



## MMM Group Limited

### Highway 401 / Kingston Road 38 Interchange Operational Improvements

G.W.P. 4049-11-00

Preliminary Design and Class  
Environmental Assessment Study

### Transportation Environmental Study Report

COMMUNITIES  
TRANSPORTATION  
BUILDINGS  
INFRASTRUCTURE



January 2016



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**HIGHWAY 401 / KINGSTON ROAD 38  
INTERCHANGE OPERATIONAL IMPROVEMENTS  
PRELIMINARY DESIGN AND ENVIRONMENTAL  
ASSESSMENT STUDY**

**G.W.P. 4049-11-00**

**City of Kingston**

CLASS ENVIRONMENTAL ASSESSMENT FOR  
PROVINCIAL TRANSPORTATION FACILITIES  
GROUP 'B' PROJECT

**MINISTRY OF TRANSPORTATION  
EASTERN REGION**

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**TRANSPORTATION ENVIRONMENTAL STUDY  
REPORT**

January 2016

# Highway 401 / Kingston Road 38 Interchange Operational Improvements

## PRELIMINARY DESIGN AND ENVIRONMENTAL ASSESSMENT STUDY

City of Kingston

CLASS ENVIRONMENTAL ASSESSMENT FOR  
PROVINCIAL TRANSPORTATION FACILITIES (2000)  
GROUP 'B' PROJECT

Ministry of Transportation  
Eastern Region

G.W.P. 4049-11-00

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## **THE PUBLIC RECORD**

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

**Kingston City Hall**

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Kingston, Ontario K7L 2Z3

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## EXECUTIVE SUMMARY

The Ontario Ministry of Transportation (MTO) retained MMM Group Limited to complete a Preliminary Design and Environmental Assessment (EA) Study for geometric and operational improvements to the Highway 401 interchange at Kingston Road 38, in the City of Kingston (G.W.P. 4049-11-00).

The existing interchange was originally constructed in the 1960s, with minor modifications completed during the widening of Highway 401 to six lanes between Montreal Road and Kingston Road 38.

Geometric and operational issues associated with the existing interchange include:

- High traffic volumes on Kingston Road 38, leading to delays and queuing during peak periods, particularly where northbound traffic on Kingston Road 38 turns left onto the westbound Highway 401 on-ramp;
- A lack of dedicated left-turn lanes from Kingston Road 38 to Highway 401 on-ramps;
- Increasing volumes of traffic using the interchange;
- Limited storage capacity on the Highway 401 off-ramps, resulting in queuing that can back up onto the freeway during peak periods; and
- Highway 401 off-ramps with undesirable inner-loop ramp radii.

The objectives of the study are to review the existing geometric and operational issues at the interchange, to identify potential improvement alternatives and to recommend interchange improvements, taking into account the associated natural environmental, social / economic, and cultural environmental impacts. Planning and design solutions considered include: relocation and / or realignment of interchange ramps; relocation and improvements to the carpool lot, widening / replacement / rehabilitation of the existing Kingston Road 38 underpass; and additional lanes and / or turning lanes. For the purposes of the study, alternatives were designed to address traffic conditions until the project horizon year of 2033.

### *Environmental Assessment Process*

The study is being carried out in accordance with the approved planning process for Group 'B' projects under the Ministry of Transportation *Class Environmental Assessment for Provincial Transportation Facilities* (1999, amended in 2000). This Transportation Environmental Study Report (TESR) has been prepared in accordance with the requirements of the MTO Class EA process and documents the following:

- The generation, assessment, evaluation, selection and development of the design alternatives;
- The transportation engineering and environmental issues and how they were incorporated into the environmental assessment program;
- The identified potential environmental condition changes, effects and commitments to mitigation measures;
- Commitments to further work, including any environmental effects monitoring that is required;
- The consultation program followed throughout the study; and
- The identification of all project approvals, licenses and permits which have been or must be obtained prior to construction.

The TESR will be filed for a 30-day public review period. If, after consulting with the Ministry of Transportation, a person (or persons) has unresolved concerns with the recommended plan as documented in the TESR, they may request that the Minister of the Environment order MTO to comply with Part II of the *Ontario Environmental Assessment Act* and complete an individual environmental assessment.

The next steps in the engineering design and Environmental Assessment process involve the completion of Detail Design, followed by construction.

### *Consultation*

Consultation with external agencies (including the City of Kingston), First Nations and Métis communities, local elected representatives, interest groups and members of the public was conducted over the course of the study through letter and brochure mail-outs, newspaper notices, two Public Information Centres (PICs) and individual stakeholder meetings.

Comments provided throughout the study were taken into consideration during the development and evaluation of design alternatives. Correspondence from external agencies pertained primarily to expressing interest in being kept informed of project proceedings; the proposed scope of work at the interchange; planned archaeological and cultural heritage investigations; the accommodation of long combination vehicles (LCVs) at the interchange; and impacts to adjacent wetland habitat and woodlands. Other comments received included expressions of concern related to potential impacts to private properties, impacts to the natural environment and traffic safety.

### *Evaluation of Alternatives*

A multi-phased evaluation process was used to identify a Technically Preferred Alternative for interchange improvements:

- Based on the identified interchange deficiencies, a long list of possible interchange improvements was developed. A high level screening of alternatives was carried out by qualitatively assessing technical criteria, environmental considerations and cost to develop a short list of possible solutions.
- A short list of 8 alternatives was evaluated quantitatively and qualitatively against 17 different key measures reflecting technical, environmental, cost and constructability considerations.
- The alternative with the best overall score emerged as the Technically Preferred Alternative for long-term interchange improvements.
- With the Technically Preferred Alternative selected, interim improvements that can be made in the short term (within 5-10 years) were identified.

### *Technically Preferred Alternative*

The Technically Preferred Alternative for long-term improvements (10 – 20 years) at the interchange includes:

- A new interchange configuration. The interchange will be reconfigured into a Parclo AB configuration from its current Parclo B2 configuration. The reconfiguration requires a new direct ramp and inner-loop ramp in the southwest quadrant, and the removal of the existing eastbound off-ramp loop ramp. The existing westbound on- and off-ramps will also be enlarged with the north ramp terminal shifted to the McIvor Road intersection.
- Widening of Kingston Road 38 to six lanes from Centennial Drive / Creekford Road intersection to the north ramp terminal, per the City of Kingston Transportation Master Plan.
- Replacement of the Kingston Road 38 underpass on a new alignment. As the existing bridge cannot accommodate six lanes, a structural assessment concluded that replacing the underpass to the west of the existing bridge was preferred over bridge widening. To accommodate a new structure, Kingston Road 38 is realigned to the west between McIvor Road and Centennial Drive / Creekford Road intersections.

- Relocation and enlargement of the existing carpool lot. The new eastbound off-ramp intersects the south ramp terminal through the existing carpool lot, requiring its relocation. A carpool lot demand assessment was not included as part of this study and the new carpool lot is sized per the recommendations of the Carpool Lot Demand Assessment and Concept Plan for Expansion, 2007.
- Widening of the westbound Collins Creek Bridge to accommodate the speed-change lane of the realigned westbound on-ramp.
- Improvements to stormwater management infrastructure. The Technically Preferred Alternative proposes to expand the existing stormwater management pond east of the eastbound lane Collins Creek Bridge. A dry stormwater management pond will also be located south and west of McIvor Road and Jackson Mills Road, respectively.

#### *Proposed Interim Improvements*

Certain elements of the Technically Preferred Alternative can be implemented in the short-term (within 5-10 years) to provide geometric and operational benefits. The Proposed Interim Improvements include:

- Reconfiguring the interchange into a Parclo B / Diamond hybrid by constructing the new eastbound Highway 401 off-ramp in the southwest quadrant. The difference between this and the ultimate Parclo AB configuration is that the Parclo B / Diamond hybrid configuration does not have the inner-loop ramp in the southwest quadrant.
- Minor rehabilitation of the existing underpass. The rehabilitation will include patching of the soffit and substructure. No rehabilitation work on the deck (on top of the structure) is required in the interim.
- Enlarging and realigning the westbound on- and off-ramps in the northwest quadrant, and shifting the north ramp terminal to the McIvor Road intersection.
- Relocating and constructing the new carpool lot in the southeast quadrant. The existing eastbound loop off-ramp will be removed and traffic will utilise the new eastbound direct off-ramp to exit Highway 401.

#### *Implementation / Construction Staging*

Proposed Interim Improvements:

- The new westbound on- and off-ramps and new eastbound off-ramp can be constructed with minimal impacts to traffic. Traffic will be temporarily disrupted during the completion of the new westbound off-ramp inner-loop ramp.
- Temporary disruptions to the carpool facilities will occur during its relocation to the southeast quadrant.

Technically Preferred Alternative:

- The realigned Kingston Road 38 can be constructed with small disruption to traffic, with the construction of the new underpass requiring a reduced cross-section on Highway 401. No lane closures are anticipated.
- The demolition of the existing underpass will require lane reduction on Highway 401, and alignment shifts of the Highway 401 westbound and eastbound traffic through the northern and southern spans consecutively. This enables the existing bridge to be demolished in halves. During the demolition, Kingston Road 38 traffic will be utilizing the realigned Kingston Road 38. No road closures are anticipated.

### *Environmental Issues and Commitments*

An assessment of the environmental impacts associated with the Technically Preferred Alternative was completed and is outlined in this report. Key environmental impacts include:

- Natural environment: removal of approximately 2.9 ha of provincially rare alvar habitat and 5.3 ha of significant woodlands; blasting and grading in forested areas and alvar that may result in hydrologic changes and disturbances to wildlife; infilling of an estimated 37.6 m<sup>2</sup> of Collins Creek as a result of widening the bridge to the north; and, potential impacts to turtle and bird Species at Risk (SAR) present in Collins Creek as a result of bridge works.
- Social / cultural environment: acquisition of an estimated 5.2 ha of private property.

Mitigation measures to address these and other environmental impacts, as well as commitments to further work in Detail Design are outlined in Sections 7.3, 7.4 and 7.5.

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## 1 OVERVIEW OF THE UNDERTAKING

### 1.1 PROJECT SUMMARY

#### 1.1.1 INTRODUCTION

The Ministry of Transportation (MTO) has retained MMM Group to complete a Preliminary Design and Environmental Assessment Study (EA Study) for operational improvements to the Highway 401 interchange at Kingston Road 38 in the City of Kingston (G.W.P. 4049-11-00). The location of the interchange is illustrated in **Figure 1-1** and **Figure 1-2**.

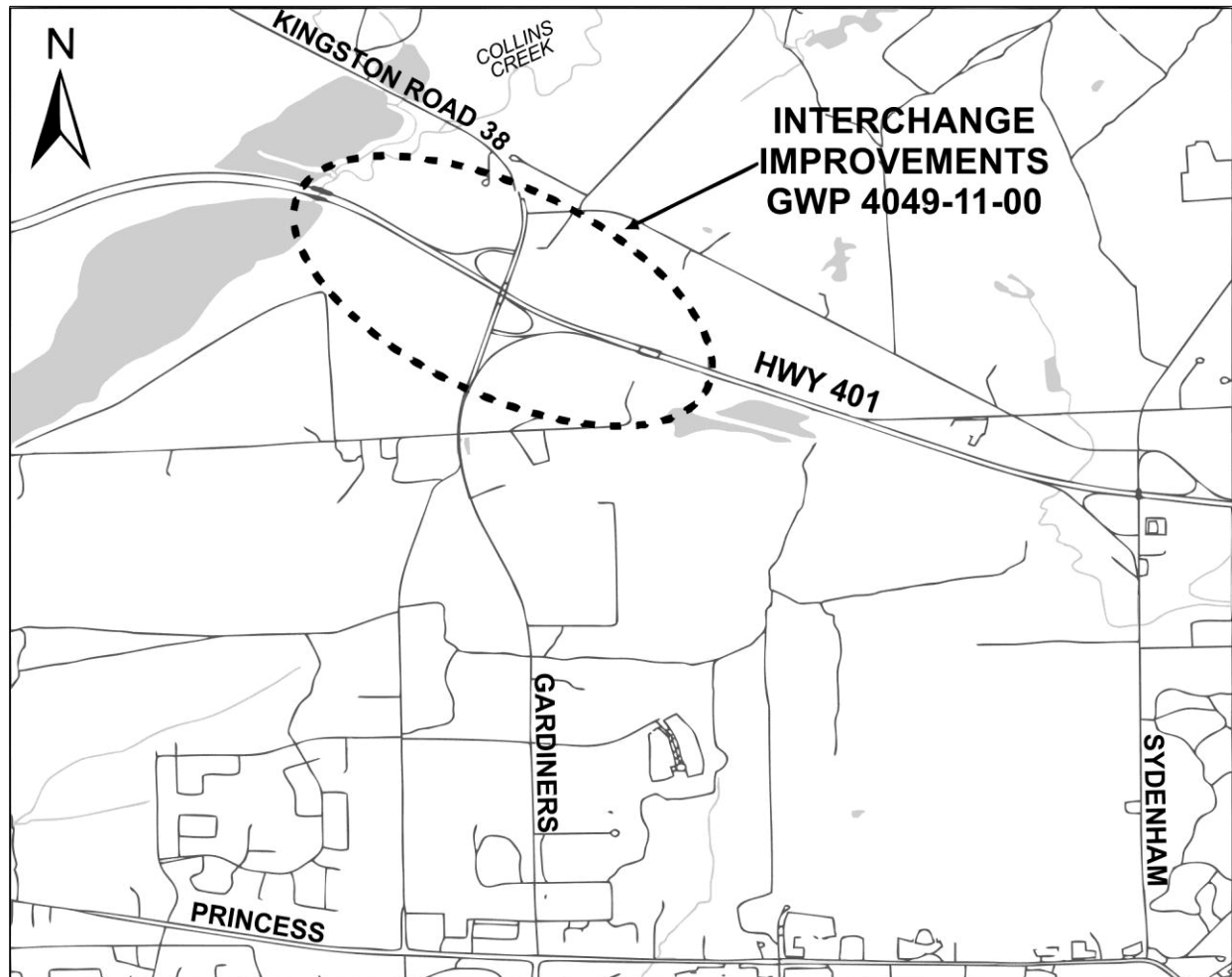


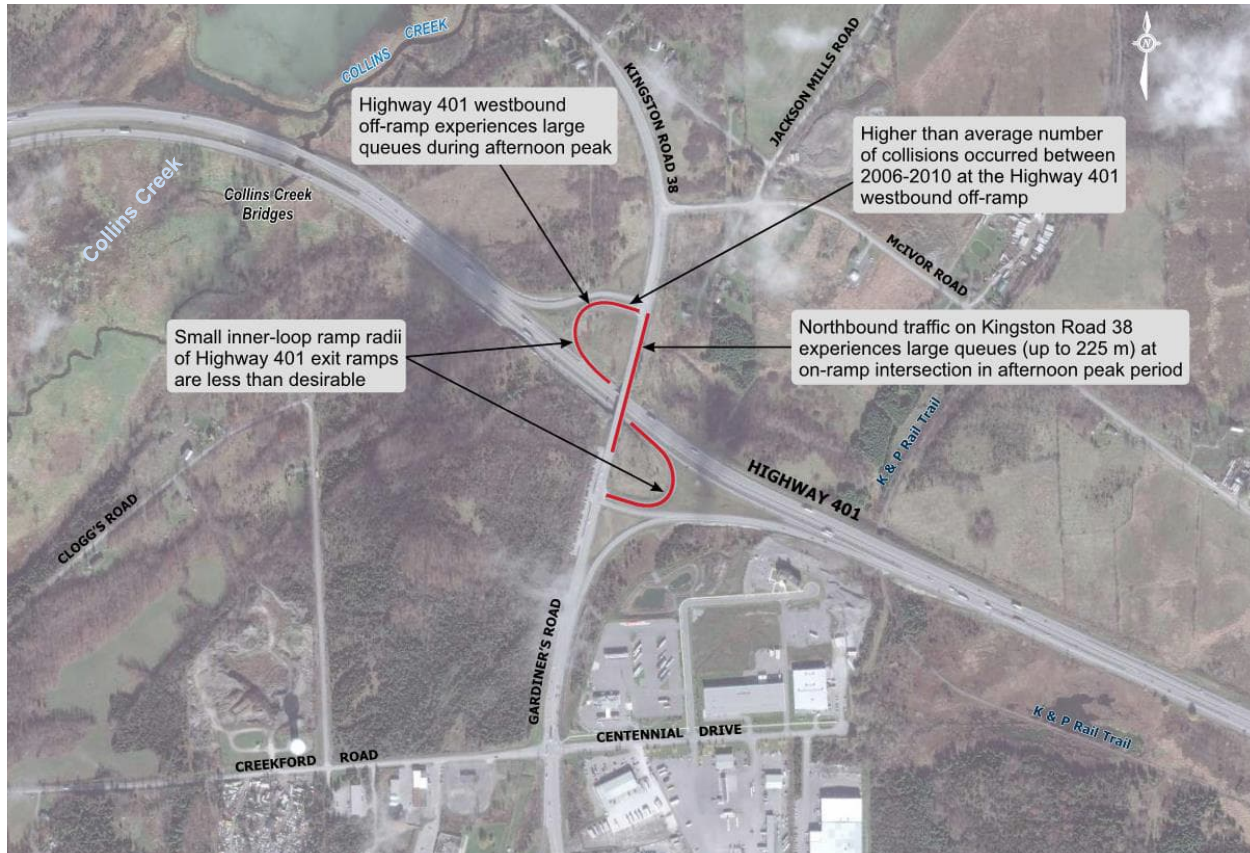
Figure 1-1: Study Area

This Transportation Environmental Study Report (TESR) presents the findings of this transportation engineering and Environmental Assessment Study, as per the approved planning process for Group 'B' undertakings outlined in the *Class Environmental Assessment (Class EA) for Provincial Transportation Facilities* (2000).

#### 1.1.2 STUDY PURPOSE

The Highway 401 interchange at Kingston Road 38 is located in Kingston, Ontario in the former Township of Kingston. The interchange is located directly north of the main urban area, and is one of six interchanges along the Highway 401 corridor that provide access to the City of Kingston.

The overall objectives of this study are to identify existing operational issues at the Highway 401 / Kingston Road 38 interchange and determine the most appropriate solution to these issues while taking into account natural environmental, social / economic, and cultural environmental impacts. The following planning and design options were considered: relocation of ramps; relocation of the commuter lot; widening, replacement, or rehabilitation of the bridge; additional through and turning lanes. For the purposes of the study, alternatives were designed to address traffic conditions until the project horizon year of 2033.



**Figure 1-2: Highway 401 / Kingston Road 38 Interchange Key Operational Issues**

The existing interchange was originally constructed in the 1960s, with minor modifications completed during the widening of Highway 401 to six lanes, between Montreal Road and Kingston Road 38. Operational issues associated with the existing interchange design include:

- High traffic volumes on Kingston Road 38 and associated delays and queuing during peak periods, particularly for northbound Kingston Road 38 traffic turning left onto the westbound Highway 401 on-ramps;
- A lack of dedicated left-turn lanes from Kingston Road 38 to Highway 401 on-ramps, which contributes to queuing and delays;
- Steadily increasing traffic volumes at the interchange;
- Limited storage capacity on Highway 401 off-ramps, resulting in queuing that can back up onto the highway during peak periods; and
- Small inner-loop ramp radii of Highway 401 exit ramps are less than desirable.

Land to the south of the interchange is designated by the City of Kingston to accommodate long-term growth and development post-2026, which may further exacerbate traffic volumes at the interchange.

### 1.1.3 CONSULTATION

Throughout the duration of the study, external agencies, the City of Kingston, First Nations and Métis communities, local elected representatives, interest groups, and members of the public were encouraged to participate through a proactive consultation plan that included contact letters, newspaper notices, two Public Information Centres and individual stakeholder meetings.

Stakeholder comments provided throughout the study were taken into consideration during the development and evaluation of design alternatives and refinement of the Technically Preferred Alternative for interchange improvements. Correspondence from external agencies pertained primarily to expressing interest in being kept informed of project proceedings; the proposed scope of work at the interchange; planned archaeological and cultural heritage investigations; the interchange by long combination vehicles (LCVs); impacts to adjacent wetland habitat and woodlands. Other comments received included expressions of concern related to potential impacts to private properties and impacts to the natural environment, and traffic safety.

A comprehensive discussion of comments received is included in **Appendix C** of this report.

### 1.1.4 EVALUATION OF ALTERNATIVES

During the planning phase of this study, a longlist of alternative interchange configurations was developed and screened based on technical and environmental considerations. Alternatives that did not meet minimum operational requirements were removed from consideration and not evaluated further.

The resulting short list of alternatives was evaluated against criteria in three factor areas, including: transportation; environment (natural, social/economic, and cultural); and cost. The evaluation of short-listed interchange alternatives led to the identification of a preferred long-term alternative for interchange improvements that best meets future transportation needs, while minimizing negative environmental impacts and costs. The detailed methodology and results of the evaluation process are documented in **Section 5** of this report.

### 1.1.5 GENERAL DESCRIPTION OF THE TECHNICALLY PREFERRED ALTERNATIVE

The Technically Preferred Alternative is described in detail in **Section 6** and detailed in **Figure 1-3**. The recommended long-term interchange improvements include:

- New eastbound on- and off-ramps in the southwest quadrant of the interchange;
- Realignment of the westbound on- and off-ramps in the northwest quadrant;
- New northbound left-turn lanes at the north ramp terminal;
- Realignment of Kingston Road 38 to the west and replacement of the existing Kingston Road 38 underpass;
- Replacement of the existing carpool lot with a new, larger facility in the southeast quadrant of the interchange; and
- Widening of the Highway 401 westbound Collins Creek Bridge.

Prior to the full implementation of the recommended long-term interchange improvements, interim interchange improvements have been identified to address operational issues in the short term (detailed in **Figure 1-4**). The Proposed Interim Improvements are expected to occur within 5-10 years, with the Technically Preferred Alternative being realized between 10-20 years. Both improvement stages will be subject to provincial funding and priorities. In general, the Proposed Interim improvements include:

- Shifting the north ramp terminal to McIvor Road and realigning the westbound on- and off-ramps to accommodate a larger 'loop' ramp radius;
- Widening the westbound Collins Creek Bridge to accommodate the westbound on-ramp speed-change lane;
- Providing a channelized right-turn lane on the westbound off-ramp, for traffic exiting Highway 401 westbound to Kingston Road 38 southbound;

- Adding two northbound left-turn lanes at the ramp terminal on the north side of Highway 401 to reduce traffic delays;
- Adding a southbound left-turn lane at the ramp terminal on the south side of Highway 401;
- Providing dual right-turn lanes for traffic exiting Highway 401 eastbound to Kingston Road 38 southbound; and
- Replacing the existing carpool lot with a larger lot in the southeast quadrant.

Environmental impacts resulting from the Technically Preferred Alternative were assessed and mitigation measures developed. Mitigation includes planning decisions, design features, detail design and construction requirements and construction constraints.

## 1.2 PURPOSE OF THE TRANSPORTATION ENVIRONMENTAL STUDY REPORT

This Transportation Environmental Study Report (TESR) documents the Environmental Assessment process carried out to identify the recommended plan for improvements to the interchange at Highway 401 and Kingston Road 38. It includes a description of existing conditions in the study area, the consultation process undertaken and a summary of feedback received, the evaluation of alternatives (including alternatives to the undertaking and design alternatives), and the recommended plan, including mitigation measures developed to address environmental impacts.

This TESR has been prepared in accordance with the requirements of the approved environmental planning process for Group 'B' projects under the Ministry of Transportation's *Class Environmental Assessment (Class EA) for Provincial Transportation Facilities (2000)*.

Interested persons are encouraged to review the TESR and provide comments by February 15, 2016. If, after consulting with the Ministry of Transportation, you have serious unresolved concerns, you have the right to request the Minister of the Environment (11th Floor, Ferguson Block, 77 Wellesley Street West, Toronto, Ontario, M7A 2T5) to issue a Part II Order ("bump-up") for this study. A Part II Order may lead to the preparation of an individual environmental assessment. A copy of the "bump-up" request should be forwarded to the addresses below. If there are no outstanding concerns after February 15, 2016, the study will be considered to have met the requirements of the Class EA. If you have questions or comments please feel free to contact the Project Team members listed below.

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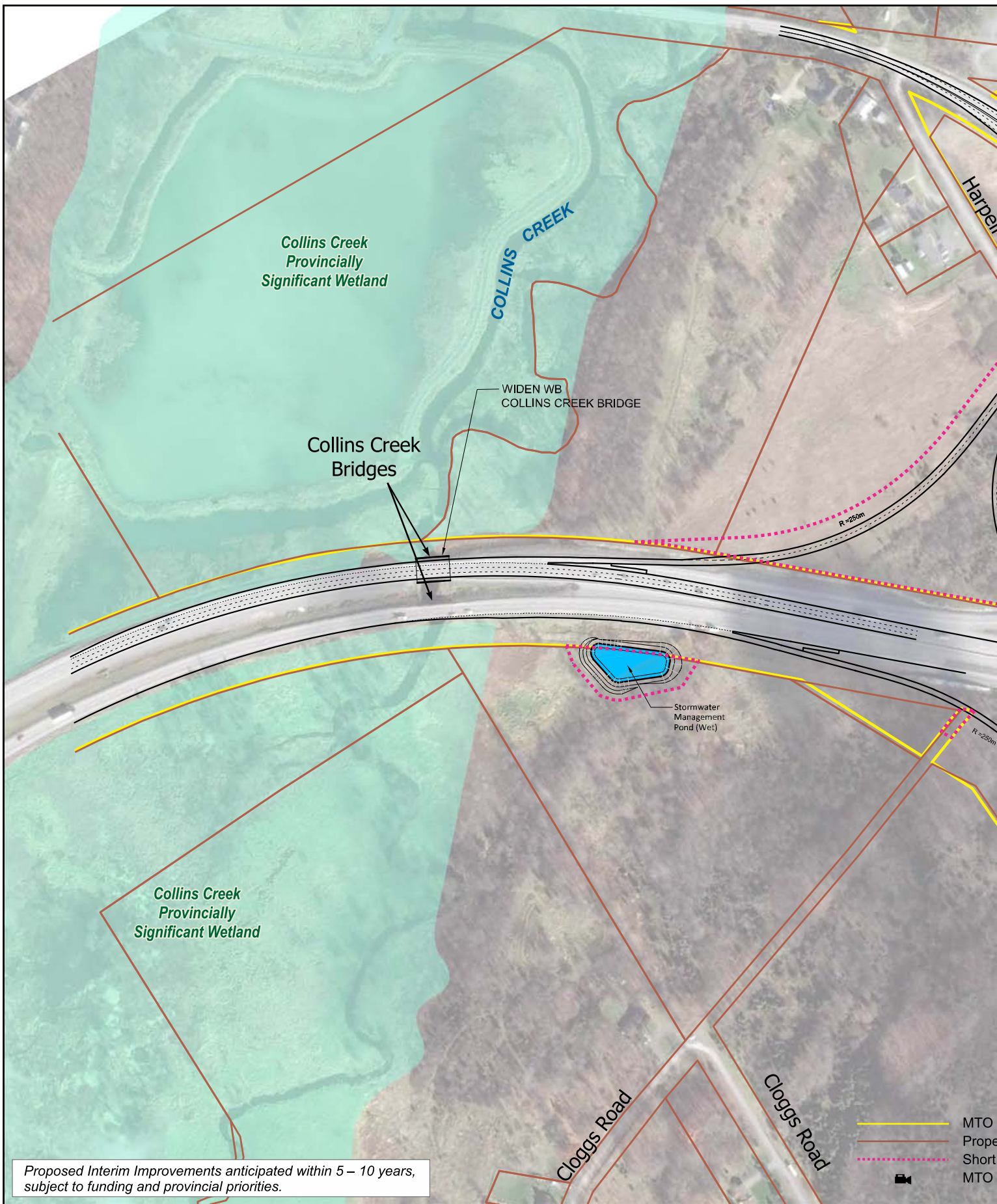
Tel: 1-800-267-0295  
Fax: (613) 540-5106  
E-mail: [kevin.ogilvie@ontario.ca](mailto:kevin.ogilvie@ontario.ca)

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Proposed Interim Improvements anticipated within 5 – 10 years, subject to funding and provincial priorities.



G.W.P. 4049-11-00  
 Highway 401 Interchange Improvements  
 Kingston Road 38

- MTO
- Property
- - - Short
- MTO

## 2 ENVIRONMENTAL ASSESSMENT PROCESS

### 2.1 THE ONTARIO ENVIRONMENTAL ASSESSMENT ACT (OEAA) AND MTO CLASS ENVIRONMENTAL ASSESSMENT PROCESS

The Ministry of Transportation *Class Environmental Assessment for Provincial Transportation Facilities* (MTO Class EA) was approved under the *Ontario Environmental Assessment Act* (OEAA) in the fall of 1999 and amended in 2000. This planning document outlines the EA process that MTO has committed to follow for certain defined groups of projects and activities. Provided that this process is followed, projects and activities included under the MTO Class EA do not require formal review and approval under the OEAA.

The following principles underlie the MTO Class EA process:

- *Transportation engineering principles*

The transportation engineering principles ensure that the project provides an *effective and safe transportation system*.

- *Environmental protection principles*

The environmental protection principles ensure that the project provides *effective environmental protection*. Existing environmental conditions, sensitivities and environmental protection requirements were assessed and are documented in this TESR. Mitigation measures have been developed to avoid, prevent, and/or reduce any residual adverse effects.

- *External consultation principles*

The consultation principles ensure that there is *effective consultation* with stakeholders early and throughout the study process. Throughout this study, local elected representatives, Aboriginal communities, provincial and federal agencies, local municipalities, interest groups, and members of the general public were encouraged to participate through a proactive consultation plan that included letters, newspaper notices, brochures and two Public Information Centres.

- *Evaluation principles*

The evaluation principles ensure that an *effective evaluation* process is in place to provide a balance between transportation engineering and environmental protection principles and to fulfill the project goals. The evaluation process used to assess planning and design alternatives was traceable, replicable and understandable by those who may be affected by the decisions.

- *Documentation principles*

The documentation principles ensure that there is *effective environmental documentation* and that the *opportunity to challenge the project* is provided. The environmental documentation required for this project is this Transportation Environmental Study Report, which will be filed for a 30-day public review period.

- *Bump-up principles*

The bump-up process (i.e. a Part II order) for Group 'B' projects provides an appeal process to address unresolved concerns. Interested persons are encouraged to review this TESR and any individuals with serious concerns have the right to request that the Minister of the Environment "bump-up" this project. A Part II Order may lead to the preparation of an individual environmental assessment.

- *Environmental clearance principles to proceed.*

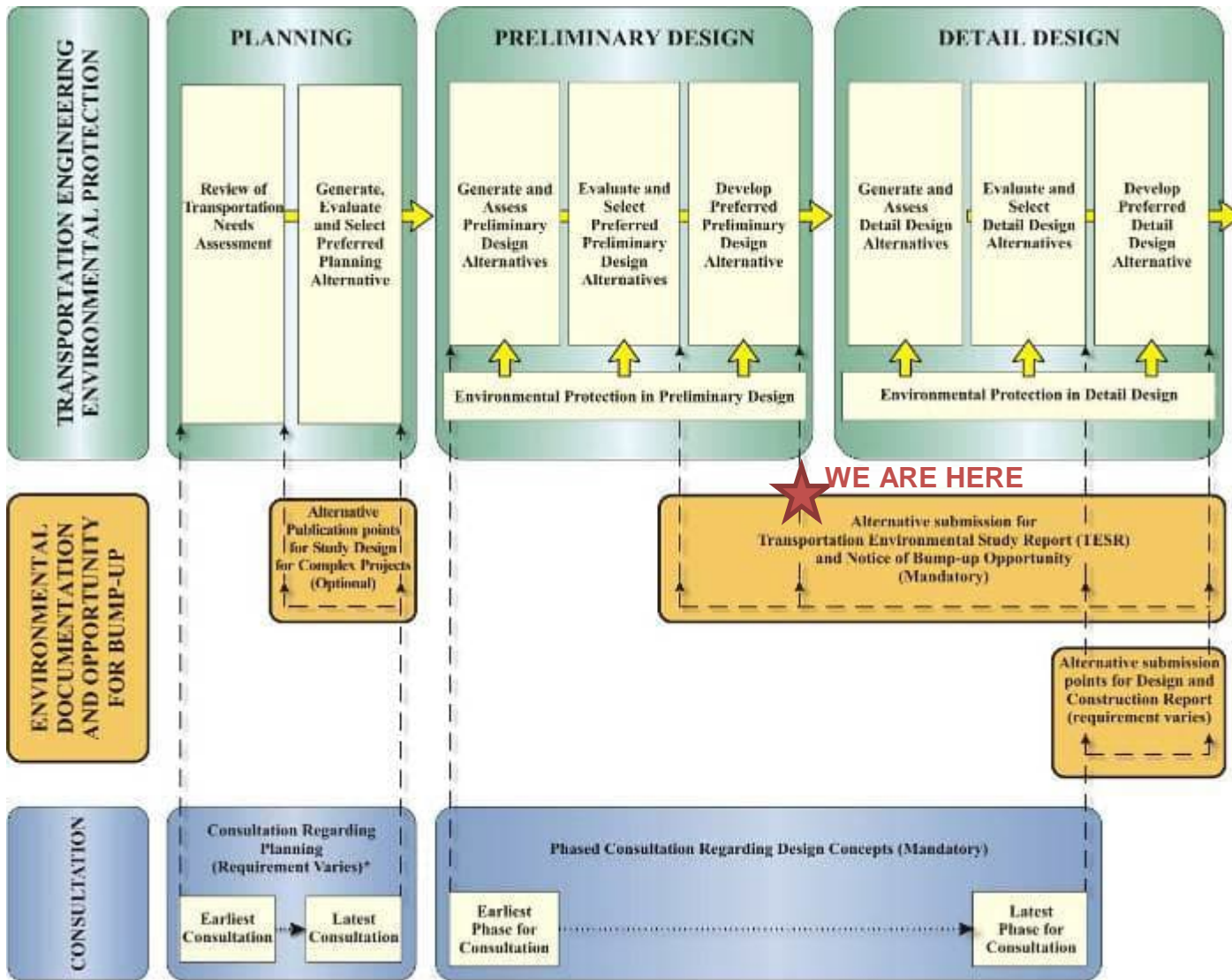
This study is being carried out in accordance with the approved planning process for Group 'B' projects. An overview of the Class EA process for Group 'B' projects is provided in **Figure 2-1**. As illustrated in **Figure 2-1**, this TESR is being submitted at the completion of the Preliminary Design phase. The next steps in the engineering design and Environmental Assessment process involve the completion of Detail Design, followed by construction. A Design and Construction report will be prepared for public and stakeholder review to document how commitments to future work have been addressed and how recommended environmental mitigation measures will be implemented in Detail Design and construction.

As per the requirements of the MTO Class EA process, the TESR documents the following:

- The generation, assessment, evaluation, selection and development of the design alternatives;
- The transportation engineering and environmental issues and how they were incorporated into the environmental assessment program;
- The identified potential environmental condition changes, effects and commitments to mitigation measures;
- Commitments to further work, including any environmental effects monitoring that is required;
- The consultation program followed throughout the study; and
- The identification of all project approvals, licenses and permits which have been or must be obtained prior to construction.

The TESR will be filed for a 30-day public review period. If, after consulting with the Ministry, a person (or persons) has unresolved concerns with the recommended plan as documented in the TESR, they may request that the Minister of the Environment order MTO to comply with Part II of the OEAA and complete an individual environmental assessment.





\*Mandatory if a Study Design is prepared.

Figure 2-1: Overview of Class EA Process for Group 'B' Projects (MTO Class Environmental Assessment for Transportation Facilities, 2000)

## 2.2 CONSULTATION PROCESS

Consistent with the requirements for Group 'B' projects under the MTO Class EA, consultation with federal, provincial and municipal agencies, First Nations and Métis communities, local elected representatives, interest groups, and members of the public was on-going over the course of the study.

A comprehensive Consultation Plan was prepared to address the requirements of the MTO Class EA and placed emphasis on consultation with stakeholders and members of the public that have the potential to be most directly affected by the project. The Consultation Plan was designed to involve stakeholders and the public early and throughout the study, to identify public concerns and assist in the selection of a recommended plan.

Stakeholders and the public were kept informed of the study and were asked for input through the use of conventional, effective consultation methods including:

- Ontario Government Notices published in two local newspapers;
- Direct letter mailings and brochures mailed to nearby residents;
- Correspondence with external agencies and members of the public;
- Two Public Information Centres (PICs); and
- Filing of this Transportation Environmental Study Report (TESR) for public review.

### 2.2.1 EXTERNAL AGENCY CONSULTATION

#### 2.2.1.1 Study Contact List

A contact list of local elected officials, First Nations and Métis communities, provincial and federal agencies, local municipal government, emergency services, utilities, school boards and interest groups was developed at the beginning of the study. Over the course of the study, any individuals or organizations expressing interest in the project were added to the contact list. The contact list includes the following individuals and organizations:

<b>Local Elected Officials</b>	MPP – Kingston and the Islands Mayor – City of Kingston Councillor – District 1 (Countryside) Councillor – District 2 (Loyalist-Cataraqui) Councillor – District 3 (Collins-Bayridge) Councillor – District 7 (Kingscourt-Rideau)
<b>First Nations and Métis Communities and Organizations</b>	Alderville First Nation Algonquins of Ontario Consultation Office Algonquins of Pikwakanagan First Nation Beausoleil First Nation (Christian Island) Chippewas of Georgina Island Chippewas of Rama First Nation (Mnjikaning) Curve Lake First Nation Hiawatha First Nation Métis Nation of Ontario Mississaugas of the Credit First Nation Mississaugas of Scugog Island First Nation Mohawks of the Bay of Quinte Mohawk Council of Akwesasne Moose Deer Point First Nation Northumberland Métis Council Shabot Obaadijwan First Nation

	Wahta Mohawks (Mohawks of Gibson) Coordinator, Williams Treaty First Nations
<b>Provincial and Federal Government Agencies</b>	Ministry of the Environment Ministry of Tourism, Culture and Sport Ministry of Natural Resources and Forestry, Peterborough District Ontario Ministry of Aboriginal Affairs Aboriginal Affairs and Northern Development Canada Infrastructure Ontario Canadian Forces Base Kingston Catawaqui Region Conservation Authority Ministry of Transportation (Goods Movement)
<b>Municipalities</b>	Clerk – City of Kingston Manager, Traffic Division – City of Kingston Director, Transportation Services – City of Kingston Director, Public Works – City of Kingston Director, Planning and Development – City of Kingston Director, Engineering – City of Kingston Committee Clerk – Municipal Heritage Committee, Heritage & Urban Design Division Chief Executive Officer – Kingston Economic Development Corporation Transit Service Project Manager – Kingston Transit Manager of Sustainability Planning – County of Frontenac
<b>Emergency Services</b>	Ontario Provincial Police, Frontenac Detachment Kingston Police Kingston Fire & Rescue Frontenac Paramedic Services
<b>Utilities</b>	Allstream Bell Canada Cogeco Inc. Enbridge Gas Distribution Hydro One Rogers Communications Union Gas Utilities Kingston
<b>School Boards</b>	Algonquin and Lakeshore Catholic District School Board Conseil des écoles catholiques du Centre-Est Conseil des écoles publiques de l'Est de l'Ontario Limestone District School Board Tri-Board Student Transportation Services
<b>Other Agencies / Interest Groups</b>	Kingston Chamber of Commerce Frontenac Heritage Foundation Ontario Trucking Association Rideau Trail Association SLH Transport

### 2.2.1.2 Study Notification to External Agencies

#### *Study Commencement*

Notification letters dated August 30, 2013 were sent to local elected officials, First Nations and Métis communities, provincial and federal agencies, local municipal government, emergency services, utilities, school boards and interest groups to announce the commencement of the preliminary design study. These letters included an overview of the study process and contact information. The notices also noted the similar preliminary design and environmental assessment study being carried out concurrently for operational improvements to the Highway 401 / Highway 15 interchange in the City of Kingston (documented in a separate TESR). A copy of the Study Commencement letter is provided in **Appendix A**.

#### *Public Information Centre #1*

Notification letters dated February 7, 2015 were sent to local elected officials, First Nations and Métis communities, provincial and federal agencies, local municipal government, emergency services, utilities, school boards and interest groups inviting them to attend the first Public Information Centre (PIC) held on Wednesday, February 26, 2014 (see **Section 2.2.2.2** for more information on the PIC). Local elected officials, First Nations and Métis communities, and external agency representatives were also invited to attend a one-hour session in advance of the PIC from 3:00 pm to 4:00 pm. This advance session was intended to provide agencies with the opportunity to discuss the project with Project Team representatives during regular business hours. The letters also included information regarding the first PIC for the concurrent Highway 401 / Highway 15 study, which was held on Tuesday, February 25, 2014. A copy of the PIC invitation letter is provided in **Appendix B**.

#### *Public Information Centre #2*

Notification letters dated January 23, 2015 were sent to local elected officials and First Nations and Métis communities, and on January 26, 2015, letters were sent to provincial and federal agencies, local municipal government, emergency services, utilities, school boards and interest groups inviting them to attend the second PIC held on Wednesday, February 11, 2015 (see **Section 2.2.2.2** for more information on the PIC). Local elected officials, First Nations and Métis communities, and external agency representatives were also invited to attend a one-hour session in advance of the PIC from 3:00 pm to 4:00 pm. This advance session was intended to provide agencies with the opportunity to discuss the project with the Project Team representatives during regular business hours. The letters also included information regarding the second PIC for the concurrent Highway 401 / Highway 15 study, which was held on Tuesday, February 10, 2015. A copy of the PIC invitation letter is provided in **Appendix B**.

#### *TESR Submission*

Notification letters dated January 11, 2016 were sent to local elected officials, First Nations and Métis communities, provincial and federal agencies, local municipal government, emergency services, utilities, school boards and interest groups announcing the submission of the TESR for a 30-day public review period, and identified the start and end dates for the TESR review period and the addresses and hours of operations for the review locations. A copy of the Notice of Submission letter is provided in **Appendix A**.

### 2.2.1.1 Comments Received from External Agencies

A total of twenty-four (24) comments were received from local elected officials, First Nations and Métis communities, provincial and federal agencies, local municipal government, emergency services, utilities, school boards and interest groups over the course of the study. A summary of all the comments received from external agencies and how they were addressed is provided in **Table 2-1**. Copies of all external agency correspondence received are included in **Appendix C**. Personal information has been redacted in accordance with the *Freedom of Information and Protection of Privacy Act*.

