

FINAL REPORT

## **Transportation Environmental Study Report**

**Highway 401 Interchange Improvements at Power  
Dam Road**

**G.W.P. 4092-19-00**

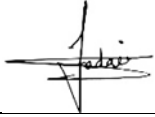
Presented to:

**Ministry of Transportation**  
1355 John Counter Blvd. P.O. 4000  
Kingston, ON  
K7L 5A3

**Project No. 132800060**

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Date

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November 27, 2025

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Date

## PUBLIC RECORD

This Transportation Environmental Study Report (TESR) has been made available for public review on the project website: [www.highway401powerdam.com](http://www.highway401powerdam.com)

We are interested in hearing any comments or concerns that you may have with the study. Comments must be received no later than **January 11, 2026**. Please send any comments or requests to either of the following:

|                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Under the Ontario EA Act, members of the public, interest groups, agencies, and other interested parties may submit a written request to the Minister of the Environment, Conservation and Parks (MECP) (the Minister) to require the proponent to comply with Section 16 of the Ontario EA Act, (previously referred to as a Part II Order) before proceeding with the proposed undertaking. Section 16 of the Ontario Environmental Assessment Act addresses Individual (now known as Comprehensive) Environmental Assessments. Written requests for a Section 16 Order must be submitted to the Minister within the official 45 calendar-day project document review period.

The Minister of the Environment, Conservation and Parks (MECP) has the authority and discretion to make an Order under Section 16 of the Environmental Assessment Act. A request may be made to the Ministry of the Environment, Conservation and Parks for an order requiring a higher level of study (i.e., requiring an Individual/comprehensive EA approval before being able to proceed), or that conditions be imposed (e.g. require further studies), **only on the grounds that the requested order may prevent, mitigate or remedy adverse impacts on constitutionally protected Aboriginal and treaty rights**. Requests on other grounds will not be considered. Requests should include the requester contact information and full name for the ministry. This will ensure that the ministry is able to efficiently begin reviewing the request.

To submit a Section 16(6) Order request, the following information must be provided to ensure that the ministry is able to efficiently begin reviewing the request:

- Name, address and email address
- Project name
- Proponent name
- What kind of Order is being requested i.e., a request for additional conditions or a request for an individual/comprehensive environmental assessment.
- Details about the concerns about potential adverse impacts on constitutionally protected Aboriginal or treaty rights and how the proposed Order may prevent, mitigate potential adverse impacts on Aboriginal and treaty rights, and any information in support of the statements in the request.

- Whether the concerned party belongs to, represents or has spoken with an Indigenous community who's constitutionally protected Aboriginal, or treaty rights may be adversely impacted by the proposed project.
- Whether the concerned party has raised their concerns with the proponent, the proponent's response (if any) and why the concerns could not be resolved with the proponent.
- Any other information to support the request.

The request for a Section 16 Order must be sent to the Minister of the Environment, Conservation and Parks in writing or by email to:

**Minister of the Environment, Conservation and Parks**

Ministry of the Environment, Conservation and Parks  
777 Bay Street, 5<sup>th</sup> Floor  
Toronto, ON M7A 2J3  
[Minister.mecp@ontario.ca](mailto:Minister.mecp@ontario.ca)

**Director, Environmental Assessment Branch**

Ministry of the Environment, Conservation and Parks  
135 St. Clair Ave. W., 1<sup>st</sup> Floor  
Toronto, ON M4V 1P5  
[EABDirector@ontario.ca](mailto:EABDirector@ontario.ca)

Requests should also be sent to the Ministry of the Transportation by mail or by e-mail.

For more information and specific instruction and details on the process, please visit:  
<https://www.ontario.ca/page/class-environmental-assessments-section-16-order>

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

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

*Ce document hautement spécialisé n'est disponible qu'en anglais en vertu du règlement 671/92, qui en exempte l'application de la Loi sur les services en français. Pour de l'aide en français, veuillez communiquer avec le ministère des Transports, Bureau des services en français au: 905-704-2045 ou 905-704-2046.*

## EXECUTIVE SUMMARY

Morrison Hershfield, now Stantec, was retained by the Ontario Ministry of Transportation (MTO) to conduct the Preliminary Design and Class Environmental Assessment (EA) Study for the replacement of Bridge Site 13X-180/B.0. (Power Dam Drive Bridge), which spans Highway 401 in the Township of South Stormont, within the United Counties of Stormont, Dundas, and Glengarry. The Power Dam Drive Bridge was last rehabilitated in 2016, with a planned replacement within 10 years. The current interchange configuration is limited, allowing only eastbound traffic to exit and westbound traffic to enter Highway 401 at this partial interchange.

The primary objective of this study is to identify both existing and future operational issues and to determine the most appropriate solution, while considering environmental, social, economic, and cultural impacts. The study will initially focus on replacing the Power Dam Drive Bridge but will also account for potential future improvements to the interchange that may be needed over the life of the new structure.

This study follows the approved planning process for a Group 'B' project, as outlined in the Class Environmental Assessment for Provincial Transportation Facilities (2000), providing opportunities for public input throughout the process. The final Transportation Environmental Study Report (TESR) summarizes the background, need, and justification for the project, outlines the design alternatives developed and evaluated, presents the recommended plan, describes proposed mitigation measures, and provides an overview of public consultation to date.

Throughout the study, the Township of South Stormont, United Counties of Stormont, Dundas and Glengarry, external agencies, Indigenous communities, local elected representatives, interest groups, landowners, and the general public were encouraged to participate. Consultation efforts included contact letters, newspaper notices, two Public Information Centres, meetings with the local municipality, and individual landowner consultations. Feedback collected during the study was incorporated into the development and evaluation of design alternatives, as well as the refinement of the Technically Preferred Alternative and Recommended Plan.

A total of ten (10) long-list alternatives were developed as part of this study. These alternatives were evaluated based on their ability to address deficiencies at the interchange and their associated impacts. Evaluation criteria included Social and Natural Environment impacts (e.g., property impacts, cultural heritage, watercourse and fisheries impacts, vegetation and wildlife habitat, and water resources), Cost and Staging (e.g., cost, staging opportunities, utility impacts), and Transportation considerations (e.g., operational performance, geometry, local road impacts, structural implications, and accommodation for active transportation on Power Dam Drive).

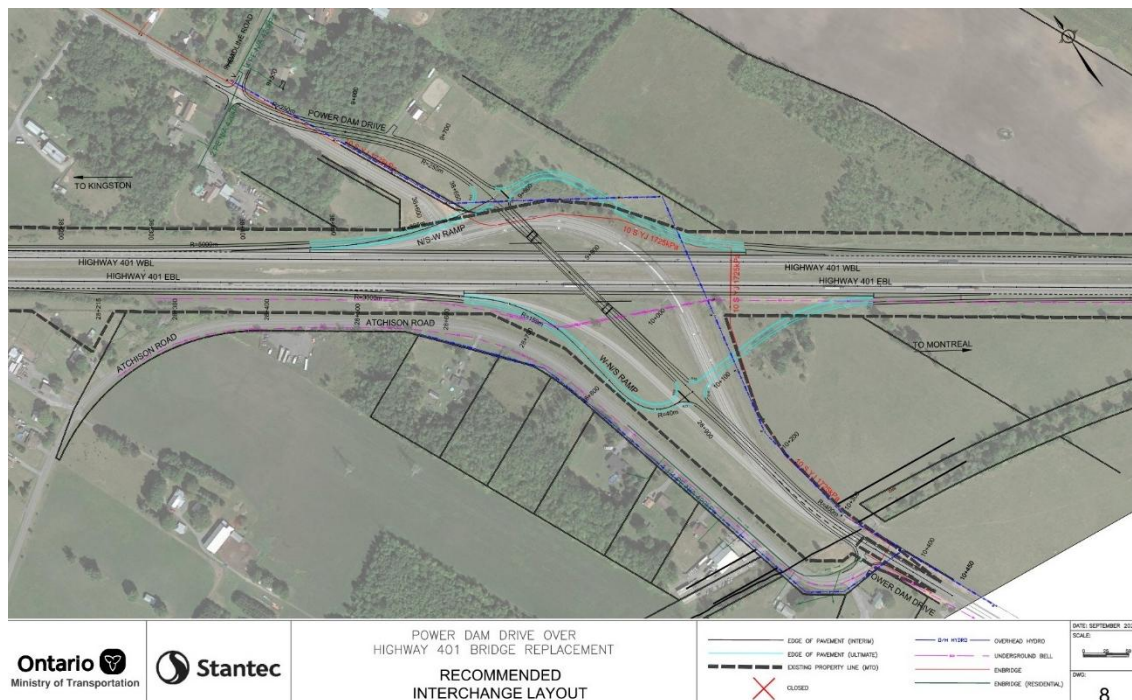
After evaluating the long-list alternatives, five (5) were carried forward to a short-list. The short-listed alternatives were assessed using a weighted-scoring method, with Alternative 8 emerging as the Technically Preferred Alternative, as it best meets current and future transportation needs while minimizing environmental and social impacts.

### The Recommended Plan

The Recommended Plan involves the construction of a partial interchange designed to accommodate future ramp connections. This includes the construction of a new bridge over

Highway 401, built on a new alignment to improve traffic flow and safety. Additionally, new interchange ramp tie-ins will be established, which involve reinstating the existing eastbound off-ramp (W-N/S) and westbound on-ramp, realigned to improve roadway geometry and provide better access to the highway. To maintain existing drainage patterns, new culverts will be installed, along with new ditches where necessary. The plan also includes the reconfiguration of Power Dam Drive, with new horizontal and vertical alignments and grading improvements to enhance traffic movement. New illumination will be added to the interchange to improve visibility and safety. The interchange ramps will be illuminated including at the ramp terminal intersections and at the Highway 401 speed change lanes. Finally, landscaping will be reinstated as required, ensuring the project integrates well with the surrounding environment.

The Recommended Interchange design is shown below and outlined in **Section 7**.



## Environmental Issues, Proposed Mitigations and Commitments to Future Work

### *Fish and Fish Habitat*

The proposed interchange may impact fish and fish habitats due to several activities, including culvert extensions and drainage channel realignments associated with new on- and off-ramps. These changes could directly alter or reduce habitat. General construction activities, such as site access, debris removal, material stockpiling, and de-watering, may also affect fish habitats. Potential impacts include sedimentation in downstream areas, which could lead to respiratory issues and reduced feeding efficiency for fish. Additionally, staging and site access may temporarily increase the project's footprint, depending on machinery operation from the existing right-of-way.

While the overall scale and intensity of these impacts are expected to be low due to the presence of non-sensitive habitats, the potential residual effects on fish and habitats need to be confirmed during the Detail Design phase. Most potential construction impacts are expected to

be mitigated through standard provincial and MTO guidelines, however, the proposed work at Culvert 22/23 could lead to a low likelihood of harmful alteration, disruption, or destruction (HADD) of fish habitat. Currently it is unlikely that the works at Culvert 22/23 will warrant a Fisheries and Oceans Canada (DFO) review since the affected fish habitat is low quality and showed minimal use by baitfish in 2022.

A detailed impact assessment will be conducted during Detail Design to determine the likelihood of causing fish mortality or a harmful alteration, disruption, or destruction of fish habitat (HADD) of fish habitat as defined by the Fisheries Act. This will involve completing an Aquatic Effects Assessment according to MTO guidelines and documenting it in a Fish and Fish Habitat Impact Assessment Report.

During Detail Design, the qualified Fisheries Assessment Specialist determine if the works can proceed under the MTO Project Notification Form process or if a DFO Request for Review Application is necessary.

### *Terrestrial Ecosystems*

Construction activities have the potential to impact the vegetation and terrestrial communities within the Highway 401 and Power Dam Drive Study Area include vegetation clearing and disturbance to vegetated areas as a result of road construction and road re-alignment. The Recommended Plan will require the clearing of approximately 5.25 hectares (ha) of land for the interchange modifications needed for the project. This vegetation clearing will include mature trees, shrubs and herbaceous vegetation found within the forest and meadow communities. Further vegetation removals may be identified during the Detail Design phase of the project, such as removals for equipment access and/or storage of materials.

The study area may also be home to migratory birds, Eastern Meadowlark a species at risk (SAR), and potential SAR bat roosting trees. Based on information collected during the background review, ten (10) Endangered or Threatened SAR protected under the ESA were recorded within the general vicinity of the Study Area. These species should therefore be considered for future mitigation measures during Detail Design.

To reduce impacts to terrestrial ecosystems, the clearing of vegetation should be kept to a minimum whenever possible and limited within the construction footprint. Existing trails, roads or cut lines should be used to avoid disturbance to vegetation and prevent soil compaction. Additional mitigation measures aimed at reducing impacts to vegetation and trees should be utilized. Timing windows and avoidance should also be used. Further species-specific surveys will also be required during Detail Design.

### *Hydrogeology*

If during Detail Design it is determined that water taking at rates between 50,000 liters and 400,000 liters per day is required, an Environmental Activity and Sector Registry registration is recommended.

While it is anticipated that there will be minimal temporary and residual effects on the groundwater quantity (i.e., well yields) resulting from the project, consideration during Detail Design should be given regarding the mobilization of contaminants during construction from sources like fill material of unknown quality, auto garage, waste generation, metal fabrication, and historic diesel spills.

### *Land Use*

As much of the land use surrounding the Highway 401 and Power Dam Drive Bridge has been identified as a key transportation and development corridor within the County, the project is not anticipated to have an impact to land use.

### *Property Impacts*

It is anticipated that six (6) properties on both the north and south sides of the highway will be impacted. Efforts will be made to minimize these impacts as much as possible. For the interim interchange configuration, less overall property is required; however, it will still be sourced from the same six properties. Preliminary discussions regarding property acquisitions are currently underway with the affected property owners and will continue throughout the detailed design phase.

### *Utilities*

It is anticipated that five (5) Hydro One poles, and associated anchors will require relocation, and existing underground Bell will need to be relocated to accommodate the new ramp geometry. It is anticipated that the existing Enbridge lines will remain in their current locations. A relocation plan will be developed for impacted utility infrastructure assets in advance of construction. Final details and timing for relocation will be determined during Detail Design.

### *Contamination*

Further environmental assessments/investigations are recommended during Detail Design for the Areas of Potential Environmental Concern (APECs) that will be directly impacted by the construction of the bridge replacement work. These assessments will help to confirm the environmental conditions of soil and groundwater on those lands in support of property acquisition, excess soil management, and/or environmental due diligence. The environmental assessments/investigations may include Phase I/II Environmental Site Assessments (ESAs), and planning and soil sampling requirements in accordance with Ontario Regulation 406/19 Onsite and Excess Soil Management if deemed necessary. If actual contamination is identified during the environmental assessments/investigations, additional delineation investigations and/or remediation may also be required.

### *Erosion and Sediment Control*

During Detail Design, appropriate erosion and sediment control measures will be developed to contain disturbed soils and to prevent the migration of materials and sediments beyond the work limits and into adjacent communities.

### *Drainage and Hydrology*

The proposed interchange will increase the imperviousness of the project area from 30.7% to 37.5%. To manage drainage, four (4) new culverts, three (3) culvert replacements, and three (3) culvert extensions will be required. Two (2) existing culverts will remain unchanged.

Stormwater management will be implemented through enhanced grass swales, providing “Enhanced” treatment (80% total suspended solids removal) and “post-to-pre” quantity control to maintain pre-development flow rates. A storage capacity of 1,450 m<sup>3</sup> is required to attenuate peak flows to pre-development 2023 levels, accounting for both the impact of new impervious areas and climate change on peak flows.

A survey of existing culverts should be completed as part of Detail Design to allow for hydraulic analysis of existing culverts and evaluation of impact of the proposed design.

### *Noise*

The relative increase in future sound levels due to the Recommended Plan was not significant. However, future ambient absolute sound levels with the undertaking did exceed 65 dBA at two (2) locations.

During the Detail Design mitigation measures to limit construction noise shall be developed. These measures may include the use of properly maintained equipment, maintaining haul routes, keeping equipment in good working order, and a documented, regular inspection and maintenance program must be implemented.

### *Air Quality*

Overall, impacts to local air quality resulting from the project are anticipated to be minor with increases in greenhouse gas emissions resulting from the project very low. To minimize potential air quality impacts during construction, an Air Quality Management Plan should be developed during Detail Design and included within the construction tender package.

### *Archaeology*

Due to disturbance from previous construction, no further work is required for the area within the current ROW, however due to the proximity of water and other features, the archaeological potential is much greater outside the current right-of-way. Within a 250-metre study area buffer, approximately 71.7 percent should be subject to a Stage 2 archaeological assessment during Detail Design. The only areas not requiring further assessment, are due to the disturbances from the rural roads and ditching, the low and wet area near the west end, and the previously assessed area at the east end.

### *Cultural Heritage Resources*

Indirect impacts resulting from construction-related vibration to built heritage resources identified within the study area (B.H.R. 1) may result. To address the potential for indirect impacts due to construction-related vibration, a baseline vibration assessment should be undertaken during Detail Design. This assessment will determine potential vibration impacts and determine if monitoring is required. Built heritage resources and cultural heritage landscapes which are not anticipated to be impacted by the proposed works, shall be avoided.

### *Traffic*

While it is anticipated that Highway 401 traffic will not be impacted for the entirety of construction, a minimum of one (1) lane of traffic in both eastbound lanes and westbound lane directions of Highway 401 will be maintained during most of the work. Short and medium duration full closures of Power Dam Drive will be required for parts of construction of the new approaches and ramps.

Final closures, durations, and detour routes will be confirmed during Detail Design and through consultation with the County, Township and Emergency Services. Final recommendations will be included as part of a Traffic Management Plan.

### *Future Consultation*

During Detail Design, the following consultation activities are recommended: engaging with the Township of South Stormont and the United Counties of Stormont, Dundas, and Glengarry to discuss road closures and construction works; coordinating with local Emergency Service Providers to address potential access disruptions caused by the closure of Highway 401 and Power Dam Drive; consulting with affected property owners to inform them of any impacts; and working with utility companies, including Bell Canada and Hydro One, to finalize utility relocation requirements.

These consultations will ensure that all stakeholders are informed and that any necessary adjustments are made to minimize disruptions.

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Appendix I – Highway 401 and Power Dam Drive Interchange Environmental Noise Assessment

Appendix J - Contamination Overview Study (COS) – Highway 401 Power Dam Bridge Replacement

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# 1 OVERVIEW OF THE PROJECT

## 1.1 Project Summary

Morrison Hershfield Limited now Stantec, was retained by the Ontario Ministry of Transportation (MTO) to undertake the Preliminary Design Study for the replacement of Bridge Site 013X-180/B.O. (Power Dam Drive bridge) that carries Power Dam Drive over Highway 401 in the Township of South Stormont, within the United Counties of Stormont, Dundas and Glengarry (Figure 1).

