conditions;
- Location of any species of conservation concern, or SAR or their habitat; and
- Evidence of groundwater upwelling and high groundwater table.

The delineation of vegetation community boundaries for the Potentially Impacted Area was based on field investigations and aerial photograph interpretation. Vegetation communities were classified using the *Ecological Land Classification (ELC) Manual for Southern Ontario* (Lee *et al.*, 1998). Floral species lists were compiled for the Potentially Impacted Area.

Incidental wildlife observations were recorded during all field investigations. Incidental observations noted include species sightings, tracks, scat, as well as any other wildlife activity.

5. Existing Conditions

5.1 Physiography, Geology and Soils

The Overall Study Area is located in Lake Simcoe-Rideau (Ecoregion 6E), which is part of the Mixedwood Plains Ecozone. This Ecoregion extends from Lake Huron in the west to the Ottawa River in the east and is the considered the second most densely populated ecoregion in Ontario. The surface is gently undulating to rolling terrain of ice-laid materials deeply covering bedrock. Mineral materials represent more than 95% of substrates within this ecoregion. Forests within this ecoregion are diverse. Upland sites typically dominated by Sugar Maple (*Acer saccharum*), American Beech (*Fagus grandifolia*), White Ash (*Fraxinus americana*) and Eastern Hemlock (*Tsuga canadensis*) while lowland forests are often represented by Green Ash (*Fraxinus pennsylvanica*), Silver Maple (*Acer saccharinum*), Red Maple (*Acer rubrum*), Eastern White Cedar (*Thuja occidentalis*), Yellow Birch (*Betula allegheniensis*), Balsam Fir (*Abies balsamea*) and Black Ash (*Fraxinus nigra*) (Crins et al. 2009).

5.2 Significant Features

Areas of Natural and Scientific Interest

An Area of Natural and Scientific Interest (ANSI) is defined as an area of land and/or water containing natural landscapes or features that have been scientifically identified (by the OMNR) as having life science or earth science values related to protection, scientific study or education (MNRF, 2014b). ANSIs are designated as earth science (geological) or life science (biological) depending on the features present (MNRF, 2014b). The background information review of the *MNRF Make-a-Map: Natural Heritage Areas Application* (MNRF, 2014a), indicated that there are no designated ANSI's located within the Overall Study Area.

Provincially and Locally Significant Wetlands

Wetlands are described as lands that are seasonally or permanently flooded by shallow water, as well as lands where the water table is close to the surface and present an abundance of water that has caused the formation of hydric soil, which supports primarily hydrophytic or water tolerant plants (MNRF, 2013). The MNRF evaluates the significance of wetlands through the Ontario Wetland Evaluation System (OWES). This evaluation system uses a scoring system to assign values to four principal components of the wetland, which are the biological, social, hydrological, and special features. Based on the resulting score of an evaluation, an evaluated wetland can fall into one of two classes: Provincially Significant or Locally Significant (MNRF, 2013). According to the background information review of the *MNRF Make-a-Map: Natural Heritage Areas Application* (MNRF, 2014a), there are no Provincially or Locally Significant Wetlands located within the Overall Study Area; however, there are areas of unevaluated wetland within the Overall Study Area located south of Highway 401 west of the Napanee River, and north of Highway 401 east of the Napanee River.

Environmental Protection Areas

The Official Plan of the Town of Greater Napanee applies the Environmental Protection designation to ANSIs, Provincially or non-provincially or locally significant wetlands, significant habitat of endangered and threatened species, fish habitat and lands having inherent environmental hazard, such as poor drainage, organic soils, steep slopes karstic conditions or that are subject to flooding and/or erosion. Within the Overall Study Area, the Napanee River and its riparian area are designated Environmental Protection on Schedule C of the Official Plan.

5.3 Vegetation

The majority of the Potentially Impacted Area was comprised of Cultural Meadow (CUM1), with Mixed Forest (FOM), Deciduous Forest (FOD) and Coniferous Plantation (CUP3) communities adjacent to the ROW on the northwest, southwest and eastern limits, respectively. ELC mapping for the Potentially Impacted Area is provided in **Figure 2**. A list of vascular plant species recorded is provided in **Appendix C**.

Vegetation composition within the ROW north and south of Highway 401, as well as locations between the entrance and exit ramps, was represented by a Mineral Cultural Meadow (CUM1) and appeared to be periodically maintained (i.e., mowed). These areas were dominated by several common grass and forb species including Reed Canary Grass (*Phalaris arundinacea*), Timothy (*Phleum pratense*), Awnless Brome (*Bromus inermis* ssp. *inermis*), sedges (*Carex* species), Goldenrod (*Solidago* sp.), Wild Carrot (*Daucus carota*) and Cow Vetch (*Vicia cracca*). Trees and shrubs included Norway Maple (*Acer platanoides*), Austrian Pine (*Pinus nigra*), Common Buckthorn (*Rhamnus cathartica*), Sweetbriar (*Rosa rubiginosa*), Gray Dogwood (*Cornus racemosa*) and Choke Cherry (*Prunus virginiana*). A Mixed Forest (FOM) community was found to exist north of Highway 401, west of Palace Road and south of the Napanee River. Tree and shrub species noted included Basswood (*Tilia americana*), White Ash, Austrian Pine, Spruce (*Picea* sp.), Common Buckthorn and Honeysuckle (*Lonicera* sp.).

A Coniferous Plantation community (CUP3) was identified south of Highway 401, east of Palace Road. The canopy was dominated by coniferous tree species such as Austrian Pine, Eastern White Pine (*Pinus strobus*) and Eastern Red Cedar (*Juniperus virginiana*), as well as White Ash, Common Apple (*Malus pumila*) with Choke Cherry in the understorey. A Cultural Meadow (CUM) community was found to represent the hydro corridor within the Cultural Plantation.

A Deciduous Forest community (FOD) was found to exist southwest of Highway 401, along the western limits of the Potentially Impacted Area. The canopy was dominated by deciduous tree species such as Manitoba Maple (*Acer negundo*), Norway Maple (*Acer platanoides*), White Ash and Austrian Pine, with Common Buckthorn in the understorey.

As noted above, not all lands within the Potentially Impacted Area could be accessed and, as such, ELC for such areas were determined based on aerial interpretation. These lands were predominately represented by agricultural fields, anthropogenic lands (landscaped) and cultural meadow communities, and deciduous communities.

Please refer to **Figure 2** for a detailed map of the vegetation communities identified above.

5.4 Wildlife

No incidental wildlife was observed during the 2016 field investigations. Nest searches were conducted at the two Highway 401 overpass structures at Palace Road and the bridge structure at the Napanee River. No nests were found on these bridges.

The Overall Study Area provides suitable habitat for a variety of wildlife species. Although the existing Highway 401 presents a barrier to wildlife movement, it is likely that the Napanee River provides some opportunity for wildlife movement under the existing Highway.

According to the Atlas of the Mammals of Ontario (Dobbyn, 1966), a total of 23 common mammal species have been recorded within 10 x 10 km UTM block 18QU40 that encompasses the Overall Study area. **Table 1** below provides a summary of these species and their *ESA 2007* status. The Little Brown Bat (*Myotis lucifugus*) identified in this background review is listed as Endangered in Ontario and will be further discussed in **Section 5.5** below.

Figure 2: Ecological Land Classification Mapping

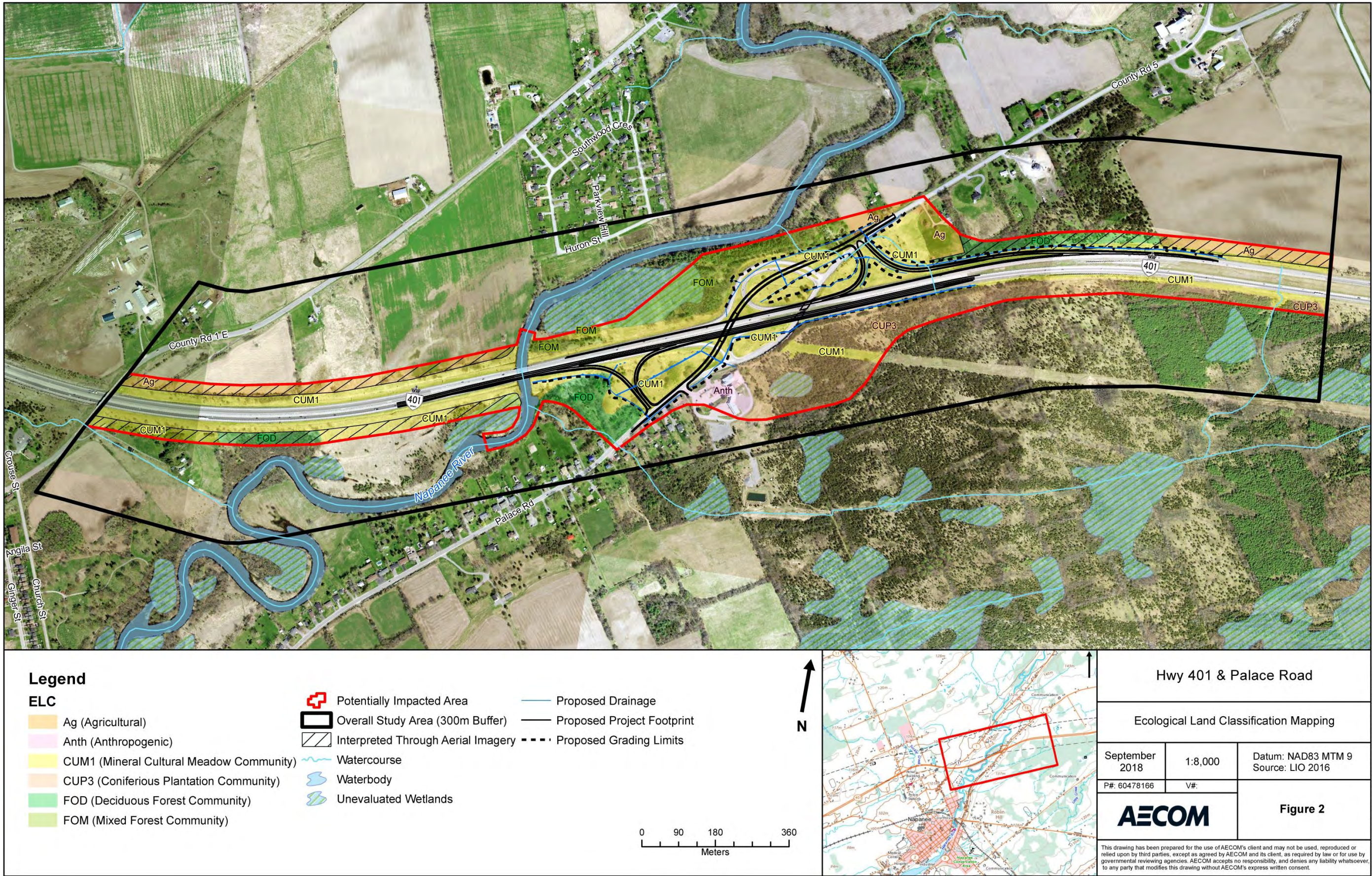


Table 1: Atlas of the Mammals of Ontario Records

Common Name	Scientific Name	ESA Status
Virginia Opossum	<i>Dedelpis virginiana</i>	-
Common Shrew	<i>Sorex cinereus</i>	-
Northern Short-tailed Shrew	<i>Blarina brevicauda</i>	-
Star-nosed Mole	<i>Condylura cristata</i>	-
Little Brown Bat	<i>Myotis lucifugus</i>	END
Big Brown Bat	<i>Eptesicus fuscus</i>	-
Eastern Red Bat	<i>Lasiurus borealis</i>	-
Hoary Bat	<i>Lasiurus cinereus</i>	-
Eastern Cottontail	<i>Sylvilagus floridanus</i>	-
Snowshoe Hare	<i>Lepus americanus</i>	-
Eastern Chipmunk	<i>Tamias striatus</i>	-
Woodchuck	<i>Marmota monax</i>	-
Gray Squirrel	<i>Sciurus carolinensis</i>	-
Red Squirrel	<i>Tamiasciurus hudsonicus</i>	-
Northern Flying Squirrel	<i>Glaucomys sabrinus</i>	-
White-footed Mouse	<i>Peromyscus leucopus</i>	-
Deer Mouse	<i>Peromyscus maniculatus</i>	-
Meadow Vole	<i>Microtus pennsylvanicus</i>	-
Muskrat	<i>Ondatra zibethicus</i>	-
Norway Rat	<i>Rattus norvegicus</i>	-
House Mouse	<i>Mus musculus</i>	-
Porcupine	<i>Erethizon dosatum</i>	-
Beaver	<i>Castor Canadensis</i>	-

5.5 Species at Risk

There were no SAR observed within the Potentially Impacted Area during the 2016 field investigations; however, based on a review of background information, there is potential for a number of SAR to occur within the Overall Study Area.

As stated in **Section 5.4**, the Little Brown Bat was identified as potentially occurring within the Overall Study Area during background review. It should also be noted that three other bat species have recently been uplisted to the Species at Risk Ontario List including Eastern Small-footed Myotis (*Myotis leibii*), Tri-colored Bat (*Perimyotis subflavus*) and Northern Myotis (*Myotis septentrionalis*). These species may find suitable habitat within the FOD and FOM communities in the Potentially Impacted Area.

According to the Ontario Breeding Bird Atlas (hereafter OBBA; BSC, *et al.* 2006), a total of 107 bird species have been recorded within the in 10 x 10 km UTM block 18QU40 that encompasses the Overall Study Area. The OBBA has records of 10 bird SAR, either confirmed or possibly breeding in the Overall Study Area. **Table 2** below provides a summary of these bird species and their *ESA 2007* status.

Table 2: OBBA Bird Species at Risk Records

Common Name	Scientific Name	ESA Status	Habitat Potential
Bank Swallow	<i>Riparia riparia</i>	Threatened	No suitable habitat present
Barn Swallow	<i>Hirundo rustica</i>	Threatened	Foraging habitat present
Bobolink	<i>Dolichonyx oryzivorus</i>	Threatened	Suitable habitat present
Chimney Swift	<i>Chaetura pelagica</i>	Threatened	Foraging habitat present
Common Nighthawk	<i>Chordeiles minor</i>	Special Concern	Suitable habitat present
Eastern Meadowlark	<i>Sturnella magna</i>	Threatened	Suitable habitat present
Eastern Wood-Pewee	<i>Contopus virens</i>	Special Concern	Suitable habitat present

Table 2: OBBA Bird Species at Risk Records

Common Name	Scientific Name	ESA Status	Habitat Potential
Loggerhead Shrike	<i>Lanius ludovicianus</i>	Endangered	Suitable habitat present
Eastern Whip-poor-will	<i>Caprimulgus vociferous</i>	Threatened	Suitable habitat present
Wood Thrush	<i>Hylocichla mustelina</i>	Special Concern	Suitable habitat present

According to the species range map provided by BCI (2017), the Overall Study Area encompasses the ranges of the four bat species, which are listed as Endangered on the Species at Risk in Ontario List: Little Brown Myotis, Northern Myotis (*Myotis septentrionalis*), Eastern Small-footed Myotis (*Myotis leibii*) and Tri-Colored Bat (*Perimyotis subflavus*). **Table 3** below provides a summary of these bats SAR and their *ESA 2007* status.

Table 3: Bat Species with Ranges that overlap the Study Area (BCI)

Common Name	Scientific Name	ESA Status	Habitat Potential
Little Brown Myotis	<i>Myotis lucifugus</i>	Endangered	Suitable habitat present
Northern Myotis	<i>Myotis septentrionalis</i>	Endangered	Suitable habitat present
Eastern Small-footed Myotis	<i>Myotis leibii</i>	Endangered	Suitable habitat present
Tri-Colored Bat	<i>Perimyotis subflavus</i>	Endangered	Suitable habitat present

An information request was sent to the MNRF Peterborough District on March 15, 2016 asking for identification of any SAR records within the Overall Study Area. A response from the MNRF was given on March 16, 2016 and indicated the following SAR in **Table 4** as potentially occurring within or in the vicinity the Overall Study Area.

Table 4: MNRF Species at Risk Consultation Results

Common Name	Scientific Name	ESA Status	Habitat Potential
Eastern Musk Turtle	<i>Sternotherus odouratus</i>	Threatened	Suitable habitat present
Four-leaved Milkweed	<i>Asclepias quadrifolia</i>	Endangered	No suitable habitat present
Northern Map Turtle	<i>Graptemys geographica</i>	Special Concern	Suitable habitat present
Ogden's Pondweed	<i>Potamogeton ogdenii</i>	Endangered	No suitable habitat present
Snapping Turtle	<i>Chelydra serpentina</i>	Special Concern	Suitable habitat present

A total of 19 SAR were identified as having potential to occur within or in the vicinity of the Overall Study Area based on the review of background information from the OBBA, the Atlas of the Mammals of Ontario, Bat Conservation International and through consultation with the MNRF. It should be noted that the MNRF had identified the potential for Eastern Milksnake (*Lampropeltis triangulum*) within the Overall Study Area. At the time, Eastern Milksnake was listed as a Species of Special Concern; however, this species was removed from the SAR in Ontario (SARO) list in June 2016.

An assessment was completed to determine the presence of suitable habitat for each SAR identified during background review. This assessment was completed using aerial photo interpretation to delineate habitat communities in the Overall Study Area and was further refined after ELC community delineation during field investigations. **Appendix D** provides a habitat assessment of each of the 19 SAR, including their habitat preferences and assessment of potential occurrence in the Overall Study Area.

Bank Swallow (*Riparia riparia*) [source: OBBA records] – This species is listed as Threatened in Ontario. Bank Swallows nest in erodible soils on vertical or near-vertical banks and bluffs in lowland areas that are dominated by rivers, streams, lakes, and oceans (MNRF, 2016b). Through the background information review of the OBBA, Bank Swallow were identified to occur within the OBBA survey square 18QU40 which encompasses the Overall Study Area. During the field investigations, no vertical faces in silt and sand deposits were identified for nesting along the Napanee River; as such, no suitable habitat for the Bank Swallow was observed within in the Potentially Impacted Area.

Barn Swallow (*Hirundo rustica*) [source: OBBA records] – This species is listed as Threatened in Ontario. Barn Swallows occur in close association with human-made structures, building their cup-shaped mud nests almost exclusively on structures such as open barns, under bridges and in culverts (MNRF, 2016c). Potentially suitable habitat (i.e., bridges) was present within the Potentially Impacted Area. However, visual nest surveys were conducted during field investigations and no nests were observed on any of the structures within the Potentially Impacted Area.

Bobolink (*Dolichonyx oryzivorus*) [source: OBBA records] – This species is listed as Threatened in Ontario. Bobolink utilizes large, open expansive grasslands with dense ground cover; hayfields, meadows or fallow fields; marshes (MNRF, 2016d). Bobolink prefers larger grasslands, generally greater than 10 ha in size (McCracken et al. 2013). Cultural Meadow (CUM1) communities represent a large portion of the Potentially Impacted Area, while agricultural land exists within the Potentially Impacted Area. As such, suitable habitat may exist within the Potentially Impacted Area.

Chimney Swift (*Chaetura pelagica*) [source: OBBA records] – This species is listed as Threatened in Ontario. Chimney Swifts are found in and around urban settlements where they nest and roost in chimneys and other manmade structures (MNRF, 2016e). Based on the results of the habitat assessment there is no suitable habitat for the Chimney Swift within the Potentially Impacted Area and the species is unlikely to occur.

Common Nighthawk (*Chordeiles minor*) [source: OBBA records] – This species is listed as Special Concern in Ontario. Common Nighthawk is usually found in open areas with little to no ground vegetation, such as logged or burned-over areas, forest clearings, rock barrens, peat bogs, lakeshores, and mine tailings. The species may also nests in cultivated fields, orchards, urban parks, mine tailings and along gravel roads and railways but generally prefer natural areas (MNRF 2016f). Suitable habitat may exist within the Potentially Impacted Area.

Eastern Meadowlark (*Sturnella magna*) [source: OBBA records] – This species is listed as Threatened in Ontario. Eastern Meadowlark utilizes native grasslands, savannah, old fields, hayfields, lightly grazed pastures, weedy meadows, fields with occasional shrubs. Eastern Meadowlark requires a core habitat of at least 5 ha and can be negatively impacted by habitat fragmentation (COSEWIC, 2011). Cultural Meadow (CUM1) communities were common within the Potentially Impacted Area and may provide suitable habitat

Eastern Musk Turtle (*Sternotherus odouratus*) [source: MNRF consultation] – This species is listed as Threatened in Ontario. The Eastern Musk Turtle utilizes ponds, lakes, marshes and rivers that are generally slow-moving have abundant emergent vegetation and muddy bottoms that they burrow into for winter hibernation (MNRF, 2016g). The Napanee River presents potential habitat within the Potentially Impacted Area.

Eastern Small-footed Myotis (*Myotis leibii*) [source: Bat Conservation International] – Eastern Small-Footed Myotis roosts in a variety of habitats, including under rocks and bridges and in rock outcrops, caves, mines, and hollow trees. Individuals may change their roosting location daily. Along with other bat species, the Eastern Small-footed Myotis swarming occurs at or near their hibernacula (NatureServe, 2016). This species hibernates in caves and abandoned mines, preferring colder, drier sites and showing strong hibernation site fidelity. This species was recently emergency listed under the *ESA 2007* as it is one of the rarest bats in eastern North America, and was one of the rarest even prior to the introduction of White Nose Syndrome (MNRF, 2016h). Suitable habitat may be present within the forest and plantation communities in the Potentially Impacted Area.

Eastern Whip-Poor-Will (*Caprimulgus vociferous*) [source: OBBA records] – This species is listed as Threatened in Ontario. Whip-poor-Will is usually found in areas with a mix of open and forested areas, such as savannahs, open woodlands or openings in more mature, deciduous, coniferous and mixed forests (MNRF, 2016i). Suitable habitat may be present within the forest communities in the Potentially Impacted Area.

Eastern Wood-Pewee (*Contopus virens*) [source: OBBA records] – This species is listed as Special Concern in Ontario. Eastern Wood-Pewee can be found in deciduous, coniferous and mixed forests in eastern North America. Additionally, the size of the forest does not appear to be an important factor in habitat selection as this species has been found in both small fragmented forests and larger forest tracks (MNRF, 2016j). Suitable habitat may be present within the forest communities in the Potentially Impacted Area.

Four-leaved Milkweed (*Asclepias quadrifolia*) [source: MNRF consultation] – This species is listed as Endangered in Ontario. The Four-leaved Milkweed is found in two types of habitat in Ontario: dry woodlands dominated by Tallgrass prairie herbs, Bur Oak and Shagbark Hickory, and in woodland alvar communities dominated by Red Cedar pasture grasses, cultivated by human activity (MNRF). Based on the results of the habitat assessment there is no suitable habitat for the Four-leaved Milkweed in the Potentially Impacted Area and the species is unlikely to occur within the Potentially Impacted Area.

Little Brown Bat (*Myotis lucifugus*) [source: Atlas of the Mammals of Ontario] – This species is listed as Endangered in Ontario. Little Brown Bats are typically between four or five centimeters long, with wingspans of 22 to 27 centimeters. Little Brown Bats are active in two or three hours after sunset, feeding on insects. During the day, Little Brown Bats roost in trees and buildings, and are known to use attics, abandoned buildings and barns during the summer to raise their young and hibernate in caves or abandoned mines during the winter months (MNRF, 2016l). Suitable habitat may be present within the forest and plantation communities in the Potentially Impacted Area.

Loggerhead Shrike (*Lanuis ludovicianus*) [source: OBBA records] – This species is listed as Endangered in Ontario. The Loggerhead Shrike prefers pasture or grassland habitats with scattered trees and low shrubs. Remaining Loggerhead Shrikes are found in two core grassland habitats, the Carden Plain north of Lindsay, and the Napanee Limestone Plain (MNRF, 2016m). There is low potential for this species to occur within the Potentially Impacted Area.

Northern Map Turtle (*Graptemys geographica*) [source: MNRF consultation] – This species is listed as Special Concern in Ontario. Northern map turtle inhabits lakes and rivers, showing a preference for slow moving currents, muddy bottoms, and abundant aquatic vegetation (MNRF, 2016n). The Napanee River presents potential habitat within the Potentially Impacted Area.

Northern Myotis (*Myotis septentrionalis*) [source: Bat Conservation International] – Northern Myotis is primarily a forest-dwelling species (Owen *et al.*, 2002). It is often associated with old growth mixed or coniferous forests and is known to roost under loose bark or in tree cavities (COSEWIC, 2013; MNRF, 2016o). Unlike other bats, this species rarely roosts in anthropogenic structures (COSEWIC, 2013). Breeding occurs in late summer in maternal colonies, and migration to hibernation sites in caves or mines begins in October (COSEWIC, 2013). This species remains in hibernation until late March or April (MNRF, 2016o). Suitable habitat may be present within the forest and plantation communities in the Potentially Impacted Area.

Ogden's Pondweed (*Potamogeton ogdenii*) [source: MNRF consultation] – This species is listed as Endangered in Ontario. Ogden's pondweed is an underwater plant with branching, thread-like stems and is found in clear, slow moving streams, beaver ponds and lakes. In Canada, Ogden's Pondweed was found only in southeastern Ontario at Murphys Point Provincial Park and Davis Lock on the Rideau Canal between 1970 and 1990 (MNRF, 2016p). There is no suitable habitat present within the Potentially Impacted Area.

Snapping Turtle (*Chelydra serpentina*) [source: MNRF consultation] – This species is listed as Special Concern in Ontario. The Snapping Turtle utilizes a wide variety of shallow freshwater water habitats including: ponds, sloughs, shallow bays, river edges, slow streams, or areas combining several of these wetland habitats. Individual turtles can also persist in urbanized water bodies, such as golf course ponds and irrigation canals, but it is unlikely that a population could become established in such habitats (MNRF, 2016q). The Napanee River presents potential habitat within the Potentially Impacted Area and Snapping Turtle may nest in the gravel or loose soil adjacent to the highway near the Napanee River.

Tri-colored Bat (*Perimyotis subflavus*) [source: Bat Conservation International] – Tri-colored Bat lives in a variety of forested habitats, forming day roosts and maternity colonies in older forests and occasionally in anthropogenic structures. This species is rare and thus has a scattered distribution in southern Ontario. The Tri-colored Bat forages over water and along streams in the forest where it eats flying insects and spiders. At the end of the summer, individual bats swarm to an overwintering location generally underground or near a cave. Similar to Little Brown Myotis and Northern Myotis, mating occurs during swarming behaviour which is typically associated with hibernacula (EC, 2015; Randall and Broders, 2014). Individual overwintering bats typically roost by themselves rather than as part of a group (MNRF, 2016r). Suitable habitat may be present within the forest and plantation communities in the Potentially Impacted Area.

Wood Thrush (*Hylocichla mustelina*) [source: OBBA records] – This species is listed as Special Concern in Ontario. Wood Thrush can be found in the interior and along the edges of well-developed upland deciduous and mixed forests. To be considered suitable, these forests should have: trees that are greater than 16 m in height, a high variety of deciduous tree species, a moderate sub-canopy and shrub density, shade, a fairly open forest floor, moist soils and decaying leaf litter (MNRF, 2016s). There is potential habitat for this species within the forest communities located east of the Napanee River, north and south of Highway 401.

6. Impact Assessment and Mitigation Measures

The proposed works for this project includes the following:

- Realignment of Palace Road to the west, including construction of a new Palace Road structure over Highway 401 and removal of the existing bridges along Highway 401;
- Construction of new westbound and eastbound on and off-ramps;
- Removal of existing ramps and bypassed section of Palace Road, and,
- Fill in the bypassed section of Palace Road.

The outermost grading limits were used to determine the extent of the construction footprint for this project (Refer to **Figure 2**). The construction footprint provided in the preliminary design for the Highway 401 Interchange Improvements at Palace Road (GWP 4197-13-00) is smaller in extent than the Potentially Impacted Area shown on **Figure 2**. The proposed works will largely be confined to the disturbed Cultural Meadow (CUM1) community that makes up the existing right-of-way (ROW) and existing interchange within the construction footprint; however, small portions of the Coniferous Plantation (CUP3), Deciduous Forest (FOD) and mixed Forest (FOM) will also be affected. The construction footprint at the Napanee River is limited to the bridge deck. The potential impacts associated with the proposed works include loss of vegetation cover through vegetation removal and disturbance to local wildlife through noise and lighting. A general discussion of the potential impacts and the mitigation measures recommended is provided in the following sections.

6.1 Assessment of Potential Impacts

6.1.1 *Potential Impacts to Vegetation Communities and Designated Natural Areas*

There are no ANSIs or PSWs present within the construction footprint; therefore, no impacts to provincially designated natural areas are anticipated; however the Napanee River and its associated riparian area which is designated Environmental Protection Area on Schedule C of the Town of Greater Napanee Official Plan occurs within the construction footprint. As such, the Environmental Protection Area will be impacted by the proposed works. The potential impacts to vegetation communities and designated natural areas are described as follows:

- It is anticipated that a total of up to 9.14 ha of vegetation communities will be affected. This includes 8.38 ha of Cultural Meadow (CUM1); 0.08 ha of Coniferous Plantation (CUP3), 0.32 ha of Deciduous Forest (FOD) and 0.35 ha of Mixed Forest (FOM). The existing Meadow (CUM1) is considered to be disturbed by anthropogenic influences (i.e., periodic mowing and proximity to Highway 401) and at the time of field investigation was largely dominated by non-native species. No SAR plants were identified within the construction disturbance footprint.
- Based on a review of the Town of Greater Napanee Official Plan, portions of the Napanee River and its associated riparian area designated as an Environmental Protection Area and will be affected by the proposed works.
- **Reduction of Surface Water and Groundwater to Vegetation Communities:**
Alteration of surface water runoff or groundwater inputs may result in damage or alteration to the vegetation communities.

- **Fill, Sediment or Debris Deposition within Vegetation Communities:**
During the proposed works, fill, sediment runoff and/or debris from the active construction area may enter vegetation communities and drainage ditches.
- **Introduction or Spread of Invasive Species:**
Thirty of the 69 plants (43%) recorded within the Overall Study Area during field investigations are non-native, which includes some highly invasive species such as common reed (*Phragmites australis*) and common buckthorn. Common Reed was noted to be present within the Mineral Cultural Meadow communities (CUM1) within the highway ROW. The proposed works and movement of construction equipment may perpetuate the spread and establishment of these species.

6.1.2 Potential Impacts to Wildlife

The majority of the Overall Study Area consists of a Cultural Meadow (CUM1) community with small portions of Coniferous Plantation (CUP3), Deciduous Forest (FOD) and mixed Forest (FOM) communities. Vegetation communities and planted trees present within the Overall Study Area are likely to support breeding birds. The potential impacts to breeding birds as a result of the proposed works are described as follows:

- **Disturbance/Displacement and Potential Destruction of Breeding Birds and Their Active Nests Due to Vegetation Clearing:**
Vegetation clearing during the breeding bird season of April 1st to August 31st could result in the disturbance/displacement of breeding birds and/or destruction of their active nests. The proposed works will result in a loss of some vegetated areas and habitat for some common species; however, the area lost provides only marginal habitat which is disturbed by existing anthropogenic impacts.

Mitigation measures to avoid potential impacts to the wildlife, including breeding birds are provided in **Section 6.2** below.

6.1.3 Potential Impacts to Species at Risk

As described in **Section 5.5** the Overall Study Area was considered to potentially suitable habitat for a total of 11 SAR, of which the construction footprint may represent habitat for up to 10 of these including: Barn Swallow, Bobolink, Eastern Meadowlark, Eastern Whip-Poor-Will, Eastern Wood Pewee, Little Brown Myotis, Northern Myotis, Eastern Small-footed Myotis, Tricolored Bat and Snapping Turtle. While a Cultural Meadow community (CUM1) is located within the construction footprint is considered disturbed anthropogenic influences (i.e., periodic mowing and proximity to Highway 401) and is also largely dominated by non-native species. Due to the high level of anthropogenic disturbance, these areas are considered poor quality habitat for Bobolink and Eastern Meadowlark and it is unlikely that the species are using this area for breeding. Similarly the woodland edges associated with vegetation removal in the construction footprint is also considered disturbed anthropogenic influences and it is unlikely that the Eastern Whip-Poor-Will are using this area for breeding.

Eastern Wood Pewee is listed as Special Concern and thus does not receive protection under the *ESA 2007*. Nevertheless, the mitigation measures prescribed for the protection of Migratory birds would also be sufficient for the protection of Eastern Wood Pewee (Refer to **Section 6.2** below). However the wooded communities within the construction footprint (i.e., Coniferous Plantation (CUP3), Deciduous Forest (FOD) and Mixed Forest (FOM)) may represent suitable habitat for bat SAR and impacts to these species are discussed below. Similarly, Snapping Turtle are listed as Special Concern and thus does not receive protection under the *ESA 2007*. Nevertheless, specific mitigation measures necessary to protect Snapping Turtle during construction will be provided (Refer to **Section 6.2** below).

Suitable habitat for Barn Swallow and bat SAR (Little Brown Myotis, Northern Myotis, Eastern Small-footed Myotis and Tricolored Bat) may be present within the construction footprint for the improvements to the Highway 401 / Palace Road interchange (G.W.P. 4197-13-00). The potential impacts to SAR as a result of the proposed works are described as follows:

- **Disturbance / Displacement or Mortality of SAR:**
Barn Swallow and bat SAR may be displaced or disturbed as a result of noise during construction. Light used during nighttime construction may also result in the displacement or disturbance of bat SAR. There is also a low possibility of species being injured or killed as a result of collision with construction vehicles. These potential impacts would result in a contravention of the *ESA 2007*.
- **Habitat Removal:**
Up to 0.75 ha of wooded habitat (i.e., Coniferous Plantation [CUP3], Deciduous Forest [FOD] and Mixed Forest [FOM]) that is potentially suitable for bat SAR may be lost as a result of proposed works. The removal of bat SAR habitat would result in a contravention of the *ESA 2007*. The removal of existing bridges may result in the loss of habitat for Barn Swallow.

6.2 Mitigation Measures

Proposed mitigation and avoidance measures to address potential impacts on terrestrial features are described below and apply to the proposed improvements to the Highway 401 / Palace Road interchange (G.W.P. 4197-13-00).

General

- To assist in mitigating potential impacts to terrestrial ecosystems, applicable MTO Provisions should be included in contract documents and utilized during construction.

Vegetation Communities and Designated Natural Areas

- Vegetation removal should be kept to a minimum and will be limited to the construction disturbance footprint;
- A Landscape Plan should be developed to address removal of woody vegetation using similar native species;
- Areas of herbaceous vegetation disturbed during proposed works should be seeded with a site appropriate MTO approved native seed mix;

Wildlife and Species at Risk

- Vegetation removal should be scheduled to occur outside of the breeding bird season of April 1st to August 31st to avoid disturbance to breeding birds and to avoid destruction of active nests, including any bird SAR. If vegetation removal must occur within this time period, active nest searches may be conducted prior to vegetation removal by a qualified biologist within 'simple habitats' to ensure that no active nests of breeding birds or bird SAR are destroyed, in order to prevent any contravention of the *Migratory Birds Convention Act, 1994* and / or the *ESA 2007*;
- Vegetation removal within the woodlands should be avoided. If avoidance is unfeasible, additional species specific investigations (as described in **Section 6.3**) should be undertaken to confirm the presence or absence of bat SAR within the construction footprint. If it is confirmed that the proposed activities require removal of confirmed habitat for bat SAR additional mitigation measures and an Authorization under the *ESA 2007*, generally an Overall Benefit Permit under clause 17(2)(c), may be required;

- In the event a nesting Snapping Turtle is observed, the individual turtle will be permitted to continue nesting and the nest location shall be reported to MTO and MNRF immediately; and,
- Any SAR observations should be reported to MTO and MNRF and protection should be implemented immediately to ensure compliance with the *ESA 2007*.

6.3 Commitments to Work during Detail Design

The following surveys are recommended for completion during detail design for the Project:

- It is recommended that nest surveys be undertaken at all affected structures to confirm if nesting birds, particularly Barn Swallow, are breeding or nesting at or on structures. Findings from these surveys will determine whether or not proposed works on the structure require registration under the *ESA 2007*.
- The MNRF should be consulted regarding the required surveys to confirm suitable bat SAR habitat within forests, plantations or woodlands wherein vegetation removal is proposed. Species specific surveys for bats may include an updated bat habitat suitability assessment, identification of suitable maternity roost trees, acoustic surveys, and snag density surveys in accordance with the *Survey Protocol for Species at Risk Bats within Treed Habitats: Little Brown Myotis, Northern Myotis and Tri-colored Bat* (MNRF, 2017).
- During detail design, it is recommended that the precise locations of Common Reed be identified to aid in the development of mitigation measures to halt the spread of this invasive species.

6.4 Net Effects

If mitigation measures identified in **Section 6.2** are implemented, impacts to SAR, SAR habitat and terrestrial ecosystems within the Overall Study Area, and net effects are expected to be minimal. Bat SAR may be impacted as a result of the proposed works and these species disturbance and habitat destruction impacts must be addressed by future correspondence with the MNRF during detail design and may require Authorization under the *ESA 2007*.

7. Summary and Recommendations

Potential effects to the following terrestrial features, SAR and SAR habitat will need to be considered and appropriately minimized or mitigated:

- While no provincially designated natural areas were identified within the Overall Study Area; the Napanee River and its associated riparian area which are designated Environmental Protection on Schedule C of the Official Plan are designated Environmental Protection on Schedule C of the Official Plan and located within the construction footprint;
- If during detail design, impacts cannot be avoided within the Environmental Protection Area associated with the Napanee River and its associated riparian area, mitigation measures to reduce the impact should be developed.
- No SAR were observed during field investigations; however, potentially suitable habitat for four (4) bat SAR may be present within the construction footprint. Should vegetation removal within these woodlands be unavoidable, additional surveys and Authorization under the *ESA 2007* may be required prior to construction;
- No Barn Swallows were found to be nesting within the structures during the 2016 surveys; however, up-to-date investigations to confirm use of this species should be undertaken during the detail design phase; and,
- Bird species protected under the *MBCA 1994* are likely to use the Overall Study Area. Vegetation in the immediate vicinity of the construction disturbance footprint may provide suitable nesting habitat for some of these species. Vegetation clearing should occur outside of the breeding bird season (April 1st to August 31st) in order to minimize impacts to these species. Nest surveys by qualified biologists can be conducted if minor vegetation clearing is required during this period.

Net effects associated with the improvements to the Highway 401 / Palace Road interchange (G.W.P. 4197-13-00) are anticipated to be minimal should the mitigation measures and permitting prescribed in **Section 6.2**, be implemented.

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Survey Protocol for Species at Risk Bats within Treed Habitats: Little Brown Myotis, Northern Myotis and Tri-colored Bat. April 2017

Appendix **A**

Agency Correspondence

Kime, Heather

From: Arsenault, Ami
Sent: March-15-16 12:58 PM
To: catherine.warren@ontario.ca; elizabeth.spang@ontario.ca
Cc: Hodges, Nick; Minion, Ashley; Kime, Heather
Subject: Palace Road MNR Info Request
Attachments: 2016-03-14-MNRInfoRequest-PalaceRd.pdf; MNR Fisheries Information Request Table_401 Napanee.docx

Hello Ms. Spang and Ms. Warren,

AECOM has been retained by the Ontario Ministry of Transportation (MTO) to undertake the two separate Preliminary Design and Class Environmental Assessment Studies for improvements to the Highway 401 / County Road 41 interchange (G.W.P. 4459-04-00) and the Highway 401 / Palace Road interchange (G.W.P. 4197-13-00). Both projects are located in the Town of Greater Napanee within the County of Lennox and Addington.

Please see the attached information request letter and the fisheries table for data gaps which we require additional information.

If you have any questions, please do not hesitate to contact Ashley Minion (aquatic biologist, 1-905-747-7693, Ashley.minion@aecom.com), or myself at the number below.

Thank you!

Ami

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March 15, 2016

Elizabeth Spang (District Planner)
Catherine Warren (District Planner)
Peterborough – District Office
300 Water Street
Peterborough, ON K9J 3C7

Dear Ms. Warren and Ms. Spang:

**Regarding: Highway 401 Interchange Improvements at County Road 41 Interchange and Palace Road Interchange – PD and EA
GWP 4459-04-00 and GWP 4197-13-00
Request for Background Data and Fish Community Data for Aquatic and Terrestrial Investigations**

AECOM Canada Limited (AECOM) has been retained by the Ontario Ministry of Transportation (MTO) to undertake the two separate Preliminary Design and Class Environmental Assessment Studies for improvements to the Highway 401 / County Road 41 interchange (**G.W.P. 4459-04-00**) and the Highway 401 / Palace Road interchange (**G.W.P. 4197-13-00**). Both projects are located in the Town of Greater Napanee within the County of Lennox and Addington. These studies will examine interim and long-term interchange operational improvements, median improvements on Highway 401, replacement and/or widening of the Highway 401 bridges, pavement rehabilitation, drainage improvements, traffic signals, illumination, the traffic staging (including potential detours on County Road 41 and Palace Road) during construction. Both areas of improvement are highlighted in the attached map.

Both studies are following the approved environmental planning process for Group 'B' projects in accordance with the *Class Environmental Assessment for Provincial Transportation Facilities* (2000) with the opportunity for the public to provide input. A Transportation Environmental Study Report will be prepared for each study area and will include the following information:

- Justification for the project
- Existing environmental conditions
- Generation, assessment and evaluation of alternatives
- Preferred alternatives
- Summary of potential environmental issues and mitigation measures
- Summary of consultation undertaken throughout the study

AECOM has undertaken a preliminary review of available background data within the study area, using several available sources including: the MNRF's Make-a-Map: Natural Heritage Areas, Conservation Ontario Species at Risk and DFO Mapping and the Atlas of Breeding Birds of Ontario. No significant woodlands or wetlands were identified within the immediate area. No aquatic species at risk were identified within the study areas.

According to the Ontario Breeding Bird Atlas, a total of 107 bird species have been recorded within the 10 x 10 km UTM block 18UQ40 that encompasses both study areas. Eight (8) bird species were identified as being either endangered, threatened or of special concern.

OBBA Square 18UQ40		
Common Name	Scientific Name	ESA Status
Bobolink	<i>Dolichonyx oryzivorus</i>	THR
Barn Swallow	<i>Hirundo rustica</i>	THR
Bank Swallow	<i>Riparia riparia</i>	THR
Common Nighthawk	<i>Chordeiles minor</i>	SC
Whip-poor-will	<i>Antrostomus vociferus</i>	THR
Chimney Swift	<i>Chaetura pelagica</i>	THR
Loggerhead Shrike	<i>Lanius ludovicianus</i>	END
Eastern Meadowlark	<i>Sturnella magna</i>	THR

Additional species at risk or concern were also identified through the Natural Heritage Areas Make-a-Map search. They include Snapping Turtle (*Chelydra serpentina*), Milksnake (*Lampropeltis triangulum*), and Eastern Meadowlark (*Sturnella magna*).

During this preliminary review, AECOM has also identified data gaps for which we require additional information. Please consider this a formal request for the following information with respect to both study areas in the attached map. If you could please review the above listed data, and provide us with any additional information, reports and GIS Data pertaining to:

- Presence of Natural Areas (ESA, PSW, ANSI, Significant Woodlands/Wetlands, Provincial Parks, Conservation Reserves and Wildlife Management Areas);
- Natural Area Reports;
- Rare Species Occurrences (locally and provincially rare);
- ELC Vegetation Community GIS data;
- Regulated Area and Floodline GIS data;
- Natural Heritage System GIS data;
- Municipal Drains and Drain Classification;
- In-water Timing Restrictions;
- Water Quantity/Quality Data;
- Groundwater Discharge Areas;
- Watercourse Names, Thermal and Flow Regimes;
- Thermal and flow regime classification of watercourses – GIS data;
- MNRF's Interpretation of Fish Habitat Sensitivity;
- Habitat Information and Location;
- MNRF's Fisheries Management Objectives/plans; Fish and Mussel Records;
- Species at Risk & of Conservation Concern (aquatic);
- Fish Community Records;
- Fisheries Management Designations;
- Fish Habitat Sensitivity;
- Important Angling areas, specifically: Baitfish Harvesting and/or Fish Sanctuaries;
- Aboriginal Fisheries;
- Recovery Strategies; and
- Presence of Critical Habitat

Please also review the MNRF Fisheries Information Request Table attached to this email, outlining additional aquatic information needed.

We understand that not all of the information requested from the list above may be available; however, it would be greatly appreciated if you could please provide a response of what information can be or will be provided.