**Table 2-1: Summary of External Agency Comments Received and How They Were Addressed**

DATE / FORM OF CONTACT	AGENCY	COMMENTS RECEIVED	HOW IT WAS ADDRESSED / RE
<b>STUDY COMMENCEMENT</b>			
Sept. 19, 2013 / Email	Alderville First Nation	<ul style="list-style-type: none"> <li>• Advised that the project is located in Alderville First Nation traditional and treaty territory.</li> <li>• Interested in any archaeological findings, burial sites or any environmental impacts.</li> </ul>	<ul style="list-style-type: none"> <li>• Advised that we are undertaking ecological and archaeological investigations in the vicinity of the interchanges. Once completed, specific information will be available upon request.</li> </ul>
Sept. 23, 2013 / Email	Councillor, Collins Bay District – City of Kingston	<ul style="list-style-type: none"> <li>• Inquired why the project was occurring considering that the interchange was redone a short time ago.</li> <li>• Expressed concerns related to the retention of a buffer of trees within the MTO right-of-way between the existing eastbound on-ramp and the A&amp;W/Petro Canada.</li> <li>• Requested that trees planted in the triangular section of grass between the on- and off-ramps about 2-3 years ago be replaced.</li> <li>• Requested that any new tree planting occur in the fall and that MTO follow up with the Contractor before the end of the warranty period to replace any dead trees.</li> </ul>	<ul style="list-style-type: none"> <li>• Noted that minor modifications to the interchange to the ramp terminal intersection at the interchange were implemented as part of the Highway 401 expansion from 4 to 6 lanes. The design did not address specific operational impacts but was designed to accommodate long-term impacts anticipated at the interchange.</li> <li>• The Technically Preferred Alternative also include preliminary landscape design and aesthetic improvements, stormwater management and environmental mitigation measures and trees where possible. The Contractor is required to plant in accordance with standard specifications and any additional requirements identified in the preliminary landscape plan.</li> </ul>
Sept. 3, 2013 / Fax	City of Kingston, Engineering	<ul style="list-style-type: none"> <li>• Advised that the City of Kingston is currently updating its Transportation Master Plan.</li> </ul>	<ul style="list-style-type: none"> <li>• No response required.</li> </ul>
Sept. 6, 2013 / Email	Utilities Kingston	<ul style="list-style-type: none"> <li>• Provided drawings indicating various City of Kingston / Utilities Kingston infrastructure in the vicinity of the</li> </ul>	<ul style="list-style-type: none"> <li>• Information regarding impacts to utilities was considered in the evaluation of interchanges.</li> </ul>

DATE / FORM OF CONTACT	AGENCY	COMMENTS RECEIVED	HOW IT WAS ADDRESSED / RE
		interchange, on both sides of Highway 401 (street lights and associated wiring). <ul style="list-style-type: none"> <li>Identified that these utilities may be impacted depending on the extent of the work proposed and will require concurrence from Utilities Kingston prior to any relocation.</li> </ul>	alternatives.
Sept. 9, 2013 / Fax	Conseil des écoles publiques de l'Est de l'Ontario	<ul style="list-style-type: none"> <li>Confirmed that the agency does not wish to participate in the study.</li> </ul>	<ul style="list-style-type: none"> <li>No response was required.</li> <li>The agency was removed from the s</li> </ul>
Sept. 12, 2013 / Email	Union Gas	<ul style="list-style-type: none"> <li>Confirmed that Union Gas does not have any gas mains near the interchange.</li> </ul>	<ul style="list-style-type: none"> <li>No response was required.</li> <li>The contact was updated in the study</li> </ul>
Sept. 13, 2013 / Email	MNRF Peterborough District	<ul style="list-style-type: none"> <li>Provided background information related to fish and fish habitat data for Collins Creek and the Cataraqui River as well as Cataraqui Marsh wetland information. Also provided timing windows for in-water work and to protect hibernating turtles.</li> <li>Requested that the information be considered during the preparation of TESR, and that the TESR be circulated to MNRF for further comment, as there are several provincially significant features in the vicinity of the interchange.</li> </ul>	<ul style="list-style-type: none"> <li>No response required.</li> <li>The background information and timi incorporated into fish and fish habitat reports, as well as the TESR.</li> <li>MNRF will be notified of the 30-day T</li> </ul>
Sept. 13, 2013 / Email	Ministry of Culture, Tourism & Sport	<ul style="list-style-type: none"> <li>Inquired as to whether an archaeological assessment is planned.</li> <li>Inquired as to the age of the interchange and whether a Cultural Heritage</li> </ul>	<ul style="list-style-type: none"> <li>Advised that Stage 1-2 Archaeologica carried out in the interchange study an assessment will focus on areas of imp Preferred Alternative has been identifi</li> </ul>



DATE / FORM OF CONTACT	AGENCY	COMMENTS RECEIVED	HOW IT WAS ADDRESSED / RE
		Evaluation Report would be prepared. <ul style="list-style-type: none"> <li>Inquired as to whether a separate study/report will examine built heritage resources and cultural heritage landscapes.</li> </ul>	<ul style="list-style-type: none"> <li>The Kingston Road 38 underpass has for cultural heritage value and no Cultural Heritage Report (CHER) will be prepared as part of the study.</li> <li>The archaeological assessment report will be reviewed by the MTCS for their review upon completion.</li> </ul>
Oct. 1, 2013 / Email	City of Kingston, Transportation Services	<ul style="list-style-type: none"> <li>The City of Kingston may have an interest in a municipal park and ride at the Kingston Road 38 interchange. If the city has an interest in a new park and ride, we will advise the study team.</li> </ul>	<ul style="list-style-type: none"> <li>The information was noted. No further action was issued.</li> </ul>
Oct. 1, 2013 / Email	Ministry of Transportation, Goods Movement	<ul style="list-style-type: none"> <li>Would like to be kept informed as the study progresses regarding potential impacts to Long Combination Vehicles.</li> </ul>	<ul style="list-style-type: none"> <li>Contacts were added to the study contact list.</li> </ul>
Feb. 3, 2014 / Email	Union Gas	<ul style="list-style-type: none"> <li>Provided new contact information.</li> </ul>	<ul style="list-style-type: none"> <li>Study contact list was updated.</li> </ul>
<b>PUBLIC INFORMATION CENTRE #1</b>			
Feb. 11, 2014 / Email	Hiawatha First Nation	<ul style="list-style-type: none"> <li>Hiawatha First Nation would like to be kept apprised of any updates, archaeological findings, and/or of any environmental impacts, should any occur.</li> <li>Hiawatha First Nation would like to be contacted if artifacts are found and to be sent any archaeological reports as they are completed.</li> </ul>	<ul style="list-style-type: none"> <li>Advised that Stage 1-2 Archaeological assessments are completed.</li> <li>Should archaeological resources be identified during Stage 2 archaeological assessments, Hiawatha First Nation will be notified.</li> </ul>
Feb. 13, 2014 / Phone	SLH Transport	<ul style="list-style-type: none"> <li>Noted that Kingston Road 38 is a Long Combination Vehicle route.</li> </ul>	<ul style="list-style-type: none"> <li>Noted that the study team is aware of the interchange by LCVs and that the MTCS Office has been included in the project.</li> </ul>

DATE / FORM OF CONTACT	AGENCY	COMMENTS RECEIVED	HOW IT WAS ADDRESSED / RE
			regarding LCV vehicle use of the inte
Feb. 27, 2014 / Email	Frontenac County	<ul style="list-style-type: none"> <li>Frontenac County has prepared a draft of its first Official Plan. It is important to consider how the County plans to improve its transportation system over the next twenty years, and this interchange is important within that context.</li> <li>Noted that more detailed comments on the alternatives would follow.</li> </ul>	<ul style="list-style-type: none"> <li>No further comments were provided</li> </ul>
Mar. 12, 2014 / Email	SLH Transport	<ul style="list-style-type: none"> <li>Recommended that the maximum improvements possible should be completed on both the north and south sides to address immediate transportation concerns and to address future traffic volume requirements.</li> <li>Requested that the analysis of alternatives consider the engineering prerequisites for Long Combination Vehicles used today for egress, exit ramps and turning radius for both Hwy 401 and Hwy 15.</li> </ul>	<ul style="list-style-type: none"> <li>Advised that MTO is aware that Long (LCVs) use the interchange, and LCV geometric design requirements will b development and evaluation of all alt</li> <li>Explained that the recommended alt one that achieves the best balance b performance, the ability to address lo needs, and cost, while minimizing im businesses and the environment.</li> </ul>
Mar. 12, 2014 / Email	Ontario Trucking Association	<ul style="list-style-type: none"> <li>Noted that the interchange is used by LCVs.</li> <li>The LCV program conditions require that a suitable rest/emergency stop locations be identified along the primary highway network. In this case the Cataraqui Truck Stop is one of those locations. This same location and the adjacent yards east and west of the truck stop are also origin destination locations for many LCV</li> </ul>	<ul style="list-style-type: none"> <li>Noted that MTO is aware that Long (LCVs) use the interchange, and hav will continue to liaise with the MTO G to address the specific needs of LCV geometric design requirements will b development and evaluation of all alt</li> <li>Construction staging, detour alternat minimization of potential impacts to t (including LCV operations) are impor considered throughout the process o</li> </ul>



DATE / FORM OF CONTACT	AGENCY	COMMENTS RECEIVED	HOW IT WAS ADDRESSED / RE
		carriers. <ul style="list-style-type: none"> <li>We request that the study include an analysis of LCV operations on the entrance and egress ramps from Highway 401 to Gardiners Road. LCV operations require additional roadway space for maneuvering, which must be taken into account for normal LCV operations as well as operations during construction periods.</li> <li>As this project reaches construction phases, we request that plans be put in place so that LCV traffic is not disrupted.</li> </ul>	evaluating the various interchange a preliminary design. <ul style="list-style-type: none"> <li>A mitigation plan will be prepared to project impacts, including those to tra the interchange and on surrounding staging and impacts to traffic operati developed in the detail design stage</li> </ul>
Apr. 14, 2014 / Email	Ministry of Aboriginal Affairs	<ul style="list-style-type: none"> <li>Advised that the project is located in an area where the following First Nations and Métis communities may have existing or asserted rights or claims:</li> <li>Algonquins of Ontario Consultation Office</li> <li>Ottawa Region Métis Council</li> <li>Métis Nation of Ontario</li> </ul>	<ul style="list-style-type: none"> <li>Aboriginal community contacts provid included on the study contact list.</li> </ul>
<b>PUBLIC INFORMATION CENTRE #2</b>			
Mar. 2, 2015 / Email	Mohawks of the Bay of Quinte	<ul style="list-style-type: none"> <li>Mohawks of the Bay of Quinte has an interest in all projects occurring in our traditional territory. We are also interested if the preliminary archaeological investigations identified the potential for artifacts or burial remains. There is a traditional process that must be followed for the repatriation or re-internment of remains.</li> <li>To determine our level of interest in your</li> </ul>	<ul style="list-style-type: none"> <li>Specialty reports were provided to M Quinte once finalized.</li> </ul>

DATE / FORM OF CONTACT	AGENCY	COMMENTS RECEIVED	HOW IT WAS ADDRESSED / RE
		proposed project, please provide the following documentation: <ul style="list-style-type: none"> <li>○ Environmental reports and assessments;</li> <li>○ Archaeological reports and assessments; and</li> <li>○ Any comments provided by involved government parties (i.e. the Ministry of Natural Resources and Forestry; Ministry of the Environment; Department of Fisheries and Oceans; Environment Canada; Indian and Northern Affairs; etc.).</li> </ul>	
Jan. 29, 2015 / Email	Aboriginal Affairs and Northern Development Canada	<ul style="list-style-type: none"> <li>• Requested to be removed from the study contact list as AANDC official do not participate in environmental assessments that pertain to projects outside of reserve lands.</li> </ul>	<ul style="list-style-type: none"> <li>• The agency was removed from the s</li> </ul>
Feb. 11 & 19, 2015 / Email	Cataraqui Region Conservation Authority	<ul style="list-style-type: none"> <li>• Noted that the southwest corner of this study area is significant woodland, based on size, in the Central Cataraqui Region Natural Heritage Study.</li> <li>• The material presented at the PIC acknowledges the need for the compensation of the loss of wetland habitat and timing restrictions on in-water works. The implementation of appropriate sediment and erosion control measures should be employed in this location.</li> <li>• The impact of widening the bridge and the</li> </ul>	<ul style="list-style-type: none"> <li>• Impacts to the significant woodland v considered during the evaluation of a other factors (including cultural enviro private property impacts, and transpo impacts to the significant woodlands quadrant could not be avoided. Base we anticipate approximately 5.3 ha o impacted. The estimated reduction in 4.6 ha. A total of 9.5 ha of core wood the retained portion will still meet size significance.</li> <li>• The widening of the westbound Collin</li> </ul>

DATE / FORM OF CONTACT	AGENCY	COMMENTS RECEIVED	HOW IT WAS ADDRESSED / RE
		<p>highway embankment on the Collins Creek floodplain will also need to be considered to ensure that there will be no increased risk of flooding adjacent properties and roads.</p>	<p>required to accommodate modification lane. Mitigation measures will be implemented. Design and construction to minimize environmental impacts, including mitigation in-water and wetland works, implementation of sedimentation control measures, adherence to best practices for in-water works, and preventing impacts to the structure.</p>
<p>Mar. 4, 2015 / Email</p>	<p>Ministry of Culture, Tourism &amp; Sport</p>	<ul style="list-style-type: none"> <li>• Would like an update on the status of the Stage 1-2 Archaeological Assessment and the Cultural Heritage Evaluation Report.</li> </ul>	<ul style="list-style-type: none"> <li>• The Stage 1 Archaeological Assessment for both interchanges in 2014. The Stage 2 assessment indicates that areas outside of the existing highway right-of-way have archaeological potential, and will undergo subsurface disturbances assessment.</li> <li>• The Stage 2 Archaeological Assessment is scheduled to be completed in summer 2015. Upon being finalized, it will be submitted to MTCS.</li> </ul>

## 2.2.2 PUBLIC CONSULTATION

### 2.2.2.1 Notice of Study Commencement

A Notice of Study Commencement was published in the following local newspapers to inform the general public of study commencement and to solicit questions, concerns, and pertinent information:

- Kingston Whig Standard (English and French) – Thursday, September 5, 2013
- Kingston EMC (English and French) – Thursday, September 5, 2013

At the same time, a study commencement brochure providing details about the study and the Class EA process was distributed via Canada Post Unaddressed Admail to potentially affected residents and businesses in a catchment area within 2.5 kilometres of the interchange.

Potentially impacted property owners in the immediate vicinity of the interchange received letter notifications by direct mail dated August 30, 2013 to inform them of study commencement and advise that members of the Project Team would be conducting an inventory of existing conditions in the study area.

Copies of the newspaper notices, brochures, and direct letter mailings to potentially impacted property owners are included in **Appendix A**. All comments received from the general public in response to the study commencement notification are summarized in **Table 2-2**.

### 2.2.2.2 Public Information Centres

#### *Public Information Centre #1*

The first of two Public Information Centres (PICs) for this project was held on Wednesday, February 26, 2014 at the INVISTA Centre (1350 Gardiners Road, Kingston, Ontario) from 4:00 pm to 8:00 pm to provide an opportunity for stakeholders and members of the general public to review and comment on the project, the study area existing conditions, the long list of interchange improvement alternatives, and the short list of interchange improvement alternatives. In order to ensure general public awareness and invite anyone with an interest in the project to attend the PIC, a notice was published in the following local newspapers:

- Kingston Whig Standard (English and French) – Wednesday, February 12, 2014
- Kingston EMC (English and French) – Thursday, February 13, 2014

In addition to the newspaper notices, targeted letter and brochure notifications were sent to property owners, businesses and the general public in the vicinity of the interchange to notify them of the PIC.

Potentially impacted property owners received a PIC notification letter dated February 7, 2014 which also included drawings of the short-listed interchange improvement alternatives and an invitation to meet with the Project Team prior to the PIC to discuss potential impacts to their property. No property owners responded to the invitation for an advance meeting.

PIC notification letters dated February 10, 2014 were sent to all other property owners in the vicinity of the interchange.

A PIC notification brochure was sent to approximately 3,000 nearby residential and business addresses via Canada Post Unaddressed Admail on February 10, 2014.

Members of the Project Team, including bilingual team members, were available at the PIC to discuss the project and answer any questions.

Twenty-eight (28) individuals signed the register at the PIC. The majority of comments received expressed concerns regarding Alternative N-PA, due to impacts to a property with heritage interest and other residences on Jackson Mills Road. General support for Alternative N-PB1 was voiced as a less intrusive option for property owners in the northeast quadrant of the study area.

A copy of the first PIC Summary Report, including copies of notification letters, the brochure, PIC display materials, and comments received, is provided in **Appendix B**.

#### *Public Information Centre #2*

The second of two PICs for this project was held on Wednesday, February 11, 2015 at the INVISTA Centre (1350 Gardiners Road, Kingston, Ontario) from 4:00 pm to 8:00 pm to provide an opportunity for stakeholders and members of the general public to review and comment on the recommended interchange improvements. A notice was published in the following local newspapers:

- Kingston Whig Standard (English and French) – Wednesday, January 28, 2015
- Kingston EMC (English and French) – Thursday, January 29, 2015

In addition to the newspaper notices, targeted letter and brochure notifications were sent to property owners, businesses and the general public in the vicinity of the interchange to notify them of the PIC.

Letters were sent January 26, 2015 to directly impacted property owners, non-impacted property owners, and the general public.

A PIC notification brochure was sent to approximately 3,000 nearby residential and business addresses via Canada Post Unaddressed Admail on January 30, 2015.

Twenty-one (21) individuals signed the register at the PIC and were encouraged to complete comment sheets. Three (3) comment sheets were received. An additional four (4) comments were submitted following the PIC. The comments received were regarding impacts to significant woodlands and the Collins Creek Provincially Significant Wetland; compatibility of the new interchange with Long Combination Vehicles; amenities in the carpool lot; and safety issues regarding Kingston Road 38 north of Highway 401.

A copy of the second PIC Summary Report, including copies of notification letters, the brochure, PIC display materials, and comments received, is provided in **Appendix B**.

#### **2.2.2.3 Impacted Property Owner Consultation**

Notification letters dated December 11, 2014 were sent to property owners to advise them of the Technically Preferred Alternative and to identify property requirements. The letters indicated that a portion of the recipient's property would be required for the implementation of the Technically Preferred Alternative. The letters included a drawing of the Technically Preferred Alternative, including property requirements and an invitation to meet with the Project Team in advance of the February 2015 PIC to discuss property impacts in greater detail. No requests for meetings were made in advance of the PIC.

#### **2.2.2.4 City of Kingston Consultation**

The Project Team consulted with representatives of the City of Kingston throughout the study to provide study status updates and coordinate the proposed preliminary design plans with approved, ongoing and/or proposed municipal infrastructure and development plans within the study area.

Several meetings occurred during the progression of the study:

- Meetings were held (February 4, 2014 / December 17, 2014) between the project team and City of Kingston transportation representatives. The purpose of these meetings was to provide study status updates and discuss the project prior to both Public Information Centres (PICs).
- City of Kingston representatives attended both PICs, detailed in **Section 2.2.2.1 and Section 2.2.2.2.**
- MMM Group attended a council meeting (May 19, 2015) to provide a study overview, update on status and present the Technically Preferred Alternative.

#### **2.2.2.5 TESR Submission**

Notification letters dated January 11, 2016 were sent to the study mailing list announcing the submission of the TESR for a 30-day public review period. The letters identified the start and end dates for the TESR review period and the addresses and hours of operations for the review locations. Copies of the notification letters are provided in **Appendix A.**

#### **2.2.2.6 Comments Received from Members of the Public**

**Table 2-2** provides a summary of all comments received from members of the public and how they were addressed. A total of sixteen (16) comments were received from members of the public over the course of the study. Copies of these comments are included in **Appendix C.** Personal information has been redacted in accordance with the *Freedom of Information and Protection of Privacy Act.*

**Table 2-2: Summary of Public Comments Received and How They Were Addressed**

Date	Comments Received	How it was addressed
<b>STUDY COMMENCEMENT</b>		
Sept. 3, 2013 / Email	<ul style="list-style-type: none"> <li>Noted concerns about Kingston Road 38 safety north of Highway 401.</li> <li>Requested that an entrance to Harpell Road as a continuance of Mclvor Road be reviewed.</li> </ul>	<ul style="list-style-type: none"> <li>Noted safety concerns regarding Kingston Road 38</li> <li>Concerns regarding Harpell Road will be addressed by the City of Kingston Engineering Department</li> </ul>
Sept. 12, 2013 / Email	<ul style="list-style-type: none"> <li>Noted that this project is not necessary. The interchange including ramps and the bridge were worked on already just a few years ago when the 401 was widened.</li> </ul>	<ul style="list-style-type: none"> <li>Provided an overview of the operational issues and deficiencies of the interchange and previous work related to the Highway 401 interchange to address these issues.</li> </ul>
Oct. 4, 2013 / Email	<ul style="list-style-type: none"> <li>Noted that they find this area extremely unsafe for driving and have witnessed several accidents.</li> <li>Requested closing Cordukes Road at Highway 38 or making it for local traffic only.</li> </ul>	<ul style="list-style-type: none"> <li>Noted safety concerns regarding Kingston Road 38</li> <li>Concerns regarding Cordukes Road will be addressed by the City of Kingston Engineering Department</li> </ul>
<b>PUBLIC INFORMATION CENTRE #1</b>		
Feb. 21, 2014 / Email Resident	<ul style="list-style-type: none"> <li>Expressed concerns regarding negative impacts to Collins Creek, K&amp;P Trail, or the Cataraqui Conservation Area.</li> </ul>	<ul style="list-style-type: none"> <li>Noted that depending on the preference selected, the existing Highway 401 bridge over Collins Creek may require widening and the K&amp;P Trail structure under Highway 401 may need to be extended. If necessary, the only alternative would be short-term disruptions to the trail.</li> </ul>
Feb. 26, 2014 / PIC Comment Sheet Resident	<ul style="list-style-type: none"> <li>Expressed support for interchange alternative N-PB1 due to potential property and noise impacts for residents on Jackson Mills Road associated with other alternatives.</li> </ul>	<ul style="list-style-type: none"> <li>Noted preference for N-PB1 and expressed that impacts to private homes are an important consideration in the planning process and are given significant weight in the evaluation of alternatives.</li> </ul>

Date	Comments Received	How it was addressed
Feb. 26, 2014 / PIC Written Comment Resident	<ul style="list-style-type: none"> <li>Expressed support for interchange alternative N-PB1 due to potential property and noise impacts for residents on Jackson Mills Road associated with other alternatives.</li> </ul>	<ul style="list-style-type: none"> <li>Noted preference for N-PB1 and explained that private homes are an important consideration in the planning process and are given significant weight in the evaluation of alternatives.</li> </ul>
Feb. 26, 2014 / PIC Written Comment Resident	<ul style="list-style-type: none"> <li>Expressed understanding for the need to change the entrances/exits to Hwy 401, but that the interchange alternatives that require the displacement of local residents should not be considered.</li> <li>Expressed opposition to alternative N-PA in particular.</li> </ul>	<ul style="list-style-type: none"> <li>Noted concerns and explained that private homes are an important consideration in the planning process and are given significant weight in the evaluation of alternatives.</li> </ul>
Feb. 26, 2014 / PIC Written Comment Resident	<ul style="list-style-type: none"> <li>Expressed support for N-PB1.</li> <li>Expressed opposition to alternative N-PA, as it maintains the location of the WB off-ramp on Highway 38.</li> </ul>	<ul style="list-style-type: none"> <li>Preferences were noted.</li> </ul>
Mar. 5, 2014 / PIC Comment Sheet Resident	<ul style="list-style-type: none"> <li>Expressed support for Alternative N-PB1 as the least invasive to properties on Jackson Mills Road.</li> <li>Expressed concern with noise levels due to the recent 401 expansion.</li> <li>Expressed opposition to Alternative N-PA which appears to shorten the ramp and could lead to greater traffic backing up onto the 401.</li> </ul>	<ul style="list-style-type: none"> <li>Noted preferences and explained that private homes are an important consideration in the planning process and are given significant weight in the evaluation of alternatives.</li> </ul>
<b>PUBLIC INFORMATION CENTRE #2</b>		
February 11, 2015 / Comment Form Resident	<ul style="list-style-type: none"> <li>Should widen Kingston Road 38 north of Highway 401 over a longer distance to reduce accidents in this area.</li> <li>Noted support for the proposed landscaping plan.</li> </ul>	<ul style="list-style-type: none"> <li>Forwarded concerns regarding widening of Kingston Road 38 to the City of Kingston.</li> </ul>
February 11, 2015 / Comment Form Resident	<ul style="list-style-type: none"> <li>Suggested including a sheltered waiting area with benches and a picnic table at the carpool lot location, as well as trees, shrubs, even flower plantings around the waiting area and carpool lot.</li> </ul>	<ul style="list-style-type: none"> <li>Noted suggestions to add various amenities to the carpool lot area.</li> <li>The preliminary landscape plan incorporated these suggestions and strategically placed around the perimeter of the carpool lot.</li> </ul>



Date	Comments Received	How it was addressed
		to assist with visual buffering of Highway 401 allowing views into the lot for safety

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## 3 EXISTING ENVIRONMENTAL CONDITIONS

### 3.1 TERRESTRIAL ENVIRONMENT

#### 3.1.1 METHODOLOGY

Background information regarding the natural environment in the study corridor was drawn from:

- Consultation with the Ontario Ministry of Natural Resources and Forestry (MNRF);
- The MNRF Natural Heritage Information Centre (NHIC) database;
- The Land Information Ontario (LIO) database;
- Wetland Summary Report, Peterborough District MNRF (2013);
- Correspondence with the MNRF Peterborough District to gather existing terrestrial and aquatic information in the vicinity of the study area, and to determine the potential for Species at Risk (SAR);
- Consultation with Ducks Unlimited to identify species recorded at the created wetland (adjacent to Collins Creek); and
- Aerial mapping of the study area.

Significant natural environmental work has been completed previously in the study area. A review of the following previously-completed reports was conducted:

- Preliminary Design Report, Highway 401 Widening from West of County Road 38 to Highway 15 (2001); and
- Wildlife Mortality Study on Highway 401 from Sydenham Road to Highway 15, LGL Associates (2007).

Site investigations were conducted on September 12 and 13, 2013 to assess existing terrestrial ecosystems and wildlife. Weather conditions were rainy and overcast. A follow-up spring field visit was completed on June 23, 2014 to confirm and add to findings.

The terrestrial field investigation focused on assessing vegetation and wildlife habitat characteristics within the study area. For the purposes of field investigations, the study area was defined as the area extending approximately 50m from the edges of the preliminary interchange improvement alternatives with the largest footprint impacts. Vegetation communities were classified and mapped according to the Ecological Land Classification (ELC) system for Southern Ontario.

The full Terrestrial Ecosystem Existing Conditions and Impact Assessment Report is available in **Appendix D**.

#### 3.1.2 VEGETATION

The lands within the study area are a mix of forest/woodland, open cultural communities, and wetlands, with built areas throughout. The majority of the existing right-of-way (ROW) lands are occupied by open, maintained cultural meadow (CUM) communities, residential lawns, or other urban uses. Cultural meadow communities occur both on shallow (CUM2) and deeper soils (CUM1-1), but generally contain a similar species composition consisting of a mix of common grasses and other herbaceous plants.

Significant woodlands have been identified in the City of Kingston Official Plan in the southwest quadrant. Significant woodlands are those that meet any of the following criteria: contain forest patches over 100 years or older; are 40 hectares or larger; have an interior core area of 4 ha. or larger, measured 100 m from the edge; are within 30 m of a waterbody; or are within 120 m of other significant features.

The most commonly encountered species in these areas include Awnless Brome (*Bromus inermis* ssp. *inermis*), Tall Goldenrod (*Solidago altissima*), knapweed (*Centaurea* spp.), Chicory (*Cichorium intybus*), Common Milkweed (*Asclepias syriaca*), Wild Carrot (*Daucus carota*), Bird's-foot Trefoil (*Lotus*

*corniculatus*), and Poverty Oat-grass (*Danthonia spicata*). Common Juniper (*Juniperus communis*) and Staghorn Sumac (*Rhus typhina*) along with other deciduous trees and shrubs are occasionally scattered throughout these open areas.

One vegetation community identified in the southwest quadrant, the Common Juniper Shrub Alvar Type (ALS1-1), is considered provincially rare by the NHIC and ranked as S2 (very rare in the province) (Bakowsky, 1996). Alvares are open habitats with a thin covering of soil or no soil, over a base of limestone or dolostone.

The vegetation communities found within the site are indicated on the map in **Figure 3-2** and described in detail in **Table 3-1**.

**HIGHWAY 401 / KINGSTON ROAD 38 INTERCHANGE  
OPERATIONAL IMPROVEMENTS (G.W.P. 4049-11-00)**

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Highway 401 Interchange Improvements - Highway 38  
VEGETATION COMMUNITIES

Figure 3-1: Existing Vegetation



**Table 3-1: Description of Existing Vegetation Communities in the Study Area**

Vegetation Community	Description
<p>ALS1-1: Common Juniper Shrub Alvar Type</p> <p>Rare Vegetation Community</p>	<p>The ALS1-1 community is potentially considered provincially rare by the NHIC (Bakowsky, 1998) as these communities are ranked as S2 (very rare in the province).</p> <p>The Napanee Plain physiographic region is a limestone plain bedrock area where alvars are common. Site observations revealed substrate conditions judged to be indicative of alvars (i.e. in this case, a combination of relatively thin vegetated soil and small patches exposed, relatively level calcareous bedrock with a moderate degree of cracking). Plant indicators for alvar communities generally occur in the spring and early summer. During spring field work, the presence of alvar plant indicators was confirmed.</p> <p>Two species were observed nearby and in the general study area that have an 'extreme' level of occurrence in alvars: Prairie Goldenrod (<i>Oligoneuron album</i>) and False Pennyroyal (<i>Trichostema brachiatum</i>). False Pennyroyal was observed in the ROW to the southeast side of the interchange (south of the 401), while Prairie Goldenrod was observed in the same location as well as on each side of Highway 38 near the FOC community. These species were not delineated as alvars due to their anthropogenically disturbed nature. The ROW has undergone recent grading activities and the resulting vegetation is in the early stages of regeneration. Substrate conditions consist of exposed bare bedrock or a layer of graded sandy gravel, both of which would help provide a suitable growing habitat for these species.</p> <p>This unit contains a relatively sparse canopy of Eastern Red Cedar (<i>Juniperus virginiana</i>) with associates of Elm (<i>Ulmus americana</i>), White Cedar (<i>Thuja occidentalis</i>), Sugar Maple (<i>Acer saccharum</i>) and Black Cherry (<i>Prunus serotina</i>) associates. The understory or shrub layer is moderately dense with Common Juniper, with occasional associates of Gray Dogwood (<i>Cornus racemosa</i>), Chokeberry (<i>Viburnum virginiana</i>), Prickly Ash (<i>Zanthoxylum americanum</i>), and Common Buckthorn (<i>Rhamnus cathartica</i>). The ground layer is patchy and consists mainly of Field Goldenrod (<i>Solidago nemoralis</i>), Early Goldenrod (<i>Solidago nemoralis</i>), aster species, Virginia Strawberry (<i>Fragaria virginiana ssp. virginiana</i>), and Poverty Oat-grass (<i>Leptochloa virginiana</i>). Patches were observed throughout.</p>
<p>CUM/CUW2-1: Cultural Meadow with an inclusion of Eastern Red Cedar Cultural Alvar Woodland</p>	<p>The northern portion of this unit is made up of old-field meadow, with Awnless Brome, goldenrod, and clover predominating in the ground layer. Southwards, the soil becomes shallower with patches of exposed bedrock observed throughout. A sparse canopy of scattered young to mid-age Bitternut Hickory (<i>Carya amara</i>) and White Oak (<i>Quercus macrocarpa</i>), and ash overtops a denser sub-canopy composed mainly of Eastern Red Cedar. Common Juniper is dominant in the understory. Ground cover is patchy with Poverty Oat-grass, Virginia Goldenrod providing the dominant cover.</p>
<p>CUP3-2: White Pine Coniferous Plantation Type</p>	<p>There are three occurrences of this community type within the study area. All consist of dense stands of White Pine (<i>Pinus strobus</i>) with no understory or ground vegetation.</p>

Vegetation Community	Description
CUT1-1: Sumac Cultural Thicket Type	This small thicket occupies a gentle slope behind a residence. It consists mostly of dense Star Red Raspberry ( <i>Rubus idaeus ssp. strigosus</i> ) at the edges and grass species in the sparse ground
CUT1-4: Gray Dogwood Cultural Thicket Type	This small community consists of a dense stand of Gray Dogwood with no ground vegetation. Grape ( <i>Vitis riparia</i> ) is abundant on the community edges.
CUT2: Bedrock Cultural Thicket Ecosite	This thicket community contains a sparse young canopy of Paper Birch ( <i>Betula papyrifera</i> ), White Trembling Aspen ( <i>Populus tremuloides</i> ) overtop a denser shrub layer containing a mix of Common Staghorn Sumac, Gray Dogwood, Tartarian Honeysuckle ( <i>Lonicera tatarica</i> ) and Prickly Ash. The ground is mixed with no clear dominants; species include Common Juniper, Panicked Aster ( <i>Symphyotrichum ssp. lanceolatum</i> ), Canada Goldenrod ( <i>Solidago canadensis</i> ), Wild Carrot, Virginia Strawberry, and many others.
CUW/CUM1-1: Cultural Woodland	This small unit is fairly mixed consisting mostly of American Elm and Green Ash ( <i>Fraxinus pennsylvanica</i> ) canopy and Eastern Red Cedar in the sub-canopy. Shrubs include Common Buckthorn, Stag Dogwood, and Tartarian Honeysuckle. Ground vegetation is dominated by Awnless Brome with occasional occurrences of Common Milkweed, Poison Ivy ( <i>Toxicodendron rydbergii</i> ), and Riverbank Grass.
CUW2: Bedrock Cultural Woodland Ecosite	This small woodland community consists of an open canopy layer of low growing Eastern Red Cedar, Juniper and Common Buckthorn abundant in the understory. Ground vegetation consists of several species.
CUW2-1: Red Cedar Cultural Alvar Woodland Type	There are four occurrences of this vegetation type in the study area. In general, the dominant canopy consists of an open stunted tree layer made up predominantly of Eastern Red Cedar, with scattered deciduous trees such as ash ( <i>Fraxinus</i> sp.) and American Elm. The understories are typically dominated by Gray Dogwood, with varying occurrences of Common Lilac ( <i>Syringa vulgaris</i> ), Common Juniper, Common Buckthorn, and Prickly Ash. Ground vegetation consists of a mix of graminoids and forbs, including bedrock patches, with Field Goldenrod, Early Goldenrod, Arrow-leaved Aster ( <i>Symphyotrichum angustifolium</i> ), Awnless Brome, Heath Aster ( <i>Symphyotrichum ericoides</i> var. <i>ericoides</i> ), Creeping Bentgrass, Poverty Oat-grass, hawkweed species ( <i>Hieracium</i> sp.), Wild Carrot, Virginia Strawberry, European Viper's Bugloss ( <i>Lithospermum officinale</i> ), Poison Ivy, and Viper's Bugloss ( <i>Echium vulgare</i> ) the most common species.
FOC: Coniferous Forest	South of highway 401 and west of the interchange is a young stand of coniferous forest where the tallest tree exceeds 10 cm dbh. The canopy of this forest contains abundant White Spruce ( <i>Picea canadensis</i> ) and White Cedar ( <i>Abies balsamea</i> ). White Cedar occurs occasionally in the sub-canopy and understory. Ground vegetation in the understory are abundant Common Juniper and Eastern Red Cedar. Light is limited under the canopy which provides 80 percent coverage, and the ground contains a sparse cover of grasses and mosses. Occasional American Elm, Green Ash, Bur Oak and Trembling Aspen appear as infrequent canopy layer.

Vegetation Community	Description
FOD4-2: Dry – Fresh White Ash Deciduous Forest	White Ash ( <i>Fraxinus americana</i> ) is the most abundant canopy species in this young forest, with occurrences of Sugar Maple, American Elm, and Bur Oak. Gray Dogwood and Common Buckthorn are present in both the sub-canopy and understory. The ground layer consists mostly of Thicket Creeper ( <i>Fragaria virginiana</i> ) with a grass species, Riverbank Grape, and Panicked Aster also occurring. An old field meadow occurs within this unit.
FOD5: Dry – Fresh Sugar Maple Deciduous Forest Ecosite	This mid-age forest occupies a slope between the adjacent communities. The canopy is composed of Sugar Maple with Eastern Hop-hornbeam ( <i>Ostrya virginiana</i> ) in the sub-canopy and ash saplings above. Very little herbaceous ground vegetation is present, but Thicket Creeper and Poison Ivy are present throughout.
FOD5-6: Dry – Fresh Sugar Maple – Basswood Deciduous Forest	This mid-aged forest consists mainly of Sugar Maple with American Basswood ( <i>Tilia americana</i> ) with Eastern Hop-hornbeam as the most common sub-canopy species. Chokecherry and Common Buckthorn are present up the patchy understory. Sedge species ( <i>Carex</i> spp.), ash seedlings, and Thicket Creeper are present in the dense ground layer along with Zig-zag Goldenrod ( <i>Solidago flexicaulis</i> ), False Yellow ( <i>Maianthemum racemosum ssp racemosum</i> ), Garlic Mustard ( <i>Alliaria petiolata</i> ) and Poison Ivy.
FOD5-7: Dry – Fresh Sugar Maple – Black Cherry Deciduous Forest Type	This mid-age forest unit does not fit perfectly into an ELC community type; the ELC code was assigned as the best-fit according to community composition and structure. The most abundant canopy species is Black Cherry with occasional American Elm and rarer occurrences of Sugar Maple, White Pine and American Red Cedar dominates the moderately dense sub-canopy. Common Buckthorn is dominant in the understory with Tartarian Honeysuckle and Chokecherry as occasional associates. The ground layer is composed of Thicket Creeper, Riverbank Grape, and Poison Ivy. The largest and most mature trees in the unit are Sugar Maple, which occur sparsely.



Vegetation Community	Description
<p>FOD7-2: Fresh – Moist            Ash Lowland Deciduous            Forest Type</p>	<p>There are three units of this type in the study area:</p> <p>One unit is located directly west of Highway 38 north of McIvor Rd. The canopy is made up of proportions of young to mid-age American Elm and Green Ash with Bur Oak as an associate. The understory is surrounded by a dense rim of Gray Dogwood shrubs, while Common Buckthorn is abundant in the interior. Ground vegetation is relatively sparse with Thicket Creeper, Poison Ivy, and avens (predominating), along with Virginia Strawberry, multiple sedge species (<i>Carex spp</i>), Panicked Bentgrass.</p> <p>The second unit is located along the northern side of Highway 401 west of Highway 38. This unit is on a tableland and valley slope adjacent to Collins Creek. The eastern portion of the unit lies on the valley slope and is relatively young, consisting mainly of Green Ash with scattered Bur Oak and American Elm. The vegetation layers are sparse, with Wild Red Raspberry, Gray Dogwood, and Common Buckthorn in the canopy and avens, Common Dandelion (<i>Taraxacum officinale</i>), Panicked Aster, Thicket Creeper, and Geranium robertianum in the ground vegetation. Westwards down the slope the community becomes more mature (mid-age), with Green Ash again predominating in the canopy along with the occasional Bur Oak. These species and Eastern Hop-hornbeam occur in the sub-canopy. The understory is dense with Chokecherry, Common Buckthorn, and Gray Dogwood occurring. Ground vegetation consists of a mix of species of the ground area and consists largely of Poison Ivy, Thicket Creeper, and Panicked Aster.</p> <p>The third unit of this type occurs within the northeast quadrant of the study area along the northern side of Highway 401. The young to mid-age forest slopes upwards to the adjacent field at its eastern edge. Green Ash is an abundant canopy species, with American Elm and Eastern Red Cedar present as occasional associates. Gray Dogwood is dominant in the understory along with Common Buckthorn and Chokecherry. Thicket Creeper, Enchanter's Nightshade (<i>Circaea lutetiana ssp. canadensis</i>), Riverbank Grape, and Geranium robertianum make up the sparse ground layer. The community slopes upward towards the east, with exposed bedrock visible, and transitions into a more open cultural woodland consisting of the same species along with Cedar and typical Old Field Meadow species.</p>
<p>FOD9-5: Fresh – Moist            Bitternut Hickory            Deciduous Forest Type</p>	<p>This mid-age forest unit has a relatively open canopy layer consisting mainly of Bitternut Hickory and Bur Oak associates. The moderately dense understory consists mainly of Wild Red Raspberry and American Elm with scattered occurrences of Eastern Red Cedar. Ground vegetation consists of a mix of Timothy (<i>Phlebotium pratense</i>) and other grass species, Riverbank Grape, Panicked Aster, and Poison Ivy. A seep on an exposed bedrock shelf drains to the adjacent marsh community and contains a small association of vegetation including Reed Manna Grass (<i>Glyceria maxima</i>), bulrush (<i>Scirpus/ Schoenoplectus</i>), Spotted Ragwort (<i>Onoclea sensibilis</i>), Wild Mint (<i>Mentha arvensis</i>), Marsh Marigold (<i>Caltha palustris</i>), and water hellebore (sp.)</p>

Vegetation Community	Description
MAM2-2: Reed-canary Grass Mineral Meadow Marsh	This wetland unit is associated with bottomland surrounding Collins Creek, and consists of a species, with Reed-canary Grass ( <i>Phalaris arundinacea</i> ) the most abundant, followed by Spotted Joe-pye Weed ( <i>Eupatorium maculatum ssp maculatum</i> ), cattail ( <i>Typha sp.</i> ), Smooth Goldenrod ( <i>Solidago glabra</i> ), Calico Aster ( <i>Symphotrichum lateriflorum var. lateriflorum</i> ), and sedge species. Some mature willow ( <i>Salix sp.</i> ) trees line the creek and a small grove of mature Freeman's maple trees occurs in the center of the unit just south of the stream channel.
MAM2-2/MAM2-10: Reed-canary Grass Mineral Meadow Marsh with an inclusion of Forb Mineral Meadow Marsh	This unit is associated with branches of a stream channel, with Reed-canary Grass dominating. Occasional scattered occurrences of other herbaceous species include Sensitive Fern, Panicum, Jewelweed ( <i>Impatiens capensis</i> ), Climbing Nightshade ( <i>Solanum dulcamera</i> ), and Rice Cut-grass ( <i>Oryzoides</i> ). The north-south branch contains some water flows while the east-west branch is intermittent.
MAM2-2/MAS2-1: Reed-canary Grass Mineral Meadow Marsh with Cattail Shallow Marsh inclusion	This unit consists of a dense layer of Reed Canary Grass with a small inclusion of Cattail Shallow Marsh. Narrow-leaved Cattail ( <i>Typha angustifolia</i> ) dominates.
MAM2-10: Forb Mineral Meadow Marsh	This small meadow marsh consists of a herbaceous layer where sedge species and goldenrod are the most abundant. Fewer occurrences of Spotted Joe-pye Weed, Panicked Aster, rush species, and bulrush species occur within the unit.
MAS2-1: Cattail Mineral Shallow Marsh Type	There are two stand-alone occurrences of this community type in the study area. The first is associated with a drainage channel under the eastbound Highway 401 on-ramp on the south side of the stormwater management ponds to the south. The second occurrence occurs at the south end of the area adjacent to Collins Creek. Narrow-leaved Cattail is dominant in both communities. Small-leaved Cattail ( <i>microcarpus</i> ), Reed-canary Grass, Creeping Bentgrass, and sedge species occur occasionally.
SWM Ponds (MAS2: Mineral Shallow Marsh Ecosite)	The ponds consist of a mix of open water and shallow rooted species with the most abundant being Flowering-rush ( <i>Butomus umbellatus</i> ), Beggar's Ticks ( <i>Bidens cernua</i> ), Fox Sedge ( <i>Carex vulpinoidea</i> ), and Broad-leaved Water-plantain ( <i>plantago-aquatica</i> ). The maintained areas around the ponds consist of cut grass, planted horsetails, and mats of Crown-vetch.
SWT2-9: Gray Dogwood Mineral Thicket Swamp Type	This unit consists of a very dense shrub layer of Gray Dogwood located at the bottom of a slope along the southern stream channel branch of the MAM2-2/MAM2-10 community. Ground vegetation is sparse and interior and consists largely of Climbing Nightshade, Calico Aster, and an avens species.

Vegetation Community	Description
SWT2-9/CUM1-1: Gray Dogwood Mineral Thicket Swamp complexed with Dry – Moist Old Field Meadow	This unit varies in composition and structure, consisting of patches of dense Gray Dogwood thicket and more open old-field meadow habitat. In addition to common CUM1-1 species discussed elsewhere, this unit contains an abundance of Canada Anemone ( <i>Anemone canadensis</i> ) and Creeping Bentgrass. A mid-age to mature Black Locust ( <i>Robinia pseudoacacia</i> ) trees is located at the southern edge.

### 3.1.3 WILDLIFE

The forests, marshes and cultural communities in the study area support the variety of wildlife species described below.

#### 3.1.3.1 Birds

Along the forest edges and in habitats with scattered trees and shrubby undergrowth (such as the alvar) birds observed include: Western Palm Warbler (*Dendroica palmarum palmarum*), Nashville Warbler (*Vermivora ruficapilla*), Black-capped Chickadee (*Poecile atricapillus*), Blue Jay (*Cyanocitta cristata*) and American Goldfinch (*Carduelis tristis*). The forest habitat adjacent to the alvar contained American Crow (*Corvus brachyrhynchos*). Turkey Vulture (*Cathartes aura*) and Herring Gull (*Larus argentatus*), were observed flying over the south quadrants of the interchange. A Double-crested Cormorant (*Phalacrocorax auritus*) was found in the stormwater management pond in the southeast quadrant and several individuals of this species were seen in a tree next to Collins Creek north of Highway 401. Wood Ducks (*Aix sponsa*) were seen in Collins Creek and in the Ducks Unlimited created wetland. The lake also contained a Great Egret (*Ardea alba*), a species considered an imperiled breeder in the province. Its status is a result of its recent expansion into Ontario, rather than significant losses of breeding colonies (NatureServe 2013). South of the bridge was a Great Blue Heron (*Ardea herodias*) and Canada Geese (*Branta canadensis*). A Barn Swallow (*Hirundo rustica*) nest that was active in 2013 was found attached to the underside of the eastbound Highway 401 bridge over Collins Creek. A large nest of sticks, possibly belonging to a raptor, was observed in a tree adjacent to the marsh not far from this bridge.