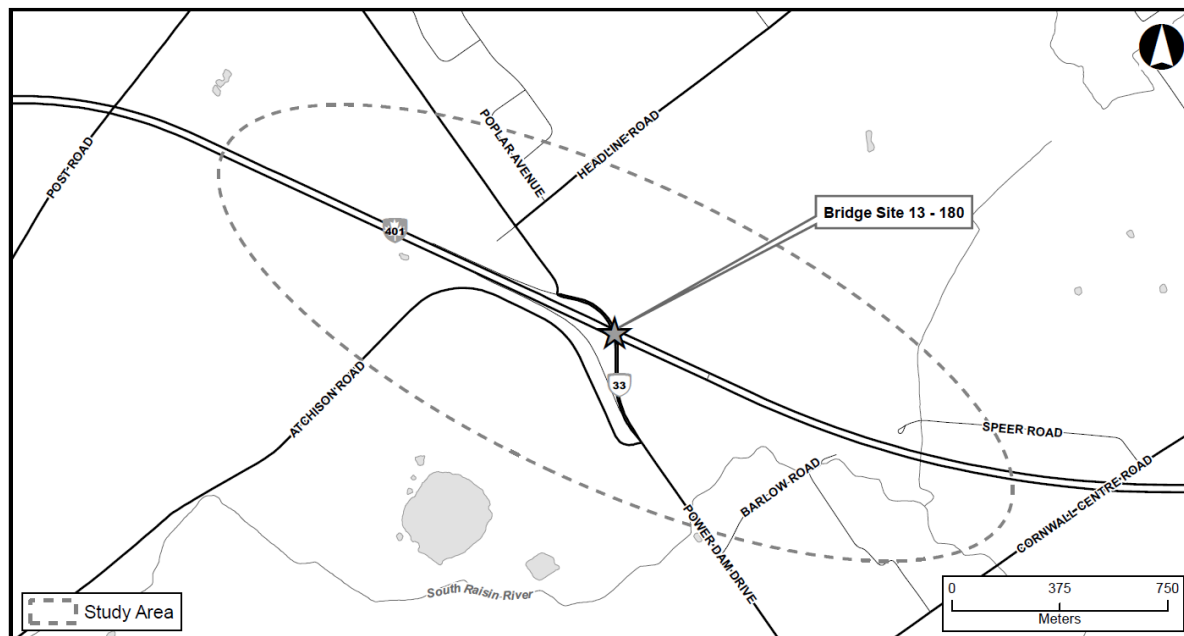


Figure 1: Highway 401 at Power Dam Drive Project Limits

## 1.2 Study Purpose, Objectives & Scope

The purpose of this Study is to examine improvements to accessibility and long-term planning with regards to the Highway 401 Power Dam Drive overpass.

The Power Dam Drive bridge is approaching the end of its intended service life, and the interchange's current configuration does not allow for all traffic movements onto and from Highway 401. Currently traffic can exit eastbound and enter westbound at this partial interchange.

While traffic analysis has determined that there is no current need for a full interchange at this location, an expansion of capacity at the Highway 401 and Power Dam Drive will require a full interchange in the future. To accommodate for this future need, a partial interchange is being proposed.

As part of the Study, the following was included within the scope:

- Assessment of all natural and social environmental constraints with the identification of mitigation measures to reduce environmental impacts and to minimize disruption to Highway 401 and Power Dam Drive operations.
- Development and evaluation of a reasonable number of design alternatives for the bridge and operational improvements to select a Technically Preferred Alternative(s).
- Development of a long-range plan for the Highway 401 and Power Dam Drive interchange so that an ultimate interchange design can be established, and land protected for future improvements.
- Identification of any property requirements.
- Recommend the most appropriate strategy for staging the construction of the structure (e.g., detour routes for Highway 401 and Power Dam Drive).
- Preparation of a Transportation Environmental Study Report (TESR) in compliance with the Class Environmental Assessment (Class EA), supported by all project-specific environmental reference documents.

### 1.3 Study Process

This study followed the approved planning process for a Group 'B' project under the Ministry of Transportation's Class Environmental Assessment for Provincial Transportation Facilities (2000) (Class EA). The study process provided opportunities for consultation, review at key project milestones, as well as for a continuous, evolving approach to the technical work involved.

"Study Commencement" involved notifying Indigenous Communities, government agencies, Township of South Stormont, United Counties of Stormont, Dundas and Glengarry, interest groups and members of the public that the study had been initiated, and their involvement was encouraged. This involved placing an advertisement in local newspapers and the mailing of notification letters to potentially interested and affected stakeholders. Interested parties were advised to contact the Project Team for further information and/or to be placed on the project mailing list. Two (2) Public Information Centres (PICs) were held for this project. The PIC's were advertised in local newspapers and mailed letters and emails were sent to those individuals and agencies with an identified interest in the project. Refer to **Section 4** for additional information on the consultation that was carried out for the project.

After documenting the existing conditions within the study areas, the Project Team developed a Long-List of Alternatives for the replacement of the Power Dam Drive bridge. The Long-List of Alternatives included the following:

- Alternative 1: Do Nothing
- Alternative 2: Straight bridge with a 60-degree skew at the existing bridge
- Alternative 3: Straight bridge with a 35-degree skew, Parclo AB
- Alternative 4: Straight bridge with a 89 degree skew, Parclo A2 south of bridge
- Alternative 5: Straight bridge with a 60-degree skew, Parclo B2 north of the bridge and a diamond south of the bridge
- Alternative 6: Curved bridge with a 60-degree skew, Parclo B2
- Alternative 7: Straight bridge with a 60-degree skew, Parclo B2 south of the bridge
- Alternative 8: Straight bridge with a 41-degree skew with a single diamond interchange
- Alternative 9: Curved bridge with a 49-degree skew, Parclo A2

- Alternative 10: Straight bridge with a 90-degree skew, Parclo A2

The Long-List of alternatives were evaluated based on their impacts to the following criteria:

- **Social/Natural Environment:** Social and Community, Property Impacts, Cultural and Built Heritage/Archaeology, Watercourses/Fisheries, Vegetation, Woodlots, and Wildlife Habitat, Water Resources
- **Cost/Staging:** Cost, Staging Opportunities, Utility Impacts
- **Transportation:** Operational Performance, Geometry, Local Road Impacts, Structural Implications, Accommodation of Power Dam Drive Active Transportation

The alternatives and their evaluation were presented to the public at Public Information Centre (PIC) No. 1, which was held on the project website from December 14, 2022, to January 20, 2023.

Following the completion of PIC No. 1, a Short-List of five (5) alternatives were refined and carried forward. The Short-List of Alternatives were the following:

- Alternative 1: Do Nothing
- Alternative 3: Parclo AB
- Alternative 5: Parclo B2 – North
- Alternative 6: Parclo B2 – South
- Alternative 8: Diamond Interchange

A detailed evaluation of these alternatives was undertaken, and Alternative 8 emerged as the Technically Preferred Alternative. This alternative was presented to the public at PIC No. 2, which was held on the project website from May 30, 2024, to June 30, 2024.

This Transportation Environmental Study Report (TESR) has been prepared and made available for a 45-day public review. If there are no outstanding concerns after the 45-day review period, the project will be considered to have met the requirements of the Class EA and may proceed to Detail Design.

## 1.4 General Description of the Recommended Plan

To accommodate for both the present and future traffic needs of the users of Highway 401 and Power Dam Drive, the Recommended Plan proposes the construction of a partial diamond interchange (Alternative 8) which can accommodate a future full interchange. This partial interchange will be constructed with Power Dam Drive on a new alignment with a new structure over Highway 401. The Recommended Plan will allow for the construction of future ramps when/if a full interchange is warranted. This “Interim configuration” is part of a phased approach proposed to coincide with the bridge replacement and realign the existing ramps to tie into the new structure and Power Dam Drive alignment. The partial interchange will maintain the level of service with the Brookdale Interchange to the East. Some culvert replacements and drainage improvements will also be required to accommodate the works.

The Recommended Plan addresses interim interchange improvements while accommodating the potential for long-term interchange and Highway 401 improvements.

To ensure environmental impacts are minimized, mitigation measures and timing windows will be implemented during construction.

To implement the Technically Preferred Alternative, property acquisition will be required. Preliminary discussions are currently underway with impacted property owners and should continue during Detail Design.

## **1.5 Purpose of a Transportation Environmental Study Report**

This TESR documents the Preliminary Design and planning process followed and provides an overview of the study, a summary of the environmental conditions, the potential impacts including mitigation measures to address the environmental conditions within the study area. The TESR fulfills the documentation requirements of the MTO Class EA process for a Group 'B' project and contains pertinent information regarding the following:

- Study objectives
- Existing conditions of the study area
- Generation and evaluation of alternatives
- Consultation
- Potential impacts and mitigation measures
- The Recommended Plan

Technical documents prepared under this assignment which provide additional background information to support the project recommendations as outlined in this report, including an inventory and analysis of existing environmental conditions (physical, natural, socio-economic, and cultural environments), identification of potential impacts and determination of mitigation measures to be applied are summarized in this TESR and also detailed in the supporting specialist reports included in the Appendices of this TESR.

As required under the MTO Class EA, this TESR is being made available to the Indigenous Communities, the public, other interested parties, and external agencies for a 45-day review period electronically on the project website ([www.highway401powerdam.com](http://www.highway401powerdam.com)) or in hard copy upon request.

Interested persons are encouraged to review this document and provide comments to the Project Team by January 11, 2026.

## **1.6 Environmental Clearance**

If there are no significant concerns following the public review period, or if the MECP has not received a Section 16 Order request with issues relating to Aboriginal and treaty rights, the project will be eligible to move forward into Detail Design.

The final design plans completed during the Detail Design stage may have design modifications or refinements that may result in environmental benefits or impacts that were not anticipated or identified in this TESR. Changes that result in significant design modifications will be discussed with affected external agencies, interested stakeholders and property owners during the next phase of the study.

During Detail Design, MTO will ensure that commitments to future work are undertaken. Although the timeline for construction is unknown at present, the phased approach of this project will assist the MTO, municipality, business owners, and private landowners with future planning and development within the study area. The implementation of the identified improvements is dependent on regional and provincial priorities and available funding.

## 2 PROJECT NEEDS ASSESSMENT

The objective of the study was to develop a Preliminary Design for the bridge replacement at Highway 401 and Power Dam Drive as part of the Ministry's ongoing review of safety and operational needs for the provincial highway network.

### 2.1 Problem/Opportunity Statement

The Power Dam Drive Bridge is a post-tensioned concrete structure with a curved design, constructed around 1967. It consists of four spans and has an overall length of 92.4 meters. The bridge currently supports two traffic lanes, with wide curbs and concrete barrier walls on either side, spanning over Highway 401.

Although the Power Dam Drive Bridge remains in fair condition, it is nearing the end of its intended service life, with the most recent rehabilitation completed in 2016. As a result, the bridge requires replacement. This replacement will not only address the aging infrastructure but will also improve roadway geometry and accommodate future traffic demands, particularly in anticipation of interchange upgrades and potential Highway 401 expansion.

Developing a comprehensive Recommended Plan for the bridge replacement is essential to align with the Ministry of Transportation's ongoing safety and operational assessments of the provincial highway network. This proactive planning will ensure that the new structure meets both current and future transportation needs, enhancing safety and operational efficiency. The replacement project also offers an opportunity to improve the bridge's structural condition and update roadside safety features in line with current standards, while anticipating future requirements.

### 2.2 Alternatives to the Undertaking

The MTO Class EA process requires the consideration 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 as part of this Study:

- Do Nothing
- Replace the structure with a design that meets current needs
- Replace the structure with a design that meets ultimate transportation needs
- Replace the structure with an interim design that meets current needs, but can be accommodate future transportation needs

The Do Nothing alternative was considered to provide a baseline against which the effects of other alternatives could be compared. The Do Nothing alternative does not address the problem/opportunity statements of enhancing roadway geometrics and was therefore not considered a feasible solution. The Do Nothing alternative was carried forward throughout the process for comparison purposes.

Replacing the structure with a design that only met current needs would not address the potential need for a future interchange and Highway 401 expansion. Alternatively, replacing the structure with a design that only addressed the future interchange requirements did not address

the present traffic demand. As such, both alternatives were screened out from further consideration. Instead, the replacement of the structure with an interim design that met current traffic needs while being able to accommodate future traffic demand was carried forward for further study.

### 3 ENVIRONMENTAL ASSESSMENT PROCESS

#### 3.1 Impact Assessment Act

The Canadian Impact Assessment Act (IAA) applies to projects described in the Regulations Designating Physical Activities (available on the e-Laws website). Although any project may be designated under the Impact Assessment Act by the federal Minister of the Environment, if they are of the opinion that carrying out the project may cause adverse effects, or that public concerns related to those effects warrant designation, the federal impact assessment process typically only designates projects that significantly impact one or more of the following:

- Fish and fish habitat
- Migratory birds
- Federal lands
- Effects that cross provincial or international boundaries
- Effects that impact Indigenous peoples, such as their lands and resources for traditional purposes
- Changes to the environment that are directly linked to or necessarily incidental to any federal decisions about a project

This project is not captured within the Regulations Designating Physical Activities, will not affect federal lands or the traditional use of resources by Indigenous communities, and will not cross a provincial or international boundary. The project will be screened under the established MTO/DFO/OMNR Protocol for Protecting Fish and Fish Habitat on Provincial Transportation Undertakings (2009) to satisfy the requirements of the Fisheries Act and ensure that the project is unlikely to cause a harmful alteration, disruption, or destruction of fish habitat (HADD). In addition, the project will conform to the requirements of the Migratory Birds Convention Act (MBCA) to ensure there are no lasting negative impacts to migratory birds. For these reasons, a screening under the IAA is not required.

#### 3.2 Ontario Environmental Assessment Act

The Ontario Environmental Assessment Act (OEAA) allows for a planning and decision-making process so that potential environment impacts are considered prior to a project's initiation. The OEAA applies to provincial ministries and agencies; municipalities such as towns and cities, and public bodies such as conservations authorities and Metrolinx. Within the Environmental Assessment (EA) process, public consultation is mandatory as part of the decision-making process; this allows the public, Indigenous communities, and government agencies to become involved. Examples of projects that go through the EA process include public roads and highways; transit projects; waste management projects; water and wastewater work; resource management, and flood protection projects.

There are two types of Environmental Assessments: Comprehensive and Streamlined.

Comprehensive EAs are prepared for large-scale, complex projects with the potential for significant environmental impacts. They require the approval of the Ministry of the Environment, Conservations and Parks.

Streamlined EAs can be used for routine projects that have predictable and manageable environmental effects. Proponents of these types of projects follow a self-assessment and decision-making process. Approval is not directly granted for each project. Examples of streamlined self-assessment processes include Class Environmental Assessment; Electricity Projects Regulation; Waste Management Projects Regulation, and Transit Projects Regulation. Projects planned that follow a streamlined process are:

- Pre-approved or exempt (Minister's approval is not required).
- Conditional upon being planned according to the streamlined process.
- Not required to conduct a higher level of assessment such as a comprehensive environmental assessment.

The Ministry of Transportation's Class Environmental Assessment for Provincial Transportation Facilities (MTO Class EA) was approved under the Ontario Environmental Assessment Act in 1999 and amended in 2000. The MTO Class EA defines groups of projects based on the complexity of their activities and outlines the consultation and documentation that must be followed to ensure compliance. The following principles underlie the Class EA process for Group A, B and C projects:

- Transportation engineering principles.
- Environmental protection principles.
- External consultation principles.
- Evaluation principles that are intended to achieve the best overall balance of these principles.
- Documentation principles.
- Bump-up principles.
- Environmental clearance principles to proceed.

Class EA do not require formal review and approval separately under the EA Act. Under the Class EA, the groupings are largely defined by their relative complexity and potential for impacts and the undertakings, or projects are classified into three groups:

- **Group A:** Projects that are new provincial transportation facilities and highway/freeway realignments.
- **Group B:** Projects that modify access or add capacity to existing provincial transportation facilities, and new service/maintenance/operations facilities.
- **Group C:** Improvements to existing provincial transportation facilities.

Study groupings within the MTO Class EA were established for the purposes of consultation, documentation, and formal EA challenge (Section 16 Order requests).

### 3.3 MTO Class EA Group 'B' Requirements

The MTO Class EA is an approved planning document that defines groups of studies and activities, and the EA process that the proponent commits to following for each of these undertakings. The defined process that is to be followed is in respect of projects and activities similar in complexity and performed by the MTO. Principles and processes that must be followed for applicable projects, include consultation, development and evaluation of

alternatives, and documentation. Public participation and consultation with property owners and other interested parties is a significant element of the decision-making process.

This Preliminary Design and Environmental Assessment Study has followed the approved planning process for a Group 'B' project (refer to Figure 2). Group 'B' projects are those which involve major improvements to existing facilities, such as replacement of an existing bridge and interchange improvements. Types of Group 'B' projects include:

- Highway and freeway improvements that provide a significant increase or modification in traffic capacity, access, or footprint.
- Major realignments.
- Improvements to existing transitways and ferryboat dock/terminals.
- New provincial service, maintenance, or operation facilities.

The Class EA process, which is principle-based rather than prescriptive, has culminated in this document, recognized as the Transportation Environmental Study Report, also known as the TESR. This Transportation Environmental Study Report (TESR) is prepared in accordance with the requirements of the MTO Class EA for Provincial Transportation Facilities (2000), which has been approved under the Ontario EA Act. The TESR documents the Preliminary Design elements of the transportation engineering requirements, consultation process, existing environmental constraints, alternatives to the undertaking, the technically preferred alternative, environmental protection measures and mitigation measures developed to address anticipated environmental impacts.

Changes that result in significant design modifications will be discussed with affected external agencies, interested stakeholders and property owners during Detail Design, and documented in a Design and Construction Report (DCR) that will be made available for public review. If significant changes are made to the project following the completion of the TESR and eligibility for Environmental Clearance, a TESR Addendum may be required to document the project changes.