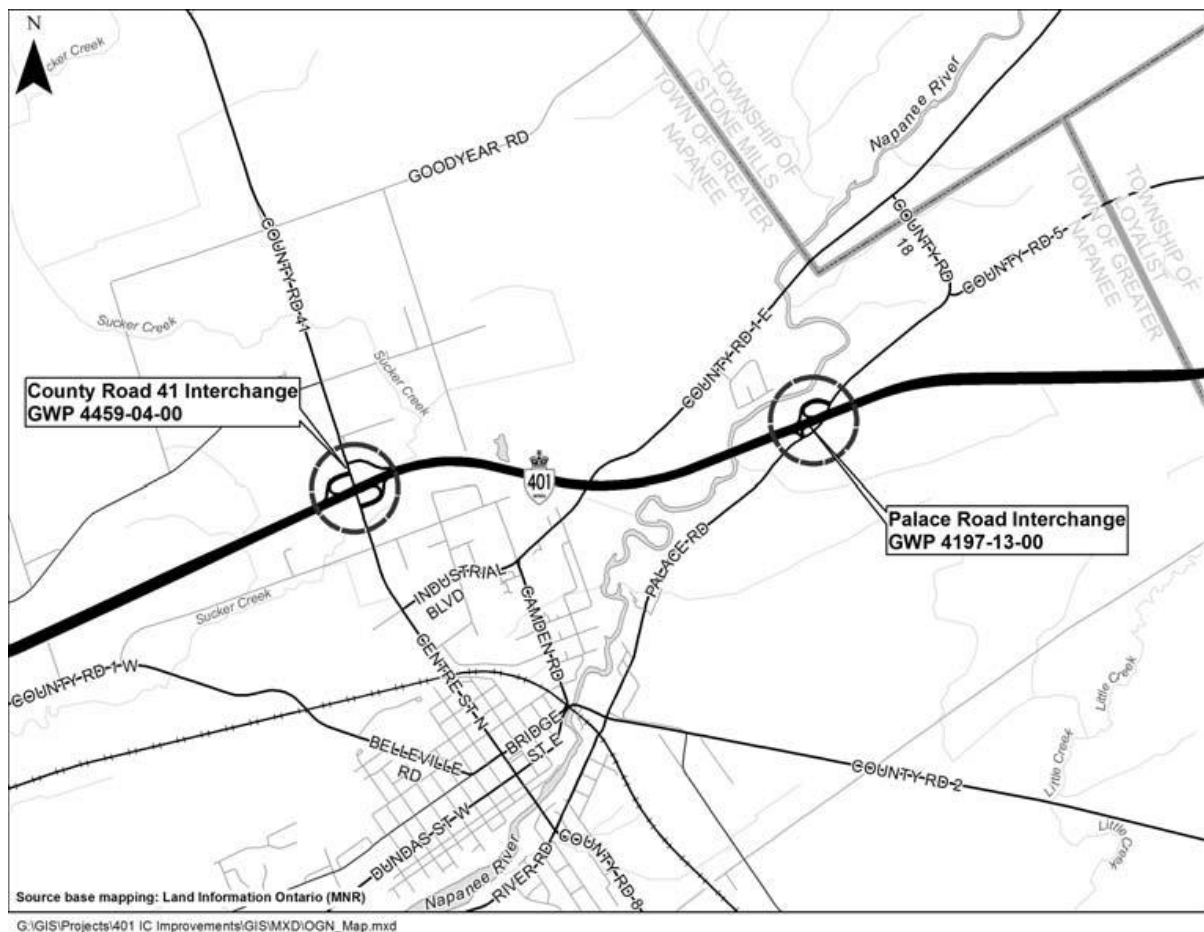
Should you have any questions or require further information, please do not hesitate to contact me as I would be more than glad to provide assistance.

Thank you,

Ami Arsenault

Ami Arsenault

Key Plan



Kime, Heather

From: Warren, Catherine (MNRF) <Catherine.Warren@ontario.ca>
Sent: March-16-16 3:23 PM
To: Leech, Fred; Arsenault, Ami
Cc: Hodges, Nick; Minion, Ashley; Kime, Heather
Subject: 401 Interchanges at Palace Road and County Road 41 MNRF File No: 16-RICH-LNA-EAE-2138
Attachments: MNRF Fisheries Information Request Table_401 Napanee.docx

Hello,

MNRF Peterborough District has received your notice (dated January 18, 2016 and March 15, 2016) regarding the MTO Environmental Assessment for the interchanges of Highway 401 and County Road 41 as well as Palace Road (Richmond and Fredricksburgh), Napanee. We provide the following general information for your consideration:

General: MNR Data and Information

We would like to inform you that MNRF's natural heritage and natural resources data and information (including wetlands, ANSIs) for the study area can be obtained through the Land Information Ontario Warehouse (LIOW) through the Ministry's Land Information Ontario (LIO) website at: <https://www.ontario.ca/environment-and-energy/land-information-ontario>.

You may also view natural heritage information online (e.g. Provincially Significant Wetlands, ANSIs, Woodlands, NHIC 1 km screening squares) using Natural Heritage Make a Map at: <https://www.ontario.ca/environment-and-energy/make-natural-heritage-area-map>.

You can also obtain Species at Risk occurrence information on our Natural Heritage Information Centre website: <https://www.ontario.ca/environment-and-energy/get-natural-heritage-information>. In addition, the official Species at Risk in Ontario (SARO) List can be obtained at: http://www.e-laws.gov.on.ca/html/regs/english/elaws_regs_080230_e.htm

We recommend that you use the above-noted sources of information during the review of your project proposal.

MNRF may provide additional information and technical advice if details of the proposed location(s) and design(s) of the proposed works are circulated to our office.

Wetlands

At County Road 41 the subject area is not adjacent to any wetlands. At Palace Road the subject area is adjacent to unevaluated wetlands. We recommend contacting your local Conservation Authority for more information on approvals that may be required.

ANSIs: There are no ANSIs located near the County Road 41 or the Palace Road interchanges with Highway 401.

Fisheries

Please see the attached fisheries information table.

* Please contact Department of Fisheries and Oceans/local Conservation Authority for any approvals that may be required and/or recommendations on any sediment/erosion control measures that may be required to be installed prior/during/after construction.

Species at Risk

A review of our best available information indicates that there are occurrences of Four-leaved Milkweed (Endangered) and Milksnake (Special Concern) in the immediate area of the sites. Also, there are occurrences of Eastern Meadowlark (Threatened), Lake Sturgeon (Threatened), Barn Swallow (Threatened), Northern Map Turtle (Special Concern), Wood Thrush (Special Concern), Eastern Wood-Pewee (Special Concern), Loggerhead Shrike (Endangered), Snapping Turtle (Special Concern), Bobolink (Threatened), Eastern Musk Turtle (Special Concern), American Eel (Endangered) and Ogden's Pondweed (Endangered) in the general area (5 km) of the proposed activities. Although no other threatened or

endangered species or their habitat have been documented in the area of the proposed projects, these features may be present and this list should not be considered complete.

Species listed as endangered or threatened on the Species at Risk in Ontario (SARO) list are protected under the Endangered Species Act, 2007 (ESA). Section 9(1) of the ESA prohibits a person from killing, harming, harassing, capturing or taking a member of a species listed as endangered, threatened or extirpated on the SARO list. Section 10(1) of the ESA prohibits the damage or destruction of habitat of a species listed as endangered or threatened on the SARO list.

Since comprehensive mapping for most Species at Risk is not available **a site assessment is recommended**, to identify the presence of any Species at Risk and/or their habitat on the subject lands, as a decision should not be made in the absence of such information. The focus of the site assessment can include a review of the information about known occurrences provided by MNRF above along with other information sources such as species distributions and habitat requirements as well as field visits using MNRF approved protocols during the appropriate seasons by a qualified professional. Due to the species that are potentially present at this site, the following recommendations should help prevent adverse impacts:

Birds

Workers must be vigilant and check work areas for the presence of breeding birds and nests containing eggs and/or young. If breeding birds and/or nests are encountered, works should not continue in the location of the nest until after July 1 (or as soon as it has been determined that the young have left the nest). Please note that the breeding bird season in the subject area extends from April 1 to June 30. Therefore, works should commence after June 30 whenever possible.

Specific Barn Swallow Information: Barn Swallow nests may be present under bridges and/or culverts. Therefore, the underside of these structures should be assessed for Barn Swallow nests before proceeding. If there are no nests present (or if nests are present, but not being used at the time of construction), a contravention of the ESA is unlikely. However, if nests are present and being utilized, construction should not begin until after August 15 of any year. Understanding that some projects need to occur before or during nesting season, the bridge should be blocked prior to nesting season (April 15 – August 15) using netting or tarping in order to prevent Barn Swallows from nesting under the bridge (if there is evidence of past nesting activity).

Turtles and Snakes

Workers must be vigilant and check work areas for the presence of turtles. If turtles or snakes are encountered, whenever possible, work should be temporarily suspended until the animal is out of harm's way. Workers should report any turtle observations (including photographs and coordinates) to the Peterborough District Office immediately at (705) 755-2001. Please note that the turtle nesting season in the subject area extends from May 15 to Aug 15. Therefore, activities which may cause adverse impacts to a species or habitat (e.g. use of heavy equipment) should commence after Aug 15.

As of July 1, 2013, there are new regulatory provisions provided under the ESA. This regulatory provision allows eligible activities, such as work undertaken to repair, modify, demolish, replace or general maintenance of a structure or the removal of buildings and/or excavation of land, vegetation removal, etc. that is considered to be species at risk habitat to proceed without a permit, provided the proponent register with the Ministry of Natural Resources and Forestry and then follow the specific rules in regulation under the ESA. These rules include, but are not limited to, preparing a mitigation plan and implementing steps to minimize the adverse effects of the activity on the species identified.

Information on the new ESA regulatory provision that come into effect on July 1, 2013 can be found at <http://www.ontario.ca/environment-and-energy/natural-resources-approvals..>

The amended ESA regulation (O.Reg 242/08) can be found at http://www.e-laws.gov.on.ca/html/regs/english/elaws_regs_080242_e.htm.

If an impact to a Species at Risk or its habitat cannot be avoided, a person(s) should contact MNRF to discuss options, including applying for an authorization under the ESA. In situations where an activity is not registered with or authorized by the MNRF, a person(s) must comply with the ESA by modifying proposed activities to avoid impacts to Species at Risk and habitat protected under the ESA.

It is highly recommended that landowners and on-site workers familiarize themselves with information found at the following links:

MNRF Species at Risk website: www.ontario.ca/speciesatrisk

During on-site activities, should any species at risk or their habitat be potentially impacted, MNRF should be contacted immediately and operations should be modified to avoid any negative impacts to species at risk or their habitat until further discussions with MNRF can occur regarding opportunities for mitigation. If any species at risk are found, the Peterborough District MNRF office should be contacted at 705-755-2001. If possible, pictures of the species at risk and coordinates for the location where it was observed should be provided to MNRF.

Significant Wildlife Habitat

The site may contain significant wildlife habitat which typically must be identified during site-specific investigations. Significant wildlife habitat may include features such as: seasonal concentration areas for wildlife species (e.g. snake hibernaculum), rare vegetation communities (e.g. tallgrass prairie), specialized habitats of wildlife (e.g. turtle nesting and over-wintering areas), habitats of species of conservation concern (e.g. Special Concern species as identified on the Species at Risk in Ontario list) and animal movement corridors (e.g. amphibian movement corridors). We recommend that you contact the local planning authority for potential study requirements for the identification of Significant Wildlife Habitat. In addition, when no information is available, we refer you to the Significant Wildlife Habitat Technical Guide and the recently approved Ecoregion 6E Criterion Schedule for the identification of Significant Wildlife Habitat (January 2015). The Ecoregion Criterion Schedules and newly approved Significant Wildlife Habitat Mitigation Support Tool (MiST) can be downloaded here: <https://www.ontario.ca/search/natural-heritage-planning-resources-municipal-planning>

General Information Regarding MNRF approvals:

Endangered Species Act (ESA)

Species listed as endangered or threatened on the Species at Risk in Ontario (SARO) List are protected under the *Endangered Species Act*, 2007 (ESA, 2007). Section 9(1) of the ESA, 2007 prohibits a person from killing, harming, harassing, capturing or taking a member of a species listed as endangered, threatened or extirpated on the SARO list. Section 10(1) of the ESA, 2007 prohibits the damage or destruction of habitat of a species listed as endangered or threatened on the SARO list.

Site assessments may be recommended to determine and confirm the presence or absence of a Species at Risk included in the Species at Risk in Ontario (SARO) List. Please note that you may require a permit under the ESA, 2007 from our office, if any Species at Risk or their habitat is found within the study area.

Should any Species at Risk or their habitat be potentially impacted by on site activities, MNRF should be contacted immediately and operations should be modified to avoid any negative impacts to Species at Risk or their habitat until further discussions with MNRF can occur regarding opportunities for mitigation.

If any species at risk is found please contact the Peterborough District Office immediately at 705-755-2001.

NEW ESA Regulations in effect starting July 1, 2013:

MNR may be able to provide species specific survey methodology to assist your review.

Fish and Wildlife Conservation Act

Please note that you may require a Scientific Collector's Permit from our office if you will be doing any fish or wildlife sampling, collection, salvage, or relocation within Peterborough District. For more information about Scientific Collector's Permits, please contact Julie Formsma, Acting Fish and Wildlife Technical Specialist at 705-755-3296.

Other Approvals

It is the responsibility of the proponent to acquire all other information and necessary approvals from any other municipal, provincial or federal authority under other legislation. We recommend that you contact your local Conservation Authority, Department of Fisheries and Oceans, Ministry of the Environment and Climate Change, Ministry of Tourism, Culture and Sport, etc.

If you have any questions regarding the above comments, don't hesitate to contact me. Please reference the file number in the subject line for any future correspondence.

Sincerely,

Catherine

Catherine Warren
A/District Planner
Peterborough District
Ontario Ministry of Natural Resources and Forestry
300 Water Street, 1st Floor South
Peterborough, ON K9J 8M5
Tel: (705) 755-3294
Fax: (705) 755-3125
Email: catherine.warren@ontario.ca

VIA EMAIL

January 27, 2016

Tina White
Senior Project Manager
Planning and Design
Ministry of Transportation, Eastern Region
1355 John Counter Boulevard
Postal Bag 4000
K7L 5A3

Fred Leech
Consultant Environmental Planner
AECOM
201-45 Goderich Road
Hamilton, ON
L8E 4W8

**Re: Notice of Study Commencement
Preliminary Design and Class Environmental Assessment Studies:
Highway 401 Interchange Improvements at County Road 41, and
Highway 401 Interchange Improvements at Palace Road
(G.W.P. 4459-04-00 and G.W.P. 4197-13-00)**

Further to your letter (dated January 18, 2016) regarding the above noted environmental assessment, we would like to offer the following comments:

1. Quinte Conservation maintains floodplain mapping for both the Selby/Sucker Creek, which is adjacent to the County Road 41 Interchange; and the Napanee River, which is adjacent to the Palace Road Interchange. Further information regarding flood flows & engineering should be addressed by contacting Christine McClure, Water Resources Manager at this office (613-968-3434 x 130).
2. The 'Palace Road Interchange' lies within the Source Water Protection - Intake Protection Zone 2 for the Town of Napanee's municipal drinking water intake. There are no significant drinking water threats associated with the alteration of the interchange, however, general concerns include the application of road salt on the roadways as well as spills along the highway within the Intake Protection Zone 2. For further information, please contact Amy Dickens, Risk Management Official/Inspector at this office (613-968-3434 x 132).
3. Quinte Conservation does not have any natural heritage reports, mapping or inventories for the study area. Further information regarding natural heritage values should be obtained from the Ministry of Natural Resources and Forestry.
4. Quinte Conservation would appreciate a copy of the final Environmental Assessment document for our records.

Should you require any further information regarding this matter, please contact the undersigned.

Sincerely,

A handwritten signature in black ink that reads "Tim Trustham". The signature is written in a cursive, flowing style.

Tim Trustham
Planner/Ecologist

/tt

Appendix **B**

Photo Log



Photograph 1. ↑
North of the Napanee River, facing south towards FOM



Photograph 2. ↑
North of the Napanee River, facing south towards FOM



Photograph 3. ↑
CUM1 facing east towards Palace Road, south of FOM



Photograph 4. ↑
CUM1, south of Highway 401 and north of Palace Road



Photograph 5. ↑
CUM1 facing west towards Napanee River, south of 401



Photograph 6. ↑
Facing southeast to Hydro One Corridor towards CUP3



Photograph 7. ↑
FOD north of Palace Road



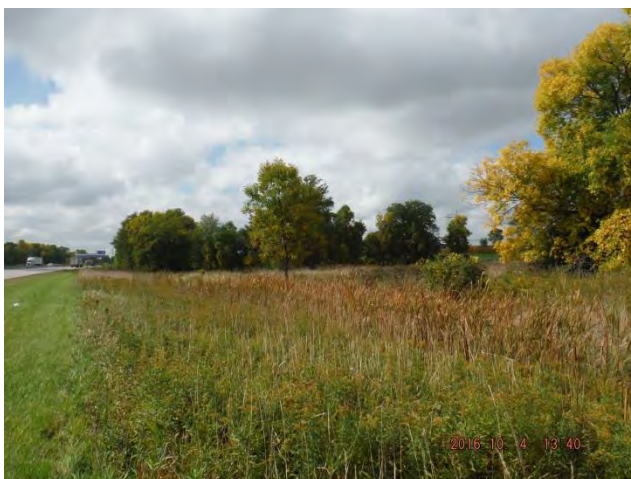
Photograph 8. ↑
FOD north of Palace Road



Photograph 9. ↑
CUP/CUM1 south of Highway 401, east of Palace Road



Photograph 10. ↑
CUM1 south of Highway 401, facing west to Newburgh Road



Photograph 9. ↑
CUM1 north of Highway 401, west of Palace Road



Photograph 10. ↑
FOM, north of Highway 401, east of Napanee River

Appendix **C**

Plant List

Appendix C. Vascular Plant Species List

Highway 401 / Palace Road Interchange Improvements - GWP 4197-13-00

BOTANICAL NAME		COMMON NAME	CUM1	FOM	CUP3	FOD	COEFFICIENT OF CONSERVATISM	WETNESS INDEX	WEEDINESS INDEX	PROVINCIAL STATUS	OMNR STATUS	COSEWIC STATUS	GLOBAL STATUS
PTERIDOPHYTES		FERNS & ALLIES											
Dryopteridaceae		Wood Fern Family											
<i>Onoclea</i>	<i>sensibilis</i>	Sensitive Fern		A			4	-3		S5			G5
GYMNOSPERMS		CONIFERS											
Cupressaceae		Cedar Family											
<i>Juniperus</i>	<i>virginiana</i>	Eastern Red Cedar	O	R	A	R	4	3		S5			G5
<i>Thuja</i>	<i>occidentalis</i>	Eastern White Cedar		R			4	-3		S5			G5
Pinaceae		Pine Family											
<i>Larix</i>	<i>laricina</i>	Tamarack	R	O		O	7	-3		S5			G5
<i>Picea</i>	<i>abies</i>	Norway Spruce	O					5	-1	SE3			G?
<i>Pinus</i>	<i>nigra</i>	Austrian Pine	O	A	D	O		-5	-1	SE2			G?
<i>Pinus</i>	<i>strobus</i>	Eastern White Pine			A		4	3		S5			G5
DICOTYLEDONS		DICOTS											
Aceraceae		Maple Family											
<i>Acer</i>	<i>ginnala</i>	Amur Maple		O				5	-2	SE1			G?
<i>Acer</i>	<i>negundo</i>	Manitoba Maple	O		R	A	0	-2		S5			G5
<i>Acer</i>	<i>platanoides</i>	Norway Maple	O			O		5	-3	SE5			G?
<i>Acer</i>	<i>saccharinum</i>	Silver Maple	R				5	-3		S5			G5
<i>Acer</i>	<i>saccharum</i>	Sugar Maple		O			4	3		S5			G5T?
Anacardiaceae		Sumac or Cashew Family											
<i>Toxicodendron</i>	<i>rydbergii</i>	Western Poison-ivy	O				0	0		S5			G5T
<i>Rhus</i>	<i>hirta</i>	Staghorn Sumac	O		O		1	5		S5			G5
Apiaceae		Carrot or Parsley Family											
<i>Daucus</i>	<i>carota</i>	Wild Carrot	O					5	-2	SE5			G?
<i>Pastinaca</i>	<i>sativa</i>	Wild Parsnip	O	O				5	-3	SE5			G?
Asclepiadaceae		Milkweed Family											
<i>Asclepias</i>	<i>syriaca</i>	Common Milkweed	O				0	5		S5			G5
Asteraceae		Composite or Aster Family											
<i>Cichorium</i>	<i>intybus</i>	Chicory	O					5	-1	SE5			G?
<i>Cirsium</i>	<i>arvense</i>	Canada Thistle	O					3	-1	SE5			G?
<i>Erigeron</i>	<i>annuus</i>	Eastern Daisy Fleabane	O				0	1		S5			G5
<i>Inula</i>	<i>helenium</i>	Elecampane	O					5	-2	SE5			G?
<i>Solidago</i>	<i>canadensis</i>	Canada Goldenrod	A	A			1	3		S5			G5
<i>Taraxacum</i>	<i>officinale</i>	Common Dandelion	O					3	-2	SE5			G5
Balsaminaceae		Touch-me-not Family											
<i>Impatiens</i>	<i>capensis</i>	Spotted Touch-me-not	O				4	-3		S5			G5
<i>Impatiens</i>	<i>glandulifera</i>	Glandular Touch-me-not	O					-3	-2	SE4			G?
Boraginaceae		Borage Family											
<i>Echium</i>	<i>vulgare</i>	Blueweed/common vipersbugloss	O					5	-2	SE5			G?
Caprifoliaceae		Honeysuckle Family											
<i>Lonicera</i>	<i>species</i>	Honeysuckle Species	O	R									
<i>Viburnum</i>	<i>lentago</i>	Nannyberry	O		O	O	4	-1		S5			G5
Caryophyllaceae		Pink Family											
<i>Silene</i>	<i>vulgaris</i>	Catchfly	O					5	-1	SE5			G?
Cornaceae		Dogwood Family											
<i>Cornus</i>	<i>racemosa</i>	Red Panicked Dogwood/Gray dogwood	O		O		2	-2		S5			G5?
<i>Cornus</i>	<i>rugosa</i>	Round-leaved Dogwood	O				6	5		S5			G5
<i>Cornus</i>	<i>sericea</i>	Red-osier Dogwood	O				2	-3		S5			G5
Euphorbiaceae		Spurge Family											

Appendix C. Vascular Plant Species List

Highway 401 / Palace Road Interchange Improvements - GWP 4197-13-00

BOTANICAL NAME		COMMON NAME	CUM1	FOM	CUP3	FOD	COEFFICIENT OF CONSERVATISM	WETNESS INDEX	WEEDINESS INDEX	PROVINCIAL STATUS	OMNR STATUS	COSEWIC STATUS	GLOBAL STATUS
<i>Euphorbia</i>	<i>esula</i>	Leafy Spurge	R					5	-2	SE5			G5
Fabaceae		Pea Family											
<i>Melilotus</i>	<i>officinalis</i>	Yellow Sweet-clover	O					3	-1	SE5			G?
<i>Robinia</i>	<i>pseudo-acacia</i>	Black Locust	R					4	-3	SE5			G5
<i>Trifolium</i>	<i>pratense</i>	Red Clover	O					2	-2	SE5			G?
<i>Vicia</i>	<i>cracca</i>	Tufted Vetch	A					5	-1	SE5			G?
Fagaceae		Beech Family											
<i>Quercus</i>	<i>alba</i>	White Oak	R				6	3		S5			G5
<i>Quercus</i>	<i>macrocarpa</i>	Bur Oak		R			5	1		S5			G5
<i>Quercus</i>	<i>rubra</i>	Red Oak	R				6	3		S5			G5
Nyctaginaceae		Four-O'clock Family											
<i>Mirabilis</i>	<i>nyctaginea</i>	Heart-leaved Umbrella-wort	R					5	-1	S4			G5
Oleaceae		Olive Family											
<i>Fraxinus</i>	<i>americana</i>	White Ash	O	D	O	O	4	3		S5			G5
<i>Syringa</i>	<i>vulgaris</i>	Common Lilac	R			O		5	-2	SE5			G?
Onagraceae		Evening-primrose Family											
<i>Oenothera</i>	<i>biennis</i>	Common Evening-primrose	R				0	3		S5			G5
Ranunculaceae		Buttercup Family											
<i>Anemone</i>	<i>canadensis</i>	Canada Anemone	O				3	-3		S5			G5
<i>Ranunculus</i>	<i>acris</i>	Tall Buttercup	O						-2	SE5			G5
Rhamnaceae		Buckthorn Family											
<i>Rhamnus</i>	<i>cathartica</i>	Common Buckthorn	O	A		A		3	-3	SE5			G?
Rosaceae		Rose Family											
<i>Aronia</i>	<i>melanocarpa</i>	Black chokeberry			O		7	-3		S5			G5
<i>Fragaria</i>	<i>virginiana</i>	Virginia Strawberry	O				2	1		SU			G5T?
<i>Malus</i>	<i>pumila</i>	Common Crabapple			O			5	-1	SE5			G5
<i>Potentilla</i>	<i>argentea</i>	Silvery Cinquefoil	O	O				3	-2	SE5			G?
<i>Potentilla</i>	<i>simplex</i>	Old-field Cinquefoil	O				3	4		S5			G5
<i>Prunus</i>	<i>virginiana</i>	Choke Cherry	O		O	O	2	1		S5			G5T?
<i>Rosa</i>	<i>rubiginosa</i>	Sweetbrier Rose	O					5	-1	SE4			
<i>Rubus</i>	<i>allegheniensis</i>	Alleghany Blackberry		O			2	2		S5			G5
Salicaceae		Willow Family											
<i>Populus</i>	<i>deltoides ssp. deltoides</i>	Eastern Cottonwood	O	O	O		4	-1		SU			G5T?
<i>Populus</i>	<i>tremuloides</i>	Trembling Aspen	O	O			2	0		S5			G5
Scrophulariaceae		Figwort Family											
<i>Linaria</i>	<i>vulgaris</i>	Butter-and-eggs	O					5	-1	SE5			G?
<i>Verbascum</i>	<i>thapsus</i>	Common Mullein	O					5	-2	SE5			G?
Tiliaceae		Linden Family											
<i>Tilia</i>	<i>americana</i>	American Basswood		D		O	4	3		S5			G5
Ulmaceae		Elm Family											
<i>Ulmus</i>	<i>americana</i>	White Elm	O	O		O	3	-2		S5			G5?
Urticaceae		Nettle Family											
<i>Urtica</i>	<i>dioica ssp. dioica</i>	European Stinging Nettle		O				-1	-1	SE2			G5T?
Vitaceae		Grape Family											
<i>Parthenocissus</i>	<i>quinquefolia</i>	Five-leaved Virginia-creeper				O	6	1		S4?			G5
<i>Vitis</i>	<i>riparia</i>	Riverbank Grape	O			O	0	-2		S5			G5
MONOCOTYLEDONS		MONOCOTS											
Cyperaceae		Sedge Family											
<i>Carex</i>	<i>species</i>	Sedge species	A										

Appendix C. Vascular Plant Species List

Highway 401 / Palace Road Interchange Improvements - GWP 4197-13-00

BOTANICAL NAME		COMMON NAME	CUM1	FOM	CUP3	FOD	COEFFICIENT OF CONSERVATISM	WETNESS INDEX	WEEDINESS INDEX	PROVINCIAL STATUS	OMNR STATUS	COSEWIC STATUS	GLOBAL STATUS
Poaceae		Grass Family											
<i>Bromus</i>	<i>inermis</i> ssp. <i>inermis</i>	Awnless Brome	A					5	-3	SE5			G4G5T?
<i>Deschampsia</i>	<i>flexuosa</i>	Common Hairgrass	R				8	5		S5			G5
<i>Phalaris</i>	<i>arundinacea</i>	Reed Canary Grass	D				0	-4		S5			G5
<i>Phleum</i>	<i>pratense</i>	Timothy	D					3	-1	SE5			G?
<i>Phragmites</i>	<i>australis</i>	Common Reed	O				0	-4		S5			G5
Typhaceae		Cattail Family											
<i>Typha</i>	<i>latifolia</i>	Broad-leaved Cattail	O				3	-5		S5			G5

FLORISTIC SUMMARY & ASSESSMENT

Species Diversity

Total Species:	69	
Native Species:	39	56.52%
Exotic Species	30	43.48%
S1-S3 Species	0	
S4 Species	1	
S5 Species	36	

Co-efficient of Conservatism and Floral Quality Index

Co-efficient of Conservatism (CC) (average)	3.13	
CC 0 to 3 lowest sensitivity	20	51.28%
CC 4 to 6 moderate sensitivity	16	41.03%
CC 7 to 8 high sensitivity	3	7.69%
CC 9 to 10 highest sensitivity	0	0.00%
Floral Quality Index (FQI)	19.54	

Presence of Weedy & Invasive Species

mean weediness	-1.73	
weediness = -1 low potential invasiveness	13	43.33%
weediness = -2 moderate potential invasiveness	12	40.00%
weediness = -3 high potential invasiveness	5	16.67%

Presence of Wetland Species

average wetness value	1.71	
upland	22	31.88%
facultative upland	19	27.54%
facultative	10	14.49%
facultative wetland	15	21.74%
obligate wetland	2	2.90%

EXPLANATION OF TERMINOLOGY (See the following pages for addition detailed information on terms.)

Botanical and Common Name: From Newmaster et. al, 1998. Species requiring confirmation noted (cf).

Co-efficient of Conservatism: This value, ranging from 0 (low) to 10 (high), is based on a species tolerance of disturbance and fidelity to a specific habitat integrity.

Wetness Index: This value, ranging from -5 (obligate wetland) to 5 (upland) provides the probability of a species occurring in wetland or upland habitats.

Weediness Index: This value, ranging from -1 (low) to -3 (high) quantifies the potential invasiveness of non-native plants. In combination with the percentage of non-native plants, it can be used as an indicator of disturbance.

Provincial Status: Provincial ranks are used by the NHIC to set protection priorities for rare species and natural communities. These ranks are not legal designations. S4 and S5 species are generally uncommon to common in the province. Species ranked S1-S3 are considered to be rare in Ontario.

Local Status:

X: native species present (collection-based) and all exotic species

R: native species locally rare (number of stations): Durham (<10 stations), GTA (<40 stations), Site District 6E7 (<20 stations)

U: native species locally uncommon Durham (11-20 stations), GTA (41-80 stations), Site District 6E7 (21-40 stations)

Note: study area in Site District 6E13

Record Type

SR - sight record

SRP - sight record with photograph

KRAUS-00-001 - collection by D.T. Kraus for deposition into OAC (University of Guelph) herbarium

Annotations: Provides comments on general distribution and abundance on the subject lands. Definitions of terminology and abbreviations used as follows.

Abundance

Dominant: A plant with the greatest cover and/or biomass within a plant community and represented throughout the community by large numbers of individuals. Visually more abundant than other species in the same stratum and forming >10% ground cover, and >35% of the vegetation cover in any one stratum.

Abundant: Referring to a plant which is represented throughout the polygon or community by large numbers of individuals or clumps. Likely to be encountered anywhere in the polygon. Usually forming >10% ground cover.

Occasional: Referring to plants which are present as scattered individuals throughout a community, or represented by one or more large clumps of many individuals. Most species will fall into this category.

Rare: Cover or abundance of a plant species that is represented in the area of interest by only one to a few individuals.

DETAILED EXPLANATION OF TERMS

Floral Quality Index and Coefficient of Conservatism Values

Vegetation species and community sensitivity was assessed through the application of coefficient of conservatism values (CC), assigned to each native species in southern Ontario (Oldham, et. al, 1995). The value of CC, ranging from 0 (low) to 10 (high), is based on a species tolerance of disturbance and fidelity to specific habitat integrity. The occurrence of species with a CC of 9 or 10 can be good indicators of undisturbed conditions such as mature forests, fens or bogs.

General habitat values associated with the CC values are:

0-3: species found in a wide variety of communities, including disturbed sites

4-6: species associated with a specific community, but tolerate moderate disturbance

7-8: species associated with a community in an advanced successional stage, tolerant of minor disturbances

9-10: species with a high degree of fidelity to a narrow range of synecological parameters

The floristic quality of an area is reflected in the mean value of CC. For example, an old field or grazed woodlot would tend have a low mean CC; these habitats are dominated by opportunistic species that occur in a wide range of site conditions and are tolerant of disturbance. A bog, prairie or intact forest would have a higher value, reflecting the specific habitat requirements of many of the species and a generally undisturbed condition. The following provides an example of interpretation of CC values:

mean CC value / % spp CC >8 / Condition of the Landscape

5 / 27 / intact

3.5 / 19 / slightly degraded

1.3 / 2 / severely degraded

The FQI accounts for the species diversity of the area by equating the number of native species with the mean CC value. The FQI is generally used for comparing natural areas. The CC value and FQI of the study area were calculated for the entire study area.

Weediness Index

The sensitivity of natural areas can be assessed through application of the Weediness Index. The Weediness Index quantifies the potential invasiveness of non-native plants, and, in combination with the percentage of non-native plants can be used as an indicator of disturbance. Values (ranging from 1- to -3) have been assigned to most non-native species based on the potential impact each species can have in natural areas:

- 1: little or no impact on natural areas (most non-native plants are in this category)
- 2: occasional impacts on natural areas, generally infrequent or localized
- 3: major potential impacts on natural areas

Wetness Index

All plants in southern Ontario have been assigned a wetland category, based on the designations developed for use by the United States Fish & Wildlife Service. Plants are designated into the following categories:

- OBL* (Obligate Wetland): occurs almost always in wetlands under natural conditions (estimated >99% probability)
- FACW* (Facultative Wetland): usually occurs in wetlands, but occasionally found in non-wetlands (estimated 67-99% probability)
- FAC* (Facultative): equally likely to occur in wetlands or non-wetlands (estimated 34-66% probability)
- FACU* (Facultative Upland): occasionally occurs in wetlands, but usually occurs in non-wetlands (estimated 1-33% probability)
- UPL* (Upland): occurs almost never in wetlands under natural conditions (estimated <1% probability)

Further refinement of the Facultative categories are denoted by a "+" or "-" to express exaggerated tendencies for those species. The "+" denotes a greater estimated probability occurring in wetlands than species in the general indicator category, but a lesser probability than species occurring in the next higher category. The "-" denotes a lesser estimated probability of occurring in wetlands than species in the general indicator category, but a greater probability than species occurring in the next lower general category.

Each wetland category has been assigned a numerical value to facilitate the quantification of the wetness index. The wetland categories and their corresponding values are as follows:

- OBL : -5
- FACW+: -4
- FACW: -3
- FACW-: -2
- FAC+: -1
- FAC: 0
- FAC-: 1
- FACU+: 2
- FACU: 3
- FACU-: 4
- UPL: 5

Provincial Status

Provincial ranks are used by the NHIC to set protection priorities for rare species and natural communities. These rankings are based on the total number of extant Ontario populations and the degree to which they are potentially or actively threatened with destruction. The ranks are:

S1: Critically Imperiled—Critically imperiled in the nation or state/province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province

S2: Imperiled—Imperiled in the nation or state/province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province

S3: Vulnerable—Vulnerable in the nation or state/province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation

S4: Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors.

S5: Secure—Common, widespread, and abundant in the nation or state/province

SH: Possibly Extirpated (Historical)—Species or community occurred historically in the nation or state/province, and there is some possibility that it may be rediscovered. Its presence may not have been verified in the past 20-40 years. A species or community could become NH or SH without such a 20-40 year delay if the only known occurrences in a nation or state/province were destroyed or if it had been extensively and unsuccessfully looked for. The NH or SH rank is reserved for species or communities for which some effort has been made to relocate occurrences, rather than simply using this status for all elements not known from verified extant occurrences

SNR Unranked—Nation or state/province conservation status not yet assessed

SX: Presumed Extirpated—Species or community is believed to be extirpated from the nation or state/province. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered

SNA Not Applicable —A conservation status rank is not applicable because the species is not a suitable target for conservation activities.

SU: Unrankable—Currently unrankable due to lack of information or due to substantially conflicting information about status or trends

Rank ranges, e.g. S2S3, indicate that the rank is either S2 or S3, but that current information is insufficient to differentiate.

S#S# Range Rank —A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species or community. Ranges cannot skip more than one rank (e.g., SU is used rather than S1S4).

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Appendix **D**

Species at Risk Habitat Assessment

Appendix D: Species at Risk Habitat Screening

Ministry of Transportation - Highway 401 / County Road 41 Interchange Improvements (G.W.P. 4459-04-00)

Taxonomy	Species	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat ^{1, 2}	Known Species Range ^{1, 2}	Source Identifying Species Record	Suitable Habitat Identified During Background Review	Species Observed During Field Investigations	Conclusions/ Recommendations
Birds	Bank Swallow <i>Riparia riparia</i>	THR	No Status	THR	Bank swallows nest in burrows in natural and human-made settings where there are vertical faces in silt and sand deposits. Many nests are on banks of rivers and lakes, but they are also found in active sand and gravel pits or former ones where the banks remain suitable. The birds breed in colonies ranging from several to a few thousand pairs.	The bank swallow is found all across southern Ontario, with sparser populations scattered across northern Ontario. The largest populations are found along the Lake Erie and Lake Ontario shorelines, and the Saugeen River (which flows into Lake Huron).	OBBA Square Search 18QU40	No. There is no suitable habitat present.	No. This species was not identified during field investigations.	No additional surveys recommended.
Birds	Barn Swallow <i>Hirundo rustica</i>	THR	No Status	THR	<p>Barn Swallows often live in close association with humans, building their cup-shaped mud nests almost exclusively on human-made structures such as open barns, under bridges and in culverts. The species is attracted to open structures that include ledges where they can build their nests, which are often re-used from year to year. They prefer unpainted, rough-cut wood, since the mud does not adhere as well to smooth surfaces.</p> <p>This species can typically be associated with the following ELC communities: TPO, CUM1, MAM, MAS, OAO, SAS1, SAM1, SAF1; containing or adjacent structures that are suitable for nesting.</p>	The Barn Swallow may be found throughout southern Ontario and can range as far north as Hudson Bay, wherever suitable locations for nests exist.	OBBA Square Search 18QU40	Yes. Potential foraging habitat is present within the cultural meadow communities along Highway 401 ROW.	No. Nest surveys were completed under suitable bridges; however, there was no evidence of this species.	Suitable habitat may be present within the Construction Footprint. Additional surveys recommended.
Birds	Bobolink <i>Dolichonyx oryzivorus</i>	THR	No Status	THR	<p>Historically, Bobolinks lived in North American tallgrass prairie and other open meadows. With the clearing of native prairies, Bobolinks moved to living in hayfields. Bobolinks often build their small nests on the ground in dense grasses. Both parents usually tend to their young, sometimes with a third Bobolink helping.</p> <p>This species can typically be associated with the following ELC communities: TPO, TPS, CUM1 and MAM2.</p>	The Bobolink breeds across North America. In Ontario, it is widely distributed throughout most of the province south of the boreal forest, although it may be found in the north where suitable habitat exists.	OBBA Square Search 18QU40	Yes. Suitable habitat may exist within cultural meadow communities and agricultural land.	No. This species was not identified during field investigations	Species unlikely to be breeding within the Construction Footprint. No additional surveys recommended.
Birds	Chimney swift <i>Chaetura pelagica</i>	THR	THR Schedule 1	THR	<p>Before European settlement Chimney Swifts mainly nested on cave walls and in hollow trees or tree cavities in old growth forests. Today, they are more likely to be found in and around urban settlements where they nest and roost (rest or sleep) in chimneys and other manmade structures. They also tend to stay close to water as this is where the flying insects they eat congregate.</p> <p>Foraging habitat for this species can be associated with the following ELC codes: TPO, CUM1, MAM, MAS, OAO, SAS1, SAM1, SAF1 containing or adjacent structures with suitable nesting habitat (i.e. chimneys).</p>	The Chimney Swift breeds in eastern North America, possibly as far north as southern Newfoundland. In Ontario, it is most widely distributed in the Carolinian zone in the south and southwest of the province, but has been detected throughout most of the province south of the 49th parallel. It winters in northwestern South America.	OBBA Square Search 18QU40	Yes. Suitable foraging habitat is present within the study area. The cultural meadow community provides foraging habitat.	No. This species was not identified during field investigations	No additional surveys recommended.

Appendix D: Species at Risk Habitat Screening

Ministry of Transportation - Highway 401 / County Road 41 Interchange Improvements (G.W.P. 4459-04-00)

Taxonomy	Species	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat ^{1, 2}	Known Species Range ^{1, 2}	Source Identifying Species Record	Suitable Habitat Identified During Background Review	Species Observed During Field Investigations	Conclusions/ Recommendations
Birds	Common Nighthawk <i>Chordeiles minor</i>	SC	THR Schedule 1	THR	<p>Traditional Common Nighthawk habitat consists of open areas with little to no ground vegetation, such as logged or burned-over areas, forest clearings, rock barrens, peat bogs, lakeshores, and mine tailings. Although the species also nests in cultivated fields, orchards, urban parks, mine tailings and along gravel roads and railways, they tend to occupy natural sites.</p> <p>This species can typically be associated with the following ELC communities: SD, BB, RB, CUM, BO, FOM, FOC and FOD with openings with little vegetation.</p>	The range of the Common Nighthawk spans most of North and Central America. In Canada, the species is found in all provinces and territories except Nunavut. In Ontario, the Common Nighthawk occurs throughout the province except for the coastal regions of James Bay and Hudson Bay. It winters in South America where it is concentrated in Peru, Ecuador and Brazil.	OBBA Square Search 18QU40	Yes. Suitable habitat may exist within the cultural meadow and mixed forest community.	No. This species was not identified during field investigations	No additional surveys recommended.
Birds	Eastern Meadowlark <i>Sturnella magna</i>	THR	No Status	THR	<p>Eastern Meadowlarks breed primarily in moderately tall grasslands, such as pastures and hayfields, but are also found in alfalfa fields, weedy borders of croplands, roadsides, orchards, airports, shrubby overgrown fields, or other open areas. Small trees, shrubs or fence posts are used as elevated song perches.</p> <p>This species can typically be associated with the following ELC communities: TPO, TPS, CUM1, CUS, and MAM2 with elevated song perches.</p>	In Ontario, the Eastern Meadowlark is primarily found south of the Canadian Shield but it also inhabits the Lake Nipissing, Timiskaming and Lake of the Woods areas.	Ontario Breeding Birds Atlas	Yes. Suitable habitat may exist within cultural meadow communities and agricultural land.	No. This species was not identified during field investigations	Species unlikely to be breeding within the Construction Footprint. No additional surveys recommended.
Birds	Eastern Whip-poor-will <i>Caprimulgus vociferus</i>	THR	THR Schedule 1	THR	<p>The Eastern Whip-poor-will is usually found in areas with a mix of open and forested areas, such as savannahs, open woodlands or openings in more mature, deciduous, coniferous and mixed forests. It forages in these open areas and uses forested areas for roosting (resting and sleeping) and nesting. It lays its eggs directly on the forest floor, where its colouring means it will easily remain undetected by visual predators.</p> <p>This species can typically be associated with the following ELC communities: TPS, TPW, CUW, FOD, FOC and FOM where open areas are present.</p>	<p>The Eastern Whip-poor-will's breeding range includes two widely separate areas. It breeds throughout much of eastern North America, reaching as far north as southern Canada and also from the southwest United States to Honduras. In Canada, the Whip-poor-will can be found from east-central Saskatchewan to central Nova Scotia and in Ontario they breed as far north as the shore of Lake Superior.</p> <p>Although Eastern Whip-poor-wills were once widespread throughout the central Great Lakes region of Ontario, their distribution in this area is now fragmented. The Whip-poor-will migrates to Mexico and Central America, where it stays throughout the cold Canadian winter.</p>	OBBA Square Search 18QU40	Yes. Suitable habitat is present within the mixed and deciduous forest communities.	No. This species was not identified during field investigations	No additional surveys recommended.
Birds	Eastern Wood-Pewee <i>Contopus virens</i>	SC	No Status	SC	<p>The Eastern Wood-Pewee can be found in every type of wooded community in eastern North America. The size of the forest does not appear to be an important factor in habitat selection as this species has been found in both small fragmented forests and larger forest tracks. ⁴</p> <p>This species can typically be associated with the following ELC communities: FOC, FOM, FOD, SWD, SWM and CUW.</p>	The Eastern Wood-Pewee Breed throughout central and eastern North America from Saskatchewan to Nova Scotia south along the Atlantic Coast to North Florida and the Gulf Coast. ⁴	OBBA Square Search 18QU40	Yes. Suitable habitat is present within the mixed forest and deciduous forest communities.	No. This species was not identified during field investigations	No additional surveys recommended.