#### 3.1.3.2 Herpetofauna

Expansive wetlands like the Collins Creek Complex Provincially Significant Wetland (PSW) typically support a large number of herpetofauna. Turtles inhabiting the PSW may be attracted to the highway shoulders by the Collins Creek Bridge in their search for nesting habitat. There is little open water elsewhere in the study area for supporting turtles. Although there is a stormwater management pond in the southeast quadrant, access is blocked by a chain-link fence. An area of meadow marsh in the northeast quadrant may support a large number of frogs. Crevices in the alvar bedrock and roadside rock outcrops may provide habitat for snakes. The only herpetofauna seen was an Eastern Garter Snake (*Thamnophis sirtalis sirtalis*) in the southeast quadrant next to the highway embankment not far from the stormwater management pond.

#### 3.1.3.3 Mammals

An Eastern Chipmunk (*Tamias striatus*) was observed in the southeast quadrant by Highway 38 and there were several dead Northern Raccoons (*Procyon lotor*) on the Highway 401 shoulder in the northwest quadrant.

### 3.1.4 SPECIES OF CONSERVATION CONCERN

MNRF Peterborough District reported that the following Species at Risk (SAR) may occur within 1 km of the study area: Black Tern (*Chlidonias niger*), Henslow's Sparrow (*Ammodramus henslowii*) and Snapping Turtle (*Chelydra serpentina*). Barn Swallow (*Hirundo rustica*), Bobolink (*Dolichonyx oryzivorus*), Eastern Meadowlark (*Sturnella magna*), and Northern Bobwhite (*Colinus virginianus*) may occur within 5 km of the study area.

Henslow's Sparrow and Northern Bobwhite are historical records from 1951 and 1856, respectively, and are assumed not to be present. The Wetland Summary Report for the Collins Creek Wetland Complex identifies the presence of the SAR Least Bittern (*Ixobrychus exilis*), Black Tern and the provincially rare Black-crowned Night Heron (*Nycticorax nycticorax*) in the wetland. The NHIC database search of within about 1 km of the study area revealed records for Black Tern and for Northern Bobwhite (NHIC 2013). Northern Map Turtle (*Graptemys geographica*) was reported for the Collins Creek Wetland Complex in the PDR for the expansion of the Highway 401.

A Barn Swallow nest identified under one of the Collins Creek Bridges demonstrates that this species is breeding in the study area. No evidence was found during the survey of other species of conservation concern.

A summary of the species of conservation concern and study area observations is provided in **Table 3-2**.

**Table 3-2: Species of Conservation Concern and Study Area Observations**

Species	General Habitat Description and Study Area Observations
Barn Swallow ( <i>Hirundo rustica</i> )  MNRF Status: Threatened SARA Status: N/A	<p>Breeding habitat usually contains open areas (fields, meadows) for foraging, nest site that includes a vertical or horizontal substrate (often enclosed) underneath some type of roof or ceiling, and a body of water that provides mud for nest-building.</p> <p>The marsh and meadows near watercourses in the study area provide food and nest-building material for this species. Nests are present under the south Collins Creek bridge.</p>
Black Tern ( <i>Chelidonias niger</i> )  MNRF Status: Special Concern SARA Status: N/A	<p>Preferred habitat includes wetlands, coastal or inland marshes; large cattail marshes, marshy edges of rivers, lakes or ponds, wet open fens, and wet meadows. Returns to the same area to nest each year in loose colonies on floating nests. Must have shallow (0.5 to 1 m deep) water and areas of open water near nests. Requires marshes &gt;20 ha in size. Reeds over adjacent grasslands for insects; also feeds on fish, crayfish and frogs.</p> <p>This habitat is present in the Collins Creek Complex PSW and it may support Black Tern. Black Tern could forage in the Ducks Unlimited created wetland. None were observed during field investigations</p>
Bobolink ( <i>Dolichonyx oryzivorus</i> )  MNRF Status: Threatened SARA Status: N/A	<p>Preferred habitat includes grassland, hayfields, and lightly grazed pasture, and has adapted to nesting in winter wheat fields. Favours fields with a high percentage of grass cover and moderate percent of forb cover and is not attracted to fields with woody vegetation. This species does not nest in woodland or shrubby thicket. Ideal habitat size varies widely and is likely affected by available habitat in a region. Individual territory size can range from 0.45-2.0 ha and may vary widely in different regions. Populations may require approximately 10-30 ha. Breeds in open grasslands, old fields, lightly-moderately grazed pastures, no-till cropland, hayfields, small grain fields, wet meadows and planted cover. In migration and in winter, uses freshwater marshes, grasslands, rice and sorghum fields. Nests are built on the ground in dense grasses.</p> <p>The largest meadow in the study area (about 5 ha) located north of Highway 401 and east of the forest bordering Collins Creek may support this species. None were observed during field investigations.</p>
Eastern Meadowlark ( <i>Sturnella magna</i> )  MNRF Status: Threatened SARA Status: N/A	<p>Preferred habitat includes grassland, including native prairies and savannahs, as well as non-native pastures, hayfields, weedy meadows, herbaceous fencerows, young orchards, golf courses, grassy roadside verges, young oak plantations, grain fields and grassy airfields with elevated singing perches. The minimum area required is estimated at 5 ha.</p> <p>May be able to inhabit the large meadow area north of Highway 401 and east of the forest bordering Collins Creek. None were observed during</p>

	field investigations
<p>Henslow's Sparrow  <i>(Ammodramus henslowii)</i></p> <p>MNRF Status: Endangered                  SARA Status: Endangered</p>	<p>Preferred habitat includes open fields with tall grasses that are interspersed with tall herbaceous flowering plants, or shrubby species, but not those that are grazed or burned. It prefers undisturbed areas with dense living grasses and a dense thatch of dead grasses. The species may occupy hayfields, but if the hay is cut early, the nests are destroyed and the resulting losses are severe. Only areas that remain undisturbed for several years appear to be more successfully colonized. Henslow's sparrow is an area-sensitive species that requires more than 30 ha of grassland and preferably more than 100 ha.</p> <p>The meadows in the Study Area are too small to support this species. None were observed during field investigations.</p>
<p>Least Bittern (<i>Ixobrychus exilis</i>)</p> <p>MNRF Status: Threatened                  SARA Status: Threatened</p>	<p>Preferred habitat includes a variety of wetland habitats but strongly prefers cattail marshes with a mix of open pools and channels. Nests are built above the marsh water on strands of dense vegetation.</p> <p>There is no suitable habitat in the Study Area. None were observed during field investigations.</p>
<p>Northern Bobwhite (<i>Colinus virginianus</i>)</p> <p>MNRF Status: Endangered                  SARA Status: Endangered</p>	<p>Northern Bobwhite requires early successional habitat consisting of grassland interspersed with cropland and brushy cover. The brush must be dense and in close proximity to the grassland and cropland to provide this species with effective escape from predators. Cropland is the Northern Bobwhite's main food source.</p> <p>This combination of habitat features does not occur in the Study Area. None were observed during field investigations.</p>
<p>Black-crowned Night Heron (<i>Nycticorax nycticorax</i>)</p> <p>MNRF Status: N/A                  SARA Status: N/A</p>	<p>This species inhabits marshes, swamps, wooded streams and the shores of lakes and ponds. It roosts by day in swampy woodland and usually nests with other heron species.</p> <p>Black-crowned Night Heron may feed in the area of Collins Creek and the Ducks Unlimited created wetland. None were observed during field investigations.</p>
<p>Northern Map Turtle (<i>Graptemys geographica</i>)</p> <p>MNRF Status: Special Concern                  SARA Status: N/A</p>	<p>Inhabits rivers and lakes where it basks on emergent rocks, banks, logs and fallen trees. It prefers shallow soft-bottomed aquatic habitats with exposed objects for basking near natural shorelines. Hibernates in winter at bottom of deep, slow-moving sections of rivers or lakes.</p> <p>Northern map turtle may be found in both Collins Creek and the Ducks Unlimited created wetland during summer and for overwintering. None were observed during field investigations.</p>
<p>Snapping Turtle (<i>Chelydra serpentina</i>)</p> <p>MNRF Status: Special Concern                  SARA Status: Special Concern</p>	<p>Preferred habitat includes permanent and semi-permanent fresh water; marshes, swamps or bogs, and rivers and streams with soft muddy banks or bottoms. Often uses soft soil or clean dry sand on south-facing slopes for nest sites. May nest at some distance from water. Often hibernate together in groups in mud under water. Home range size ~28 ha in area. Species is usually found in large bodies of water and sometimes in small ponds as well.</p> <p>Snapping Turtles inhabiting Collins Creek Complex PSW may seek out the gravel shoulders of Highway 401 for nesting. None were observed during field investigations.</p>



<p>Brainerd's Hawthorn (<i>Crataegus brainerdii</i>)</p> <p>MNRF Status: N/A SARA Status: N/A</p>	<p>Hawthorn species occur in disturbed sites and seral communities such as pastures, forest edges, open second growth forests, and thickets along streams.</p> <p>Suitable habitat exists throughout the study area. None were observed during field investigations.</p>
<p>Carolina Whitlow-grass (<i>Draba reptans</i>)</p> <p>MNRF Status: N/A SARA Status: N/A</p>	<p>Found in dry sandy open areas and alvar pavements.</p> <p>Potentially suitable habitat exists within areas of the ROW and cultural meadow habitats as well as the ALS1-1 (alvar) community. None were observed during field investigations.</p>
<p>Stiff Gentian (<i>Gentianella quinquefolia</i>)</p> <p>MNRF Status: N/A SARA Status: N/A</p>	<p>Found in woods and moist or wet open places.</p> <p>Suitable habitat exists throughout the study area. None were observed during field investigations.</p>
<p>Bowman's-root (<i>Porteranthus trifoliatius</i>)</p> <p>MNRF Status: N/A SARA Status: N/A</p>	<p>Found in open sandy woods and edges.</p> <p>Sandy woods are generally not present in the study area. Woodland edge areas within the ROW have shallow soils that may have a sand component and suitable habitat would be limited to these areas. None were observed during field investigations.</p>
<p>Smith's Bulrush (<i>Schoenoplectus smithii</i>)</p> <p>MNRF Status: N/A SARA Status: N/A</p>	<p>Found in moist sandy or muddy shorelines.</p> <p>Suitable wetland habitat limited to Collins Creek Complex and the SWM ponds. None were observed during field investigations.</p>
<p>Branching Burreed (<i>Sparganium androcladum</i>)</p> <p>MNRF Status: N/A SARA Status: N/A</p>	<p>Found in muddy shores and shallow water.</p> <p>Suitable wetland habitat limited to Collins Creek Complex and the SWM ponds. None were observed during field investigations.</p>

## 3.2 AQUATIC ENVIRONMENT

### 3.2.1 METHODOLOGY

Following a review of background information regarding the natural environment in the study corridor, site investigations were conducted in September 2013 to assess existing fish and fish habitat conditions. The site visit to the Highway 401 interchange at Kingston Road 38 was conducted on September 12 and September 13. Weather conditions were rainy and overcast. A follow-up spring field visit was completed on June 23, 2014 to confirm and add to findings.

The fisheries investigation was carried out in accordance with the MTO/DFO/MNRF *Protocol for Protecting Fish and Fish Habitat on Provincial Transportation Undertakings – Version 2* (The Protocol). As the proposed rehabilitation project is not expected to encroach upon the existing aquatic habitat, fish community investigations were not undertaken at either site.

The full Fish and Fish Habitat Impact Assessment Report is available in **Appendix E**.

### 3.2.2 FISH AND FISH HABITAT

Within the study area, one major watercourse, Collins Creek (WC-1), and two branches of one of its tributaries (WC-2 and WC-3) were identified. The watercourses are illustrated in **Figure 3-3**. Collins Creek



is considered by MNRF to provide warmwater, permanent fish habitat that supports a variety of fish species, including Northern Pike (*Esox lucius*). The Collins Creek tributary is also considered to provide warmwater habitat by MNRF, however no fish community records were provided.

Collins Creek flows permanently from north to south under Highway 401 through two single-span concrete bridges (eastbound and westbound lanes), approximately 725 m west of Kingston Road 38. The watercourse originates as outflow from Collins Lake, approximately 11 km upstream of Highway 401, and ultimately discharges to Lake Ontario approximately 10 km downstream. MNRF background information indicated records of baitfish, panfish and game fish species within Collins Creek. Background fish community data information is included in **Table 3-3**.

**Table 3-3: Fish Community Data for Collins Creek**

Common Name	Scientific Name
Banded Killifish*	<i>Fundulus diaphanus</i>
Black Crappie^	<i>Pomoxis nigromaculatus</i>
Bluegill^	<i>Lepomis macrochirus</i>
Bluntnose Minnow*	<i>Pimephales Notatus</i>
Brown Bullhead*	<i>Ameiurus nebulosus</i>
Central Mudminnow*^	<i>Umbra limi</i>
Common Carp*^	<i>Cyprinus carpio</i>
Golden Shiner*	<i>Notemigonus crysoleucas</i>
Green Sunfish^	<i>Lepomis cyanellus</i>
Pumpkinseed*^	<i>Lepomis gibbosus</i>
Northern Pike*^	<i>Esox lucius</i>
Rock Bass*	<i>Ambloplites rupestris</i>
Stonecat^	<i>Noturus flavus</i>
White Sucker^	<i>Catostomus commersoni</i>
Yellow Bullhead^	<i>Ictalurus natalis</i>
Yellow Perch*^	<i>Perca flavescens</i>

\*MNRF, 2013; ^PDR for Highway 401 widening (2001)

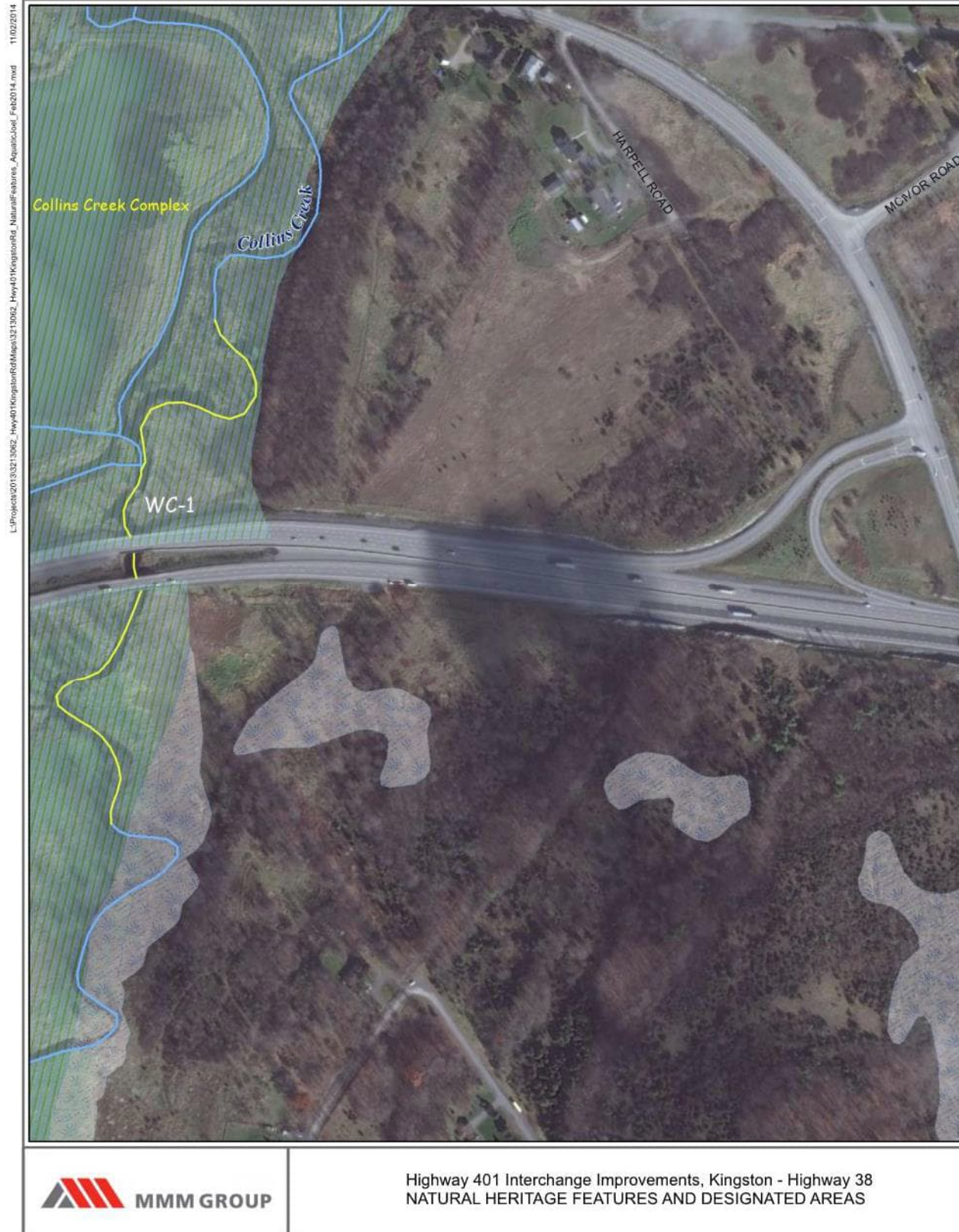


Figure 3-2: Watercourse

At Collins Creek, fish community sampling was undertaken using minnow traps; however no fish were captured. The broad channel, low velocity, and aquatic vegetation in the assessed reach appears to be well suited for general life functions (i.e. forage, spawning, cover) of the fish community reported from this watercourse, which generally prefer slow flows and a wide variety of vegetated habitats (Becker, 1983; Eakins, 2013; Holm et al., 2009; Scott and Crossman, 1998). Although no specialized spawning habitat was identified in Collins Creek by the MNR, evidence of suitable conditions to support Northern Pike spawning (i.e. seasonally flooded emergent vegetation) was observed throughout the watercourse and riparian wetland. However, use of this habitat for spawning could not be confirmed during the 2013 fall field investigations.

Approximately 150 m downstream of the highway there is a beaver dam that likely adversely affects the movement of fish within the downstream reach during periods of low flow. No other barriers to fish movement were observed.

The unnamed Collins Creek tributary within the study area includes a west branch (WC-2) and an east branch (WC-3). The west branch originates immediately north of Highway 401, approximately 200 m east of Kingston Road 38 and likely has permanent flow. Water depth is shallow and there is limited habitat diversity. No fish were observed or captured. The west branch of the tributary likely functions as indirect fish habitat. There are two naturally occurring gradient drops (0.4 m and 0.2 m high) within the assessed reach, which may function as barriers to the upstream movement of fish.

The east branch of the Collins Creek tributary originates immediately south of the highway, approximately 550 m east of Kingston Road 38, as a spring discharging from bedrock. Flow appears to be permanent. Fish community sampling was not undertaken due to lack of flow and shallow depth. No fish were observed. Based on the limited habitat diversity and shallow water depth, the east branch of the tributary is likely indirect fish habitat.

A summary of the three watercourses is provided in **Table 3-4**.

**Table 3-4: Existing Fish Habitat Summary**

Waterbody	Flow	Thermal Regime	Substrate Type	Vegetation	Supports a Fishery
Collins Creek (WC-1)	Permanent	Warm water	Muck	<i>Riparian:</i> Grass, cattail, sedges, goldenrod, willow, ash, nanny berry  <i>In-stream:</i> Milfoil, Canada waterweed, pondweed, duckweed, rushes, bur reed, grass	Direct
West Branch of Tributary (WC-2)	Permanent	Warm water	Bedrock – 40% Gravel – 30% Cobble – 20% Sand – 10%	<i>Riparian:</i> Grass, cattail, sedges, goldenrod, dogwood, buckthorn  <i>In-stream:</i> Cattail	Indirect
East Branch of Tributary (WC-3)	Permanent	Warm water	Muck – 80% Gravel – 10% Sand – 10%	<i>Riparian:</i> Grass, cattail, sedges, goldenrod  <i>In-stream:</i> Grass, cattail, sedges	Indirect

### 3.3 LAND USE

#### 3.3.1 METHODOLOGY

Existing land uses and social/economic conditions in the vicinity of the project limits were determined through the review of existing reports, land use planning documents, Google Satellite imagery and Google Streetview images. Background information was drawn from the following documents:

- City of Kingston Official Plan;
- City of Kingston Transportation Master Plan;
- Township of Kingston Zoning By-law 76-26;
- Google Streetview (2012); and
- Google Satellite Imagery.

The Land Use Factors report is available in **Appendix F**.

#### 3.3.2 LAND USE EXISTING CONDITIONS

The existing land uses within the study area are primarily open space, rural residential and industrial.

The study area is located outside of the urban boundary, within lands that have been designated Rural Area in Schedules 3-A and 3-B of the City of Kingston Official Plan.

Rural Area designations are intended to protect the rural community by balancing the environmental, resource protection, community and economic objectives of land use, and to protect land suitable for agricultural production from scattered development and land uses which are unrelated to agriculture. Generally, designated Rural Areas have Class 5, 6, and 7 soils. Limited non-farm growth is permitted in the Rural Area if it does not limit or interfere with agricultural use, agriculture-related uses or a broader range of rural uses.

Lands in the southeast quadrant of the interchange have a Business Park Industrial designation, applied to areas of employment intended to provide prominent locations for industry and industrial-support uses in architecturally-treated and finished buildings with a high-quality landscaped setting. This designation applies to the lands that are part of the existing Cataraqui Industrial Estates business park.

The Deferred Area in the southwest quadrant of the interchange indicates that these lands are designated to accommodate long-term growth and development. This is one of three Deferred Areas within the City of Kingston. Deferred Areas generally do not have full municipal services. Growth and development are to be limited until the lands are needed and are contingent on the completion of specific studies stipulated in the Official Plan (e.g., Secondary Plan, Master Servicing Plan). Development of Deferred Areas is not expected until after 2026; however, the timing of development will be reviewed every five years through the Official Plan Review process.

##### 3.3.2.1 Zoning

Within the study area the following zoning currently exists:

<b>Northeast Quadrant</b>	<b>Northwest Quadrant</b>	<b>Southeast Quadrant</b>	<b>Southwest Quadrant</b>
<ul style="list-style-type: none"> <li>• R1-Residential Type 1</li> <li>• EPA-Environmental Protection</li> </ul>	<ul style="list-style-type: none"> <li>• R1-Residential Type 1</li> <li>• A1-Restricted Agricultural</li> </ul>	<ul style="list-style-type: none"> <li>• BP-1-Business Park</li> </ul>	<ul style="list-style-type: none"> <li>• D-Development</li> </ul>



R1-Residential Type 1 Zoning generally permits only single-family dwellings, home occupations, and some public uses. The D-Development Zone applies to the Deferred Area identified in the Official Plan, and permits only existing dwellings and accessory dwellings. The areas zoned BP-1 - Business Park permits data processing, business offices, professional offices, hotels, laboratories, research and development, financial institutions, and public uses. Development is highly limited in the EPA-Environmental Protection zone, which applies to Collins Creek and associated wetlands.

### 3.4 ARCHAEOLOGY

#### 3.4.1 METHODOLOGY

Stage 1 and 2 Archaeological Assessments of the study area surrounding the Highway 401 and Kingston Road 38 interchange were conducted with the purpose of:

- Providing information about the study area's geography, history, previous archaeological fieldwork and current land condition;
- Evaluating in detail the study area's archaeological potential;
- Documenting archaeological resources in the study area; and
- Determining whether the study area contains archaeological resources requiring further assessment.

The Stage 1 visual assessment was conducted on August 13, 2013 under warm and mostly sunny conditions. The entire area was visually assessed on foot and photo documented. The Stage 2 investigations were conducted the week of August 13 – 18, 2015.

#### 3.4.2 ARCHAEOLOGICAL EXISTING CONDITIONS

A Stage 1 Archaeological Assessment of the study area was completed in 2013. The assessment found that the study corridor is located in close proximity to historic roads and railways, an historic town, and the Orser House, a property with cultural heritage value. Collins Creek is located within 300 m of the study corridor to the west. Given that the study corridor is in close proximity to historic roads and railways, historic waterways, an historic town, and the Orser House, there is a high possibility of locating some historic material in undisturbed areas.

Based on the findings of the Stage 1 Archaeological Assessment, the current Highway 401 and Kingston Road 38 corridor is free of archaeological concern and requires no further archaeological assessment.

Stage 2 archaeological investigations were undertaken in undisturbed areas of archaeological potential that are anticipated to be impacted during construction. Testing consisted of the excavation of test pits on a 5 m grid, with each test pit measuring approximately 30 cm by 30 cm. All soils were screened through millimeter hardware cloth. Areas that are steeply sloping, rocky or contain exposed limestone bedrock which are unsuitable for past human settlement were omitted from the assessment (approximately 5% of the area assessed).

No artefacts were recovered from the study area during the Stage 2 assessment.

### 3.5 CULTURAL HERITAGE

#### 3.5.1 METHODOLOGY

A Heritage Impact Statement (HIS) (**Appendix G**) was prepared for the Orser House, a historic property located in the northeast quadrant of the Highway 401 / Kingston Road 38 interchange. The HIS was prepared to assess the cultural heritage value of the home and to identify potential impacts and mitigation measures. Archival materials, census data, historic maps, other reference documents, and City of

Kingston heritage staff were consulted to research the history of the property and surrounding area. A site visit was conducted in April 2014 to examine the property.

### 3.5.2 CULTURAL HERITAGE EXISTING CONDITIONS

The Orser House property was deemed to have cultural heritage value by the City of Kingston in 1992. It comprises a former farm complex that was developed for agricultural use in the late 1700s, although most of the land historically associated with the property has been severed. The principal built heritage resource is a one-and-a-half storey stone residence, the former farmhouse, which is known as the Orser House.

The Heritage Impact Statement concluded that the property is of cultural heritage value or interest due to its design or physical value, its historical or associative value and its contextual value.

The former farmhouse is considered to be a very good example of rural residence built in the mid-1800s and executed in stone. It displays design elements inspired by the Classical Revival style of architecture. The building also retains important aspects of its interior layout. The building remains in active use as a private residence and has been well maintained. An extensive renovation in the mid-1980s resulted in modifications to the building; however, the original built form is clearly discernible.

The property is associated with the settlement history of Kingston Township and the Orser family, United Empire Loyalists from New York State. They were one of the first families to settle in the central part of Kingston Township. The original log house on the property was replaced with a stone residence, possibly shortly before the Orsers sold the property in 1849. Subsequently it had a series of owners including Bairstowe (1852-1872), Trudell (1872-1919), Knight (1919-1945) and Corcoran (1945-1985).

Throughout this time the farm complex, comprised of Part Lots 11 and 12, Concession 4, remained in agricultural use. The residence is physically and historically linked to its surroundings; however, contextually it has suffered from the loss of its associated agricultural buildings and fields. The surrounding lands remain primarily rural in character and the former farmhouse remains an important element in the landscape.

## 3.6 TRANSPORTATION NETWORK

The Highway 401 and Kingston Road 38 Interchange (Interchange 611) provides a vital connection between the City of Kingston and the surrounding provincial highway network. The interchange is located in the northwest part of Kingston and provides an arterial connection into the city. Kingston Road 38, formerly County Road 38 and Highway 38, is known as Gardiners Road south of Highway 401. Within Kingston, Gardiners Road connects with Kingston Roads 2 and 33, providing connections to the east and west of the City of Kingston.

### 3.6.1 EXISTING INTERCHANGE GEOMETRY

The Kingston Road 38 Interchange is a 'Parclo B2' design with signalized ramp terminals. Kingston Road 38 has 4 lanes at the interchange, with one through and one through-left lane in each direction. A carpool lot is located opposite the south ramp terminal.

**Figure 3-3** illustrates the key deficiencies found at the interchange. They include:

- A Parclo B2 configuration that requires traffic travelling northbound on Kingston Road 38 to turn left to enter westbound Highway 401. Traffic travelling south on Kingston Road 38 must turn left to enter eastbound Highway 401.
- Traffic exiting the highway must negotiate small-radius loop ramps. This is not a desirable configuration, particularly as there is significant truck traffic at this interchange.



- The Highway 401 westbound off-ramp has the highest collision rate of all four ramps (1.83 collisions per million vehicles).
- At the south ramp terminal, the southbound Kingston Road 38 left turn onto the eastbound Highway 401 on-ramp employs a relatively short 'slip ramp' which merges with the northbound Kingston Road 38 to eastbound Highway 401 direct ramp.

### 3.6.2 PREVIOUS INTERCHANGE IMPROVEMENTS

Previous improvements to the interchange occurred at the time of widening of Highway 401, wherein the speed change lanes were lengthened and sections of the ramps widened to better conform to current standards. Following the widening of Highway 401, the eastbound on-ramp also was lengthened and its radii increased to better conform to design standards and to provide a longer merging length for vehicles.

### 3.6.3 EXISTING TRAFFIC OPERATIONS

A traffic analysis was undertaken for the interchange and the results are detailed in the Traffic Operations Report, included as **Appendix H**. Existing year (2013) traffic volumes were used for the intersection capacity and micro-simulation analysis, and the assessment was undertaken utilizing Synchro 8 and VISSIM software. The operational analysis was conducted considering current intersection configurations and the traffic signal control timing plans for morning and afternoon peak periods. Synchro was used to estimate the volume to capacity (v/c) ratio for individual intersection movements. VISSIM (micro-simulation software) was used to analyze existing vehicle delay, queue length (95th percentile) and the resulting Level of Service (LOS). The LOS is used as a measurement of overall performance at an intersection / interchange. The breakdown of LOS is as follows:

- LOS A = Light Traffic / Free Flow Speeds
- LOS B = Slightly Increased traffic levels / Still free flow speeds
- LOS C = Approaching moderate congestion levels / Speeds near free flow
- LOS D = Speeds Reduced / Lane changes restricted due to traffic
- LOS E = Congestion / Irregular traffic flow
- LOS F = Road at capacity / Gridlock with frequent stops

#### 3.6.3.1 Highway 401 Traffic Operation Analysis

Highway 401 LOS analysis was undertaken using the methodology outlined in the *Geometric Design Standards for Ontario Highways* for assessing freeway operations. It was concluded that:

- The Annual Average Daily Traffic (AADT) through the study corridor has been growing at about 2% per annum.
- Highway 401, between Wilton Road and Sydenham Road, is currently operating at LOS 'C' or better based on the morning and afternoon peak hour and design hour volumes.
- Mainline traffic is operating without any significant speed drops during morning or afternoon peak periods.

#### 3.6.3.2 Kingston Road 38 at Mclvor Road Intersection

The Kingston Road 38 and Mclvor Road signalized intersection operates with an overall LOS 'A' during both morning and afternoon peak periods, with each turning movement operating with a LOS 'C' or better. The 95<sup>th</sup> percentile queues on the Kingston Road 38 and Mclvor Road approaches extend to a maximum of 50 m (approx. 7 vehicles) and 30 m (approx. 4 vehicles) in length, respectively.



Figure 3-3: Existing Kingston Road 38 Interchange Deficiencies

### **3.6.3.3 Kingston Road 38, North Ramp Terminal**

The north ramp terminal (i.e., the Highway 401 westbound on- and off-ramp terminal) operates with an overall LOS 'B' and 'D' during morning and afternoon peak hours, respectively. The northbound left-turn movement has no dedicated lane, and this movement operates at LOS 'E / F' during the afternoon peak hour. The 95th percentile queue length for the northbound approach is approximately 225 m (approx. 32 vehicles). The eastbound approach operates at LOS 'D' and has 95th percentile queue lengths of up to 250 m (approximately 35 vehicles) in the afternoon peak hour. On the westbound off-ramp, the right-turn traffic volume during the afternoon peak hour is relatively high, at approximately 770 vehicles per hour, and queues on the ramp occasionally back-up onto Highway 401. The high traffic volume for the right turn and the high volume for the northbound Kingston Road 38 left-turn movement (approximately 400 vehicles per hour) results in a poor LOS. Additional capacity (e.g. an additional lane / dedicated ramp/double left-turn lanes etc.) would be required at the terminal to accommodate future demand.

### **3.6.3.4 Kingston Road 38, South Ramp Terminal**

The south ramp terminal (i.e., Highway 401 eastbound on- and off-ramp terminal) is a signalized intersection and operates with an overall LOS 'B' during morning and afternoon peak periods. The simulated 95th percentile queue length on the Highway 401 eastbound off-ramp does not exceed more than 75 m (approximately 11 vehicles). The Kingston Road 38 north- and southbound 95th percentile queues extend to 150 m (approximately 21 vehicles) in length with maximum queues to 200 m (approximately 29 vehicles). There are several movements operating at LOS 'D' which indicates that this intersection does not have significant capacity to accommodate future growth in traffic demand.

### **3.6.3.5 Kingston 38, Creekford Road / Centennial Drive Intersection**

The Kingston Road 38 and Creekford Road / Centennial Drive intersection operates with an overall LOS 'B' during morning and afternoon peak periods, with each turning movement operating with LOS 'D' or better. The 95th percentile simulated queue lengths on the Kingston Road 38 approaches to the intersection extend to 120 m (approximately 17 vehicles), and the side street queue lengths extend to 40 m (approximately 6 vehicles). The simulated queue lengths for this interchange have been substantiated by the field investigations.

### **3.6.3.6 Traffic Operations Summary**

In summary, the interchange suffers extensive queuing on the Kingston Road 38 underpass during the afternoon peak period. This is due to the combination of high traffic volumes and the geometric constraints of the interchange; the situation is exacerbated by the lack of dedicated left-turn lanes on Kingston Road 38 at the ramp terminals, effectively reducing the through-movement capacity.

Left-turn movements onto the Highway 401 on-ramps tend to require an inordinate allocation of green time, creating queuing problems for vehicles on the Highway 401 off-ramps. The small storage capacity on the westbound off-ramp can result in queuing backing up towards Highway 401. The high percentage of truck usage also places additional pressure on the interchange. This is particularly an issue at the south ramp terminal where eastbound trucks travelling in to Kingston must turn left at the signal.

### **3.6.3.7 Collision Analysis**

The 5-year average motor-vehicle collision rate (collisions per million vehicle km travelled) for Highway 401 in the study area is 0.42 (based on 2006-2010 data), which is lower than the provincial average collision rate for those years. During that time period, 48% of the total collisions on Highway 401 occurred on dry pavement and the remaining 52% of collisions occurred due to other (ice, snow, slush, wet) pavement conditions.

The collision data analysis for the Kingston Road 38 interchange ramps indicates that both off-ramps have relatively high collision rates compared to other ramps at this interchange. Collision analysis is further detailed in the Traffic Operations Report, included in **Appendix H**.



### 3.6.4 LOCAL ROADS

Kingston Road 38 intersects with roads to the north and south of the interchange that run parallel to Highway 401. The Kingston Road 38 and Mclvor Road intersection is located approximately 180 m north of the north ramp terminal, and the Kingston Road 38 and Centennial Drive / Creekford Road intersection is located approximately 200 m south of the south ramp terminal. While the design standards state that the distance between the interchange and service roads depends on the traffic characteristics and design of the crossing, both intersections are located closer than the recommended spacing of 365 m.

### 3.6.5 KINGSTON ROAD 38 UNDERPASS

Originally constructed in 1960, the existing Kingston Road 38 / Highway 401 underpass is a four-span (14.6 m, 21.4 m, 21.4 m, 14.6 m) variable depth reinforced concrete T-beam bridge founded on a combination of spread footings (on rock) at the piers and short piles at the abutments. The structure has been rehabilitated several times, most recently in 2005 wherein it was converted to a semi-integral structure. The rehabilitation included substructure repairs, new parapet walls and concrete overlay on the deck, which provided a slight widening in the deck travel width. This allowed for four 3.75 m lanes and 1.105 m shoulders. Highway 401 was recently widened to six lanes (including two speed-change lanes) which are accommodated within the interior spans of the structure, in addition to the westbound and eastbound off-ramp speed change lanes. While the six lanes and two speed change lanes are accommodated under the bridge, the median and shoulder widths are narrower than recommended. The outer shoulders have widths of 1.83 m (the desirable width is 2.5 m) and the inside shoulders have widths of 1.5 m (the desirable being 3.35 m). **Figure 3-4** details the cross-sections of Kingston Road 38 and Highway 401 at the underpass.

### 3.6.6 CARPOOL LOT

A carpool lot is located on the west side of Kingston Road 38, south of Highway 401 and opposite the Highway 401 eastbound ramp terminal. The carpool lot has two driveways and consists of one row of 71 parking bays. The aisle and row of parking are parallel to Kingston Road 38, with the aisle separated from the roadway by wooden posts, except at the driveways. The lot is illuminated and has one Bell phone booth.

### 3.6.7 HIGHWAY 401 COLLINS CREEK BRIDGES

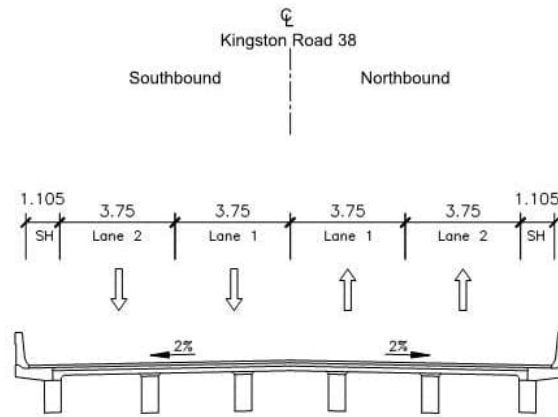
The west- and eastbound lanes of Highway 401 are accommodated by two separate bridges across Collins Creek, located approximately 400 m west of Kingston Road 38. The existing structures are concrete rigid frames with a 9.1 m clear span and are founded on piles. These structures were constructed in 1959 and have not been rehabilitated recently with the exception of patching of the deck, new waterproofing and paving, and new barrier walls, which were constructed in the 1980s.

## 3.7 ILLUMINATION

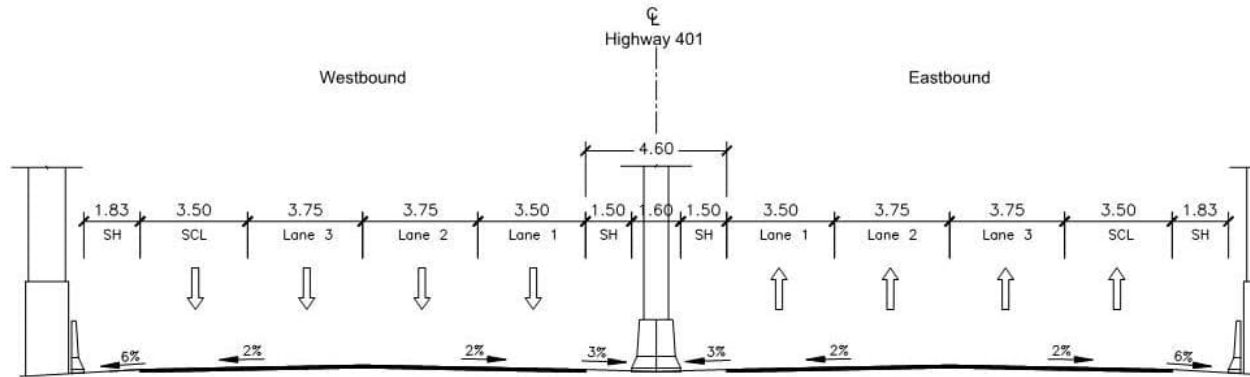
Currently, there is no full, continuous illumination on Highway 401 within the limits of the interchange. The exit ramps of the interchange (westbound off-ramp and eastbound off-ramp) have full continuous lighting whereas the entrance ramps (westbound on-ramp and the eastbound on-ramp) are not illuminated. There is also full, continuous lighting on Kingston Road 38. Both the interchange ramp and municipal lighting are conventional poles with High Pressure Sodium (HPS) luminaires.

## 3.8 EXISTING UTILITIES

**Figure 3-5** details the existing utility infrastructure within the area of the Kingston Road 38 interchange. The utilities include plant belonging to Hydro One and Bell. The Hydro One plant includes Hydro poles and lines of various voltages, traversing the study area in a north / south direction adjacent and parallel to Kingston Road 38. Bell plant within the study area includes Fibre Optic cabling for properties along Mclvor Road and Jackson Mills Road, and transmission lines both north and south of Highway 401.



Existing Kingston Road 38 Underpass



Existing Highway 401 at Kingston Road 38 Underpass

**Figure 3-4 Existing Kingston Road 38 and Highway 401 Cross-sections**

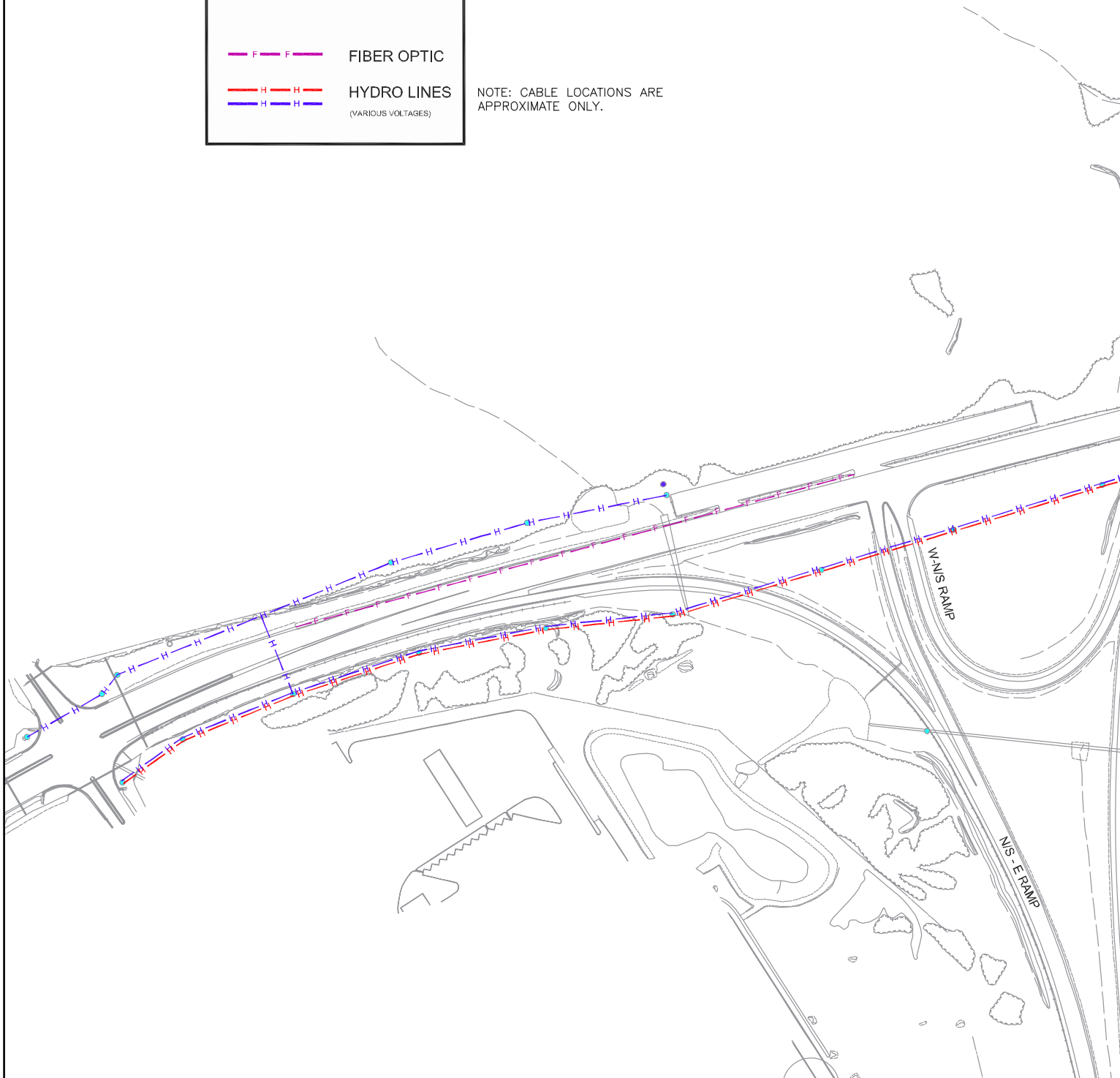
**LEGEND:**

- BELL - HYDRO
- HYDRO POLE
- POLE - OTHER

- F — F — FIBER OPTIC
- H — H — HYDRO LINES  
(VARIOUS VOLTAGES)

NOTE: CABLE LOCATIONS ARE APPROXIMATE ONLY.





### 3.9 EXISTING STORMWATER MANAGEMENT

The overall area is within the Napanee Limestone Plain and slopes southward toward Lake Ontario. The Napanee Limestone Plain is characterized by undulating plains or limestone bedrock, tills, and fine-grained silty and clayey soil. The area upstream of Highway 401 is drained by three (3) major water courses including: Collins Creek, Little Cataraqui Creek, and Cataraqui River. Highway 401 also crosses three (3) Provincially Significant Wetlands (PSWs) including: Lower Collins Creek Wetlands, Little Cataraqui Creek Wetlands, and the Cataraqui River Marsh. The Collins Creek crosses Highway 401 approximately 700 m west of the Kingston Road 38 Interchange.