## THE CLASS ENVIRONMENTAL ASSESSMENT PROCESS FOR GROUP 'B' PROJECTS

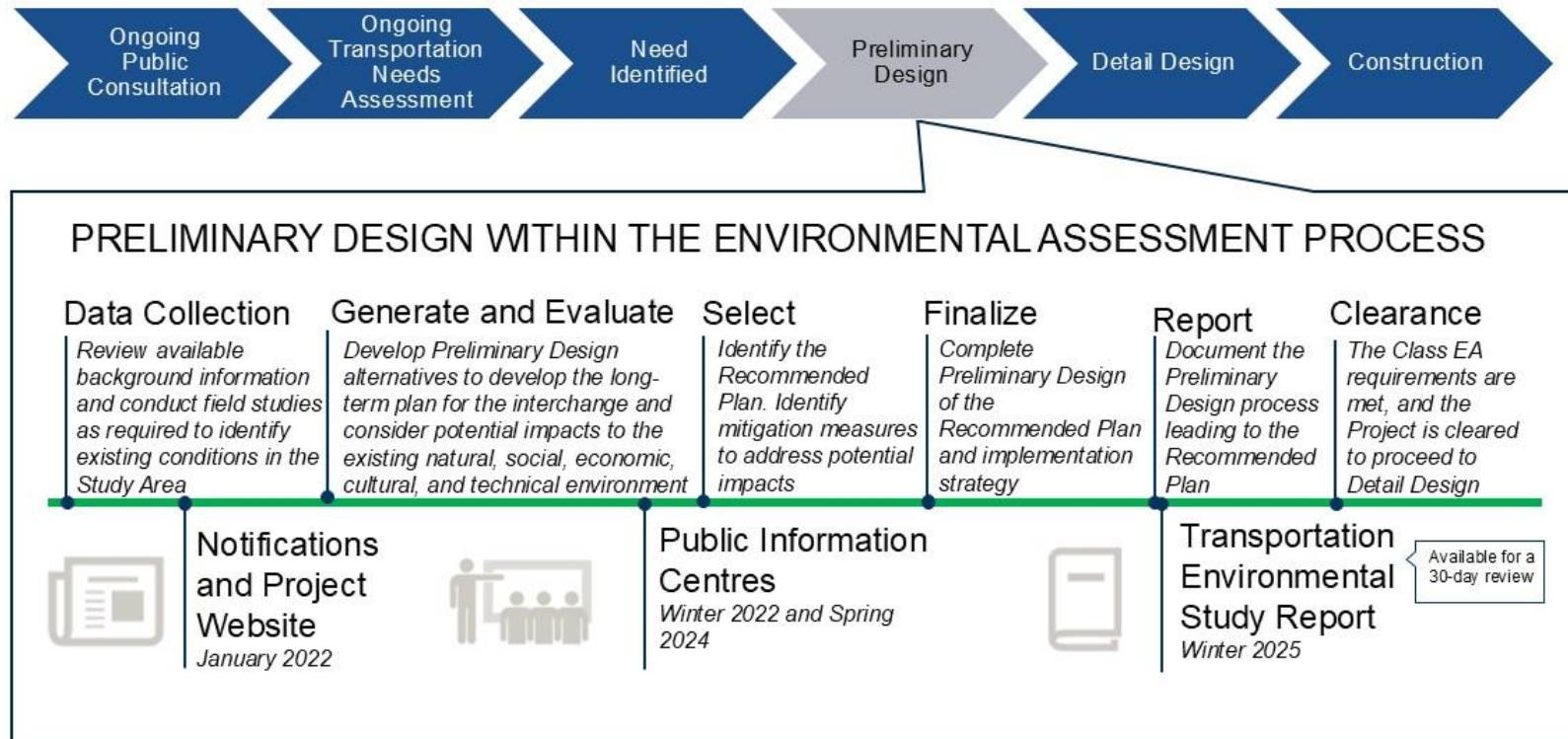


Figure 2: MTO Class Environmental Assessment for a Group B Project

## 4 CONSULTATION

Consultation is a key element of the MTO Class EA process and is crucial for the successful completion of this study. To be effective, consultation must be inclusive, timely, and clear. The primary goals of consultation, as outlined in the MTO Class EA, include:

- Identifying public concerns and values
- Identifying agency concerns
- Collecting information about the existing environment
- Providing relevant information on decisions and potential effects
- Ensuring regulatory compliance with the EA process

The Consultation Plan developed for this study employs a variety of tools and techniques to engage a wide range of stakeholders, including government agencies, municipalities, Indigenous communities, and the public. The overarching objectives are to inform stakeholders about the study and to gather input at key stages, ensuring the Study Team can make well-informed recommendations.

The consultation program was developed based on the following guiding principles:

- Engage with the stakeholders most directly affected by the project
- Constructively address feedback and concerns
- Provide information on the potential impacts associated with the project
- Use appropriate tools and techniques tailored to different stakeholder groups
- Make all reasonable efforts to proactively resolve concerns

Our approach is designed to foster a transparent, open, and two-way dialogue, ensuring that the consultation process is accountable, respectful, timely, and defensible.

Key consultation tools and techniques used throughout the process included:

- Public notifications
- A project website
- Public Information Centres

The consultation process involved Indigenous communities, regulatory agencies, local interest groups, and the general public. Notices were published in local newspapers to inform the public about the project. Copies of all notification materials issued during the study are included in **Appendix A**, while the complete project contact list can be found in **Appendix B**. Stakeholders identified with a potential interest in the project were added to the external mailing list and invited to provide comments.

### 4.1 Project Website

A project website, [www.highway401powerdam.com](http://www.highway401powerdam.com), was developed during the Preliminary Design phase. The purpose of the project website is to announce project milestones, to keep members of the public informed on the project by sharing information, and to allow for public

comments. The website features an overview of the study, information on the Class EA process, a copy of the PIC materials, this TESR and copies of projects notices.

Web materials were updated throughout the study, including all relevant study information for review, including links to project-specific documents (i.e., study notifications, EA process, PIC display boards, TESR), opportunities for public engagement and other relevant information.

## **4.2 Public Notifications**

### **4.2.1 Notice of Study Commencement**

A “Notice of Study Commencement” was published in the Cornwall Standard Freeholder (English) and Cornwall Express (French) newspapers on January 19, 2022. The notice appeared in both English and French as per the French Languages Services Act. Letters providing notification of study commencement were also mailed to all those listed on the external mailing list on January 10, 2022. A copy of the consultation material can be referred to in **Appendix A**.

### **4.2.2 Notice of Public Information Centre No. 1**

PIC No. 1 was held online between December 19, 2022, to January 20, 2023, on the project’s website. A “Notice of Public Information Centre” was published in the Cornwall Standard Freeholder (English) and the Cornwall L’express (French) on December 14, 2022. Letters were distributed on December 14, 2022, to individuals on the project mailing list. A copy of the Notice of Public Information Centre No. 1 can be referred to in **Appendix A**.

### **4.2.3 Notice of Public Information Centre No. 2**

PIC No. 2 was held online between May 30, 2024, to June 30, 2024, on the project’s website. A “Notice of Public Information Centre” was published in the Cornwall Standard Freeholder (English) on May 30, 2024, and the Cornwall L’express (French) on May 29, 2024. Letters were distributed on May 27, 2024, to agencies and individuals on the project mailing list.

For stakeholders who had previously indicated a preference to receive electronic communication, or where an address was not available, an email was sent on May 31, 2024.

The local Member of Provincial Parliament (MPP), and Indigenous Communities/Groups were distributed letters/emails on May 22, 2024. A copy of Notice of Public Information Centre No. 2 can be referred to in **Appendix A**.

### **4.2.4 Notice of Transportation Environmental Study Report Submission**

Notification letters were mailed to stakeholders on the project mailing list to notify of the 45-day public review period for this Transportation Environmental Study Report (TESR). In addition, a “Notice of Submission – Transportation Environmental Study Report” was placed in the Cornwall Standard Freeholder and the Cornwall L’express and posted on the Project’s website ([www.highway401powerdam.com](http://www.highway401powerdam.com)).

### 4.3 Local Government, Government Agencies & Utility Company Consultation

#### 4.3.1 Local Government

The Township of South Stormont, the United Counties of Stormont, Dundas, and Glengarry, and the City of Cornwall were contacted as part of the study. Staff were advised of the project via letters sent by the project team during the Notice of Study Commencement, Notice of Online Public Information Centre No. 1, Notice of Online Public Information Centre No. 2, and Notice of Completion (refer to **Appendix A**). Meetings were also held with members from the Township of South Stormont, the United Counties of Stormont, Dundas, and Glengarry, and the City of Cornwall to discuss the project as part of our Municipal Technical Advisory Committee.

##### 4.3.1.1 Municipal Technical Advisory Committee (MTAC)

A Municipal Technical Advisory Committee (MTAC) was set up at the outset of the project. This committee was made up of members from the project team, as well as representatives from the Township of South Stormont, the United Counties of Stormont, Dundas, and Glengarry, and the City of Cornwall.

The purpose of MTAC was to discuss project related details and to obtain feedback. During the study, two (2) meetings were held with MTAC.

##### *MTAC Meeting No. 1*

The first MTAC meeting was held on November 9, 2022. The project team provided an overview of the project, including information on challenges and opportunities, the environmental assessment process, the long list of interchange alternatives, the evaluation criteria, and next steps.

The current and future needs traffic conditions of the intersection were also discussed.

##### *MTAC Meeting No. 2*

The second MTAC meeting was held on December 5, 2023. The project team provided an update of work undertaken for the project to date, the short-list of alternatives, and next steps. Details regarding construction staging was discussed.

#### 4.3.2 Government & Regulatory Agencies

Government and regulatory agencies identified as having a potential interest in the project were also contacted. They were advised of the project via letters sent by the project team during the Notice of Study Commencement, Notice of Online Public Information Centre, Notice of Public Information Centre No. 2, and Notice of Completion (refer to **Appendix A**). The government and regulatory agencies consulted include:

- Ministry of the Environment, Conservation and Parks
- Ministry of Natural Resources
- Ministry of Agriculture, Food and Rural Affairs
- Ministry of Citizenship and Multiculturalism
- Raisin Region Conservation Authority
- Canadian National Railway

- Canadian Pacific Railway
- Ontario Federation of Agriculture
- Cornwall and Area Chamber of Commerce
- South Stormont Chamber of Commerce
- Catholic District School Board of Eastern Ontario
- Conseil des écoles publiques de l'Est de l'Ontario
- Conseil scolaire de district catholique de l'Est ontarien
- Student Transportation of Eastern Ontario
- Upper Canada District School Board
- Consortium de transport scolaire de l'Est

### 4.3.3 *Utility Companies*

At the outset of the Preliminary Design, a review of the existing and planned utility infrastructure systems was conducted. This review was based on inventory data, planning information and other relevant reports.

Following this review, all applicable utility companies with an identified interest in the project were contacted. These utility companies included Enbridge, Bell Canada and Hydro One. Follow up consultations with utility companies and municipal services providers continued to occur throughout the preliminary design phase to identify any specific concerns with the proposed Project.

## 4.4 **Indigenous Community Consultation**

All project notifications, including a Notice of Study Commencement, Notice of Online Public Information Centre No. 1, Notice of Online Public Information Centre No. 2, and the Notice of Completion were sent directly to the following Indigenous communities/organizations by MTO:

- Mohawks of Akwesasne
- Métis Nation of Ontario

To date, no comments were received due to this correspondence. Letters sent to Indigenous Communities can be found in **Appendix B**.

## 4.5 **Public Information Centres**

### 4.5.1 *Online Public Information Centre No. 1*

The first Online Public Information Centre (PIC) was held virtually on the project's website ([www.highway401powerdam.com](http://www.highway401powerdam.com)) and made accessible to the public on December 19, 2022. The PIC was structured as an online format with a PowerPoint presentation available for review (in English and French) on the project website. To ensure information was made accessible, copies of the website content was also available to be mailed out in hardcopy by request, though no requests were received. The purpose of this PIC was to present and receive input on the project background, existing roadway configuration, existing environmental conditions, evaluation of long list design alternatives, and next steps. Refer to **Appendix B** for the material presented.

The comments received during the public review period are summarized in **Table 1**. Full comments can be found in **Appendix B**.

Table 1: Summary of Comments Raised during the Public Information Centre No. 1 Comment Period

| Stakeholder & Date Received                             | Comment Summary                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Response Summary                                                                                                                                                                                                                                                                                                                                                               |
|---------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Property Owner<br>Dec 17/22                             | <ul style="list-style-type: none"> <li>Disagreed with the alternatives under consideration and suggested an alternate alternative which should be located to the west of the existing curved overpass.</li> <li>The new overpass and on/off ramps should be designed similar to the existing ramp configuration now in use at Boundary Road 491 overpass at the east side of Cornwall.</li> <li>The existing on ramp going west can remain but will need to be extended.</li> </ul> | <ul style="list-style-type: none"> <li>The project team advised that a number of alternatives had been considered as part of the study, and the short-listed alternatives represented the most feasible options.</li> </ul>                                                                                                                                                    |
| Raisin Region Conservation Authority<br>Dec 20/22       | <ul style="list-style-type: none"> <li>Information was provided regarding area watercourses.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                             | <ul style="list-style-type: none"> <li>The project team advised that the information provided will be used in the evaluation of the shortlisted alternatives.</li> </ul>                                                                                                                                                                                                       |
| Property Owner<br>Dec 22/22                             | <ul style="list-style-type: none"> <li>Support for the Do-Nothing option as the addition of the interchange was believed to be unnecessary.</li> <li>Concerns regarding impacts to private property including farmland and forests. Supported the replacement of the interchange with a similar structure using rapid replacement technology.</li> </ul>                                                                                                                            | <ul style="list-style-type: none"> <li>The project team advised that it was an appropriate time to examine the needs of the future and improve the operations of the interchange. Also due to the curved structure and unusual geometry/interchange the current layout creates potential safety hazards which can be corrected with a replacement of the structure.</li> </ul> |
| Ministry of Natural Resources and Forestry<br>Dec 22/22 | <ul style="list-style-type: none"> <li>Referred the study team to several technical guides, resources, contacts, and policies regarding the project.</li> </ul>                                                                                                                                                                                                                                                                                                                     | <ul style="list-style-type: none"> <li>The project team advised that the resources provided will be assessed regarding their applicability.</li> </ul>                                                                                                                                                                                                                         |
| Public<br>April 4/23                                    | <ul style="list-style-type: none"> <li>Comment received advised of a update to landfill sites within the study area, and advised of a concern regarding the sizing of two culverts, and provided background information regarding the culverts</li> </ul>                                                                                                                                                                                                                           | <ul style="list-style-type: none"> <li>The project team advised that that the study team is looking into information on the two culverts in question and thanked the commenter regarding the landfill site clarification.</li> </ul>                                                                                                                                           |

## 4.5.2 Online Public Information Centre No. 2

PIC No. 2 was held virtually on the project's website ([www.highway401powerdam.com](http://www.highway401powerdam.com)) from May 30, 2024, to June 30, 2024. A PowerPoint presentation was available for review (in English and French), and to ensure information was made accessible, copies of the website content was also made available to be mailed out in hardcopy by request.

The purpose of this PIC was to present a summary of PIC No. 1, the short-list of design alternatives, the evaluation of the short-list of alternatives, the selected Technically Preferred Alternative, and to provide an opportunity for feedback as well as advise of next steps in the project. Refer to **Appendix B** for the material presented.

The comments received during the public review period are summarized in **Table 2**. Full comments can be found in **Appendix B**.

Table 2: Summary of Comments Raised during the Public Information Centre No. 2 Comment Period

| Stakeholder & Date Received     | Comment Summary                                                                                                                                                                                                                                                                                                            | Response Summary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Property Owner<br>June 5, 2024  | <ul style="list-style-type: none"> <li>Stated their concern regarding maintaining property access, as well as their support for Alternative No. 3 as a first choice and Alternative No. 8 as a second choice.</li> </ul>                                                                                                   | <ul style="list-style-type: none"> <li>The project team advised Alternative 8 emerged as the Technically Preferred Alternative as it offers the best outcome for motorists and residents while minimizing potential impacts.</li> <li>The Project Team further advised that Alternative 8 will maintain access to their property.</li> </ul>                                                                                                                                                                                                                                                      |
| Property Owner<br>June 12, 2024 | <ul style="list-style-type: none"> <li>Requested additional information regarding the weighting of the costing element.</li> <li>Agreement with the potential need for a full interchange in the future, however, was concerned regarding whether Alternative 8 could allow for this potential future expansion</li> </ul> | <ul style="list-style-type: none"> <li>The project team advised that costing was one of many factors considered when evaluating the alternatives, and each factor was given a relatively equal weight, with slightly more emphasis placed on the Evaluation Criteria in the Transportation and Environmental Evaluation Components.</li> <li>The project team also advised that the Recommended Alternative (Alternative 8 – Single Diamond Interchange) does meet the current needs of the surrounding area while providing options for future transportation and traffic conditions.</li> </ul> |

## 5 OVERVIEW OF EXISTING CONDITIONS

To support the examination of a reasonable range of alternatives, an inventory of environmental features within the study area was compiled and detailed within the specialist reports produced for the Preliminary Design and included within the appendices of this TESR. Identifying significant features involved the collection of primary and secondary source data derived from surveys, field investigations, published and unpublished literature, government sources, and consultation with agencies and the public.

### 5.1 Fish & Fish Habitat

Following the collection of background data, spring and summer fish and fish habitat field investigations were completed throughout the study area. The field investigations were completed in accordance with Section 5 of the Fish Guide, with a specific focus on confirming presence/absence of fish habitat, as well as identifying any areas of seasonal habitat. A total of 26 existing culverts were assessed using results from field investigations and background information, and it was determined that six (6) of the culverts supported direct fish habitat, including four (4) separate watercourses which were unnamed tributaries of South Raisin River. The tributaries that supported fish habitat were confirmed to be warmwater systems with permanent flow regimes, and the fish community present included common bait/forage fish species. Refer to **Figure 3** for aquatic opportunities and constraints located within the study area.

Based on the results of the field investigations and review of background research, it was determined that there were no sensitive or significant fish or fish habitat features present within the study area. All habitats had been previously altered through channelization and/or roadway construction and experience ongoing degradation through pollution from highway runoff and litter as well as Highway ROW maintenance.

A summary of fish and fish habitat located within the project area is provided in **Table 3**. For a full discussion of fish and fish habitat located within the project area, refer to **Appendix E**.

#### 5.1.1 Aquatic Species at Risk

According to available background information, and correspondence with provincial agencies there were no provincial aquatic Species at Risk (SAR), and no federal aquatic SAR were identified within the general project area. Cutlip Minnow (*Exoglossum maxillingua*) which is listed as Threatened under the provincial Endangered Species Act (ESA) and listed as Special Concern under Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was identified as being potentially located within the Study Area and within an area existing immediately west of the study area including an unnamed tributary of the Raisin River. Given that this tributary of Raisin River is part of a separate sub-watershed compared to the tributaries within the study area (South Raisin River tributaries), it is deemed unlikely that this species exists within the study area.