Appendix D: Species at Risk Habitat Screening

Ministry of Transportation - Highway 401 / County Road 41 Interchange Improvements (G.W.P. 4459-04-00)

Taxonomy	Species	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat ^{1, 2}	Known Species Range ^{1, 2}	Source Identifying Species Record	Suitable Habitat Identified During Background Review	Species Observed During Field Investigations	Conclusions/ Recommendations
Birds	Loggerhead Shrike <i>Lanius ludovicianus</i>	END	END Schedule 1	END	<p>In Ontario, the Loggerhead Shrike prefers pasture or other grasslands with scattered low trees and shrubs. It lives in fields or alvars (areas of exposed bedrock) with short grass, which makes it easier to spot prey. It builds its nest in small trees or shrubs and hunts by waiting patiently in tree branches until it swoops down and attacks its unsuspecting prey – usually large insects, such as grasshoppers. Loggerhead Shrikes also require spiny, multi-branched shrubs where they can impale prey before eating it. Barbed wired fencing can also be used for this.</p> <p>This species can typically be associated with the following ELC communities: SWT, CUM, CUT, ALO and ALS.</p>	The Loggerhead Shrike currently breeds in central and western North America. Until the 1970s, the Loggerhead Shrike could be found at many locations throughout southern Ontario and other parts of northeastern North America, but it has declined dramatically. Although the occasional bird is still found within the broader former range, most remaining Loggerhead Shrikes are now found in two core grassland habitats - the Carden Plain north of Lindsay, and the Napanee Limestone Plain. Every fall these birds migrate to the southern United States for the winter.	MNRF Peterborough Consultation	Yes. There is potential habitat in the cultural meadow communities along the Highway 401 ROW.	No. This species was not identified during field investigations	No additional surveys recommended.
Birds	Wood Thrush <i>Hylocichla mustelina</i>	SC	No Status	THR	<p>The Wood Thrush can typically be found in the interior and along the edges of well-developed upland deciduous and mixed forests. Key elements of these forests include trees that are greater than 16 m in height, high variety of deciduous tree species, moderate subcanopy and shrub density, shade, fairly open forest floor, moist soils and decaying leaf litter. Wood Thrush is more likely to occur in larger forests but may also nest in 1 ha fragments and semi-wooded residential areas and parks. Smaller habitat fragments have lower fecundity when compared to larger fragments.</p> <p>This species can typically be associated with the following ELC communities: FOD and FOM that are greater than 1 ha in size.</p>	<p>The Wood Thrush ranges across central and southern Ontario, southern Quebec, New Brunswick and southern Nova Scotia and the majority of the eastern United States.</p> <p>It winters in Central American between southern Mexico and Panama. ³</p>	MNRF Peterborough Consultation	Yes. There is potential habitat within the FOM and FOD communities located south and east of the Napanee River.	No. This species was not identified during field investigations	No additional surveys recommended.
Mammals	Eastern Small-footed Myotis	END			<p>In the spring and summer, eastern small-footed bats will roost in a variety of habitats, including in or under rocks, in rock outcrops, in buildings, under bridges, or in caves, mines, or hollow trees.</p> <p>These bats often change their roosting locations every day. At night, they hunt for insects to eat, including beetles, mosquitos, moths, and flies.</p> <p>In the winter, these bats hibernate, most often in caves and abandoned mines. They seem to choose colder and drier sites than similar bats and will return to the same spot each year.</p>	The eastern small-footed bat has been found from south of Georgian Bay to Lake Erie and east to the Pembroke area. There are also records from the Bruce Peninsula, the Espanola area, and Lake Superior Provincial Park. Most documented sightings are of bats in their winter hibernation sites.	Bat Conservation International	Yes. Suitable habitat is present within the woodland communities (i.e., FOD, FOM, CUP).	No. This species was not identified during field investigations	Additional MNRF consultation recommended.

Appendix D: Species at Risk Habitat Screening

Ministry of Transportation - Highway 401 / County Road 41 Interchange Improvements (G.W.P. 4459-04-00)

Taxonomy	Species	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat ^{1, 2}	Known Species Range ^{1, 2}	Source Identifying Species Record	Suitable Habitat Identified During Background Review	Species Observed During Field Investigations	Conclusions/ Recommendations
Mammals	Little Brown Myotis (Bat) <i>Myotis lucifugus</i>	END	No Status	END	<p>Bats are nocturnal. During the day they roost in trees and buildings. They often select attics, abandoned buildings and barns for summer colonies where they can raise their young. Bats can squeeze through very tiny spaces (as small as six millimetres across) and this is how they access many roosting areas.</p> <p>Little brown bats hibernate from October or November to March or April, most often in caves or abandoned mines that are humid and remain above freezing. This species can typically be associated with any community where suitable roosting (i.e. caviety trees, houses, abandoned buildings, barns, etc.) habitat is available.</p>	The little brown bat is widespread in southern Ontario and found as far north as Moose Factory and Favourable Lake. Outside Ontario, this bat is found across Canada (except in Nunavut) and most of the United States.	Mammals of Ontario Atlas, Bat Conservation International	Yes. Suitable habitat is present within the woodland communities (i.e., FOD, FOM, CUP).	No. This species was not identified during field investigations	Additional MNRF consultation recommended.
Mammals	Northern (Long-eared) Myotis (Bat) <i>Myotis septentrionalis</i>	END	No Status	END	<p>Northern long-eared bats are associated with boreal forests, choosing to roost under loose bark and in the cavities of trees. These bats hibernate from October or November to March or April, most often in caves or abandoned mines.</p> <p>This species can typically be associated with the following ELC communities: FOC, FOM, FOD, SWC, SWM and SWD where suitable roosting (i.e. caviety trees and trees with loose bark) habitat is available.</p>	<p>The northern long-eared bat is found throughout forested areas in southern Ontario, to the north shore of Lake Superior and occasionally as far north as Moosonee, and west to Lake Nipigon.</p> <p>This bat is found in all Canadian provinces as well as the Yukon and Northwest Territories.</p>	Bat Conservation International	Yes. Suitable habitat is present within the woodland communities (i.e., FOD, FOM, CUP).	No. This species was not identified during field investigations	Additional MNRF consultation recommended.
Mammals	Tri-colored Bat <i>Perimyotis subflavus</i>	END	END Schedule 1	END	The Tri-colored Bat lives in a variety of forest habitats, preferring edge habitats near areas of mixed agriculture. The species forms day roosts and maternity colonies in older forest and occasionally in barns and buildings. In winter, the Tri-colored Bat hibernates solitarily in caves or underground locations.	The Tri-colored Bat has a scattered distribution across eastern North America from southern Ontario south to Central America. The species can be found across southern Ontario as far north as Sudbury.	Bat Conservation International	Yes. Suitable habitat is present within the woodland communities (i.e., FOD, FOM, CUP).	No. This species was not identified during field investigations	Additional MNRF consultation recommended.
Plants	Four-leaved Milkweed <i>Asclepias quadrifolia</i>	END	No Status	END	<p>Four-leaved milkweed typically occurs on dry to somewhat moist, shallow or rocky soils over limestone, or sometimes sandstone, bedrock within mature deciduous woodlands and sometimes in forests, thickets or meadows.</p> <p>In Ontario, it is found in two types of habitat: (1) dry woodlands dominated by Tallgrass prairie herbs, Bur Oak and Shagbark Hickory, and (2) a woodland alvar dominated by Red Cedar and pasture grasses, which was probably created by human activities.</p>	In Ontario, there are only two known populations remaining for Four-leaved Milkweed, both in Prince Edward County. Historically, populations have also been recorded from the neighbouring Lennox and Addington County, as well from the Niagara River gorge.	MNRF Peterborough Consultation	No. There is no suitable habitat present.	No. This species was not identified during field investigations	No additional surveys recommended.

Appendix D: Species at Risk Habitat Screening

Ministry of Transportation - Highway 401 / County Road 41 Interchange Improvements (G.W.P. 4459-04-00)

Taxonomy	Species	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat ^{1, 2}	Known Species Range ^{1, 2}	Source Identifying Species Record	Suitable Habitat Identified During Background Review	Species Observed During Field Investigations	Conclusions/ Recommendations
Plants	Ogden's Pondweed <i>Potamogeton ogdenii</i>	END	END Schedule 1	END	<p>In Ontario, Ogden's pondweed is found in clear, slow-moving streams, beaver ponds and lakes.</p> <p>It often grows with other species of narrow-leaved pondweeds, which can make identification of this rare plant even more difficult.</p>	<p>In Canada, Ogden's pondweed is found only in southeastern Ontario. It was recorded at Murphys Point Provincial Park and Davis Lock on the Rideau Canal between 1970 and 1990.</p> <p>A historical sighting of the species was recorded in Hastings County in 1873. It has been recommended that additional surveys are needed to determine whether this species exists at any other sites in Ontario.</p> <p>Outside of Canada, Ogden's pondweed has been identified in Connecticut, New York, Vermont and Massachusetts.</p>	MNRF Peterborough Consultation	No. There is no suitable habitat present.	No. This species was not identified during field investigations	No additional surveys recommended.
Reptiles	Eastern Musk Turtle (Stinkpot) <i>Sternotherus odoratus</i>	THR	THR Schedule 1	SC	<p>Eastern Musk Turtles are found in ponds, lakes, marshes and rivers that are generally slow-moving have abundant emergent vegetation and muddy bottoms that they burrow into for winter hibernation. Nesting habitat is variable, but it must be close to the water and exposed to direct sunlight. Nesting females dig shallow excavations in soil, decaying vegetation and rotting wood or lay eggs in muskrat lodges, on the open ground or in rock crevices.</p> <p>This species can typically be associated with the following ELC communities: MAS, OAO, SAS, SAM and SAF. Nesting habitat can be any upland areas adjacent these area that are exposed to direct sunlight.</p>	<p>In Canada, the Eastern Musk Turtle is found mostly along the southern edge of the Canadian Shield in Ontario and Quebec. In Ontario, it also occurs at various locations throughout southwestern and eastern Ontario. The limited data available indicate that the stinkpot has disappeared from much of its original range in southwestern Ontario.</p>	MNRF Peterborough Consultation	Yes. The Napanee River presents potential habitat within the Overall Study Area.	No. This species was not identified during field investigations	No additional surveys recommended.
Reptiles	Northern Map Turtle <i>Graptemys geographica</i>	SC	SC Schedule 1	SC	<p>The Northern Map Turtle inhabits rivers and lakeshores where it basks on emergent rocks and fallen trees throughout the spring and summer. In winter, the turtles hibernate on the bottom of deep, slow-moving sections of river. They require high-quality water that supports the female's mollusc prey. Their habitat must contain suitable basking sites, such as rocks and deadheads, with an unobstructed view from which a turtle can drop immediately into the water if startled.</p> <p>This species can typically be associated with the following ELC communities: OAO, SA with emergent rocks and fallen trees suitable habitat for prey.</p>	<p>The Northern Map Turtle's range extends from the Great Lakes region west to Oklahoma and Kansas, south to Louisiana and east to the Adirondack and Appalachian mountain barrier. There are isolated populations in New Jersey and New York states. In Canada, it is found in southwestern Quebec and southern Ontario. In southern Ontario, it lives primarily on the shores of Georgian Bay, Lake St. Clair, Lake Erie and Lake Ontario, and along larger rivers including the Thames, Grand and Ottawa.</p>	MNRF Peterborough Consultation	Yes. The Napanee River presents potential habitat within the Overall Study Area.	No. This species was not identified during field investigations	No additional surveys recommended.

Taxonomy	Species	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat ^{1, 2}	Known Species Range ^{1, 2}	Source Identifying Species Record	Suitable Habitat Identified During Background Review	Species Observed During Field Investigations	Conclusions/ Recommendations
Reptiles	Snapping turtle Chelydra serpentina	SC	SC Schedule 1	SC	<p>Snapping Turtles spend most of their lives in water. They prefer shallow waters so they can hide under the soft mud and leaf litter, with only their noses exposed to the surface to breathe. During the nesting season, from early to mid summer, females travel overland in search of a suitable nesting site, usually gravelly or sandy areas along streams. Snapping Turtles often take advantage of man-made structures for nest sites, including roads (especially gravel shoulders), dams and aggregate pits.</p> <p>This species can typically be associated with the following ELC communities: OA0, SA near gravelly or sandy areas.</p>	The Snapping Turtle's range extends from Ecuador to Canada. In Canada this turtle can be found from Saskatchewan to Nova Scotia. It is primarily limited to the southern part of Ontario. The Snapping Turtle's range is contracting.	MNRF Peterborough Consultation	Yes. The Napanee River presents potential habitat within the Overall Study Area.	No. This species was not identified during field investigations	No additional surveys recommended.

Appendix I – Fish and Fish Habitat Existing Conditions Report

Ontario Ministry of Transportation (MTO)

Fish and Fish Habitat Existing Conditions – Improvements to Highway 401 Interchange at Palace Road (GWP 4197-13-00) in the County of Lennox-Addington

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Project #: 60318949

Distribution List

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1	✓	AECOM Canada Ltd.

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1. Introduction

The Ontario Ministry of Transportation (MTO) has retained AECOM to undertake a Preliminary Design and Class Environmental Assessment Study (Group 'B' project) for improvements to the Highway 401 / Palace Road interchange (G.W.P. 4197-13-00). The project is located in the Town of Greater Napanee within the County of Lennox and Addington.

The primary focus of this study is to:

- Review the structural requirements (e.g., major rehabilitation or replacement) of the two Palace Road bridges;
- Identify interim and long-term interchange improvements to address geometric and operational concerns;
- Develop a Preliminary Design including a staging plan to allow the technically preferred structural works and interchange improvements to be implemented efficiently, minimizing construction costs, traffic disruption and future throwaway.

The operational improvements for the interchange are not expected to require widening of the Highway 401 bridge over the Napanee River to provide an extension to the eastbound off ramp and/or westbound on-ramp.

Minor rehabilitation was completed on both bridges in 2012, which was limited in scope due to limitations on construction staging imposed by Highway 401 lane restrictions. It is anticipated that a full replacement of the bridges will be required within the next 5 years.

Concurrently, MTO is undertaking a separate Preliminary Design and Class Environmental Assessment Study for improvements to the Highway 401 interchange at County Road 41.

The development of an ultimate plan for the Palace Road interchange allows for the necessary structural replacement works to be implemented efficiently and in a cost effective manner, minimizing future throwaway.

This project is being conducted in accordance with the approved environmental planning process for Group 'B' projects in accordance with the *Class Environmental Assessment for Provincial Transportation Facilities* (2000).

The Recommended Plan includes a westerly realignment of Palace Road and a new interchange configuration with new buttonhook ramps. As part of the realignment, Palace Road will cross over Highway 401 and the existing bridges will be removed. The new interchange ramps will require additional property in both the northeast and northwest quadrants. The staging strategy will be confirmed during a future Detail Design assignment in advance of the short-term construction.

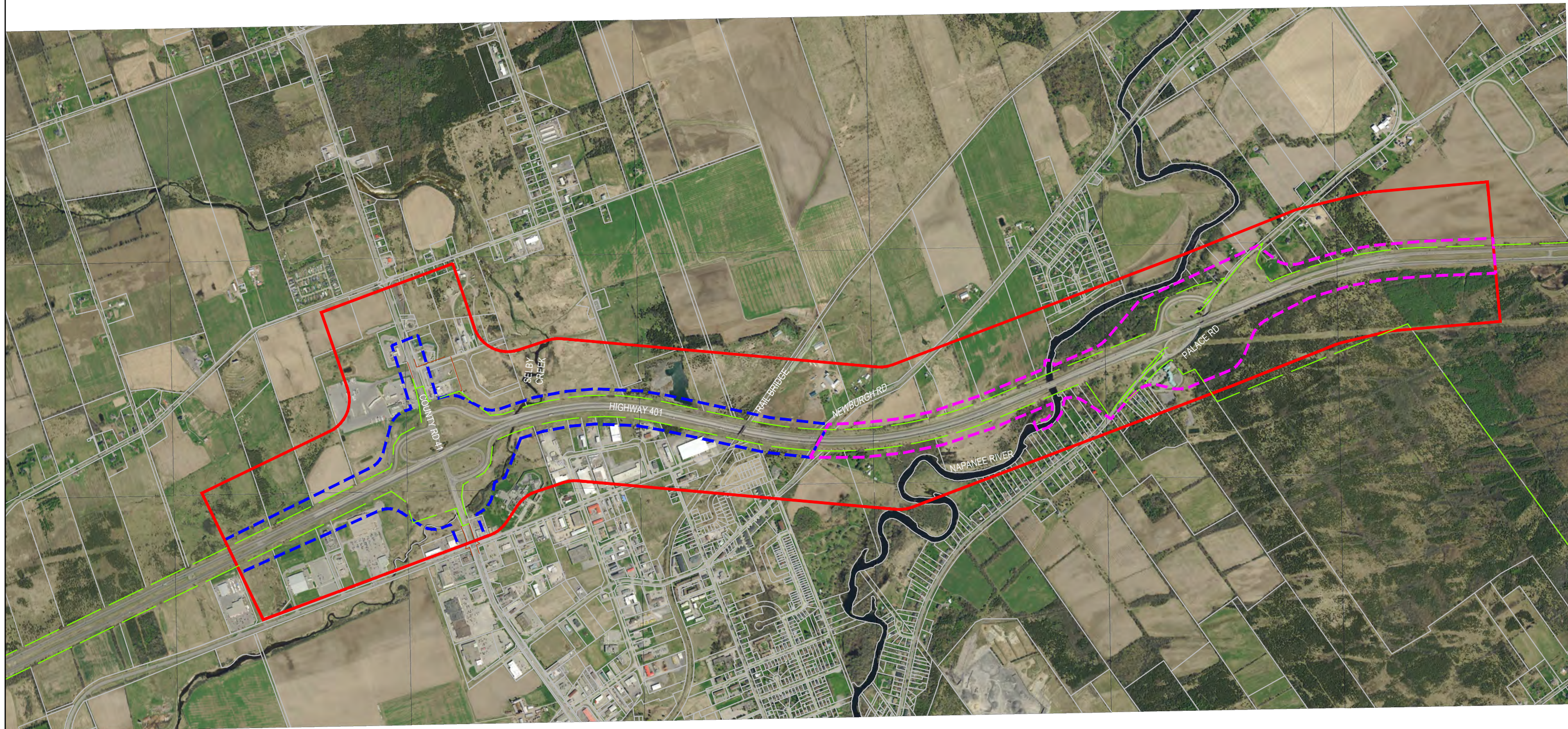
The Overall Study Area for this project is 600 m wide, extending along Highway 401 from the Newburgh Road underpass easterly across the Napanee River to 1,300 m east of the Palace Road bridges. In compliance with the MTO 'Environmental Guide for Fish and Fish Habitat (the Guide; 2009), the area of interest extends along the Napanee River 50 m upstream and 200 m downstream of the Highway 401 right-of-way. **Figure 1** shows the Overall Study Area considered as part of this report.

This report provides the Fish and Fish Habitat Existing Conditions documented by AECOM to fulfill the requirements under the MTO/DFO/MNRF Fisheries Protocol for Protecting fish and Fish Habitat on Provincial Transportation Undertakings, Version 3 (the Protocol, 2016).


Table 1 provides the Universal Transverse Mercator (UTM) co-ordinates for the structure assessed under the MTO/DFO/OMNR Fisheries Protocol in this report:

Table 1: Location of Structures (Template 10.1)

Label	Name	Creek Name	Municipality	Easting	Northing
GWP 4197-13-00	Highway 401	Napanee River	Greater Napanee	579813	4902079



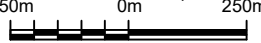
- OVERALL STUDY AREA (300m BUFFER)
- - - POTENTIALLY IMPACTED AREA (COUNTY ROAD 41)
- - - POTENTIALLY IMPACTED AREA (PALACE ROAD)
- - - LIMITS OF MTO OWNED PROPERTY




Ontario
Ministry of Transportation

**FIGURE 1: HIGHWAY 401 INTERCHANGE
IMPROVEMENTS AT COUNTY ROAD 41 (G.W.P.
4459-04-00) AND PALACE ROAD (G.W.P.
4197-13-00)**

250m 0m 250m



OCTOBER 2016



2. Background and Data Collection

In accordance with Step 2 of the Protocol; 2016, pertinent information on the fish and fish habitat features of the study area were obtained through review of secondary source material from the following sources:

- Ministry of Transportation Eastern Region. (2011) Environmental Screening Document – W.P. 98-99-00 & W.P. 99-99-00;
- Ontario Ministry of Natural Resources and Forestry (MNRF) – Natural Heritage Information Centre Make a Map feature;
- MNRF Online Species at Risk Database and email request for information to MNRF Kingston Office;
- DFO Aquatic Species At Risk Online Mapping website and email request for information;
- Ontario Freshwater Fishes Life History on-line database; and,
- Aerial photography;

The Napanee River is within the jurisdiction of Quinte Conservation. The Overall Study Area does not contain any Provincially Significant Wetlands.

Based on email correspondence from the Kingston MNRF (**Appendix C**), American Eel (listed as Endangered with the Provincial *Endangered Species Act*; ESA) is present in the Napanee River. The species was not identified on the species list for the Napanee River which was received from the Peterborough MNRF on March 16, 2016, however; clarification from the Kingston MNRF stated that an MNRF researcher has caught American Eel in the River in 2010 and the species has the potential to the river presently. Further, although American Eel are not currently listed as a Species at Risk (SAR) under the federal Species at Risk Act (SARA), it is considered Threatened by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), and DFO has indicated American Eel is under consideration for listing to Schedule 1 of SARA.

Present science considers the American Eel to consist of a single breeding population in which all individuals travel to the Sargasso Sea in the Atlantic Ocean to spawn. From there, young eels drift with ocean currents and most eventually migrate inland into streams, rivers and lakes.

American Eel begin moving upstream to freshwater habitats when the water temperatures reach 10°C and continue until the temperatures exceed 20°C. In Canada this is typically between late April and early August. However, the eels can tolerate a wide range of water temperatures and lotic conditions (DFO, 2013).

The Napanee River exhibits many of the habitat characteristics that American Eel require. This includes a silty substrate and slow to moderate flowing water. Further, habitat conditions within the assessed reach contain non-limiting feeding and migratory habitat that is likely conducive to eels, including pools for elvers protection and silt substrate for periods of rest.

Overall, the Napanee River was found to contain fish habitat and is managed as warmwater habitat by the MNRF. The Napanee River is a permanent warmwater system that supports a mixed warmwater and coolwater assemblage. The Peterborough District Area MNRF noted that the Napanee River has dams in the Town of Napanee, Strathcona, Camden East, and Colebrook which inhibit fish migration up the river. MNRF files also indicate that there is a waterfall in the Town of Yarker and an escarpment between Howes Lake and Bass Lake that act as natural barriers.

2.1 Field Investigation Methods

On June 3, and on October 4 and 5, 2016, AECOM ecologists conducted a Fisheries and Aquatic Habitat assessment to determine the existing conditions of one (1) watercourse, the Napanee River. The Fisheries and Aquatic Habitat Assessment was completed in accordance with the Guide (June 2009). Sufficient information (confirmed by MNRF as representative of current conditions) was available within background information to characterize the fish community within the vicinity of the study area. As such, fish community sampling was not conducted.

A canoe was utilized to obtain grab samples of the river substrate and to document the depth profile across the river in various locations, both upstream and downstream of the bridge.

As per Section 3.1.2 of the *MTO Environmental Reference for Highway Design* (ERD; 2013), for the purposes of investigating the potential impacts of the Project on fish and fish habitat, the study area, for each respective structure, was divided into two (2) zones: the Zone of Detailed Assessment (ZDA), which includes the areas within the MTO right-of-way (ROW), from 0 m to 50 m downstream of the ROW, and from 0 m to 20 m upstream of the ROW and the Zone of General Assessment (ZGA), which included from 50 m to 200 m downstream of the ROW and from 20 m to 50 m upstream of the ROW (of which only a general description of the aquatic environment is documented).

Recorded criteria included:

- Surrounding natural features and land uses (i.e., wetland, agriculture, industrial etc.);
- Channel dimensions, channel morphology and bank stability;
- Stream morphology dimensions:
 - Runs – typically deep, fast moving water with little to no turbulence of water
 - Riffles – shallow, fast moving water typically running over rocks; riffles provide areas of high oxygenated waters
 - Flats – low flowing water with a smooth un-agitated surface
 - Pools – are described as deep pockets of slow moving water that provide ideal habitat for fish;
- Substrate composition (e.g., clay, silt, sand, gravel, cobble, rock, boulder, muck and detritus);
- Indicators of water clarity, water colour, presence and type of aquatic macrophytes, algal growth and evidence of runoff;
- Potential enhancement opportunities; and,
- Pollution sources (i.e., tile drain discharges, other piped discharges and road runoff).

In-stream cover was documented based on the percentage of cover provided by woody debris, boulders (>256 millimetres (mm) diameter), cobble (256-64 mm diameter), gravel (64-2 mm), aquatic vegetation and undercut banks. In-stream cover was classified as high if there was in-stream coverage between the areas of 76 to 100%; moderate 31 to 75%; and low 0 to 30%. Riparian vegetation canopy cover was provided as a percentage of cover over the site of investigation. Overall canopy cover was classified as: high 61 to 100%; moderate cover 31 to 60%; and low cover 0 to 30%.

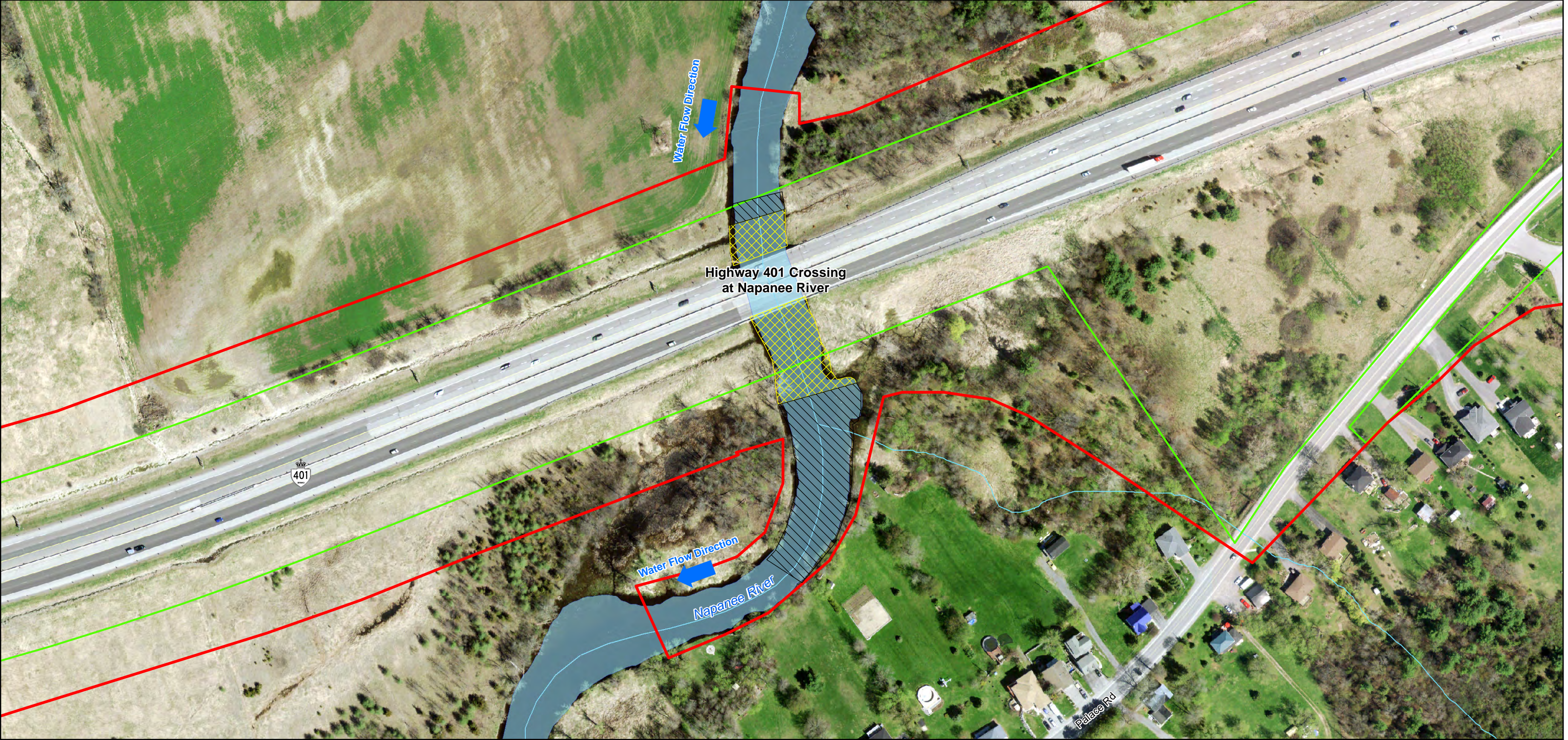
A representative photo-log is provided in **Appendix A** to document the site characteristics. Field notes are found in **Appendix B**.

3. Project Description

The following subsection provides a description of the existing structure and the proposed works. An opportunity and constraints map for the Palace Road bridge structure is provided in **Figure 2**.

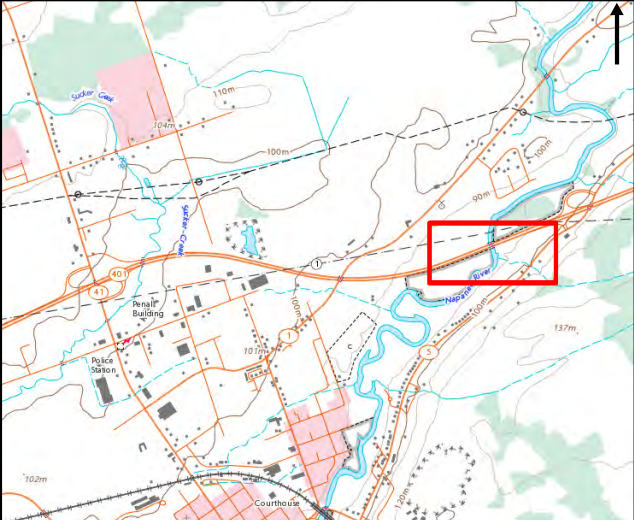
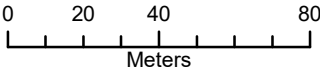
3.1 Palace Road Bridge and New Interchange Ramps

The Recommended Plan includes a westerly realignment of Palace Road and a new interchange configuration with new buttonhook ramps. As part of the realignment, Palace Road will cross over Highway 401 and the existing bridges will be removed. The new interchange ramps will require additional property in both the northeast and northwest quadrants. The staging strategy will be confirmed during a future Detail Design assignment in advance of the short-term construction.



Legend

- Potentially Impacted Area
- Existing MTO ROW
- Watercourse
- Waterbody
- Unevaluated Wetlands
- Zone of Detailed Assessment
- Zone of General Assessment



Hwy 401 & Palace Road		
Palace Road Bridge over Napanee River Opportunities and Constraints		
September 2018	1:2,000	Datum: NAD83 UTM18 Source: LIO 2015
P#: 60478166	V#:	AECOM
Figure 2		
<small>This drawing has been prepared for the use of AECOM's client and may not be used, reproduced or relied upon by third parties, except as agreed by AECOM and its client, as required by law or for use by governmental reviewing agencies. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that modifies this drawing without AECOM's express written consent.</small>		

Map location: C:\PROJECTS\60478166 - Palace Road\GIS\Map\Final\Fisheries.mxd
Date saved: 27/09/2018 4:39:31 PM

4. Field Investigations

In accordance with Step 1 of the Protocol, an assessment of existing fish and fish habitat conditions has been completed as outlined in the following subsections to determine if the project/activity may cause impacts to a commercial, recreational or Aboriginal fishery or to fish that support such a fishery.

4.1 Fish Habitat Assessment

Bridge at Highway 401 (Napanee River)

The Napanee River is a permanent, large, slow to moderate flowing river. The wetted width was approximately 18-20 m. The structure at Highway 401 is a two-span concrete bridge with its centre pier in the centre of the river, and with abutments that constitute the shoreline under the bridge. No barriers to fish passage were observed during the site reconnaissance of the Potentially Impacted Area (although as noted above, there are dams in the Town of Napanee, Strathcona, Camden East, and Colebrook). No specialized fish habitats (e.g., spawning, feeding, nursery areas) were identified within the Napanee River study area.

4.1.1 Zone of Detailed Assessment

Upstream (extending 20 m upstream of the highway right-of-way)

Upstream of the bridge the riparian zone was approximately 10-15 m wide and dominated by herbaceous and grass species. Beyond this zone was highway immediately south and agricultural fields to the east, further northwest a manicured park was observed. The entire reach was dominated by a flat. The substrate consisted of a detritus with fine sand and silt as evidenced by a grab sample. The mean wetted width was 18 to 20 m and water depth was measured to be an average of 1.23 m (east bank = 0.7 m, centre = 1.7 m, west bank = 1.3 m). Instream cover consisted of aquatic vegetation (70%), undercut banks (40%), and woody debris (25%). The instream vegetation was estimated to account for 50%, mainly mosses, Tape grass, and Canada waterweed, while the overhanging vegetation (herbaceous grasses) accounted for 20%. The banks were observed to be moderately unstable and very silty, as roots were exposed at the water's edge. It was evident that the river was under a period of decreased flow during the site reconnaissance and that increased flow from previous months had eroded some of the bank material away. The west bank consisted of large mature trees, including White pines, Basswood, and White/Green Ash, with Cattails dominating within the immediate impact area. The east bank had a smaller riparian area (5 m wide) of mature trees adjacent to the manicured park. The east bank was steeper (3 m in height) with herbaceous grasses as main riparian species. Less canopy cover existed on the east bank however submerged vegetation was present, including Canada waterweed and algae. No evidence of groundwater was observed and no specialized fish habitats for the warmwater fishery (e.g., spawning, feeding, nursery areas) were identified at the site. No barriers to fish passage were observed during the site reconnaissance. A school of Bluntnose minnows (*Pimephales notatus*) was observed near the east bank approximately 20 m upstream of the bridge and a Black sandshell (*Ligumia recta*) mussel was captured with a substrate grab sample at the east bank within the immediate area of potential impact.

Downstream (extending 50 m downstream of the highway right-of-way)

Downstream of the bridge the riparian zone was approximately 5 m wide and dominated by herbaceous and grass species. Similar to the upstream reach, the downstream was dominated by a flat. The dominant substrate was a dark detritus comprised of organic matter with fine sandy silt. An organic odour was noticed from the sample which

may indicate elevated levels of nitrogen and phosphorus along with decaying plant matter and an increased level of algae which was evident at the time of the site visit. Mean wetted width was 14-15 m and water depth was measured to be an average of 1.53 m (east bank = 1.3 m, centre = 2.0 m, west bank = 1.3 m). Instream cover was high and consisted of submergent and emergent vegetation including Yellow water lily (*Nuphar lutea*), Canada waterweed (*Elodea canadensis*), and a variety of unidentified mosses and algae. The instream vegetation accounted for 60%, mainly mosses and Canada waterweed, while the overhanging vegetation accounted for 40%. Moss and algae was present on submerged rocks. The banks were grass covered and moderately unstable as the silty areas were eroding or beginning to erode, however, they were well vegetated with grasses, Cow vetch, Sensitive fern, and Sweet white clover. A moderate amount of canopy cover existed, however more canopy cover was present on the east bank. No evidence of groundwater was observed, however; potential specialized fish habitats (e.g., spawning, feeding, nursery areas) were identified at the site. Approximately 5 m downstream of the bridge at the west bank, a ditch area appeared to be connected to the floodplain and was inundated with water during the site reconnaissance with a wetted width of approximately 1 m. Earth barriers were observed to prevent fish from possibly migrating further up the ditch to the west. Approximately 20 m downstream of the bridge on the east side was an area of inundation where the river is well connected to the floodplain. It is possible that these areas on the east and west banks may provide potential Pike spawning during the spring season when flows are increased.

4.1.2 Zone of General Assessment

Upstream (extending from 20 m to 30 m upstream of the highway right-of-way)

The upstream habitat is similar to that of the habitat within the detailed zone of assessment. The banks were predominately silt with mature tree cover and moderately unstable. The aquatic vegetation consisted mainly of Tape grass and Canada waterweed and was very prevalent. A downed tree was present in the water at the east bank. The average water depth measured at 0.97 m (east bank = 0.72 m, centre = 1.10 m, west bank = 1.10 m). The adjacent land uses were forest, residential, highway, and parkland.

Downstream (extending from 50 m – 150 m downstream of the highway right-of-way)

The downstream habitat was surrounded by private residential properties. Mature tree cover was present as the creek flowed downstream. The river appeared consistent in morphology throughout the detailed and general zone of assessment. The average water depth measured at 1.7 m (east bank = 1.7 m, centre = 2.0 m, west bank = 1.4 m). Approximately 20 m to 30 m downstream of the bridge the river was very well connected to the floodplain. The area at this location is likely subject to inundation during increased flows and likely provides Pike spawning habitat due to the presence of some hummocks and suitable vegetation including sedges, Cow vetch, Asters, Cattails, Sensitive fern, Arrowhead, and Sweet white clover were observed in this area. During the site reconnaissance, the area was not inundated with water. The adjacent land uses were forest, residential, highway, and parkland.

4.1.3 Extended Study Area

The extended Study Area was included to encompass the additional land that extends to Newburgh Road from west of the Napanee River. The area to the west of Newburgh Road is included in the study area for the *Improvements to the Highway 401 Interchange at County Road 41 (G.W.P. 4459-04-00)* which is documented in the *Draft Fish and Fish Habitat Existing Conditions Report (December 2016)*.

Southwest of Highway 401

An inundated channel was identified within the roadside ditch along the Highway 401, however; the water was not connected to the river due to earth barriers. The roadside ditch along the south side of the highway provides

potential fish habitat for 75 m west from the Napanee River. Beyond the 75 m the ditch was observed to have only ~0.01 m of water which was likely from overland flow and rainfall.

At approximately 100 m east of Newburgh Road the ditch had a gravel bottom with decreased amounts of vegetation and 0.05 m of water with some flow. A perched corrugated steel pipe (CSP) culvert was observed creating a pooling of water flowing from north of the highway. A steep bank was observed immediately east, as the roadside ditch ended. From the identified CSP to Newburgh Road no potential fish habitat was identified.

Northwest of the Palace Road Interchange

A 1.5 m by 1.5 m cast in place culvert for road drainage was identified. The area was dry at the time of the site reconnaissance; however it appeared to convey stormwater from the highway to an entrenched channel overgrown with grasses. It was not likely potential fish habitat and not connected to any existing fish habitat.

Northeast of the Palace Road Interchange

Overland flow likely passes through this area as evidenced by an entrenched ditch approximately 0.5 m wide and 0.25 m deep. There was no water observed during the site visit, however during periods of high flow and storm events, the channel likely conveys flow into the forest. The ditch line has cattails but no defined channel or water.

Southeast of Palace Road Interchange

The ditch line is mowed up to a rock cut and beyond to the Pine trees. A grate to drain overland flow was observed ~150 m east of Palace Road. No fish habitat was observed in this section.

Southwest of Palace Road Interchange

The ditch is dominated by cattails with no defined channel or water present. Upland vegetation increases to the east. Closer to the river there is the possibility for connection if water were to flow around the steeper banks as the river is very well connected to floodplain in this area; however it is not likely that full connection from the river to the ditch area would occur.

4.2 Fish Community Structure

Initial review of fish community data provided through MNRF information requests was greater than 10 years old, however, MNRF indicated that the fish community records provided were still considered relevant and valid to characterize fish community and as such the fish community survey was not conducted.

Table 2 summarizes the existing fish community assemblage based on Template 10.2 of the MTO Fish Guide.

Table 2: Template 10.2 Summary of Existing Fish and Fish Habitat Conditions

GWP or Project Name	Waterbody	Latitude	Longitude	Flow	Thermal Regime	Fish Habitat	Fish Species Present	Substrate Type	Vegetation	Constraints and Opportunity	Important, Exceptional Fish Habitat	Species at Risk / Critical Habitat Present	*In-water Works Timing Window
Improvements to Highway 401 Interchange at Palace Road (GWP 4197-13-00)	Napanee River	44.267639	76.932412	Permanent	Warm	Yes	<p>Source: MNR (2016) American Eel (captured in 2010)</p> <p>Source: MNR (1977) White Perch, Yellow Perch, Brown Bullhead, Northern Pike, Smallmouth Bass, Burbot, Black Crappie, Yellow Bullhead, White Sucker, Rock Bass, Bluegill, Pumpkinseed</p> <p>Source: Beak Consultants Limited (1995) Northern Pike, Walleye, Smallmouth Bass, Rock Bass, Pumpkinseed, Fallfish, White Sucker, Yellow Bullhead, Logperch, American Eel, Largemouth Bass, Burbot,</p> <p>Source: P. Riebel Associates Inc. (1999) Common Shiner, Mimic Shiner, Bluntnose Minnow</p> <p>Source: Minnow Environmental Inc. (2002) Bluntnose Minnow, Brown Bullhead, Yellow Bullhead, Creek Chub, Johnny Darter, Common Shiner, Golden Shiner, Mimic Shiner, Pumpkinseed, Brook Silverside, Northern Pike, Rock Bass, Yellow Perch, White Sucker</p> <p>Source: Minnow Environmental Inc. (2005) Bluntnose Minnow, Fathead Minnow, Golden Shiner, Brown Bullhead, Logperch, Mimic Shiner, Central Mudminnow, Northern Pike, Pumpkinseed, Rock Bass, Brook Silverside, White Sucker, Yellow Perch, Johnny Darter</p>	Detritus with fine sand and silt	<p>Riparian- herbaceous plants and grass species</p> <p>In-stream- Moss, Tape grass, algae, and Canada waterweed</p>	Eroding banks	The assessed reach provides habitat for fish migration, spawning (Northern Pike), feeding and rearing however, no limiting important or exceptional habitat was identified.	Potential habitat for American Eel.	In water works are restricted between: - April 1 and June 30 (no in water work allowed) Source: MNRF Peterborough District Office correspondence, dated March 16, 2016.

4.3 Summary of Existing Fish and Fish Habitat

Through the background information review, consultation with MNRF and 2016 fish habitat field investigations, it was determined that the Napanee River within the assessed reach provides permanent direct fish habitat to a mixed warmwater and coolwater community assemblage that is generally tolerant to intermediately tolerant of environmental perturbation. The MNRF interpretation of fish and fish habitat sensitivity (scale of high, moderate, low or unknown) was noted as low (MNRF, 2003).

Based on email correspondence from the Kingston MNRF (**Appendix C**), American Eel (listed as Endangered with the Provincial *Endangered Species Act*; ESA) is present in the Napanee River. The species was not identified on the species list for the Napanee River which was received from the Peterborough MNRF on March 16, 2016, however; clarification from the Kingston MNRF stated that an MNRF researcher has caught American Eel in the River in 2010 and the species has the potential to the river presently. Further, although American Eel are not currently listed as a species at risk (SAR) under the federal SARA, it is considered Threatened by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), and DFO has indicated American Eel is under consideration for listing to Schedule 1 of SARA.

Present science considers the American Eel to consist of a single breeding population in which all individuals travel to the Sargasso Sea in the Atlantic Ocean to spawn. From there, young eels drift with ocean currents and most eventually migrate inland into streams, rivers and lakes.

American Eel begin moving upstream to freshwater habitats when the water temperatures reach 10°C and continue until the temperatures exceed 20°C. In Canada this is typically between late April and early August. However, the eels can tolerate a wide range of water temperatures and lotic conditions (DFO, 2013).

The Napanee River exhibits many of the habitat characteristics that American Eel require. This includes a silty substrate and slow to moderate flowing water. Further, habitat conditions within the assessed reach contain non-limiting feeding and migratory habitat that is likely conducive to eels, including pools for elvers protection and silt substrate for periods of rest.

There were no barriers to fish passage present upstream of the Palace Road interchange during the site reconnaissance that would prevent eels from swimming upstream. American Eels have been recorded within this river, according to the MNRF (pers comm., November 2016).

5. Potential Enhancement Opportunities

Opportunities for potential aquatic habitat enhancement were identified following completion of the site visit. Although the Napanee River is in a naturalized state, it was noted that the banks along the river were unstable and eroding. Increased bank stabilization by way of native woody plantings installed along the banks may improve bank stability and decrease sources of sedimentation into the creek. Enhancement opportunities will be discussed further in the forthcoming Fish and Fish Habitat Impact Assessment Report.