According to the Ontario Soil Mapping, the predominant soil type in the study area is Farmington Loam. The predominant land use is a combination of woodland and meadows with some impervious areas.

**Figure 3-6** details the existing conditions drainage mosaics for the Kingston Road 38 interchange and surrounding area. The existing drainage and stormwater management systems consist of open ditches, swales, culverts, storm sewers, ditch inlets, and a Stormwater Management (SWM) facility is located on the south side of Highway 401, east of the Collins Creek Bridge.

Catchments 100 and 105 both drain in a northeast direction via a culvert on Jackson Mills Road to the south ditch of McIvor Road. This ditch drains to a tributary which ultimately joins with Collins Creek, north of Kingston Road 38.

Catchment 110, which includes a portion of existing eastbound inner-loop off-ramp, is conveyed to Catchment 115 through an existing ditch and further drains to Catchment 130 through Culvert C2. The flows drain to Catchment 135 through Culvert C3 and combine with the flows from Catchment 140, ultimately discharging to Collins Creek on the north side of the bridge. The minor system runoff from Catchments 120 and 125 are conveyed via storm sewers and discharged to Culvert C3. The major system flows drain overland to Collins Creek.

Flow from Catchment 140 is drained by Culvert C4, which has a concrete box section under Kingston Road 38 and was extended by a corrugated steel pipe (CSP), 600 mm diameter, under the eastbound on-ramp. Flow from Catchment 150 is conveyed through Culvert C5. The total flows from Catchments 145, 150, and 155 are conveyed through Culvert C6. With combined flows from Catchment 180, the total flow discharges to a tributary of Collins Creek.

Flow from Catchments 160, 165, 170, and 175 drains via a Highway 401 ditch on the south side which ultimately discharges to Collins Creek bypassing the existing SWM pond.

**Table 7** provides a summary of the characteristics of the existing six (6) culverts in the study area







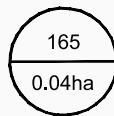
**Table 3-5: Summary of Existing Culvert Characteristics**

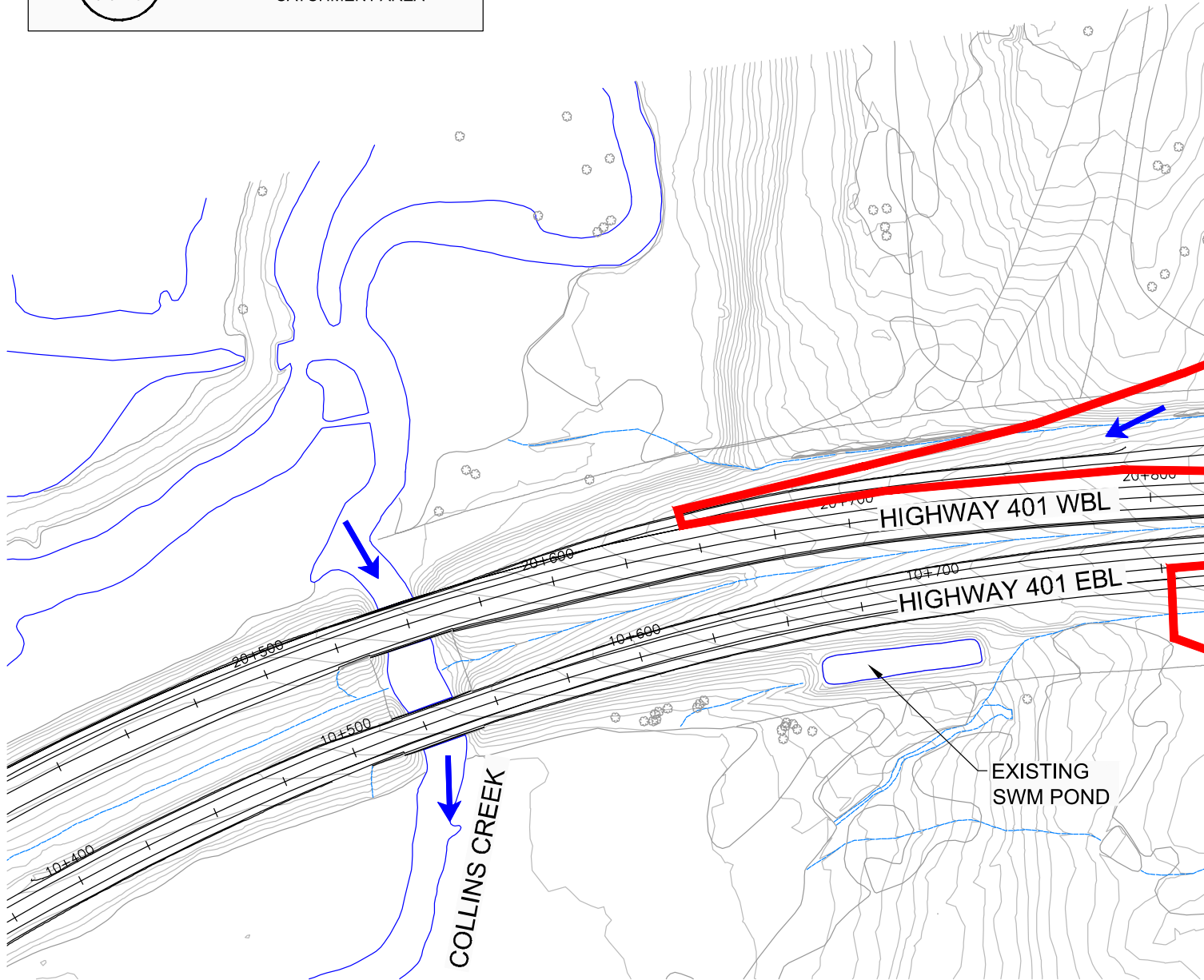
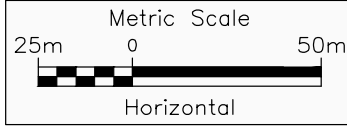
Culvert ID	Location	Station	Culvert Dimensions			Type	Material	Upstream Invert (m)
			Width (mm)	(Height (mm))	Length (m)			
C1	South of KR 38 and Mclvor Road Intersection	13+360	600 mm diameter		36.0	CSP	Corrugated Steel	105.80
C2	Under E-N/S Ramp	39+980	600 mm diameter		17.0	CSP	Corrugated Steel	107.00
C3	Under N/S-W Ramp	21+020	600 mm diameter		17.0	CSP	Corrugated Steel	101.70
C4	Under KR38 and N-E Ramp	80+120	914 mm x 914 mm Concrete Box with 600 mm CSP Extension		54	Box and Circular	Concrete and CSP	116.60
C5	Under N-E Ramp, North of C4	80+250	600 mm diameter		23.0	CSP	Corrugated Steel	114.55
C6	Under N/S-E Ramp, East of KR 38 (up to Catchment 155)	90+300	825 mm diameter,		120	Pipe	Concrete	112.30
	Under Highway 401, East of KR 38 ((From Catchment 155 to north of Highway 401)	21+490	1220	1220	79.0	Box	Concrete	110.74

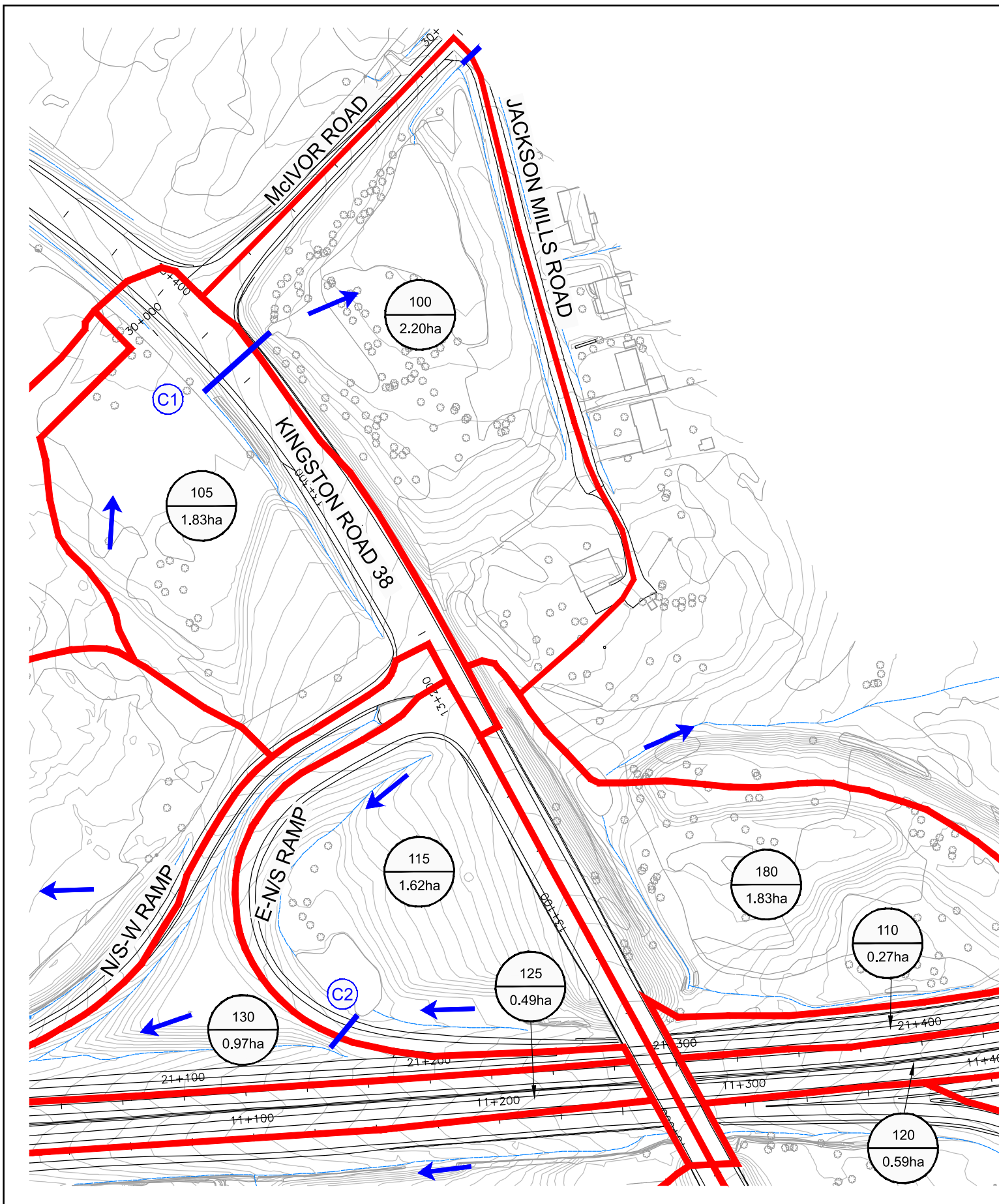
Note: CSP = corrugated steel pipe

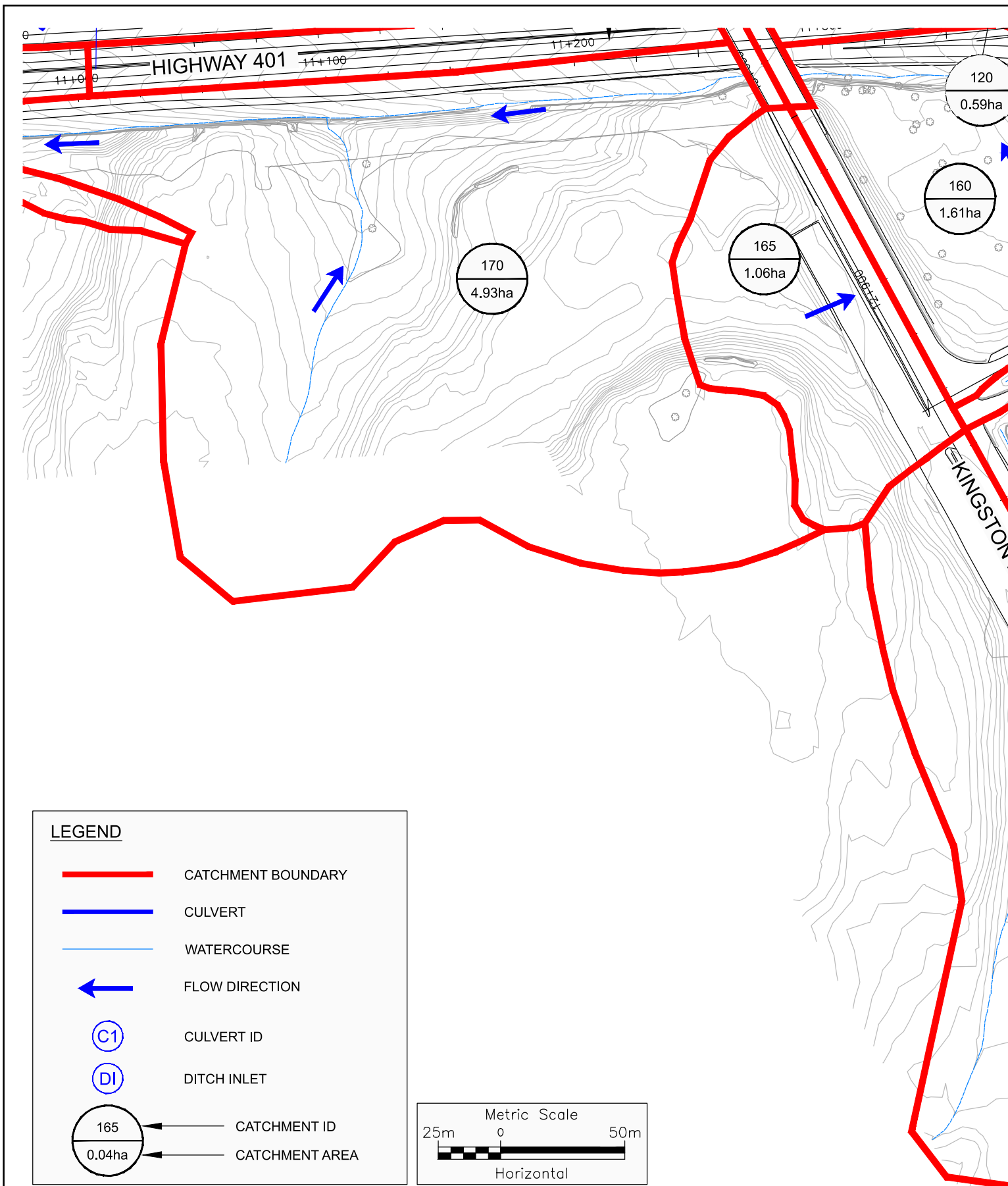
Culvert Inverts are estimated based on available information such as existing contract drawings, contour plans and

**LEGEND**

-  CATCHMENT BOUNDARY
-  CULVERT
-  WATERCOURSE
-  FLOW DIRECTION
-  CULVERT ID
-  DITCH INLET
-  CATCHMENT ID  
CATCHMENT AREA









## 4 PROJECT NEEDS ASSESSMENT & JUSTIFICATION

### 4.1 PROBLEM / OPPORTUNITY STATEMENTS

The Highway 401 interchange at Kingston Road 38 is one of seven interchanges along the Highway 401 corridor that provide access to the City of Kingston. The interchange was originally constructed in the 1960s, with minor modifications completed during the recent widening of Highway 401. These modifications do not address all the existing operational issues identified at the interchange, which include:

- High traffic volumes on Kingston Road 38 and associated delays and queuing during peak periods, exacerbated by a lack of dedicated left-turn lanes from Kingston Road 38 to Highway 401 on-ramps;
- Steadily increasing traffic volume on Highway 401 at the interchange;
- Limited storage capacity on Highway 401 off-ramps, resulting in queuing that can back up onto Highway 401 during peak periods; and
- Small-radius loop ramps that are less-than desirable.

Improvements are required to address the identified operational issues. Opportunities for improvements include:

- More efficient operation, with improved geometry, at the interchange;
- Improved ramp capacities;
- Reduced risk of traffic backing-up onto Highway 401;
- Reduced queues on Kingston Road 38; and
- Accommodation of future traffic growth due to planned development in the area.

### 4.2 ALTERNATIVES TO THE UNDERTAKING

The MTO Class EA process requires the consideration and evaluation of alternatives to the undertaking. Alternatives to the undertaking can be defined as all reasonable and feasible means of solving a stated problem or addressing a stated opportunity.

The following alternatives to the undertaking were considered:

- Do nothing
- Transportation demand management (TDM)
- New or improved provincial transportation facilities (Highway 401)
- New or improved municipal / private roads

The “Do nothing” alternative was considered in order to provide a baseline against which the effects of other alternatives could be compared. The do nothing alternative does not address any of the problem / opportunity statements in **Section 4.1** and was therefore not considered a feasible solution. The Do Nothing alternative was carried forward throughout the process for comparison purposes.

Transportation demand management (TDM) includes the implementation of measures to sufficiently reduce, shift, or eliminate transportation demand, such that improved transportation infrastructure / operations within the study area are not required. This alternative does not improve the less-than desirable geometry of the existing interchange and is not likely to sufficiently address the needs of future development in the area. It is therefore not considered a feasible alternative.



A new or improved provincial transportation facility and a new or improved municipal / private road, individually, do not fully address the problem / opportunity statements, as issues have been identified on both MTO and municipal roads. However, a widening of Kingston Road 38, combined with improvements to the Highway 401 ramps and operations, can fully address the identified problems and opportunities.

Therefore, the preferred planning solution is to implement a combination of improvements to provincial transportation facilities and local roads in the study area.

## 5 GENERATION AND ASSESSMENT OF DESIGN ALTERNATIVES

### 5.1 EVALUATION OF DESIGN ALTERNATIVES

This section provides an overview of design alternatives developed to address operational issues at the Highway 401 / Kingston Road 38 interchange, as well as the evaluation process used to identify a Technically Preferred Alternative.

#### 5.1.1 OVERVIEW OF EVALUATION PROCESS

A multi-phased evaluation process was used to identify a Technically Preferred Alternative. **Figure 5-1** provides an overview of the evaluation process. Numbering corresponds to the steps described below.

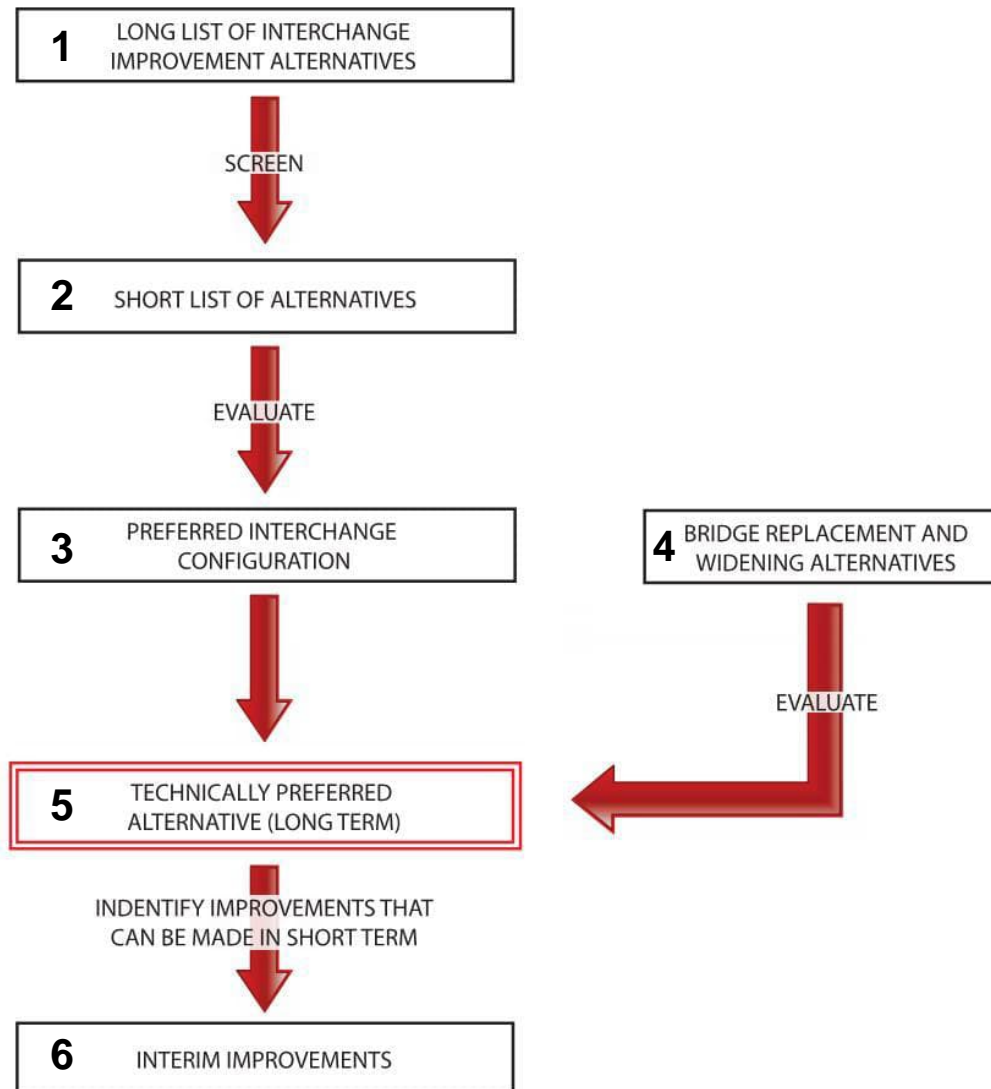


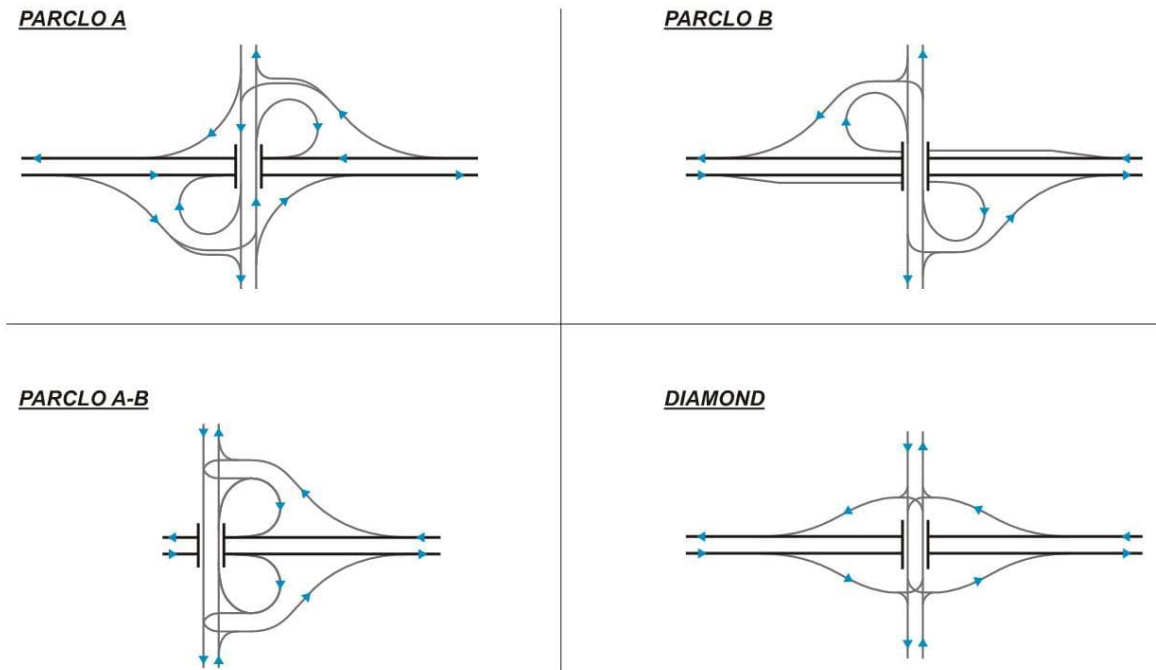
Figure 5-1: Overview of Evaluation Process

The evaluation process consisted of the following phases, described in more detail in the sections that follow:

1. Based on the identified interchange deficiencies, a long list of possible interchange improvements was developed. A high level screening of these alternatives was carried out by qualitatively assessing technical criteria, environmental considerations and cost. Alternatives that met minimum criteria for technical feasibility were carried forward for more detailed evaluation (“the short list”).
2. The short list of interchange improvement alternatives consisted of all possible combinations of improvements to the north half of the interchange that were carried forward with those for the south half. The resulting short list consisted of 8 alternatives and was evaluated quantitatively and qualitatively against 17 different key measures reflecting technical, environmental, cost and constructability considerations. For each interchange alternative, each key measure was assigned a score of 1 to 5. Key measures were also assigned a weighting to reflect their relative importance. An overall score was calculated for each alternative based on the weighted sum of key measures.
3. The alternative with the best overall score emerged as the preferred configuration for interchange improvements.
4. A variety of alternatives were developed to accommodate possible widening and / or replacement of the Kingston Road 38 underpass. Alternatives included replacement of the bridge on a new alignment (e.g., to the east or to the west of the exiting bridge). Bridge alternatives were evaluated and a recommended plan for replacement of the bridge was identified.
5. The preferred interchange configuration, combined with the recommendation for replacement of the Kingston Road 38 underpass, comprise the Technically Preferred Alternative for long-term improvements to the interchange.
6. With the Technically Preferred Alternative selected, possible improvements that can be made in the short term (< 5 years) were identified. These are referred to in this report as Interim Improvements.

### 5.1.2 PHASE 1 – SCREENING OF LONG LIST OF INTERCHANGE ALTERNATIVES

For the Kingston Road 38 interchange (KR 38), a total of 18 alternative ramp terminal configurations were developed for preliminary screening: 9 for the north ramp terminal, and 9 for the south ramp terminal. Each is described in detail below. The alternatives are generally based on the standard interchange configurations illustrated in **Figure 5-2**.



**Figure 5-2: Standard Interchange Configurations**

The alternatives were screened based on a list of criteria, including natural environment impacts, cultural heritage impacts, social and economic impacts, constructability, traffic impacts, long-term suitability, and cost. The long-list alternatives and results of the screening are summarized below and detailed in **Appendix I**.

#### **5.1.2.1 Improvements North of Highway 401**

**Do Nothing:** This alternative, detailed in **Figure 5-3**, involves no modifications to the existing configuration.

This alternative results in no construction costs or impacts, but does not address short- or long-term traffic needs. It was **carried forward** for comparison purposes only.

**Alternative N-W1:** This alternative, detailed in **Figure 5-4**, involves the following elements:

- Widening the westbound off-ramp to accommodate a dual right turn for traffic turning south onto KR 38;
- Widening KR 38 to accommodate a dedicated left-turn lane at the ramp terminal, with the remaining two lanes as through lanes; and
- Maintaining the bridge as is.

This alternative is low cost, has minimal impacts, and provides traffic improvements that may address short-term needs. However, the new northbound left-turn lane on KR 38 is relatively short. It was **carried forward** as an interim solution only.

**Alternative N-W2:** This alternative, detailed in **Figure 5-5**, involves the following elements:

- Widening the westbound off-ramp to accommodate a dual right turn for traffic turning south onto KR 38;

- Widening northbound KR 38 at the ramp terminal to accommodate a dedicated left-turn lane at the ramp terminal, with the remaining two lanes as through lanes; and
- Widening the bridge to accommodate a longer left-turn lane.

This alternative has minimal property impacts, addresses short- and possibly long-term traffic needs, and offers a longer northbound left-turn lane compared with Alternative N-W1. It was **carried forward** for further evaluation.

**Alternative N-PB1:** This alternative, detailed in **Figure 5-6**, involves the following elements:

- Shifting the ramp terminal north to Mclvor Road;
- Providing a channelized right-turn lane for traffic exiting westbound Highway 401 to southbound KR 38;
- Widening northbound KR 38 to accommodate a dedicated left-turn lane at the ramp terminal, with the remaining two lanes as through lanes; and
- Potentially widening the bridge to provide additional northbound left-turn capacity.

This alternative addresses short-term and possibly long-term traffic needs at a relatively low cost. However, it results in some minor property impacts in the northwest quadrant. It was **carried forward** for further evaluation.

**Alternative N-PB2:** This alternative, detailed in **Figure 5-7**, involves the following elements:

- Constructing a new off-ramp for traffic existing westbound Highway 401 to northbound KR 38;
- Accommodating a dual right turn for traffic existing westbound Highway 401 to southbound KR 38;
- Widening KR 38 to accommodate a dedicated left-turn lane at the ramp terminal, with the remaining two lanes as through lanes;
- Potentially widening the bridge to provide additional northbound left-turn capacity; and
- Extending the K&P Rail Trail structure.

This alternative provides sufficient additional interchange ramp capacity for short- and long-term traffic needs and has relatively few property impacts. However, the close proximity of the new off-ramp and Mclvor Road would result in operational concerns. This alternative was **not carried forward**.

**Alternative N-PB3:** This alternative, detailed in **Figure 5-8**, involves the following elements:

- Constructing a new off-ramp for traffic existing westbound Highway 401 to northbound KR 38;
- Enlarging the exit loop ramp and providing free-flow access to southbound KR 38, which requires widening the bridge for a speed-change lane;
- Widening northbound KR 38 to create a dedicated left-turn lane at the ramp terminal, with the remaining two lanes as through lanes; and
- Extending the K&P Rail Trail structure.

This alternative provides sufficient additional interchange capacity for short- and long-term traffic needs and an improved alignment for the westbound loop ramp. However, the close proximity of the new off-ramp and the Mclvor Road intersection on KR 38 would result in operational concerns. In addition, this alternative requires widening or replacement of the KR 38 Bridge in the short term, at a relatively high cost. It was **not carried forward**.

**Alternative N-PA:** This alternative, detailed in **Figure 5-9**, involves reconfiguring the north ramps into a Parclo A interchange. It includes the following elements:

- Widening the bridge to accommodate a northbound speed change lane on KR 38;

- Accommodating a dual left turn for traffic existing westbound Highway 401 to southbound KR 38; and
- Providing an optional off-ramp for traffic entering westbound Highway 401 from southbound KR 38, requiring the widening of westbound Collins Creek Bridge.

This alternative provides an improved ramp alignment and a high-capacity interchange configuration that addresses short- and long-term traffic needs. However, it requires widening or replacement of the KR 38 bridge at a relatively high cost, and its inner loop ramp has significant impacts to heritage features. It could also require the widening of the westbound Highway 401 bridge over Collins Creek. This alternative was **carried forward** for further evaluation.

**Alternative N-D1:** This alternative, detailed in **Figure 5-10**, involves reconfiguring the north ramps into a diamond interchange. It includes the following elements:

- Widening KR 38, including the bridge, to create a dedicated left-turn lane at the ramp terminal, with the remaining two lanes as through lanes;
- Extending the K&P Rail Trail structure;
- Accommodating a dual left turn for traffic exiting westbound Highway 401 to southbound KR 38.

This alternative removes the inner loop ramp for drivers exiting Highway 401. However, it does not address short- or long-term traffic needs and requires widening of the existing KR 38 bridge. It was **not carried forward**.

**Alternative N-D2:** This alternative, detailed in **Figure 5-11**, involves reconfiguring the north ramps into a diamond interchange with a roundabout intersection. It includes the following elements:

- Maintaining the existing width of the KR 38 bridge; and
- Extending the K&P Rail Trail structure.

This alternative removes the inner loop ramp for drivers exiting Highway 401 and does not require widening of the KR 38 bridge. However, it does not address short- or long-term traffic needs, and the roundabout is less compatible with long-combination vehicles compared to a traditional intersection. This alternative was **not carried forward**.



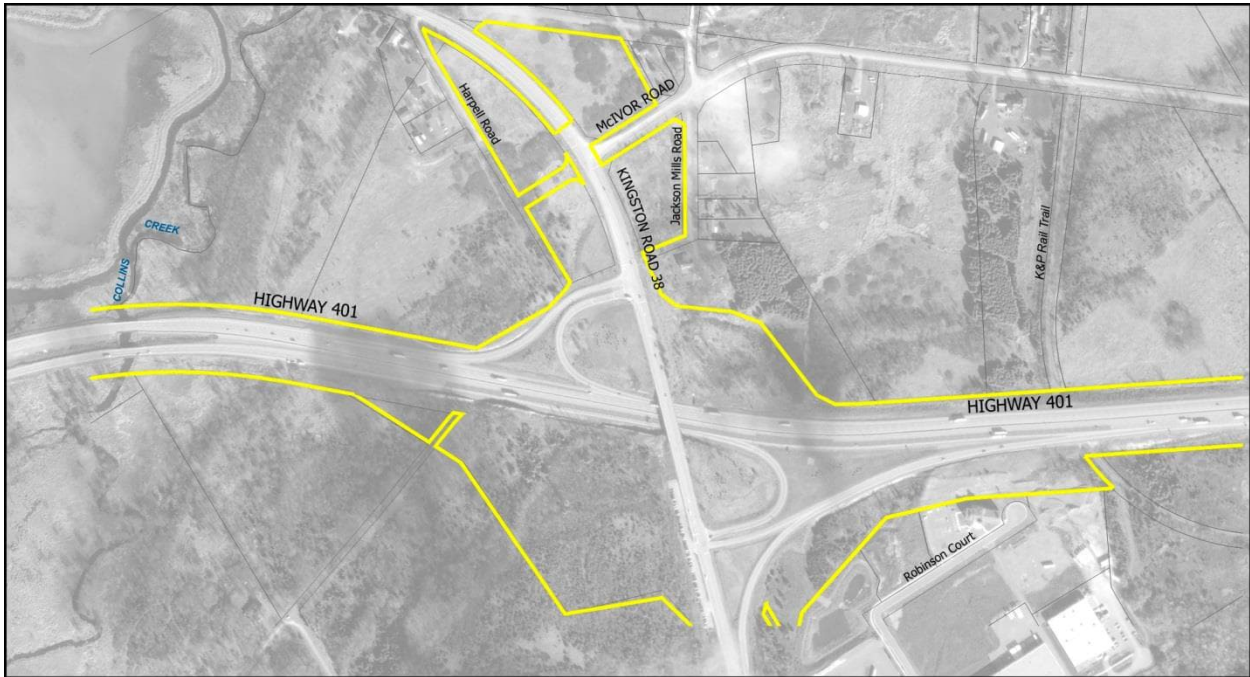


Figure 5-3 Do Nothing, North of Highway 401 (Carried Forward)



Figure 5-5 Alternative NW2 (Carried Forward)



Figure 5-7 Alternative NPB2 (Not Carried Forward)

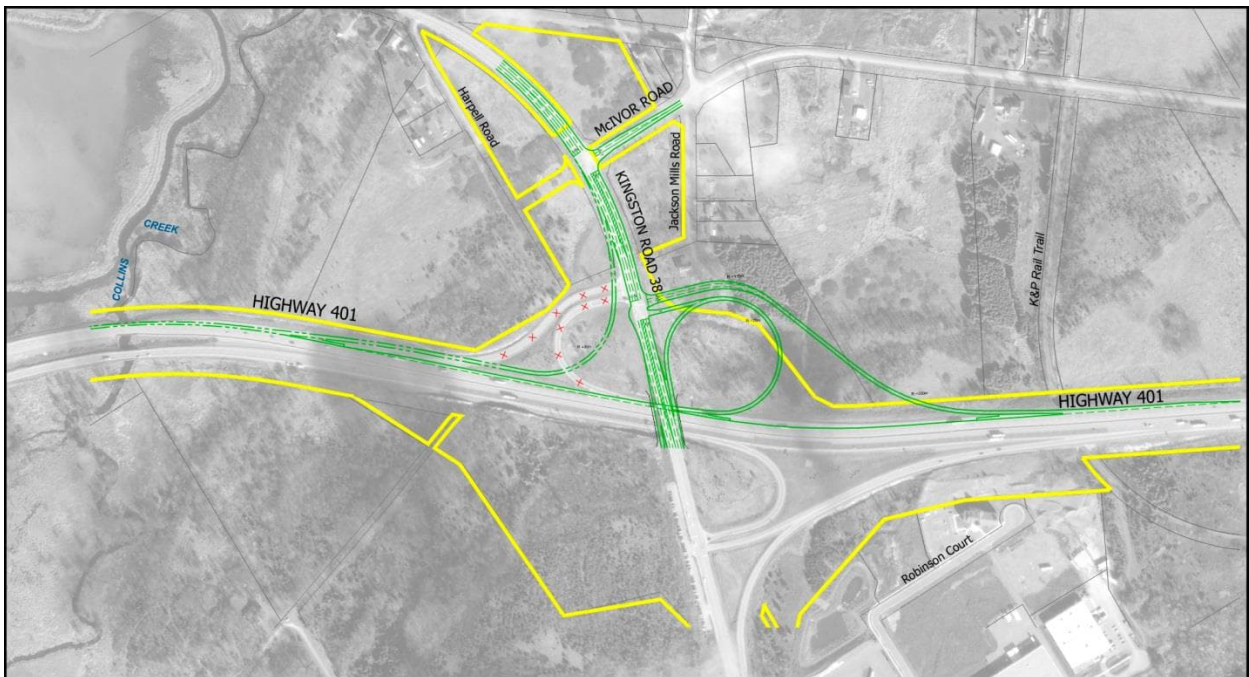


Figure 5-9 Alternative NPA (Carried Forward)



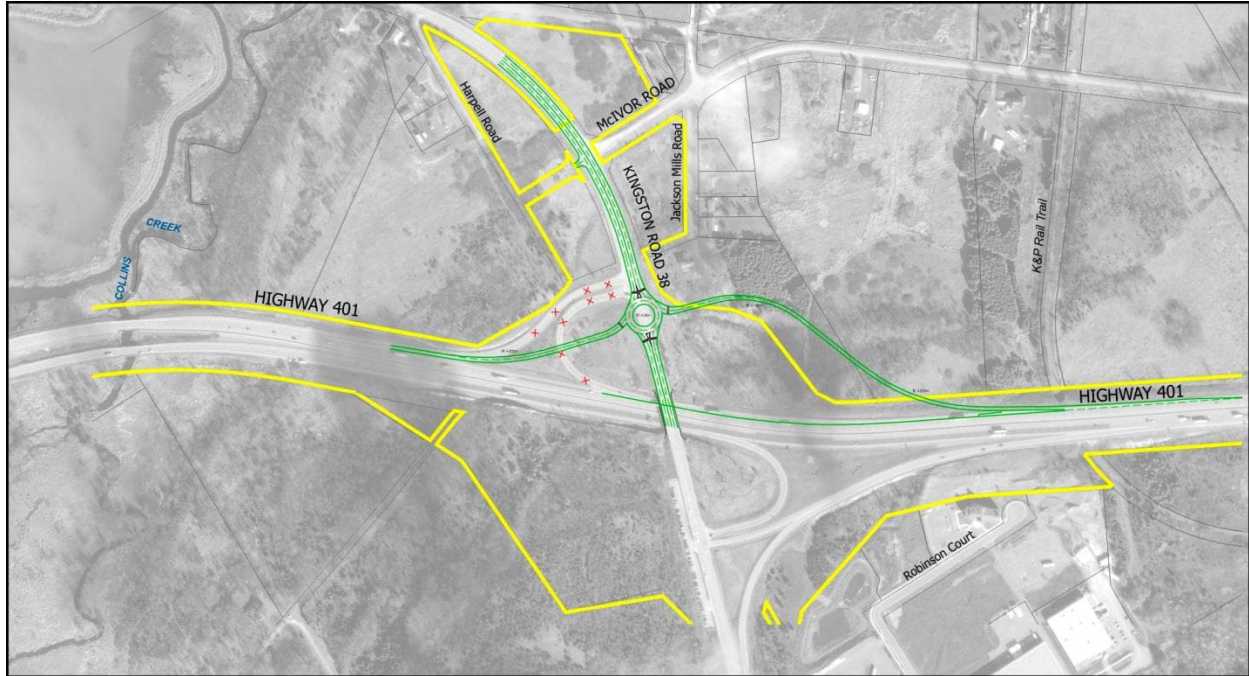


Figure 5-11 Alternative ND2 (Not Carried Forward)

A summary of the alternatives carried forward for further evaluation is provided below.

Alternative	Recommendation	Rationale
Do Nothing	Carried forward	Carried forward for comparison purposes.
N-W1	Carried forward	Provides traffic improvements and addresses short-term needs.
N-W2	Carried forward	Minimal property impacts and addresses short-term traffic needs.
N-PB1	Carried forward	Addresses short-term traffic needs at a low cost.
N-PB2	Not carried forward	Close proximity to McIvor Road would result in operational concerns.
N-PB3	Not carried forward	Close proximity to McIvor Road would result in operational concerns.
N-PA	Carried forward	High-capacity interchange that addresses short- and long-term traffic needs.
N-D1	Not carried forward	Does not address short- or long-term traffic needs.
N-D2	Not carried forward	Roundabout is less compatible with long-combination vehicles.

### 5.1.2.2 Improvements South of Highway 401

**Do Nothing:** This alternative, detailed in **Figure 5-12**, involves no modifications to the existing configuration and is included for comparison purposes. This alternative results in no construction costs or impacts, but does not address short- or long-term traffic needs. It was **carried forward** for comparison purposes only.

**Alternative S-W1:** This alternative, detailed in **Figure 5-13**, involves the following elements and considerations:

- Widening the eastbound off-ramp to accommodate a dual left turn for traffic turning south onto KR 38;
- Widening southbound KR 38 to accommodate a dedicated left-turn lane at the ramp terminal, with the remaining two lanes as through lanes;
- Maintaining the bridge as is; and
- Relocating the carpool lot.

This alternative is low cost, has minimal impacts, and provides traffic improvements that may address short-term needs. However, the new southbound left-turn lane on KR 38 is relatively short. It was **carried forward** as an interim solution only.

**Alternative S-W2:** This alternative, detailed in **Figure 5-14**, involves the following elements and considerations:

- Widening the eastbound off-ramp to accommodate a dual left turn for traffic turning south onto KR 38;
- Widening southbound KR 38 to accommodate a dedicated left-turn lane at the ramp terminal, with the remaining two lanes as through lanes;
- Widening the bridge to accommodate a longer left-turn lane; and
- Relocating the carpool lot.

This alternative has minimal property impacts, addresses short- and possibly long-term traffic needs, and offers a longer southbound left-turn lane compared with Alternative S-W1. However, it requires the existing bridge to be widened, which may not be cost-effective. It was **carried forward** for further evaluation.

**Alternative S-PB1:** This alternative, detailed in **Figure 5-15**, involves the following elements and considerations:

- Shifting the ramp terminal to the south;
- Accommodating a dual left turn for traffic exiting westbound Highway 401 to southbound KR 38;
- Potential widening of KR 38 Bridge to provide a northbound speed-change lane;
- Widening of KR 38 to create dedicated left-turn lane at ramp terminal, with the remaining two lanes as through lanes; and
- Impacting the carpool lot.

This alternative addresses short- and long-term traffic needs, improves the geometry of the eastbound inner loop ramp, and provides an increased storage length for vehicles on the off-ramp. However, it requires the widening or replacement of the existing KR 38 underpass in the short term. This option was **carried forward** for further evaluation. A larger-radius option was considered but rejected due to impacts on the existing development in the southeast.

**Alternative S-PB2:** This alternative, detailed in **Figure 5-16**, involves the following elements and considerations:

- Constructing a new off-ramp for traffic exiting eastbound Highway 401 to southbound KR 38;
- Widening of KR 38 to create dedicated left-turn lane at ramp terminal, with the remaining two lanes as through lanes;
- Potential widening of the bridge to provide additional southbound left-turn capacity; and
- Relocating the carpool lot.

This alternative provides additional interchange capacity sufficient for short- and long-term traffic needs. However, the proximity of the new off-ramp and the Centennial Drive / Creekford Road intersection on KR

38 would result in operational concerns, particularly due to the high volume of trucks anticipated. This alternative was **not carried forward**.

**Alternative S-PB3:** This alternative, detailed in **Figure 5-17**, involves the following elements and considerations:

- Constructing a new off-ramp for traffic exiting eastbound Highway 401 to southbound KR 38;
- Enlarging the inner loop ramp;
- Potential widening of the KR 38 Bridge to provide a northbound speed-change lane;
- Widening of KR 38 to create dedicated left-turn lane at ramp terminal, with the remaining two lanes as through lanes; and
- Relocating the carpool lot as a result of the widening.

This alternative provides additional interchange capacity sufficient for short- and long-term traffic needs, as well as improved geometry for the eastbound inner loop ramp. However, the proximity of the new off-ramp and the Centennial Drive / Creekford Road intersection on KR 38 would result in operational concerns, particularly due to the high volume of trucks anticipated. This alternative also has a relatively high cost. It was **not carried forward**.