For a detailed discussion of the fish and fish habitat existing conditions within the study area including identified species, refer to the Fish and Fish Habitat Existing Conditions and Preliminary Impact Assessment Report provided in **Appendix D**.

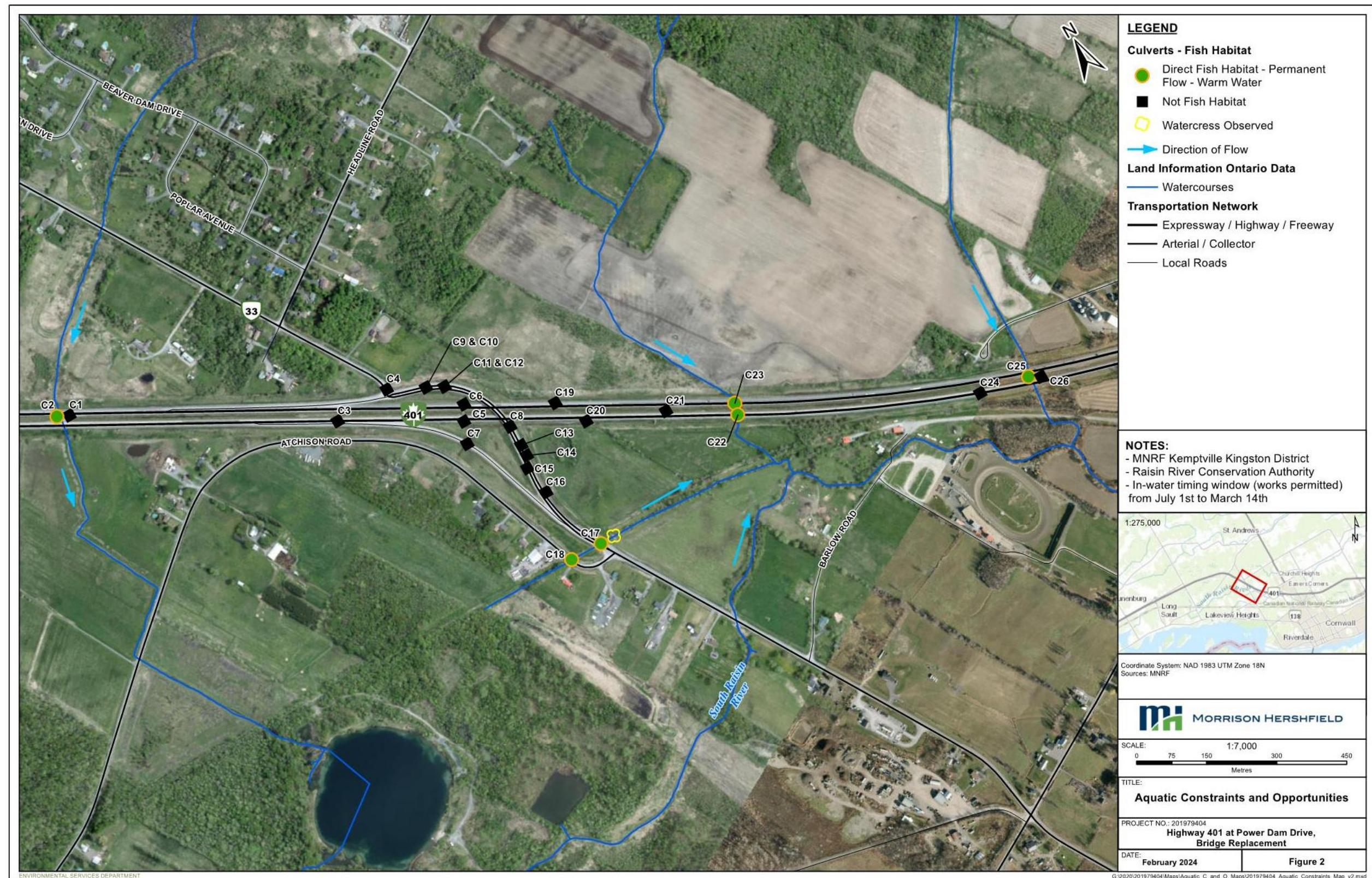


Figure 3: Aquatic Constraints and Opportunities within the Study Area

Table 3: Fish and Fish Habitat within the Study Area

| Waterbody ID/Culvert Station                     | Flow Regime | Thermal Regime | Fish Habitat* | Substrate Type                                     | Channel Morphology | Vegetation                                                                                                    | Constraints and Opportunity                                                          | Significant Fish Habitat |
|--------------------------------------------------|-------------|----------------|---------------|----------------------------------------------------|--------------------|---------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|--------------------------|
| Unnamed Tributary of South Raisin River – C2     | Permanent   | Warmwater      | Direct        | Clay, cobble, boulder gravel, sand, silt, detritus | Run, riffle, pool  | <b>Riparian:</b> Scattered deciduous trees, grasses, sedges, cattails and forbes<br><b>Instream:</b> none     | Potential seasonal barrier to fish passage at culvert inlet (boulder/cobble cascade) | None identified          |
| Unnamed Tributary of South Raisin River – C17/18 | Permanent   | Warmwater      | Direct        | Gravel, clay, sand, silt, muck, detritus           | Run                | <b>Riparian:</b> Grasses, sedges, cattails and forbes<br><b>Instream:</b> Water Plantain, grasses, Watercress | Watercress observed surrounding C17 – indicates potential groundwater inputs         | None identified          |
| Unnamed Tributary of South Raisin River – C22/23 | Permanent   | Warmwater      | Direct        | Gravel, clay, muck, silt                           | Run, flats         | <b>Riparian:</b> Grasses<br><b>Instream:</b> Grasses                                                          | Potential low flow barrier at south side of ROW due to debris jam at property fence  | None identified          |
| Unnamed Tributary of South Raisin River – C25    | Permanent   | Warmwater      | Direct        | Muck, silt, detritus                               | Runs, flats        | <b>Riparian:</b> Grasses, forbes<br><b>Instream:</b> Grasses                                                  | Potential seasonal barrier at south side of ROW due to debris jam at property fence  | None identified          |

## 5.2 Terrestrial Ecosystems

A review of potential biological constraints related to terrestrial features, including SAR, designated natural areas, and Significant Wildlife Habitat (SWH) was completed for the Highway 401 and Power Dam Drive interchange. The Study Area contains a mix of forested and cultural features (e.g., roads) that may provide suitable and significant habitats for several wildlife species including candidate nesting habitat for migratory birds and candidate bat maternity habitat.

Results of the background research, agency consultation and field studies were used to determine the habitat function and significance within the Study Area. The field investigations were conducted in accordance with the MTO's Environmental Reference of Highway Design (2013) terrestrial ecosystems requirements and included the classification of vegetation communities and search for SAR and their habitat within 120 m of the project area. The findings of the field investigations and background data review is detailed in the following sections of this TESR.

For a detailed discussion of the existing conditions within the study area including identified species, refer to the Natural Sciences Existing Conditions and Preliminary Impact Assessment Report provided in **Appendix D**.

### 5.2.1 Bedrock & Soils

The study area is located within the Lake Simcoe-Rideau Ecoregion (Ecoregion 6E), which extends from Lake Huron in the west, to the Ottawa River in the east and includes most of the Lake Ontario shore and the St. Lawrence River Valley in Ontario. It encompasses 6,311,957 ha (6.4%) of the province. The underlying bedrock is comprised of Paleozoic dolomite and limestone from the Ordovician and Silurian ages. The Frontenac Axis (an arch of rock between Algonquin Park and the Adirondacks) is an exemption since the granites and gneisses from the Precambrian age are mixed with Ordovician limestone and sandstone. Most of the bedrock is covered with rolling terrain of ice-laid materials. The eastern portion of the ecoregion is underlain by glaciomarine deposits which are a result of brief post-glacial incursions of salt water from the Champlain Sea along the St. Lawrence valley. The ecoregion is comprised of Gray Brown Luvisols (43%), and Melanic Brunisols (27%), Gleysols (14%) and Humo-ferric Podzols (5%). Most of the substrates provide a high capacity to buffer acidic atmospheric deposits before they reach the surface water (Crins, et.al., 2009).

### 5.2.2 Vegetation Communities

The vegetation communities located within the study area were classified based on the Ecological Land Classification for Southern Ontario (Lee, 2008). This system provides a standard for comparing similar communities across Ontario using a multilayer vegetation inventory (canopy, sub-canopy, ground cover), and supports the management of natural resources.

The study area, including the Highway 401 and Power Dam Drive Interchange and adjacent 120 m, consisted of a mixture of natural, agricultural and disturbed vegetation communities, indicative of past disturbance due to previous construction and maintenance activities, and nearby rural residential homes with maintained lawns (refer to **Figure 5**).

**Table 4** provides a list and description of the fourteen (14) Ecological Land Classification (ELC) communities identified within the study area, including dominant plant species occurring within each community.

#### **5.2.2.1 Rare Vegetation**

Results from background review and Natural Heritage Information Centre (NHIC) data identified the potential for Butternut (*Juglans cinerea*) to be present within the vicinity of the study area. Butternut is provincially Endangered. To confirm the presence or absence of Butternut within the Study Area, visual surveys were completed during the 2022 field investigations. Correspondence with the Ministry of Natural Resources (MNR) Kemptville District, MTO and the Raisin Region Conservation Authority (RRCA) did not return additional records of rare flora immediately within or adjacent to the Study Area.

A targeted survey for Butternut was completed within the study area, from the MTO right-of-way. A 25 m surveying buffer from the preliminary design limits was applied to the targeted survey as the Endangered Species Act (ESA) regulates the habitat of a Butternut 25 m from its stem.

During field investigations, one (1) Butternut measuring 1 cm diameter at-breast-height (DBH) was identified near the northwest limits of the study area within the mixed forest (FOM) community adjacent to open pasture (OAGM4) habitat.

Patches of Wild Parsnip (*Pastinaca sativa*) were also observed throughout the ROW communities adjacent to Highway 401, and multiple stands of invasive Common Reed (*Phragmites australis* ssp. *australis*) were identified within the Power Dam Drive and Highway 401 ROWs within the Study Area.

Due to the presence of private property, observations were limited to the existing ROW.