6. Conclusions

The Napanee River includes potentially specialized habitat for the coolwater/warmwater fish community that it contains. This specialized habitat includes potential spawning and rearing areas for Northern Pike in the well vegetated areas of the ditch lines on the south side of Highway 401 that become inundated with water in the early spring, when Pike spawning occurs. Submerged aquatic macrophytes were observed that may be used for feeding and refuge purposes.

American Eel was identified in the Napanee River in 2010 and other observations have been documented in surrounding waterbodies, albeit, not connected to the Napanee River. American Eel may potentially still inhabit the Napanee River, whether it may be as a migration route or longer term, as the habitat present in the Napanee River is considered potentially suitable for the species. Further consultation with the MNRF is recommended during Detail Design to determine any potential permitting requirements with regard to the presence of American Eel.

The proposed interchange improvements associated with changes to the widening of the Highway 401 over the Napanee River have the potential to impact fish and fish habitat, however; the detailed impacts to fish and fish habitat based on the preferred Preliminary Design alternative has been documented under separate cover in a Fish and Fish Habitat Impact Assessment Report. Findings documented in the Impact Assessment Report should be updated concurrent with the advancement of Detail Design.

7. Literature Cited

Fisheries and Oceans Canada (DFO). 2015:
Aquatic Species at Risk Mapping

Fisheries and Oceans Canada (DFO). 2016:
Personal communications with DFO Biologist dated April 25, 2016

Ministry of Natural Resources and Forestry (MNRF), 1977:
Fish Collection Records

Ministry of Natural Resources and Forestry (MNRF), 1995:
Fish Collection Records

Ministry of Natural Resources and Forestry (MNRF), 1999:
Fish Collection Records

Ministry of Natural Resources and Forestry (MNRF), 2002:
Fish Collection Records

Ministry of Natural Resources and Forestry (MNRF), 2003:
Fish Collection Records

Ministry of Natural Resources and Forestry (MNRF), 2016:
Personal communications with Management Biologist, Monique Charette on November 8/9/11, 2016

Ministry of Transportation (MTO), 2009:
Environmental Guide for Fish and Fish Habitat

Appendix **A**

Photo Log

Photo Log – Aquatic Environment



Photograph 1 ↑

Napanee River at highway 401 bridge, looking from upstream of bridge to downstream right bank- southeast



Photograph 2 ↑

Napanee River highway 401 bridge, looking from upstream of bridge to downstream- south



Photograph 3 ↑

Napanee River right bank, looking from upstream of bridge to the right bank- southeast



Photograph 4 ↑

Napanee River upstream of bridge looking at the right bank from the left bank, looking southeast

Photo Log – Aquatic Environment



Photograph 5 ↑
Napanee River, upstream of bridge
looking at the right bank- southeast



Photograph 6 ↑
Left bank riparian area and park land, looking
downstream from upstream of the bridge- west



Photograph 7 ↑
Napanee River, looking downstream
from upstream of bridge- southeast



Photograph 8 ↑
Looking downstream at Highway 401
bridge from upstream

Photo Log – Aquatic Environment



Photograph 9 ↑
Napanee River, from downstream
looking upstream at bridge



Photograph 10 ↑
Left bank riparian area (area of potential impact),
from downstream looking upstream to the west



Photograph 11 ↑
Inundated channel to the west, looking from
downstream of the bridge to the west or left bank



Photograph 12 ↑
Inundated channel to the west, looking from
downstream of the bridge to the west or left bank

Photo Log – Aquatic Environment



Photograph 13 ↑

Right bank riparian area (area of potential impact),
from downstream looking upstream to the east



Photograph 14 ↑

Right bank and potentially inundated area
from downstream looking upstream to the east



Photograph 15 ↑

Muck/organic substrate downstream of bridge



Photograph 16 ↑

Muck with fine sand and silt substrate upstream of bridge

Appendix **B**

Field Notes

GENERAL INFORMATION													
PROJECT #:		PROJECT DESCRIPTION:		DAY:	MONTH:	YEAR:							
60478166		Highway 40		03	06	2016							
Is STREAM REALIGNMENT required for this section:													
<input type="radio"/> Yes <input checked="" type="radio"/> No <input type="radio"/> Unknown													
COLLECTORS:		WEATHER CONDITIONS:		TIME STARTED:		TIME FINISHED:							
A. Minion		sun + cloud / light breeze		09:30		11:00							
AIR TEMP:		WATER TEMP:		CONDUCTIVITY ($\mu\text{S}/\text{cm}$):									
25°C													
PHOTO NUMBERS AND DESCRIPTIONS:													
LOCATION													
NAME OF WATERBODY:		DRAINAGE SYSTEM:		CROSSING #:		STATION #:							
Napanee River													
LOCATION OF CROSSING: North of hwy 401, South of Huron St, at the Park													
GPS COORDINATES:				MTO CHAINAGE:									
579813 4902079													
TOWNSHIP:				MNR DISTRICT:									
Lennox & Addington				Kingston									
LAND USE AND POLLUTION													
SURROUNDING LAND USE:				SOURCES OF POLLUTION:									
Park land, agricultural, highway				Rd salt, agricultural inputs									
EXISTING STRUCTURE TYPE													
Bridge <input type="radio"/>		Box Culvert <input checked="" type="radio"/>		Open Foot Culvert <input type="radio"/>		CSP <input type="radio"/>		N/A <input type="radio"/>					
Other <input type="radio"/> Describe:		3 barrel				Size (w x h) m ²							
SECTION TYPE AND MORPHOLOGY													
SECTION IDENTIFIER:			SECTION LOCATION:										
US of 401			North of 401, adjacent to Huron St. & Park										
TYPE:		Stream / river		Channelized		Permanent		Intermittent		Ephemeral		ASSOCIATED WETLAND:	
		<input checked="" type="radio"/>		<input type="radio"/>		<input checked="" type="radio"/>		<input type="radio"/>		<input type="radio"/>			
TOTAL SECTION LENGTH (m):				50 m				CURRENT VELOCITY (m/s):					
								unknown but low					
SUB-SECTION(S)	Run	Pool	Rifle	Flats	Inside culvert	Other							
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>								
Percentage of area				100									
Mean depth wetted (m)				unknown ~1-2m?									
Mean width wetted (m)				18m									
Mean bankfull width (m)				19m									
Mean bankfull depth (m)				1.5-2.5									
Substrate				silt sand gr									
Bedrock	Boulder	Cobble	Gravel	Sand	Silt	Clay	Muck	Detritus					
Br	Bo	Co	Gr	Sa	Si	Cl	Mu	D					

BANK STABILITY				
	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	0	0	0	0
Right Upstream Bank	0	0	0	0

HABITAT							
IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	40	5		25 Instream (20) Overhanging (5)		70 Instream (50) Overhanging (20)	
SHORE COVER (% stream shaded):	100 - 90 %	90 - 80 %	80 - 70 %	70 - 60 %	60 - 50 %	50 - 40 %	None
	0	0	0	0	0	0	0
VEGETATION TYPE (%)	Submergent		Floating		Emergent		None
	70				30		
Predominant Species	Canada Waterweed algae				Horse tail		
MIGRATORY OBSTRUCTIONS:	None		Seasonal		Permanent		
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning		Evidence of Groundwater		Other		
	NO		NO				

POTENTIAL ENHANCEMENT OPPORTUNITIES
<ul style="list-style-type: none"> - riparian plantings to help stabilize the silty banks. - possibly upsize precast culvert to a clear span bridge (appears slightly undersized)

COMMENTS
<p>large flowing river could not be traversed. Right bank consists of mature trees - Pines, + Basswood + Ash. Bank appears to be moderately unstable as roots are exposed at water's edge. silty bank has been eroded by increased flows. Left bank has thin (5m) buffer of mature trees adjacent to a park. Bank is steeper (~3m) with grasses + less canopy cover, mainly submergent vegetation - Canada Waterweed, algae. Substrate appears silt dominated, drainage outlet on west side + CSP on east. Grasses present at concrete culvert slope. A few ash trees, silty substrate. Immediately downstream is private property. No specialized habitat observed, however lots of cover available for juveniles.</p>

Additional Notes Appended? ☐ No ☐ Yes number of pages _____

SECTION IDENTIFIER: US of 401	SECTION LOCATION: Napanee River	SECTION LENGTH (m): 50 m	SCALE (cm / m):
---	---	------------------------------------	-----------------

PROJECT #:
60478166

MAPPER:
A. Minion

NAME OF WATERBODY:
Napanee River

CROSSING #:

STATION #:

DATE: DD-MMM-YY
03-Jun-16

LEGEND

10d depth (cm)
6w width

→ Riffle
⇒ Run/Glide
○ Pool
■ Island/Bar
|||| Fine Substrate
Gravel Substrate
oOoO Cobble / Boulder
*** Debris
CT Cattail
SV/FV Submerge/Float Veg
EV Emergent Vegetation
W Watercress
Fe Iron Staining
///// Eroded Bank
XXX Riprap / Other Stabilization
○ Instream Log/Tree
AAA Dam/Weir/Obstruction
⊗ Riparian Tree
↳ Seep/Spring
— Undercut Bank
— Barrier to Fish Movement
-S- Seasonal Barrier
-x-x- Fence line
□ Culvert

PROFILE:	Horz. Scale	Vert. Scale
left bank	Right bank	

Ministry of Transportation
Environmental Guide for Fish and Fish Habitat

Section 4: Field Investigations
Appendix 4.A: Watercourse Field Record Form

GENERAL INFORMATION									
PROJECT #: 604781614		PROJECT DESCRIPTION: Highway 401		DAY: 03	MONTH: June	YEAR: 2016			
Is STREAM REALIGNMENT required for this section: <input type="radio"/> Yes <input checked="" type="radio"/> No <input type="radio"/> Unknown									
COLLECTORS: A. Minion		WEATHER CONDITIONS: Sun + cloud		TIME STARTED: 9:30		TIME FINISHED: 10:30			
AIR TEMP: 25.0°C		WATER TEMP:			CONDUCTIVITY (µS/cm):				
PHOTO NUMBERS AND DESCRIPTIONS:									
LOCATION									
NAME OF WATERBODY: Madawaska River		DRAINAGE SYSTEM:		CROSSING #:		STATION #:			
LOCATION OF CROSSING: DS of 401									
GPS COORDINATES: 579813 490257		MTO CHAINAGE:							
TOWNSHIP: Lennox + Addington		MNR DISTRICT: Kingston							
LAND USE AND POLLUTION									
SURROUNDING LAND USE: residential, highway					SOURCES OF POLLUTION:				
EXISTING STRUCTURE TYPE									
Bridge <input type="radio"/>		Box Culvert <input checked="" type="radio"/>		Open Foot Culvert <input type="radio"/>		CSP <input type="radio"/>		N/A <input type="radio"/>	
Other <input type="radio"/> Describe:		Th e Barrel				Size (w x h) m ²			
SECTION TYPE AND MORPHOLOGY									
SECTION IDENTIFIER:		SECTION LOCATION: (include on habitat map)							
TYPE:	Stream / river <input checked="" type="radio"/>	Channelized <input type="radio"/>	Permanent <input checked="" type="radio"/>	Intermittent <input type="radio"/>	Ephemeral <input type="radio"/>	ASSOCIATED WETLAND:			
TOTAL SECTION LENGTH (m):			CURRENT VELOCITY (m/s):						
SUB-SECTION(S)	Run <input type="radio"/>	Pool <input type="radio"/>	Riffle <input type="radio"/>	Flats <input type="radio"/>	Inside culvert <input type="radio"/>	Other			
Percentage of area		10	30	60					
Mean depth wetted (m)						~ 1.5			
Mean width wetted (m)						12.0			
Mean bankfull width (m)						15.0			
Mean bankfull depth (m)						2.0			
Substrate						Si 75a 76r			
Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D	

BANK STABILITY				
	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	0	6	0	0
Right Upstream Bank	0	6	0	0

HABITAT							
IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
				Instream		Instream	
				Overhanging		Overhanging	
				10 5 5		60 40 20	
SHORE COVER (% stream shaded):	100 - 80 %	80 - 60 %	60 - 30 %	30 - 1 %	None		
	0	0	0	0	0		
VEGETATION TYPE (%)	Submergent		Floating		Emergent		None
	60				20		
Predominant Species	canada waterweed		yellow water lily				
	moss						
MIGRATORY OBSTRUCTIONS:	None		Seasonal		Permanent		
	✓						
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning		Evidence of Groundwater		Other		
POTENTIAL ENHANCEMENT OPPORTUNITIES							
Native plantings on banks to increase stability							
COMMENTS							
<p>Riparian zone was ~ 5m wide dominated by herbaceous grass species. Private residential properties, limited access. Arrowhead present on bank + in inundated area in section. Moss + algae present on submerged rocks. SE Banks were grass covered + moderately unstable. A moderate amount of canopy cover existed. No specialized habitat observed - inundated area SE of bridge is potential pike spawning during higher flows.</p>							
Additional Notes Appended? <input type="radio"/> No <input type="radio"/> Yes number of pages _____							

SECTION IDENTIFIER: DS of 401	SECTION LOCATION: Highway 401	SECTION LENGTH (m):	SCALE (cm / m):
---	---	---------------------	-----------------

PROJECT #:
60478166

MAPPER:
A. Minion

NAME OF WATERBODY:
Nogance River

CROSSING #:

STATION #:

DATE: DD-MMM-YY
03-JUN-16

LEGEND

10d depth (cm)
6w width

→ Riffle
⇒ Run/Glide
○ Pool
■ Island/Bar

⦿ Fine Substrate
Gravel Substrate
oOooO Cobble / Boulder
*** Debris

CT Cattail
SV/FV Submerg/Float Veg
EV Emergent Vegetation
W Watercress

Fe Iron Staining
///// Eroded Bank

xxx Riprap / Other Stabilization

⊞ Instream Log/Tree
AAA Dam/Weir/Obstruction

⊙ Riparian Tree

└ Seep/Spring
— Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x-x- Fence line
└ Culvert

PROFILE:	Horz. Scale	Vert. Scale

Palace Rd.

100m N of bridge looking US
- 1.10m deep in centre.

Centre = 1.10m

EB = 0.70m

WB = 1.10m

- aquatic Vegetation = Tape grass.
= Canada Waterweed
- downed tree at EB (LB)

less Vegetation towards bridge (ps)

50m US of bridge depths =

EB = 1.40m

Centre = 1.7m

WB = 2.2m

limited vegetation

Substrate 35m US of bridge
is muck with fine sand and
silt.

↑ Vegetation at 35m US.

5m US of bridge

EB = 0.7m

Centre = 1.70m

WB = 1.30m

Rite in the Rain

October 3, 2016

large amount of submergent vegetation. Tape grass, Canada waterweed, algae at banks, less veg in centre of channel.

WB = cattails, in impact area

EB = eroded undercut = grasses.

EB(LB) substrate is ~~muck~~ consolidated - gravel & sand with some muck.

WB(RB) - muck substrate with fine sand & silt.
fat mucket mussel

RB(WB) - proposed abutment would likely be into water.

DS of bridge

well vegetated banks on both sides.

- cattails
- arrowhead

200m DS from bridge.

EB(RB) = 1.7m muck w/ fine sand & silt.

WB = 1.4m sandy silt - mussels
centre = 2.0m

potential inundation during high flows (spring) on East bank. River well connected to surrounding bank & topography. ~ 50m DS. nearer to bridge less chance - steeper banks ~ 1:5m.

5m DS of bridge depths

WB = 0.25m - well connected to possible habitat (pike spawning) currently inundated. (only ~ 1m wide)
- grasses, cowitch, asters, cattails, sensitive fern, sweet white clover.
substrate is muck, more organic/dark

organic smell.
centre = 2.0m

WB = 1.3m substrate = muck +
fine sand/silt

- heavy weeds + algae on top of
the water, grasses

Inundated channel South + West
of 401

- currently inundated but not
connected to river - earth
barriers, possible spawning area
during high flows.

Piers/abutments on South side
would likely be in the water.

East side would have no impact
to possible spawning grounds
as banks are high
West bank would impact seasonal
channel along ditchline.

^{MTO}
Beyond fencing is upland ^{hardwood} forest
on both sides. no aquatic
vegetation/habitat.

ditch line along South side likely
only potential fish habitat
75m West.
cattails throughout most

Ditch 775m has ~ 0.01m
water - likely overland flow/rain.

Ditch becomes more entrenched
+ has standing water with high
amounts of algae

relic CSP culvert observed on
South side ~ halfway to Newburgh Rd

2nd relic CSP filled with concrete.
arrowhead present at culvert + then
ditch becomes overgrown with
Phragmites + cattails.

~ 100m East of Newburgh Rd the
~~the~~ ditch has gravel bottom with
lusc vegetation, 005m of water
with flow.

perched CSP (0.7 x 0.7) creating
pool + water into ditch from
North side of highway?
Steep bank immediately east.

from CSP to Newburgh is no
ditch channel, no habitat for water.

North side of 401
Newburgh to Palace.

concrete culvert to dry channel/ditch
would receive overland flow,
cattails present.

North of ditch is a hummocky
channel with no water currently
but appears to carry flow at
certain times, adjacent to
agricultural fields.

channel + ditch become undefined.

Wet area with cattails ~~to~~ North
of MTD fence at farm.
no obvious defined channel.

hummocky cattail area closer to
highway - likely standing water after
storm events.

trenched channel ~ 50m West of
river - small CSP outlet
possible habitat ~ 50m West of
river - later in channel, emergent
vegetation, cattails.

NorthWest of Palace Rd Interchange

1.5 x 1.5 m cast in place culvert for road drainage. Dry today, appears to convey storm water from 401 - entrenched channel overgrown with bracken grass. Not likely fish habitat.

No fish habitat east of culvert in ditch. ditch likely supports overland flow.

NorthWest of Palace Rd interchange

overland flow evidenced by entrenched ditch - 0.5 m wide \pm 0.25 m deep. dry today, appears to convey flow into forest.

small cattail area along fence line.

ditch line has cattails but no defined channel or water.

Phragmites along ditch - ATV fire tracks

SouthEast of Palace Rd Interchange

ditch line is mowed up to rock cut & further ditch line is mowed up to pine trees.

Grate to drain overland flow is present ~ 150 m east of Palace Rd

~ 200 m east " " is an animal corridor / drainage concrete structure.

No fish habitat in this SE section.

SouthWest of Palace Rd Interchange

ditch has cattails, no defined channel & no water. Ditch opens up to larger cattail area, & becomes more upland vegetation closer to the river. Possibility for connection around bank to the south to where river is very well connected to floodplain but not likely.

South East of CR 41 Interchange

Selby Creek is well connected to flood plain on South east bank.

During high flow or storm events there is potential for inundation along 401 SE of interchange.

No defined channel + no cattails in ditch but possibly 75m of temporary habitat during inundation - entire ditch is upland vegetation + mowed ditch after 75m east.

No fish habitat beyond the possible 75m of inundation.

North east of CR 41 Interchange

No fish habitat along ditch, but large pond immediately North of 401 is offline pond.

upland vegetation along entire north ditch, drainage culvert.

At Selby creek inundation starts

- rock check dam prevents connection from ditch to creek unless very high flows - Does not appear to be connected very often.

Northwest of CR41 Interchange
- riprap lined channel leading into creek. riprap ~ 20m, then cattails in ditch. Possibly inundated during high flows.

- riprap lined drainage at exit lane
- ditch is upland vegetation with no channel or water. - No fish habitat

Southwest of CR41 Interchange
- behind Walmart.
- dry, mowed ditch, No fish habitat

Appendix **C**

MNRF Correspondence

Mirabelli, Maria

From: Charette, Monique (MNRF) <monique.charette@ontario.ca>
Sent: Monday, November 14, 2016 4:15 PM
To: Minion, Ashley
Subject: RE: Selby Creek/Napanee River

Hi Ashley,

I'm waiting to hear from our F&W Tech. But I did touch base with the researcher and he personally has caught eel near the 401 in the Napanee River (and other sites north on the river) as well as in Sucker Creek (also near the 401). I hope to have an answer for you tomorrow...

From: Minion, Ashley [<mailto:Ashley.Minion@aecom.com>]
Sent: November-08-16 3:26 PM
To: Charette, Monique (MNRF)
Subject: RE: Selby Creek/Napanee River

Hi Monique,

Thank you for the reply! I hope all is well with you also 😊

What would be the next step then, as the MTO gets closer to detailed design with the bridge/ramp works. If they are working within the water would this project be a C-Permit for certain or something else?

Thanks,
Ashley

Ashley Minion, B.Sc., EPT., RBIT
Aquatic Biologist
D 905-747-7693
C 647-227-9446
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Please consider the environment before printing this page.

From: Charette, Monique (MNRF) [<mailto:monique.charette@ontario.ca>]
Sent: Tuesday, November 08, 2016 12:38 PM
To: Minion, Ashley
Subject: FW: Selby Creek/Napanee River

Hi Ashley,

Hope all is well with you! It's been a while😊

Yes it's possible that American Eel are present in the Napanee River. Our researchers found eel in the Napanee River in 2010. Although, not connected to the Napanee River, an eel was also recently observed in Beaver Lake north of Napanee. They have also been observed in the Salmon River. We have no information for Selby Creek (Sucker Creek). So yes they are present in the Napanee and could be potentially found in Selby Creek considering the surrounding watercourses have had eel observations.

I have to step out for the afternoon and will be monitoring emails from offsite location for the next 2 days. Let me know if you need anything else.

Monique Charette

Ministry of Natural Resources and Forestry
Management Biologist
Kingston Field Office
51 Heakes Lane
Kingston, ON
K7M 9B1
Telephone: 613-531-5715
Email: Monique.charette@ontario.ca

From: Simpson, Holly (MNRF)
Sent: November-08-16 11:41 AM
To: Charette, Monique (MNRF)
Subject: FW: Selby Creek/Napanee River

Holly Simpson

705-755-3302

From: Minion, Ashley [<mailto:Ashley.Minion@aecom.com>]
Sent: November-08-16 9:52 AM
To: Simpson, Holly (MNRF)
Subject: Selby Creek/Napanee River

Hi Holly,

I have attached a location map as per your request. I am trying to determine if it is possible that American eel are present within either Selby Creek or the Napanee River.

Thank you!
Ashley

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TEMPLATE 10.2

GWP or Project Name	Waterbody	Latitude	Longitude	Flow	Thermal Regime	Fish Habitat	Fish Species Present	Substrate Type	Vegetation	Constraints and Opportunity	Important, Exceptional Fish Habitat	Species at Risk / Critical Habitat Present	In-water Works Timing Window
Description	Name of waterbody and Crossing #/Station			Ephemeral, Intermittent, Permanent	Warm, Cool, Cold	CRA fishery*, supports CRA fishery, not fish habitat	Indicate if the information is from background secondary source data (indicate source) or if obtained through file investigations	E.g. Boulder, cobble, rubble, gravel, sand, muck, etc.	Riparian & In-Stream** species	E.g. Perched culvert, eroding bank, fish passage barrier, undersized CSP	E.g. Ground water upwelling, spawning areas, refugia, migratory routes	Indicate/ describe the species at risk and/ or critical habitat present	Timing window for when in-water work can occur
Improvements to Highway 401 Interchange at Palace Road (GWP 4197-13-00)	Napanee River	44.267639	76.932412	Permanent	Warm	Yes	<p>Source: MNRF (2016) American eel (captured in 2010)</p> <p>Source: MNR (1977)</p> <p>White Perch, Yellow Perch, Brown Bullhead, Northern Pike, Smallmouth Bass, Burbot, Black Crappie, Yellow Bullhead, White Sucker, Rock Bass, Bluegill, Pumpkinseed</p> <p>Source: Beak Consultants Limited (1995)</p> <p>Northern Pike, Walleye, Smallmouth Bass, Rock Bass, Pumpkinseed, Fallfish, White Sucker, Yellow Bullhead, Logperch, American Eel, Largemouth Bass, Burbot,</p> <p>Source: P.Riebel Associates Inc. (1999)</p> <p>Common Shiner, Mimic Shiner, Bluntnose Minnow</p> <p>Source: Minnow Environmental Inc. (2002)</p> <p>Bluntnose Minnow, Brown Bullhead, Yellow Bullhead, Creek Chub, Johnny Darter, Common Shiner, Golden Shiner, Mimic Shiner, Pumpkinseed, Brook Silverside, Northern Pike, Rock Bass, Yellow Perch, White Sucker</p> <p>Source: Minnow Environmental Inc. (2005)</p> <p>Bluntnose Minnow, Fathead Minnow, Golden Shiner, Brown Bullhead, Logperch, Mimic Shiner, Central Mudminnow, Northern Pike, Pumpkinseed, Rock Bass, Brook Silverside, White Sucker, Yellow Perch, Johnny Darter</p>	Detritus with fine sand and silt	<p>Riparian-herbaceous plants and grass species</p> <p>In-stream- Moss, Tape grass, algae, and Canada waterweed</p>	Eroding banks	Potential Pike spawning	Potential habitat for American eel.	<p>Warmwater timing window- March 15 to July 15 (in water work restricted)</p> <p>*To be confirmed by MNRF</p>

Notes: * CRA Fishery - Commercial, Recreational or Aboriginal Fishery

 ** In-stream vegetation refers to emergent, submergent and floating aquatic vegetation.

Appendix J – Fish and Fish Habitat Impact Assessment Report

Ontario Ministry of Transportation (MTO)

Fish and Fish Habitat Impact Assessment

*Improvements to Highway 401 Interchange at Palace Road
(GWP 4197-13-00)*

Prepared by:

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Date: February, 2019

Project #: 60478166

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Appendices

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1. Introduction

The Ontario Ministry of Transportation (MTO) has retained AECOM to undertake a Preliminary Design and Class Environmental Assessment Study (Group 'B' project) for improvements to the Highway 401 / Palace Road interchange (G.W.P. 4197-13-00). The project is located in the Town of Greater Napanee within the County of Lennox and Addington.

The primary focus of this study is to:

- Review the structural requirements (e.g. major rehabilitation or replacement) of the two Palace Road bridges;
- Identify interim and long-term interchange improvements to address geometric and operational concerns;
- Develop a Preliminary Design including a staging plan to allow the technically preferred structural works and interchange improvements to be implemented efficiently, minimizing construction costs, traffic disruption and future throwaway.

The operational improvements for the interchange are not expected to require widening of the Highway 401 bridge over the Napanee River to provide an extension to the eastbound off ramp and/or westbound on-ramp.

Minor rehabilitation was completed on both bridges in 2012, which was limited in scope due to limitations on construction staging imposed by Highway 401 lane restrictions. It is anticipated that a full replacement of the bridges will be required within the next 5 years.

The development of an ultimate plan for the Palace Road interchange allows for the necessary structural replacement works to be implemented efficiently and in a cost effective manner, minimizing future throwaway.

This project is being conducted in accordance with the approved environmental planning process for Group 'B' projects in accordance with the *Class Environmental Assessment for Provincial Transportation Facilities* (2000).

Concurrently, MTO is undertaking a separate Preliminary Design and Class Environmental Assessment Study for improvements to the Highway 401 interchange at County Road 41.

The Recommended Plan includes a westerly realignment of Palace Road and a new interchange configuration with new buttonhook ramps. As part of the realignment, Palace Road will cross over Highway 401 and the existing bridges will be removed. The new interchange ramps will require additional property in both the northeast and northwest quadrants.

An assessment of existing fish and fish habitat and terrestrial conditions for the study area associated with the interchange as previously completed and can be found in the following reports:

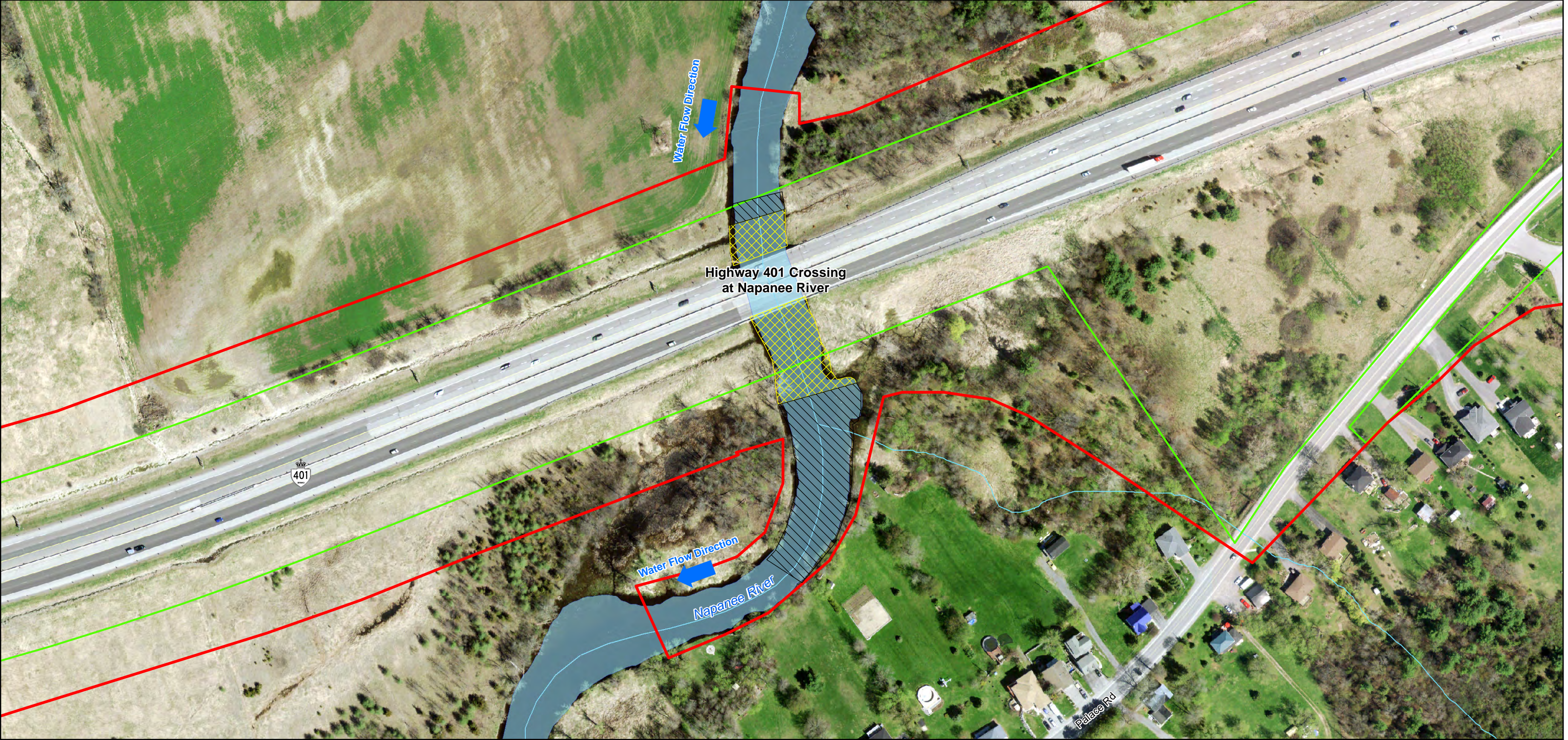
- Fish and Fish Habitat Existing Conditions–Improvements to Highway 401 Interchange at Palace Road (GWP 4197-13-00) in the County of Lennox-Addington (AECOM, 2017a).
- Terrestrial Ecology Existing Conditions–Improvements to Highway 401 Interchange at Palace Road (GWP 4197-13-00) in the County of Lennox-Addington (AECOM, 2017b).

The purpose of this report is to present the results of the impact assessment based on the Preliminary Design of the Palace Road Interchange (GWP 4197-13-00) technically preferred alternative, identify any potential constraints to proposed activities, and suggest general mitigation to avoid harm to fish and fish habitat to be refined in Detail

Design. The preliminary impact assessment based on Preliminary Design for the County Road 41 Interchange (GWP 4459-04-00) is provided under separate cover.

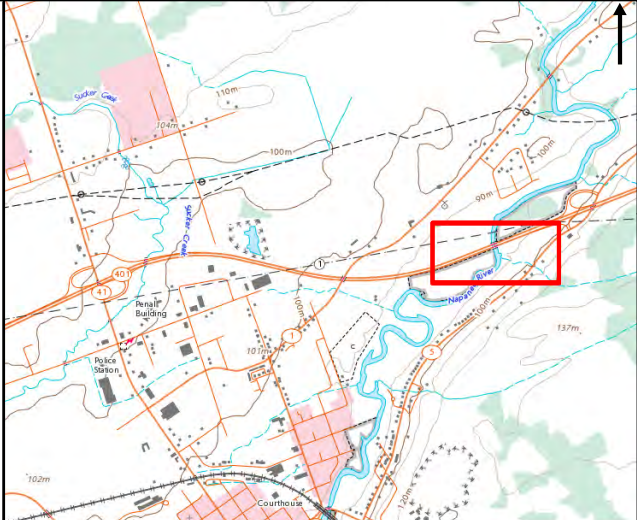
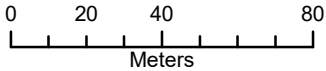
The Overall Study Area for this project is 600 m wide, extending along Highway 401 from the Newburgh Road underpass easterly across the Napanee River to 1,300 m east of the Palace Road bridges. The Napanee River was the only watercourse identified within the Palace Road Study Area and as such, for the purposes of this report, and in accordance with the MTO Environmental Guide for Fish and Fish Habitat, the area of assessment extends along the Napanee River 50 m upstream and 200 m downstream of the Highway 401 right-of-way (ROW).


Potential impacts to the Napanee River include project grading activities (refer to **Figure 1**) and therefore are discussed further herein.



Legend

- Potentially Impacted Area
- Existing MTO ROW
- Watercourse
- Waterbody
- Unevaluated Wetlands
- Zone of Detailed Assessment
- Zone of General Assessment



Hwy 401 & Palace Road		
Napanee River Opportunity and Constraints		
September 2018	1:2,000	Datum: NAD83 UTM18 Source: LIO 2015
P#: 60478166	V#:	 Figure 1
<p>This drawing has been prepared for the use of AECOM's client and may not be used, reproduced or relied upon by third parties, except as agreed by AECOM and its client, as required by law or for use by governmental reviewing agencies. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that modifies this drawing without AECOM's express written consent.</p>		

Map location: C:\PROJECTS\60478166 - Palace Road\GIS\MapInfo\Final\Final.mxd
Date saved: 27/09/2018 4:39:31 PM

2. Summary of Existing Fish and Fish Habitat Conditions

A full summary of existing conditions is available in the Fish and Fish Habitat Existing Conditions—Improvements to Highway 401 Interchange at Palace Road (GWP 4197-13-00) in the County of Lennox-Addington (AECOM, 2017a). **Table 1** (Template 10.2) provides a brief synopsis of the fish and fish habitat conditions within the Napanee River in close proximity to the Palace Road Interchange.

Through the background information review, consultation with MNRF and 2016 fish and fish habitat field investigations it was determined that the Napanee River within the assessed reach provides permanent, direct fish habitat to a mixed cool to warmwater forage and sport fish community that is intermediately tolerant to environmental perturbation. Despite the mixed community assemblage, it was confirmed with MNRF that Napanee River in the vicinity of the proposed works should be managed as a warmwater habitat. The assessed reach provided habitat for fish migration, spawning, feeding and rearing and was found generally non-limiting throughout with no limiting important or exceptional habitat identified.

2.1 Aquatic Species at Risk

Based on email correspondence from the Kingston MNRF (**Appendix C**), American Eel (listed as Endangered with the Provincial *Endangered Species Act*) is present in the Napanee River. The species was not identified on the species list for the Napanee River which was received from the Peterborough MNRF on March 16, 2016, however; clarification from the Kingston MNRF stated that an MNRF researcher has caught American Eel in the river in 2010 and the species has the potential to inhabit the river presently. Further, although American Eel are not currently listed as a Species at Risk (SAR) under the federal Species at Risk Act (SARA), it is considered Threatened by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), and DFO has indicated American Eel is under consideration for listing to Schedule 1 of SARA.

Present science considers the American Eel to consist of a single breeding population in which all individuals travel to the Sargasso Sea in the Atlantic Ocean to spawn. From there, young eels drift with ocean currents and most eventually migrate inland into streams, rivers and lakes.

The Napanee River exhibits many of the habitat characteristics that American Eels require. This includes a silty substrate and slow to moderate flowing water. Further, habitat conditions within the assessed contain non-limiting feeding and migratory habitat that is likely conducive to eels, including pools for elvers protection and silt substrate for periods of rest. American Eels begin moving upstream to freshwater habitats when these freshwater temperatures reach 10°C and continue until the freshwater temperatures exceed 20°C. In Canada this is typically between late April and early August. However, the eels can tolerate a wide range of water temperatures and lotic conditions (DFO, 2013).

Table 1: Template 10.2 Summary of Existing Fish and Fish Habitat Conditions

GWP or Project Name	Waterbody	Latitude	Longitude	Flow	Thermal Regime	Fish Habitat	Fish Species Present	Substrate Type	Vegetation	Constraints and Opportunity	Important, Exceptional Fish Habitat	Species at Risk / Critical Habitat Present	*In-water Works Timing Window
Improvements to Highway 401 Interchange at Palace Road (GWP 4197-13-00)	Napanee River	44.267639	76.932412	Permanent	Warm	Yes	<p>Source: MNR (2016) American Eel (captured in 2010)</p> <p>Source: MNR (1977) White Perch, Yellow Perch, Brown Bullhead, Northern Pike, Smallmouth Bass, Burbot, Black Crappie, Yellow Bullhead, White Sucker, Rock Bass, Bluegill, Pumpkinseed</p> <p>Source: Beak Consultants Limited (1995) Northern Pike, Walleye, Smallmouth Bass, Rock Bass, Pumpkinseed, Fallfish, White Sucker, Yellow Bullhead, Logperch, American Eel, Largemouth Bass, Burbot,</p> <p>Source: P.Riebel Associates Inc. (1999) Common Shiner, Mimic Shiner, Bluntnose Minnow</p> <p>Source: Minnow Environmental Inc. (2002) Bluntnose Minnow, Brown Bullhead, Yellow Bullhead, Creek Chub, Johnny Darter, Common Shiner, Golden Shiner, Mimic Shiner, Pumpkinseed, Brook Silverside, Northern Pike, Rock Bass, Yellow Perch, White Sucker</p> <p>Source: Minnow Environmental Inc. (2005) Bluntnose Minnow, Fathead Minnow, Golden Shiner, Brown Bullhead, Logperch, Mimic Shiner, Central Mudminnow, Northern Pike, Pumpkinseed, Rock Bass, Brook Silverside, White Sucker, Yellow Perch, Johnny Darter</p>	Detritus with fine sand and silt	<p>Riparian- herbaceous plants and grass species</p> <p>In-stream- Moss, Tape grass, algae, and Canada waterweed</p>	Eroding banks	The assessed reach provides habitat for fish migration, spawning (Northern Pike), feeding and rearing however, no limiting important or exceptional habitat was identified.	Potential habitat for American Eel.	In water works are restricted between: - April 1 and June 30 (no in water work allowed) Source: MNRF Peterborough District Office correspondence, dated March 16, 2016.

3. Impact Assessment

The purpose of the Impact Assessment is to assess the potential impacts of the project to fish and fish habitat, and to provide mitigation measures in accordance with the Environmental Reference for Highway Design (MTO, 2013). The following section outlines the impact assessment which was conducted in accordance with the MTO Environmental Guide for Fish and Fish Habitat (the Guide, 2009), and the 2016 pilot protocol entitled MTO/DFO/MNRF Protocol for Protecting Fish and Fish Habitat on Provincial Transportation Undertakings, Version 3 (the Protocol; 2016).

3.1 Description of Proposed Work

The following provides a summary of the activities proposed in or near water identified under the current scope of work. For additional detail, the grading limits are presented on **Figure 2** and the design drawing is shown in **Appendix D**.

3.1.1 Palace Road Bridge and New Interchange Ramps

Based on the Preliminary Design for the technically preferred alternative, works proposed include a realignment of Palace Road to the west, construction of a new Palace Road bridge over Highway 401, new eastbound and westbound interchange ramps, and removal or infilling of the existing Palace Road bridges, existing roadway and interchange ramps.

The proposed works include construction of a new eastbound speed change lane along Highway 401 for the new interchange off-ramp, beginning west of the Napanee River which is located approximately 700 m west of the existing Palace Road bridges. However, the existing Highway 401 median will be narrowed across the Napanee River bridge to avoid widening of the existing bridge. There will be no structural work at the Highway 401 bridge crossing at the Napanee River and no in-water work will be required. Grading associated with the new interchange ramps will extend to within 80 m east of the river on the north (upstream) side of Highway 401 and to within 10 m east of the river on the south (downstream) side of Highway 401, as shown in **Figure 2**.

All of this grading work will occur within the Highway 401 ROW, with only small areas abutting the Napanee River bridge being located within the historical floodplain. Grading of the ditch along the north side of the highway which is not well connected to the floodplain in the potential area of impact (as observed through site reconnaissance), and is not considered seasonal fish habitat as it is not likely inundated with water during high flows and rain events. This was evidenced during the site reconnaissance.

Grading of the ditch along the south side of Highway 401 is not likely to encroach on potential sensitive spawning areas for Northern Pike, as that was located 20 to 30 m downstream from the bridge. Generally habitat suitable for pike spawning is non-limiting throughout this reach. These grading activities should occur in accordance with the applicable timing restrictions for in-water works (see **Table 1**; Template 10.2), and protective erosion and sediment controls should be used in order to protect sensitive habitat features along the grading limits.

In accordance with Step 1 of the Protocol, proposed activities at this location have the potential to affect fish and fish habitat and as such, these have been carried forward through Steps 2 (Existing Conditions characterization; completed under separate cover) and 3 of the Protocol (applicability of MTO BMP) as outlined herein.

3.2 MTO Routine Works

Project activities were assessed against the list of MTO Routine Works in Table 2 of the *MTO/DFO/MNRF Protocol for Protecting Fish and Fish Habitat on Provincial Transportation Undertakings* – Version 3, 2016. Routine works are those within the MTO ROW, which includes the shoulders and paved area that do not occur within the waterbody and can be mitigated to prevent sediment / debris from entering into an aquatic feature. The following activities proposed as part of the project qualify as MTO Routine Works under the Structural Maintenance category and can be mitigated with the application of Ontario Provincial Specifications and Standards (OPSS) 182:

- Roadway and right of way grading; and,
- Erosion controls.

Provided the appropriate mitigation measures as specified in OPSS 182 are incorporated into the work plan and properly implemented, these activities are likely to avoid causing serious harm to a fishery. No additional legislative requirements, including permits under the *ESA* and the *Species at Risk Act* (SARA, 2002) have been identified for these activities.

3.3 MTO Best Management Practices

In accordance with Step 3 of the Protocol, MTO Best Management Practices Manual for Fisheries (Version 2.1, June 2016) was consulted to determine if the project/activity can be addressed by MTO Best Management Practice. The *MTO Best Management Practices Manual for Fisheries* is intended to provide MTO staff, service providers and contractors with the necessary procedures on how to undertake routine activities in a manner that avoids impacts to fish and/or fish habitat. In this instance, based on Preliminary Design, proposed activities are expected to occur primarily within the MTO ROW, not within a waterbody and in such a way that erosion and sedimentation to the nearest watercourse can be effectively mitigated. As such, MTO BMPs have not been applied at this time, however, the application of BMP should be again considered during development of the Detail Design.

3.4 Potential Impacts

The proposed work as described in **Section 3.1** is anticipated to be conducted in compliance with MTO Routine Works in accordance with Step 3 of the Protocol (Version 3, Pilot). Provided the proposed work complies with the measures and provisions stipulated under the appropriate guidance documented for Routine Works, potential impacts to fish and fish habitat associated with the proposed activities can be avoided or mitigated. In this case, works qualifying as routine and/or those that can be conducted in accordance with the BMPs need not be carried forward in the fisheries assessment process (Step 4 of the Protocol), and Notification to MTO Head Office and to DFO would not be required. However, this should be confirmed in Detail Design. Further, should proposed activities change in Detail Design such that in-water works are required, then MTO routine works may not apply, the application of BMPs should be re-assessed and MNRF should be consulted as it relates to American Eel to confirm their permitting expectations for the project.