**Alternative S-PA:** This alternative, detailed in **Figure 5-18**, involves reconfiguring the south ramps into a Parclo A interchange. It includes the following elements:

- Potential widening of KR 38 Bridge to provide a northbound speed-change lane;
- Widening of eastbound Collins Creek Bridge;
- Accommodation of a dual right turn for traffic exiting eastbound Highway 401 to southbound KR 38; and
- Relocation of the carpool lot.

This alternative provides improved ramp geometry and a high-capacity interchange configuration that addresses short- and long-term traffic needs. However, it requires widening or replacement of the KR 38 bridge at a relatively high cost, as well as widening of the eastbound Highway 401 bridge over Collins Creek. This alternative was **carried forward** for further evaluation.

**Alternative S-D1:** This alternative, detailed in **Figure 5-19**, involves reconfiguring the south ramps into a diamond interchange. It includes the following elements:

- Widening KR 38 to create a dedicated left-turn lane at the ramp terminal, with the remaining two lanes as through lanes (may require widening of the bridge);
- Accommodation of a dual right turn for traffic exiting eastbound Highway 401 to southbound KR 38; and
- Relocation of the carpool lot.

This alternative removes the inner loop ramp for drivers exiting Highway 401 and addresses short- and long-term traffic needs. It was **carried forward** for further evaluation.

**Alternative S-D2:** This alternative, detailed in **Figure 5-20**, involves reconfiguring the south ramps into a diamond interchange with a roundabout intersection. It includes the following elements:

- Providing a channelized right turn for traffic exiting eastbound Highway 401 to southbound KR 38;
- Relocation of the carpool lot.

This alternative removes the inner loop ramp for drivers exiting Highway 401 and does not require widening of the KR 38 bridge. However, it does not address short- or long-term traffic needs, and the roundabout is less compatible with long-combination vehicles compared to a traditional intersection. This alternative was **not carried forward**.



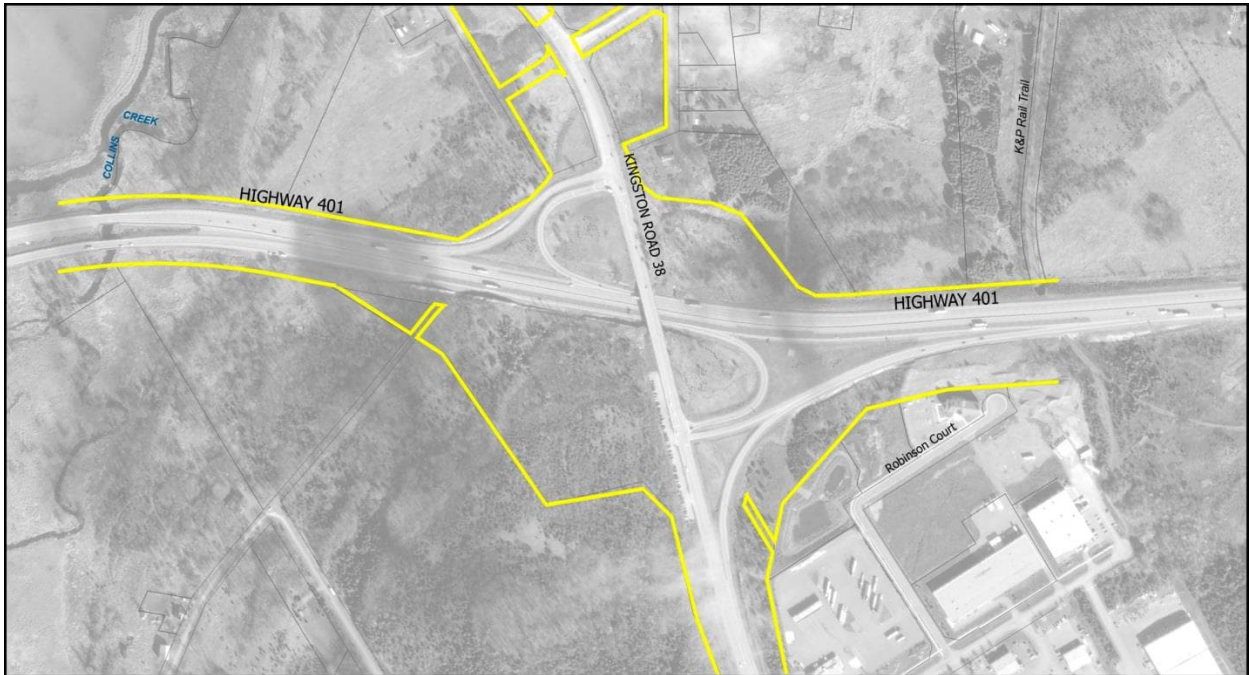


Figure 5-12 Do nothing, South of Highway 401 (Carried Forward)



Figure 5-14 Alternative SW2 (Carried Forward)



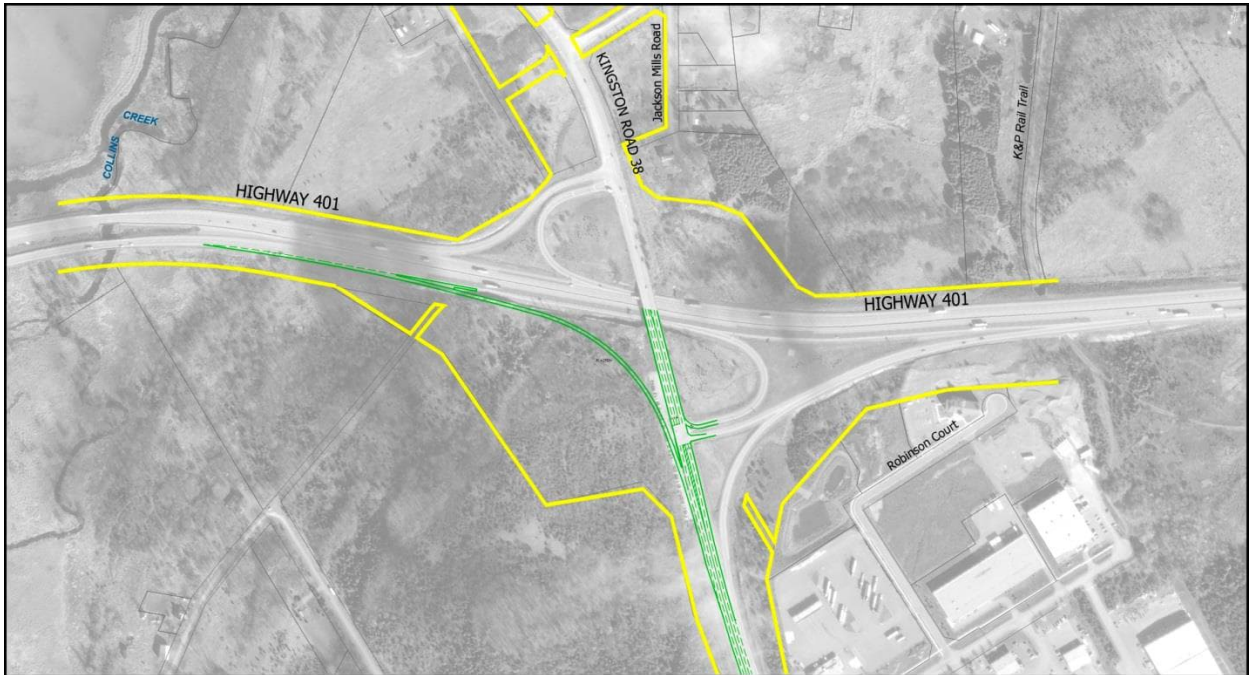


Figure 5-16 Alternative SPB2 (Not Carried Forward)

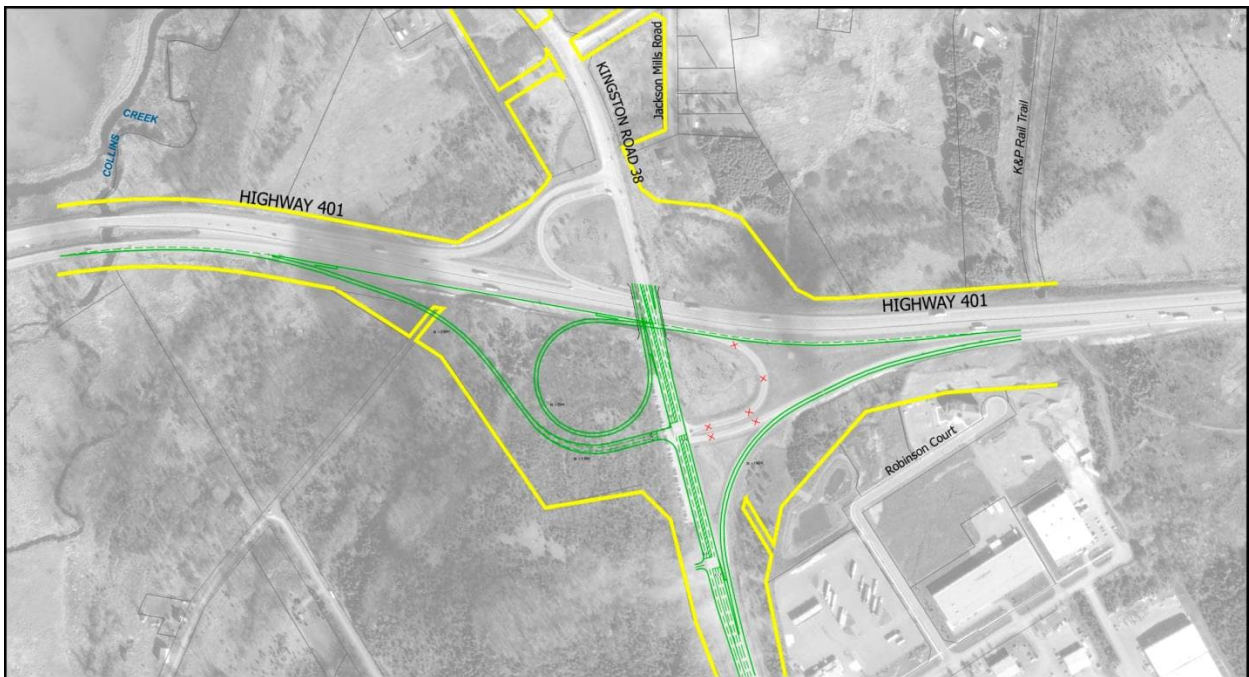


Figure 5-18 Alternative SPA (Carried Forward)

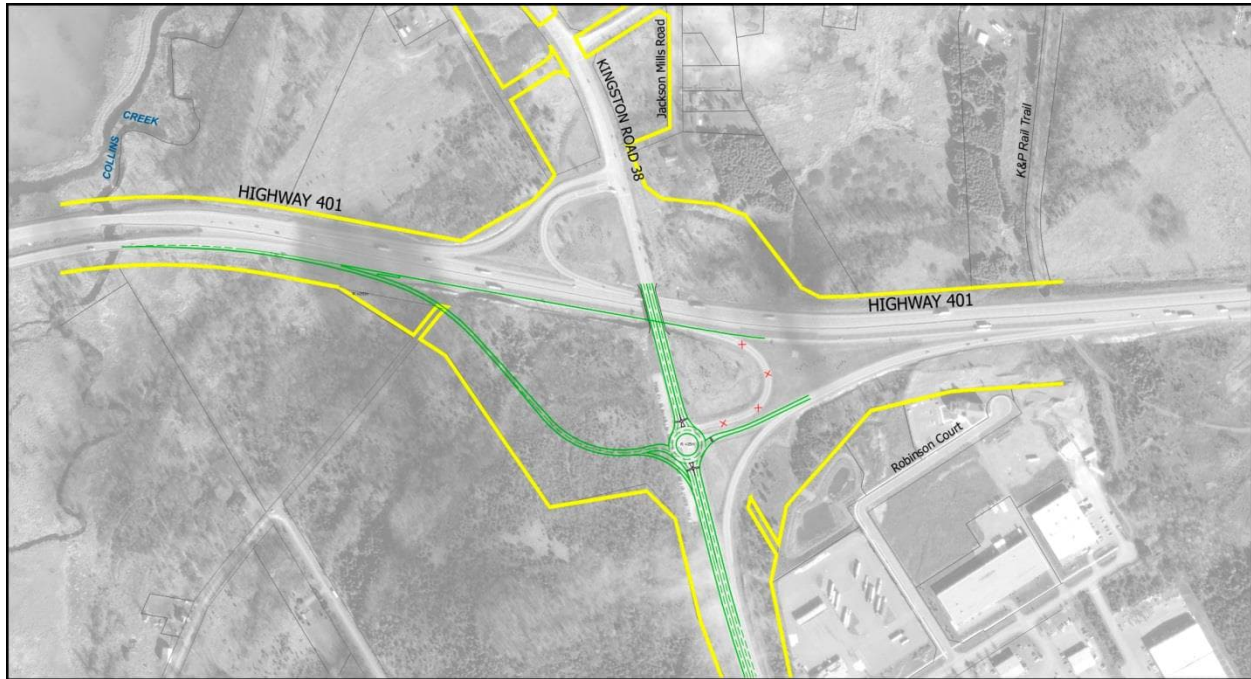


Figure 5-20 Alternative SD2 (Not Carried Forward)

A summary of the alternatives carried forward for further evaluation is provided below.

Alternative	Recommendation	Rationale
Do Nothing	Carried forward	Carried forward for comparison purposes.
S-W1	Carried forward	Minimal impacts, and provides short-term traffic improvements.
S-W2	Carried forward	Minimal property impacts and addresses short-term traffic needs.
S-PB1	Carried forward	Addresses short- and long-term traffic needs.
S-PB2	Not carried forward	Close proximity to Centennial Drive / Creekford Road intersection would result in operational concerns due to high volume of trucks.
S-PB3	Not carried forward	Close proximity to Centennial Drive / Creekford Road intersection would result in operational concerns due to high volume of trucks.
S-PA	Carried forward	High-capacity interchange addresses short- and long-term traffic needs.
S-D1	Carried forward	Addresses short- and long-term traffic needs.
S-D2	Not carried forward	Does not address short- or long-term traffic needs and roundabout is less compatible with long-combination vehicles.

### 5.1.3 PHASE 2 – EVALUATION OF SHORT LIST OF INTERCHANGE ALTERNATIVES

The following alternatives were carried forward for further evaluation:

#### North Side

- N-W1 (Parclo B; Widen WB off-ramp and KR 38)
- N-W2 (Parclo B; Widen WB off-ramp, KR 38 and bridge)
- N-PB1 (Parclo B; Shift WB off-ramp north)
- N-PA (Parclo A; Create new inner loop ramp in NE quadrant)

South Side

- S-W1 (Parclo B; Widen EB off-ramp and KR 38)
- S-W2 (Parclo B; Widen EB off-ramp, KR 38 and bridge)
- S-PB1 (Parclo B; Increase radius of EB off-ramp)
- S-PA (Parclo A; Create new inner loop ramp in SW quadrant)
- S-D1 (Diamond; Create new WB off-ramp with traffic signal at KR 38; widen bridge)

Various combinations of the north and south side improvements listed above are possible. A total of eight viable combinations of these alternatives were developed to create a short list of alternatives, as shown in **Figure 5-21** and listed below.

Alternative. No.	Description
1	NPB1 – SD1: Parclo B2 / Diamond Hybrid Interchange
2	NPB1 – SPB1: Parclo B2 Interchange
3	NPA1 – SPA1: Parclo A2 / Parclo A4 Hybrid Interchange
4	NPA1 – SPB1: Parclo A2 / Parclo B2 Hybrid Interchange
5	NBP1 – SPA1: Parclo B2 / Parclo A4 Hybrid Interchange
6	NPA1 – SD1: Parclo A2 / Diamond Hybrid Interchange
7	NPA1 – SW2: Parclo A2 / Parclo B2 Hybrid Interchange
8	NPB1 – SW2: Parclo B2 Interchange
9	Do nothing (for comparison purposes)

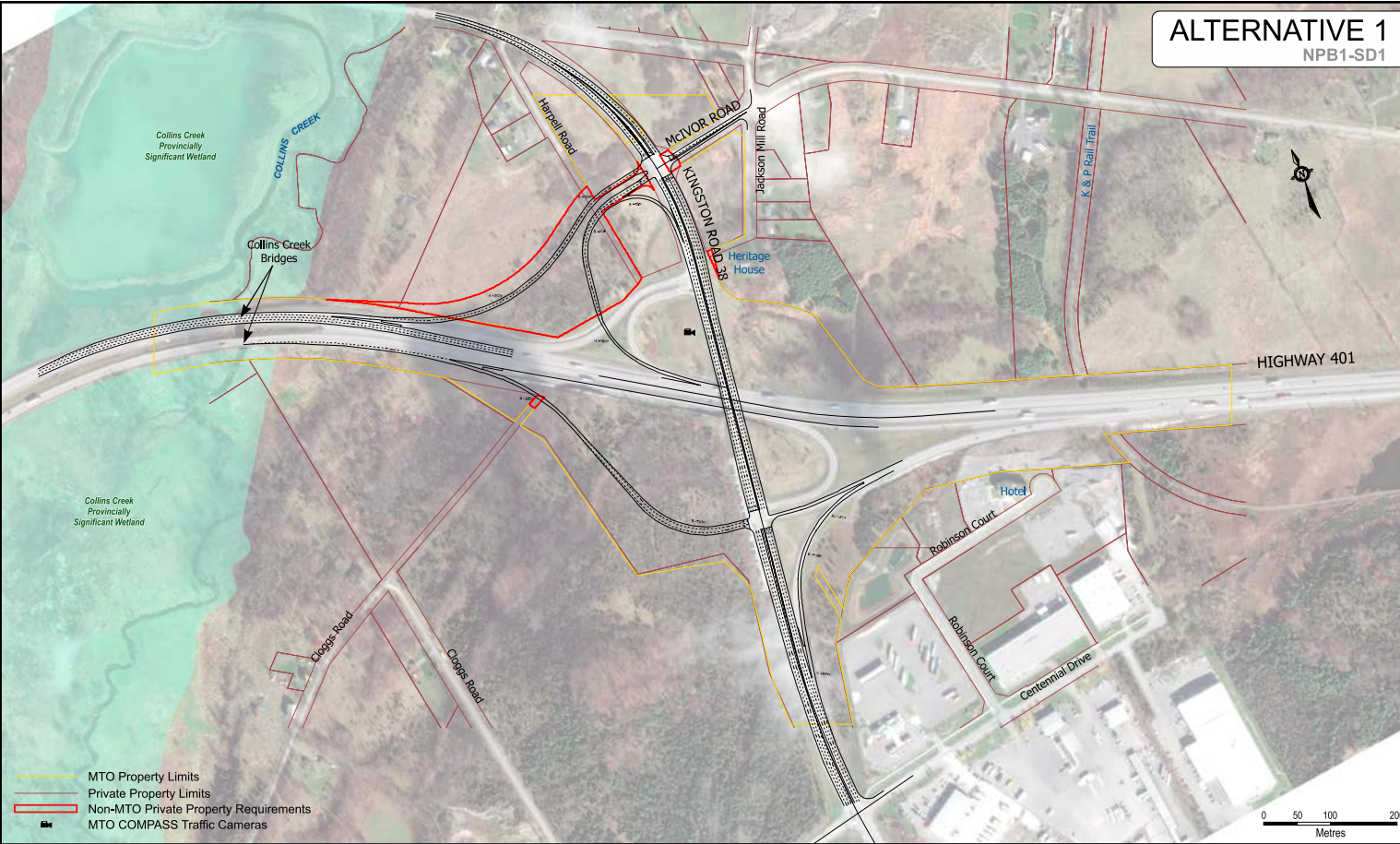
The short list of alternatives was then evaluated to identify a preferred interchange configuration. Each alternative was evaluated considering transportation considerations, environmental factors, and cost and constructability. Each factor area was broken down into a number of key measures, as outlined below. Factor areas were assigned a relative weighting, shown in parentheses. Key measures were also assigned relative weightings, outlined further in **Table 5-1** and **Table 5-2**.

<b>FACTOR AREAS</b>		
<b>TRANSPORTATION CONSIDERATIONS (50%)</b>	<b>ENVIRONMENTAL CONSIDERATIONS (40%)</b>	<b>COST &amp; CONSTRUCTABILITY (10%)</b>
<p>Key Measures:</p> <ul style="list-style-type: none"> <li>• Performance – total traffic delay (AM &amp; PM average)</li> <li>• Potential to impact existing carpool lot and opportunities for improvement</li> <li>• Improvement to ramp geometry</li> <li>• Conflicts due to turning and weaving</li> </ul>	<p>Key Measures:</p> <ul style="list-style-type: none"> <li>• Natural Environment               <ul style="list-style-type: none"> <li>○ Impacts to designated natural areas</li> <li>○ Impacts to significant wildlife or wildlife habitat</li> <li>○ Impacts to vegetation communities</li> <li>○ Potential to result in serious harm to fish</li> <li>○ Impacts to potentially contaminated properties</li> </ul> </li> <li>• Social / Economic Environment               <ul style="list-style-type: none"> <li>○ Impacts to private properties</li> <li>○ Increased noise levels at nearby properties</li> <li>○ Impacts to K&amp;P Trail</li> </ul> </li> <li>• Cultural Environment               <ul style="list-style-type: none"> <li>○ Displacement or disruption of built heritage features</li> </ul> </li> </ul>	<p>Key Measures:</p> <ul style="list-style-type: none"> <li>• Construction cost</li> <li>• Lifecycle cost</li> <li>• Potential utility conflicts (e.g. hydro lines)</li> <li>• Complexity of construction (e.g. requiring large cuts or fills)</li> </ul>

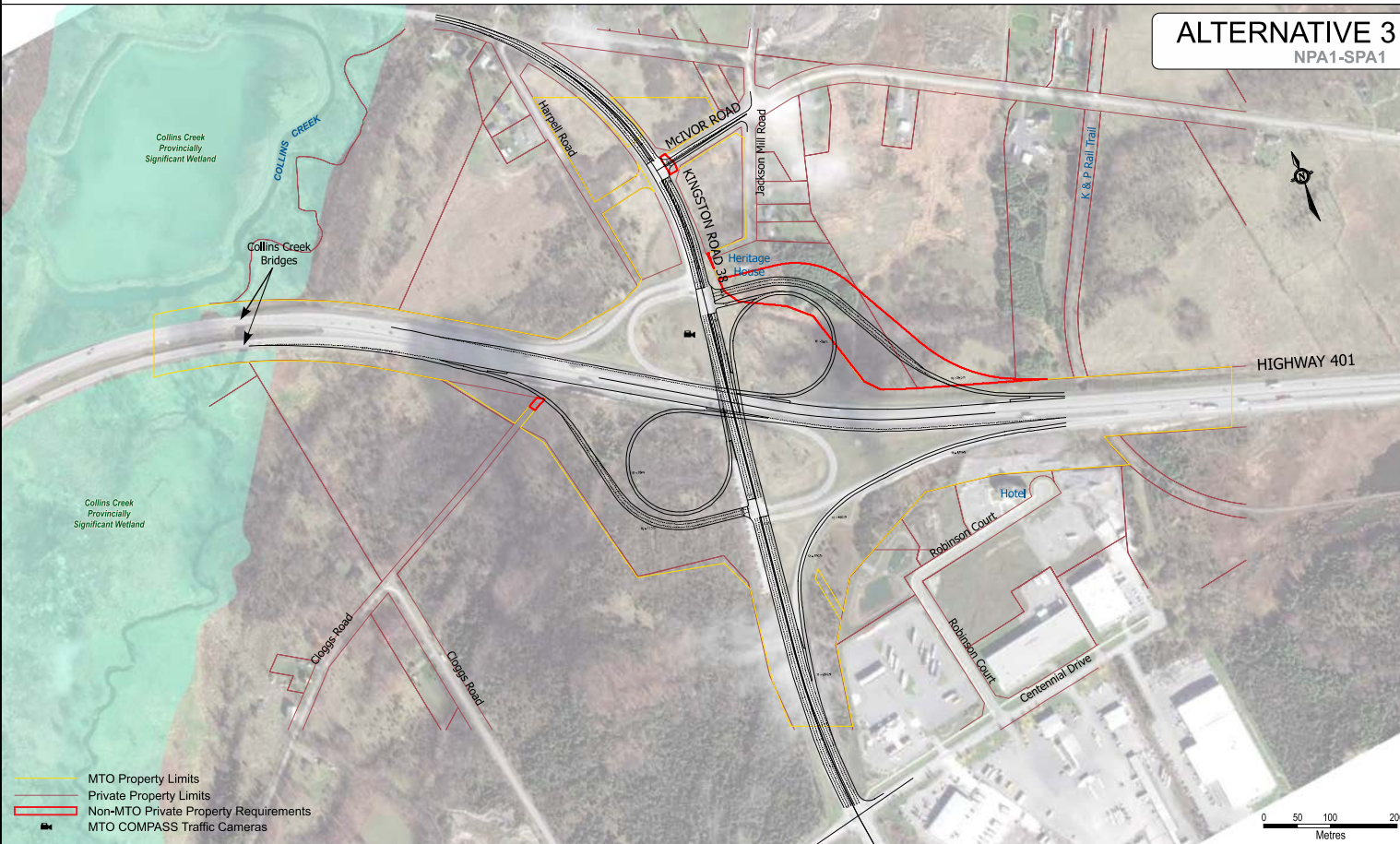
Alternatives were assigned a score for each key measure ranging from 1 (most preferred or minimal impact) to 5 (least preferred or most significant impact). The recommended alternative was identified based on a weighted sum of the key measures and overall factor area scores. The full evaluation of short-list alternatives is described in **Table 5-1** and **Table 5-2**. Detailed evaluation tables are provided in **Appendix I**.



**ALTERNATIVE 1**  
NPB1-SD1

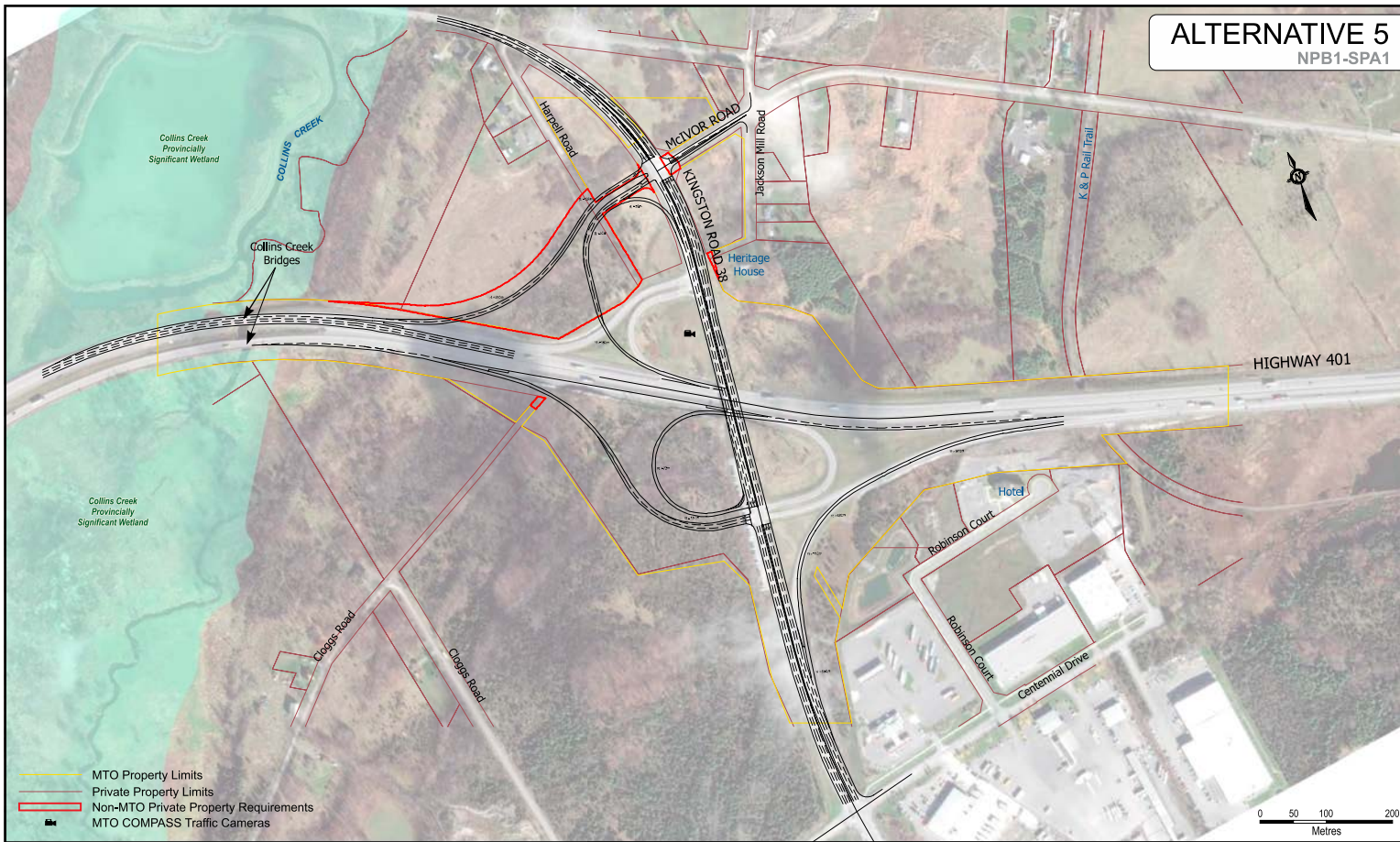


**ALTERNATIVE 3**  
NPA1-SPA1





**ALTERNATIVE 5**  
NPB1-SPA1



**ALTERNATIVE 7**  
NPA1-SW2

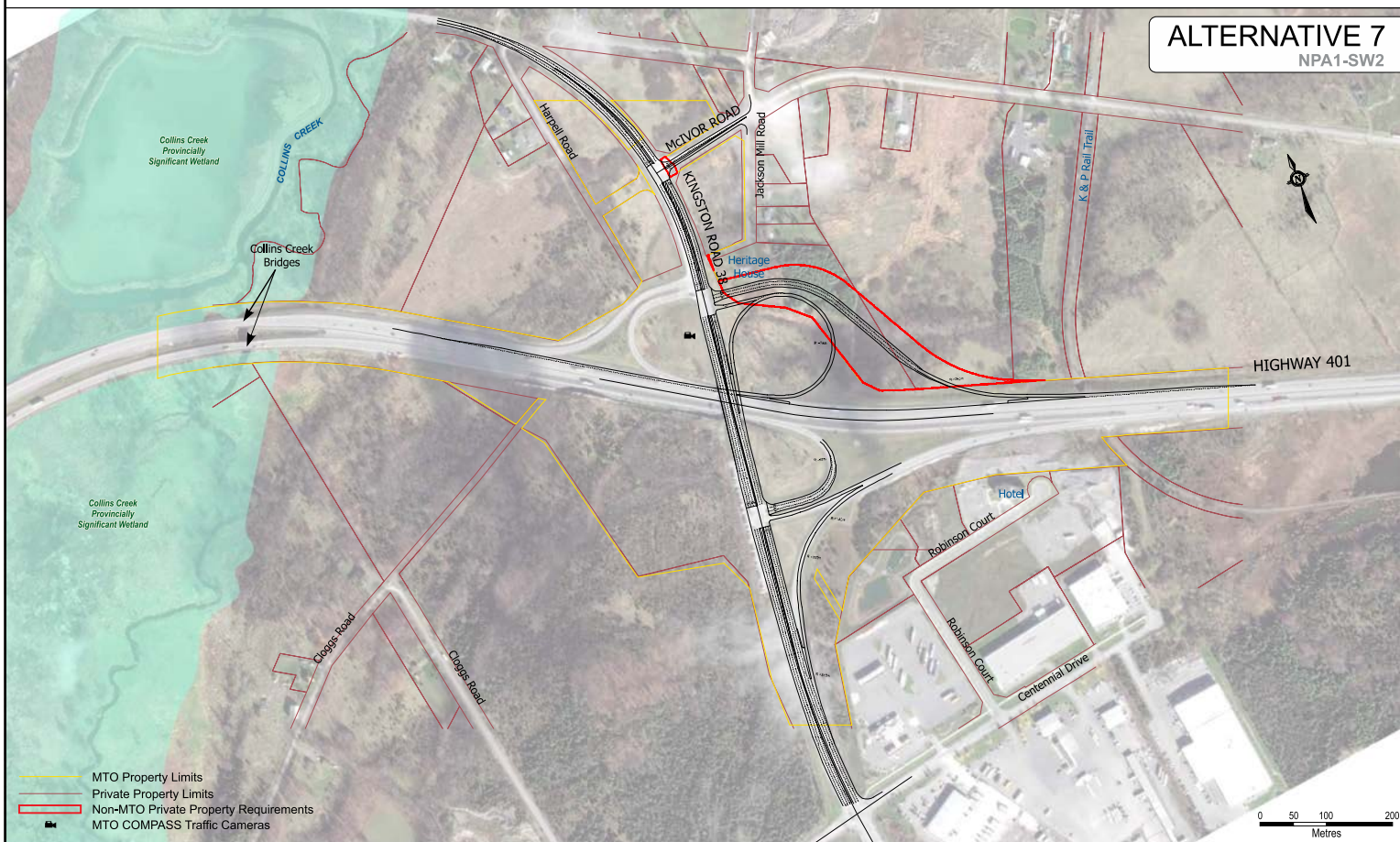




Table 5-1: Evaluation of Short List of Alternatives

<div style="display: flex; justify-content: space-between; align-items: center;"> <span>5</span> <span>3</span> <span>1</span> </div> <div style="display: flex; justify-content: space-between; align-items: center; margin-top: 5px;"> <span>Poor</span> <span style="font-size: 2em;">→</span> <span>Good</span> </div>			DO NOTHING (COMPARISON PURPOSES ONLY)	ALTERNATIVE 1 – NPB1 – SD1	ALTERNATIVE 2 – NPB1 – SPB1	ALTERNATIV NPA1 – SP
FACTOR AREA	CRITERIA	KEY MEASURES				
<b>TRANSPORTATION (50%)</b>	<b>INTERCHANGE OPERATIONS AND GEOMETRY (100%)</b>	Total Delay (40%)	5	3.5	5	3
		Impact to Carpool Lot (10%)	1	5	1	3
		Improvement to ramp geometry (35%)	5	3	5	3
		Conflicts due to turning and weaving (15%)	5	3	3	3
	<b>Weighted sum of transportation key measures</b>		4.60	3.40	4.30	1.20
<b>ENVIRONMENTAL (20%)</b>	<b>NATURAL ENVIRONMENT (10%)</b>	Impacts to designated natural areas (Provincially Significant Wetlands, significant woodlands) (30%)	0	5	1	5
		Impacts to significant wildlife or wildlife habitat (including alvar and wetlands), including SAR and migratory birds (30%)	0	5	1	5
		Impacts to vegetation communities (5%)	0	3	1	3
		Potential to result in serious harm to fish (30%)	0	3	3	3

		Impacts to potentially contaminated areas (includes K&P Rail Trail) (5%)	0	0	0	0
	SOCIAL/ECONOMIC ENVIRONMENT (10%)	Impacts to private properties (80%)	0	3	3	3
		Increased noise levels at nearby properties (15%)	0	3	3	3
		Impact to K&P recreational trail (5%)	0	0	0	0
	CULTURAL ENVIRONMENT (10%)	Displacement or disruption of built heritage features (100%)	0	1	1	1
	<b>Weighted sum of environmental key measures</b>		0.00	2.60	2.35	4.66
	COST AND CONSTRUCTABILITY (30%)	CONSTRUCTION COST AND CONSTRUCTABILITY (100%)	Construction cost (70%)	0	2.5	4.5
Lifecycle cost (10%)			1	3	3	1
Potential utility conflicts (5%)			0	1	3	1
Complexity of construction (15%)			0	3	1	3
<b>Weighted sum of cost and constructability key measures</b>		0.10	2.55	3.75	4.90	
<b>OVERALL ASSESSMENT</b>			-	<b>OVERALL WEIGHTED SCORE: 3.00</b> NOT RECOMMENDED	<b>OVERALL WEIGHTED SCORE: 3.47</b> NOT RECOMMENDED	<b>OVERALL WEIGHTED SCORE: 2.95</b> NOT RECOMMENDED

### 5.1.4 PREFERRED INTERCHANGE CONFIGURATION

Alternative 5 (NPB1-SPA1), a Parclo B2 / Parclo A4 Hybrid Interchange, received the highest rating based on the evaluation of alternatives and is the Technically Preferred Alternative (TPA). The TPA is described in detail in **Section 6.0**.

Although Alternative 5 impacts significant woodlands and the sensitive alvar vegetation community in the southwest quadrant, it avoids one of the most significant environmental impacts: the removal of heritage features. Although the heritage property is not impacted, private property acquisition is not entirely avoided. Property in the northwest quadrant would be acquired; however, no homes or heritage features would be displaced as a result. For this reason, Alternative 5 is ranked third for environmental criteria.

In terms of interchange configuration, Alternative 5 is very similar to Alternative 1, but performs better operationally due to the Parclo A configuration in the southwest quadrant. The configuration enables the southbound Kingston Road 38 to eastbound Highway 401 movement to be free-flowing, reducing delay. Alternative 5 has a LOS B.

Generally the interchange configurations that perform best operationally are those that are least preferred from an environmental perspective. Alternative 5 represents a balanced solution that scores in the mid-range for all three factor areas. This alternative is recommended as it offers operational improvements while avoiding the most significant environmental impacts.

A description of the evaluation rationale for the non-preferred interchange improvement alternatives follows, with the overall ranking and factor area rankings shown:

<b>Alternative 6</b>	Alternative 6 performs better in terms of transportation than Alternative 5, but has significantly greater environmental impacts than the recommended alternative. The Parclo A configuration in the northeast quadrant provides improved operations compared to the Parclo B configuration (as used in Alternatives 1, 2, 5 and 8), however the heritage home is directly impacted. A significant turning movement at the interchange is from northbound Kingston Road 38 to westbound Highway 401 and the Parclo A configuration allows this movement to be free-flowing. This results in this alternative having the second lowest delay of all alternatives. Alternative 6 operates at the border line between LOS A and LOS B.
Overall – 2	
Environmental – 7	
Transportation – 2	
Cost – 5	

As with Alternative 5, there are impacts to significant woodlands and the sensitive alvar vegetation community in the southwest quadrant. Due to direct impacts to private property, heritage features, and significant vegetation communities, this alternative (along with Alternative 3) is the least preferred in terms of environmental criteria.

Despite greater environmental impacts, Alternative 6 ranks second overall because of the significant improvements made to the operations of the interchange. It is one of only two short-listed alternatives that operate between LOS A and LOS B, while all other alternatives operate at LOS B or C. The Parclo A configuration in the northeast quadrant minimizes delays; however, it also results in a direct impact to the heritage property. Overall, Alternative 6 is preferred over others that avoid impacts to the heritage property (i.e., Alternatives 1, 8 and 2) because it offers much greater improvements to the operations of the interchange. All other alternatives that avoid impacts to heritage features (Alternatives 1, 8 and 2) incorporate either a Parclo B or diamond configuration, which operate at a lower LOS and are associated with greater delays.

<b>Alternative 3</b>	Alternative 3 is similar in configuration to Alternative 6, in that both incorporate Parclo A ramps in the northeast quadrant. While Alternative 6 has a diamond configuration south of Highway 401, Alternative 3 includes a loop ramp in the
Overall – 3	

Environmental – 7 southwest quadrant which reduces conflicts due to turning and weaving. The  
 Transportation – 1 resultant interchange configuration is a full Parclo A, which is the best for traffic  
 Cost – 8 performance. Alternative 3 has the lowest delay of all alternatives and operates at  
 the borderline between LOS A and LOS B.

In terms of environmental criteria, Alternative 3 and Alternative 6 rank as the least preferred alternatives. Both alternatives directly impact the heritage property, as well as significant woodlands and the sensitive alvar vegetation community in the southwest quadrant. The impacts to significant vegetation communities are considered to be equivalent for both Alternatives 3 and 6. For these reasons Alternatives 3 and 6 are scored identically as the least preferred options in terms of environmental criteria.

As with Alternative 6, Alternative 3 provides significant improvements to the operation of the interchange, yet results in significant environmental impacts (namely the heritage property). Since Alternative 3 and 6 have identical scores in terms of environmental criteria and perform similarly in terms of interchange operations, Alternative 3 receives a lower overall score than Alternative 6 due to its higher cost.

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**Alternative 1** Alternative 1 is similar in configuration to the recommended alternative (Alternative 5). Impacts to the heritage home are avoided and as a result, the alternative is among the more preferred alternatives in terms of environmental criteria. Although Overall – 4 impacts to the heritage property are avoided, there are still private property impacts Environmental – 3 in the northwest quadrant; however, no homes or heritage features are displaced Transportation – 6 as a result of this property acquisition. As with Alternative 5, there are impacts to Cost – 3 significant woodlands and the sensitive alvar vegetation community in the southwest quadrant. For these reasons, Alternative 1 and Alternative 5 (the preferred alternative) are ranked equally in terms of environmental criteria.

Unlike Alternative 5, Alternative 1 does not incorporate a loop ramp in the southwest quadrant. This diamond configuration therefore requires a left turn for traffic entering eastbound Highway 401 which increases delay at the intersection. Alternative 1 has a LOS B.

While performing moderately from a transportation perspective, Alternative 1 does not perform as well as Alternative 5 and ranks fourth overall.

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**Alternative 8** Alternative 8 avoids impacts to the heritage home and to the alvar / significant Overall – 5 woodlands in the southwest quadrant. Private property must be acquired in the Environmental – 1 northwest quadrant; however, no homes or heritage features are displaced as a Transportation – 7 result. Because Alternative 8 avoids heritage features and significant vegetation Cost – 1 communities, it is the most preferred alternative in terms of environmental criteria (tied with Alternative 2).

The minimal improvements to the existing geometry at the south ramp terminal result in a poor transportation ranking. The minimal improvements offer no significant safety benefit and the small-radius loop ramp is much less preferable than other alternatives. Alternative 8 also has the greatest delay of all the alternatives and a LOS C.

Although the environmental impacts are minimized as much as possible with Alternative 8, the overall ranking of Alternative 8 is low due to its poor transportation performance, mainly because it does not improve upon the existing substandard Parclo B design south of Highway 401.

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**Alternative 2**

Overall – 6  
Environmental – 1  
Transportation – 7  
Cost – 6

Similar in configuration to Alternative 8, Alternative 2 avoids impacts to the heritage home and to the alvar / significant woodlands in the southwest quadrant. As with Alternative 8, property must be acquired in the northwest quadrant; however, no homes or heritage features are displaced as a result. For those reasons, it is the most preferred alternative in terms of environmental criteria (tied with Alternative 8).

The Parclo B configuration south of the Highway 401 is less preferred than a Parclo A or diamond configuration; however the increased ramp length and cross-section result in increased capacity, as compared with the existing configuration. The Parclo B configurations produce more delay than their Parclo A counterparts and so rate poorly in performance. Alternative 2 has a LOS C.

Due to the only modest improvements to the operations of the interchange, Alternative 2 has a poor overall ranking.

---

**Alternative 4**

Overall – 7  
Environmental – 5  
Transportation – 3  
Cost – 7

Alternative 4 incorporates a Parclo A ramp in the northeast quadrant that performs well operationally, but directly impacts the heritage home. A significant turning movement at the interchange is from northbound Kingston Road 38 to westbound Highway 401 and the Parclo A configuration allows this movement to be free-flowing. The Parclo B configuration south of the Highway 401 is less preferred than a Parclo A configuration; however, the increased ramp length and cross-section result in increased capacity, as compared with the existing configuration. Alternative 4 has a LOS B.

Impacts to the significant woodlands and alvar vegetation community in the southwest quadrant are avoided; however, the high weighting attributed to private property and heritage feature impacts results in this alternative ranking among the less preferred options in terms of environmental criteria.

The geometry of the interchange is moderately improved, but with significant environmental impacts. For these reasons, Alternative 4 has a poor overall ranking.

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**Alternative 7**

Overall – 8  
Environmental – 5  
Transportation – 5  
Cost – 2

Similar in configuration to Alternative 4, Alternative 7 incorporates a Parclo A ramp in the northeast quadrant that directly impacts the heritage home. As with Alternative 4, impacts to the significant woodlands and alvar vegetation community in the southwest quadrant are avoided. Due to impacts to the heritage property, this alternative is among the less preferred options in terms of environmental criteria (tied with Alternative 4).

A significant turning movement at the interchange is from northbound Kingston Road 38 to westbound Highway 401 and the Parclo A configuration north of the Highway 401 allows this movement to be free-flowing. The alternative offers minimal improvements south of Highway 401 that result in minimal safety benefits and is much less preferable than other alternatives. Alternative 7 therefore only offers a moderate overall improvement to interchange performance and has a LOS B.