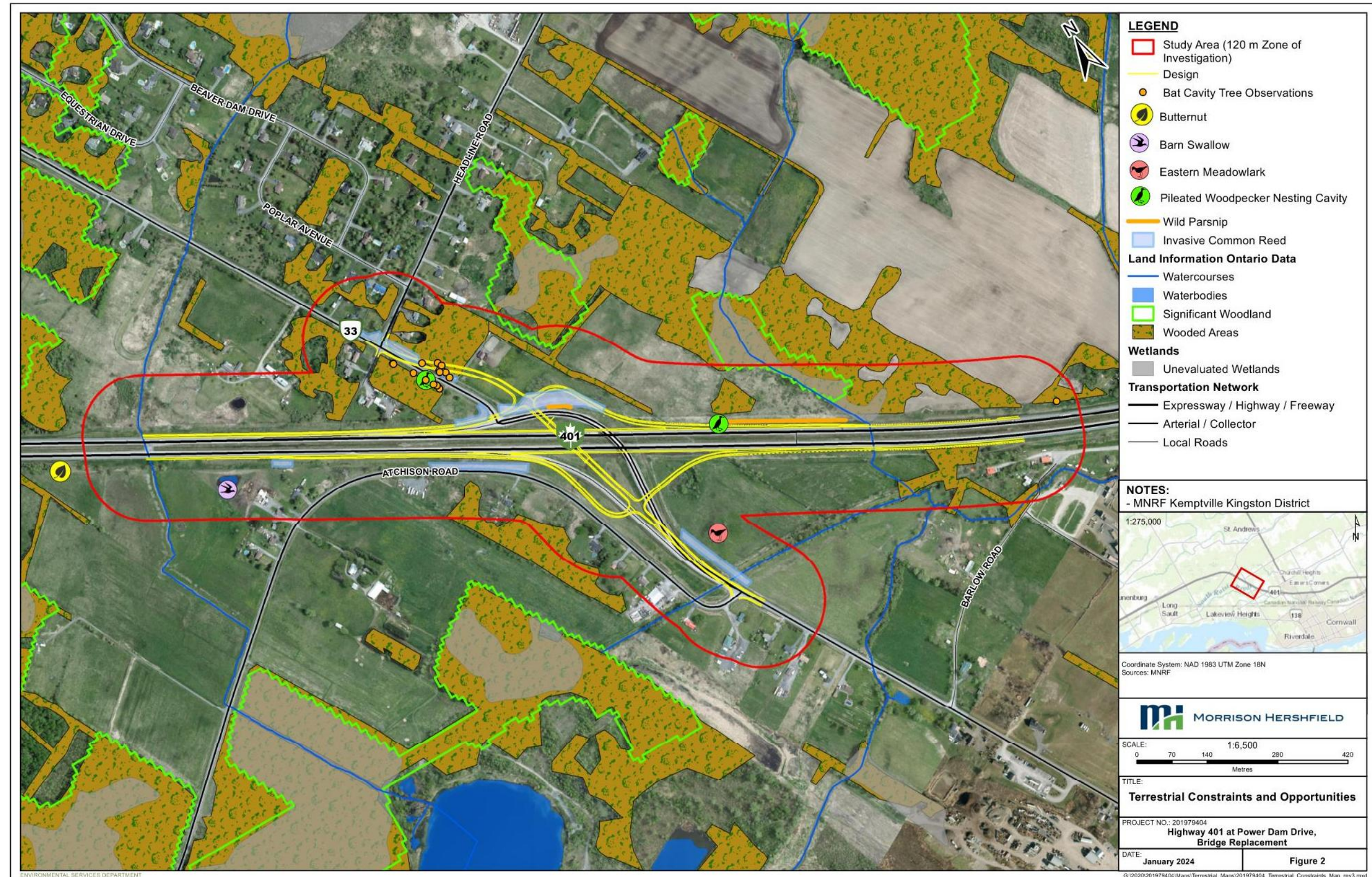


Figure 4: Terrestrial Constraints and Opportunities within the Study Area

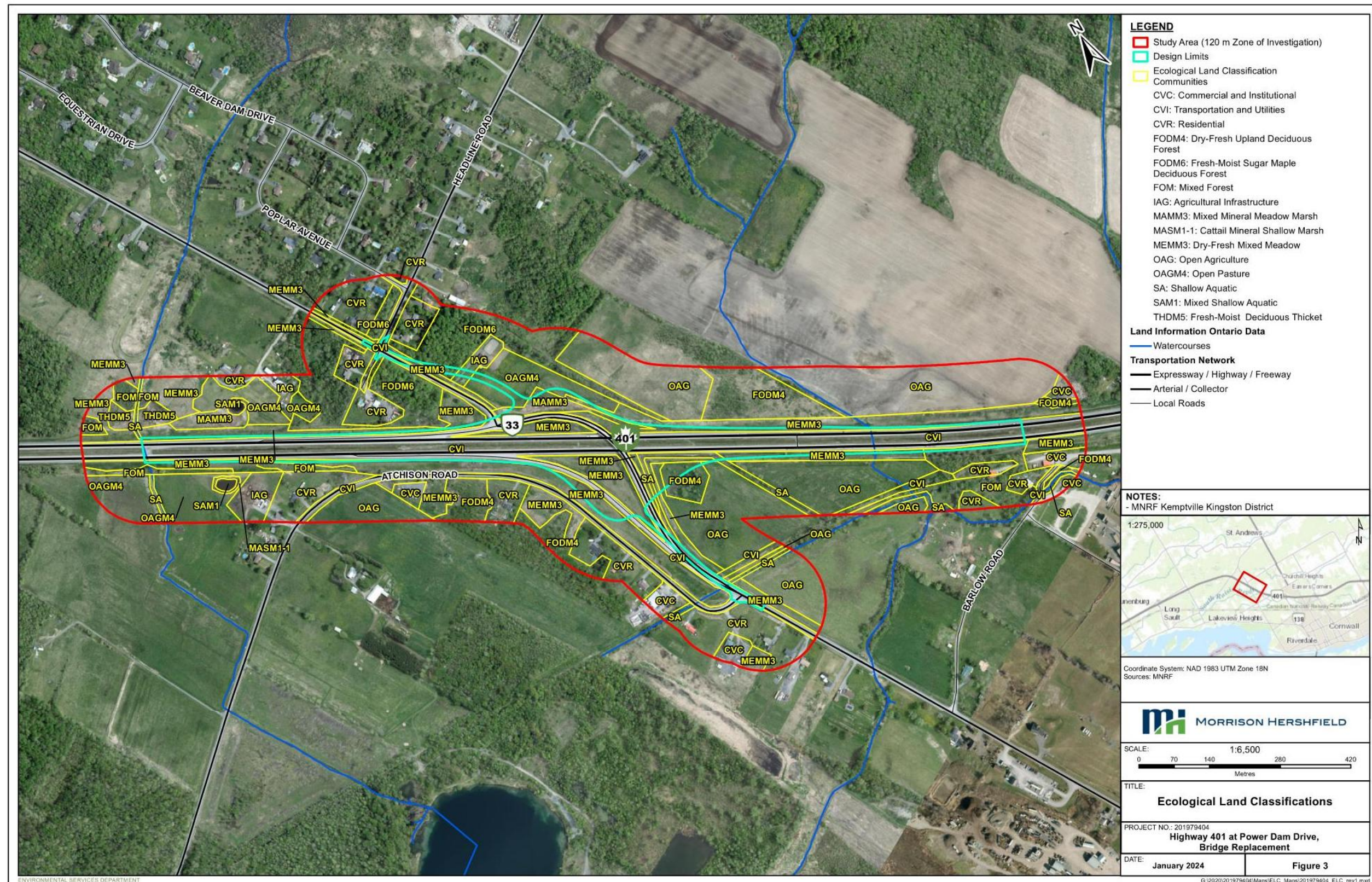


Figure 5: Ecological Land Classifications within the Study Area

Table 4: Ecological Land Classification Ecosites Present Within the Study Area

| Ecosite Name                                          | Description of Ecosite                                                                                                                                                                                                                                                                                                                                                                       | Dominant Species within Ecosite                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CVR Residential</b>                                | These anthropomorphic areas consist of residential properties and the surrounding maintained landscapes.                                                                                                                                                                                                                                                                                     | Species observed include mowed grass and planted ornamental trees, shrubs, and herbaceous plants.                                                                                                                                                                                                                                                                                                                                                            |
| <b>CVI Transportation and Utilities – Highway</b>     | These anthropomorphic areas consist of roads, highways, rights of way (ROW), towers, pipelines, airports, railways, marinas, etc. CVI communities within the study area include Highway 401, Power Dam Drive and adjacent roadways.                                                                                                                                                          | Species observed within the highway ROW include Cow Vetch ( <i>Vicia cracca</i> ), Ox-eye Daisy ( <i>Leucanthemum vulgare</i> ), Field Hawkweed ( <i>Hieracium caespitosum ssp. caespitosum</i> ), Bird's-foot Trefoil ( <i>Lotus corniculatus</i> ), Perennial Sow-thistle ( <i>Sonchus arvensis ssp. uliginosus</i> ), Canada Goldenrod ( <i>Solidago canadensis</i> ) and White-sweet Clover ( <i>Melilotus alba</i> ).                                   |
| <b>CVC Commercial and Institutional</b>               | Commercial and Institutional (CVC) areas consist of commercial and businesses and the surrounding maintained landscapes. CVC areas also consist of abandon commercial or business structures.                                                                                                                                                                                                | Manicured lawn and ornamental vegetation.                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>OAG Open Agriculture</b>                           | Open agricultural crop fields.                                                                                                                                                                                                                                                                                                                                                               | Open crop fields (i.e. annual row crops and perennial cover crops)                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>OAGM4 Open Pasture</b>                             | Open grasslands that are patchy rather than continuous due to the disturbance of animal grazing.                                                                                                                                                                                                                                                                                             | Dominant species include grazed grasses, Common Yarrow ( <i>Achillea millefolium ssp. millefolium</i> ), Common Plantain ( <i>Plantago major</i> ), Canada Thistle ( <i>Cirsium arvense</i> ) and Red Clover ( <i>Trifolium pratense</i> ).                                                                                                                                                                                                                  |
| <b>IAG Agricultural Infrastructure</b>                | Agricultural Infrastructure areas contain infrastructure used for agricultural practices such as buildings, barns, silo etc.                                                                                                                                                                                                                                                                 | Primarily consists of manicured lawns and OAG communities.                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>FODM4 Dry-Fresh Upland Deciduous Forest</b>        | Mix of deciduous tree species. Deciduous trees occupy over 75% of the canopy and trees present are usually an indication of disturbance or management.                                                                                                                                                                                                                                       | Species observed include Hawthorn ( <i>Crataegus conspecta</i> ), Amur Maple ( <i>Acer ginnala</i> ), Basswood ( <i>Tilia americana</i> ), White Elm ( <i>Ulmus americana</i> ), and Riverbank Grape ( <i>Vitis riparia</i> ), and understory consisting of Wild Sarsaparilla ( <i>Aralia nudicaulis</i> ), and Large-leaved Aster ( <i>Eurybia macrophylla</i> ).                                                                                           |
| <b>FODM6 Fresh-Moist Sugar Maple Deciduous Forest</b> | Canopy dominant in Sugar Maple with other deciduous species present in over 75% of the canopy. Dominant species can vary but usually contain Ash species. Moist to fresh moisture regime and mineral substrate present.                                                                                                                                                                      | Dominant species include Sugar Maple ( <i>Acer saccharum ssp. saccharum</i> ), Red Maple ( <i>Acer rubrum</i> ), American Beech ( <i>Fagus grandifolia</i> ), Basswood, White Elm ( <i>Ulmus americana</i> ), and Red Ash ( <i>Fraxinus pennsylvanica</i> ) and understory species include Wild Sarsaparilla, Yellow Trout Lily ( <i>Erythronium americanum ssp. americanum</i> ), Large-leaved Aster and Sharp-lobed Hepatica ( <i>Anemone acutiloba</i> ). |
| <b>FOM Mixed Forest</b>                               | Community consists of conifer tree species that comprise > 25% of the canopy cover and deciduous tree species that comprise > 25% of the canopy cover.                                                                                                                                                                                                                                       | Species includes Red Pine ( <i>Pinus resinosa</i> ), Sugar Maple, Trembling Aspen ( <i>Populus tremuloides</i> ) and Tamarack ( <i>Larix laricina</i> ). Common understory included Virginia Creeper ( <i>Parthenocissus quinquefolia</i> ), Woodland Strawberry ( <i>Fragaria vesca ssp. americana</i> ), and Wild Sarsaparilla.                                                                                                                            |
| <b>MASM1-1 Cattail Mineral Shallow Marsh</b>          | Graminoid shallow marsh dominant in cattail species including Narrow-leaved Cattail and Broad-leaved Cattail in variable proportions. Standing or flowing water is present for much for the growing season. Water present in less than 2 m deep.                                                                                                                                             | Dominant species include Broad-leaved Cattail ( <i>Typha latifolia</i> ), Narrow-leaved Cattail ( <i>Typha angustifolia</i> ) and sedge species.                                                                                                                                                                                                                                                                                                             |
| <b>MAMM3 Mixed Mineral Meadow Marsh</b>               | Mixed marsh with a combination of forb and graminoid species. This ecosite contains primarily seasonal flooding and is less tolerant of prolonged flooding. Represents the wetland- terrestrial interface.                                                                                                                                                                                   | Species includes Reed Canary Grass ( <i>Phalaris arundinacea</i> ), Wood Grass ( <i>Scirpus cyperinus</i> ), Common Water-plantain ( <i>Alisma plantago-aquatica</i> ), Lady's Thumb ( <i>Polygonum persicaria</i> ), Scouring Rush ( <i>Equisetum hyemale ssp. affine</i> ) and sedge species.                                                                                                                                                              |
| <b>MEMM3 Dry-Fresh Mixed Meadow</b>                   | Vegetation in this community consists of grass-like and broadleaf species primarily. Tree and shrub cover does not exceed 25%. This community is open herbaceous and has cover that varies from scattered and patchy to continuous meadow. Natural areas typically have unique floras (e.g. Tallgrass Prairie), areas with a cultural legacy, typically dominated by invasive plant species. | Dominant species includes Cow vetch, Common Yarrow ( <i>Achillea millefolium ssp. millefolium</i> ), Alsike Clover, Black Medic ( <i>Medicago lupulina</i> ), Common Evening-primrose ( <i>Oenothera biennis</i> ), Common Ragweed ( <i>Ambrosia artemisiifolia</i> ) and Common St. John's-wort ( <i>Hypericum perforatum</i> ).                                                                                                                            |
| <b>SAM1 Mixed Shallow Marsh</b>                       | Mixture of emergent and floating aquatic vegetation present. Standing water is always present. Water is less than 2 m deep.                                                                                                                                                                                                                                                                  | Dominant species includes Narrow-leaved Cattail, Northern Arrowhead ( <i>Sagittaria cuneata</i> ) and Great Duckweed ( <i>Spirodela polyrrhiza</i> ).                                                                                                                                                                                                                                                                                                        |
| <b>THDM5 Fresh-Moist Deciduous Thicket</b>            | Shrub over is greater than 25% and tree cover does not exceed 25%. Substrate consists of mineral soil > 30 cm deep. Tree establishment is inhibited by environment or have been removed by land use practices. Ecosite likely occurs due to recovering from cultural disturbance (e.g. clearing, pasture) and is often found associated with the verges of wetlands.                         | Dominant species includes Staghorn Sumac, Red-osier Dogwood ( <i>Cornus stolonifera</i> ) and Wild Red Raspberry ( <i>Rubus idaeus ssp. melanolasius</i> ).                                                                                                                                                                                                                                                                                                  |

### 5.2.3 Wildlife

#### 5.2.3.1 Insects

According to the Ontario Butterfly Atlas (OBA), fifty-five (55) butterfly species, including one (1) SAR, have been recorded within the two (2) 10 km x 10 km atlas squares which encompasses the Study Area.

Responses from the MNR, MTO and RRCA did not provide additional records of invertebrate species within the surrounding Study Area.

#### 5.2.3.2 Herpetofauna

According to the Ontario Reptile and Amphibian Atlas (ORAA), fourteen (14) herpetofauna species have been recorded within the two (2) 10 km x 10 km atlas squares encompassing the study area. The fourteen (14) records for herpetofauna include one (1) snake species, five (5) SAR turtle species and eight (8) amphibians.

Responses from the MNR, MTO and RRCA did not provide additional records of herpetofauna species within the area surrounding the study.

During the field investigations, one (1) Eastern Garter Snake (*Thamnophis sirtalis*) was observed within the dry-fresh mixed meadow (MEMM3) community immediately adjacent to the Power Dam Drive overpass north of Highway 401, moving from the top of slope to the bottom toward the mixed mineral meadow marsh (MAMM3).

#### 5.2.3.3 Avifauna

According to the Ontario Breeding Bird Atlas (OBBA), seventy (70) records of breeding birds found have been recorded within the 10 km x 10 km atlas squares surrounding the Study Area, including five (5) SAR, and one (1) inactive Eastern Pheobe (*Sayornis phoebe*) nest observed within a box culvert along Highway 401.

To confirm the presence or absence of SAR birds within the study area, targeted breeding bird surveys were completed within the Study Area.

In accordance with Ontario Breeding Bird Atlas (OBBA) Guide for Participants, breeding bird surveys were conducted twice during the breeding bird season, separated by at least fifteen days on calm mornings with little or no precipitation and minimal winds (1-3 on the Beaufort scale). The recommended time to complete the surveys is between sunrise and 10:00 am; however, with the amount of breeding bird stations required for the project, half of the stations were surveyed between sunrise and 10:00 am on the first day of surveys, and the other half were surveyed between sunrise and 10:00 am on the second day of surveys. The surveys consisted of five-minute point counts where the weather, time, species, breeding evidence and individual bird movement within a 100 m radius were recorded. Species heard outside of the 100 m radius or observed outside of their breeding habitat within the 100 m radius (i.e., flyovers) were recorded separately.

A total of twenty-five (25) breeding bird stations were established for surveying (distanced 200 m apart) along Highway 401 and Power Dam Drive ROW. The findings of the breeding bird surveys are summarized in **Table 5** below.

Table 5: Breeding Birds Observed within the Study Area

| Breeding Bird Species                                  |                                                            |
|--------------------------------------------------------|------------------------------------------------------------|
| American Crow ( <i>Corvus brachyrhynchos</i> )         | European Starling ( <i>Sturnus vulgaris</i> )              |
| American Goldfinch ( <i>Carduelis tristis</i> )        | Gray Catbird ( <i>Dumetella carolinensis</i> )             |
| American Kestrel ( <i>Falco sparverius</i> )           | Hairy Woodpecker ( <i>Leuconotopicus villosus</i> )        |
| American Robin ( <i>Turdus migratorius</i> )           | Killdeer ( <i>Charadrius vociferus</i> )                   |
| American Woodcock ( <i>Scolopax minor</i> )            | Merlin ( <i>Falco columbarius</i> )                        |
| Barn Swallow ( <i>Hirundo rustica</i> )                | Northern Cardinal ( <i>Cardinalis cardinalis</i> )         |
| Black-capped Chickadee ( <i>Poecile atricapillus</i> ) | Oven Bird ( <i>Seiurus aurocapillus</i> )                  |
| Canada Goose ( <i>Branta canadensis</i> )              | Red-eyed Vireo ( <i>Vireo olivaceus</i> )                  |
| Cedar Waxwing ( <i>Bombycilla cedrorum</i> )           | Red-winged Blackbird ( <i>Agelaius phoeniceus</i> )        |
| Chipping Sparrow ( <i>Spizella passerine</i> )         | Rock Pigeon ( <i>Columba livia</i> )                       |
| Cliff Swallow ( <i>Petrochelidon pyrrhonota</i> )      | Rough-winged Swallow ( <i>Stelgidopteryx serripennis</i> ) |
| Common Grackle ( <i>Quiscalus quiscula</i> )           | Savannah Sparrow ( <i>Passerculus sandwichensis</i> )      |
| Common Yellow-throat ( <i>Geothlypis trichas</i> )     | Song Sparrow ( <i>Melospiza melodia</i> )                  |
| Downy Woodpecker ( <i>Picoides pubescens</i> )         | Turkey Vulture ( <i>Cathartes aura</i> )                   |
| Eastern Kingbird ( <i>Tyrannus tyrannus</i> )          | Wild Turkey ( <i>Meleagris gallopavo</i> )                 |
| Eastern Meadowlark ( <i>Sturnella magna</i> )          | Yellow Warbler ( <i>Dendroica petechia</i> )               |
| Eastern Phoebe ( <i>Sayornis phoebe</i> )              |                                                            |

### ***Pileated Woodpecker***

Given the preferred habitat requirements (forested communities) and general distribution of Pileated Woodpecker in Ontario, there is a potential for this species to utilize the Study Area during its life cycle for nesting, foraging or roosting purposes. Pileated Woodpecker nests are always protected unless monitoring of the nesting cavity for 36 months (3 years) indicates the nest is unoccupied.

Six (6) foraging cavities and one (1) roosting cavity were observed within the Study Area confirming Pileated Woodpecker activity, however foraging and roosting cavities are not protected under the MBCA. One (1) inactive Pileated Woodpecker nesting cavity and one (1) nesting cavity occupied by European Starling (*Sturnus vulgaris*) were observed within the 120 m Preliminary Design zone of investigation during the 2022 field investigations. Both nesting cavities identified fall outside the area of impact and are not likely to be removed based on the Preliminary Design. If these nesting cavities are to be removed during the construction process, notifications must be submitted through the Abandoned Nest Registry and the nests must be monitored for 36 months to confirm abandonment by any migratory bird. The nesting cavity

observed east of Power Dam Drive along Highway 401 contained European Starling hatchlings within the cavity. European Starlings and their nests are not protected under the MBCA and therefore, the nest is not considered to be active when this species is occupying it.

#### 5.2.3.4 Mammals

According to species range maps and iNaturalist records, the study area is likely to support a variety of mammals that make use of forest and open habitats such as Raccoon (*Procyon lotor*), Eastern Gray Squirrel (*Sciurus carolinensis*), White-tailed Deer (*Odocoileus virginianus*), Eastern Cottontail (*Sylvilagus floridanus*), Coyote (*Canis latrans*), Marten (*Martes americana*) and Red Fox (*Vulpes vulpes*).

During the 2022 field investigations, Eastern Grey Squirrel (*Sciurus carolinensis*), a mouse species (*Muridae* sp.) was visually observed within the study area while signs of Groundhog (*Marmota monax*) burrows and White-tailed Deer scat were also present.

Responses from the MNR did not provide additional records of mammalian species within the surrounding project area.

Four (4) provincially designated Endangered SAR bat species are also known to have ranges that extend into this region (Naughton, 2012). To confirm the presence or absence of potential bat habitat, bat maternity roosting surveys were completed to identify candidate bat cavity trees within the study area.

#### Bat Maternity Roosting Survey

As per the survey protocol for Species at Risk Bats within Treed Habitat: Little Brown Myotis, Northern Myotis & Tri-colored Bat (MNR, 2017), based on Phase 1: Bat Habitat Suitability Assessment of the protocol, any coniferous, deciduous, or mixed wooded ecosite that includes trees at least 10 cm in diameter at breast height (DBH) has the potential to be suitable maternity roosting habitat. The study area contains deciduous and mixed wood forest communities that meet this criterion. As per Phase II: Identification of Suitable Maternity Roost Trees of the protocol, cavity tree surveys were completed in April 2022. All areas within the proposed alternative designs, as well as a buffer area extending 15 m from the alternative designs, were surveyed for maternity roost trees from the publicly accessible MTO ROW; private properties were not accessed for this survey. Trees measuring 25 cm DBH and larger were identified within the study area, to identify potential trees for Phase III of the protocol: acoustic monitoring.

- A total of sixteen (16) potential bat cavity trees were identified within the study area, including hardwood species with flaking bark. A preliminary assessment of the 16 potential bat cavity trees was completed and 10 trees were identified as having low potential roost usage, and 6 trees were identified as having moderate potential roost usage.

It should be noted that the majority of trees identified were present within private property and there were not physically measured or assessed.

#### 5.2.4 Designated Significant Natural Areas

According to the Natural Heritage Information Centre (NHIC) and Land Information Ontario (LIO), there are no Areas of Scientific Interest (ANSI's), or Provincially Significant Wetlands

(PSW) within the Study Area; however, there are several unevaluated wetlands within the Study Area limits. Unevaluated wetlands are wetlands that have not yet been evaluated using the Ontario Wetland Evaluation System, with the results reviewed by the MNR.

Two (2) significant woodlands also exist within the Study Area as identified through LIO and the townships Official Plan - Schedule B2 (SDG Counties, 2018b). The design footprint does not encroach on these significant woodlands; however, they are located within the 120 m zone of investigation.

### 5.2.5 Significant Wildlife Habitat

The study area was screened for significant wildlife habitat (SWH) using the Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E (MNRF, 2015) to determine the presence of Candidate SWH within the study area. The criteria schedules are intended to be used during development projects to identify and protect SWH in the planning process.

The four (4) categories of SWH within Ecoregion 6E include:

- Seasonal Concentration Areas
- Rare Vegetation Communities or Specialized Habitat for Wildlife
- Habitat for Species of Conservation Concern (Not including Endangered or Threatened Species)
- Animal Movement Corridors

The following sections discuss each Significant Wildlife Habitat and confirm the presence or absence of candidate habitat within the study area based on the results of the background review and 2022 field investigations.

#### 5.2.5.1 Seasonal Concentration Areas

Some species of animals gather from geographically wide areas at certain times of the year. This could be to hibernate or to bask (e.g., some reptiles and bats), over-winter (e.g., deer yards), or to breed (e.g., bird breeding colonies). Maintenance of the habitat features that result in these concentrations can be critical in sustaining local or even regional populations of wildlife. Based on information collected during the 2022 field investigations, the following seasonal concentration areas may be present:

- **Candidate Bat Maternity Colonies** may be present in the forested communities (FOM, FODM4, FODM6) within the study area, where large diameter deciduous trees (>25 cm DBH) are located. During the 2022 spring bat cavity searches, sixteen (16) potential bat maternity roosting trees were identified throughout the forested habitats.
- **Reptile Hibernaculum** may be present near the footings of the Power Dam Drive overpass, as one (1) Eastern Garter Snake was observed moving immediately adjacent to the top of slope north of Highway 401 during the April 21 field investigation. According to the SWH 6E criteria, presence of snake hibernacula are confirmed with the presence of five (5) or more snake individuals of the same species, or presence of two (2) different snake species near a potential hibernacula. It is understood that snakes are known to use man-made structures with abandoned and crumbling foundations as hibernaculum and not highway structures; however, with the observation of the Eastern Garter Snake during early spring, there is a possibility of habitat within the vicinity of the roadway structures.