4. Mitigation

The potential negative effects to fish and fish habitat in the Napanee River that may be caused by the proposed activities described in **Section 3** can be negated or avoided by implementing the mitigation and protection measures listed below. Provided these measures and provisions are properly implemented and maintained, the proposed work will likely remain in compliance with the *Fisheries Act*. The proposed work will not likely result in serious harm to a fishery and however further review is warranted during development of the Detail Design when construction phasing, timing and approach are refined. The recommended mitigation measures include the following which are to be confirmed during further design stages”:

Timing of Work

- Near water works at the Napanee River will be timed to avoid wet and windy conditions;
- Time of in-water work (if determined to be required) at the Napanee River to prevent disruption of vulnerable fish life stages, including eggs and larvae, by adhering to appropriate fisheries timing windows (no in-water work permitted April 1 to June 30)

Erosion and Sediment Control

- An Erosion and Sediment Control Plan should be developed and implemented and maintained for the site that minimizes risk of sedimentation of the waterbody during all phases of the project;
- Effective erosion and sediment control measures should be installed before starting work to prevent sediment from entering the water body;
- Grading should be carried out in stages and stabilized as soon as possible;
- Grading within 30 m of the Highway 401 bridge should be conducted in the appropriate timing window (listed above), as to avoid impacts to sensitive habitat (potential Northern Pike spawning areas south of the Highway 401 bridge);
- Measures should be undertaken to contain and stabilize waste material (e.g., dredging spoils, construction waste and materials, uprooted or cut plants, accumulated debris) above the high water mark of nearby waterbodies to prevent re-entry;
- Regular inspection and maintenance of erosion and sediment control measures and structures should occur during the course of construction; and
- Repairs to erosion and sediment control measures and structures should be completed promptly if damage occurs.

Operation of Machinery

- Activities near water should be conducted such that materials such as paint, primers, blasting abrasives, rust, solvents, degreasers, grout or other chemicals do not enter the watercourse;
- A response plan for spills should be developed before work commences. This plan should be implemented immediately in the event of a sediment release or spill of a deleterious substance and an emergency spill kit should be maintained on site;
- Machinery should arrive on site in a clean condition and be maintained free of fluid leaks, invasive species and noxious weeds;

- Machinery should be washed, refuelled and serviced and fuel and other materials will be stored in such a way as to prevent any deleterious substances from entering the watercourse;
- Refuelling should be conducted >30 m from the watercourse on a refuelling pad to prevent spills from entering the watercourse;
- Construction materials should be removed from site upon completion of the project; and,
- Clearing of riparian vegetation should be kept to a minimum to avoid disturbance to the riparian vegetation and prevent soil compaction. When practicable, prune or top the vegetation instead of grubbing/uprooting.

Dewatering Activities

- Although de-watering of surface watercourses is not anticipated, if this requirement is confirmed during detail design, a temporary water passage/isolation/containment system should be implemented during construction to isolate the work area from the open area of the watercourse, in order to maintain fish passage and water flow that is both adequate and clean.
- The contractor will be required to retain a qualified fisheries biologist to complete fish salvage activities from the isolated work area, as applicable;
- An appropriate back up pump will be available on-site as a contingency in the event of primary pump failure;
- Where by-pass pumping of flows is required or temporary channel restriction occurs, the contractor will limit the discharge pump velocity and/or partial channel restriction to ensure discharge velocities will not result in localized scouring in the receiving water feature;
- Any water intakes or outlet pipes will be screened to prevent entrainment or impingement of fish;
 - Screens will be located away from natural or artificial structures that may attract fish that are migrating, spawning or in rearing habitat;
 - The screen face will be oriented in the same direction as the flow;
 - Openings in the guides and seals will be less than the opening criteria in order to ensure that it is "fish tight";
 - Screens will be located a minimum of 300 mm (12 in.) above the bottom of the watercourse to prevent entrainment of sediment and aquatic organisms associated with the bottom area;
 - Structural support will be provided to the screen panels to prevent sagging and collapse of the screen;
 - Large cylindrical and box-type screens will have a manifold installed in them to ensure even water velocity distribution across the screen surface;
 - Provisions will be made for the removal, inspection, and cleaning of screens;
 - Regular maintenance and repair of cleaning apparatus, seals, and screens will be carried out in order to prevent debris-fouling and impingement of fish;
- Pumps will be shut down when fish screens are removed for inspection and cleaning.
- Any sediment laden dewatering discharge should be pumped to a filtering system at least 30 m from the watercourse and allowed to settle and/or filter through riparian vegetation before being discharged downstream of the construction area and controls shall be monitored for their effectiveness.
- A spill management plan (including materials, instructions regarding their use, education of contract personnel, and emergency contact numbers) will be ensured on site at all times for implementation in event of an accidental spill during construction.

5. Determination of Serious Harm

Based on the Preliminary Design, the proposed works as described in Section 3.1 are anticipated to be conducted in compliance with MTO Routine Works in accordance with the Protocol (Version 3, Pilot). In this case, works qualifying as routine and/or those that can be conducted in accordance with the BMPs need not be carried forward in the fisheries assessment process (Step 4 of the Protocol), and Notification to MTO Head Office and to DFO would not be required.

Provided the proposed work complies with the measures and provisions stipulated under the appropriate guidance documented for Routine Works, and the mitigation measures outlined in **Section 4**, potential impacts to fish and fish habitat associated with the proposed activities can be avoided or mitigated.

Further, serious harm to the fish that are part of, or support a commercial, recreational or Aboriginal (CRA) fishery (i.e., the Napanee River) will be avoided. This determination of 'no serious harm' is further supported by the following rationale.

- No in-water works are proposed and as such, the project will not result in death; or harm to fish and/or aquatic SAR (i.e. American Eel);
- Near-water works at the Napanee River will be timed to avoid wet and windy conditions; and,
- There will be no destruction and/or permanent alteration of fish habitat that would limit or diminish fishes' ability to continue to rely upon the habitat as spawning grounds, or as nursery, rearing, or food supply areas, or as a migration corridor, or any other area required by fishes to carry out one or more of their life processes.

Based on a review of the existing fish community data, the American Eel was identified as potentially occurring within the Napanee River Watershed. Although suitable habitat for the American Eel is present within the Napanee River, it is unlikely that proposed work will result in any negative effects to the species or its habitat. No work will occur below the High Water Mark (HWM) to construct a new bridge and ramps at the Palace Road interchange. Grading associated with the new interchange ramps will extend to within 80 m east of the river on the north (upstream) side of Highway 401 and to within 10 m east of the River on the south (downstream) side of Highway 401 however it is expected that all grading work adjacent to Highway 401 will be effectively contained using erosion and sediment controls to prevent the entry to deleterious substances to the watercourse. With the appropriate implementation, monitoring for effectiveness and maintenance of the recommended mitigation measures, activities associated with the project as described in **Section 3.1.1** are not likely to result in serious harm to the American Eel or its habitat. Should proposed activities change in Detail Design such that in-water works are required, then MTO routine works may not apply, the application of BMPs should be re-assessed and MNRF should be consulted as it relates to American Eel to confirm their permitting expectations for the project.

6. Fish Habitat Enhancement

The results of the preliminary review of potential impacts of the Preliminary Design of the technically preferred alternative determined that serious harm to a fishery (which includes sensitive aquatic SAR) is not anticipated and as such no measures to offset residual effects are proposed at this time.

7. Conclusions

Through the background information review, consultation with MNRF and 2016 fish and fish habitat field investigations it was determined that the Napanee River within the assessed reach provides permanent, direct fish habitat to a warmwater forage and sport fish community that is intermediately tolerant to environmental perturbation. The assessed reach provided habitat for fish migration, feeding and rearing and was found generally non-limiting throughout with no limiting important or exceptional habitat identified.

Based on a review of the existing fish community data, American Eel was identified as potentially occurring within the Napanee River Watershed. Although suitable habitat for the American Eel is present within the Napanee River, it is unlikely that proposed work will result in any negative effects to the species or its habitat. No in-water works are currently proposed and with the appropriate implementation, monitoring for effectiveness and maintenance of the recommended mitigation measures, activities associated with the project as described in herein are not likely to result in serious harm to the American Eel or its habitat.

Based on the Preliminary Design for the technically preferred alternative there will be no structural work at the Highway 401 bridge crossing at the Napanee River and no in-water work will be required. Proposed grading however, will occur approximately 80 m east of the river on the north (upstream) section and as near as 10 m east of the river on the south (downstream) section. On the south (downstream) section the grading limits may encroach on potential sensitive spawning areas for Northern Pike. Generally habitat suitable for pike spawning is non-limiting throughout this reach. Grading activities will occur in accordance with the applicable timing restrictions for in-water works and protective erosion and sediment controls shall be used in order to protect sensitive habitat features along the grading limits.

Based on the Preliminary Design, the proposed works as described in **Section 3.1** are anticipated to be conducted in compliance with MTO Routine Works in accordance with the Protocol (Version 3, Pilot). Provided the proposed work complies with the measures and provisions stipulated under the appropriate guidance documented for Routine Works, and the mitigation measures outlined in **Section 4**, potential impacts to fish and fish habitat associated with the proposed activities can be avoided or mitigated. In this case, works qualifying as routine and/or those that can be conducted in accordance with the BMPs need not be carried forward in the fisheries assessment process, and Notification to MTO Head Office and to DFO would not be required.

Should proposed activities change in Detail Design such that in-water works are required, then MTO routine works may not apply, the application of BMPs should be re-assessed and MNRF should be consulted as it relates to American Eel to confirm their permitting expectations for the project.

AECOM Fisheries Biologists certified in the MTO Registry, Appraisal and Qualification System (RAQS) as Fisheries Assessment Specialists have assessed the potential negative impacts of the proposed work and recommended appropriate mitigation measures to avoid or negate these impacts. It was determined that negative impacts to general use and exceptional aquatic habitat features within the Study Area can be avoided. Provided the recommended mitigation and protection measures are appropriately implemented, monitored and maintained, serious harm to a recreational, commercial or Aboriginal fishery can be avoided based on the preliminary impact assessment of the preferred alternative.

8. Literature Cited

Fisheries and Oceans Canada (DFO), 2015:
Aquatic Species at Risk Mapping

Fisheries and Oceans Canada (DFO), 2016:
Personal communications with DFO Biologist dated April 25, 2016

Ministry of Natural Resources and Forestry (MNRF), 1977:
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Ministry of Natural Resources and Forestry (MNRF), 1995:
Fish Collection Records

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Fish Collection Records

Ministry of Natural Resources and Forestry (MNRF), 2002:
Fish Collection Records

Ministry of Natural Resources and Forestry (MNRF), 2003:
Fish Collection Records

Ministry of Natural Resources and Forestry (MNRF), 2016:
Personal communications with Management Biologist, Monique Charette on November 8/9/11, 2016

Ministry of Transportation (MTO), 2009:
Environmental Guide for Fish and Fish Habitat

Appendix **A**

Photo Log

Photo Log – Aquatic Environment



Photograph 1 ↑
June 3, 2016

Napanee River at Highway 401 bridge, looking from upstream of bridge to downstream right bank- southeast



Photograph 2 ↑
June 3, 2016

Napanee River Highway 401 bridge, looking from upstream of bridge to downstream- south



Photograph 3 ↑
June 3, 2016

Napanee River right bank, looking from upstream of bridge to the right bank- southeast



Photograph 4 ↑
June 3, 2016

Napanee River upstream of bridge looking at the right bank from the left bank, looking southeast

Photo Log – Aquatic Environment



Photograph 5 ↑
June 3, 2016

Napanee River, upstream of bridge looking at the right bank- southeast



Photograph 6 ↑
June 3, 2016

Left bank riparian area and park land, looking downstream from upstream of the bridge- west



Photograph 7 ↑
June 3, 2016

Napanee River, looking downstream from upstream of bridge- southeast



Photograph 8 ↑
June 3, 2016

Looking downstream at Highway 401 bridge from upstream

Photo Log – Aquatic Environment



Photograph 9 ↑
October 5, 2016

Napanee River, from downstream looking upstream at bridge



Photograph 10 ↑
October 5, 2016

Left bank riparian area (area of potential impact), from downstream looking upstream to the west



Photograph 11 ↑
October 5, 2016

Inundated channel to the west, looking from downstream of the bridge to the west or left bank



Photograph 12 ↑
October 5, 2016

Inundated channel to the west, looking from downstream of the bridge to the west or left bank

Photo Log – Aquatic Environment



Photograph 13 ↑
October 5, 2016

Right bank riparian area (area of potential impact),
from downstream looking upstream to the east



Photograph 14 ↑
October 5, 2016

Right bank and potentially inundated area from
downstream looking upstream to the east



Photograph 15 ↑
October 5, 2016

Muck/organic substrate downstream of bridge



Photograph 16 ↑
October 5, 2016

Muck with fine sand and silt substrate upstream of bridge

Appendix **B**

Fisheries Assessment Field Notes and Fish Collection Record

GENERAL INFORMATION									
PROJECT #:		PROJECT DESCRIPTION:		DAY:	MONTH:	YEAR:			
60478166		Highway 40		03	06	2016			
Is STREAM REALIGNMENT required for this section:									
<input type="radio"/> Yes <input checked="" type="radio"/> No <input type="radio"/> Unknown									
COLLECTORS:		WEATHER CONDITIONS:		TIME STARTED:		TIME FINISHED:			
A. Minion		Sun + cloud / light breeze		09:30		11:00			
AIR TEMP:		WATER TEMP:		CONDUCTIVITY (µS/cm):					
25°C									
PHOTO NUMBERS AND DESCRIPTIONS:									
LOCATION									
NAME OF WATERBODY:		DRAINAGE SYSTEM:		CROSSING #:		STATION #:			
Napaneer River									
LOCATION OF CROSSING: North of hwy 401, South of Huron St, at the Park									
GPS COORDINATES:				MTO CHAINAGE:					
579813 4902079									
TOWNSHIP:				MNR DISTRICT:					
Lennox & Addington				Kingston					
LAND USE AND POLLUTION									
SURROUNDING LAND USE:				SOURCES OF POLLUTION:					
Park land, agricultural, highway				Ed salt, agricultural inputs					
EXISTING STRUCTURE TYPE									
Bridge <input type="radio"/>		Box Culvert <input checked="" type="radio"/>		Open Foot Culvert <input type="radio"/>		CSP <input type="radio"/>		N/A <input type="radio"/>	
Other <input type="radio"/> Describe:		3 barrel				Size (w x h) m ²			
SECTION TYPE AND MORPHOLOGY									
SECTION IDENTIFIER:		SECTION LOCATION:							
US of 401		(Include on habitat map) North of 401, adjacent to Huron St. & Park							
TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:			
	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>				
TOTAL SECTION LENGTH (m):				CURRENT VELOCITY (m/s):					
50 m				unknown but low					
SUB-SECTION(S)	Run	Pool	Rifle	Flats	Inside culvert	Other			
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>				
Percentage of area				100					
Mean depth wetted (m)				unknown ~ 1-2m?					
Mean width wetted (m)				18m					
Mean bankfull width (m)				19m					
Mean bankfull depth (m)				1.5-2.5					
Substrate				Silt & Gr					
Bedrock	Boulder	Cobble	Gravel	Sand	Silt	Clay	Muck	Detritus	
Br	Bo	Co	Gr	Sa	Sl	Cl	Mu	D	

BANK STABILITY				
	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	0	0	<input checked="" type="checkbox"/>	0
Right Upstream Bank	0	0	<input checked="" type="checkbox"/>	0

HABITAT							
IN-STREAM COVER (% surface area):	Undercut banks 40	Boulders 5	Cobble	Woody Debris 25 Instream (20) Overhanging (5)	Organic debris	Vascular Macrophytes 70 Instream (50) Overhanging (20)	None
SHORE COVER (% stream shaded):	100 - 90 % 0	90 - 80 % <input checked="" type="checkbox"/>	80 - 30 % 0	30 - 1 % 0	None 0		
VEGETATION TYPE (%):	Submergent 70		Floating		Emergent 30		None
Predominant Species	Canada Waterweed algae				Horsetail		
MIGRATORY OBSTRUCTIONS:	None <input checked="" type="checkbox"/>		Seasonal		Permanent		
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning NO		Evidence of Groundwater NO		Other		

POTENTIAL ENHANCEMENT OPPORTUNITIES
<ul style="list-style-type: none"> - riparian plantings to help stabilize the silty banks. - possibly upsize precast culvert to a clear span bridge (appears slightly undersized)

COMMENTS
<p>large flowing river could not be traversed. Right bank consists of mature trees - Pines, + Basswood + Ash. Bank appears to be moderately unstable as roots are exposed at water's edge. silty bank has been eroded by increased flows. Left bank has thin (5m) buffer of mature trees adjacent to a park. Bank is steeper (~3m) with grasses + less canopy cover, mainly submergent vegetation - Canada Waterweed, algae. Substrate appears silt dominated, drainage outlet on west side + CSP on east. Grasses present at concrete culvert slopes. A few ash trees, silty substrate, immediately downstream is private property. No specialized habitat observed, however lots of cover available for juveniles.</p>

Additional Notes Appended?	<input type="radio"/> No <input type="radio"/> Yes	number of pages	_____
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SECTION IDENTIFIER: US of 401	SECTION LOCATION: Napanee River	SECTION LENGTH (m): 50 m	SCALE (cm / m):
---	---	------------------------------------	-----------------

PROJECT #:
60478166

MAPPER:
A Minion

NAME OF WATERBODY:
Napanee River

CROSSING #:

STATION #:

DATE: DD-MMM-YY
03-Jun-16

LEGEND

10d depth (cm)
6w width

→ Riffle
⇒ Run/Glide
○ Pool
■ Island/Bar

■ Fine Substrate
Gravel Substrate
oOooO Cobble /Boulder
*** Debris

CT Cattail
SV/FV Submerg/Float Veg
EV Emergent Vegetation
W Watercress

Fe Iron Staining
///// Eroded Bank

xxx Riprap / Other Stabilization

○ Instream Log/Tree
AAA Dam/Weir/Obstruction
® Riparian Tree

└ Seep/Spring
— Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier
-x-x- Fence line
└ Culvert

PROFILE:	Horz. Scale	Vert. Scale
left bank		Right bank

Ministry of Transportation
Environmental Guide for Fish and Fish Habitat

Section 4: Field Investigations
Appendix 4.A: Watercourse Field Record Form

GENERAL INFORMATION									
PROJECT #:		PROJECT DESCRIPTION:		DAY:	MONTH:	YEAR:			
60478166		Highway 401		03	June	2016			
Is STREAM REALIGNMENT required for this section:									
<input type="radio"/> Yes <input checked="" type="radio"/> No <input type="radio"/> Unknown									
COLLECTORS:		WEATHER CONDITIONS:		TIME STARTED:		TIME FINISHED:			
A. Minion		Sun + cloud		9:30		10:30			
AIR TEMP:		WATER TEMP:		CONDUCTIVITY (µS/cm):					
25.0C									
PHOTO NUMBERS AND DESCRIPTIONS:									
LOCATION									
NAME OF WATERBODY:		DRAINAGE SYSTEM:		CROSSING #:		STATION #:			
Nadance River									
LOCATION OF CROSSING:									
DS of 401									
GPS COORDINATES:				MTO CHAINAGE:					
579813 490207									
TOWNSHIP:				MNR DISTRICT:					
Lennox + Addington				Kingston					
LAND USE AND POLLUTION									
SURROUNDING LAND USE:				SOURCES OF POLLUTION:					
residential, highway									
EXISTING STRUCTURE TYPE									
Bridge <input type="radio"/>		Box Culvert <input checked="" type="radio"/>		Open Foot Culvert <input type="radio"/>		CSP <input type="radio"/>		N/A <input type="radio"/>	
Other <input type="radio"/> Describe:		Th e Barrel				Size (w x h) m ²			
SECTION TYPE AND MORPHOLOGY									
SECTION IDENTIFIER:				SECTION LOCATION: (Include on habitat map)					
TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:			
	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>				
TOTAL SECTION LENGTH (m):				CURRENT VELOCITY (m/s):					
SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other			
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Percentage of area		10	30	60					
Mean depth wetted (m)						~ 1.5			
Mean width wetted (m)						12.0			
Mean bankfull width (m)						15.0			
Mean bankfull depth (m)						2.0			
Substrate						Si 75a 76r			
Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D	

BANK STABILITY				
	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	0	0 ✓	0	0
Right Upstream Bank	0	0 ✓	0	0

HABITAT							
IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
				Instream		Instream	
				Overhanging		Overhanging	
				10		60	
				5		40	
				5		20	

SHORE COVER (% stream shaded):	100 - 90 %	90 - 60%	60-30%	30 - 1%	None
	0	0	0	0	0

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
	60		20	
Predominant Species	canada waterweed moss		yellow water lily	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	✓		

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other

POTENTIAL ENHANCEMENT OPPORTUNITIES
Native plantings on banks to increase stability

COMMENTS
Riparian zone was ~ 5m wide dominated by herbaceous grass species. Private residential properties, limited access. Moss + algae present on submerged rocks. Banks were grass covered + moderately unstable A moderate amount of canopy cover existed No specialized habitat observed.

Additional Notes Appended? <input type="radio"/> No <input type="radio"/> Yes number of pages _____
--

SECTION IDENTIFIER: DS of 401	SECTION LOCATION: Highway 401	SECTION LENGTH (m):	SCALE (cm / m):
---	---	----------------------------	------------------------

	PROJECT #: 60478166
	MAPPER: A. Minion
	NAME OF WATERBODY: Napanee River
	CROSSING #:
	STATION #:
	DATE: DD-MMM-YY 03-JUN-16

<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px; text-align: center;"> 401 Bridge </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> PROFILE: <table border="1" style="width: 100%; height: 100px; border-collapse: collapse;"> <tr><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td></tr> </table> </div> <div style="width: 45%;"> <table border="1" style="width: 100%; height: 100px; border-collapse: collapse;"> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> </table> </div> </div>																					LEGEND 10d depth (cm) 6w width ➡ Riffle ➡ Run/Glide ○ Pool ■ Island/Bar ■ Fine Substrate ### Gravel Substrate oOooO Cobble / Boulder * * * Debris CT Cattail SV/FV Submerg/Float Veg EV Emergent Vegetation W Watercress Fe Iron Staining ///// Eroded Bank XXX Riprap / Other Stabilization ○ Instream Log/Tree AAA Dam/Weir/Obstruction ® Riparian Tree ▸ Seep/Spring — Undercut Bank — Barrier to Fish Movement -S- Seasonal Barrier -x-x- Fence line □ Culvert

Appendix **C**

Agency Correspondence

Mirabelli, Maria

From: Charette, Monique (MNRF) <monique.charette@ontario.ca>
Sent: Monday, November 14, 2016 4:15 PM
To: Minion, Ashley
Subject: RE: Selby Creek/Napanee River

Hi Ashley,

I'm waiting to hear from our F&W Tech. But I did touch base with the researcher and he personally has caught eel near the 401 in the Napanee River (and other sites north on the river) as well as in Sucker Creek (also near the 401). I hope to have an answer for you tomorrow...

From: Minion, Ashley [<mailto:Ashley.Minion@aecom.com>]
Sent: November-08-16 3:26 PM
To: Charette, Monique (MNRF)
Subject: RE: Selby Creek/Napanee River

Hi Monique,

Thank you for the reply! I hope all is well with you also 😊

What would be the next step then, as the MTO gets closer to detailed design with the bridge/ramp works. If they are working within the water would this project be a C-Permit for certain or something else?

Thanks,
Ashley

Ashley Minion, B.Sc., EPT., RBIT
Aquatic Biologist
D 905-747-7693
C 647-227-9446
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Please consider the environment before printing this page.

From: Charette, Monique (MNRF) [<mailto:monique.charette@ontario.ca>]
Sent: Tuesday, November 08, 2016 12:38 PM
To: Minion, Ashley
Subject: FW: Selby Creek/Napanee River

Hi Ashley,

Hope all is well with you! It's been a while😊

Yes it's possible that American Eel are present in the Napanee River. Our researchers found eel in the Napanee River in 2010. Although, not connected to the Napanee River, an eel was also recently observed in Beaver Lake north of Napanee. They have also been observed in the Salmon River. We have no information for Selby Creek (Sucker Creek). So yes they are present in the Napanee and could be potentially found in Selby Creek considering the surrounding watercourses have had eel observations.

I have to step out for the afternoon and will be monitoring emails from offsite location for the next 2 days. Let me know if you need anything else.

Monique Charette

Ministry of Natural Resources and Forestry
Management Biologist
Kingston Field Office
51 Heakes Lane
Kingston, ON
K7M 9B1
Telephone: 613-531-5715
Email: Monique.charette@ontario.ca

From: Simpson, Holly (MNRF)
Sent: November-08-16 11:41 AM
To: Charette, Monique (MNRF)
Subject: FW: Selby Creek/Napanee River

Holly Simpson
705-755-3302

From: Minion, Ashley [<mailto:Ashley.Minion@aecom.com>]
Sent: November-08-16 9:52 AM
To: Simpson, Holly (MNRF)
Subject: Selby Creek/Napanee River

Hi Holly,

I have attached a location map as per your request. I am trying to determine if it is possible that American eel are present within either Selby Creek or the Napanee River.

Thank you!
Ashley

Ashley Minion, B.Sc., EPt., RBIT
Aquatic Biologist
D 905-747-7693
C 647-227-9446
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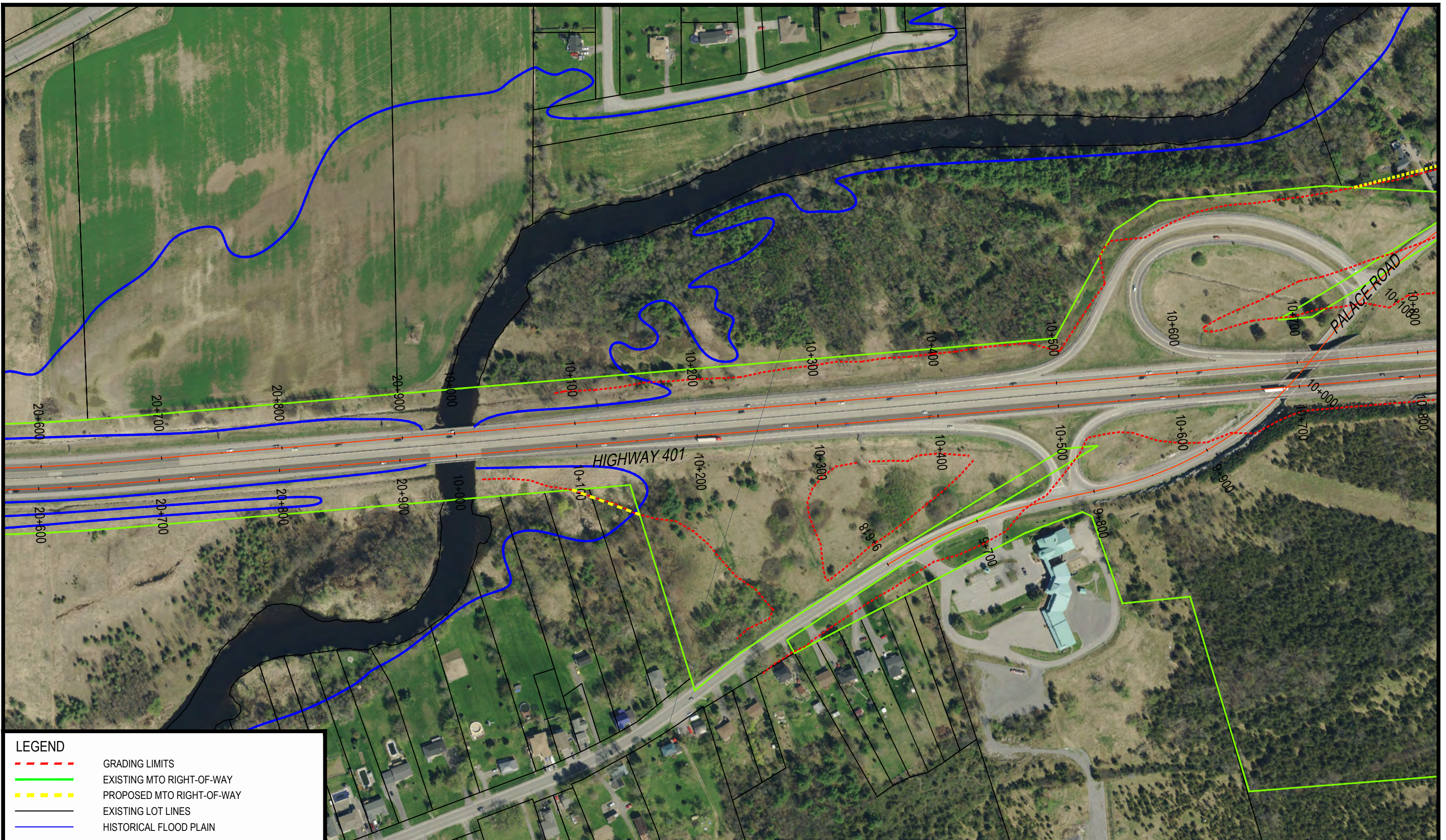
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Appendix **D**

Design and Grading Limits



- LEGEND
- GRADING LIMITS
 - EXISTING MTO RIGHT-OF-WAY
 - PROPOSED MTO RIGHT-OF-WAY
 - EXISTING LOT LINES
 - HISTORICAL FLOOD PLAIN



HIGHWAY 401 INTERCHANGE IMPROVEMENTS
AT PALACE ROAD
GWP 4197-13-00

PALACE ROAD INTERCHANGE
PROJECT STUDY AREA
FIGURE 1

DATE
JULY 2017



PRELIMINARY/DRAFT

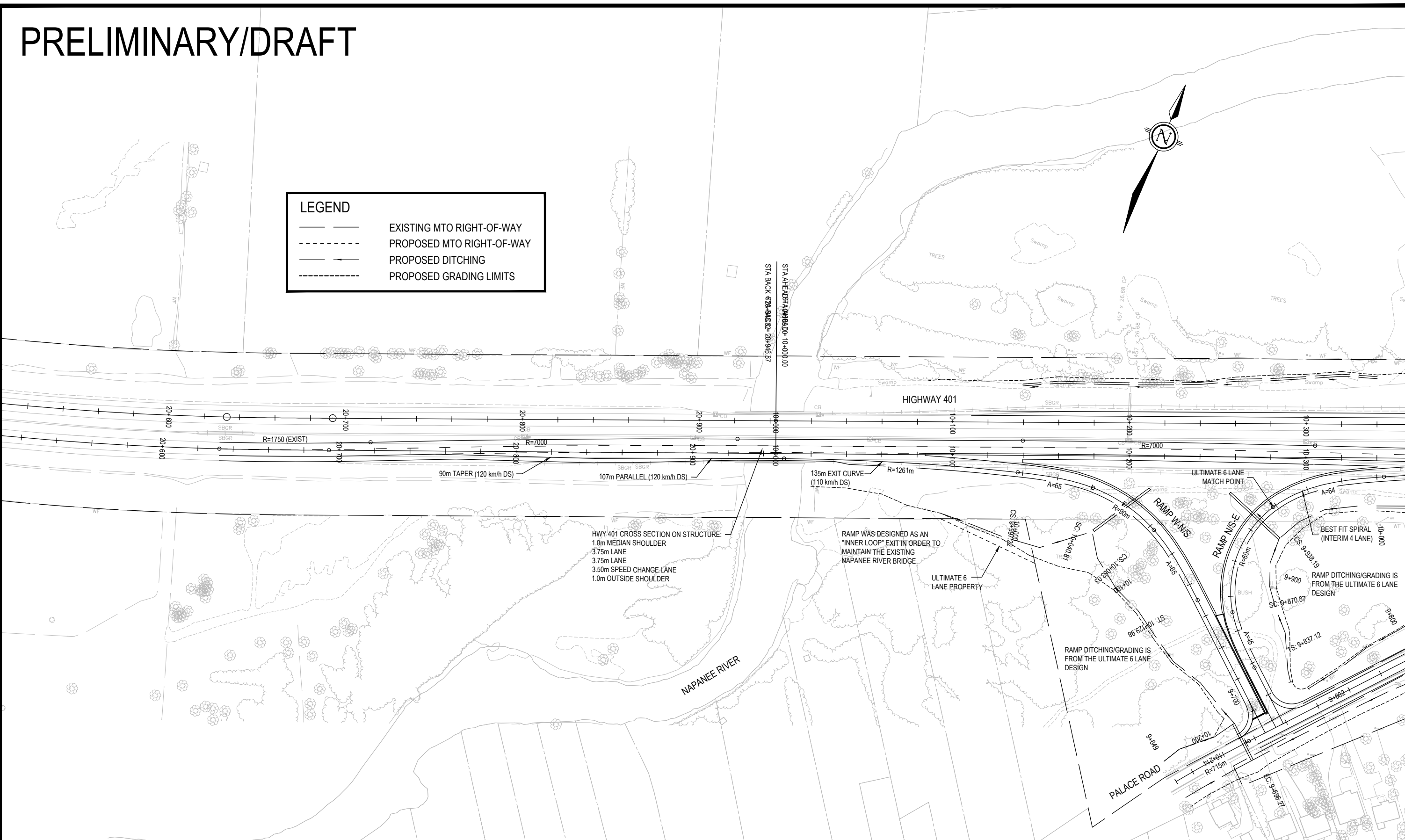
LEGEND

EXISTING MTO RIGHT-OF-WAY

PROPOSED MTO RIGHT-OF-WAY

PROPOSED DITCHING

PROPOSED GRADING LIMITS

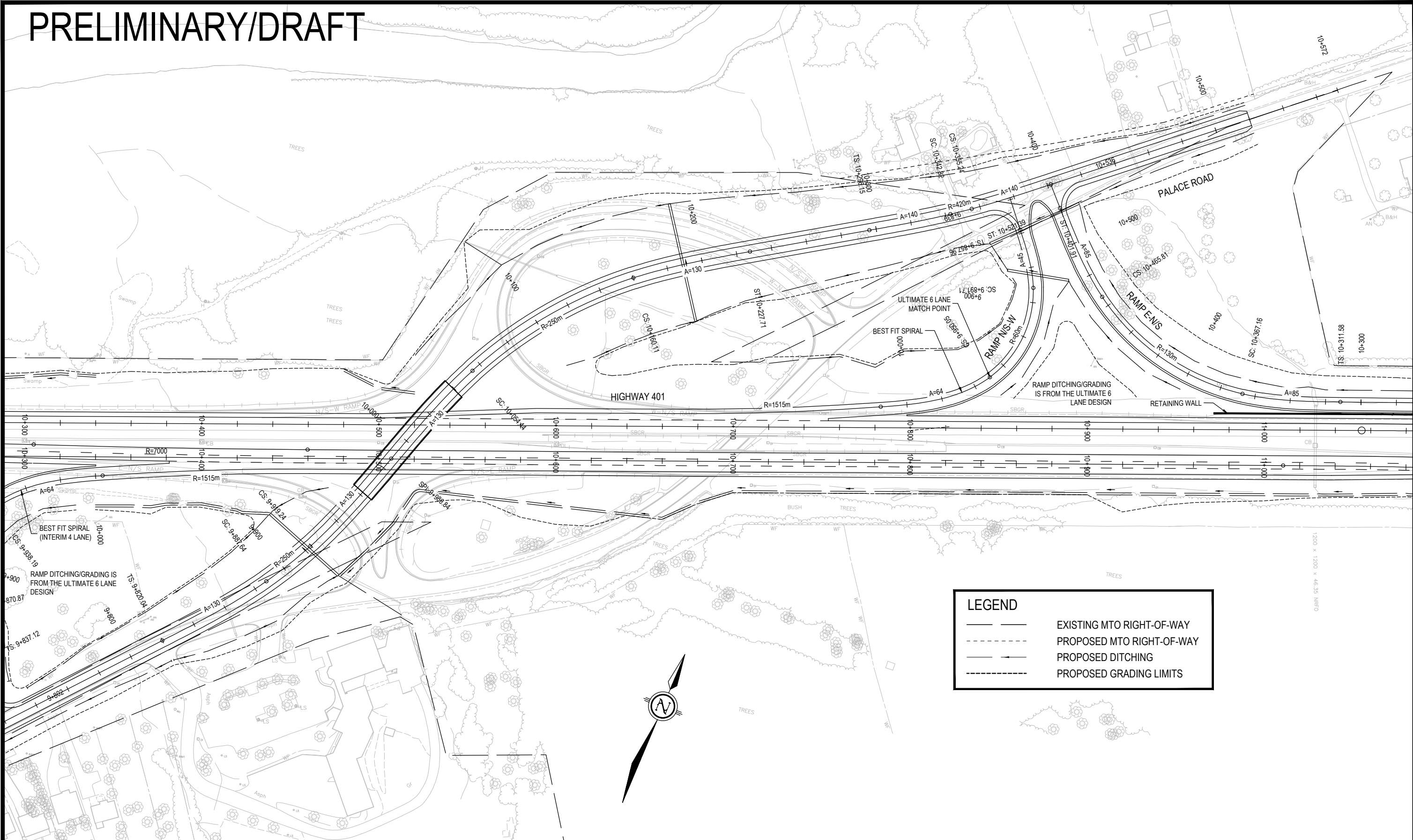


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PLOTDATE: Jul 20, 2017 - 10:17am

		HIGHWAY 401 AT PALACE ROAD GWP 4197-13-00	INTERCHANGE IMPROVEMENTS - PLAN -	<div>50m0m50m</div> <div>DATE: JULY 2017</div>	DWG 1
--	--	---	--------------------------------------	--	----------

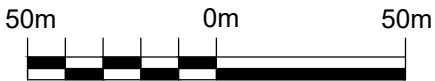
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HIGHWAY 401
AT PALACE ROAD
GWP 4197-13-00

INTERCHANGE IMPROVEMENTS
- PLAN -



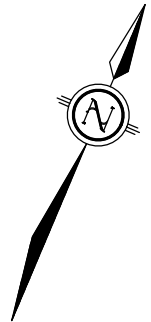
DATE: JULY 2017

DWG
2

PRELIMINARY/DRAFT

LEGEND

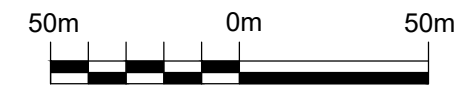
- EXISTING MTO RIGHT-OF-WAY
- PROPOSED MTO RIGHT-OF-WAY
- PROPOSED DITCHING
- PROPOSED GRADING LIMITS



AECOM

HIGHWAY 401
AT PALACE ROAD
GWP 4197-13-00

INTERCHANGE IMPROVEMENTS
- PLAN -



DATE: JULY 2017

DWG
3

Appendix K – Groundwater Assessment Report

Ontario Ministry of Transportation (MTO)

**Groundwater Assessment - Preliminary
Design and Class Environmental
Assessment Study
Highway 401 Interchange Improvements
at Palace Road (G.W.P 4197-13-00),
Town of Greater Napanee, ON**

Prepared by:

AECOM

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905 886 9494 fax

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Revision #	Date	Revised By:	Revision Description

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- was prepared for the specific purposes described in the Report and the Agreement; and
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AECOM: 2015-04-13

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Report Reviewed By:

Sergiy Tchernikov, M.Sc., P.Geo.
Senior Environmental Scientist/Hydrogeologist
Project Manager

Executive Summary

AECOM Canada Ltd. (AECOM) was retained by the Ontario Ministry of Transportation (MTO) to complete a groundwater assessment in support of a Preliminary Design (PD) and Class Environmental Assessment (EA) Study (the Study) for improvements to the Highway 401/Palace Road interchange (Contract G.W.P 4459-04-00) in the Town of Greater Napanee, County of Lennox and Addington, Ontario. The study will examine interim and long-term interchange operational improvements, median improvements on Highway 401, replacement and/or widening of the Highway 401 bridges, pavement rehabilitation, drainage improvements, traffic signals, illumination, and traffic staging (including potential detours on Palace Road) during construction.

The study area includes Highway 401 and Palace Road interchange and the Highway 401 corridor westerly from the interchange to Newburgh Road.

The objective of this groundwater study was to evaluate the local hydrogeological conditions within the study area, to verify potential impacts from highway construction activities to the local hydrogeology, and to recommend measures that could mitigate those potential impacts.

A summary of the hydrogeological conditions within the study area is as follows:

Geology and Hydrogeology

The study area is situated within a limestone terrane with thin or no soil coverage. The quaternary deposits consist of glaciolacustrine deposits of silt and clay (basin and quiet water deposit) on top of limestone bedrock. Modern alluvial deposits of clay, silt, sand and gravel are observed along the Napanee River valley. The majority of the limestone terrane exhibits shallow soil cover, while glacial till deposits of silt and clay present along the stream valleys could be deep in some areas. A fault line is present along the Napanee River trending the river orientation, crossing the study area on the west side of Napanee River.

Based on the Ministry of the Environment and Climate Change (MOECC) well records and the overburden deposit thickness map generated as part of the Approved Assessment Report for Quinte Source Protection Region (SPR) (July 2014) (the July 2014 Quinte SPR Assessment Report), the thickness of the overburden deposits ranged from approximately 1.2 m to 4.9 m below ground surface within the study area. Bedrock was observed exposed at the ground surface within the study area along Palace Road in a limited area immediately south of the interchange overpass.

There are two major bedrock aquifer systems in the vicinity of the study area: the shallow limestone aquifer and the deep Precambrian aquifer. According to the July 2014 Quinte SPR Assessment Report, the yield from the bedrock aquifers is typically low to moderate and considered adequate for meeting most domestic and agricultural needs.

The quality of supply from the aquifers is normally good with fresh water reported on well records. However, the water is often hard and in some areas natural water quality problems such as mineralization, gas and sulphur may be experienced (the July 2014 Quinte SPR Assessment Report). These natural water quality problems are typically encountered when wells are drilled deep (i.e., depths greater than 30 m in limestone bedrock) or in areas of groundwater discharge.

Potable water in Napanee is municipally supplied with water obtained from Lake Ontario. The study area is located at the eastern end of Napanee and based on the MOECC well records, there are a number of private wells present within the study area. All existing water wells within the study area are bedrock wells, with the majority of them drawing water from the limestone aquifer.

Groundwater Flow

The study area is situated within a limestone terrane and the limestone aquifer is the predominant aquifer for potable water supplies in the vicinity of the study area. The local movement of groundwater in the limestone aquifer is typically a reflection of surface topography with groundwater flowing from areas of high elevations to low. Based on the MOECC well records, the static groundwater level in the existing water wells ranges from approximately 2.1 m to 17.7 m below ground surface within the study area. The water table elevation in the limestone aquifer is generally within or at 5 m below ground surface (bgs). Based on the water table elevation map covering the Greater Napanee (the July 2014 Quinte SPR Assessment Report), the regional groundwater flow direction consists of different components in the vicinity of the study area, flowing towards the Napanee River and the Bay of Quinte.

Groundwater Recharge and Discharge Conditions

According to the Tier 1 Water Budget Report for the Quinte Source Protection Region (Quinte Conservation, April 14, 2009) completed as part of the July 2014 Quinte SPR Assessment Report, the annual recharge rates for the limestone aquifer were calculated in the order of 81 to 109 mm with an average of 93 mm. The average annual recharge rate of the Precambrian (granite) aquifer was approximately 50 mm. The groundwater recharge in the vicinity of the study area is considered medium and according to the Significant Groundwater Recharge Areas (SGRAs) mapped as part of the July 2014 Quinte SPR Assessment Report, there are no significant SGRAs present within the study area.

Within the study area, groundwater discharge likely occurs along Napanee River and its associated wetlands.

Areas of Shallow Groundwater Table and Potential Dewatering

Shallow groundwater table conditions (generally within 5 m bgs) are present throughout the study area. At the time of preparing this report, the recommended plan for the interchange improvement work has not been finalized and details regarding the design are not available. Depending on the actual scope of the interchange improvement work and excavation depth, dewatering may be required given the shallow groundwater conditions.

If during the detail design stage, it is determined that dewatering is required (i.e., construction is anticipated to go below the groundwater table), the dewatering activities will have to be registered as "prescribed activities" on the Environmental Activity and Sector Registry (EASR) if the amount of water taken exceeds 50 m³/day and is below 400 m³/day. A Category 3 Permit to Take Water (PTTW) must be obtained from the MOECC if the amount of water taken exceeds 400 m³/day during the dewatering activities.

It should be noted that the areas of high water table have been identified based on a well record review, topographic mapping and visual observations. A more accurate EASR or PTTW evaluation should be conducted as the detail design progresses. Geotechnical investigation/design reports and detail design drawings for the project will be reviewed to confirm the geological/hydrogeological conditions (stratigraphy, groundwater level, thickness and hydraulic conductivity of the overburden aquifer) in the areas where deep excavations are required.

Groundwater Vulnerability

The study area is situated within a limestone terrane with thin or no soil coverage. The overburden thickness within the study area ranged from approximately 1.2 to 4.9 m bgs based on the MOECC well records. The limestone bedrock aquifer is the dominant aquifer which is used for domestic and commercial water supply within the study area. This aquifer is most susceptible to potential sources of surface contamination where bedrock outcrops at the surface or where the overburden deposit is thin. The rate of groundwater and contaminant transmission depends on the amount of fractured zones of the bedrock.

Given the fact that shallow soil/bedrock and shallow groundwater table conditions (generally within 5 m bgs) are present throughout the study area and the presence of private water wells, the groundwater vulnerability within the study area is rated as having a high potential for contamination.