The significant environmental impacts with only moderate improvements to interchange operations result in a poor overall ranking for Alternative 7.

### 5.1.5 KINGSTON ROAD 38 UNDERPASS ALTERNATIVES

The existing Kingston Road 38 underpass was originally built in 1960 and has undergone repairs and rehabilitations since that time. As part of this study, a condition survey was undertaken and concluded that, due to its age and current condition, the bridge would likely require significant rehabilitation in the near future with subsequent regular maintenance at short intervals thereafter.

The Technically Preferred Alternative (TPA) accommodates a six-lane Kingston Road 38, per the City of Kingston Transportation Master Plan (TMP) (2009); however, the proposed improvements are compatible with either a six- or four-lane Kingston Road 38.

The structural construction / rehabilitation options for the underpass were as follows:

- A. Do Nothing
- B. Rehabilitate the existing four-lane bridge
- C. Widen existing bridge to six lanes and rehabilitate
- D. Construct new six-lane bridge on existing alignment using conventional methods
- E. Construct new six-lane bridge on existing alignment using accelerated construction methods
- F. Construct new six-lane bridge on a new alignment

The preferred interchange configuration requires a left turn lane across the bridge for traffic entering the proposed carpool lot and a bridge-span able to accommodate the new eastbound inner-loop on-ramp. The existing bridge is not sufficient to accommodate this and therefore **Option A and Option B are not feasible in the long term.**

Based on the condition of the bridge, any widening would also require a replacement of the bridge deck. The existing bridge type causes complications in this regard as the superstructure is integral with the substructure (i.e. the deck and girders of the bridge are integrated with the piers and abutments). Therefore to widen the bridge, part of, or the entire, substructure would require replacement, and thus the bridge as a whole would need to be replaced. As a result, **Option C is not feasible.**

It is feasible to replace the bridge on the existing alignment using conventional methods. The replacement would require a small realignment of Kingston Road 38 and utilize the 'replacement in halves' construction method (detailed in **Figure 5-21**). **Option D is therefore feasible.**

To construct a replacement bridge using accelerated construction methods, the existing superstructure is removed and the substructure is retained to support the new superstructure (i.e. the old deck is removed and a wider deck is hoisted onto the existing foundations). As the superstructure is integral with the substructure, any removal of the deck and girders would also require significant substructure replacement / rehabilitation. This would increase construction time and would offer minimal advantage over conventional techniques. Therefore, **Option E is not feasible.**

It is feasible to replace the bridge on a new alignment, therefore **Option F is feasible.** Several new alignment options are possible:

- Replace the bridge in halves to the east / west: the 'replacement in halves' construction method is utilized and concentrated to either the west or east of the existing bridge. The replacement will result in an alignment shift of 7.8 m, approximately half the width of the existing bridge. The replacement in halves to the west is detailed in **Figure 5-22**. The mirror of what is detailed in **Figure 5-22** would result in a replacement in halves to the east.
- Replace the bridge to the east / west: the bridge is replaced in its entirety either to the west or east of the existing structure on a new alignment shifted approximately 16.2 m (measured from the centreline of Kingston Road 38).

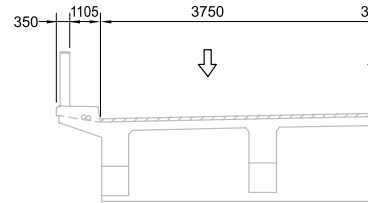


In summary, the following options for replacement of the bridge are feasible:

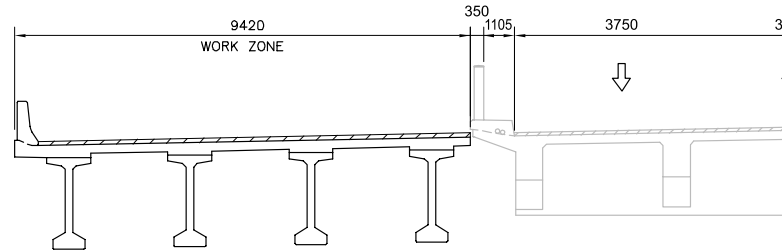
Bridge Replacement Option	Description of Alternatives
Option D	Replace the bridge on its current alignment (i.e., in the same location)
Option F-1	Replace the bridge on a new alignment, shifted approximately 16.2 m to the west
Option F-2	Replace the bridge in halves on a new alignment, shifted approximately 7.8 m to the west
Option F-3	Replace the bridge on a new alignment, shifted approximately 16.2 m to the east
Option F-4	Replace the bridge in halves on a new alignment, shifted approximately 7.8 m to the east

**Table 5-2** summarizes the key considerations used to screen the various bridge replacement options. As with the evaluation of interchange improvement alternatives, impacts to private property and heritage features were given significant consideration, as well as the overall construction duration. As a result, replacement of the bridge on a new alignment shifted by 16.2 m to the west is preferred, as it has the shortest construction duration and avoids impacts to property and heritage features.

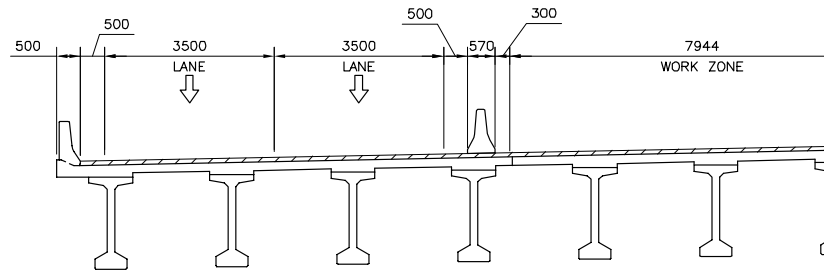
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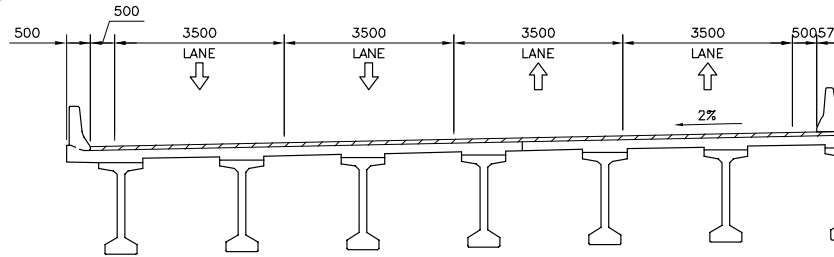
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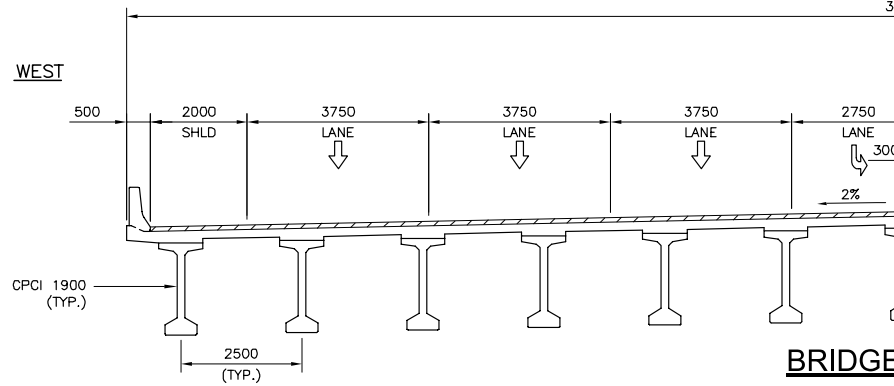
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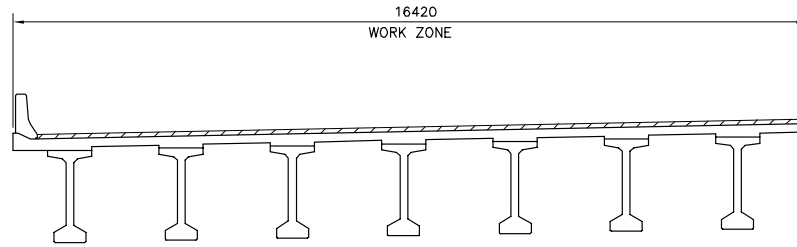
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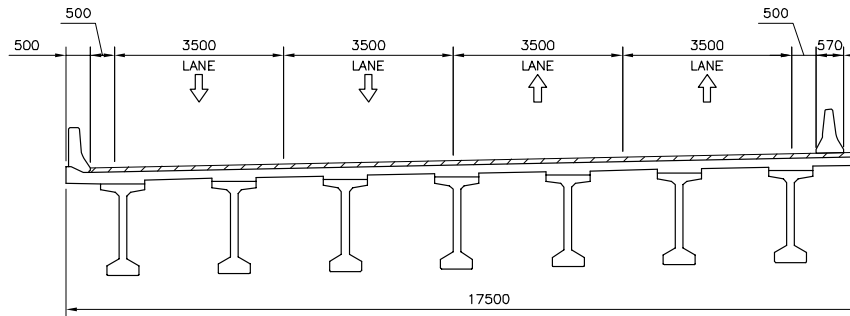
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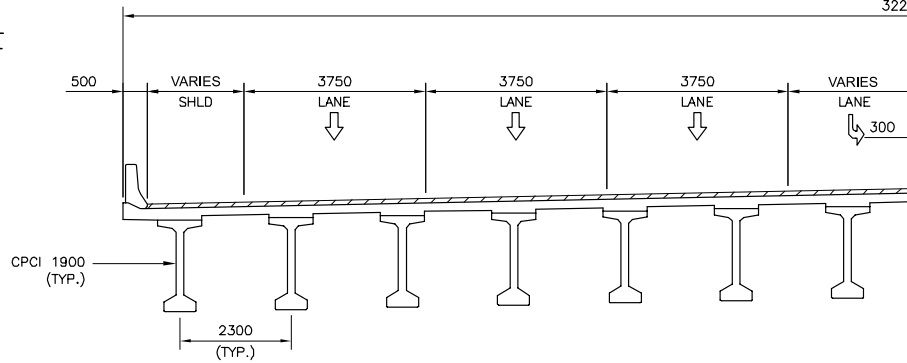
WEST



WEST



WEST



**Table 5-2: Screening of Kingston Road 38 Bridge Replacement Alternatives**

Realignment Alternatives	Environmental			Construction Duration	Results
	Natural	Socioeconomic	Cultural		
<b>Option D</b> Replace on Existing Alignment	Minimal impacts outside of existing footprint	No impacts to private property	No impacts	Requires 2 years of construction.	<b>Not preferred due to longer construction period</b>
<b>Option F-1</b> Replace on New Alignment (Shifted 16.2 m to the West)	Results in impacts to significant woodlands in SW quadrants	Lesser impact to homes and private property	No direct impacts to heritage features	Requires 1 year of construction.	<b>Preferred</b>
<b>Option F-2</b> Replace on New Alignment in Halves (Shifted 7.8 m to the West)	Results in impacts to significant woodlands in SW quadrants	Slightly lesser impact to homes and private property	No direct impact to Heritage Home	Requires 2 years of construction.	<b>Not preferred due to longer construction period</b>
<b>Option F-3</b> Replace on New Alignment (Shifted 16.2 m to the West)	Lesser impact to woodlands in NW and SW quadrants	Impacts to homes on Jackson Mills Rd	Directly impacts heritage features	Requires 1 year of construction.	<b>Not preferred due to significant heritage impacts</b>
<b>Option F-4</b> Replace on New Alignment in Halves (Shifted 7.8 m to the East)	Slightly lesser impact to woodlands in NW and SW quadrants	Impacts to homes on Jackson Mills Rd	Directly impacts heritage features	Requires 2 years of construction.	<b>Not preferred due to significant heritage impacts</b>

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## 6 TECHNICALLY PREFERRED ALTERNATIVE (LONG-TERM)

The Technically Preferred Alternative (TPA) is detailed in **Figure 6-1** and consists of a new interchange configuration (Alternative 5), combined with the realignment of Kingston Road 38. The Technically Preferred Alternative addresses the operational and geometric deficiencies of the interchange and enables efficient operation for the long-term.

### 6.1 TECHNICALLY PREFERRED ALTERNATIVE (LONG-TERM)

The Technically Preferred Alternative (TPA) includes the following operational improvements: a new interchange configuration, widening and realignment of Kingston Road 38, replacement of the Kingston Road 38 underpass on the new alignment, relocation of the carpool lot, and improvements to stormwater management infrastructure.

#### 6.1.1 GEOMETRIC AND OPERATIONAL IMPROVEMENTS

Kingston Road 38 will be realigned to the west, and retain the classification of Urban Arterial, with a design speed of 90 km/h. The City of Kingston's Transportation Master Plan (2009) shows that Kingston Road 38 will be widened from four to six lanes from the Centennial Drive / Creekford Road intersection to Mclvor Road. The long-term interchange improvements are designed to accommodate the widened Kingston Road 38 cross section; however, the proposed interchange improvements do not depend on the widening of Kingston Road 38, and can be constructed with a four-lane Kingston Road 38. Through-lanes and right- or left-turning lanes will have widths of 3.75 m and 3.5 m respectively, per the Geometric Design Standards for Ontario Highways (GDSOHs). The standards require minimum 3.5 m through-lane widths for a design speed of 90 km/h; however this is increased one increment when there is a high volume of trucks ( $\geq 10\%$ ). The wider lane widths will also aid LCVs to navigate the interchange. Existing shoulder widths will be retained except across the structure, where 2 m shoulders will be utilised to reduce structural cost. Per the GDSOH, shoulder width can be reduced to a minimum of 1.5 m on structures with spans over 50 m, and a 2 m width was preferred as it is considered the minimum usable shoulder width required to accommodate a disabled vehicle.

Existing operational issues result from the lack of capacity to accommodate traffic demand, which is exacerbated by the geometric limitations of the interchange. As a result, the majority of the proposed works include improvements to geometry and capacity. All geometric improvements conform to GDSOH. Traffic performance is measured by a 'Level of Service' (LOS) which acts as a measure of flow through the road network. Levels A - D are considered acceptable.

- LOS A = Light Traffic / Free Flow Speeds
- LOS B = Slightly Increased traffic levels / Still free flow speeds
- LOS C = Approaching moderate congestion levels / Speeds near free flow
- LOS D = Speeds Reduced / Lane changes restricted due to traffic
- LOS E = Congestion / Irregular traffic flow
- LOS F = Road at capacity / Gridlock with frequent stops

##### 6.1.1.1 North Ramp Terminal

The westbound off-ramp radii will be enlarged from 54 m to 130 m, per the GDSOH. To accommodate the enlarged loop ramp, the westbound on-ramp will be realigned and the north ramp terminal shifted north to the existing Mclvor Road and Kingston Road intersection. The existing Parclo 'B' inner-loop ramp radius of 54 m, north of Highway 401, is currently undesirable, and the limited vehicle storage and capacity exacerbates the impacts of queueing. The enlarged ramp radii, with widened pavement and lengthened / additional turning lanes, will improve the ramp storage and capacity. The new north ramp terminal at Mclvor Road will result in a four-leg intersection, providing for: Kingston Road 38, the Highway 401 westbound off- and on-ramps, and Mclvor Road. A channelized right-turn lane (radius of 55 m) will be provided for the traffic exiting the westbound off-ramp to southbound Kingston Road 38, allowing it to be free-flowing and thus improve operational performance.

As a result of these improvements, it is expected that the north ramp terminal will have an overall LOS C by 2033.

#### **6.1.1.2 South Ramp Terminal**

The less-than desirable eastbound inner-loop off-ramp will be removed and the interchange reconfigured south of Highway 401 into a Parclo 'A' configuration. South- and northbound Kingston Road 38 traffic will enter Highway 401 eastbound via a new eastbound inner-loop on-ramp loop ramp and the existing direct eastbound on-ramp, respectively. A carpool lot will replace the removed Parclo 'B' inner-loop ramp in the southwest quadrant. The existing eastbound on-ramp will be retained, with some slight adjustments to accommodate the realigned Kingston Road 38. Similar to the improvements to the north of Highway 401, the improvements to the south will mitigate the identified operational concerns. The existing interchange geometry south of Highway 401 is less-than-desirable. The recommended Parclo 'A' configuration is the most desired interchange configuration in terms of capacity and operational performance.

As a result of these improvements, it is expected that the north ramp terminal will have an overall LOS B or better by 2033. Overall, the interchange is expected to operate LOS C or better by 2033.

#### **6.1.1.3 Kingston Road 38 Realignment**

As detailed in Section 5.1.5, the recommendation to realign Kingston Road 38 sources from the structural assessment undertaken as part of this study. In summary, the identified Technically Preferred Alternative can accommodate seven lanes crossing Highway 401 (six general purpose lanes, as recommended by the City of Kingston's Transportation Master Plan [2009], and one left-turn lane) and a structure able to accommodate the new eastbound inner-loop on-ramp. It is noted that construction of the Kingston Road 38 realignment and structural replacement do not depend on a six-lane Kingston Road 38 cross section. The existing underpass can only accommodate four lanes across Highway 401, and cannot easily accommodate the new eastbound inner-loop ramp, therefore widening and / or replacement is required. Widening and / or replacement to the east are ruled out due to property, environmental and / or structural constraints, thus widening and / or replacement the west is preferred. Due to the bridge's age and structural type, widening is undesirable; therefore a replacement structure is required to the west of the existing. Kingston Road 38 is realigned to accommodate the new structure.

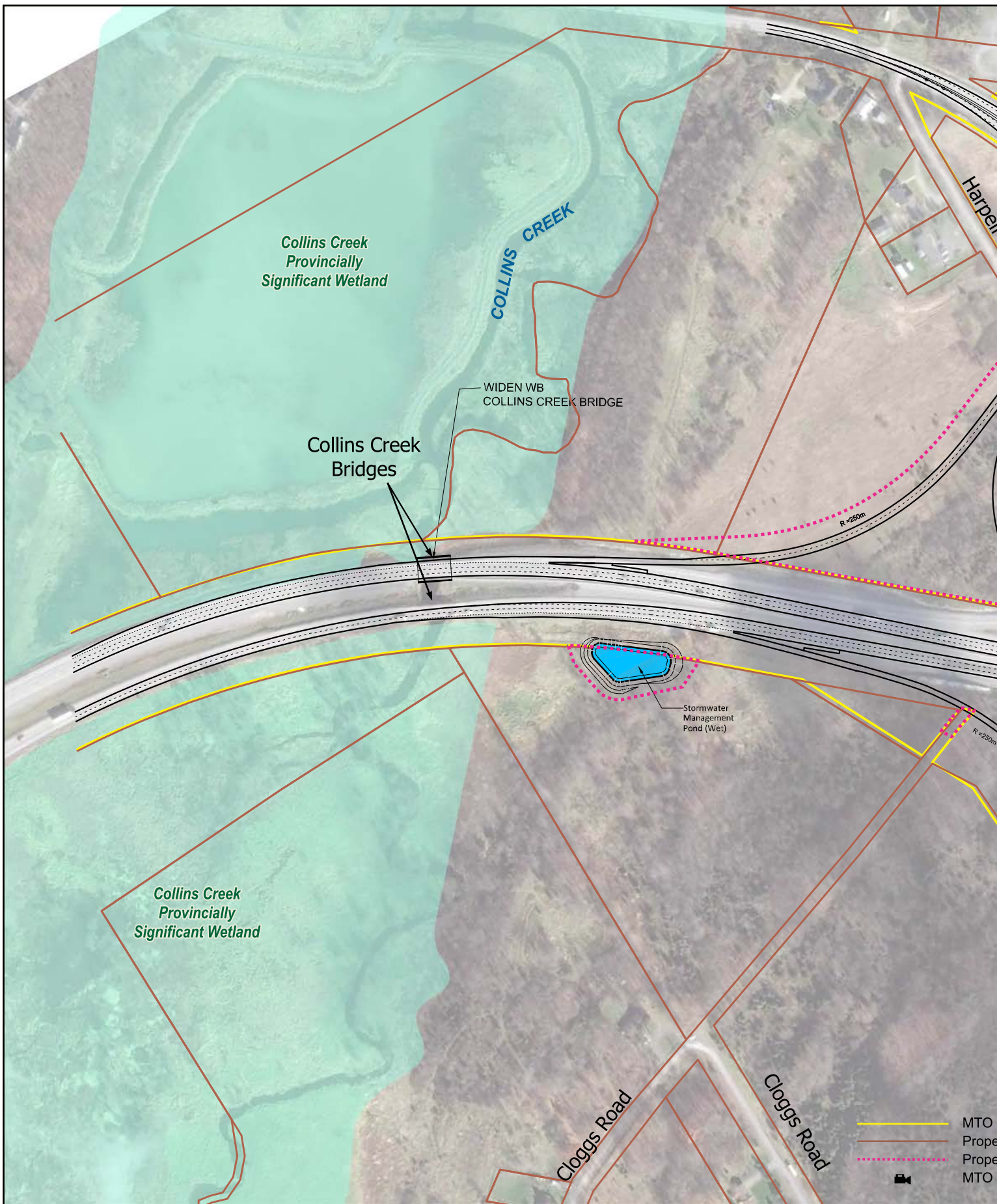
The realigned Kingston Road 38 will have a vertical alignment similar to that of the existing Kingston Road 38 to ensure the realignment ties into the existing alignment at the Mclvor Road and Centennial Road / Creekford Drive intersections. Tying into these intersections simplifies construction staging and constructability, as the new construction will be at the same elevation as the existing intersections. To achieve the horizontal realignment, the realigned Kingston Road 38 tightens the existing curve north of Highway 401 from 499 m to 420 m (minimum radius for a design speed of 90 km/h, per GDSOH) to curve the alignment west of the existing alignment and utilises a radius of 1700 m to curve eastwards and tie back into the existing Centennial Road / Creekford Drive intersection.

#### **6.1.1.4 Local Roads**

The vertical profile of Mclvor Road will be modified to improve the crest 'K' value at the north ramp terminal. Currently, at the Mclvor Road intersection with Kingston Road 38, Mclvor Road has a 'K' value of only 3, which corresponds to a design speed of less than 40 km/h, despite a posted speed of 60 km/h. The low 'K' value is not necessarily problematic in the current three-leg intersection configuration, as westbound traffic on Mclvor Road must reduce speed to stop, turn left, or turn right.

In both the interim proposed improvements and the Technically Preferred Alternative (long-term), the interchange is modified such that the north ramp terminal is shifted northerly to the Mclvor Road intersection, and therefore reconfigures the intersection into a four-way intersection. It is thus possible that through traffic on westbound Mclvor Road could pass directly through the intersection to access Highway 401 westbound; as there is not necessarily a requirement for these vehicles to slow down, the existing substandard 'K' value is not acceptable from a road safety perspective.

To address this issue, it is necessary to improve to the vertical profile of Mclvor Road, specifically the 'K' value of the crest curve on the approach to the ramp terminal. It is noted that improvement of the 'K' value will require raising the profile of Mclvor Road by up to 2 m, which would in turn require raising the offset intersection of Jackson Mills Road. It is noted that the profile raise of Mclvor Road can likely be lessened by lowering the profile of Kingston Road 39 by approximately 1 m (the maximum the road can be lowered without impacting proposed culverts) and by reducing superelevation rate on Kingston Road 38. It is further noted that lowering the superelevation rate on Kingston Road 38 would require reducing the design speed to 10 km/h over the posted limit. These measures should be considered in detail design, in consultation with the City of Kingston. If possible, opportunities to lower the posted speed of Kingston Road 38 and/or Mclvor Road would reduce the extent of re-profiling Mclvor Road.





## 6.1.2 STORMWATER MANAGEMENT PLAN

**Figure 6-2 (a-c)** details the proposed conditions drainage mosaic based on the proposed improvements to the Kingston Road 38 interchange. The majority of the Stormwater Management (SWM) plan recommended as part of the Proposed Interim Improvements is retained for the Technically Preferred Alternative (TPA). The stormwater management plan utilized for the Proposed Interim Improvements is detailed in **Section 6.2.2**.

Flows from Catchments 105, 104, 102 and 100 will drain to a dry SWM facility southeast of the McIvor Road and Jackson Mills Road intersection (Pond SWM 1) to provide quantity control.

New culverts P3 and P4, recommended as part of the Proposed Interim Improvements, will be retained as part of the TPA. Runoff from Catchment 112 will be directed to Catchment 115 via storm sewer. The combined flows from Catchments 112, 115, 130, 135 and 140 drain to Collins Creek via Culvert P5.

The drainage patterns of Catchments 110, 120, 145, 150, 155, and 180 remain the same as in interim conditions. Culvert C4 will be relocated and replaced by a new Culvert P6 under Kingston Road 38.

With the realignment of Kingston Road 38 and the construction of the new eastbound inner-loop on-ramp, the drainage boundary of Catchment 160 is updated. Runoff from Catchment 160 drains to the south side ditch of Highway 401 via a storm sewer and overland flow. A ditch inlet is proposed to collect the overland runoff. The storm sewer extends from the ditch inlet to the west side of Kingston Road 38.

The eastbound inner-loop on-ramp dissects the area west of Kingston Road 38 into Catchments 170 and 174. A new Culvert P7 located on the new eastbound inner-loop on-ramp is required to drain Catchment 170. The combined flows from Catchments 160, 170, 172, 174, and 175 including the minor system flows from Catchment 125 will be directed to the wet pond facility SWM 2, to provide quantity control, an enhanced level of water quality treatment and erosion control before discharging into Collins Creek. SWM 2 is the expanded existing SWM facility currently located southeast of the eastbound Collins Creek Bridge.

## 6.1.3 STRUCTURAL IMPROVEMENTS

### 6.1.3.1 *New Kingston Road 38 Underpass*

Prior to the project horizon year of 2033, it is expected that the Kingston Road 38 underpass will be replaced on a new alignment, west of the existing structure. The recommended new underpass is a two-span (39 m and 46 m) prestressed concrete I-girder structure. It will accommodate the realigned Kingston Road 38 cross-section: up to six general purpose lanes (3.75 m), one left-turn lane (3.5 m), paved shoulders (2 m) and a raised median. The bridge will be supported by a single reinforced concrete pier in the median of Highway 401 and by reinforced concrete abutments. A preliminary General Arrangement is provided in **Figure 6-3**. The new underpass will span the existing Highway 401 and a widened Highway 401 should capacity expansion be required in the future. The year in which the new underpass will be constructed will be dependent on the extent of the minor rehabilitation conducted in the interim (detailed in **Section 6.2.3**) and provincial funding and priorities.

### 6.1.3.2 *Collins Creek Bridges*

#### Westbound Lane Collins Creek Bridge

The new Highway 401 westbound on- and off-ramps require the westerly shift of the westbound speed-change lane. As a result, the westbound Collins Creek Bridge must be widened to accommodate the speed-change lane. Currently, the existing bridge accommodates three lanes of Highway 401 traffic (3.5 m, 3.75 m and 3.75 m) with shoulders of approximately 1 m; the shoulders vary slightly in width due to the curve of westbound Highway 401 over the structure. The Technically Preferred Alternative proposes to widen the structure to the north by a total width of approximately 7 m. A preliminary General Arrangement is provided in **Figure 6-4**. The widening of the bridge will remain within the MTO right-of-way.



#### Eastbound Lane Collins Creek Bridge

The Technically Preferred Alternative (TPA) will not directly impact the eastbound Collins Creek Bridge. The TPA proposes a new eastbound off-ramp for Highway 401 traffic, the speed-change lane of which will only begin east of the bridge. The eastbound lane Collins Creek Bridge currently accommodates two lanes of eastbound Highway 401 traffic (3.75 m each). The bridge has an outside shoulder of 3 m and an inside shoulder approximately 2 m; the shoulder varies slightly in width due to the curve of eastbound Highway 401 over the structure.

#### **6.1.4 CARPOOL LOT**

A new carpool lot will be constructed in the location of the existing Highway 401 eastbound off-ramp. The existing carpool lot was previously identified as requiring expansion; the *Carpool Lot Demand Assessment and Concept Plan for Expansion* completed by Read, Voorhees & Associates in March 2010 concluded that by 2019, the forecasted demand would require 110 spaces in the lot. A carpool lot of 120 spaces has been provided to accommodate the recommendations of the assessment and provide extra capacity should it be required. The location of the new carpool lot also affords sufficient space for future expansion. The preliminary design also provides for potential transit and/or active transportation facilities should they be desired. The *Carpool Lot Demand Assessment and Concept Plan for Expansion* completed by Read, Voorhees & Associates is included in **Appendix J**.

#### **6.1.5 FOUNDATIONS**

A foundations investigation and design report was completed as part of this study. The stratigraphy at the interchange typically comprises a thin layer of root mat or roadway asphalt and granular fill, occasionally overlying silty sand, which in turn are underlain by limestone bedrock.

In general, all boreholes drilled at the interchange encountered bedrock surface at shallow depths, with grey limestone bedrock encountered at shallow depth at each foundation of the existing Kingston Road 38 underpass. At the north abutment, the bedrock was covered by a thin veneer of root mat and at the Highway 401 median, bedrock was overlain by a 1.2 m layer of fill. At the south abutment, the bedrock surface was found outcropping at much higher elevation than at the north abutment. The groundwater level at the bridge site fluctuates and, in general, is governed by the seasonal weather patterns.

For the new Kingston Road 38 underpass, consideration was given to the following foundation types for the new abutments and piers:

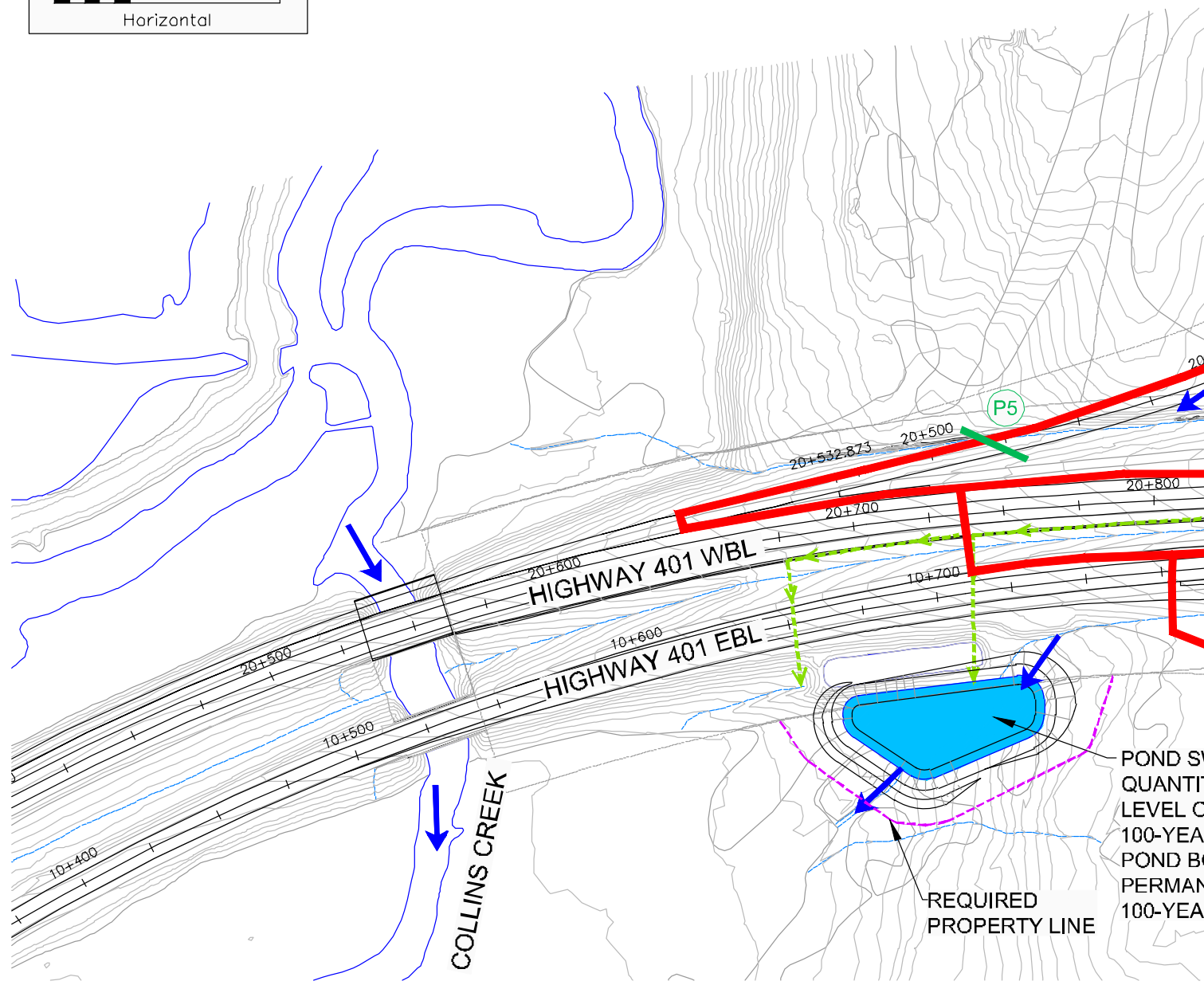
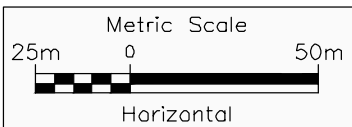
- Spread footings placed on limestone bedrock
- Spread footings placed on the granular pad
- Steel H-piles socketed into limestone bedrock, and
- Caissons socketed into bedrock.

Spread footings constructed directly on the bedrock surface or on granular pads placed on bedrock are expected to offer cost-effectiveness and relatively easy construction. A foundation consisting of H-piles socketed into bedrock is feasible and would permit design of integral abutments. Due to shallow depth to bedrock, socketing piles in the bedrock would probably be required to develop sufficient lateral resistance. Caissons socketed into bedrock could be also considered at this site; however it will require coring of large diameter holes in the relatively hard limestone, which will be significantly less cost-effective than spread footings.

The advantages and disadvantages of each alternative were assessed and Spread Footings on Bedrock was identified as the preferred option.

**LEGEND**

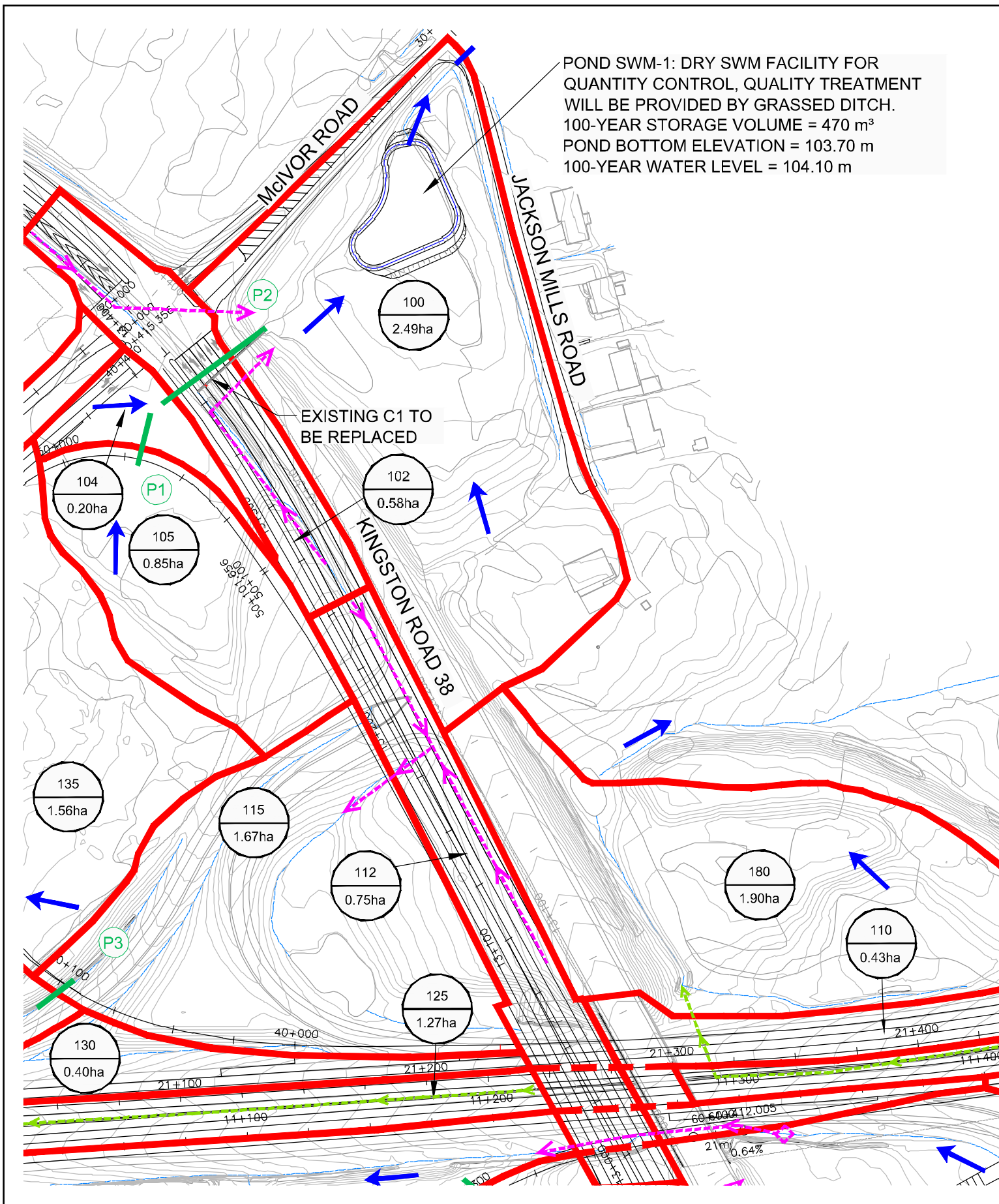
- CATCHMENT BOUNDARY
- PROPOSED CULVERT
- EXISTING CULVERT
- WATERCOURSE
- - - EXISTING STORM SEWER
- - - PROPOSED STORM SEWER
- FLOW DIRECTION
- P4 PROPOSED CULVERT ID
- C1 EXISTING CULVERT ID
- 165 CATCHMENT ID
- 0.04ha CATCHMENT AREA

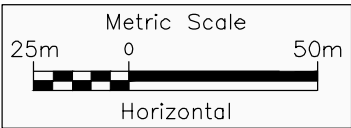
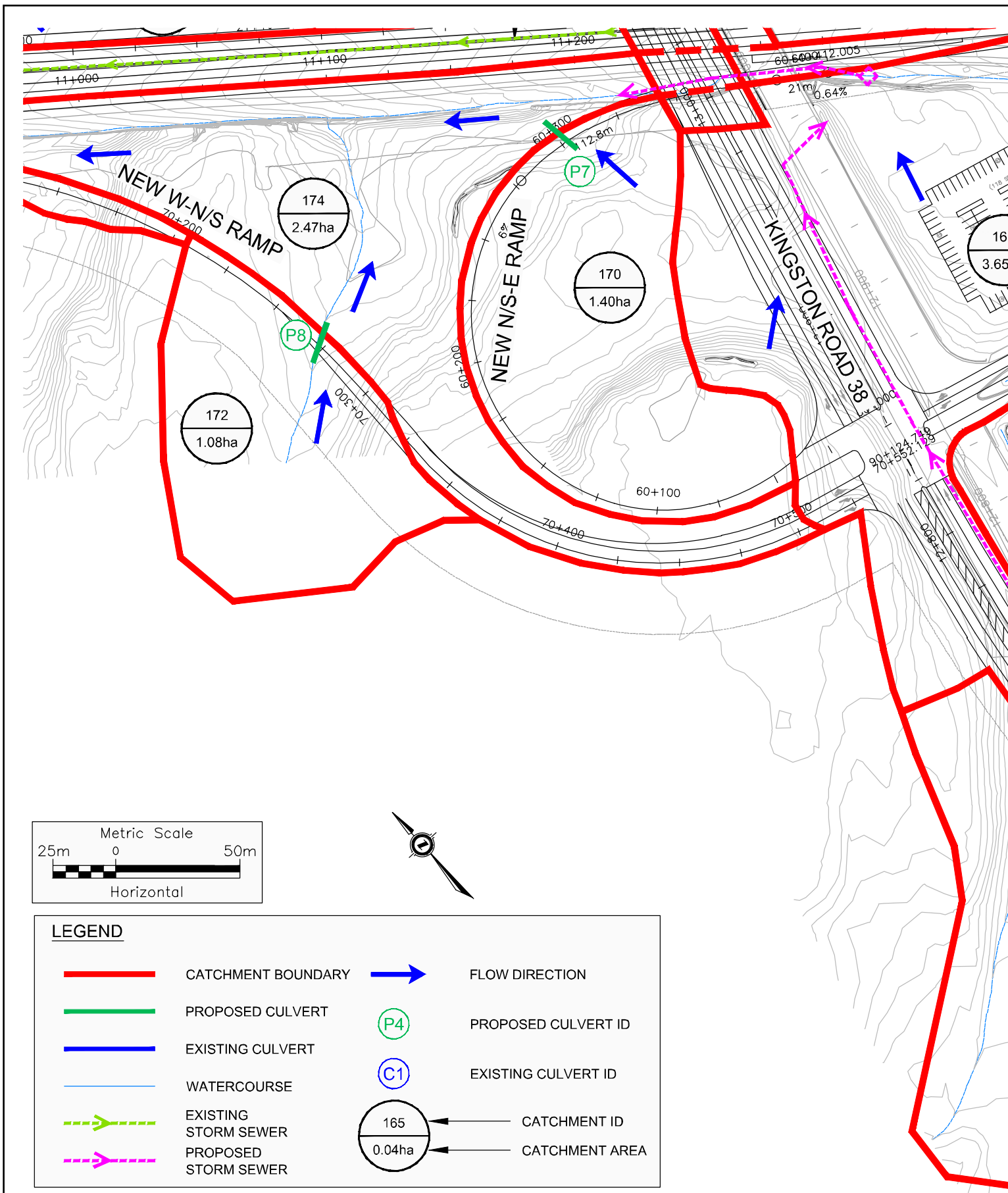


POND S  
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LEVEL C  
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POND B  
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100-YEA

REQUIRED  
PROPERTY LINE

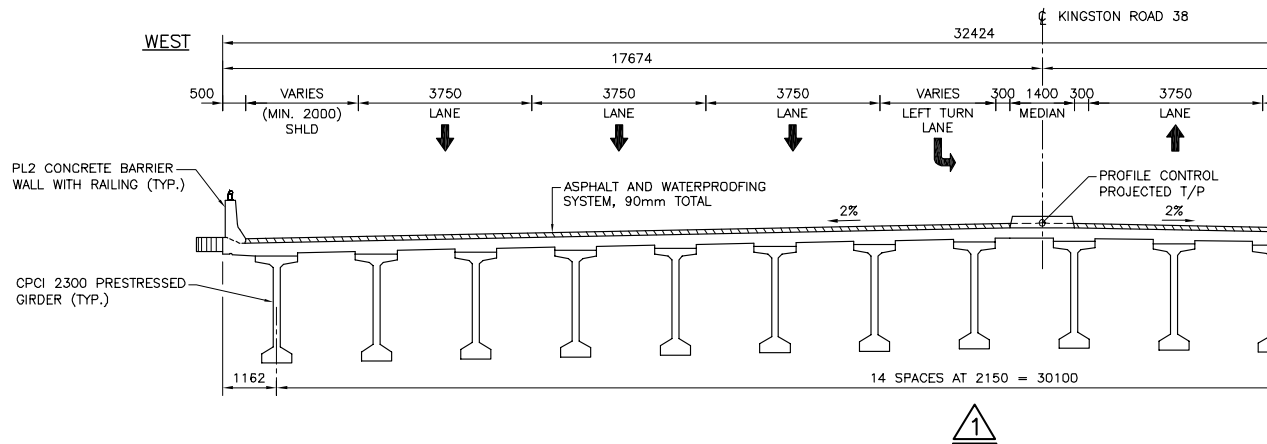
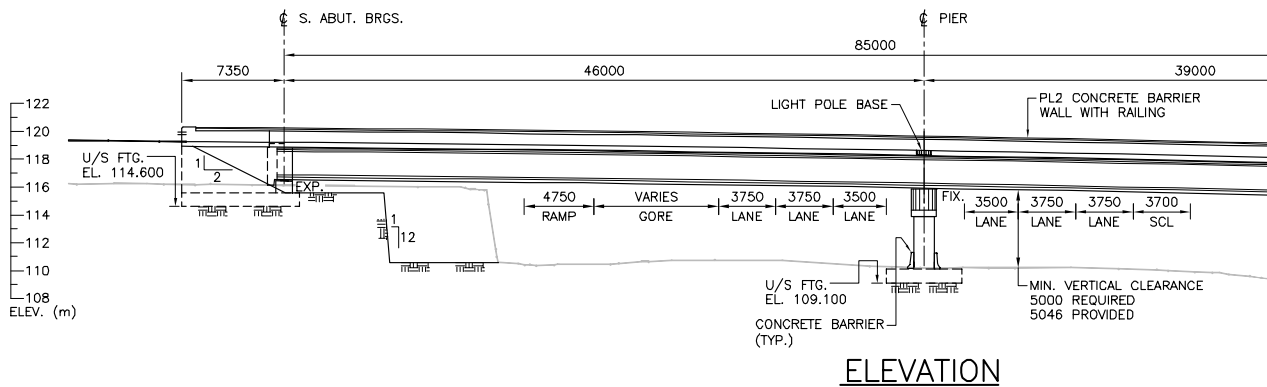
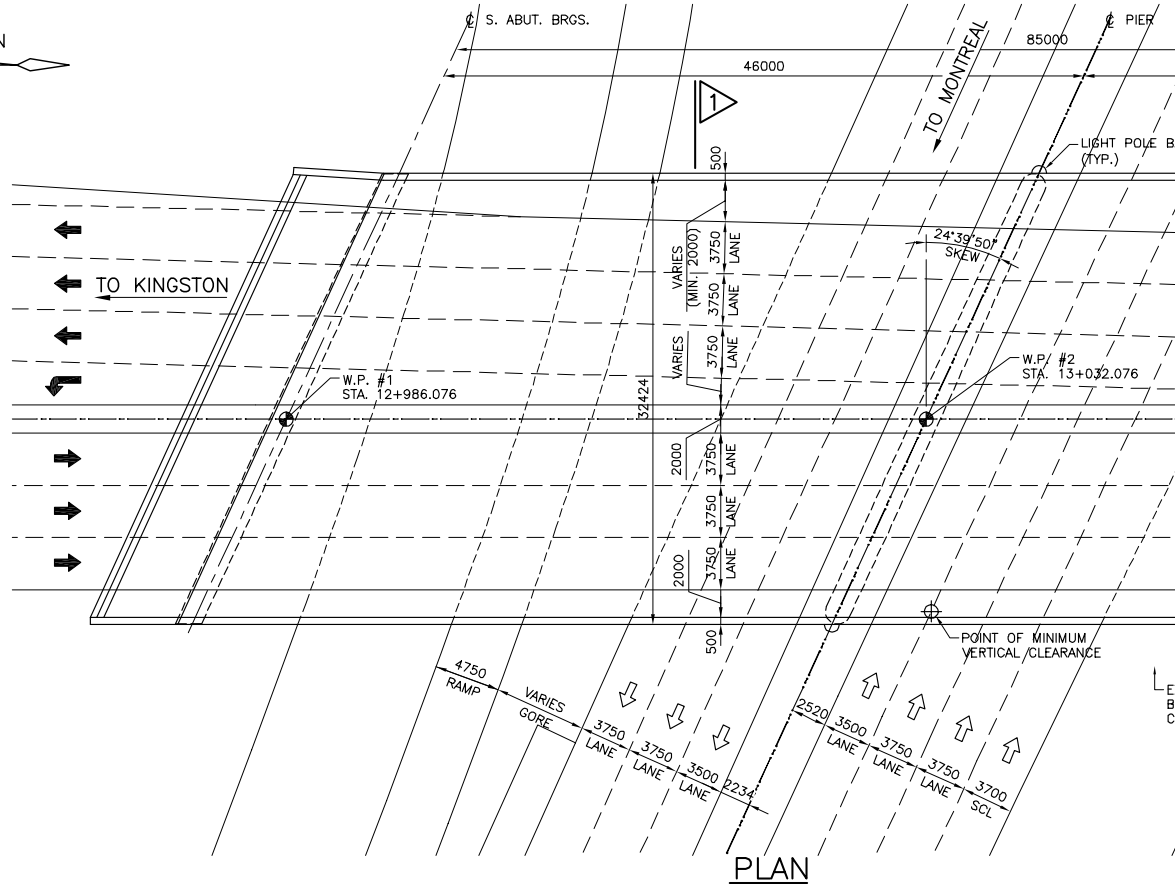
POND SWM-1: DRY SWM FACILITY FOR QUANTITY CONTROL, QUALITY TREATMENT WILL BE PROVIDED BY GRASSED DITCH. 100-YEAR STORAGE VOLUME = 470 m<sup>3</sup> POND BOTTOM ELEVATION = 103.70 m 100-YEAR WATER LEVEL = 104.10 m





LEGEND			
	CATCHMENT BOUNDARY		FLOW DIRECTION
	PROPOSED CULVERT		PROPOSED CULVERT ID
	EXISTING CULVERT		EXISTING CULVERT ID
	WATERCOURSE		CATCHMENT ID
	EXISTING STORM SEWER		CATCHMENT AREA
	PROPOSED STORM SEWER		









### 6.1.6 ILLUMINATION

Currently, there is no full, continuous illumination on Highway 401 within the limits of the interchange. The exit ramps of the interchange (westbound off-ramp and eastbound off-ramp) have full continuous lighting whereas the entrance ramps (westbound on-ramp and the eastbound on-ramp) are not illuminated. There is also full, continuous lighting on Kingston Road 38. Both the interchange ramp and municipal lighting are conventional poles with High Pressure Sodium (HPS) luminaires. The Kingston Road 38 interchange met the warranty for full, continuous illumination. However, the full lighting is optional based on the results of a benefit cost analysis. High-mast lighting is the recommended lighting plan for this interchange if full continuous lighting is to be installed, and is detailed in **Appendix K**. Should high-mast lighting not be desired, it is possible to use conventional illumination at the interchange, and this alternative is also detailed in **Appendix K**. There will be light trespass with both high mast and conventional lighting arrangements along the Ministry's Right-of-Way. Mitigating measures such as shielded photo-metrics will be reviewed in an attempt to address the light trespass in the preliminary design report.