#### 5.2.5.2 *Rare Vegetation Communities & Significant Habitat for Wildlife*

Rare Vegetation Communities often contain unique species, particularly plants, which depend on specialized habitats for survival and cannot readily move or find alternative habitats. According to the *Significant Wildlife Habitat Criteria Schedule for Ecoregion 6E*, there were no significant habitat areas found within the study area for rare vegetation communities.

Specialized Habitat for Wildlife can include old-growth forests, calving areas for moose, cliffs, and habitat for bird species requiring large blocks of habitat (generally greater than 25 ha in size). Based on information collected during field investigations, the following specialized habitat for wildlife areas may be present within and/or adjacent to the study area:

- **Candidate Woodland Raptor Nesting Habitat** may be present within the forested communities (FOM, FODM4 and FODM6) as stick nests may be constructed within the large trees dominating the forest canopies. No raptor nests were observed during the 2022 field investigations.
- **Candidate Amphibian Breeding Habitat (Wetlands)** maybe be present in the Shallow Aquatic (SA) ponds or marsh (MASM1-1 and MAMM3) communities found throughout the study area.

#### 5.2.5.3 *Habitat for Species of Conservation Concern*

Species of Conservation Concern includes species that may be locally rare or in decline, but that have not yet reached the level of rarity that is normally associated with “Endangered” or “Threatened” designations under the ESA and/or SARA. Rare wildlife status is based on species listed as Special Concern under the ESA, Global Rank (G-rank) or Provincial Rank (S-rank) status, identified through the National Heritage Information Centre. The *Significant Wildlife Habitat Technical Guide* (MNR, 2000) suggests that the highest priority for protection should be provided to habitats of the rarest species (on a scale of global through to local municipality); it also states that habitats that support large populations of a species of concern should be considered significant.

Based on the background review and 2022 field investigations, seven (7) provincial species of concern have the potential to be present within the general vicinity of the study area:

- Monarch
- Eastern Wood-pewee
- Wood Thrush
- Eastern Musk Turtle
- Northern Map Turtle
- Midland Painted Turtle
- Snapping Turtle

Monarch butterflies may forage on nectar producing plants within the ROW and dry meadow communities (MEMM3), and Wood Thrush and Eastern Wood-pewee may find nesting and breeding habitat within the mixed and deciduous forested communities (FOM, FODM4 and FODM6) within the study area. Turtle species may be present within the shallow aquatic (SA) ponds found within the study area, however, these features are limited in size and isolated from watercourse influences, so the potential for turtles to be present within the study area is low.

#### 5.2.5.4 Animal Movement Corridors

According to the guidelines for Ecoregion 6E and to the Significant Wildlife Habitat Technical Guidelines for Ecoregion 6E (MNR, 2015), the following potential Animal Movement Corridors may be present:

- **Candidate Amphibian Movement Corridor** may be present within the marsh communities (MASM1-1 and MAMM3) within the study area; however, these features are often adjacent to ROW and agricultural communities which do not provide preferred corridor movement habitat (forests) for amphibians.
- **Candidate Deer Movement Corridors** may be present in the forested communities (FOM, FODM4 and FODM6) within the study area, as White-tailed Deer will use corridors found in all treed ecosites. White-tailed Deer scat was observed within the Moist, Coarse: Aspen, Birch hardwood forest (G070Tt/TI) during field investigations.

#### 5.2.6 Species at Risk

Background data collected within the study area identified records of eight (8) provincially designated Endangered or Threatened SAR likely to occur within the general project area based on background review, existing conditions on site, and the known habitat preferences for the following SAR:

##### Threatened:

- Blanding's Turtle
- Bobolink
- Butternut
- Eastern Meadowlark
- Least Bittern

##### Endangered:

- Northern Myotis
- Eastern Small-footed Bat
- Little Brown Myotis
- Tri-coloured Bat

During the 2022 field investigations, two (2) designated Threatened SAR were observed within the Highway 401 and Power Dam Drive interchange, including Butternut and Eastern Meadowlark. Additionally, potential habitat for bat maternity colonies may be present within the study area, as bat cavity trees were identified from the ROW.

Components of the Preliminary Design that have the potential to impact SAR include the vegetation removal required for the interchange modifications within the open agriculture, meadow, and forested communities within the Study Area.

### 5.2.6.1 SAR Vegetation

As previously stated, one (1) Butternut measuring 1 cm diameter at-breast-height (DBH) was identified during the field investigations, just outside the northwest limits of the preferred design footprint within the mixed forest (FOM) community adjacent to open pasture (OAGM4) habitat. The Butternut was observed approximately 180 m west of the western design limits along Highway 401, therefore registration under the ESA is not required for this individual.

It should be noted that vegetation observations were limited to those made from the existing ROW within the Study Area, and that further field investigations for SAR species (i.e., Butternut and Black Ash) may be warranted during Detail Design within private properties where permission to enter was not available for the Preliminary Design surveys.

### 5.2.6.2 SAR Bats

As previously stated, SAR bats have the potential to use trees within the forested communities (FOM, FODM4, FODM6) throughout the Study Area, as they can be present within any treed ecosite in Ontario. Targeted cavity tree surveys were completed within the Study Area, including the 120 m buffer to identify potential maternity roosting trees for SAR bats. Sixteen (16) potential maternity roosting trees were identified, and eight (8) fall within the interchange modification area. It is unlikely that the tree removals required within the design will impact SAR bat individuals (if present) as there are likely alternative cavity trees within the surrounding and connected forest communities.

### 5.2.6.3 SAR Birds

Bobolink and Eastern Meadowlark foraging and breeding habitat is present within the agricultural communities situated within the Study Area. Habitat for Least Bittern includes expansive wetlands which were not present within the Study Area.

One (1) Eastern Meadowlark was observed within the open agriculture (OAG) community, southeast of the proposed interchange. The footprint of the Preliminary Design falls within a small section of the agricultural field in which the Eastern Meadowlark was observed.

Eastern Meadowlark is a provincially Threatened species and is afforded general habitat protection under the ESA. General habitat for Eastern Meadowlark is categorized as follows (MECP, 2021):

- **Category 1:** The Eastern Meadowlark nest and area immediately surrounding nest (i.e., 10 m). This area is highly sensitive and has the lowest tolerance to alteration.
- **Category 2:** The area between 10 m and 100 m of the nest or approximate defended territory. This area has a moderate level of tolerance to alteration.
- **Category 3:** The area between 100 m and 300 m of the nest or approximate defended territory. This area has the highest level of tolerance to alteration.

Due to the confirmed presence of Eastern Meadowlark and observed calls of anxiety, permanent impacts to this species within Category 3 habitat is anticipated due to the interchange modification works. As this species is protected under the ESA, appropriate avoidance and mitigation measures will be required to protect this SAR and its habitat. In addition, if the pertinent design elements stay the same in Detail Design, it is likely that a Notice of Activity (NOA) form will need to be prepared and submitted to the MECP through the

Environmental Registry prior to construction start to receive a conditional exemption under Part IV of O.Reg. 830/21.

Recent changes to the ESA legislation have provided a streamlined registration process for several SAR, including Eastern Meadowlark. Upon submitting an NOA form, the Proponent may now choose to satisfy all the conditions that are required for the species exemption under Ontario Regulation 830/21 or pay a species conservation charge in lieu of completing beneficial actions required under the conditional exemption to the Species at Risk Conservation Trust. The Proponent calculates the cost of the conservation charge based on the formula presented in O.Reg. 829/21 and is required to be paid at least one day before the activity begins or within 30 days after registering the activity, whichever is earlier. Regardless of which option the Proponent selects to move forward with an exemption under the ESA, potential impacts to SAR still need to be minimized as required (e.g., conducting work outside of the Eastern Meadowlark breeding period).

#### **5.2.6.4 SAR Reptiles**

Blanding's Turtles prefer large open wetlands or riverine habitats for their lifecycle. Based on the isolated ponds and agricultural fields within the Study Area, it is unlikely that Blanding's Turtles are within the immediate Study Area and will not be impacted by construction works.

Adherence to appropriate mitigation measures and wildlife timing windows will reduce the risk of potential impacts to SAR reptiles from the proposed construction activities.

#### **5.2.7 Hydrogeology**

The desktop hydrogeological study was carried out to determine the existing geological and hydrogeological conditions of the study area, evaluation of the potential need for groundwater dewatering, potential groundwater impacts associated with the adjacent landfill to the project limits, and potential impacts on nearby receptors of the planned work.

The topography at the existing Highway 401/Power Dam Drive intersection slopes gently southward towards South Raisin River located, approximately 600 m south of the Site, and the St. Lawrence River located approximately 3.5 kilometers (km) south of the Site.

The surficial geology is described as till comprised of stone-poor, sandy silt to silty sand-textured till on Paleozoic terrain. The southern part of the study area has fine textured glaciomarine deposits comprising silt, clay, minor sand, and gravel (Ontario Geological Survey, 2003). The study area is located on the Bobcaygeon Formation within the Simcoe Group and is made up of limestone, with minor shales in the upper part (Ontario Geological Survey, 2011). According to the WWIS, the average depth to bedrock within the study area is found to be about 37m.

According to Ontario Source Protection Information Atlas, the project area comes under the Highly Vulnerable Aquifer (HVA) zone and with a vulnerability score of 6.

#### **5.2.8 Natural and Scientific Interest**

There are no areas of natural and scientific interest (ANSI) located within the study area.

## 5.3 Socio-Economic Environment

### 5.3.1 Existing Land Uses

Highway 401 is an 828 km provincial highway connecting Windsor, Ontario in the west to the Ontario-Quebec border in the east. Highway 401 at the Power Dam Drive interchange is a four-lane divided rural freeway. Power Dam Drive (or County Road 33) is a two-lane municipal road. Currently, a two-lane divided overpass carries Power Dam Drive over Highway 401. The Study Area is located in the Township of South Stormont within the United Counties of Stormont, Dundas and Glengarry where dominant land uses are commercial, agricultural and rural.

The United Counties of Stormont, Dundas and Glengarry Official Plan (2018) Land Use Schedule A4 sets out land use designations for the Township of South Stormont, see **Figure 6**. Relevant details pertaining to the Official Plan policies and how they affect land uses within the Project Study Area are presented below.

Generally, the study area can be characterized as primarily rural agricultural, with nearby rural residential dwellings, woodlands, closed waste facilities and local businesses present. Much of the lands within and immediately adjacent to the study area are used for active farming operations. Two overhead Hydro One 230 kV electrical transmission lines pass through the study area on the west side of Power Dam Drive. The 10 MW Barlow Solar Energy Centre is located approximately 1.2 km to the southwest of Highway 401.

Emergency services within the Study Area are provided by the OPP, South Stormont Fire and Rescue, and Cornwall SDG Paramedic Services. All providers are likely to use Highway 401 and Power Dam Drive, along with nearby roads at any time, dependent upon the situation. Noted that Power Dam Drive is used throughout the 2021/2022 school year to safely transport primary and secondary school students across Highway 401. In addition, other neighbouring roads within the Study Area are used to pick up / drop off for students

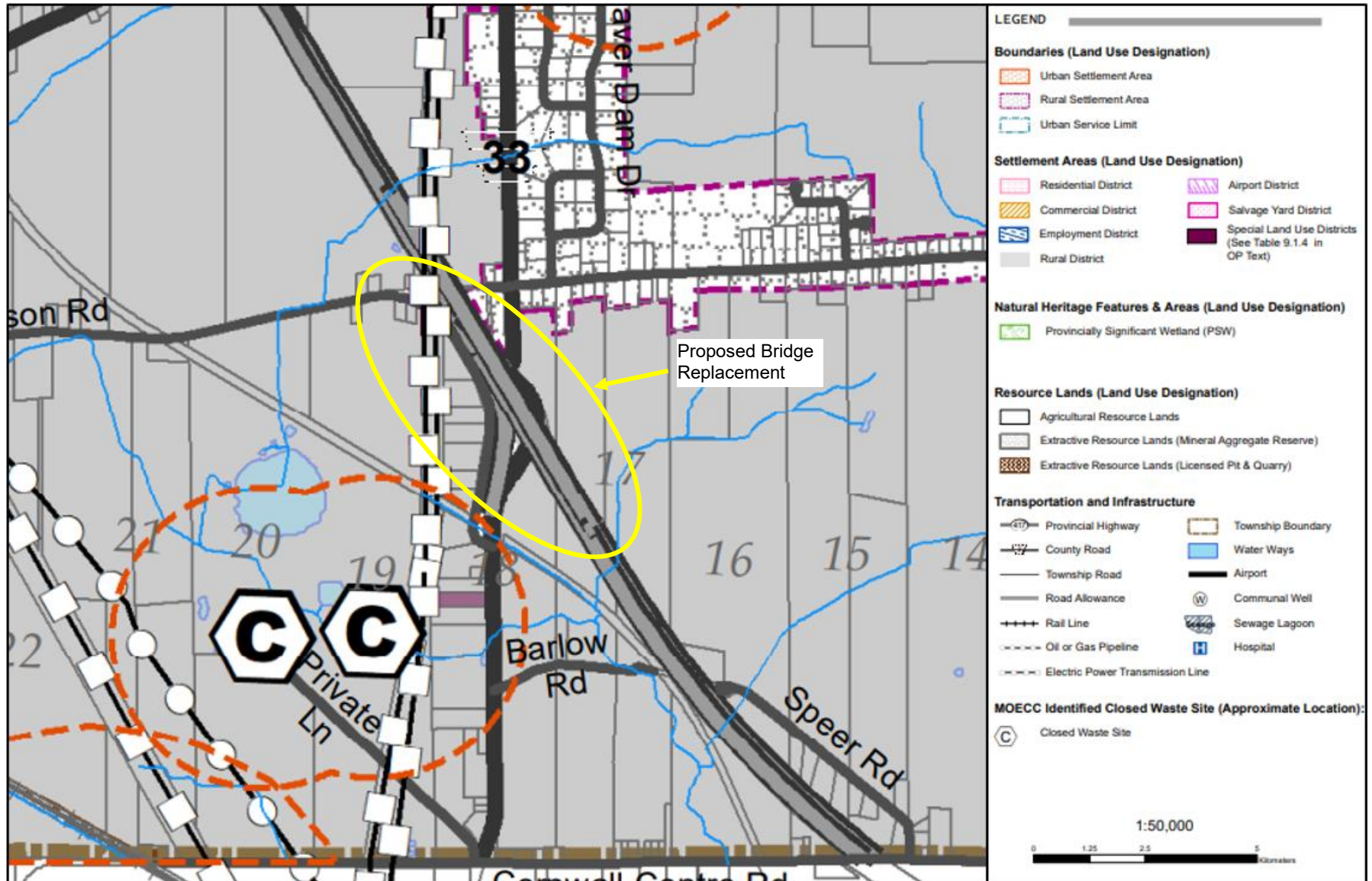


Figure 6: Land Use Schedule A4 of the United Counties of Stormont, Dundas and Glengarry Official Plan (2018)

### 5.3.2 Official Plans and Policies

#### 5.3.2.1 United Counties of Stormont, Dundas & Glengarry Official Plan (2018)

The Township of South Stormont is subject to the United Counties of Stormont, Dundas and Glengarry Official Plan (2018). The United Counties of Stormont, Dundas and Glengarry Official Plan (2018) sets out goals and objectives for development in the County for 20 years (2017-2037) including regard for the social, economic, and natural environment of the County. This Plan establishes a policy-driven framework for land use planning for the County and its six municipalities. The Plan accentuates the best attributes and amenities of the County, fosters a progressive approach to community and economic development within an environmentally friendly context, provides for the wise use of renewable and non-renewable resources, and streamlines the planning approvals process.

The County had a 2016 Census population of 65,353 residents and approximately 28,000 occupied housing units. The rate of growth in population and housing across the County has slowed since 2001 relative to the longer-term historic trend. A range of factors contribute to this trend including recession, the continued out-migration of younger aged adults and the aging demographic trend, which is occurring throughout Ontario, particularly in areas outlying the major urban centres.

The aging of the population has also contributed to a faster rate of growth for new housing than the rate of growth in population over recent Census periods. This housing growth will be an important consideration in planning for future growth and development in the County since an aging population result in smaller household sizes and affects housing demand and land needs.

As of the 2011 census there were 19,800 jobs in the County. Employment in the County declined from 2006 to 2011 and, like most of Eastern Ontario, the economy has seen a shift away from traditional manufacturing and primary sectors to public administration and service sector industries.

Under the Planning Act, 1990, the Provincial Government is the approval authority for the Regional Official Plan. Accordingly, all planning decisions under the United Counties of Stormont, Dundas and Glengarry Official Plan (2018) shall conform with Provincial plans and be consistent with the Provincial Policy Statement (PPS), 2020.

The following summary of population, total private dwellings, and private dwellings occupied by permanent residents are based on 2011 Statistics Canada data (refer to **Table 6**). Place of work status, mode of transportation to work, and the breakdown of industry are based on 2006 Statistics Canada data (refer to **Table 7**). This information is only available at the Township level from Statistics Canada.

Table 6: Population Numbers and Dwellings

| Municipality   | Population | Total Private Dwellings | Private Occupied by Usual Residents |
|----------------|------------|-------------------------|-------------------------------------|
| South Stormont | 13,110     | 5,277                   | 5,151                               |

Source: Statistics Canada, 2016

Table 7: Place of Work Status, Industry and Mode of Transportation to Work

| Municipality   | Place of Work Status                                                                                                                                                                    | Common Industries                                                                                                         | Mode of Transportation to Work (as a percentage of the population)                                                                                                                                                    |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| South Stormont | <ul style="list-style-type: none"> <li>Worked at home: 390</li> <li>Worked outside Canada: 30</li> <li>No Fixed Workplace Address: 710</li> <li>Worked at Usual Place: 5,315</li> </ul> | <ul style="list-style-type: none"> <li>Health Care: 930</li> <li>Retail Trade: 890</li> <li>Manufacturing: 760</li> </ul> | <ul style="list-style-type: none"> <li>Car, truck, van – as a driver: 91.5%</li> <li>Car, truck, van – as a passenger: 5.4%</li> <li>Public transit: 0.7%</li> <li>Walk, bicycle and all other modes: 2.4%</li> </ul> |

Source: Statistics Canada, 2016

### 5.3.2.2 Rural Districts

The areas surrounding the majority of Power Dam Drive bridge are classified as a Rural District. As outlined in the Official Plan, Rural Districts are typically found in regions characterized by poor-quality agricultural soils. While residential development is generally restricted in these districts, it may be allowed if all relevant policies, criteria, and considerations of this Plan are met. Notably, Rural District designations have been focused south of Highway 401, identifying this region as a key transportation and development corridor within the County.