Surface Water Intake Protection Zones

According to the July 2014 Quinte SPR Assessment Report, a large piece of land within the study area along Napanee River has been classified as surface water Intake Protection Zone (IPZ) 2 (Napanee Intake IPZ-2). In addition, a water Intake Protection Zone 3 (Deseronto Intake IPZ-3A) is located at the eastern end of the study area (within the study area limit). IPZs are considered vulnerable areas from the source water protection perspective.

Potential Water Well Impacts

As discussed earlier, there are no municipal wells located within the study area or in the vicinity. A total of seven existing private water wells were identified within the study area by the MOECC well records. Six wells are used for domestic (i.e., used by private residential homes), while one is used for commercial purposes.

All existing water wells are bedrock wells with well depths ranging from approximately 11.0 to 38.7 m bgs. Among the seven existing water wells, there are two shallow wells with well depths less than 15 m bgs. Depths to bedrock ranged from approximately 1.2 to 4.9 m bgs. All wells are drilled wells with a casing diameter of 15.2 cm.

The static water levels for the water wells range from approximately 2.1 m (well ID 3705380) to 17.7 m bgs (well ID 3701819). The wells draw water from two bedrock aquifers: the shallow limestone aquifer and the deeper Precambrian (granite) aquifer. The groundwater level in the limestone aquifer is generally within 5 m bgs. Shallow groundwater conditions are present throughout the study area, especially in the areas close to surface water bodies and wetlands.

Depending on the construction design and excavation depths, which are not available at the current stage of the project, dewatering may be required if the road or bridge/culvert constructions go below the groundwater table. If deep excavations or permanent service installations below the water table are to be carried out in the areas where existing water wells exist, potential impacts to groundwater in the shallow wells may occur.

In addition, the study area is dominated by bare bedrock terrain and bedrock-drift complex topography. Bedrock ridges are exposed at the ground surface intermixed with valleys and low-lying depressions. The future interchange improvement work may involve bedrock blasting at certain locations. The shock waves and vibrations from rock blasting may have temporary impacts to groundwater quality and/or quantity in the water wells located in close vicinity.

Potential Impacts to Local Groundwater

The potential impacts from the interchange improvement work to the local groundwater system include, but are not limited to, the following:

- Changes to recharge/discharge regimes resulting from the disturbance of the ground surface, ground clearing, compaction, road cuttings, placement of fill and the potential addition of impervious road surface;
- Dewatering and/or rock blasting impacts that include a reduction in groundwater level and/or reduced flow to the nearby water wells and groundwater dependent water bodies;
- Potential spills of hydrocarbons and other chemicals used during construction activities could impact the groundwater aquifer and groundwater-dependent water bodies;

- Application of commercial fertilizers during seeding activities to re-establish vegetative cover; and
- The use of salt for road de-icing in winter seasons during future highway operations.

The shallow groundwater levels in this area are high, generally with 5 m below ground surface. It is anticipated that excavations will be required during construction which have the potential for groundwater interference therefore an Environmental Activity Sector Registry (EASR) / Permit to Take Water (PTTW) will likely be required. Further analysis will be undertaken once further details are known during the Detail Design stage to confirm and support the need for an EASR / PTTW for these works.

Recommended Mitigation Measures

The following mitigation measures are recommended to manage the potential impacts:

- Limit the depth of excavation and minimize the needs for dewatering during construction;
- Minimize the needs for rock blasting;
- If dewatering is required during the future interchange improvement work:
 - Dewatering activities should 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 EASR, if the amount of water taking exceeds 50 m³/day and is below 400 m³/day. A Category 3 Permit to Take Water (PTTW) must be obtained from the Ministry of the Environment and Climate Change (MOECC) if the amount of water taken exceeds 400 m³/day.
 - A pre-construction door-to-door water well survey is recommended to confirm the presence or absence of existing water wells in the vicinity (within 500 m radius) of the future dewatering and/or rock blasting locations, if required, and document the baseline conditions (both quality and quantity) of these wells. A water well monitoring program shall be developed and implemented during and after the dewatering and/or rock blasting activities, if deemed necessary. In addition, any water wells to be removed during the interchange improvement activities will have to be decommissioned properly as per the Ontario Wells Regulation (R.R.O. 1990, Reg. 903).
- Minimize disturbance to existing vegetation and grassed slopes where re-grading is required (disturbed areas should be re-vegetated as quickly as possible after completion of construction activities);
- Prepare and implement a stormwater management plan to protect the quality of surface runoff that may infiltrate groundwater resources;
- Minimize groundwater recharge impacts in the area by directing the surface runoff to roadside ditches and improve ditch conditions;
- Prepare and implement a spill prevention and control management plan as per the Source Protection Plan for the Quinte Source Protection Region (September 2014) (*the Plan*) policies and MTO’s best management practices;
- Minimize commercial fertilizer usage and runoff by following the MTO prescribed best management practices and Ontario Provincial Standard Specification (OPSS 0804); and,
- Minimize salt usage and runoff during road de-icing applications by following *the Plan* policies and best practices consistent with those used across North America and employ the latest winter maintenance technologies.

This Executive Summary is not intended to be a "stand-alone" document, but a summary of our findings as described in the following report. It is intended to be used in conjunction with the scope of services and limitations described therein.

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1. Introduction

AECOM Canada Ltd. (AECOM) was retained by the Ontario Ministry of Transportation (MTO) to complete a groundwater assessment in support of a Preliminary Design (PD) and Class Environmental Assessment (EA) Study (the Study) for improvements to the Highway 401/Palace Road interchange (Contract G.W.P 4197-13-00) in the Town of Greater Napanee, County of Lennox and Addington, Ontario. The Study will examine interim and long-term interchange operational improvements, median improvements on Highway 401, replacement and/or widening of the Highway 401 bridges, pavement rehabilitation, drainage improvements, traffic signals, illumination, and traffic staging (including potential detours on Palace Road) during construction.

1.1 Objective

The objective of this groundwater study was to:

- Evaluate the local hydrogeological conditions within the study area;
- Identify potential impacts from the interchange improvement work to the local hydrogeology of the study area;
- Identify existing and potential drinking water threats within the study area and potential impacts from the interchange improvement work to the drinking water wells located within the study area; and
- Recommend measures that could mitigate the identified potential impacts.

1.2 Scope of Work

The scope of work for this study follows MTO's *Environmental Reference for Highway Design (ERD)*, *Environmental Standards and Practice User Guide, Section 6 Groundwater*, dated December 2006 (the *Guide*). The purpose of the *Guide* is to provide guidance to managing the typical hydrogeological impacts faced in transportation design project with respect to groundwater.

The scope of work undertaken for this study includes the following tasks:

1. Records Review

- Review of physiographic, geological and hydrogeological maps and reports to identify the general topography, geology and hydrogeology within the study area in an effort to understand the general condition and dynamics of groundwater;
- Review of the MOECC Water Well Records to obtain any relevant information on the construction of wells, depth to bedrock, static groundwater level, geological/hydrogeological units and ground surface elevation;
- Review of official plans, watershed plans and studies from local municipalities and conservation authorities; and
- Review of source water protection assessment reports and source protection plans developed by Source Protection Committees.

2. Study Area Reconnaissance

- Site inspection to observe existing local hydrogeological conditions, where visible from the public right-of-way.

3. Reporting

- Compilation of a report consisting of interpretation and assessment of collected data, evaluation of potential road construction impacts to the local groundwater aquifer systems, and recommendations of measures to mitigate those potential impacts.

2. Study Area Description

2.1 Location

The study area is located in the Town of Greater Napanee, County of Lennox and Addington, Ontario. The study area location is presented in **Figure 1**.

2.2 Study Area Limits and Current Land Use

The groundwater assessment study area includes Highway 401 and Palace Road interchange and the Highway 401 corridor westerly from the interchange to Newburgh Road. The study area limits are shown in **Figure 1**.

The land use within the study areas is a mixture of urban areas and rural areas, including residential, institutional and commercial developments along with agricultural lands and green spaces. Based on the Official Plan of the Town of Greater Napanee (May 2014), the land use within the study area includes “Rural”, “Environmental Protection”, “Fringe Area”, “Low Density Residential”, “Arterial Commercial”, “Major Institutional”, and “Environmental Sensitive” areas. The “Environmental Protection” area is located along the Nappanee River. Two strips of land with very limited area on north and south sides of the interchange are mapped “Environmental Sensitive”.

The study area existing land uses, as obtained from the Town of Greater Nappanee’s official plan, are presented in **Figure 3**.

3. Physical Settings

3.1 Physiography, Topography and Drainage

According to the Physiography of Southern Ontario (Chapman and Putnam, 1984) and “Map 2226-Physiography of South Central Southern Ontario” (Ontario Ministry of Natural Resources (OMNR), 1972), the study area is located within the Napanee Plain physiographic region. The study area is dominated by bare limestone terrain and bedrock-drift complex topography. Bedrock ridges are exposed at the ground surface intermixed with valleys and

low-lying depressions. While the majority of the limestone terrane exhibits shallow soil cover of only a few inches, glacial till deposits present along the stream valley could be deep (up to 60 m) in some areas (the July 2014 Quinte SPR Assessment Report).

According to the topographic map for the area (<http://atlas.gc.ca/site/english/toporama/>, accessed June 30, 2016) and site observations, the topography in the vicinity of the study area is undulating in nature. Limestone (with interbedded shale) bedrock ridges are exposed at the ground surface intermixed with valleys and low-lying depressions. The lands on the west and east sides of Napanee River generally slope downwards toward the river. The elevations of the study area ranged from approximately 90 m above mean sea level (amsl) in the vicinity of the river, to greater than 120 m amsl at the eastern end.

The study area is located within the Napanee River Watershed. The Napanee River Watershed has a drainage area of 800 square kilometres and originated on the Canadian Shield descending 172 metres through the Limestone Terrane to the Bay of Quinte. The Napanee River crosses the study area in a northeast-southwest orientation on the west side of Palace Road and drains southwesterly to the Bay of Quinte, which is located on the Lake Ontario.

Based on the groundwater elevation table map covering the Greater Napanee area, created as part of the Approved Assessment Report for the Quinte Source Protection Region (SPR) (July 2014) (the July 2014 Quinte SPR Assessment Report), the regional groundwater flow direction consists of different components in the vicinity of the study area: the regional groundwater generally flows towards the Napanee River and the Bay of Quinte. Locally, surface water runoff and shallow groundwater flow is influenced by ground surface topography, flowing from elevated areas to low lying areas and surface water bodies.

3.2 Geology

3.2.1 Quaternary and Bedrock Geology

According to the "Quaternary Geology of Ontario, Southern Sheet" (Ontario Geological Survey, Map 2556, Scale 1:1,000,000), the quaternary deposit within the majority of the study area consists of glaciolacustrine deposits of silt and clay (basin and quiet water deposit) on top of limestone bedrock. Modern alluvial deposits of clay, silt, sand and gravel are observed along the Napanee River valley. Sandy deposits are observed in a limited area on the north side of the interchange. This information is consistent with those available from the MOECC well records.

According to the "Bedrock Geology of Ontario, Southern Sheet" (Ontario Geological Survey's, Ministry of Northern Development and Mines, Map 2544) and available well records, underlying the overburden deposits within the study area is the Upper Ordovician aged limestone of the Simcoe Group. Minor shale is present within the upper layer of the limestone bedrock. Bedrock exposure at the ground surface is mapped at the western portion of the study area along the Highway 401 and in the vicinity of the interchange along Palace Road. Bedrock outcrop is also mapped in a very limited area at the northwestern end of the study area in the vicinity of Newburgh Road. A fault line is present along the Napanee River on the west side following the river direction. As discussed in the earlier sections, the study area is situated within a limestone terrane. The majority of the limestone terrane exhibits shallow soil cover (a few inches), while glacial till deposits present along the stream valleys could be deep (up to 60 m) in some areas (the July 2014 Quinte SPR Assessment Report). Based on the MOECC well records and overburden deposit thickness map generated as part of the July 2014 Quinte SPR Assessment Report, the thickness of the overburden deposits ranged from approximately 1.2 m to 4.9 m below ground surface within the study area.

4. Hydrogeology

4.1 Overburden and Bedrock Aquifers

As discussed earlier, the study area is situated within a limestone terrane with thin or no soil coverage. Based on the aquifer information provided in the Assessment Report for Quinte Source Protection Authority (SPA), the majority of wells (approximately 95 percent) in the region obtain supply from fractured bedrock aquifers. The remaining 5 percent obtain supply from overburden aquifers comprising of sand and gravel where the soil is of sufficient thickness. There are two major bedrock aquifer systems in Greater Napanee area: the shallow limestone aquifer and the deep Precambrian aquifer. Yield from the Quinte Source Protection Region aquifers is typically low to moderate and considered adequate for meeting most domestic and agricultural needs.

The quality of supply from the Quinte SPA aquifers is normally good with fresh water reported on well records. However the water is often hard and in some areas natural water quality problems such as mineralization, gas and sulphur may be experienced (the July 2014 Quinte SPR Assessment Report). These natural water quality problems are typically encountered when wells are drilled deep (i.e., depths greater than 30 metres in limestone bedrock) or in areas of groundwater discharge.

Potable water in Napanee is municipally supplied with water obtained from Lake Ontario. The study area is located at the eastern end of Napanee and based on the MOECC well records, there are a number of private wells present within the study area. All existing water wells within the study area are bedrock wells, with the majority of them drawing water from the limestone aquifer. Detailed information on the MOECC well records within the study area is provided in Section 4.5.

4.2 Water Table Elevations and Groundwater Flow

Groundwater flow is controlled by the permeability and porosity of the soil / rock material and by the existing hydraulic gradients. In general, 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.

As discussed earlier, there are two major bedrock aquifer systems in Greater Napanee area: the shallow limestone aquifer and the deep Precambrian aquifer. The limestone aquifer is the predominant aquifer for potable water supplies in the vicinity of the study area. The movement of groundwater in the limestone aquifer is typically a reflection of surface topography with groundwater flowing from areas of high elevations to low. Based on the MOECC well records, the static groundwater level in the existing water wells ranges from approximately 2.1 m to 17.7 m below ground surface within the study area, which reflects the water table elevations in both the shallow and deep bedrock aquifers. The water table elevation in the shallow limestone aquifer is generally within or at 5 m below ground surface (bgs). Based on the water table elevation map covering the Greater Napanee area (the July 2014 Quinte SPR Assessment Report), the regional groundwater flow direction in the vicinity of the study area is towards the Napanee River and the Bay of Quinte.

4.3 Groundwater Recharge and Discharge Conditions

Recharge areas are characterized by permeable soils exposed at the ground surface, such as sand or gravel which allows rain water to seep easily into the ground to recharge the underlying aquifer. A recharge area is considered significant when it helps maintain the water level in an aquifer that supplies a community with drinking water, or supplies groundwater recharge to a cold water ecosystem that is dependent on this recharge to maintain its ecological function (MOECC, 2007).

According to the Tier 1 Water Budget Report (Quinte Conservation, April 14, 2009) completed as part of the July 2014 Quinte SPR Assessment Report, the annual recharge rates for the limestone aquifer were calculated in the order of 81 to 109 mm with an average of 93 mm. The average annual recharge rate of the Precambrian (granite) aquifer was approximately 50 mm. The groundwater recharge in the vicinity of the study area is considered medium and according to the Significant Groundwater Recharge Areas (SGRAs) mapped as part of the July 2014 Quinte SPR Assessment Report, there are no significant SGRAs present within the study area.

Groundwater discharges from the groundwater system to the surface as springs, seeps or upwellings and groundwater discharge occurs along surface water bodies, streams and wetlands. Within the study area, groundwater discharge likely occurs along Napanee River, its tributaries and associated wetlands.

A copy of the SGRA map from the July 2014 Quinte SPR Assessment Report is attached in **Appendix A** of this report.

4.4 Groundwater Vulnerability to Contamination

Aquifer vulnerability is a measure of how easy and how fast contamination at the ground surface reaches the underlying production aquifers. The degree of groundwater vulnerability largely depends on the presence or absence of permeable surficial materials, the depth to the water table and location relative to surface water features and water wells. Generally, aquifer vulnerability is higher in areas characterized as having a shallow aquifer system and overlain by permeable surficial soil deposits.

Within the study area, the limestone bedrock aquifer is the dominant aquifer in use for domestic and commercial water supply. This aquifer is most susceptible to potential sources of surface contamination where bedrock outcrops at the surface or where the overburden deposit is thin. The rate of groundwater and contaminant transmission depends on the amount of fractured zones of the bedrock.

Given the fact that shallow soil/bedrock and shallow groundwater table conditions (generally within or at 5 m bgs) are present throughout the study area, the groundwater vulnerability within the study area is rated as having a high potential for contamination (**Figure 6**).

This is consistent with the highly vulnerable aquifers (HVAs) mapped as part of the July 2014 Quinte SPR Assessment Report. A copy of the HVA map, as obtained from the July 2014 Quinte SPR Assessment Report, is provided in **Appendix B**.

4.5 Water Well Records Review and Groundwater Usage

According to the MOECC well records, there are seven existing water supply wells identified within the study area. The locations of the existing water wells are presented in **Figure 2**. The primary water use for six wells is domestic (i.e., used by private homes), and for one well is commercial. There are no municipal wells identified within the study area. In addition, there are a number of private drinking water wells identified within a residential area on the

south side of Newburgh Road. A small portion of this residential area is located within the study area. The well locations as reported by the MOECC well records are actually out of the study area.

All existing water wells are bedrock wells with well depths ranging from approximately 11.0 to 38.7 m bgs. Among the seven existing water wells, there are two shallow wells with well depths less than 15 m bgs. Depths to bedrock ranged from approximately 1.2 to 4.9 m bgs. All existing water wells identified by the MOECC well records appear drilled with a casing diameter of 15.24 cm. The static water levels for the water wells ranged from approximately 2.1 m (well ID 3705380) to 17.7 m bgs (well ID 3701819).

Based on the well records, the recommended pumping rates for the existing water wells ranged from approximately 0.004 Litre/Second (L/s) (1 gallon/minute (GPM)) to 3 L/s (40 GPM). There are no high yield wells (yield a rate of more than 60 L/s), as defined by the Ontario Well Regulation (Regulation 903 as amended under the *Ontario Water Resources Act* R.R.O. 1990).

The study area is located within the Town of Greater Napanee and potable water in the town is municipally supplied with water obtained from Lake Ontario. The study area is located at the eastern end of the town and the majority of the study area is rural. Residential areas were observed on the south side of Newburgh Road and north of Napanee River and along Palace Road. Based on the "Drinking Water Quality Management System, Operational Plan for A.L. Dafoe DWS & Sandhurst Shores DWS" (Town of Greater Napanee, revised 2016.02.17), the residential area along Palace Road south of Highway 401 is serviced by the town drinking water system. The remaining study area is not serviced with municipal drinking water.

A summary of the MOECC well records for the existing drinking water wells is provided in **Table 1**.

4.6 Permit to Take Water Records

Water taking from aquifers, especially large volume and long term water taking, can potentially impact the quantity and quality of groundwater by lowering the groundwater tables and changing the flow patterns and flow rates. Under *Section 34 of the Ontario Water Resources Act* and *Ontario Regulation 63/16*, the MOECC requires groundwater or surface water users who are taking volumes of water greater than 50,000 L/day to register as "prescribed activities" on the Environmental Activity and Sector Registry (EASR) or obtain a Category 3 Permit to Take Water (PTTW).

A review of the MOECC PTTW database (accessed on July 6, 2016) indicates that there are no active PTTWs within the study area.

It should be noted the MOECC PTTW database is updated irregularly based on the active permits issued by the Permit to Take Water Program. Therefore, the number of active permits within the study area, especially the short term permits for construction purposes, may vary day by day. It is recommended that the MOECC PTTW database be reviewed at the detail design and/or construction time to obtain the most up-to-date data within the study area.

4.7 Municipal Wells and Wellhead Protection Areas

According to the MOECC well records discussed in the previous section and the wellhead protection areas delineated as part of the July 2014 Quinte SPR Assessment Report, there are no municipal water supply wells and/or their associated wellhead protection areas (WHPAs) located within or adjacent to the study area. The closest municipal well is located approximately 33 km southwest of the study area in the community of Peats Point.

4.8 Surface Water Intakes

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 a 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 and extending out sequentially are Zones 2 and 3. Each zone provides opportunity for the source protection committee or municipality to apply different levels of protective measures on activities planned or existing within the zone.

According to the July 2014 Quinte SPR Assessment Report, a large piece of land within the study area along Napanee River has been classified as surface water Intake Protection Zone (IPZ) 2 (Napanee Intake IPZ-2). In addition, a water Intake Protection Zone 3 (Deseronto Intake IPZ-3A) is located at the eastern end of the study area (within the study area limit). IPZs are considered vulnerable areas from the source water protection perspective.

A copy of the IPZ maps for the above referenced IPZs, as obtained from the July 2014 Quinte SPR Assessment Report, is provided in **Appendix C**.

5. Contaminant Inventory Review

The land use within the study areas is a mixture of urban areas and rural areas, including residential, institutional and commercial developments along with agricultural lands and green spaces.

A Contamination Overview Study (COS) has been completed for the study area by AECOM in parallel with this Groundwater Assessment and the findings of the COS are documented in a draft report dated November 2016. A team of contaminant specialists from AECOM has reviewed available data (i.e., land use, environmental databases, aerial photographs and fire insurance plans) and conducted a drive-by windshield survey to analyze and identify known or potential contaminated sites. The draft COS report had identified 3 property parcels with a “high” potential for environmental contamination, as well as 4 parcels with “medium” potential for environmental contamination. In addition, 4 significant spill locations were also identified within study area by the draft COS report.

Details regarding the properties that were rated for “high” and/or “medium” potentials, as well as the significant spill locations, can be found in the AECOM draft COS report (November 2016).

6. Drinking Water Source Protection

6.1 Background

The study area is located within the Quinte SPR. The Quinte Source Protection Authority (SPA), together with the Town of Greater Napanee, are identified as having important roles in implementing the Source Protection Plan for the Quinte SPR in the vicinity of the study area, and have been regular active participants in the *Class*

Environmental Assessment consultation process throughout the development of this project. The key objectives of the Source Protection Plan are outlined within the *Clean Water Act* and require existing and future drinking water sources within the source protection area be protected. Key objectives also include ensuring that, for areas identified within the July 2014 Quinte SPR Assessment Report as areas where an activity is or would be a significant drinking water threat; the activity never becomes or ceases to be a significant drinking water threat.

6.2 Threats to Drinking Water

Threat to drinking water assessment has been completed for Quinte SPR for HVAs, SGRAs and WHPAs by the Quinte SPA (July 2014). There are no municipal water supply wells or their associated wellhead protection areas (WHPAs) located within the study area. Therefore, the proposed interchange rehabilitation work will not pose significant drinking water threats from a WHPA perspective.

According to the July 2014 Quinte SPR Assessment Report and Source Protection Plan (September 2014) (*the Plan*) for the Quinte SPR, the aquifers underlying the study area has been classified as HVAs. There are no Significant Groundwater Recharge Areas (SGRAs) located within the study area limit. There are no significant drinking water threats identified for the HVAs within the Quinte SPR. Three potential project relevant activities are listed in *the Plan* as Prescribed Drinking Water Threats for HVAs: the handling and storage of fuel, the application of road salt, and the application of commercial fertilizer to land. These three project relevant activities are considered low risk threats to the HVAs.

In addition, some areas within the study area are located within the surface water intake protection zones (i.e. Napanee IPZ-2 and/or Deseronto IPZ-3A). The vulnerability score for the Napanee Intake IPZ-2 has been rated 8.1 (highly vulnerable) and three significant threats have been identified in these areas including biosolid spreading, application of pesticide on crops and livestock grazing. None of the three circumstances are project relevant activities in terms of the interchange rehabilitation work. The vulnerability score has been classified as 7.2 (highly vulnerable) for the Deseronto IPZ-3A and there are no significant threats identified for the Deseronto IPZ-3.

The same three potential project relevant activities, as discussed above for HVAs, are listed in *the Plan* as Prescribed Drinking Water Threats in the Napanee IPZ-2 and Deseronto IPZ-3A. These activities are considered as having a moderate risk.

The Quinte source protection plan provides the following prescriptive policies for the three project relevant activities in HVAs or IPZs (i.e. Napanee IPZ-2 and Deseronto IPZ-3A) within the study area:

- Policy 12-1-E & F: Salt Management Plan for Significant, Moderate, and Low Threats Related to Application of Road Salt
- Policy 12-2-E & F: Salt Management Plan for Application of Road Salt
- Policy 15-2-E & F: Management of Existing and Future Handling and Storage of Fuel (above grade storage tanks greater than 250 and less than 2,500 litres) – Moderate Drinking Water Threat

Details regarding the prescriptive policies can be found in *the Plan*. These policies should be followed on salt management and fuel handling and storage during the interchange rehabilitation work and the long term maintenance of highway operations.

In addition, MTO will follow and apply the current MTO best management practices to minimize threats from these activities by way of adherence to the ministry plans and policies, the use of special contract provisions, and contract oversight and monitoring.

6.2.1 Handling and Storage of Fuel

Several constituent compounds of fuels are listed by the *Plan* as chemicals of concern. The contractor will be handling fuels for refuelling mobile and stationary equipment during interchange improvement construction time. The contract will contain provisions and operational constraints to minimize the risk of spills as per *the Plan* and ministry policies and best management practices. Spill containment and clean-up kits will be required on site. A spill action plan will be in place to ensure any spills are reported and handled appropriately and as required by legislation.

6.2.2 Application of Road Salt

The chemicals of concern for road salt are listed as sodium and chloride. The application of road salt is considered a moderate risk threat in Napanee IPZ-2 and Deseronto IPZ-3A, and a low risk threat in the HVAs within the study area, where road salt is applied to highways and may result in a release to groundwater or surface water. The contract will contain provisions and operational constraints to minimize the risk of spills as per *the Plan* (September 2014) and ministry policies and best management practices.

MTO is committed to keeping Ontario's highways as safe as possible during winter weather conditions. The ministry and its contractors monitor weather and road conditions so they can respond to winter storm events in a quick and efficient manner. Contractors are required to meet *the Plan* policies and Ministry's maintenance standards which have been developed based on extensive experience, and are consistent with the best practices of highway authorities in North America. Clearing winter roads to bare pavement usually requires a combination of plowing and salting operations. The purpose of the salt is to break the bond between the snow and the pavement surface, in order to allow the snow to be removed by snow plows. In order to ensure the continued safety of highways, and the health of our environment, MTO have developed guidelines for the responsible and appropriate use of road salt in winter maintenance operations.

MTO's Salt Management Plan ensures that salt is used efficiently and effectively. For example, all salt spreading trucks are required to be equipped with electronic spreading controls to reduce waste and maximize the effectiveness of the materials used.

Anti-icing is a road maintenance strategy that is employed before a winter storm event to prevent snow and ice from bonding to the pavement surface. This is accomplished through the use of liquid salt solutions. These liquids are also added to road salt, to help it stick to the road and activate more quickly. This reduces the quantity of salt required and minimizes the impact on the environment. The contractor responsible for this highway interchange utilizes this salt reduction strategy.

6.2.3 Application of Commercial Fertilizer

Nitrogen is listed in the *Plan* as the chemical of concern in commercial fertilizer. The circumstance is that fertilizer is applied to land and may result in a release to groundwater or surface water. The *Plan* identifies circumstances where the risk score increases where the percent of managed land (i.e., areas where there may be application of agricultural source material, commercial fertilizer, or non-agricultural source material) in an HVA is greater than 80% and as Nutrient units per acre of managed land increase. Based on the managed land in HVAs mapped as part of the July 2014 Quinte SPR Assessment Report, the percent of managed land within the study area is 41% and the managed land activities are rated as Low Risk Threats. Therefore, no seeding activities will pose a significant threat to the drinking water system within the study area.

As part of the construction project, there will be exposed earth surfaces which will require seeding to re-establish the vegetative cover. *The Plan* does not provide prescriptive policies for the use of commercial fertilizer for the

HVAs or IPZs within the study area. MTO prescribes the use of commercial fertilizer containing nitrogen where cover is to be re-established on earth surfaces through seeding. Nitrogen application rates and soil surface conditions are prescribed in the contract by Ontario Provincial Standard Specification (OPSS 0804) such that the risk of runoff is minimized.

7. Study Area Reconnaissance

A site visit was carried out on April 21, 2016 by Chloe Zhang and Hannah Roberts of AECOM. The weather condition at the time of the site visit was sunny, with an approximate temperature of 17°C. The site visit included a visual drive-by windshield survey of the study area and surrounding lands.

The driving route included the accessible public roadways within the study area. It should be noted that the drive-by inspection did not include any property specific inspections. AECOM's observation and evaluation of the study area was limited to features and conditions that were readily visible from publically accessible roadways.

The majority of the study area is rural. Agricultural lands were observed north of the Highway 401. Wooded land and open green spaces were generally seen on the south side of highway 401. Residential properties were observed along Palace Road. A residential area was located off Newburgh Road on the south side of the road and north of Napanee River. The southern end of this residential area was located within the study area limit. A hotel and restaurant were located on the south side of Palace Road and immediately south of the Highway 401 interchange (within the southeast quadrant).

The topography of the study area was undulating, with a general downward slope from the surrounding lands to the Napanee River. A sudden elevation drop was noted along the Napanee River south of the Highway 401, where a fault line is mapped. The ground surface south of the river is a few meters elevated above the river level. The Napanee River crosses the study area in a northeast-southwest orientation on the west side of Palace Road and drains southwesterly to the Bay of Quinte. Swampy areas or wetlands associated were observed along the river.

Bedrock was observed exposed at the ground surface within the study area along Palace Road in a limited area immediately south of the interchange overpass. In addition, bedrock outcrop was observed along the south side of Palace Road further down to the south along Palace Road; this area of bedrock exposure is outside of the study area at an approximate distance of 120 m from the study area limit.

Drilled wells were observed in the residential area south of Newburgh Road and North of Napanee River. No fire hydrants were observed along the road sides in this area. No water well was observed on the residential properties along Palace Road, where fire hydrants were observed in front of the properties along the road.

The natural features and built environment of the study area are presented in **Figure 2**.

8. Preliminary Assessment of Potential Groundwater Impacts

8.1 Temporary and Permanent Construction Impacts

8.1.1 *Potential Impacts to Groundwater Recharge and Discharge*

The following equation represents the natural water balance:

$$\text{Precipitation} = \text{Evapotranspiration} + \text{Recharge} + \text{Runoff}$$

Where, Evapotranspiration is the sum of evaporation and plant transpiration.

The most significant difference associated with water balance during highway construction is the removal of vegetation and the installation of the impervious surface (i.e., concrete and/or asphalt roadway surface). 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 road bed 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 interchange improvement project, there may be a minor increase in the pavement surfaces. Increase of impermeable surface and road compaction will potentially reduce the amount of surface runoff penetrating into the ground. Groundwater recharge loss due to impermeable surfaces and road compaction will be mitigated by directing the surface runoff to roadside ditches where additional recharge can be anticipated.

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.

Therefore, significant impacts from the surface paving to the groundwater recharge and discharge in the area are not anticipated.

8.1.2 *Construction below Water Table and 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 the areas where fine-textured soil is present releases limited quantity of groundwater and most of the water would be retained in the soil, and removed with the soil. In these areas, seepage into excavations would be minimal and dewatering might not be needed. More significant impacts would occur to 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.

As discussed earlier, shallow groundwater table conditions (generally within 5 m bgs) are present throughout the study area. At the time of preparing this report, the recommended plan for the interchange improvement work has not been finalized and details regarding the design are not available. Depending on the actual scope of the interchange improvement work and excavation depths, dewatering may be required given the shallow groundwater conditions.

If during the detail design stage, it is determined that dewatering is required (i.e., construction is anticipated to go below the groundwater table), the dewatering activities will have to be registered as “prescribed activities” on the EASR if the amount of water taken exceeds 50 m³/day and is below 400 m³/day. A category 3 PTTW must be obtained from the MOECC if the amount of water taken exceeds 400 m³/day during the dewatering activities.

It should be noted that the areas of high water table have been identified based on a well record review, topographic mapping and visual observations. A more accurate EASR or PTTW evaluation should be conducted as the detail design progresses. Geotechnical investigation/design reports and detail design drawings for the project will be reviewed to confirm the geological/hydrogeological conditions (stratigraphy, groundwater level, thickness and hydraulic conductivity of the overburden aquifer) in the areas where deep excavations are required.

8.2 Likelihood of Release of Contaminants

8.2.1 Fuel Spills

There is a potential of accidental spill / release of fuels during road 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 systems due to faster 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.

The presence of the limestone terrane with no or thin soil cover and shallow groundwater table, Napanee River and its associated wetlands within the study area, increases the potential for accidental fuel spills to impact the underlying limestone aquifer. Mitigation measures regarding potential spills are discussed in detail in *Section 6.2.1 Handling and Storage of Fuels* of this report.

8.2.2 Road De-icing

Concentrations of sodium and chloride will increase in the runoff along roadside ditches and through roadside infiltration as a result of road de-icing, and therefore affect the underlying groundwater system. Chloride at high concentrations (> 250 mg/L) may produce an impact on the taste of water, while elevated concentrations of sodium may be of concern to persons suffering from hypertension or other medical conditions.

The presence of the limestone terrane with no or thin soil cover and shallow groundwater table, Napanee River and its associated wetlands within the study area increases the level of impacts from road-de-icing to the underlying groundwater system. Due to the wide application of de-icing salt along highways and the mobility of road salt constituents, complete mitigation of road salt impacts is difficult. Specific attention should be paid to salt application management within the study area, i.e. road salt application within the right-of-way should be at the minimum levels

allowed within the context of MTO's standard road salt application procedures and *the Plan*. Other general mitigation measures for salt application are provided in *Section 6.2.2 Application of Road Salt* of this report.

8.2.3 Commercial Fertilizer

As part of the construction, there will be exposed earth surfaces which will require seeding to re-establish vegetative cover. Nitrogen is listed as the chemical of concern in commercial fertilizer. The circumstance is that when fertilizer is applied to the land, it may result in a release of nitrogen to groundwater or surface water.

Mitigation measures regarding nitrogen release from the application of commercial fertilizers are discussed in detail in *Section 6.2.3 Application of Commercial Fertilizer* of this report.

9. Potential Water Well Impacts

As discussed earlier, there are no municipal wells located within the study area or in the vicinity. A total of seven existing private water wells were identified within the study area by the MOECC well records. Six wells are used for domestic (i.e., used by private residential homes), while one is used for commercial purposes.

All existing water wells are bedrock wells with well depths ranging from approximately 11.0 to 38.7 m bgs. Among the seven existing water wells, there are two shallow wells with well depths less than 15 m bgs. Depths to bedrock ranged from approximately 1.2 to 4.9 m bgs. All existing water wells identified by the MOECC well records appear drilled with a casing diameter of 15.24 cm.

The static water levels for the water wells range from approximately 2.1 m (well ID 3705380) to 17.7 m bgs (well ID 3701819). The wells draw water from two bedrock aquifers: the shallow limestone aquifer and the deeper Precambrian (granite) aquifer. The groundwater level in the limestone aquifer is generally within 5 m bgs. Shallow groundwater conditions are present throughout the study area, especially in the areas close to surface water bodies and wetlands.

Depending on the construction design and excavation depths, which are not available at the current stage of the project, dewatering may be required if the road or bridge/culvert constructions go below the groundwater table. If deep excavations or permanent service installations below the water table are to be carried out in the areas where existing water wells exist, potential impacts to groundwater in the shallow wells may occur.

In addition, the study area is dominated by bare bedrock terrain and bedrock-drift complex topography. Bedrock ridges are exposed at the ground surface intermixed with valleys and low-lying depressions. The future interchange improvement work may involve bedrock blasting at certain locations. The shock waves and vibrations from rock blasting may have potential impacts to groundwater quality and/or quantity in the water wells located in close vicinity.

10. Conclusions and Recommendations

Based on the data collected to date, shallow soil/bedrock and groundwater conditions (generally within 5 m bgs) are present throughout the study area. The groundwater vulnerability within the study area is rated as having a high potential for contamination. In addition, IPZs 2 and 3 are also present within the study area, which are considered as highly vulnerable areas.

The potential impacts from the interchange improvement work to the local groundwater system include, but are not limited to, the following:

- Changes to recharge/discharge regimes resulting from the disturbance of the ground surface, ground clearing, compaction, road cuttings, placement of fill and the potential addition of impervious road surface;
- Dewatering and/or rock blasting impacts that include a reduction in groundwater level and/or reduced flow to the nearby water wells and groundwater dependent water bodies;
- Potential spills of hydrocarbons and other chemicals used during construction activities that could impact the groundwater aquifer and groundwater-dependent water bodies;
- Application of commercial fertilizers during seeding activities to re-establish vegetative cover; and
- The use of salt for road de-icing in winter seasons during future highway operations.

The shallow groundwater levels in this area are high, generally with 5 m below ground surface. It is anticipated that excavations will be required during construction which have the potential for groundwater interference therefore an Environmental Activity Sector Registry (EASR) / Permit to Take Water (PTTW) will likely be required. Further analysis will be undertaken once further details are known during the Detail Design stage to confirm and support the need for an EASR / PTTW for these works.

The following mitigation measures are recommended to manage the potential impacts:

- Limit the depth of excavation and minimize the needs for dewatering during construction;
- Minimize the needs for rock blasting;
- If dewatering is required during the future interchange improvement work:
 - Dewatering activities should 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 EASR, if the amount of water taking exceeds 50 m³/day and is below 400 m³/day. A Category 3 Permit to Take Water (PTTW) must be obtained from the Ministry of the Environment and Climate Change (MOECC) if the amount of water taken exceeds 400 m³/day.
 - A pre-construction door-to-door water well survey is recommended to confirm the presence or absence of existing water wells in the vicinity (within 500 m radius) of the future dewatering and/or rock blasting locations, if required, and document the baseline conditions (both quality and quantity) of these wells. A water well monitoring program shall be developed and implemented during and after the dewatering and/or rock blasting activities, if deemed necessary. In addition,

any water wells to be removed during the interchange improvement activities will have to be decommissioned properly as per the Ontario Wells Regulation (R.R.O. 1990, Reg. 903).

- Minimize disturbance to existing vegetation and grassed slopes where re-grading is required (disturbed areas should be re-vegetated as quickly as possible after completion of construction activities);
- Prepare and implement a stormwater management plan to protect the quality of surface runoff that may infiltrate groundwater resources;
- Minimize groundwater recharge impacts in the area by directing the surface runoff to roadside ditches and improve ditch conditions;
- Prepare and implement a spill prevention and control management plan as per *the Plan* policies and MTO's best management practices;
- Minimize commercial fertilizer usage and runoff by following the MTO prescribed best management practices and Ontario Provincial Standard Specification (OPSS 0804); and,
- Minimize salt usage and runoff during road de-icing applications by following *the Plan* policies and best practices consistent with those used across North America and employ the latest winter maintenance technologies.

11. Limiting Conditions

The conclusions presented in this report are opinions based on our review and interpretation of available geological/hydrogeological information and documentation as noted in this report and our visual observations during a drive-by windshield survey on April 21, 2016.

Services have been performed in a manner consistent with the level of care and skill ordinarily exercised by members of our profession. No other warranties are expressed or implied.

This report is intended to be used in its entirety. No excerpts should be taken to be representative of the findings of this assessment. The report is for the sole use and benefit of the MTO and may not be relied upon by any other person or entity without the prior written consent of MTO and AECOM. Any such consent given by AECOM shall be deemed to be and shall be subject to the terms and conditions of the Proposal, including without limitation, the warranty, liability and indemnity terms thereof, and any person given such consent (the "Grantee") shall be deemed to have agreed to such terms and conditions by its use and reliance on the Reports.

It should be recognized that this study is intended only as an initial groundwater study of the hydrogeological conditions within the study area and was not intended to be a comprehensive hydrogeological investigation. Therefore, the conclusions provided are not necessarily inclusive of all the possible conditions. Given the limitation of the scope of work of this study, the availabilities of geological/hydrogeological information and the nature of the drive-by windshield survey, exploratory borings, soil and/or groundwater sampling or analytical testing were not undertaken, it is possible that currently unrecognized subsurface geological and hydrogeological conditions might exist within the study area.