### 6.1.7 UTILITIES

The utilities in the area include plant belonging to Hydro One and Bell. The proposed improvements aim to minimize impacts to the existing infrastructure where possible, and provide for the relocation and / or rehabilitation of the infrastructure subjected to unavoidable impacts. **Figure 6-5** details the impacted utilities under the Technically Preferred Alternative. Many utilities impacted by the Technically Preferred Alternative will have already been impacted by the Proposed Interchange Improvements, detailed in **Section 6.2.7**. Mitigation and final utility arrangements will be confirmed in Detail Design.





### 6.1.8 PROPERTY

To achieve the TPA, approximately 5 ha of private property will be required adjacent the interchange. Property requirement is shown in **Figure 6-1** and further detailed in **Section 7.3.6**.

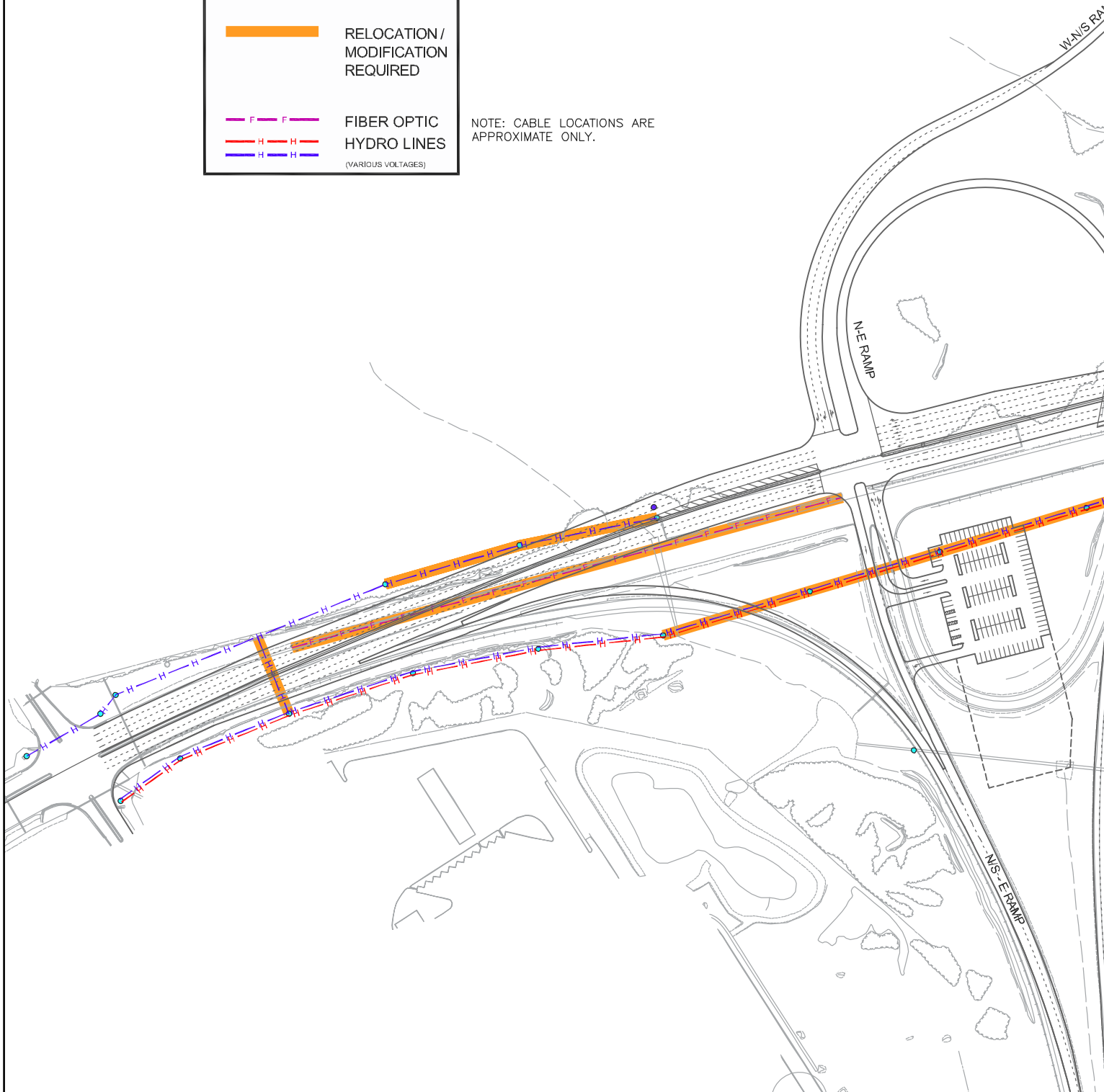
**LEGEND:**

- BELL - HYDRO
- HYDRO POLE
- POLE - OTHER

-  RELOCATION / MODIFICATION REQUIRED
-  FIBER OPTIC
-  HYDRO LINES
-  (VARIOUS VOLTAGES)

NOTE: CABLE LOCATIONS ARE APPROXIMATE ONLY.



## 6.2 PROPOSED INTERIM IMPROVEMENTS

Certain elements of the Technically Preferred Alternative can be implemented in the interim to provide operational benefits in the short term. **Figure 6-6** illustrates the recommended interim improvements.

### 6.2.1 INTERIM GEOMETRIC AND OPERATIONAL IMPROVEMENTS

Recommended interim improvements include the construction of the new eastbound Highway 401 off-ramp and the enlarged westbound Highway 401 on- and off-ramps. As detailed in **Section 6.1.1**, the existing eastbound off-ramp has an undesirable radius and is improved by relocating the ramp to the west of Kingston Road 38 and reconfiguring the off-ramp into a direct ramp. Enlarging the westbound on- and off-ramps reduces queueing, increases capacity and improves existing, undesirable ramp geometry. Kingston Road 38 will retain its existing alignment and be widened at the north and south ramp terminals to accommodate additional turn lanes. To minimize throw-away and negate impacts that are not also associated with the Technically Preferred Alternative, all widening will be to the west of the existing alignment.

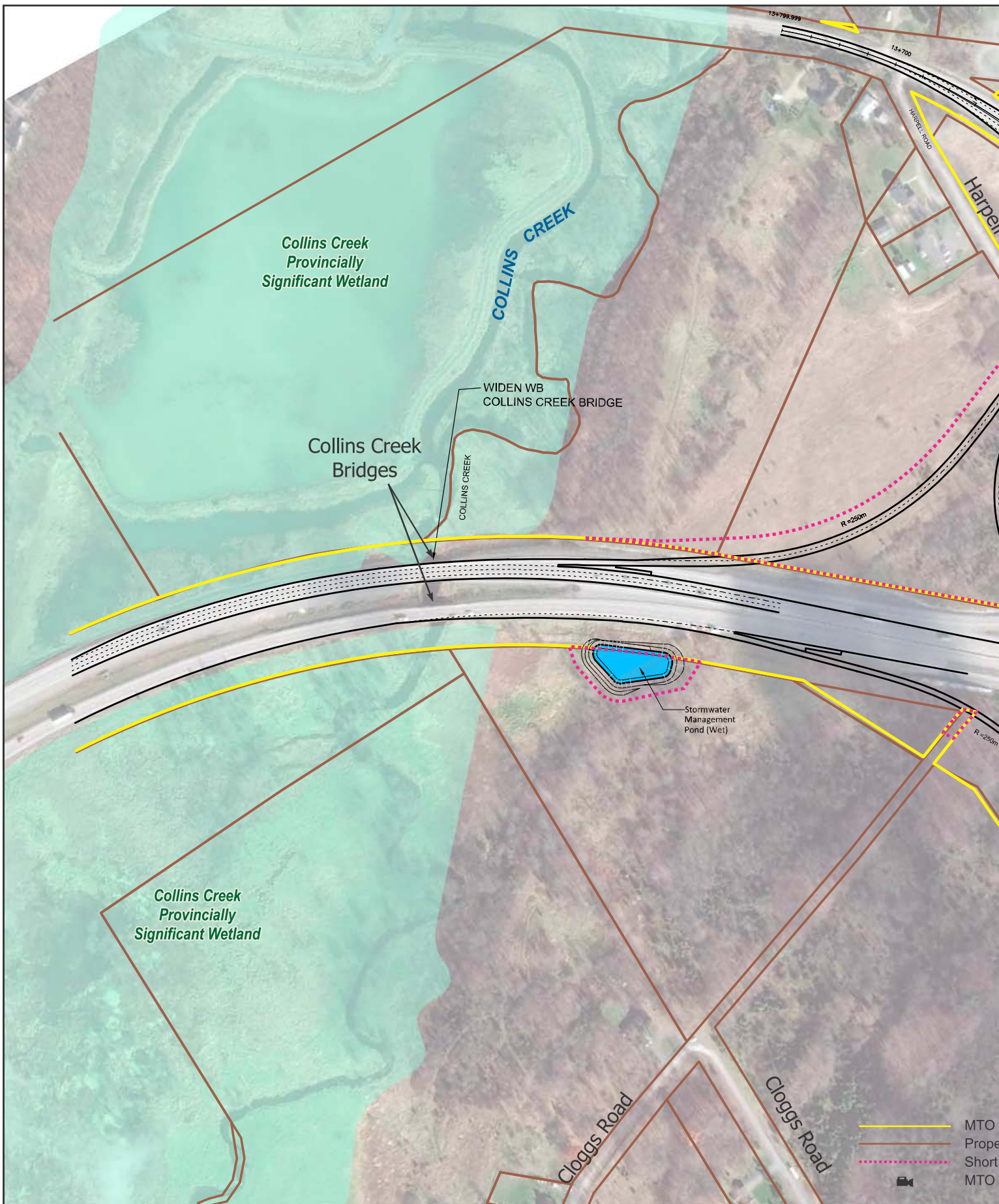
### 6.2.2 INTERIM STORMWATER MANAGEMENT

**Figures 6-7a to 6-7c** detail the interim conditions drainage mosaic based on the proposed interim improvements. Catchment 105 drains via a new Culvert P1 under the realigned westbound off-ramp to Catchment 104. Catchment 104 drains via replacement Culvert P2 under Kingston Road 38 to Catchment 100. The combined flows and the flows from Catchment 100 are directed to a proposed Stormwater Management (SWM) facility, southeast of the Mclvor Road and Jackson Mills Road intersection: Pond SWM 1. Pond SWM 1 will be a dry SWM facility to provide quantity control only. The controlled outflows from Pond SWM 1 drain to the south ditch on Mclvor Road through an existing culvert under Jackson Mills Road. Due to the realignments of the westbound off- and on-ramps, existing Culverts C2 and C3 will no longer be in service and can be abandoned or removed. Two new Culverts P3 and P4 are required on the westbound off-ramp to facilitate drainage from Catchments 115 and 135, respectively. The combined flows from Catchments 115, 130, 135 and 140 drain to Collins Creek via a new Culvert P5 on the westbound on-ramp.

The drainage patterns of Catchments 110, 120, 145, 150, 155, and 180 remain the same as existing conditions. The Corrugated Steel Pipe (CSP) extension of Culvert C4 located under eastbound on-ramp, which drains Catchment 140, is in a poor condition; therefore, the extended portion needs to be replaced in the interim.

A carpool lot is proposed in Catchment 160. Runoff from a number of catchments near this location will drain to the ditch located on the south side of Highway 401: Catchments 160, 165, 170 (via new Culvert P9 under the new eastbound off-ramp), Catchment 172 (via new Culvert P8 under the new westbound off-ramp) and Catchment 175. The combined flows including the minor system flows from Catchment 125 will be directed to an existing SWM pond located south of Highway 401. The existing SWM pond, located southeast of the eastbound Collins Creek Bridge, will be enlarged as Pond SWM 2 and will provide a wet pond facility to accommodate the additional runoff volume and to provide quantity control, an enhanced level of water quality treatment and erosion control before discharging into Collins Creek

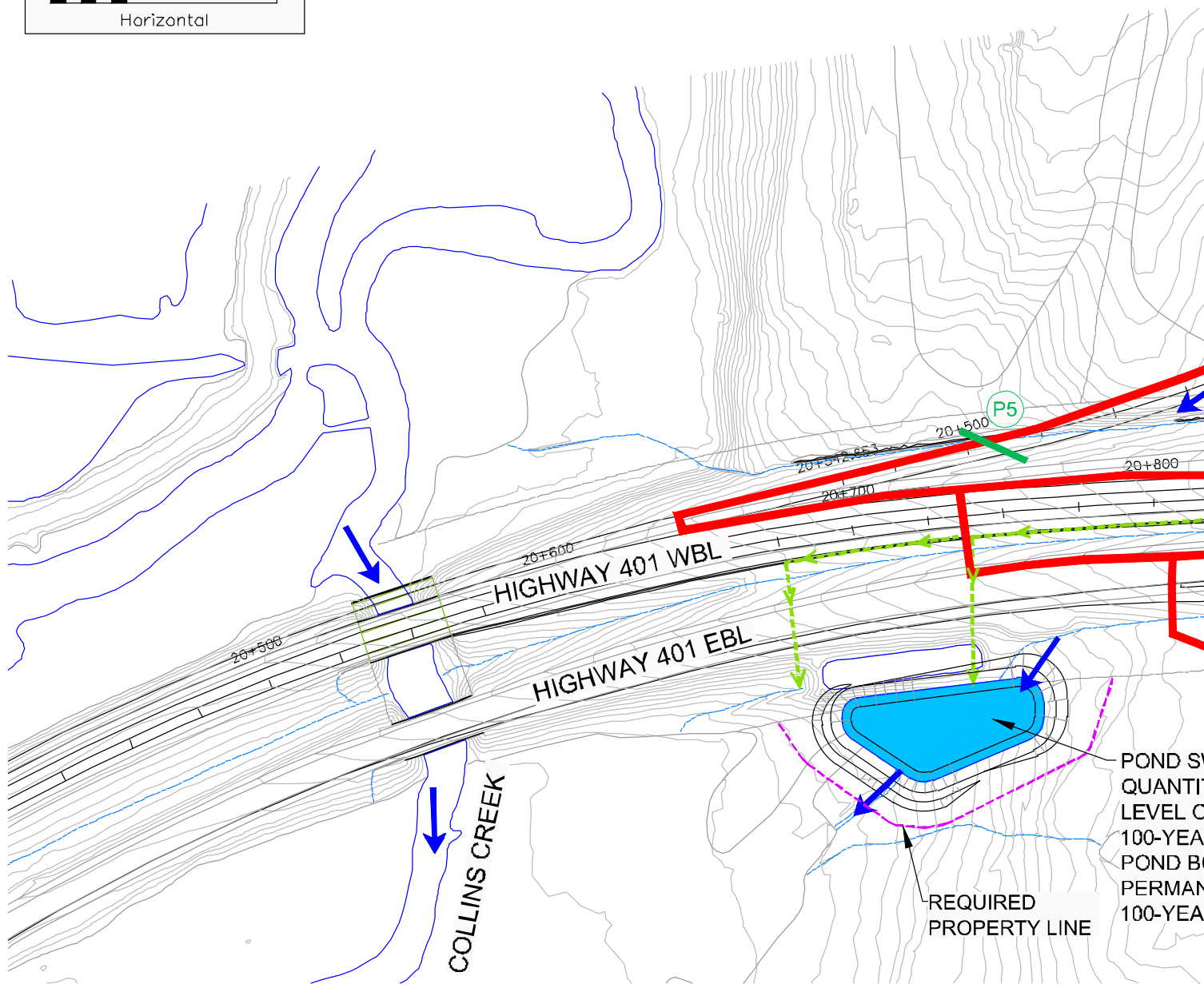
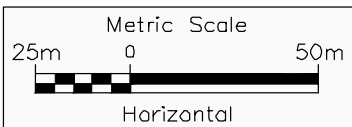






**LEGEND**

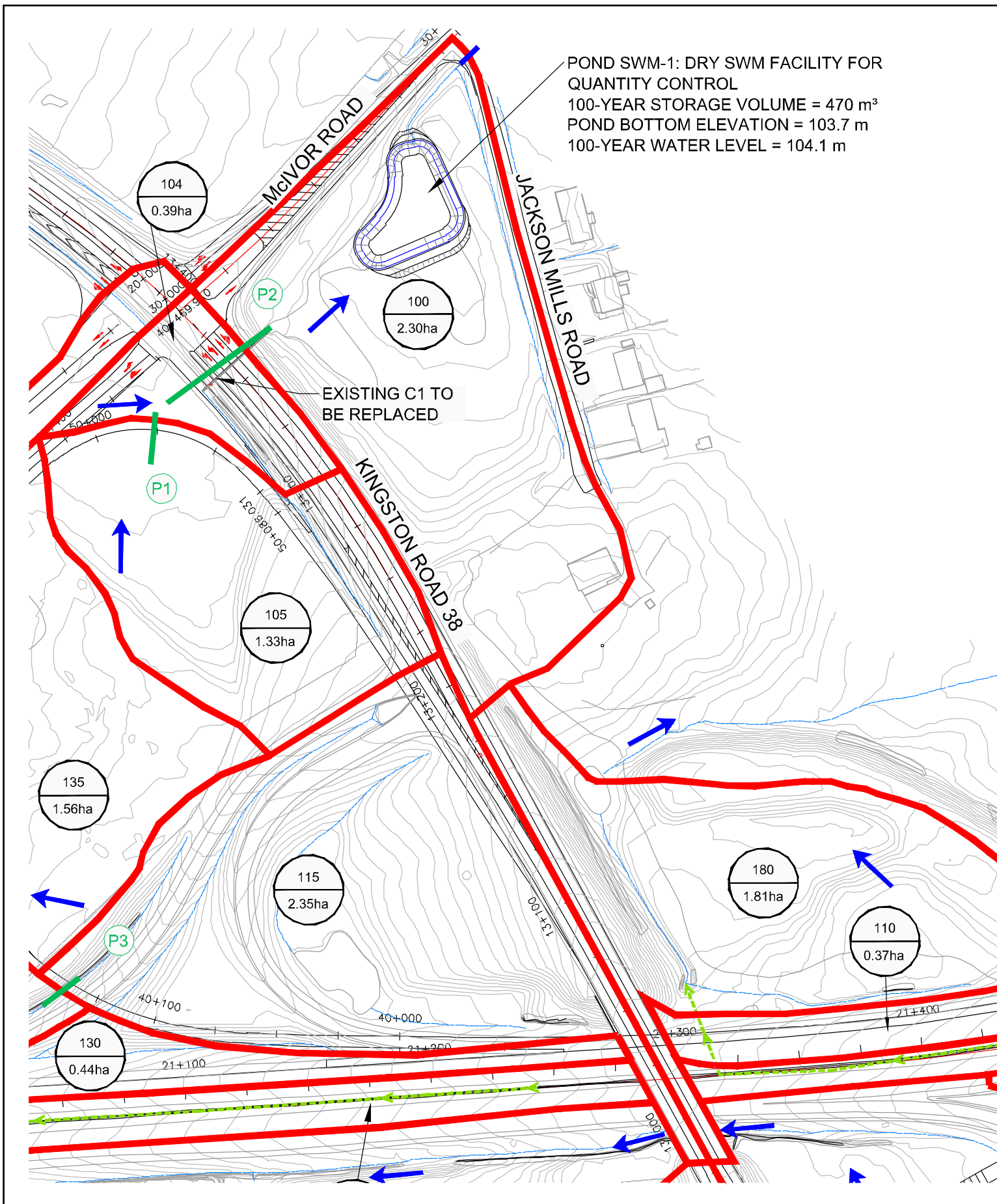
- CATCHMENT BOUNDARY
- PROPOSED CULVERT
- EXISTING CULVERT
- WATERCOURSE
- - - EXISTING STORM SEWER
- ← FLOW DIRECTION
- P4 PROPOSED CULVERT ID
- C1 EXISTING CULVERT ID
- 165 CATCHMENT ID
- 0.04ha CATCHMENT AREA

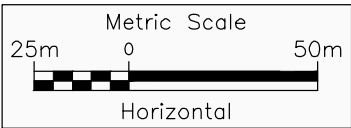
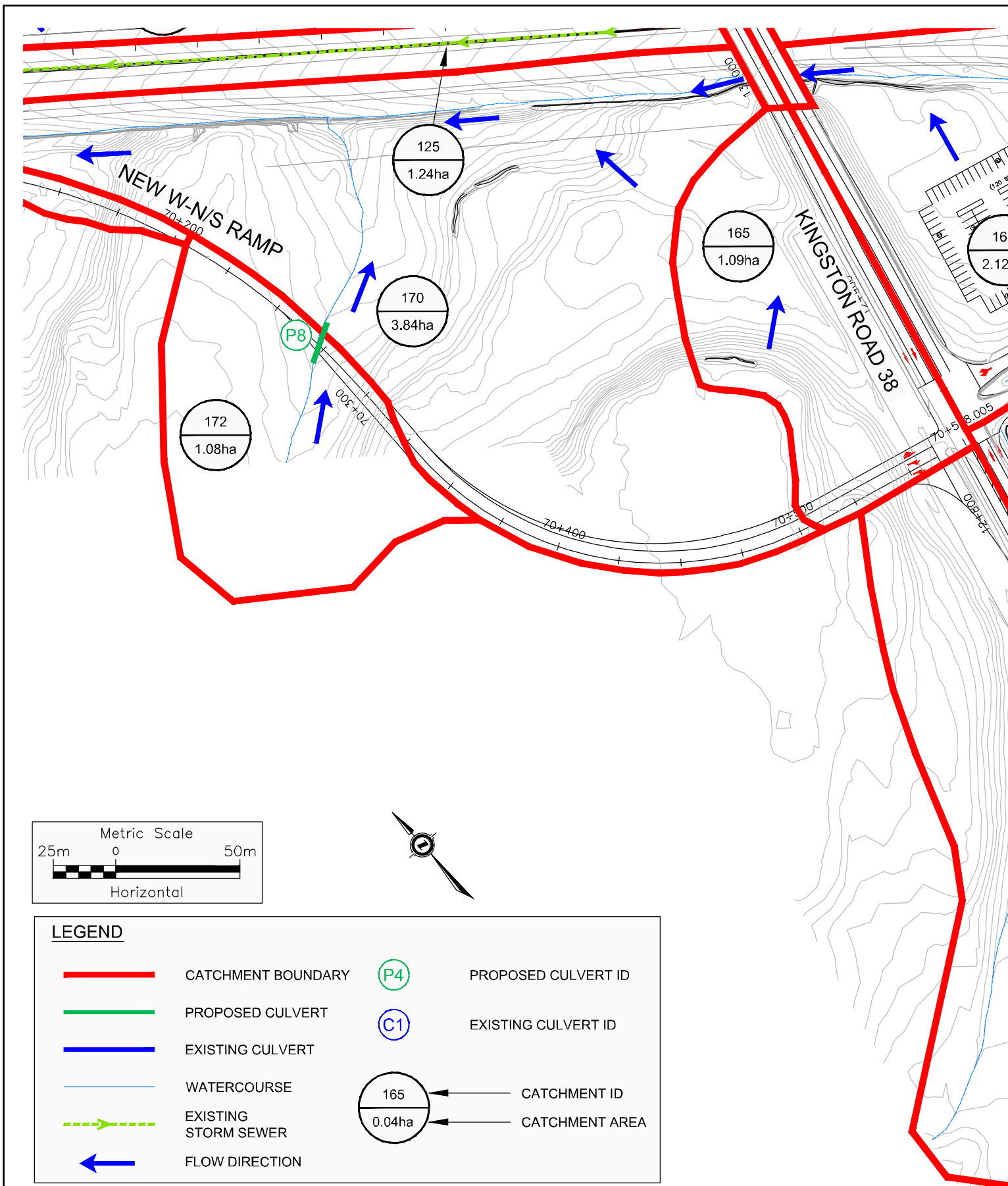


POND S  
QUANTIT  
LEVEL C  
100-YEA  
POND B  
PERMAN  
100-YEA

REQUIRED  
PROPERTY LINE

POND SWM-1: DRY SWM FACILITY FOR QUANTITY CONTROL  
 100-YEAR STORAGE VOLUME = 470 m<sup>3</sup>  
 POND BOTTOM ELEVATION = 103.7 m  
 100-YEAR WATER LEVEL = 104.1 m





LEGEND			
	CATCHMENT BOUNDARY		PROPOSED CULVERT ID
	PROPOSED CULVERT		EXISTING CULVERT ID
	EXISTING CULVERT		CATCHMENT ID
	WATERCOURSE		CATCHMENT AREA
	EXISTING STORM SEWER		
	FLOW DIRECTION		

### 6.2.3 INTERIM STRUCTURAL IMPROVEMENTS

The proposed interim improvements include a minor rehabilitation of the existing underpass. The existing underpass was last rehabilitated in 2004/5 and the work completed is expected to maintain the bridge until 2019. The “interim” time period considered for this study begins at project initiation, 2013, and spans 5 - 10 years, from 2018 - 2023. As the prior rehabilitation will only last until 2019, a further rehabilitation is recommended as part of the proposed interim improvements. The proposed rehabilitation is expected to maintain the underpass until the latter years of the long-term time period (2029 - 2033).

The proposed minor rehabilitation will include patching of the soffit and substructure and thus be concentrated underneath the existing structure. No rehabilitation work on the deck (on top of the structure) is required in the interim. As the work is concentrated underneath the existing underpass, only Highway 401 traffic will be disrupted by the work. To keep disruption to a minimum, it is proposed that the rehabilitation work only occur at night with temporary lane reduction. The construction staging details will be confirmed during detail design.

### 6.2.4 INTERIM CARPOOL LOT IMPROVEMENTS

With the removal of the existing eastbound off-ramp, a new carpool lot will be constructed in the southeast quadrant, as detailed in **Section 6.1.4**. The new carpool lot will be illuminated and will accommodate 120 spaces. Construction of the new carpool lot is recommended in the interim. Based on future needs and demand, the carpool lot can be expanded at a future date if required.

### 6.2.5 INTERIM FOUNDATION IMPROVEMENTS

As the Proposed Interim Improvements utilise the existing Kingston Road 38 underpass, no impacts or improvements are anticipated to the structural foundations. Rehabilitation to the face of the abutments may be included in the interim structural rehabilitation.

### 6.2.6 INTERIM ILLUMINATION IMPROVEMENT

The improvements to illumination will be the same as described in **Section 6.1.6**. The Kingston Road 38 interchange met the warranting condition for full, continuous illumination. However, the full lighting is optional based on the results of a benefit cost analysis. High-mast lighting is the recommended lighting plan for the interim condition at the interchange, if full continuous lighting is to be installed and is detailed in **Appendix K**. Should high-mast lighting not be desired, it is possible to use conventional illumination at the interchange, and this alternative is also detailed in **Appendix K**.

### 6.2.7 INTERIM IMPROVEMENT IMPACTS TO UTILITIES

The Proposed Interim Improvements will directly impact utilities at the interchange. As described in **Section 6.1.7**, the utilities in the area include plant belonging to Hydro One and Bell. The proposed improvements aim to minimize impacts to the existing infrastructure where possible, and provide for the relocation and / or rehabilitation of the infrastructure subjected to unavoidable impacts. **Figure 6-8** details the impacted utilities under the Proposed Interim Improvements.

### 6.2.8 INTERIM IMPACTS TO PROPERTY

To achieve the interim improvements, approximately 5 ha of private property will be required adjacent the interchange. Property requirements are shown in **Figure 6-1** and further detailed in **Section 7.3.6**. The majority of property required is located in the northwest quadrant to accommodate the new westbound on- and off-ramps.



## 6.3 TRAFFIC / CONSTRUCTION STAGING

Preliminary construction staging plans for both the proposed interim improvements and the Technically Preferred Alternative (TPA) are included in **Appendix L** and are not anticipated to require road closures. The impacts to traffic operation at the interchange due to the traffic / construction staging are further detailed in **Section 7.3.4**.

### 6.3.1 INTERIM IMPROVEMENTS STAGING

For the implementation of the proposed interim improvements, temporary disruption is anticipated for traffic utilizing the westbound on- and off-ramps during their enlargement. The majority of the new westbound on- and off-ramp can be built without impacting operations on the existing ramps. Disruption will occur when connecting the new westbound off-ramp either side of the existing westbound on-ramp (as illustrated in **Appendix L**). The contractor will have the option of temporarily closing the existing westbound on-ramp to complete construction, or temporarily utilizing the new westbound on-ramp in conjunction with the existing westbound off-ramp. The latter scenario will result in the north ramp terminal being off-set, with traffic exiting Highway 401 onto Kingston Road 38 180 m south of where traffic would enter Highway 401, using the new westbound-on ramp. The staging plan will be further refined during Detail Design.

To accommodate the speed-change lane of the new westbound on-ramp, the westbound Collins Creek Bridge requires widening. During the widening, Highway 401 westbound will be reduced from three lanes to two lanes of 3.5 m width for westbound traffic. The lane reduction is anticipated to have a small impact to operations as the third lane at this location is only utilized as a truck-climbing lane and not required in terms of capacity.

Kingston Road 38 will also be widened at the existing south ramp terminal and proposed north ramp terminal to accommodate left-turn lanes. Lane widths of general purpose lanes on Kingston Road 38 will be reduced during the widening at the terminals, and some lane closures may be required. Traffic staging will be further reviewed in Detail Design.

### 6.3.2 TECHNICALLY PREFERRED ALTERNATIVE STAGING (LONG-TERM)

#### 6.3.2.1 Preferred Construction Staging Methodology

The development from the proposed interim improvements to the Technically Preferred Alternative consists of realigning Kingston Road 38 west of the existing alignment, with a new underpass, and constructing a new eastbound inner-loop on-ramp in the southwest quadrant. The majority of construction of both the realigned Kingston Road 38 and the new eastbound inner-loop on-ramp can be completed with minimal disruption to traffic and operations at the interchange.

For the construction of the new Kingston Road 38 underpass, Highway 401 will be subject to a construction staging cross-section, with the westbound general purpose lanes reduced to 3.5 m to accommodate a work-zone in the median. A work zone within the median of Highway 401 is required to construct the main piers of the new Kingston Road 38 underpass. At this stage, the new eastbound off-ramp has already been constructed as part of the proposed interim improvements, therefore eastbound Highway 401 would be utilizing a wide right-hand shoulder where the existing eastbound off-ramp speed-change lane was located. As a result, there is adequate pavement width for the eastbound Highway 401 lanes to shift and accommodate a work zone in the median, without reducing lane width.

The proposed strategy will construct the realigned Kingston Road 38 and new underpass, shift traffic onto the new alignment and then demolish the existing infrastructure. To carry out the demolition, the existing bridge is proposed to be demolished in halves. As the structure is integral, meaning that the deck and foundations are integrated, it results in rapid demolition options being non-viable. As the bridge is a two-span structure, the proposed construction staging involves shifting the alignments of the Highway 401 traffic through the north and south spans of the existing bridge during the demolition of the unused spans. Lane widths will be reduced to 3.5 m and shoulders reduced to 0.5 m. The westbound inner-loop off-ramp speed-change lane will also be removed during the alignment shifts and traffic wishing to access the loop



ramp will utilize a direct taper, west of the new bridge. The use of the direct taper will require a reduction in posted speed to 80 km/h. The proposed alignment shifts and construction cross-sections are further detailed in **Appendix L**. This is the preferred traffic management strategy.

### **6.3.2.2 Alternative Construction Staging Methodologies**

The shifting alignments of Highway 401 require construction within the median and median crossovers both east and west of Kingston Road 38. Given that this approach has a relatively high cost, and can be complex, an alternative approach to staging has been considered. In the event that median crossovers are not pursued, it is possible to demolish the existing bridge in three stages by using a temporary support. A full description with detailed cross-sections of this alternative methodology is included in **Appendix L**. The first stage would include the demolition of the complete southern half of the existing underpass, with eastbound Highway 401 traffic being diverted through the interchange ramps. Once complete, westbound Highway 401 is reduced to one lane and a temporary support installed. The existing bridge is then demolished northwards from the median to the temporary support. Once this has occurred, westbound Highway 401 then utilizes one lane adjacent the median while the remaining northern half of the existing bridge is demolished. It is noted that there are potential risks with this alternative and further refinement of this alternative should be explored in Detail Design.





Another feasible alternative would be to detour Highway 401 and Kingston Road 38 around the interchange during bridge demolition. In this case, eastbound Highway 401 will utilize the new eastbound off-ramp and existing eastbound on-ramp as a temporary detour, and westbound Highway 401 traffic will utilize the westbound off-ramp at Sydenham Road, travel along Mclvor Road, and re-enter Highway 401 using the new westbound on-ramp at Kingston Road 38. While this alternative would simplify the bridge demolition task, it would have significant short-term traffic impacts.

In general, it is recommended that construction staging be reviewed in greater detail in Detail Design.

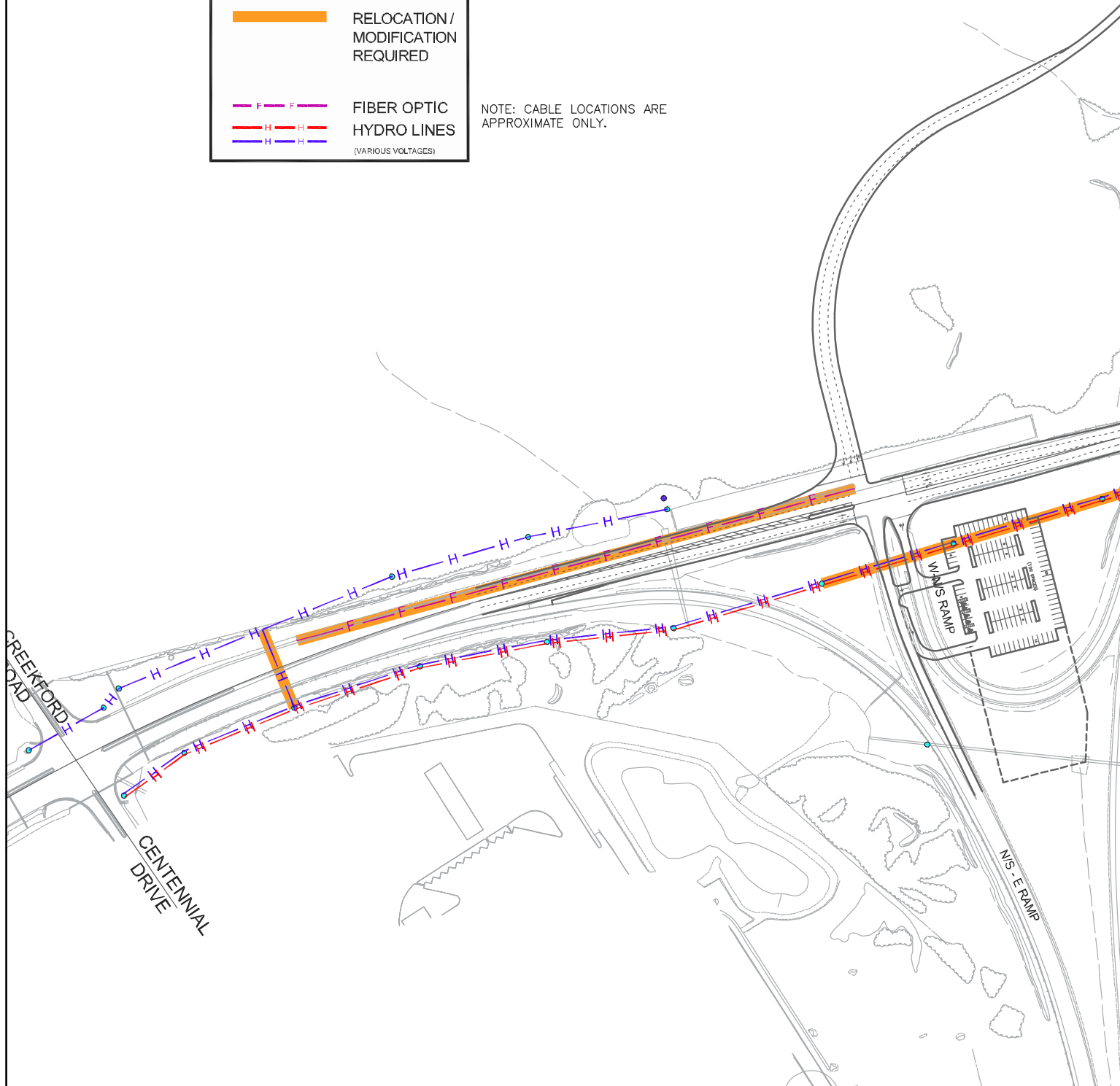
LEGEND:

- BELL - HYDRO
- HYDRO POLE
- POLE - OTHER

-  RELOCATION / MODIFICATION REQUIRED
-  FIBER OPTIC
-  HYDRO LINES
-  (VARIOUS VOLTAGES)

NOTE: CABLE LOCATIONS ARE APPROXIMATE ONLY.



## 7 ENVIRONMENTAL ISSUES AND COMMITMENTS

This section describes the direct and indirect environmental impacts and corresponding mitigation measures associated with the implementation of the Technically Preferred Alternative. Mitigation includes planning decisions, design features, and Detail Design and construction requirements / constraints to avoid or minimize impacts for each identified environmental issue.

The environmental impacts and mitigation measures outlined in this section are based on the preliminary design for the bridge replacement and highway widening. They will be reviewed and refined during the Detail Design phase and will be documented in a Design and Construction Report (DCR).

### 7.1 IMPACTS TO THE TERRESTRIAL ENVIRONMENT

#### 7.1.1 VEGETATION

##### 7.1.1.1 *Southwest Quadrant*

The area impacted by the proposed works in the southwest quadrant of the interchange encompasses forest, woodland, and shrub alvar communities including Common Juniper Shrub Alvar (ALS1-1), Dry-Fresh Sugar Maple Forest (FOD5), Red Cedar Cultural Alvar Woodland (CUW2-1), Dry-Fresh Sugar Maple - Basswood Deciduous Forest (FOD5-6), Dry-Moist Old Field Meadow (CUM1-1), Fresh-Moist Bitternut Hickory Deciduous Forest (FOD9-5), and Forb Mineral Meadow Marsh (MAM2-10). The alvar is a rare community type in Ontario and meets the criteria for significant wildlife habitat. Direct impacts on these communities include cut/fill and permanent vegetation removal (including ~2.9 ha of alvar) to accommodate new road surfaces.

The wooded area extending from near Collins Creek to Kingston Road 38 is identified as significant woodland by the City of Kingston and Cataraqui Region Conservation Authority. Following the implementation of the interchange improvements, which will result in the removal of approximately 5.3 ha of significant woodland, the woodland is expected to retain much of its ecological significance; however, its overall habitat diversity and value will be reduced. This will result in a negative impact to the significant woodland.

The Cataraqui Region Conservation Authority (CRCA) has been informed of the extent of impacts to the alvar and significant woodland; however, further consultation with CRCA and MNRF regarding appropriate mitigation is required during detail design.

Impacts to the old field meadow type vegetation include removal as a result of installation of a stormwater management pond near, as well removal of vegetation and addition of fill for installation of the W-N/S ramp where it meets Highway 401. These modifications and removals are considered minor in nature, as vegetation in these areas is composed of common and widespread species that are not limited in the study area.