### 5.3.2.3 Rural Settlement Areas

Lands located north of the Highway 401 and Power Dam Drive intersection are designated “Rural Settlement” by Land Use Schedule 4 of the Township of South Stormont Official Plan (2018). Section 3.2.1. of the Official Plan details Settlement Areas. 3.2.1.4 of the Official Plan describes Rural Settlement Areas as small communities within the rural area that have a mix of land uses including public services uses and facilities. These communities have the potential for growth and the expansion of municipal water and sewage services in the future.

Permitted uses in Rural Settlement Areas include low and medium density housing in keeping with the character and scale of the Area; retail, service, commercial, automotive and personal service uses which are deemed suitable by the Local municipality; and Class I and II industrial uses which are deemed suitable by the Local municipality.

## 5.4 Municipal Infrastructure

There are two (2) MECP Identified Closed Waste Sites located to the southwest of the Highway 401 Power Dam Bridge and Interchange Study Area. Per Section 4.3.5.3 of the County Official Plan, closed or inactive sites, whether public or private, may be used for other purposes subject to meeting the requirements of the Provincial Environmental Protection Act (Section 46 Order).

## 5.5 Entrances

Within the study area, there are currently two ramps connecting Power Dam Drive to Highway 401, one is an eastbound off-ramp to go South on Power Dam Drive, and one is a westbound on ramp coming from both the north and south of the Highway. These access points provide uninterrupted flow of traffic, allowing vehicles to enter and exit the highway without any control

measures or interruptions. Both the egress/ingress are designed to facilitate smooth access to and from Highway 401, supporting traffic movement and ensuring safe entry and exit for drivers.

There are two (2) existing intersections in the Study limit. Atchison Road connects with Power Dam Drive to the south of the Highway. Atchison Road is a local residential road that is stop controlled at Power Dam Drive. Power Dam Drive connects into the existing on-ramp north of the Highway. This is an intersection within the ramp that is stop controlled for vehicles driving south.

There is one existing field entrance located across the road from the Atchison Road intersection and one to the north of Highway 401. Both entrances are closed with gates. There are additional existing entrances both north and south of the Study limits fronting on Power Dam Drive.

As part of this study potential changes to these access points were evaluated to maintain traffic efficiency while considering safety and overall impact on the surrounding infrastructure.

## **5.6 Utility Infrastructure**

Utility Companies and municipalities were contacted to confirm and ascertain the location of their respective infrastructure within the Project Study area. Based on the consultation with the utility companies, it was determined that the following existing infrastructure is present within the study limits:

- Sixteen (16) existing Overhead Hydro One poles, which run through the study area and are a mix of distribution and transmission lines.
- Two (2) 76-millimetre (mm) diameter Bell utility ducts running parallel to the Highway on the south side.
- One (1) lighting duct in the east curb.
- Buried gas main that runs under the highway east of the existing structure and under Power Dam Drive.

## **5.7 Illumination**

There is existing MTO-owned illumination along Highway 401 within the Study limits on both the north and south sides of the Highway.

Light fixtures are present at the existing ramp terminal entrance on the south side (eastbound off-ramp) and at the intersection of Power Dam Drive and the westbound on-ramp.

No light standards or surface mounted fixtures are located within the structure limits on either Power Dam Drive or Highway 401.

## **5.8 Contamination**

The Highway 401 Power Dam Interchange area was first developed as MTO operated roadways in the early 1960s. Based on aerial photographs of the area during this time, the interchange and surrounding area was used primarily for agricultural purposes. Historically, surrounding properties have primarily been used for agricultural and residential purposes.

Based on the Water Well Information System (WWIS) domestic well installation dates and aerial photos, the properties to the north, south, west and east were developed as farmsteads or for residential purposes prior to 1947 and gradually increased in number from the 1950s to early 2000s.

Three (3) Potentially Contaminating Activities (PCA) were identified within the study area. In addition, five (5) significant spills, which are also considered as PCA, were identified within the study area. The details of the PCA are described in **Table 8** below.

Table 8: Potential Contaminating Activities

| Potentially Contaminating Activity                                                                                                                               | Location                     | Description                                                                                                                                                | Risk Rating |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| PCA No. 30: Importation of Fill Material of Unknown                                                                                                              | On-site No address           | Fill of an unknown quality used to construct the Power Dam Drive bridge approaches and abutments.                                                          | High        |
| PCA No. 10: Commercial Autobody Shops                                                                                                                            | Off-Site 16892 Atchison Road | Fix Auto Cornwall is an auto garage that has been in operation since at least 2006.                                                                        | High        |
| PCA No. 58: Waste Disposal and Waste Management, including thermal treatment, landfilling and transfer of waste, other than use of biosoils as soil conditioners | Off-Site 16892 Atchison Road | West Front Construction was approved for an Environmental Compliance Approval for 'waste management systems' on August 1, 2000.                            | High        |
| Multiple diesel spills                                                                                                                                           | On-Site/Off-Site No address  | Multiple diesel spills identified in the ERIS report consisted of diesel fuel with volumes ranging from 50 L to 780 L and dates ranging from 1988 to 2018. | High        |

Based on the findings from a records review, three areas of potential environmental concern (APEC) were identified within the Study Area (refer to **Figure 7**) and are summarized in **Table 9** below.

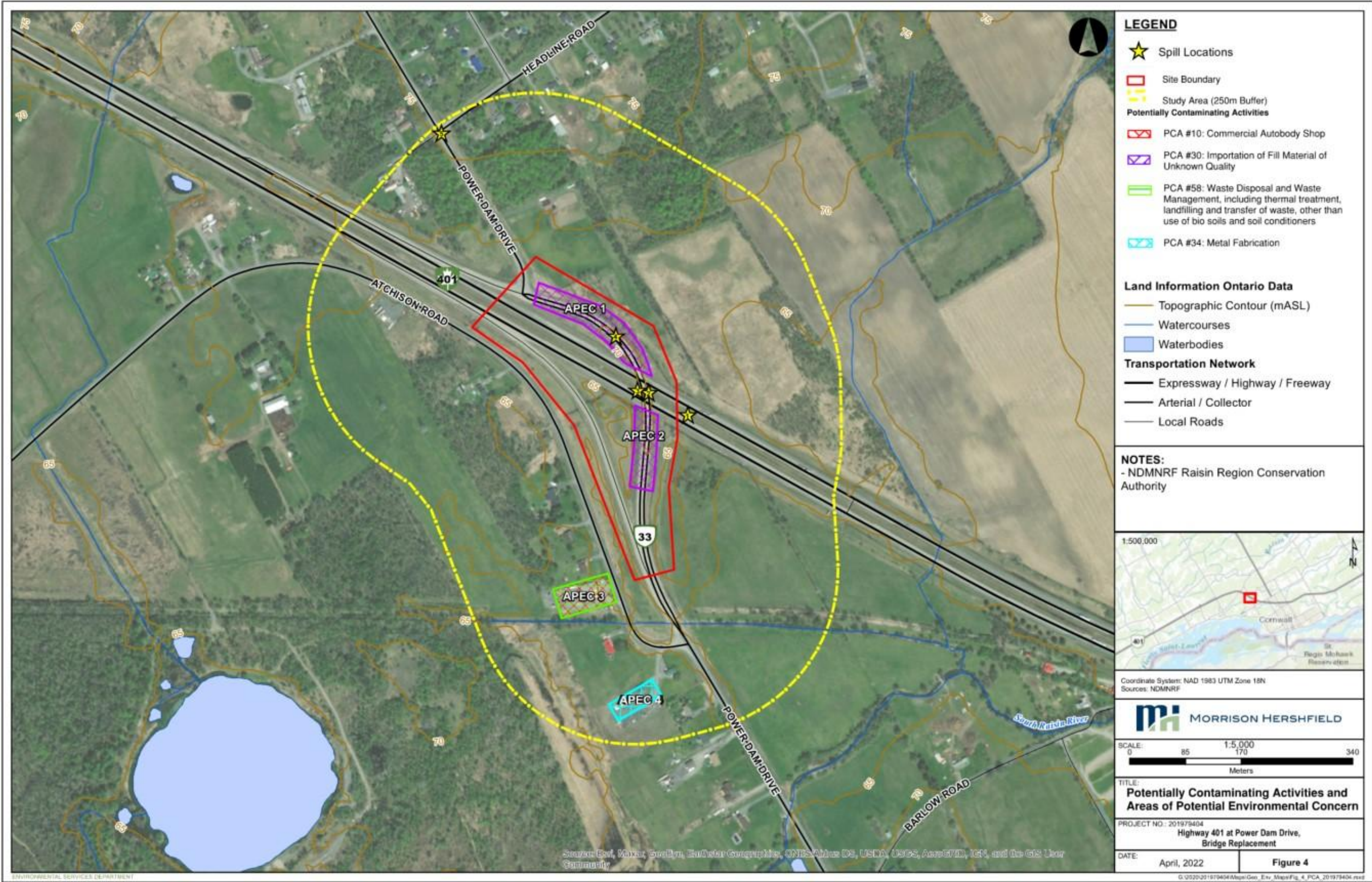


Figure 7: Potentially Contaminating Activities and Areas of Potential Environmental Concern

Table 9: Areas of Potential Environmental Concern

| Area of Potential Environmental Concern | Potentially Contaminating Activities                                                                                                                                                                      | Location                                       | Contaminants of Concern                                                                                                                             | Media Potential Impacted | Risk Rating |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|-------------|
| APEC 1                                  | PCA No. 30: Importation of Fill Material of Unknown                                                                                                                                                       | On-site Northern approach/ abutment            | Petroleum Hydrocarbons (PHC) fractions F1 to F4, Volatile Organic Compounds (VOC), Polycyclic Aromatic Hydrocarbons (PAH) and Metals and Inorganics | Soil                     | High        |
| APEC 2                                  | PCA No. 30: Importation of Fill Material of Unknown                                                                                                                                                       | On-site Southern approach/ abutment            | PHC, VOC, PAH and Metals and Inorganics                                                                                                             | Soil                     | High        |
| APEC 3                                  | PCA No. 10: Commercial Autobody Shops<br>PCA No. 58: Waste Disposal and Waste Management, including thermal treatment, landfilling and transfer of waste, other than use of biosoils as soil conditioners | Off-site within study area 16892 Atchison Road | PHC, VOC, PAH, Polychlorinated Biphenyls (PCB) and Metals and Inorganics                                                                            | Soil + groundwater       | High        |

## 5.9 Drainage and Hydrology

Drainage along Highway 401 is conveyed east and west via roadside ditches and culverts to the watercourses. Drainage along Power Dam Drive overpass is captured by catch basins and conveyed through culverts to roadside ditches along Highway 401. The existing drainage system for the interchange includes fifteen (15) culverts, nine (9) catch basins, and roadside ditches. Twelve (12) culverts cross Highway 401, two cross Power Dam Drive and one crosses Atchison Road. There are existing deck drains at the north and south abutments of the existing bridge. Refer to **Figure 8** for the existing drainage structures located within the study area.

A field investigation was conducted on November 3rd, 2021, to inspect drainage elements within the study area. The investigation found many of the culverts and ditches within the study area were not functioning as designed, resulting in standing water on both sides of many culverts. The drainage of the bridge over Highway 401 was also investigated and found the number of catch basin inlets to be sufficient, however the outlet leads appeared to be either buried or in very poor condition.



Figure 8: Existing Culverts Located within the Study Area

## 5.10 Noise

To evaluate the potential noise impacts of the proposed new interchange, an Environmental Noise Assessment was conducted in 2024. This assessment specifically targeted the Highway 401 segment between Brookdale Avenue and McConnell Avenue.

As part of the study, six (6) Noise Sensitive Areas (NSAs) were identified, primarily consisting of residential dwellings located on both sides of Highway 401 (refer to **Figure 9**). The full Environmental Noise Assessment can be found in **Appendix I**.

## 5.11 Air

To assess the potential impacts on air quality resulting from the project, an air quality assessment was conducted for the section of Highway 401 extending 1.5 km east and west of Power Dam Drive, as well as the segments of Power Dam Drive north of Highway 401 to Headline Road and south of Highway 401 to Barlow Road.

The assessment examined several scenarios:

- **Existing Conditions No-Build** for the year 2021
- **Future No-Build** and **Future Build** scenarios for 2031, and
- **Future No-Build** and **Future Build** scenarios for 2041

The No-Build scenarios depict conditions on Highway 401 and Power Dam Drive without the proposed redesign and replacement of the interchange for the specified years. The 2031 Build scenario incorporates the planned redesign and replacement of the interchange, featuring two lanes in each direction on Highway 401. In contrast, the 2041 Build scenario includes additional widening, increasing the number of lanes to three in each direction, along with the interchange adjustments proposed for 2031.

The study included thirteen (13) representative discrete residential receptors within the area. The air contaminants assessed comprised PM<sub>2.5</sub>, PM<sub>10</sub>, CO, NO<sub>2</sub>, acetaldehyde, acrolein, 1,3-butadiene, benzene, benzo(a)pyrene, and formaldehyde. Notably, for the year 2041, MOVES3 projected zero emissions of 1,3-butadiene due to updates by the US EPA regarding the toxic fractions of VOCs in vehicle exhaust; therefore, emissions for 1,3-butadiene were not quantified in the 2041 Future No-Build and Future Build scenarios. The full air quality assessment can be found in **Appendix F**.

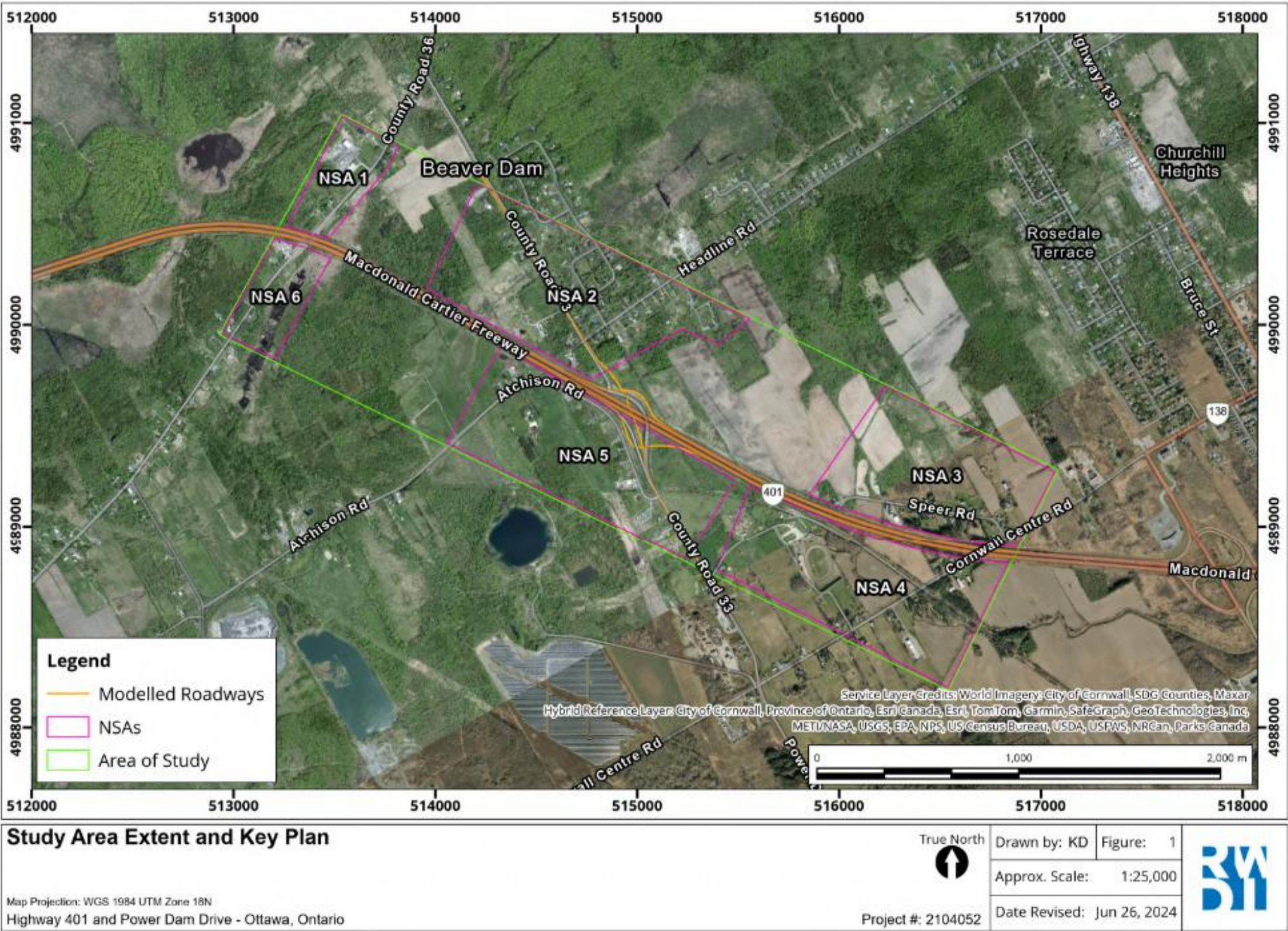


Figure 9: Noise Sensitive Areas Located within the Study Area

## 5.12 Cultural Environment

### 5.12.1 Archaeological Resources

A Stage 1 archaeological assessment determined that most of the overall study area is located close to archaeological potential features such as historic roads, farmsteads, and water sources, however, most of the archaeological potential within the current Highway 401 and Power Dam Drive right-of-way has been removed due to intensive and extensive disturbance. As a result, 16,000 m<sup>2</sup> of the Highway 401 right-of-way has archaeological potential. This area is towards the western end of the Study Area 900 metres from the bridge and will require Stage 2 property assessment via the test pit survey method.

The majority of the area within the 250-metre study area buffer will also require a Stage 2 archaeological assessment be undertaken during Detail Design. The full Stage 1 archaeological assessment can be found in **Appendix G**.

### 5.12.2 Cultural Heritage Resources

To identify known and potential built heritage resources (B.H.R.s) and cultural heritage landscapes (C.H.L.s) within the study area, a Cultural Heritage Resource Assessment Report was completed by Archaeological Services Inc, as found in **Appendix H**. The results of background historical research and a review of secondary source material, including historical mapping, indicate a study area with a rural land use history dating back to the late-eighteenth century.