12. References

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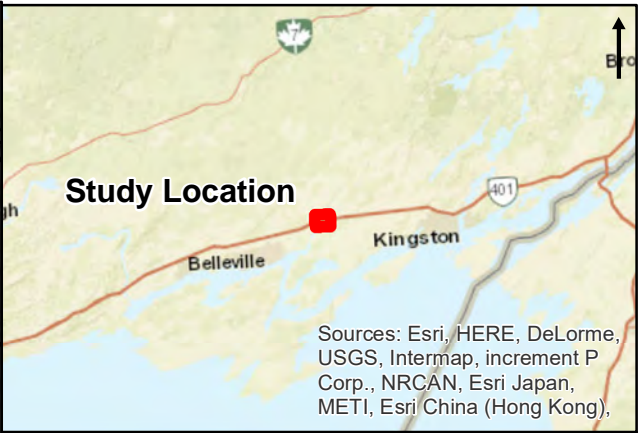
AECOM

Figures





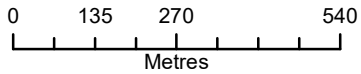
Sources: MTO, MNRF

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



Legend

-  Study Area
-  Land Parcel



GROUNDWATER ASSESSMENT
PRELIMINARY DESIGN AND CLASS ENVIRONMENTAL
ASSESSMENT STUDY
HIGHWAY 401 INTERCHANGE IMPROVEMENTS AT
PALACE RD
TOWN OF GREATER NAPANEE, ONTARIO

Study Area Location Map		
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P#: 60478166	V#:	<div>Figure 1</div>
<div>AECOM</div>		

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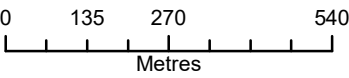
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Date Saved: 02/24/2016 9:43:20 AM



Legend

MOECC Records (16 Mar 2016)

- Commerical Water Well
- Domestic Water Well
- Study Area
- Land Parcel
- Wetland (Not evaluated per OWES)



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HIGHWAY 401 INTERCHANGE IMPROVEMENTS AT
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TOWN OF GREATER NAPANEE, ONTARIO

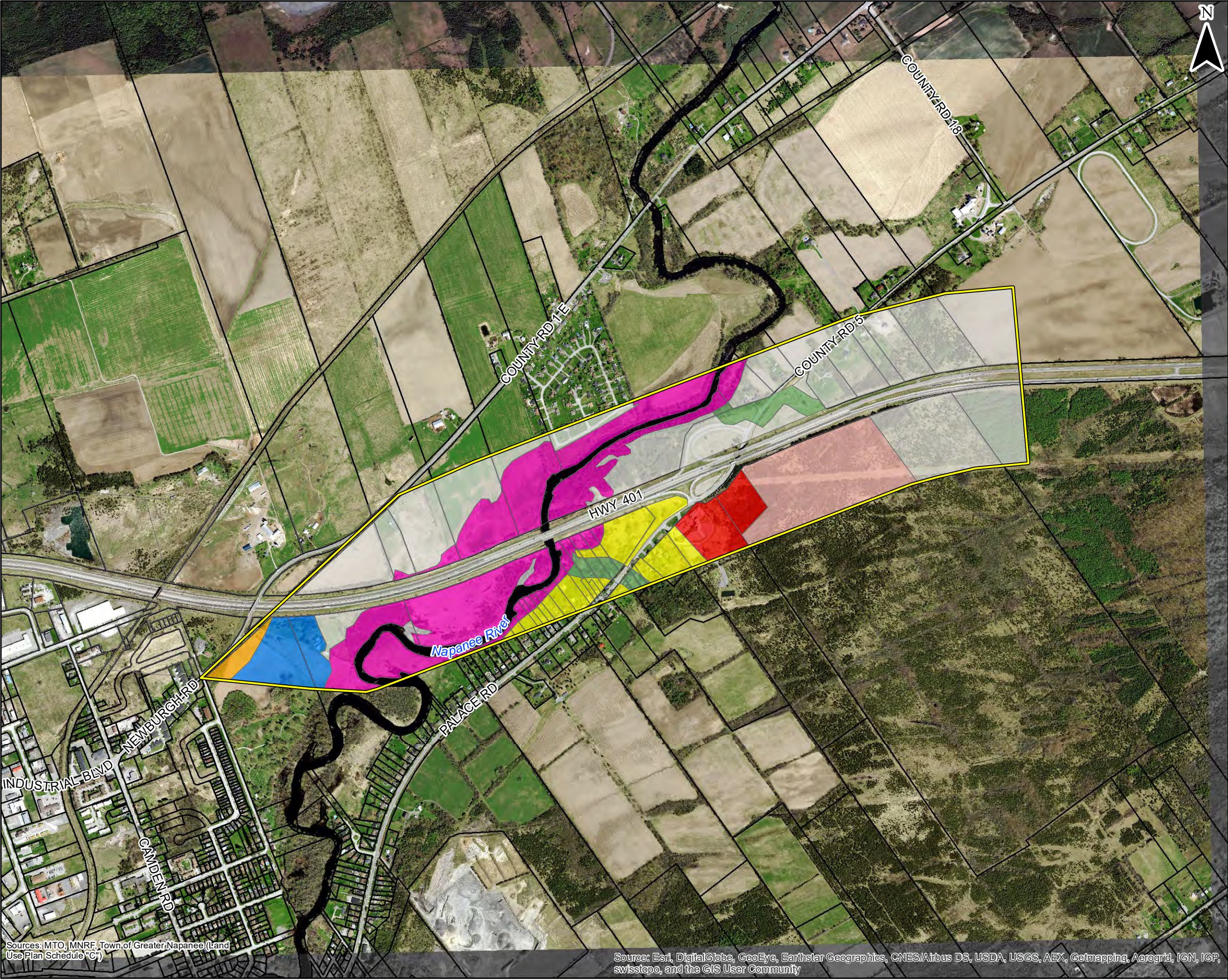
Natural Features and Built Environment

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Sources: MTO, MNRF

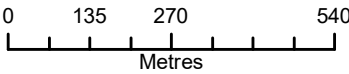
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Legend

- Study Area
- Land Parcel
- LandUse**
- Arterial Commercial
- Environmental Protection
- Environmentally Sensitive
- Fringe Area
- Low Density Residential
- Major Institutional
- Medium Density Residential
- Rural



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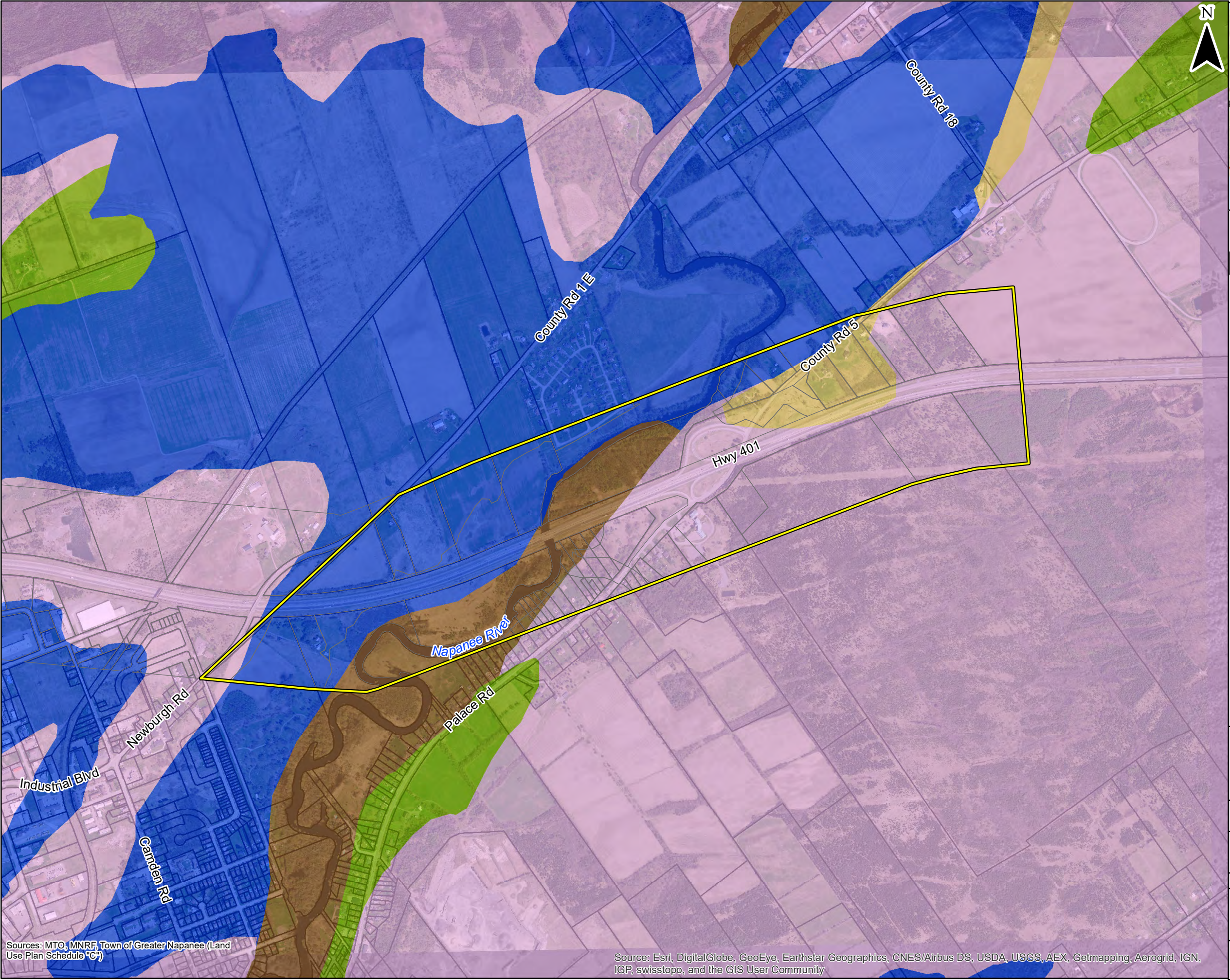
Existing Land Use

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AECOM		Figure 3
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Sources: MTO, MNRF, Town of Greater Napanee (Land Use Plan Schedule "C")

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Map location: P:\Projects\145478166-Hwy401-CyR44-1-PalaceRd\GIS\MD\GroundWater\Fig3_LandUse\2.mxd
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Sources: MTO, MNRF, Town of Greater Napanee (Land Use Plan Schedule "C")

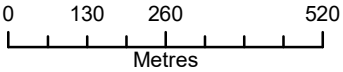
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Sources: Esri, HERE, DeLorme, USGS, Intermap, Increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong),

Legend

- Study Area
- Land Parcel
- 3: Paleozoic bedrock: limestone
- 5b: Stone-poor, sandy silt to silty sand-textured till on Paleozoic terrain
- 7a Glaciofluvial deposits of sand
- 8a Fine-textured glaciolacustrine deposits of silt and clay, minor sand and gravel
- 19: Modern alluvial deposits of clay, silt, sand, and gravel



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Quaternary Geology

Jul 2016	1:12,500 * when printed 11"x17"	Datum: NAD 1983 MTM 9 Source:
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AECOM		Figure 4

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Sources: MTO, MNRF, Town of Greater Napanee (Land Use Plan Schedule "C")

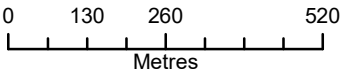
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



Sources: Esri, HERE, DeLorme, USGS, Intermap, Increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong),

Legend

- Study Area
- Land Parcel
- Ottawa Group; Simcoe Group; Shadow Lake Formation (limestone)



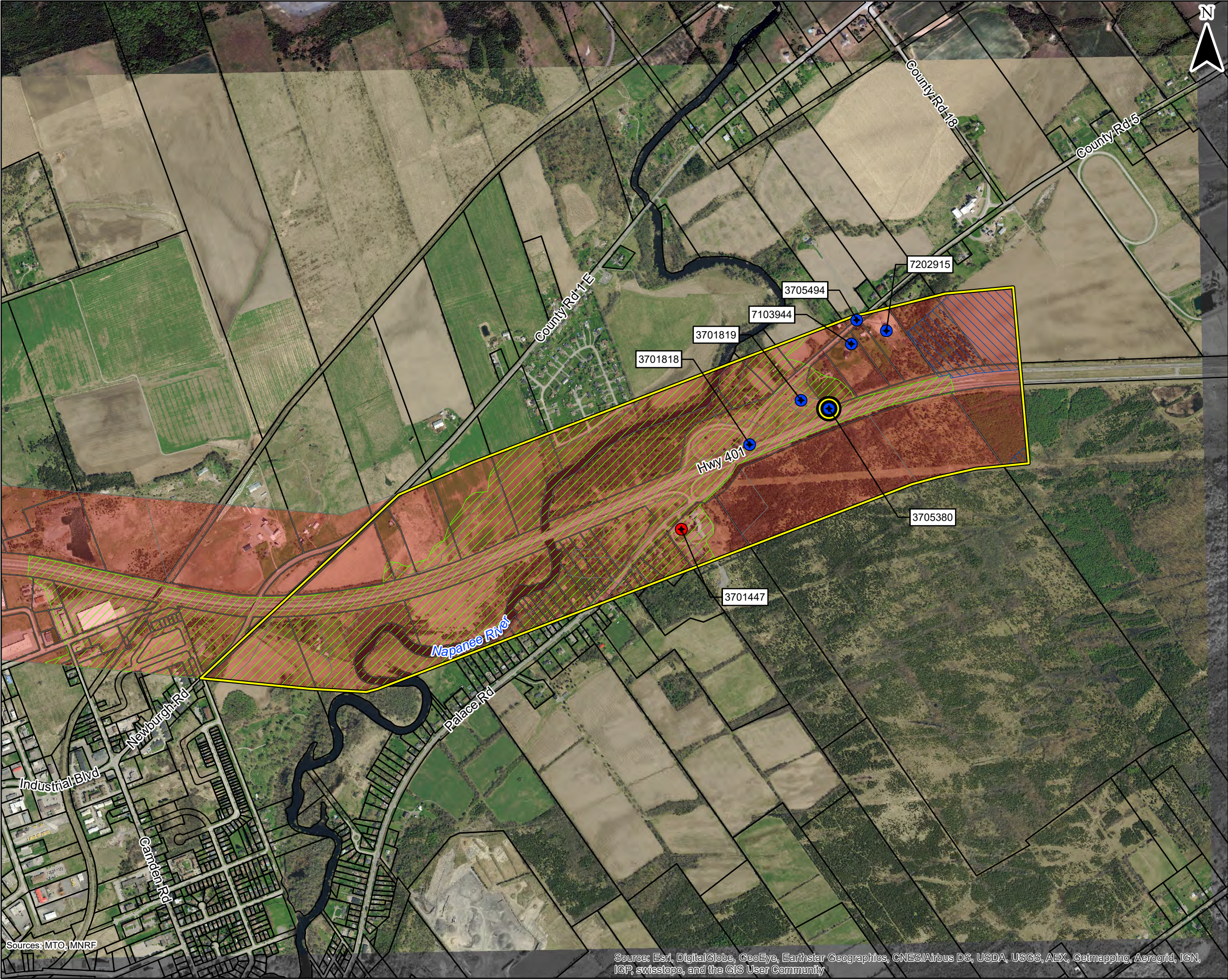
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PRELIMINARY DESIGN AND CLASS ENVIRONMENTAL
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HIGHWAY 401 INTERCHANGE IMPROVEMENTS AT
PALACE RD
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Bedrock Geology

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Sources: MTO, MNRF

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



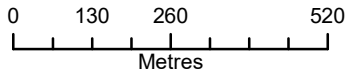
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MOECC Records (16 Mar 2016)

-  Commerical Water Well
-  Domestic Water Well
-  Shallow Well (<15m)
-  Study Area
-  Land Parcel
-  Napanee Intake IPZ-2
-  Deseronto Intake IPZ-3A


Groundwater Vulnerability

-  High



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Groundwater Vulnerability to Contamination

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P#: 60478166	V#:	<div></div> <div>Figure 6</div>
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AECOM

Tables

Table 1: Summary of MOECC Well Information

Groundwater Assessment

Preliminary Design and Class Environmental Assessment Study

Highway 401 Interchange Improvements at Palace Road, Town of Greater Napanee, Ontario

AECOM Project Number: 60478166

MOECC Well ID	Elevation (mASL)	Easting (NAD83)	Northing (NAD83)	Well Type	Primary Water Use	Water Kind	Construction Date	Well Depth (m)	Casing Diameter (cm)	Static Level (m bgs)	Recommended Pump Setting (gpm)
3701445*	104.2	346220	4903420	Bedrock	Commerical	FRESH	2/11/1965	36.6	15.2	5.5	1.0
3701446*	104.2	346220	4903420	Bedrock	Commerical	FRESH	2/18/1965	36.6	15.2	5.5	1.0
3701447	104.2	346220	4903420	Bedrock	Commerical	FRESH	2/25/1965	33.5	15.2	5.5	1.0
3701818	103.8	346457	4903705	Bedrock	Domestic	FRESH	10/9/1954	15.2	15.2	5.5	NA
3701819	107.1	346635	4903851	Bedrock	Domestic	FRESH	9/9/1967	32.3	15.2	17.7	4.0
3705380	113.1	346729	4903821	Bedrock	Domestic	SULPHUR	1/4/1979	11.0	15.2	2.1	34.0
3705494	101.3	346829	4904121	Bedrock	Domestic	FRESH	11/30/1979	22.9	15.2	4.6	40.0
7103944	106.4	346809	4904039	Bedrock	Domestic	NA	1/15/2008	38.7	15.8	11.3	3.5
7202915	100.0	346929	4904082	Bedrock	Domestic	NA	5/2/2013	30.5	15.2	3.4	4.5

Note:

mASL: m above mean sea level

NA: No information available

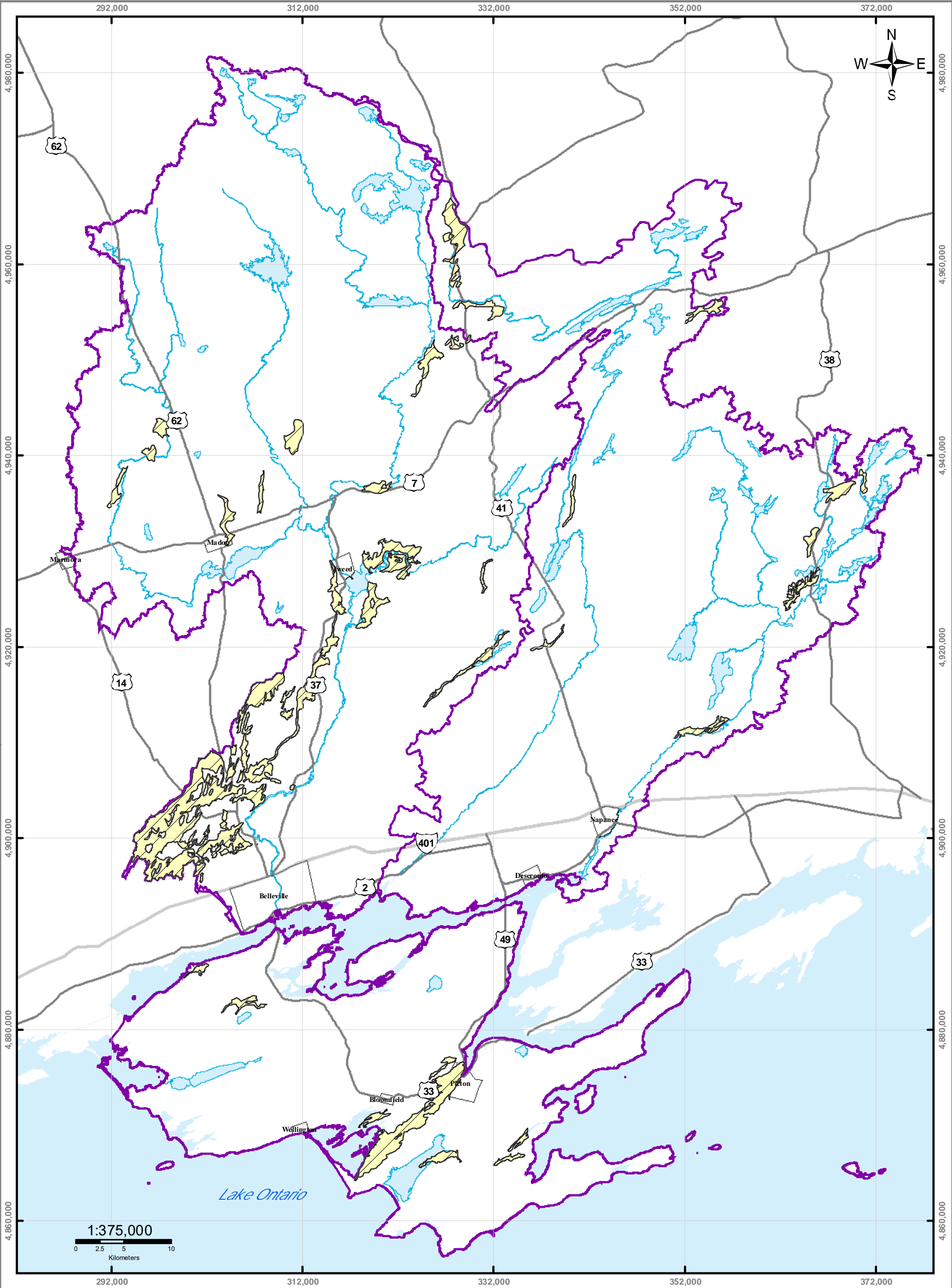
bgs:Below ground surface

gpm: gallon per minute

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Appendix A

Significant Groundwater Recharge Areas



Moir River, Napanee Region and Prince Edward Region Watersheds.
RR # 2, 2061 Old Highway # 2, Belleville, Ontario, K8N 4Z2
www.quinticonservation.ca, 613-968-3434

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UTM Zone 18N.

Digital Mapping Sources:
Base Map - Ontario Ministry of Natural Resources

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accuracy, currency, or completeness of this map or the associated data.

Legend

Highway 401	Rivers	Populated Areas	Significant Recharge Areas (vulnerability =6)
Highways	Lakes	Quinte Region	

Map 5.2

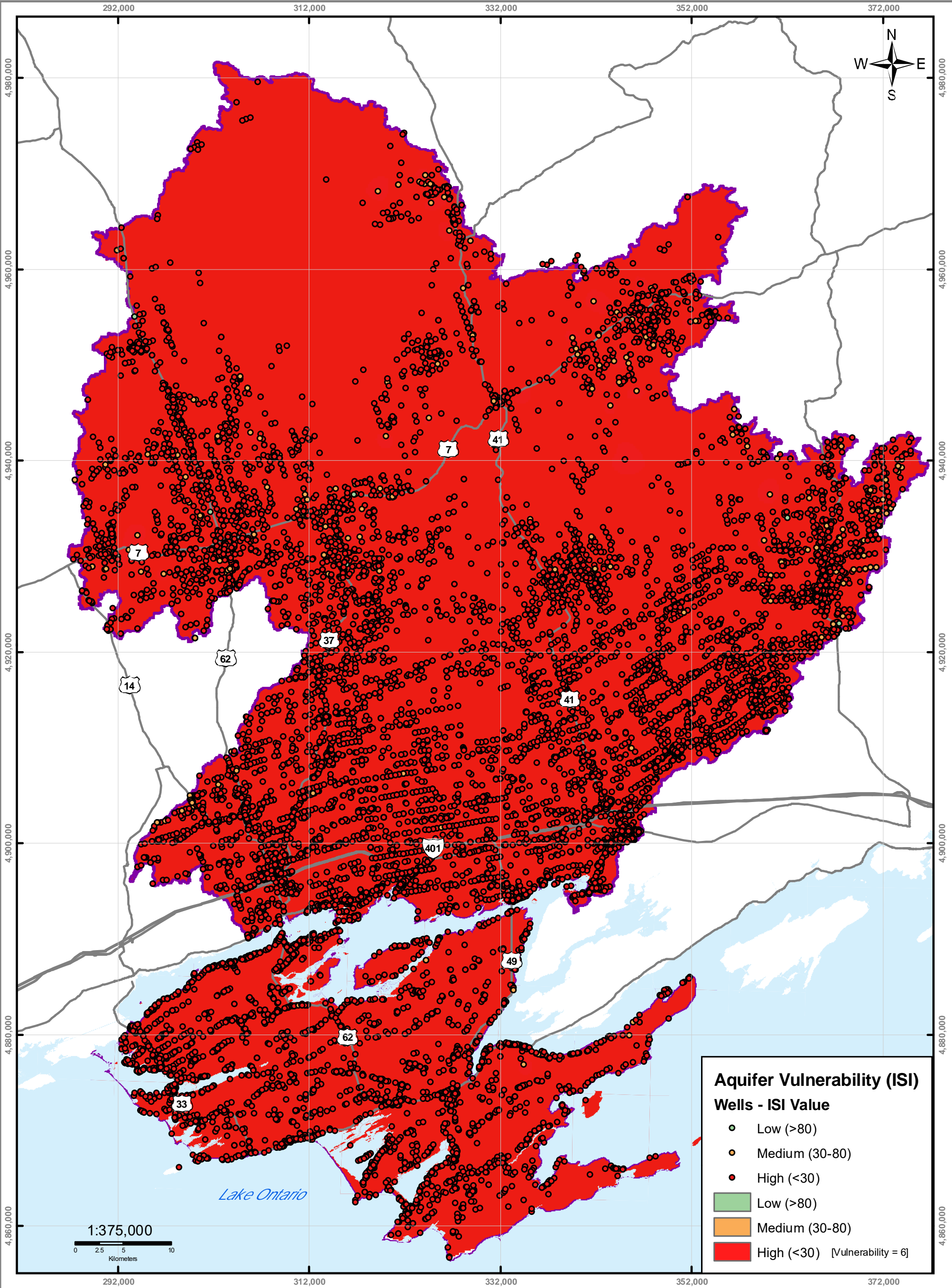
Significant Groundwater Recharge Areas



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Appendix **B**

**Highly Vulnerable
Aquifers**



QUINTE
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Moir River, Napanee Region and Prince Edward Region Watersheds.
RR # 2, 2061 Old Highway # 2, Belleville, Ontario, K8N 4Z2
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Digital Mapping Sources:
Base Map - Ontario Ministry of Natural Resources
Aquifer Vulnerability - Dillon Consulting 2004 Groundwater Study

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Legend

— Highway 401 — Highways Quinte Region

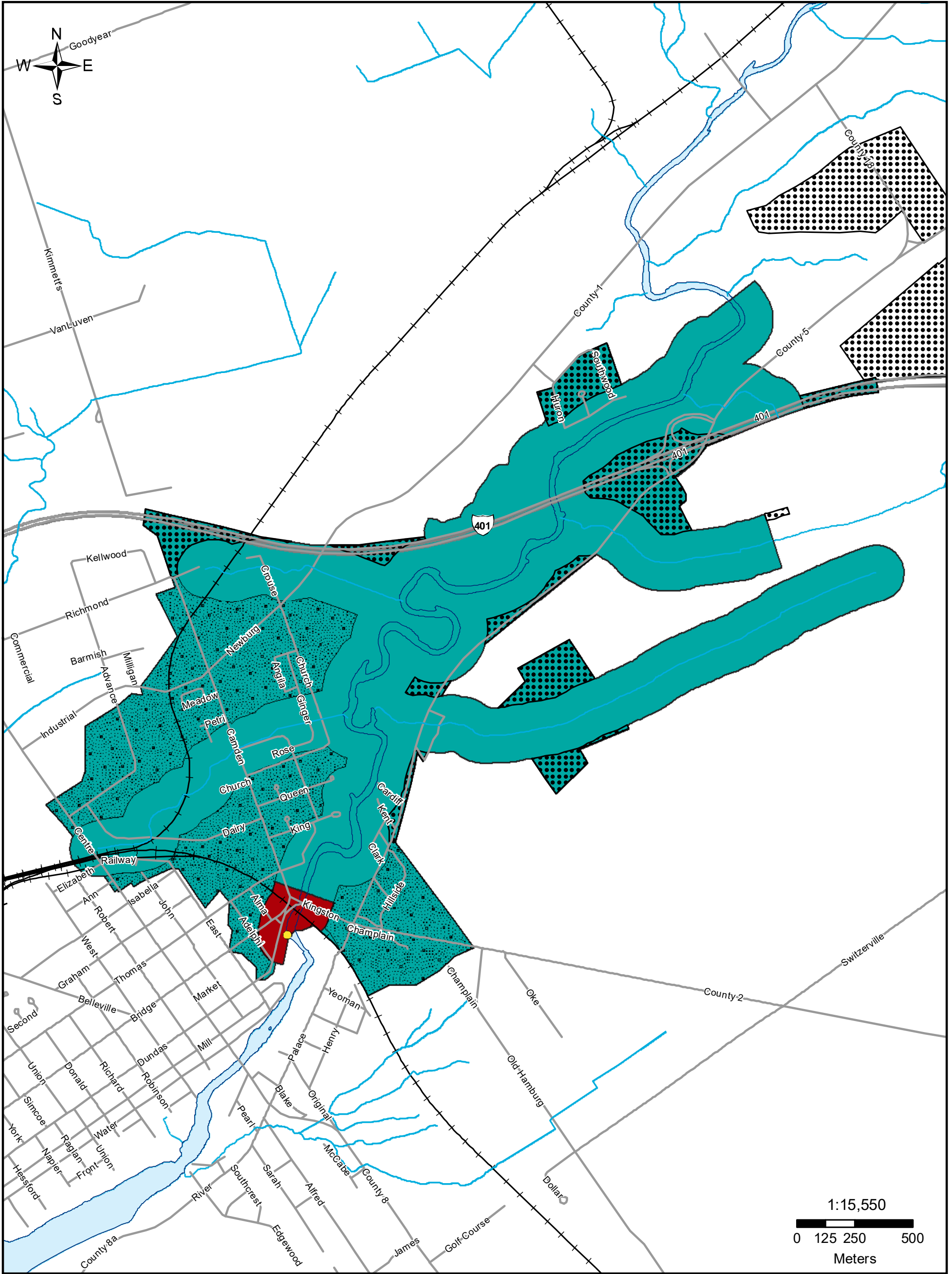
Map 5.1 Highly Vulnerable Aquifers








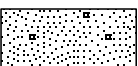
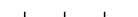

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Appendix C

Surface Water Intake Protection Zones



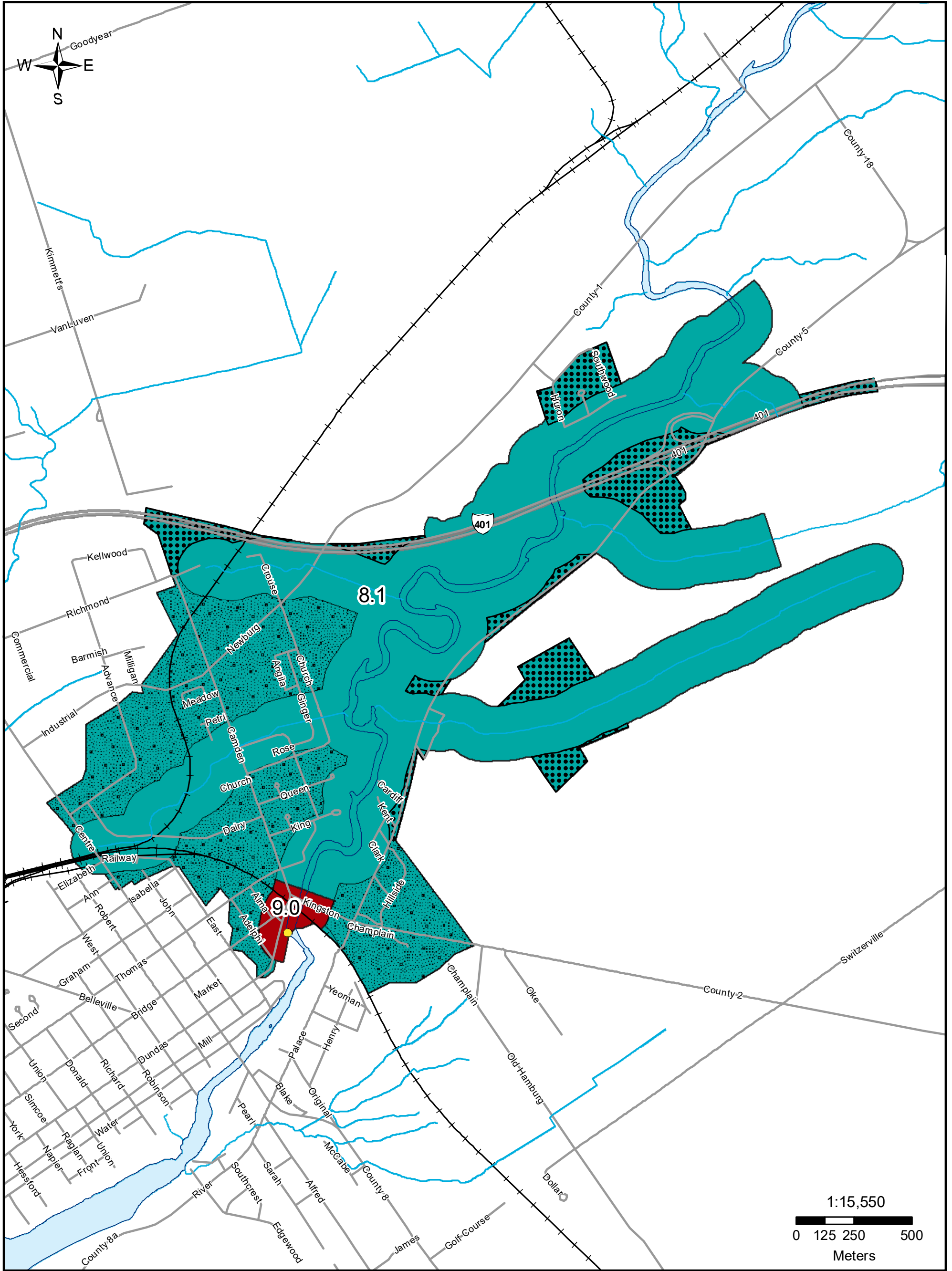
Legend

- | | | | | | |
|---|--------------|---|-----------|---|-------------------|
|  | Intake |  | Shoreline |  | Transport Pathway |
|  | Water Course |  | IPZ 1 |  | Sewershed |
|  | Railways |  | IPZ 2 | | |



Moir River, Napanee Region and Prince Edward Region Watersheds.
RR # 2, 2061 Old Highway # 2, Belleville, Ontario, K8N4Z2.
www.quinteconservation.ca, 613-968-3434
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UTM Zone 18N.
Digital Mapping Sources:
Base Map - Ontario Ministry of Natural Resources
Intake Location - Ministry of the Environment

Map 6.32 Napanee Intake Protection Zones 1 & 2



Legend

- Intake
- Water Course
- Railways
- Vulnerability = 9.0
- Vulnerability = 8.1
- Shoreline
- Transport Pathway
- Sewershed

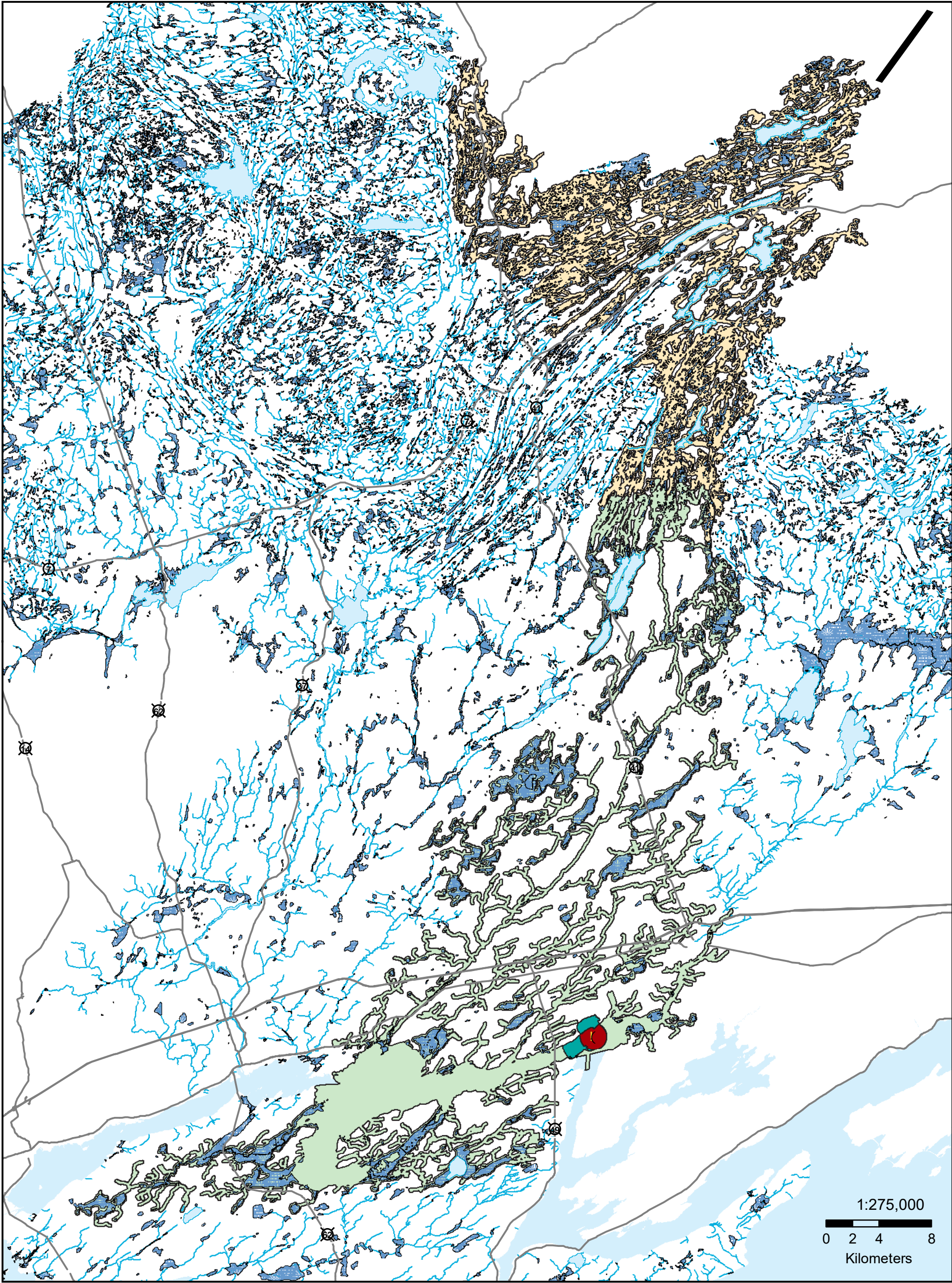
The List of Provincial Circumstance Tables for Napanee can be found in Table 6-90 while Napanee's significant threats are in Table 6-91.

Map 6.34 Napanee IPZ 1& 2 Vulnerability



Moir River, Napanee Region and Prince Edward Region Watersheds.
RR # 2, 2061 Old Highway # 2, Belleville, Ontario, K8N4Z2.
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Digital Mapping Sources:
Base Map - Ontario Ministry of Natural Resources
Intake Location - Ministry of the Environment

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Molra River, Napanee Region and Prince Edward Region Watersheds.
RR # 2, 2061 Old Highway # 2, Belleville, Ontario, K8N 4Z2.
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Base Map - Ontario Ministry of Natural Resources
Intake Location - Ministry of the Environment

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Legend



Intake

Highways



Waterbodies

Wetlands

Intake Protection Zone 1

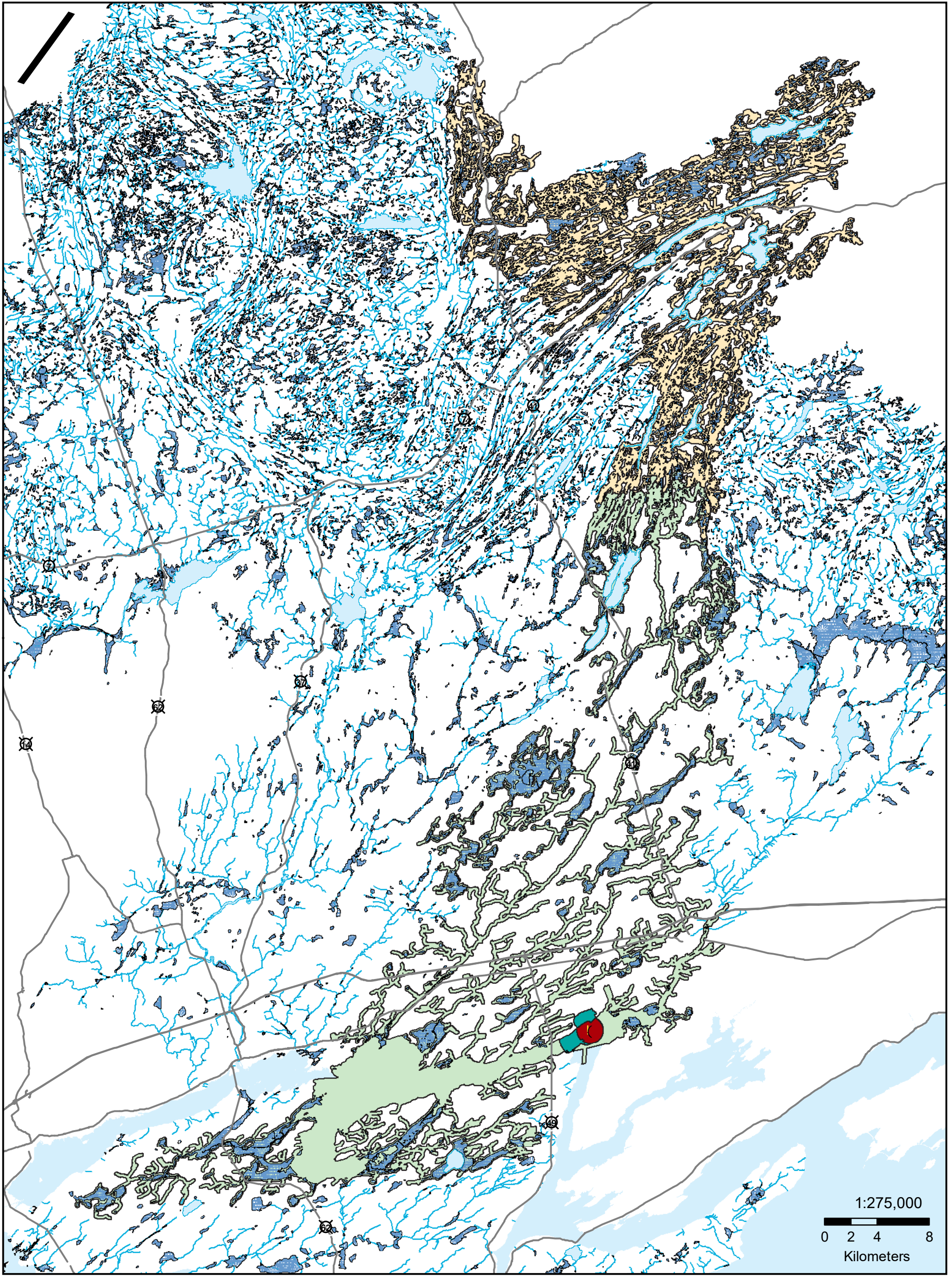


Intake Protection Zone 2

Intake Protection Zone 3a

Intake Protection Zone 3b

Map 6.24 Deseronto Intake Protection Zones



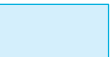
Molra River, Napanee Region and Prince Edward Region Watersheds.
RR #2, 2061 Old Highway #2, Belleville, Ontario, K8N 4Z2.
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Digital Mapping Sources:
Base Map - Ontario Ministry of Natural Resources
Intake Location - Ministry of the Environment

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accuracy, currency, or completeness of this map or the associated data.

Legend

- | | | | | | | | |
|---|----------|---|----------|---|-------------------|---|-------------------|
|  | Intake |  | Water |  | Vulnerability=9.0 |  | Vulnerability=7.2 |
|  | Highways |  | Wetlands |  | Vulnerability=8.1 |  | Vulnerability=2.7 |

The List of Provincial Circumstance Tables for Deseronto can be found in Table 6-71 while Deseronto's Significant threats are in Table 6-72.

Map 6.26
Deseronto Intake Protection Zones Vulnerability

About AECOM

AECOM (NYSE: ACM) is built to deliver a better world. We design, build, finance and operate infrastructure assets for governments, businesses and organizations in more than 150 countries.

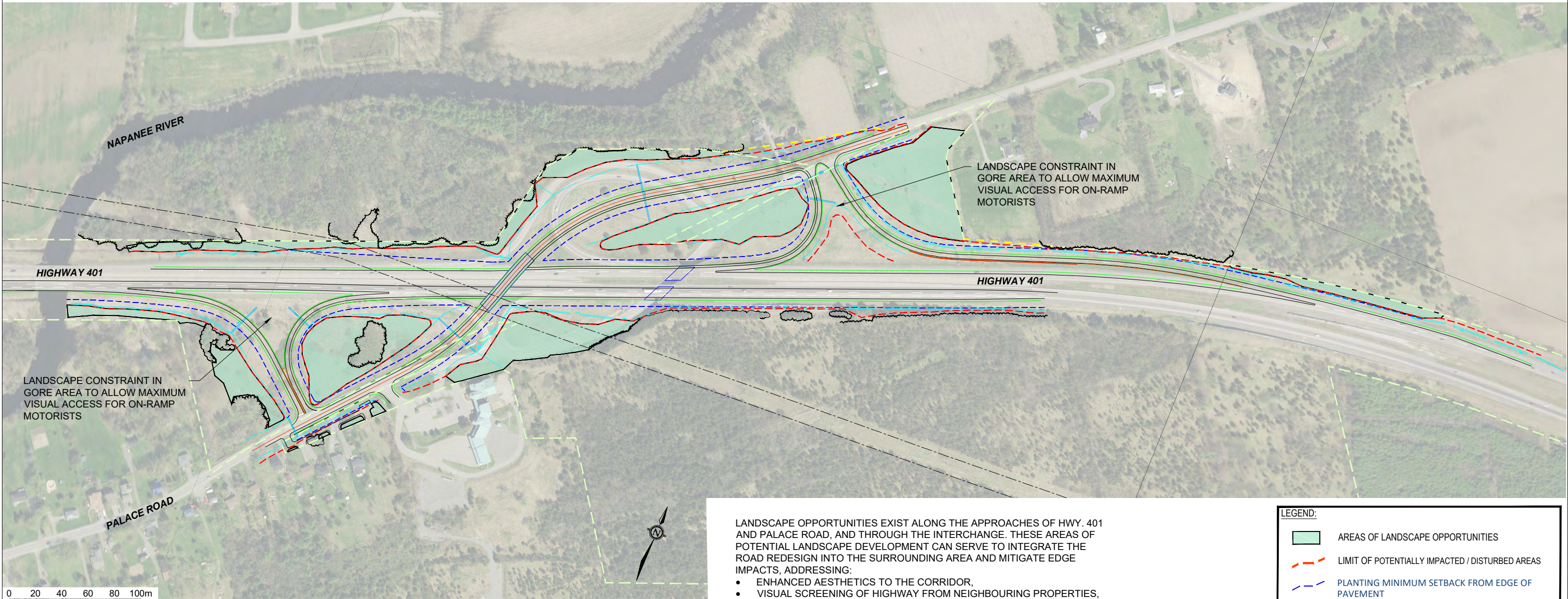
As a fully integrated firm, we connect knowledge and experience across our global network of experts to help clients solve their most complex challenges.

From high-performance buildings and infrastructure, to resilient communities and environments, to stable and secure nations, our work is transformative, differentiated and vital. A Fortune 500 firm, AECOM companies had revenue of approximately US \$19 billion during the 12 months ended June 30, 2015.

See how we deliver what others can only imagine at aecom.com and [@AECOM](https://twitter.com/AECOM).