Other impacts associated with the construction of ramps and re-alignment of Kingston Road 38 consist of blasting of 7 to 9 m in depth through the forest, cultural woodland, and alvar units, as well as removal of a small marsh (MAM2-10) community south of the existing carpool lot. Significant rock blasting (cuts below grade) is required where ramps are installed, while fill is required to accommodate portions of the realignment of Kingston Road 38. Rock blasting and contouring of the ramps and adjacent slopes will likely result in removal of all vegetation within the MTO right-of-way. Changes to the local hydrology of the communities can be expected as a result of the required works.

Removal of the marsh community is considered to have minimal ecological effects, due to its small size and lack of significant function for the wider area, as well as its location directly adjacent to the highway and carpool lot with no buffering land use. No rare flora was recorded within it and any water storage, recharge, or discharge functions it may have are considered to be minor.

Hydrological changes as a result of rock blasting and grading in the forest and alvar communities have the potential to impact a greater area outside of the direct removal zones. Current surface flows and storage potential may be altered as a result of the fragmentation of the bedrock, with a potential decrease in the amount of water available to surrounding vegetation.

The alvar may be particularly sensitive to changes in hydrology, as patterns of vegetation establishment and survival are largely linked to sheet flow and water storage capacities of the bedrock surface and shallow soils. Alvars have typically been found to experience flooding conditions in the spring, intense drought in late summer, and a return to moister conditions in the fall. A significant loss of alvar habitat and function is possible as a result of the preferred alternative.

#### **7.1.1.2 Northwest Quadrant**

Vegetation communities impacted by the proposed works in the northwest quadrant of the study area include Fresh-Moist Green Ash Lowland Deciduous Forest (FOD7-2), Dry-Moist Old Field Meadow (CUM1-1), Reed Canary Grass Mineral Meadow Marsh (MAM2-2), and Red Cedar Cultural Alvar Woodland (CUW2-1). The woodland/forest area is designated a 'contributory woodland' in the City of Kingston Official Plan. Direct impacts on these communities include cuts (to a maximum depth of 9m), addition of fill, and permanent vegetation removal to accommodate new infrastructure.

Direct impacts to the old field meadow include permanent vegetation removal and cut/fill along the length of the N/S-W ramp and a portion of the E-N/S ramp. Although the area of vegetation removal is relatively large, these impacts are considered minor due to the abundance of this community type in the local area, as well as lack of rare or sensitive flora within these communities.

Temporary and permanent vegetation removals, and rock blasting and fill for grading works are also proposed through the forest, cultural woodland, and meadow marsh communities. Hydrological impacts can be expected as a result of grade changes. Vegetation will be removed where fill is proposed along the northern edge of the CUM/MAM2-2 community, which also contains a strip of Reed Canary Grass Mineral Meadow Marsh, to accommodate the E-N/S ramp. To the north, the southern edge of the lowland forest community will be permanently removed, with a cut required through its central portion and fill required near Kingston Road 38.

Overall, given the small size of these features, signs of regular disturbance, and the relatively young age and low diversity of the forest, these vegetation removals will not result in significant alterations to existing ecological functions or conditions.

#### **7.1.1.3 Carpool lot**

The new carpool lot is proposed within a locally and provincially common cultural meadow habitat in the southeast quadrant of the study area, for which permanent vegetation removal is required. Vegetation in this area is composed of tolerant, common species, and the area is already subject to periodic maintenance activities and the effects of surrounding roads. Removal of this vegetation will not result in a loss of significant ecological function.

#### **7.1.1.4 Collins Creek Bridge Widening**

The Collins Creek Bridge widening works are expected to extend the bridge abutments approximately 8 m on the north side of the highway. Works will involve vegetation removal, grading, and extension of the west and east bridge abutments along the banks of the creek, with portions in-stream. Vegetation impacts are likely to be relatively minor, as no vegetation species at risk or species of conservation concern were recorded in the vicinity, and a large portion of the existing embankment consists of cultural meadow habitat already subject to roadside disturbances. A relatively small area of wetland habitat and vegetation will likely be removed. Impacts to these areas can be minimized with standard mitigation measures.

## 7.1.2 WILDLIFE

Wildlife species inhabit all of the vegetation communities identified during the field surveys. Clearing and grubbing of vegetation may result in direct impacts to wildlife and nesting migratory birds protected by provincial and federal legislation. Construction in all quadrants involves cuts into rock, which may impact snakes.

### 7.1.2.1 Southwest Quadrant

Works proposed in the southwest quadrant will remove a large proportion of the alvar habitat. Wildlife dependent on this rare habitat type may be destroyed or may need to relocate. In addition to SAR species discussed in Section 7.1.3 below, various land snails and insect species common to the western plains are associated with alvars in Ontario.

### 7.1.2.2 Southeast and Northwest Quadrants

Works proposed in these quadrants will remove wildlife habitat; however, the areas are already highly disturbed. For that reason, impacts are expected to be minor, warranting standard mitigation measures only.

### 7.1.2.3 Collins Creek Bridge Widening

Numerous wildlife species may be present in the vicinity of the north bridge over Collins Creek, and excavation for the abutments may disturb turtles hibernating in the mud or nesting in the banks. Due to the localized disturbance, standard measures for excluding wildlife from the construction zone will be sufficient for minimizing wildlife impacts. The proposed construction activities may increase the number of vehicle collisions with wildlife on Highway 401 beyond the construction zone, particularly in the vicinity of Collins Creek, where several dead Northern Raccoons were found.

## 7.1.3 SPECIES OF CONSERVATION CONCERN

Barn Swallow, Black Tern, Black-crowned Night Heron, Northern Map Turtle and Snapping Turtle may occur in the vicinity of Collins Creek; and Bobolink and Eastern Meadowlark may inhabit the meadows northeast of the Collins Creek Bridge. Specific impacts in each area of the project are discussed below.

### 7.1.3.1 Southwest Quadrant

Works in the southwest quadrant will remove a large proportion of the alvar habitat. SAR species known to use this habitat, such as Loggerhead Shrike and the provincially rare (S2) butterfly Juniper Hairstreak, may be impacted. These species were not observed during the field survey; however, dedicated breeding bird and butterfly surveys were not conducted for this project. Breeding bird surveys require two field visits between mid-May and early July, and the Juniper Hairstreak breeds late May through June.

### 7.1.3.2 Southeast and Northwest Quadrants

Bobolink and Eastern Meadowlark may nest in the cultural meadow east of the Collins Creek forest. However, as works are limited to peripheral portions of the habitat, impacts are expected to be negligible. One significant impact could be the removal of a population of Rock Elm (provincial status of 'S4?') located northwest of the existing westbound on-ramp in the northwest quadrant.

### 7.1.3.3 Collins Creek Bridge Widening

SAR including Barn Swallow, Black Tern, Black-crowned Night Heron, Northern Map Turtle and Snapping Turtle, may nest and forage near the north bridge over Collins Creek. Nesting or hibernating SAR turtles may be disturbed by excavation of the bank for bridge abutments. Barn Swallows may nest in the north bridge, which offers the same nesting potential as the south bridge (nesting Barn Swallows were confirmed to be present on the south bridge). Construction activities on the north bridge are not expected to interfere with Barn Swallow nesting under the south bridge due to the bridge separation distances. As disturbances are expected to be localized, standard measures for excluding wildlife from the construction zone will be sufficient for minimizing impacts to SAR.



## 7.2 IMPACTS TO THE AQUATIC ENVIRONMENT

The widening of the Collins Creek Bridge (westbound lanes) by an estimated 6.7 m to the north is required for the implementation of the Technically Preferred Alternative. Impacts to Collins Creek involve the infilling of approximately 12.26 m<sup>2</sup> on the west bank and 1.78 m<sup>2</sup> on the east bank to accommodate the footings. Rock protection is required in an area of approximately 23.55 m<sup>2</sup>. Based on the footprint of the in-water impacts and provided that appropriate mitigation measures are applied during construction, it is anticipated that the project will result in a low risk of causing serious harm to fish.

## 7.3 IMPACTS TO THE SOCIAL / CULTURAL ENVIRONMENT

### 7.3.1 LAND USE

A larger Parclo B ramp in the northwest quadrant will result in increased visual impacts for the rural residential properties on Harpell Road.

No impacts are anticipated to any private property accesses, the K&P Rail Trail, or the Cataraqui Industrial Estates business park. As the interchange improvements in the southwest quadrant are largely constrained to MTO-owned property, minimal impacts to lands in the City of Kingston Official Plan-designated Future Planning Area are anticipated.

### 7.3.2 ARCHAEOLOGY

Stage 1 and 2 archaeological assessments have been conducted within the study area to assess the archaeological potential of the areas to be impacted by the interchange improvements and to identify any archaeological resources that may be present. The existing highway and Kingston Road 38 corridors have undergone extensive disturbances due to previous roadway construction, utilities and ditching. These areas are considered to be free of archaeological concern.

All areas outside the existing highway or roadway corridor, however, have potential for the recovery of archaeological resources due to their proximity to waterways, heritage features and historic roadways. A Stage 2 assessment was completed in the areas to be impacted by construction activities.

Stage 2 archaeological investigations were undertaken in undisturbed areas of archaeological potential that are anticipated to be impacted during construction. Testing consisted of the excavation of test pits on a 5 m grid, with each test pit measuring approximately 30 cm by 30 cm. Areas that are steeply sloping, rocky or contain exposed limestone bedrock which are unsuitable for past human settlement were omitted from the assessment (approximately 5% of the area assessed).

No artefacts were recovered from the study area during the Stage 2 assessment. Provided that subsurface disturbances occur in areas that have been assessed as part of the archaeological assessment, no further assessment is required. If disturbances outside of the areas assessed as part of this assessment are anticipated in Detail Design, further investigation may be required. Any further archaeological assessments that may be required must be reviewed by the Ministry of Tourism, Culture and Sport.

### 7.3.3 CULTURAL HERITAGE

An assessment of the impacts of the proposed interchange improvements on heritage features located in the northeast quadrant of the interchange was conducted (**Appendix G**). The proposed works are not anticipated to directly or indirectly impact the heritage features.

### 7.3.4 TRAFFIC OPERATIONS

**Appendix L** details the Preliminary Construction / Traffic Staging plan for the proposed improvements. Detailed construction / traffic staging plans will be completed during Detail Design. During the implementation of the proposed interim improvements, a short-term closure of carpool lot operations at

the interchange is required. The existing carpool lot will be required to close to complete the construction of the eastbound off-ramp, and the new carpool lot facility will only be constructed after the closure and removal of the existing eastbound inner-loop off-ramp.

During the widening of the Collins Creek westbound bridge, Highway 401 westbound will be reduced to two lanes over the structure for a period of 30 weeks. It is proposed the lane reduction occur prior to the existing westbound on-ramp speed-change lane and after the existing westbound off-ramp bullnose. The third lane at this location serves as a truck-climbing lane and so the lane reduction is only expected to have a slight impact to Highway 401 traffic operations.

During the construction staging of the Technically Preferred Alternative, as detailed in **Appendix L**, the bridge will be demolished in halves, requiring alignment shifts of Highway 401 through the north / south bridge spans. To enable passage through the bridge spans, Highway 401 is reduced to two lanes in each direction. When Highway 401 is aligned through the southern span (Demolition Stage 1), the westbound off-ramp speed-change lane is removed and traffic uses a direct taper west of the bridges to access the westbound off-ramp. As a result, the Highway 401 design speed will be reduced to 80 km/h during this phase. The westbound off-ramp speed-change lane maintained through the northern span (Demolition Stage 2), and so no reduction in design speed is required. The bridge demolition, and shifting of alignments, is anticipated to take three weeks. A more detailed staging investigation and plan will be completed in Detail Design.

### 7.3.5 NOISE

A noise assessment was completed to determine the potential impact of the interchange improvements on nearby residences and to assess whether noise mitigation measures (such as a noise wall) would be warranted based on the guidance provided in the Ministry of Transportation *Environmental Guide for Noise* (2006) (referred to as the MTO Noise Guide). The full Noise Assessment Report is provided in **Appendix M**.

A total of eight Noise Sensitive Areas (NSAs) were identified in the vicinity of the interchange, including 6 residences on Jackson Mills Road and McIvor Road in the northeast quadrant; 1 residence on Harpell Road in the northwest quadrant; and 1 residence on Cloggs Road in the southwest quadrant. No NSAs are present within the northeast quadrant. The NSAs are identified in **Figure 7-1**.

To determine the impact of the implementation of the interchange improvement alternatives on noise levels at the NSA locations, STAMINA 2.0, a computer noise modelling program, was used. Per the MTO Noise Guide, the noise levels at each of the NSAs 10 years after the anticipated construction of the interchange improvements was modelled. For the purposes of this study, 2033 is the assumed year of implementation; therefore the noise assessment examined future conditions in the year 2043. Future Highway 401 and Kingston Road 38 traffic volumes were projected based on the traffic assessments performed as part of this study.

Two future scenarios were modelled using STAMINA 2.0: the first examined 2043 noise conditions at each NSA assuming no modifications to the interchange (i.e., the “do nothing” scenario) as a baseline; the second examined 2043 noise conditions with the implementation of the interchange improvements. The results are summarized in **Table 7-1**.



Figure 7-1: Noise Sensitive Areas

Table 7-1: Future Noise Levels at Receptor Locations

Receptor Location	Year 2043 Noise Level (dBA) "do nothing" scenario	Year 2043 Noise Level (dBA) with interchange improvements implemented	Change in Noise Level do nothing vs. implement interchange improvements
1	65.4	65.2*	-0.2
2	62.7	62.9	+0.2
3	61.9	62.2	+0.3
4	61.3	61.6	+0.3
5	60.8	60.9	+0.1
6	58.9	59.1	+0.2
7	60.6	61.0	+0.4
8	59.4	59.2	-0.2

\* meets conditions for review of noise mitigation per MTO Noise Guide (i.e., ≥65 dBA)

The MTO Noise Guide requires the consideration of noise mitigation measures when absolute noise levels of greater than or equal to 65 dBA are predicted or if the proposed improvements result in a change in noise level greater than 5 dBA. Based on 2043 noise levels, one receptor (Receptor 1) is expected to have an absolute noise level greater than 65 dBA. No increases greater than 5 dBA are anticipated at any location.

The installation of a 5.0 m-high noise wall within the MTO right-of-way was reviewed to mitigate noise impacts at the Receptor 1 location. The anticipated noise reduction as a result of the noise wall is 4.6 dBA. If a noise wall does not achieve a reduction of 5 dBA, it is not considered technically feasible per the MTO Noise Guide and no further consideration of noise mitigation is required.

Permanent noise mitigation has been found to be not warranted at the Kingston Road 38 interchange.

Temporary noise associated with construction may be audible to adjacent residences. During construction, standard mitigation measures (e.g., minimizing equipment idling, timing constraints for work near NSAs) should be implemented to address temporary impacts.

The use of pavement mixes that are specially designed to reduce noise levels produced by the interaction of tires with the pavement surfaces are another method of mitigating noise impacts. During Detail Design, consideration should be given to using a bituminous pavement in the vicinity of NSAs that are predicted to have an absolute noise level greater than or equal to 65 dBA.

The City of Kingston By-law to Regulate Noise (2004-52) restricts construction activities between the hours of 7:00 pm and 7:00 am (or 9:00 am on Sundays), as well as all day on Sundays and statutory holidays. If construction is to occur during these restricted times, an exemption to the City of Kingston Noise By-law is suggested.

### **7.3.6 PROPERTY**

The Technically Preferred Alternative will require the acquisition of approximately 5.2 ha of non-MTO property. The majority of land required (5 ha) is located in the northeast quadrant of the interchange. No residential properties will be displaced as a result of the proposed improvements. The majority of improvements in the southwest quadrant of the interchange occur within MTO property.

All efforts have been made to minimize the property required and maximize opportunities for the use of the remaining lands. The Ministry will negotiate the transfer of all necessary properties once the EA has been approved. Standard mitigation/compensation measures for property impacts will be addressed on an individual property/land owner basis. If a property were to be displaced, mitigation and compensation measures will include the acquisition of the property at fair market value in accordance with Ministry policy and directives.

Access disruptions and nuisance impacts (e.g. noise, air quality) will be minimized during construction. A landscaping buffer will be provided, if warranted.

The proposed interim improvements will require approximately 5 ha of private property.

### **7.3.7 CONTAMINANTS**

Areas of Potential Environmental Concern (APECs) were identified by examining existing land uses in the immediate vicinity of Highway 401/ Kingston Road 38 interchange. For the purposes of this investigation, a 250-m buffer zone was added to either side of the proposed road centrelines to account for contaminant migration from properties/areas surrounding the roads.

Only one APEC with high potential for contamination was identified to be present within the Study Area. This area is occupied by a gas station, located in the northeast corner of Centennial Drive and Kingston Road 38, which could impact soil and/or groundwater quality within the Study Area.

Several APECs with medium potential for contamination were identified to be present in the northeast quadrant of the Highway 401 / Kingston Road 38 interchange and in the northeast quadrant of Centennial Drive and Kingston Road 38. These areas represent an old railway and small commercial/industrial properties suspected of using chemical compounds or performing activities that could impact soil and/or groundwater, but may not be directly impacted by highway improvements.

Based on the Technically Preferred Alternative, no APECs are impacted by the proposed works and no further contamination investigation is required. If additional property requirements are identified during Detail Design, additional Preliminary Site Screenings are required.

### 7.3.8 UTILITIES

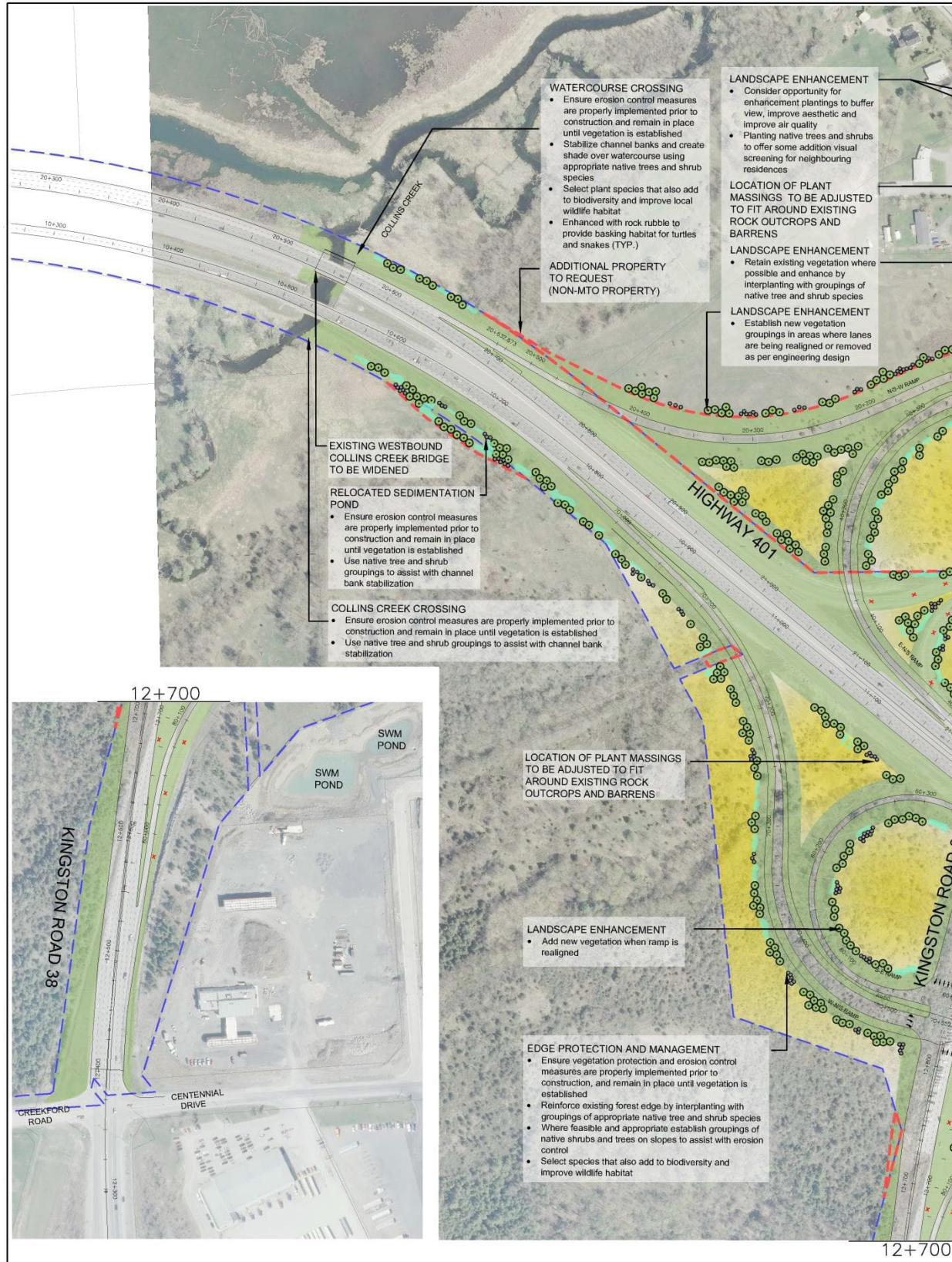
Existing utilities within the study area are summarized in **Section 3.7**, and **Section 6.1.6** details the impacted utilities due to the Technically Preferred Alternative. No impacts are anticipated due to the Proposed Interim Improvements. The impacts to/relocation of the existing utilities are anticipated to be minor and mitigation measures would be confirmed through consultation with the affected utility providers in the subsequent design phases.

### 7.3.9 LANDSCAPING

The implementation of the interchange improvements will result in impacts to the surrounding landscape through vegetation clearing and other construction disturbances. Opportunities to enhance landscaping in certain areas (e.g., carpool lot) are also possible. A Landscape Technical Report (**Appendix P**) has been prepared to identify strategies and specific recommendations to mitigate impacts to the landscape surrounding the interchange. The Preliminary Landscape Plan shown in **Figure 7-2** outlines the recommended mitigation and enhancement measures.



**HIGHWAY 401 / KINGSTON ROAD 38 INTERCHANGE  
OPERATIONAL IMPROVEMENTS (G.W.P. 4049-11-00)**



**Figure 7-2: Preliminary**

## 7.4 ENVIRONMENTAL EFFECTS, PROPOSED MITIGATION AND COMMITMENTS TO FUTURE WORK

This section outlines the standard and project-specific mitigation measures to be implemented in Detail Design and construction that were developed to address the environmental impacts outlined in **Section 7.3**. Mitigation measures will require review and refinement during the Detail Design phase.

Preliminary mitigation measures are outlined in **Table 7-3**. A summary of the key timing windows applicable to certain construction activities and mitigation measures is provided in **Table 7-2**.

Mitigation measures for this project are related to:

- Vegetation;
- Wildlife and Species at Risk;
- Fisheries and aquatic habitat;
- Management of excess materials;
- Erosion and sediment control;
- Noise;
- Visual Impact;
- Archaeological resources;
- Traffic operations; and
- Landscaping.

The following commitments to future work during Detail Design are included in **Table 7-3**:






- A 3-season vegetation inventory should be carried out in and adjacent to potential work zones in order to identify the locations of any sensitive or rare plant species. If any are located, voucher specimens should be collected if possible. An updated environmental impact assessment and revised mitigation measures should incorporate new findings.
- Impacts to Rock Elm in the northwest quadrant should be confirmed.
- The CRCA and MNRF should be consulted to discuss impacts to the alvar vegetation community and significant woodlands, and to identify appropriate mitigation requirements.
- In-season breeding bird surveys following Ontario Breeding Bird Atlas protocol should be carried out within identified impact zones in order to better characterize the species assemblage and identify any sensitive species. Impact assessments and mitigation measures should be updated to incorporate new findings.
- SAR screenings should be conducted for identified impact zones. Specific recommendations include screening for habitat for SAR bat species that may occur in the area (*Myotis* spp). Eastern Small-footed *Myotis*, Little Brown Bat, and Northern Long-eared Bat were added to the ESA Species at Risk in Ontario list in January 2013 and June 2014 and were not assessed for this stage of the project. Screening for nesting Barn Swallow under the Collins Creek Bridge should also be conducted. Updated impact assessments, permitting requirements, and mitigation measures should incorporate any new findings.
- A revised noise assessment may be required if there are significant modifications to the Technically Preferred Alternative during Detail Design.
- During Detail Design, consideration should be given to using a bituminous pavement in the vicinity of Noise Sensitive Areas that are predicted to have an absolute noise level greater than or equal to 65 dBA.
- Any areas that are identified as requiring subsurface disturbances that are outside of the area assessed in the Stage 1-2 Archaeological Assessment Report may require further archaeological investigation.

- Landscaping requirements, in accordance with the Preliminary Landscape Plan, will be refined during Detail Design. Opportunities for enhancements to the carpool lot area should be incorporated.



During the completion of Detail Design and prior to construction, the following authorizations and/or permits may be required:

- If construction is to occur during the restricted hours of 7:00 pm to 7:00 am, Sundays and Statutory holidays, an exemption to the City of Kingston Noise By-law is suggested.
- If subsurface disturbances are anticipated in areas that have not undergone assessment as part of the Stage 2 archaeological assessment, further archaeological investigations may be required. Any additional archaeological assessment reports should be submitted to the Ministry of Tourism, Culture and Sport.
- During Detail Design, the assessment of the impacts to fish and fish habitat should be refined to confirm whether the works can be considered low risk of causing serious harm to fish. If necessary, the DFO review process should be followed to determine if authorization under the *Fisheries Act* is required.
- Potential impacts to Species at Risk should be refined to determine if registration of the works and/or a permit under the *Endangered Species Act* is required.
- If new property requirements are identified, additional Preliminary Site Screenings should be undertaken.

**Table 7-2: Timing Windows for Construction and Mitigation Measures**

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
<b>FISH</b>										
No in-water work April 1 to June 30										
<b>MIGRATORY BIRDS</b>										
Bird nesting prevention measures should be installed on the Collins Creek Bridge prior to April 1 and maintained until August 31										
<b>TURTLES</b>										
Avoid in-water work between September 1 and April 30 to avoid disturbing hibernating turtles										
Install silt fencing prior to May 1 and maintain until Oct 31*										

\*if silt fencing cannot be installed prior to May 1, the construction zone should be monitored until October 31 by an Environmental Inspector for turtle eggs or turtle hatchlings.

**LEGEND:**  mitigation measures required prior to certain activities  
 prohibition on certain activities applies



## 7.5 SUMMARY OF ENVIRONMENTAL EFFECTS, PROPOSED MITIGATION AND COMMITMENTS TO FURTHER

Table 7-3: Summary of Environmental Concerns and Commitments

I.D. #	ISSUE / CONCERN / POTENTIAL EFFECTS	CONCERNED AGENCIES	I.D. #	PROPOSED MITIGATION / PROTECTION
<b>1.0 General Environmental Protection Measures</b>				
1.1	Mitigation measures must be properly implemented in order to minimize the environmental impacts of the bridge replacement.	MTO MOE MNR DFO	1.1.1	<ul style="list-style-type: none"> <li>Environmental inspections should take place to ensure that all mitigation measures are maintained and repaired and remedial measures in a timely manner where warranted.</li> </ul>
<b>2.0 Vegetation</b>				
2.1	Construction of the interchange improvements requires removal of vegetation, including approximately 5.3 ha of significant woodlands.  Vegetation that does not require removal may be at risk of damage.	MTO MNR	2.1.1	<ul style="list-style-type: none"> <li>During detail design, a 3-season vegetation survey should be carried out in and adjacent to potential work areas to identify the locations of any sensitive or rare vegetation. If any are located, voucher specimens should be collected. An updated environmental impact assessment should be completed. Mitigation measures should incorporate no-net-loss.</li> <li>Impacts to Rock Elm in northwest quadrant should be identified during detail design.</li> </ul>
			2.1.2	<ul style="list-style-type: none"> <li>During construction, ROW vegetation clearing should be completed. Vegetation retention zones should be clearly marked. Vegetation that does not require removal should be protected. Equipment, materials and other construction activities should not be permitted in vegetation retention zones.</li> <li>Vegetation protection zones should be established and clearly marked around Rock Elm that do not require removal. Construction activities should not intrude into these zones in accordance with OPSS 801.</li> </ul>
			2.1.3	<ul style="list-style-type: none"> <li>Vegetation removal should be kept to the minimum required to perform the work.</li> </ul>
			2.1.4	<ul style="list-style-type: none"> <li>Appropriate vegetation clearing techniques should be used, such as felling trees away from retained natural areas.</li> </ul>



I.D. #	ISSUE / CONCERN / POTENTIAL EFFECTS	CONCERNED AGENCIES	I.D. #	PROPOSED MITIGATION / PROTECTION
			2.1.5	in accordance with OPSS 201, 801 and 802 <ul style="list-style-type: none"> <li>All unnecessary traffic, dumping and storage of materials in tree root zones adjacent to natural / semi-natural areas should be avoided.</li> </ul>
			2.1.6	<ul style="list-style-type: none"> <li>Cut and grubbed material should be disposed of by truck or other appropriate means.</li> </ul>
2.2	Works are expected to impact significant woodland and alvar habitat.	MTO MNRF	2.2.1	<ul style="list-style-type: none"> <li>Intrusion into and disturbance of the significant alvar habitats should be minimized to the extent possible by vegetation protection zones erected and cleared of vegetation field around areas not requiring works. If works are adjacent to areas of alvar habitat should be avoided to prevent intrusion of non-native species into the alvar.</li> </ul>
			2.2.2	<ul style="list-style-type: none"> <li>MNRF and the Cataraqui Region Conservancy should be consulted during detail design to discuss impacts on the vegetation community and any mitigation measures and requirements.</li> </ul>
<b>3.0 Wildlife and Species at Risk (SAR)</b>				
3.1	Turtles, snakes and their habitat may be impacted by construction activities (e.g., excavation, grading, blocking of passage under the Collins Creek Bridge, noise and vibration).	MNRF	3.1.1	<ul style="list-style-type: none"> <li>In-water work should be avoided between April 1st and April 30th to avoid disturbing hibernating turtles with OPSS PROV 182 – Environmental Protection Act Construction in Waterbodies and on Waterbodies.</li> </ul>
			3.1.2	<ul style="list-style-type: none"> <li>If in-water construction is to occur between April 31<sup>st</sup>, the following measures should apply:                             <ul style="list-style-type: none"> <li>Install silt fencing at the limit of the construction zone by April 30th or by ground-thaw of any year, which will prevent turtles from nesting in the construction zone.</li> <li>If silt fencing is installed after April 30th, the contractor should monitor construction zones by an Environmental Specialist twice daily and with a reasonable interval. Monitor for egg laying, exposed eggs or emerging turtles. Conduct regular monitoring as soon as possible and complete by April 31st, or if excavation or fill placement is required.</li> </ul> </li> </ul>

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				when these activities occur. <ul style="list-style-type: none"> <li>Requirements should be outlined in Operational Constraints (Environmental) NSP 001A840 – Protection of Wildlife</li> </ul>
3.2	Wildlife may be disturbed by construction activities (e.g., blocking of passage, noise and vibration)	MNRF	3.1.3	<ul style="list-style-type: none"> <li>If active turtle or snake nests (with eggs or young) are encountered, appropriate measures should be taken to avoid disturbance to the nest and a Peterborough Wildlife Biologist should be contacted to discuss next steps.</li> </ul>
3.2	Wildlife may be disturbed by construction activities (e.g., blocking of passage, noise and vibration)	MNRF	3.2.1	<ul style="list-style-type: none"> <li>Wildlife incidentally encountered during construction should not knowingly be harmed and should be allowed to return to the construction area on its own.</li> <li>In the event that wildlife encountered during construction move from the construction zone, an Environmental Biologist should move the animal to a safe area.</li> </ul>
3.3	Migratory birds may be impacted during construction.  Barn Swallow are present in the vicinity and the Collins Creek Bridge is suitable for nesting.	MNRF	3.3.1	<ul style="list-style-type: none"> <li>In-season breeding bird surveys following the Ontario Breeding Bird Atlas protocol should be carried out during the construction period in identified impact zones in order to better understand bird assemblage and identify any sensitive species. The results of these assessments and mitigation measures should be used to incorporate new findings.</li> </ul>
3.3	Migratory birds may be impacted during construction.  Barn Swallow are present in the vicinity and the Collins Creek Bridge is suitable for nesting.	MNRF	3.3.2	<ul style="list-style-type: none"> <li>No vegetation clearing or structural work should occur from April 1st and August 31st to avoid disturbing migratory birds.</li> <li>If vegetation clearing or grubbing occurs during the construction period (April 1st to August 31st), this activity should be preceded by a bird nest survey conducted by a qualified biologist. If active nests (with eggs or young) are disturbed, mitigation should be in accordance with Operational Constraints (Environmental) – Migratory Bird Protection – General.</li> </ul>
3.3	Migratory birds may be impacted during construction.  Barn Swallow are present in the vicinity and the Collins Creek Bridge is suitable for nesting.	MNRF	3.3.3	<ul style="list-style-type: none"> <li>If the Collins Creek bridge widening occurs during the migratory bird period (April 1st and August 31st):                             <ul style="list-style-type: none"> <li>Remove inactive bird nests from a pre-identified area under the north bridge and implement</li> </ul> </li> </ul>

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				measures for this bridge by April 1st and the 31st of the calendar year in which they were installed. <ul style="list-style-type: none"> <li>If bird nesting prevention measures are implemented on the north bridge by April 1st, conduct a survey of the bridge as soon as possible by a qualified biologist. If active nests are present, implement bird nesting prevention immediately and maintain them until April 30th of the calendar year in which they were installed.</li> </ul>
			3.3.4	<ul style="list-style-type: none"> <li>If an active nest is identified within or adjacent to the construction site, the nest should not be disturbed or destroyed. Construction should not proceed until a qualified biologist has confirmed an appropriate setback within which no construction activity should occur.</li> </ul>
			3.3.5	<ul style="list-style-type: none"> <li>If the construction activities are such that they are in contravention of the <i>Convention Act</i>, all activities should stop and Environment Canada should be contacted for further options.</li> </ul>
3.4	Species at Risk may be present in the area (including Barn Swallow, Black Tern, Black-crowned Night Heron, Bobolink, Eastern Meadowlark, Northern Map Turtle and Snapping Turtle) and could be impacted by construction activities (e.g., grading that disturbs nesting habitat, blocking of passage, noise and vibration, blasting of rock)	MNRF	3.4.1	<ul style="list-style-type: none"> <li>During detail design, SAR screenings should be conducted. Identified impact zones and findings should be used to update impact assessments, permitting necessary mitigation measures. Specific recommendations include:                         <ul style="list-style-type: none"> <li>Screening for nesting Barn Swallow under the Bridge</li> <li>Screening for habitat for SAR bat species in the area (<i>Myotis</i> spp). Eastern Small-footed Bat, and Northern Long-eared Bat are listed as Species at Risk in Ontario list in January 2016 and were not assessed for this stage.</li> </ul> </li> </ul>
			3.4.2	<ul style="list-style-type: none"> <li>All construction site staff should know how to identify SAR species that could occur in the area (Barn Swallow, Black-crowned Night Heron, Bobolink, Eastern Meadowlark, Northern Map Turtle and Snapping Turtle).</li> </ul>

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				Map Turtle and Snapping Turtle) and follow established for addressing and reporting SARs found in the construction area. <ul style="list-style-type: none"> <li>• These requirements should be outlined in the (Environmental) – Protection of Species at Risk</li> </ul>
			3.4.3	<ul style="list-style-type: none"> <li>• If a SAR is encountered within or adjacent to the construction site, the Contract Administrator should be contacted to contact MNRF.</li> <li>• These requirements should be outlined in the (Environmental) – Protection of Species at Risk</li> </ul>
			3.4.3	<ul style="list-style-type: none"> <li>• If construction activities are such that contravention of the Act that area would result in a contravention of the Act, construction should stop and the Peterborough District Office should be contacted to discuss mitigation options.</li> <li>• SAR or potential SAR should not be handled without consultation with the MNRF SAR Biologist, unless the contractor has received specific training.</li> <li>• These requirements should be outlined in the (Environmental) – Protection of Species at Risk</li> </ul>
<b>4.0 Fisheries and Aquatic Habitat</b>				
4.1	Construction activities and erosion may lead to the release of sediment into wetlands and watercourses.	MTO MNRF DFO	4.1.1	<ul style="list-style-type: none"> <li>• Silt fencing should be installed and maintained throughout construction to prevent the movement of sediment and wildlife from the construction zone, in accordance with PROV 182 – Environmental Protection for Waterbodies and on Waterbody Banks.</li> </ul>
			4.1.2	<ul style="list-style-type: none"> <li>• Erosion and sediment controls (ESC) should be installed at Collins Creek prior to construction works to prevent encroachment and the transfer of deleterious material into aquatic habitat.</li> <li>• All ESC will be installed in accordance with the Temporary Erosion and Sediment Control Operational Constraint (Environmental) N</li> </ul>

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				and Sedimentation Control.
			4.1.3	<ul style="list-style-type: none"> <li>All ESC measures should be inspected and they are functioning as intended throughout such time that disturbed areas have been</li> </ul>
			4.1.4	<ul style="list-style-type: none"> <li>Sediment-laden water should be treated by being passed through a filter device located a minimum of 30 m away from work areas in accordance with Operational Constraint (E-001A850 – Equipment Refueling, Maintenance)</li> </ul>
			4.1.5	<ul style="list-style-type: none"> <li>Exposed surfaces should be re-stabilized as soon as possible following disturbance, in accordance with PROV 182 – Environmental Protection for Waterbodies and on Waterbody Banks.</li> </ul>
4.2	Fish and fish habitat will be impacted during the widening of the Collins Creek Bridge. The estimated increase of the in-water footprint is 14.0 m <sup>2</sup> , with rock protection over an additional 23.55 m <sup>2</sup> .	MTO MNR DFO	4.2.1	<ul style="list-style-type: none"> <li>No in-water work should be conducted beyond 30 m.</li> <li>All work in or near waterbodies will be conducted in accordance with OPSS PROV 182 – Environmental Protection for Construction in Waterbodies and on Waterbody Banks.</li> </ul>
			4.2.2	<ul style="list-style-type: none"> <li>Immediately following the isolation of any work area where fish are present, a fish removal specialist should be consulted and a qualified biologist prior to construction activities. Fish should be relocated to suitable habitat downstream.</li> </ul>
			4.2.3	<ul style="list-style-type: none"> <li>Machinery should be operated on land in order to minimize disturbance to the banks of the waterbody.</li> </ul>
			4.2.4	<ul style="list-style-type: none"> <li>A dewatering management plan should be developed and implemented as required.</li> </ul>
			4.2.5	<ul style="list-style-type: none"> <li>Temporary flow management measures (such as cofferdams) should be implemented as required during construction to minimize disruption to downstream flow conveyance.</li> </ul>
			4.2.6	<ul style="list-style-type: none"> <li>Rock protection should be riverstone material sized appropriately to withstand high flows.</li> </ul>



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4.3	Debris and other deleterious substances may enter watercourses as a result of construction and in the event of spills.	MTO MNRF DFO	4.3.1	<ul style="list-style-type: none"> <li>During work on the Collins Creek Bridge, measures should be in place to trap and prevent debris from entering the watercourse.</li> </ul>
			4.3.2	<ul style="list-style-type: none"> <li>Equipment maintenance and refueling should be done in a designated and properly contained maintenance works yard or at commercial garages located away from the river banks and wetlands and outside of environmentally sensitive areas in accordance with Operational Constraint (Environmental) NSP 001A850 – Equipment Refueling, Maintenance and Washing.</li> <li>The Contractor should have a Spills Prevention and Response Plan and spill prevention materials on site at all times in accordance with Operational Constraint (Environmental) NSP 001A850 – Prevention and Response Contingency Plan.</li> </ul>
			4.3.3	<ul style="list-style-type: none"> <li>Storage and stockpiling of soil and other materials should be located a minimum of 30 m away from water features and the top of steep slopes.</li> </ul>
<b>5.0 Management of Excess Materials</b>				
5.1	Construction waste has the potential to contaminate the surrounding environment if not managed properly.	MOE MNRF	5.1.1	<ul style="list-style-type: none"> <li>Construction waste should be removed off site by the Contractor in accordance with provincial standards (OPSS 180).</li> </ul>
5.2	Dust emissions may result from construction activities	MTO	5.1.2	<ul style="list-style-type: none"> <li>Dust control should be completed using water trucks and suppressants, and in accordance with MTO standards.</li> </ul>
<b>6.0 Erosion and Sediment Control</b>				
6.1	Exposed surfaces resulting from clearing and grading can lead to erosion.	MTO MNRF	6.1.1	<ul style="list-style-type: none"> <li>Temporary erosion and sediment control measures should be installed prior to construction and maintained throughout construction per Ontario Provincial Standards (OPSS) 805.</li> </ul>
			6.1.2	<ul style="list-style-type: none"> <li>Per OPSS 805, all temporary erosion and sediment control measures should be installed and maintained throughout construction.</li> </ul>

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				measures should be maintained in an effective stable condition. This will require routine inspection after storm events, and repair as required.
<b>7.0 Noise</b>				
7.1	Increased noise impacts are anticipated for nearby residents during construction and following the implementation of the interchange improvements.	City of Kingston Local residents	7.1.1	<ul style="list-style-type: none"> <li>A noise assessment was completed and mitigation is either not required or is not required for any of the adjacent residences. A revised assessment may be required during Detail Design if there are any modifications to the Technically Preferred Alternative.</li> </ul>
			7.1.2	<ul style="list-style-type: none"> <li>During Detail Design, consideration should be given to bituminous pavement designed to reduce noise in the vicinity of Noise Sensitive Areas (NSAs) that have an absolute noise level greater than 65 dBA.</li> </ul>
			7.1.3	<ul style="list-style-type: none"> <li>If construction is to occur during the restricted hours (7:00 am, Sundays and Statutory holidays), the City of Kingston Noise By-law is suggested.</li> </ul>
			7.1.4	<ul style="list-style-type: none"> <li>Equipment should be maintained in good condition during construction and idling should be kept to a minimum in accordance with SSP 199F33 – Construction.</li> </ul>
<b>8.0 Archaeological Resources</b>				
8.1	<p>Archaeological remains may be disturbed during construction.</p> <p>A Stage 1-2 Archaeological Assessment was completed. No artefacts were uncovered during Stage 2 investigations. No further assessment is required.</p>	MTCS First Nations	8.1.1	<ul style="list-style-type: none"> <li>Should previously unknown or unassessed archaeological resources be uncovered during construction, it may be a new archaeological site and the person discovering the archaeological resources should notify the Section 48 (1) of the <i>Ontario Heritage Act</i> immediately and engage an archaeologist to carry out archaeological investigations.</li> <li>In the event that human remains are encountered, the Registrar of Cemeteries (Ministry of Health) must be notified.</li> </ul>

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			8.1.2	<ul style="list-style-type: none"> <li>During detail design, any areas that are identified as subsurface disturbances that are outside the Stage 1-2 Archaeological Assessment will require further archaeological investigation.</li> </ul>
<b>9.0 Traffic Operations</b>				
9.1	During construction, traffic operations on Highway 401 and Kingston Road 38 will be impacted.	OPP Local Emergency Services Municipality	9.1.1	<ul style="list-style-type: none"> <li>Temporary closures of lanes on Highway 401 will be minimized during Detail Design, in order to reduce traffic delays.</li> </ul>
	Temporary closures of Highway 401 lanes are required for the removal of the Kingston Road 38 underpass.		9.1.2	<ul style="list-style-type: none"> <li>Local residents, emergency services, schools in Kingston, and the Ontario Trucking Association will be notified in advance of any Highway 401 lane closures. Operational Constraint – Notification to Emergency Service Providers and School Boards.</li> </ul>
9.2	The existing interchange is used by Long Combination Vehicles, which have particular geometric requirements (e.g., turning radius).	Ontario Trucking Association Local businesses MTO	9.2.1	<ul style="list-style-type: none"> <li>Considerations for the use of LCVs at the interchange after construction should be incorporated into the design.</li> </ul>
9.3	During the implementation of the interim improvements, the existing carpool lot will be temporarily closed during construction.	MTO Local residents	9.3.1	<ul style="list-style-type: none"> <li>Local residents and the City of Kingston should be notified in advance of the closure of the carpool lot. The duration of closure should be minimized in order to minimize inconvenience to users.</li> </ul>
<b>10.0 Landscaping</b>				
10.1	Vegetation removals and other construction activities will impact the existing landscape.	City of Kingston MTO Local residents	10.1.1	<ul style="list-style-type: none"> <li>Landscaping requirements, in accordance with the final Landscape Plan, will be refined during design and included in contract documents.</li> <li>Opportunities for enhancing landscaping at the carpool lot location (e.g., visual screening, picnic table) should be further examined in detail design.</li> </ul>

## 8 REFERENCES

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