Appendix L - Landscape Opportunities Plan

FILENAME: P:\60478166\900-Work\910-CAD\05-MODELS\A\Landscapes Design\Landscapes Opportunities Plan - Palace Rd_Rev Jan 31 2019.dwg
PLOTDATE: Jan 31, 2019 7:21am



LANDSCAPE OPPORTUNITIES EXIST ALONG THE APPROACHES OF HWY. 401 AND PALACE ROAD, AND THROUGH THE INTERCHANGE. THESE AREAS OF POTENTIAL LANDSCAPE DEVELOPMENT CAN SERVE TO INTEGRATE THE ROAD REDESIGN INTO THE SURROUNDING AREA AND MITIGATE EDGE IMPACTS, ADDRESSING:

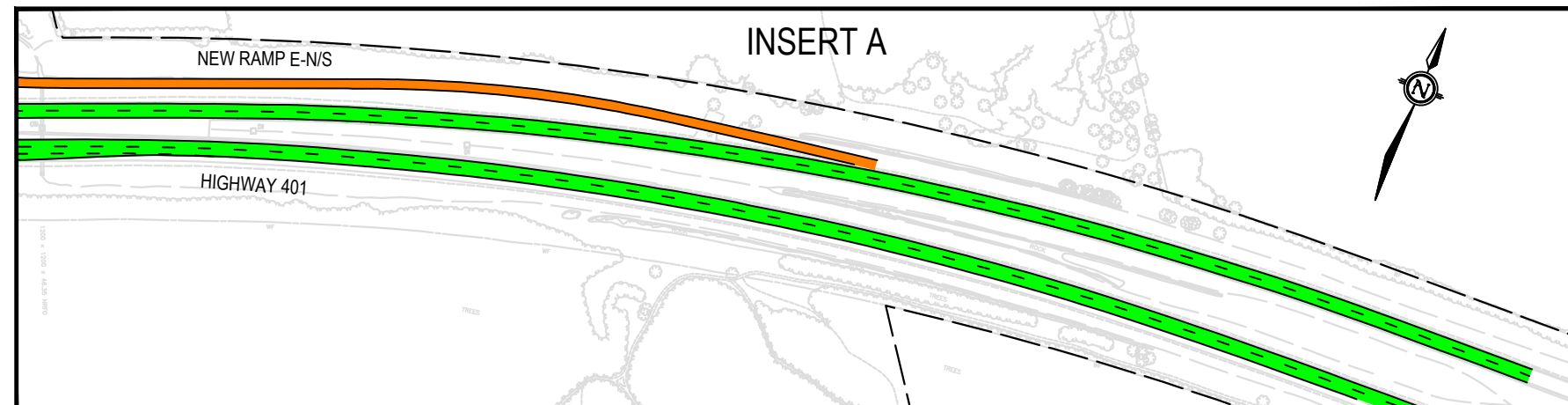
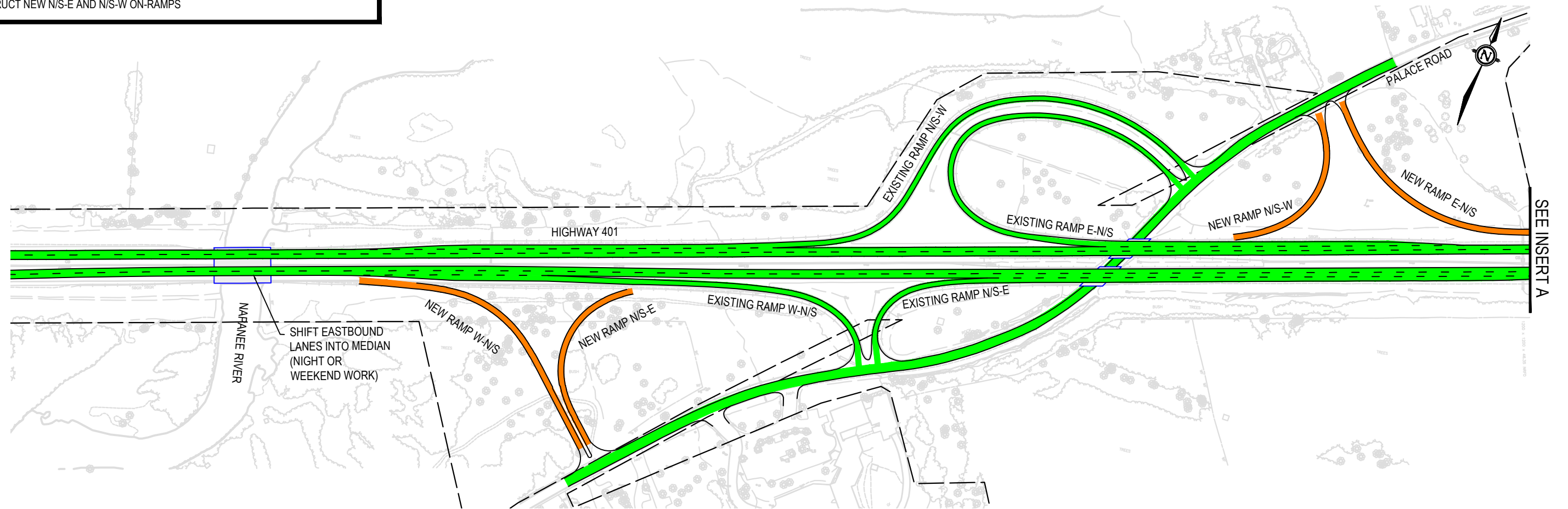
- ENHANCED AESTHETICS TO THE CORRIDOR,
- VISUAL SCREENING OF HIGHWAY FROM NEIGHBOURING PROPERTIES,
- DRIFTING SNOW CONTROL,
- WOODED EDGE PROTECTION,
- EROSION CONTROL,
- REFORESTATION,
- RUNOFF QUALITY CONTROL TO EXISTING WATER COURSES

LEGEND:	
	AREAS OF LANDSCAPE OPPORTUNITIES
	LIMIT OF POTENTIALLY IMPACTED / DISTURBED AREAS
	PLANTING MINIMUM SETBACK FROM EDGE OF PAVEMENT
	PROPOSED DITCHLINE ALIGNMENTS
	EXTENT OF EXISTING VEGETATION TO REMAIN
	EXISTING HIGHWAY 401 RIGHT-OF-WAY
	EXTENT OF PROPERTY REQUIRED

Appendix M – Conceptual Construction Staging Strategy

STAGE 1A NOTES

- ALL EXISTING TRAFFIC MOVEMENTS TO REMAIN OPEN DURING STAGE 1A
- CONSTRUCT NEW W-N/S AND E-N/S OFF-RAMPS
- CONSTRUCT NEW N/S-E AND N/S-W ON-RAMPS

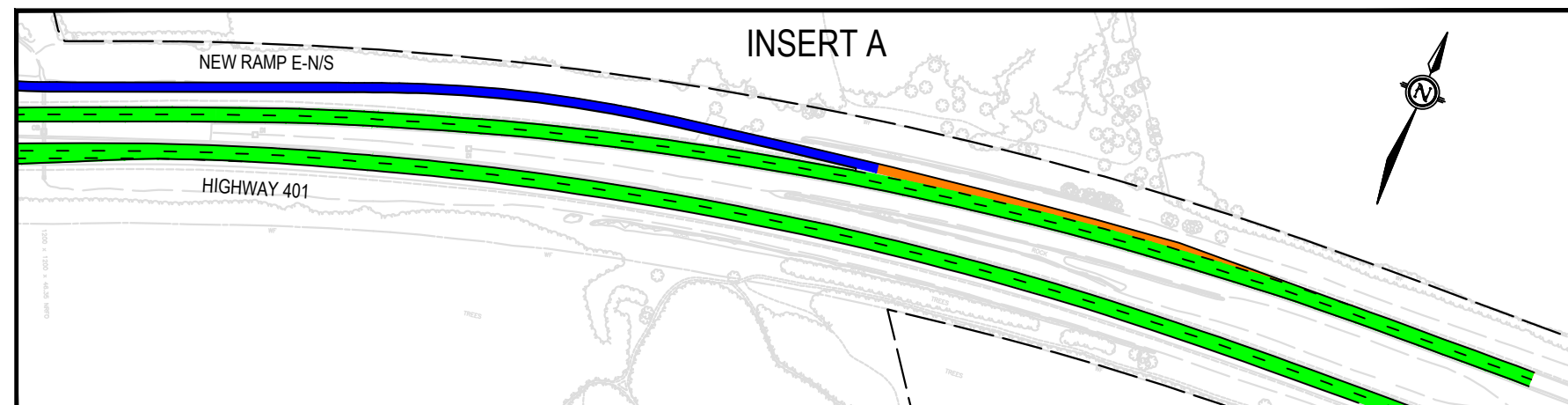
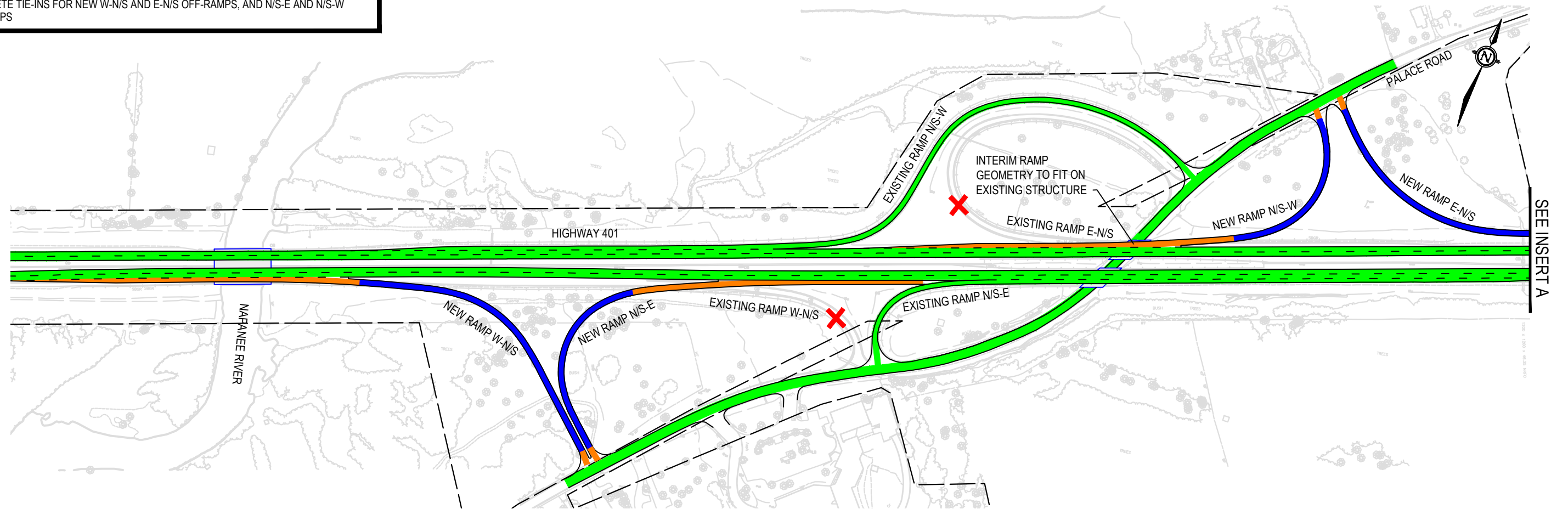


LEGEND

- TRAFFIC
- UNDER CONSTRUCTION
- CONSTRUCTED, NO TRAFFIC
- EXISTING MTO RIGHT OF WAY
- CLOSED / REMOVAL

STAGE 1B NOTES

- CLOSE EXISTING W-N/S AND E-N/S OFF-RAMPS (NIGHT-TIME / WEEKEND CLOSURES ONLY ANTICIPATED TO COMPLETE TIE-IN WORK)
- COMPLETE TIE-INS FOR NEW W-N/S AND E-N/S OFF-RAMPS, AND N/S-E AND N/S-W ON-RAMPS

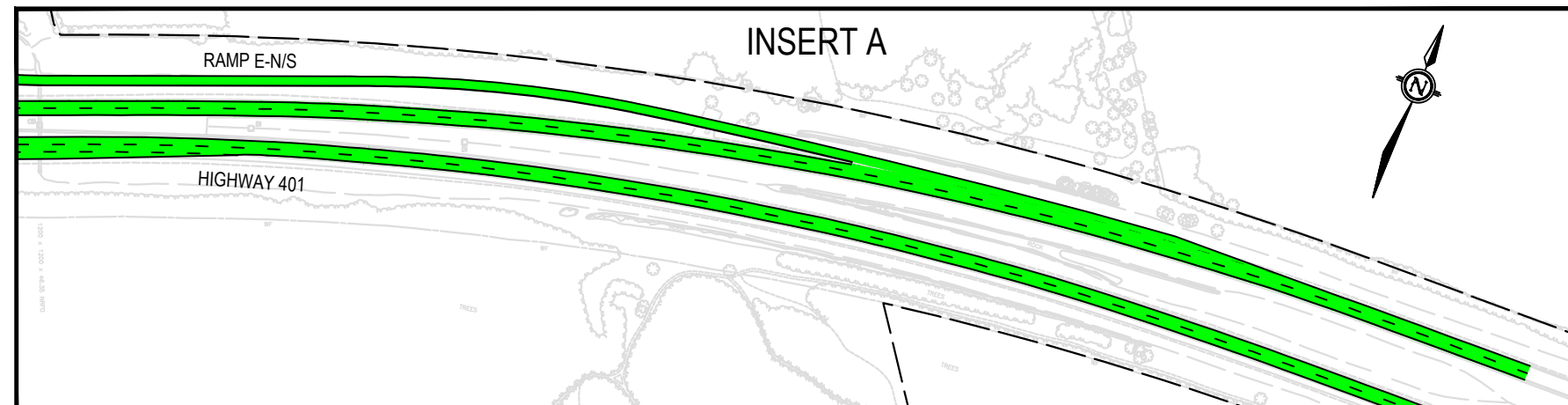
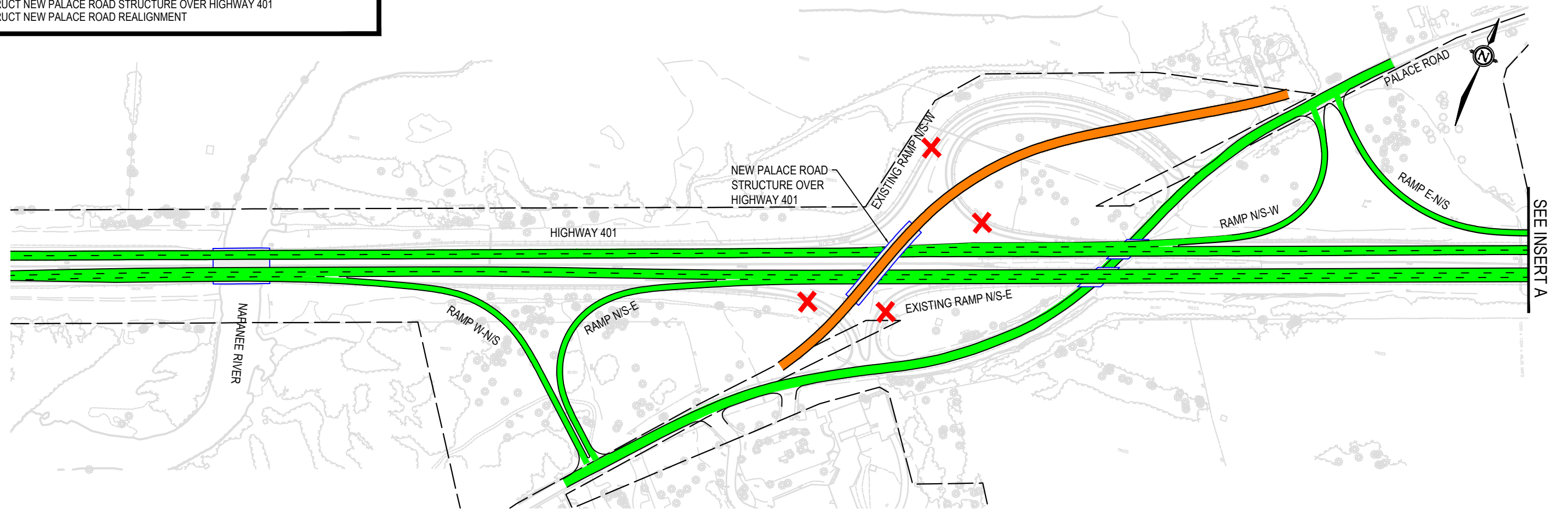


LEGEND

- TRAFFIC
- UNDER CONSTRUCTION
- CONSTRUCTED, NO TRAFFIC
- EXISTING MTO RIGHT OF WAY
- CLOSED / REMOVAL

STAGE 2A NOTES

- SHIFT TRAFFIC TO NEW N/S-E AND N/S-W ON-RAMPS AND W-N/S AND E-N/S OFF RAMPS
- CLOSE EXISTING N/S-E AND N/S-W ON-RAMPS
- CONSTRUCT NEW PALACE ROAD STRUCTURE OVER HIGHWAY 401
- CONSTRUCT NEW PALACE ROAD REALIGNMENT

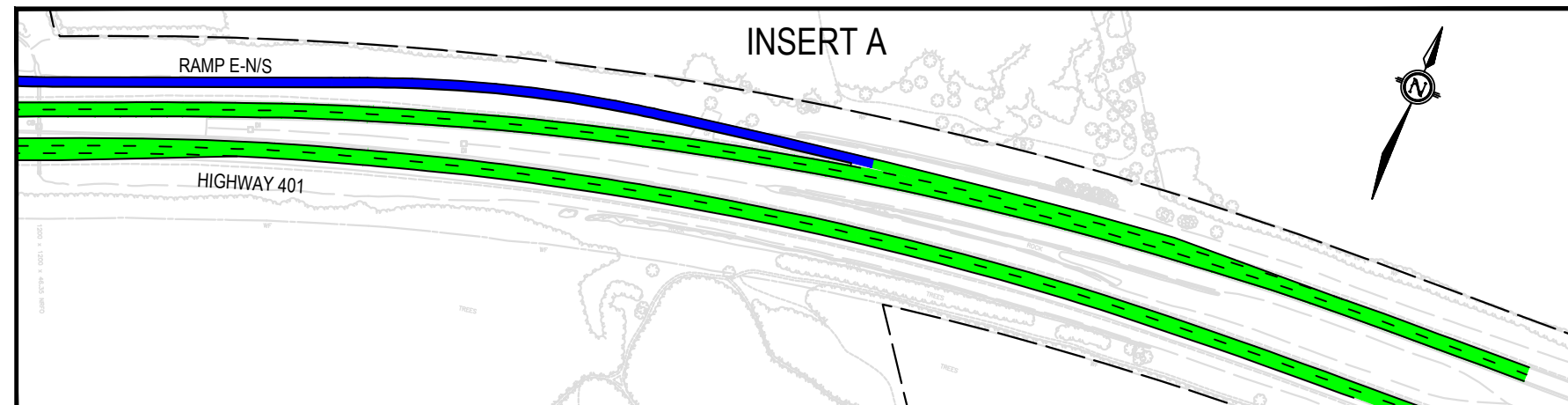
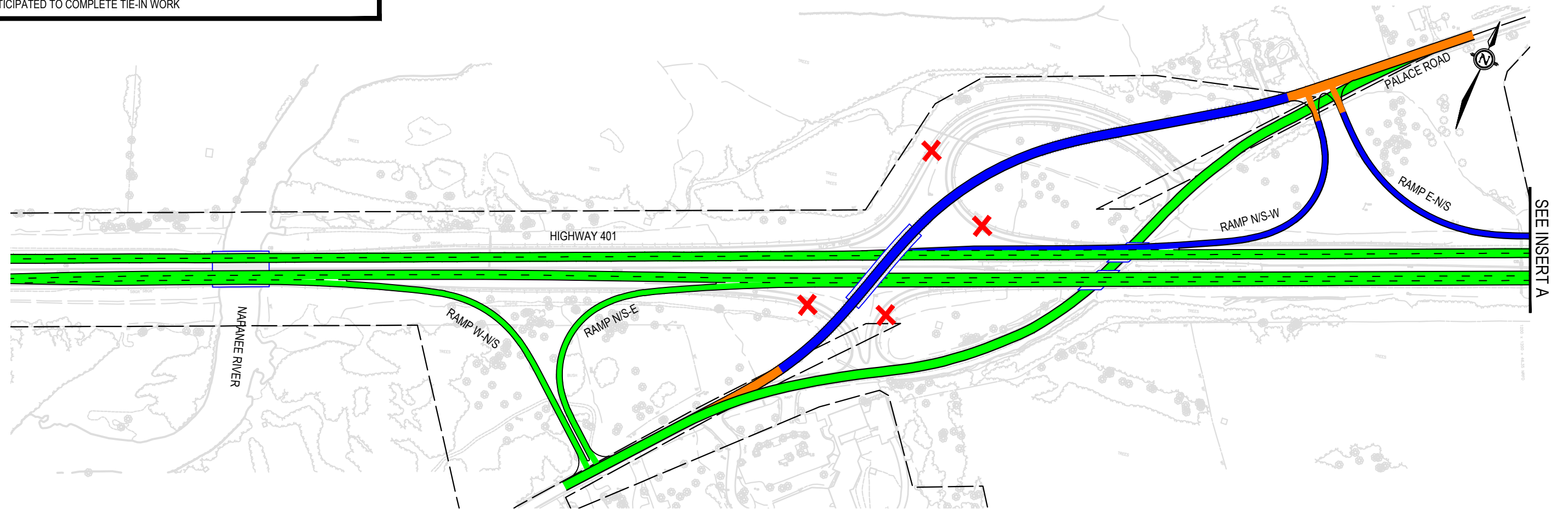


LEGEND

- TRAFFIC
- UNDER CONSTRUCTION
- CONSTRUCTED, NO TRAFFIC
- EXISTING MTO RIGHT OF WAY
- CLOSED / REMOVAL

STAGE 2B NOTES

- COMPLETE TIE-INS ALONG PALACE ROAD AND INTERCHANGE RAMPS
- NIGHT TIME / WEEKEND CLOSURES ALONG PALACE ROAD AND INTERCHANGE RAMPS ARE ANTICIPATED TO COMPLETE TIE-IN WORK

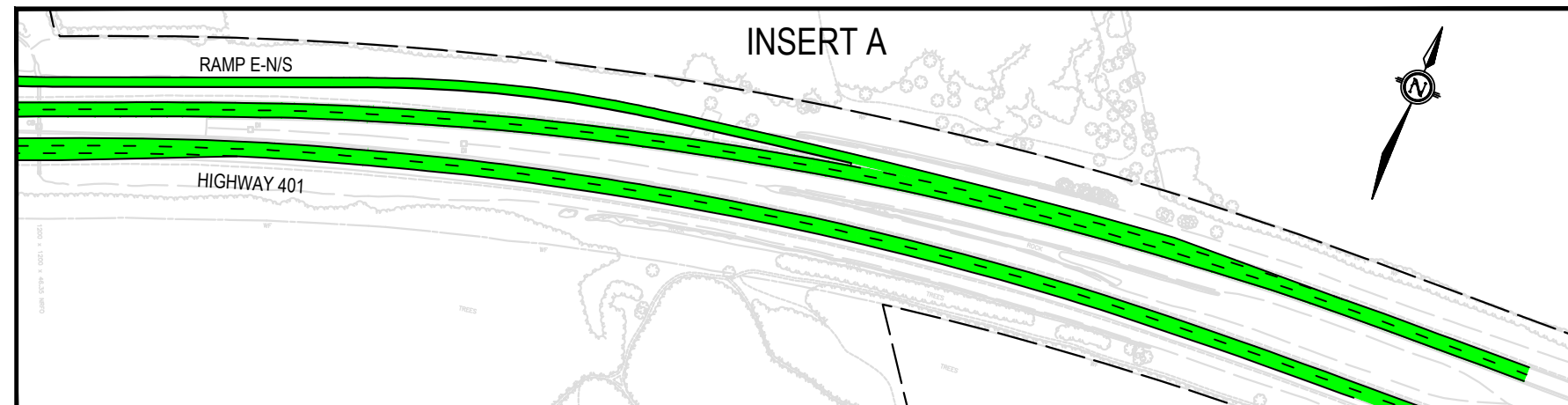
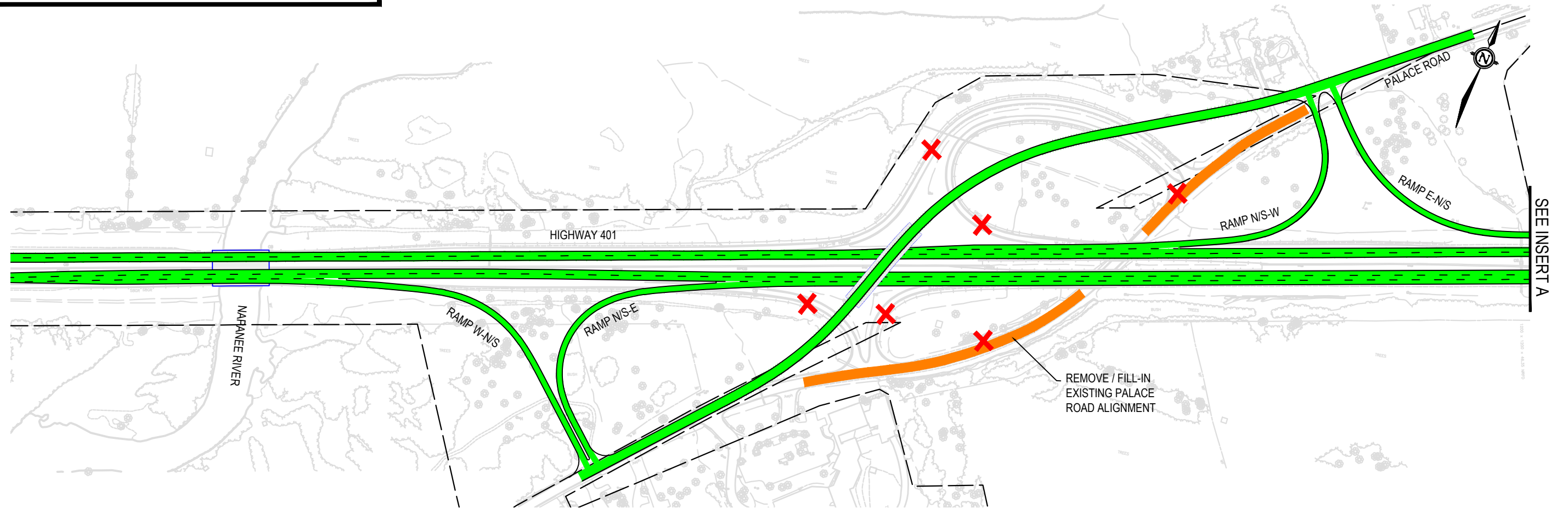


LEGEND

- TRAFFIC
- UNDER CONSTRUCTION
- CONSTRUCTED, NO TRAFFIC
- EXISTING MTO RIGHT OF WAY
- X CLOSED / REMOVAL

STAGE 3A NOTES

- SHIFT TRAFFIC TO NEW PALACE ROAD ALIGNMENT
- CLOSE EXISTING PALACE ROAD AND FILL IN EXISTING ALIGNMENT

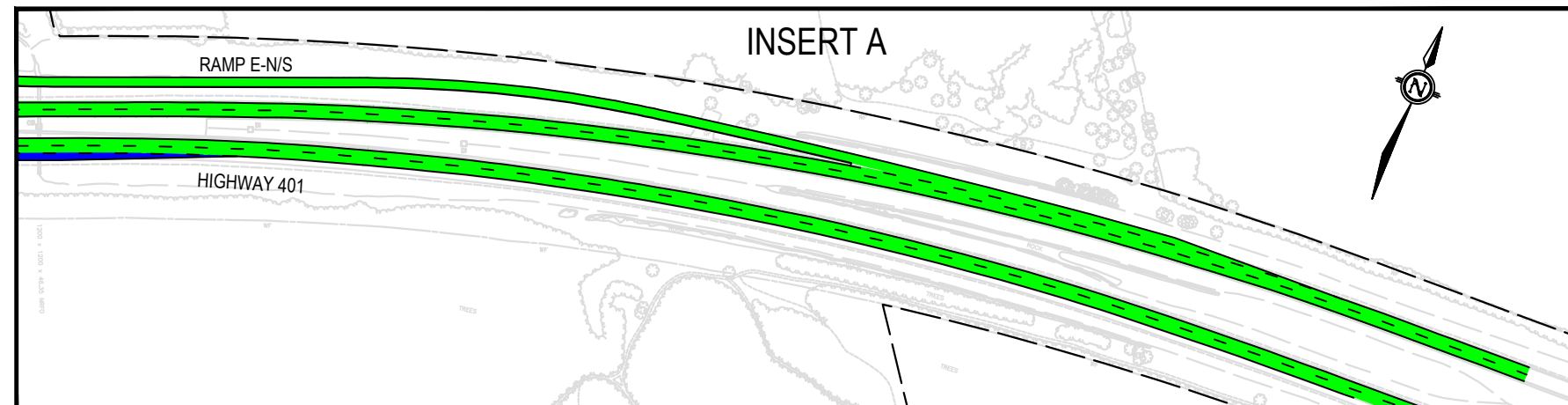
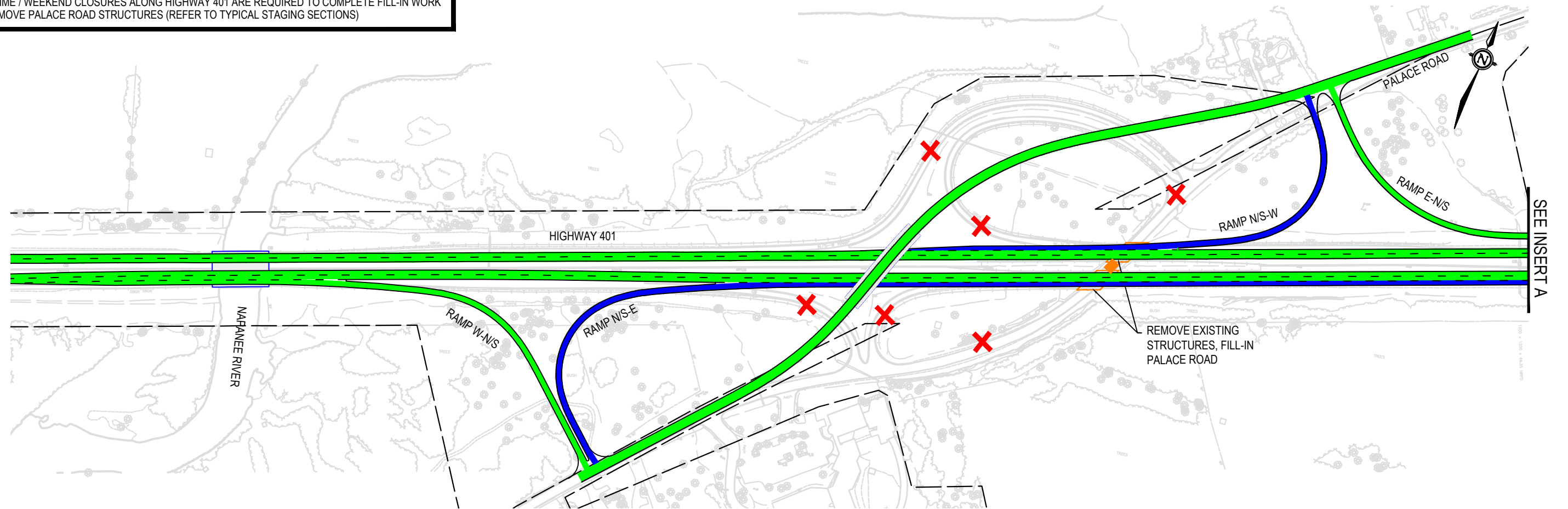


LEGEND

- TRAFFIC
- UNDER CONSTRUCTION
- CONSTRUCTED, NO TRAFFIC
- EXISTING MTO RIGHT OF WAY
- CLOSED / REMOVAL

STAGE 3B NOTES

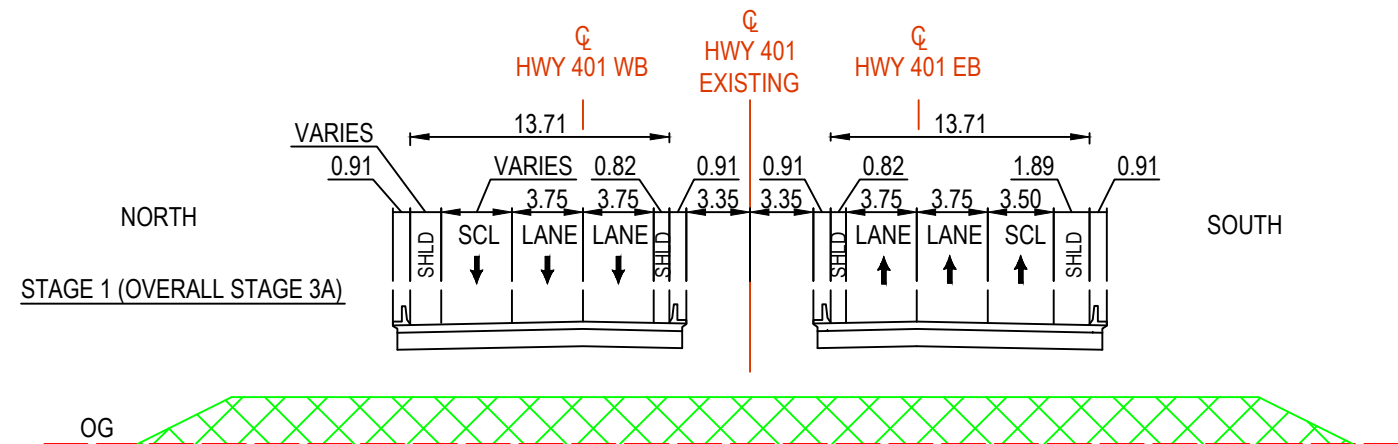
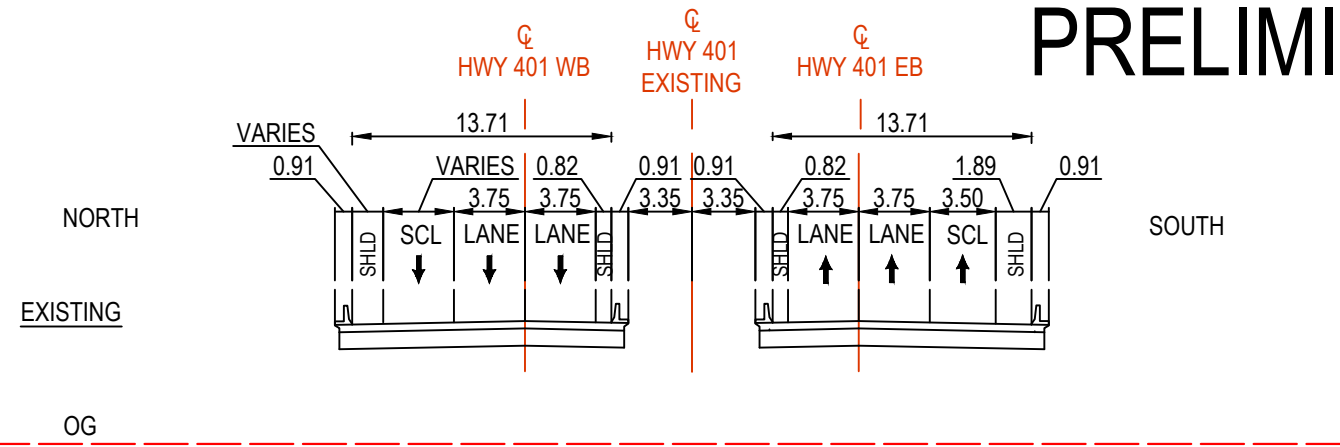
- REMOVE EXISTING PALACE ROAD STRUCTURES
- MULTIPLE SUB STAGES AND SHORT TERM ENTRANCE RAMP CLOSURES ARE REQUIRED
- NIGHT TIME / WEEKEND CLOSURES ALONG HIGHWAY 401 ARE REQUIRED TO COMPLETE FILL-IN WORK AND REMOVE PALACE ROAD STRUCTURES (REFER TO TYPICAL STAGING SECTIONS)



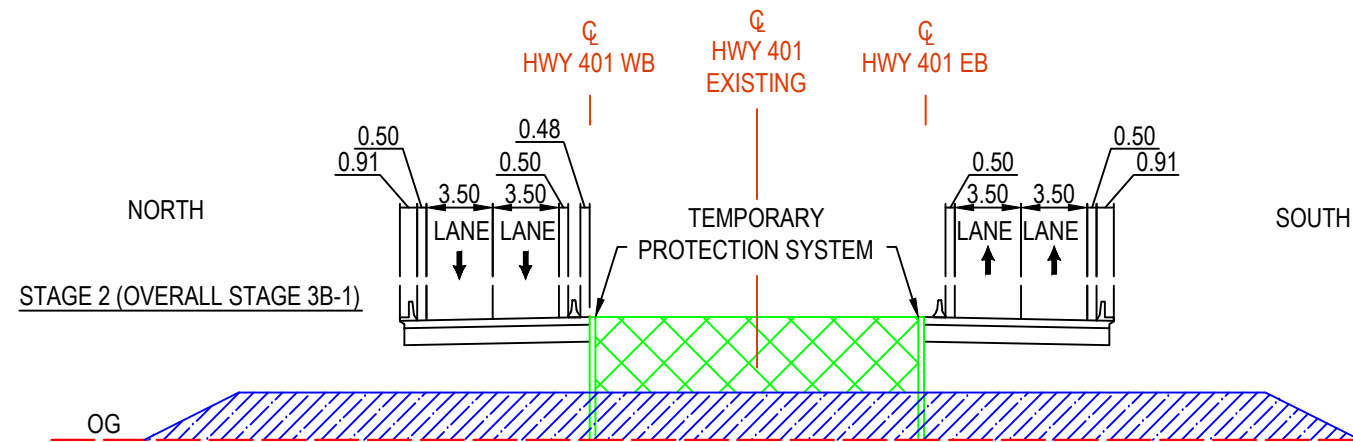
LEGEND

- | | |
|--|---------------------------|
| | TRAFFIC |
| | UNDER CONSTRUCTION |
| | CONSTRUCTED, NO TRAFFIC |
| | EXISTING MTO RIGHT OF WAY |
| | CLOSED / REMOVAL |

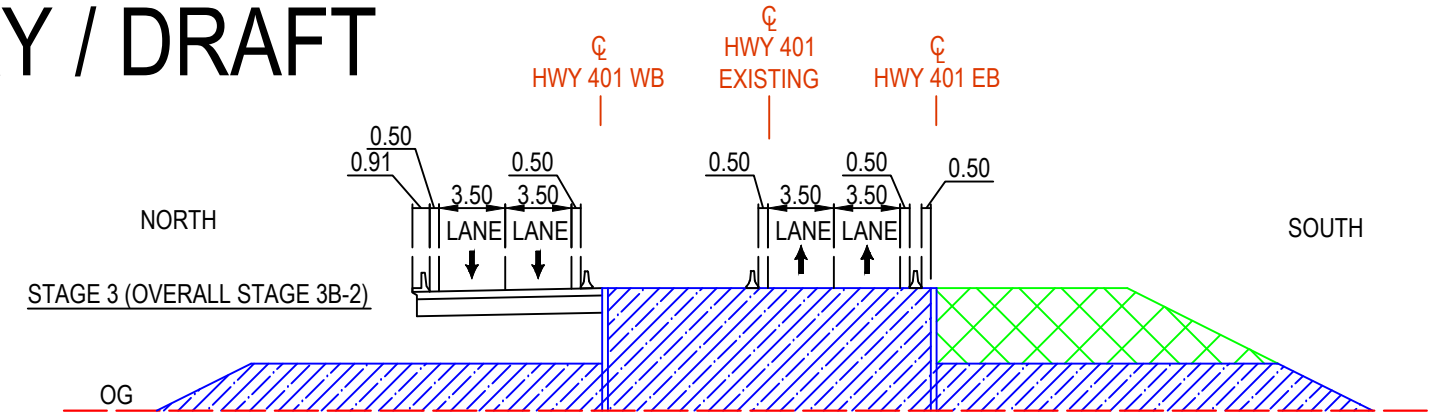
PRELIMINARY / DRAFT



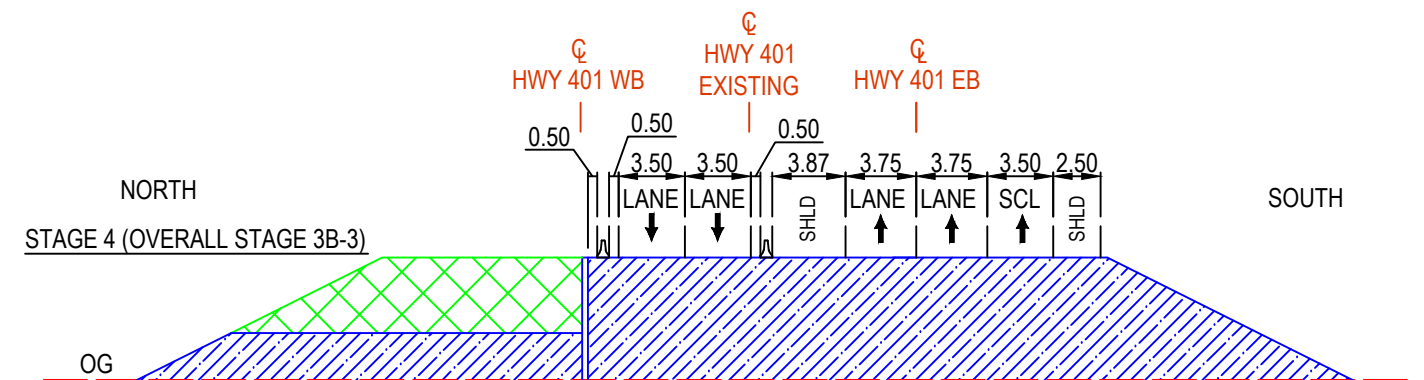
STAGE 1:
- PLACE FILL UNDER EXISTING STRUCTURES TO THE MAXIMUM HEIGHT POSSIBLE



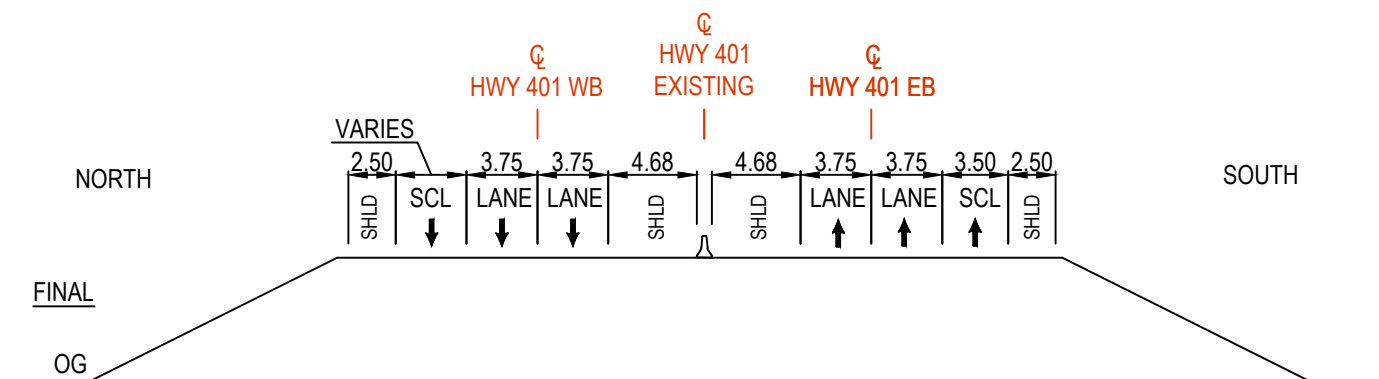
STAGE 2:
- REMOVE MEDIAN PORTIONS OF BOTH STRUCTURES
- INSTALL TEMPORARY PROTECTION SYSTEM IN MEDIAN AND FILL/CONSTRUCT LANES TO TAKE TRAFFIC IN FUTURE STAGES
- TEMPORARY CLOSURE OF EB AND WB ENTRANCE RAMP



STAGE 3:
- SHIFT EB TRAFFIC TO NEWLY CONSTRUCTED MEDIAN LANES
- REMOVE REMAINING PORTION OF EB STRUCTURE
- FILL/CONSTRUCT SOUTH PORTION OF HIGHWAY



STAGE 3:
- SHIFT EB TRAFFIC SOUTH TO NEWLY CONSTRUCTED LANES AND RE-OPEN EB ENTRANCE RAMP
- SHIFT WB TRAFFIC TO NEWLY CONSTRUCTED MEDIAN LANES
- REMOVE REMAINING PORTION OF WB STRUCTURE
- FILL/CONSTRUCT NORTH PORTION OF HIGHWAY



FINAL:
- SHIFT WB LANES TO ULTIMATE LOCATION AND RE-OPEN WB ENTRANCE RAMP

LEGEND
 UNDER CONSTRUCTION
 COMPLETED CONSTRUCTION

Appendix N – List of Reports Available under Separate Cover

List of Reports Available under Separate Cover

AECOM (October 2017) *Contamination Overview Study – Preliminary Design and Class Environmental Assessment Study Highway 401 Interchange Improvements, Palace Road (G.W.P. 4197-13-00)*

AECOM (January 2019) *Drainage and Hydrology Report: Highway 401 / Palace Road Interchange (IC 582) and Median Improvements*

AECOM (April 2018) *Preliminary Structural Design Report: Highway 401 –Palace Road Underpass, Site No. 17-063.*

AECOM (July 2016) *Socio-Economic Review Technical Memorandum: Highway 401 Interchange Improvements at Palace Road*

AECOM (August 2018) *Operational Performance Review Report: Highway 401 Interchange Improvements at Palace Road*

AECOM (September 2018) *Stage 1-2 Archaeological Assessment Report*

AECOM (February 2019) *Traffic Noise Assessment Report*