A review of federal, provincial, and municipal registers, inventories, and databases revealed that there are no previously identified features of cultural heritage value within the study area. However, during fieldwork four potential B.H.R.s and three potential C.H.L.s were located within the study area (refer to **Figure 10**).

These features included three (3) farmscapes identified as potential C.H.L.s, three (3) residences identified as potential B.H.R.s and one (1) bridge identified as a potential B.H.R.s.

## 5.13 Transportation Infrastructure

### 5.13.1 Bridge Structure

The existing Power Dam Drive bridge, built in 1969, is a curved, superelevated, four-span post-tensioned voided concrete slab bridge with a skew of approximately 42° to the Highway 401 alignment. The bridge has a generally north-south orientation and spans diagonally over Highway 401 on Power Dam Drive. The bridge has an overall length of 92.4 m (18.3 m, 29.9 m, 25.9 m, and 18.3 m spans) and a width of 13.7 m (two 4.9 m lanes, a 2.1 m median, and two 0.9 m safety curbs supporting concrete parapet walls with galvanized steel hand railings).

The bridge was last rehabilitated in 2016 and is currently in good to fair condition but is approaching the end of its intended service life. The current structure does not meet the standard vertical clearance requirements. Furthermore, the span configuration does not accommodate the ultimate Highway 401 6-lane configuration.

### **5.13.2 Roadway Network**

Highway 401 is a controlled-access 400-series provincial highway that connects the City of Windsor in southwestern, Ontario to the Ontario-Quebec border in eastern Ontario. Classified as a four-lane rural divided freeway within the Study Area, the highway is maintained by the MTO and patrolled by the OPP. Within the Study Area, Highway 401 is divided by a grassed median and has a posted speed of 100 km/h throughout, and a design speed of 120 km/h. Highway 401 generally parallels the former Highway 2 which follows along the shoreline of the St. Lawrence River within the County.

Currently, Power Dam Drive (or County Road 33) is a two-lane municipal road and is classified as a rural divided arterial with a design speed of 100 km/h to the north and south of the structure.

### **5.13.3 Active Transportation**

Per the Township of South Stormont Parks & Recreation Master Plan (December 2020), trails and active transportation routes in South Stormont are significant components of the overall parks and recreation network.

The South Stormont Recreation Trail (approximately 5 km in length) and Great Lakes Waterfront Trail (part of a larger 3,000 km province-wide trail network) are the two largest trails in the Township. The South Stormont Recreation Trail is for non-motorized uses and runs from Cornwall Centre Road in the south (Rosedale Terrace) to County Road 18 in the north (St. Andrews West). It is located approximately 2 km to the east of the Study Area. The Great Lakes Waterfront Trail is a multi-use trail running the length of the Township along the water's edge and is well removed from the Study Area. The Township currently has no definitive plans underway to increase the amount of active transportation infrastructure in the future for Power Dam Drive.

### **5.13.4 Transit Services**

There is currently no public transit servicing the Study Area.

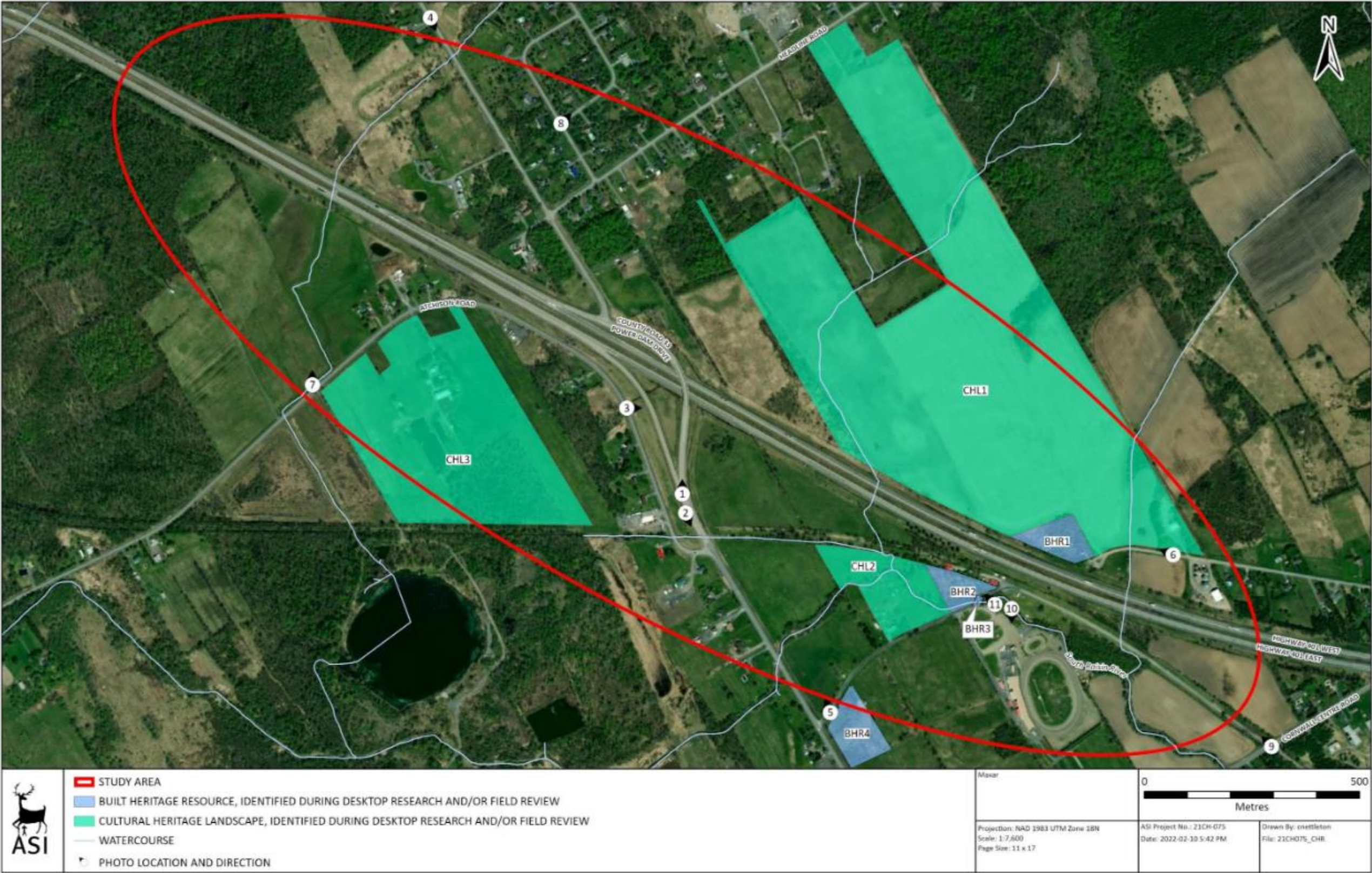


Figure 10: Built Heritage Resources and Cultural Heritage Landscapes located within the Study Area

## 6 GENERATION, ASSESSMENT & EVALUATION OF ALTERNATIVES

### 6.1 Generation & Assessment of Interchange Design Alternatives

Several high-level alternatives to meet the transportation objectives of this project were considered during Preliminary Design, which involved a two-step process. The first stage involved a long-list of ten alternatives developed to address the deficiencies at the interchange, which were subject to a high-level screening process to narrow the choices down to a short-list. The ten (10) long-listed alternatives are described in **Table 10**, and presented in **Figure 11** to **Figure 20**

Table 10: Long-List Alternatives

| Alternative | Alternative Description                                                                                                                                                                                                                                                                                                                  |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1           | Do Nothing – maintain existing conditions                                                                                                                                                                                                                                                                                                |
| 2           | Maintain existing layout with a skewed tangent structure that requires modified horizontal alignment for Power Dam Drive north of the Highway. Two direct ramps to/from the east connects to Power Dam Drive with T-intersections (Single Diamond).                                                                                      |
| 3           | New skewed straight bridge, west of existing structure. Parclo AB interchange with Two direct ramps to/from the east and two loop ramps to and from the west connects to Power Dam Drive with a T-intersections north and south of the bridge                                                                                            |
| 4           | New Power Dam Drive intersection north of a new straight bridge, east of existing structure. One direct ramp from the east connects with Power Dam Drive north of the bridge (Single Diamond) and a new eastbound loop ramp south of the bridge along with realigned W-S ramp to form part of a Parclo A2 configuration.                 |
| 5           | New skewed tangent bridge at existing location. Button Hook/Parclo B connection to Highway 401 WBL in the NW quadrant with controlled intersection on Power Dam Drive and a Single Diamond with controlled intersection located south of the bridge.                                                                                     |
| 6           | Parclo B2 Interchange with full movement with two intersections north and south of the new skewed curved bridge located west of existing structure.                                                                                                                                                                                      |
| 7           | New Power Dam Drive intersection north of a new skewed straight bridge west of existing structure. Two direct ramps to/from the east connects to Power Dam Drive with a T-intersections north and south of the bridge.<br>W-S ramp is modified as a W-N/S Parclo B loop ramp that connects to Power Dam Drive at the south intersection. |
| 8           | Single Diamond Interchange with 4 ramps connected through 2 controlled intersections on Power Dam Drive. The proposed bridge will be a skewed tangent structure west of existing bridge location.                                                                                                                                        |
| 9           | Full Parclo A4 Interchange with new skewed curved bridge east of existing structure location. The Interchange has 4 free flow on ramps and two off ramps connected through 2 controlled intersections.                                                                                                                                   |
| 10          | Full Parclo A4 Interchange with new straight bridge east of the existing structure location. The Interchange has 4 free flow on ramps and two off ramps connected through 2 controlled intersections                                                                                                                                     |

### **6.1.1 Evaluation Methodology Long-List of Alternatives**

Each alternative was assessed against the criteria listed below, and a reasoned argument (trade-off) method of evaluation was used to identify advantages and disadvantages from a multi-disciplinary perspective, and select the best alternatives based on the evaluation categories and the criteria listed below. Based on the impacts resulting to each criterion, a determination was made regarding the feasibility of each option, and whether the alternative would be carried forward.

#### **Social/Natural Environment**

- Property Impacts
- Cultural and Built Heritage/Archaeology
- Watercourse/Fisheries
- Vegetation, Woodlots, and Wildlife Habitat
- Water Resources

#### **Cost/Staging**

- Cost
- Staging Opportunities
- Utility Impacts

#### **Transportation**

- Operational Performance
- Geometry
- Local Road Impacts
- Structural Implications
- Accommodation of Active Transportation on Power Dam Drive

Refer to **Table 11** for a summary of the results of the evaluation of the Long-List of Alternatives highlighting the key advantages and disadvantages of each of the Long-List Alternatives.

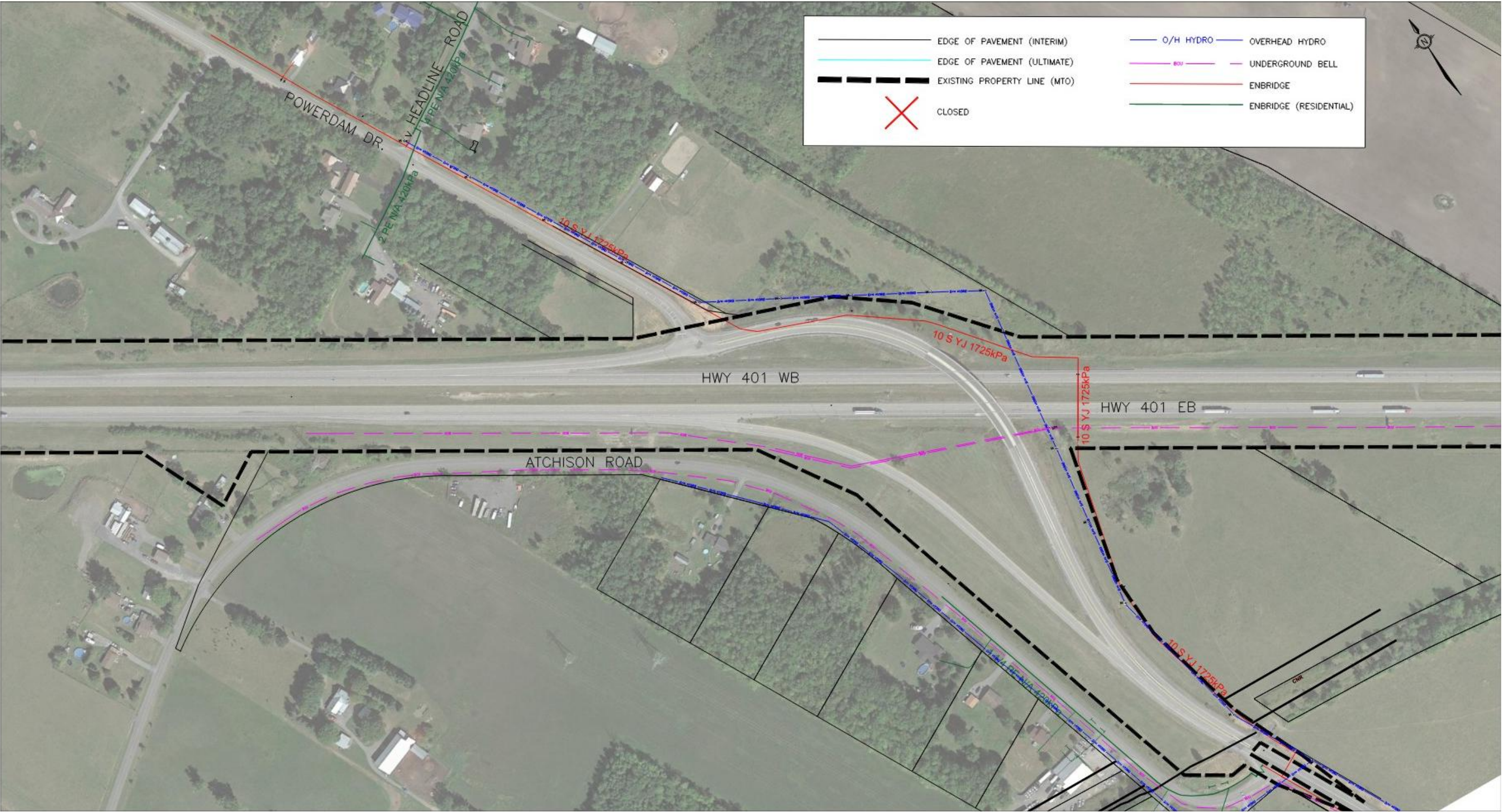
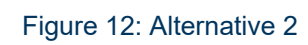


Figure 11: Alternative 1



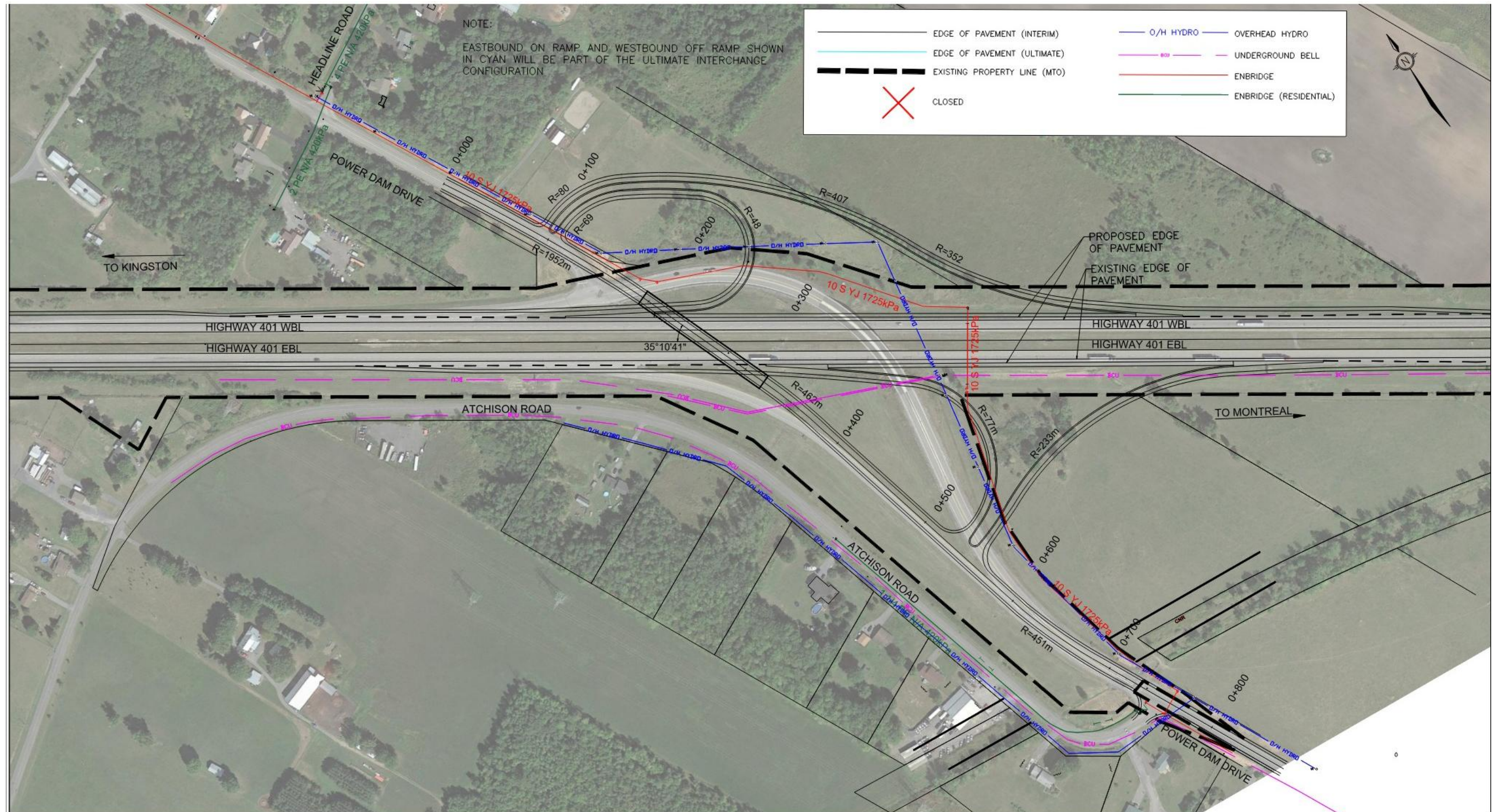


Figure 13: Alternative 3

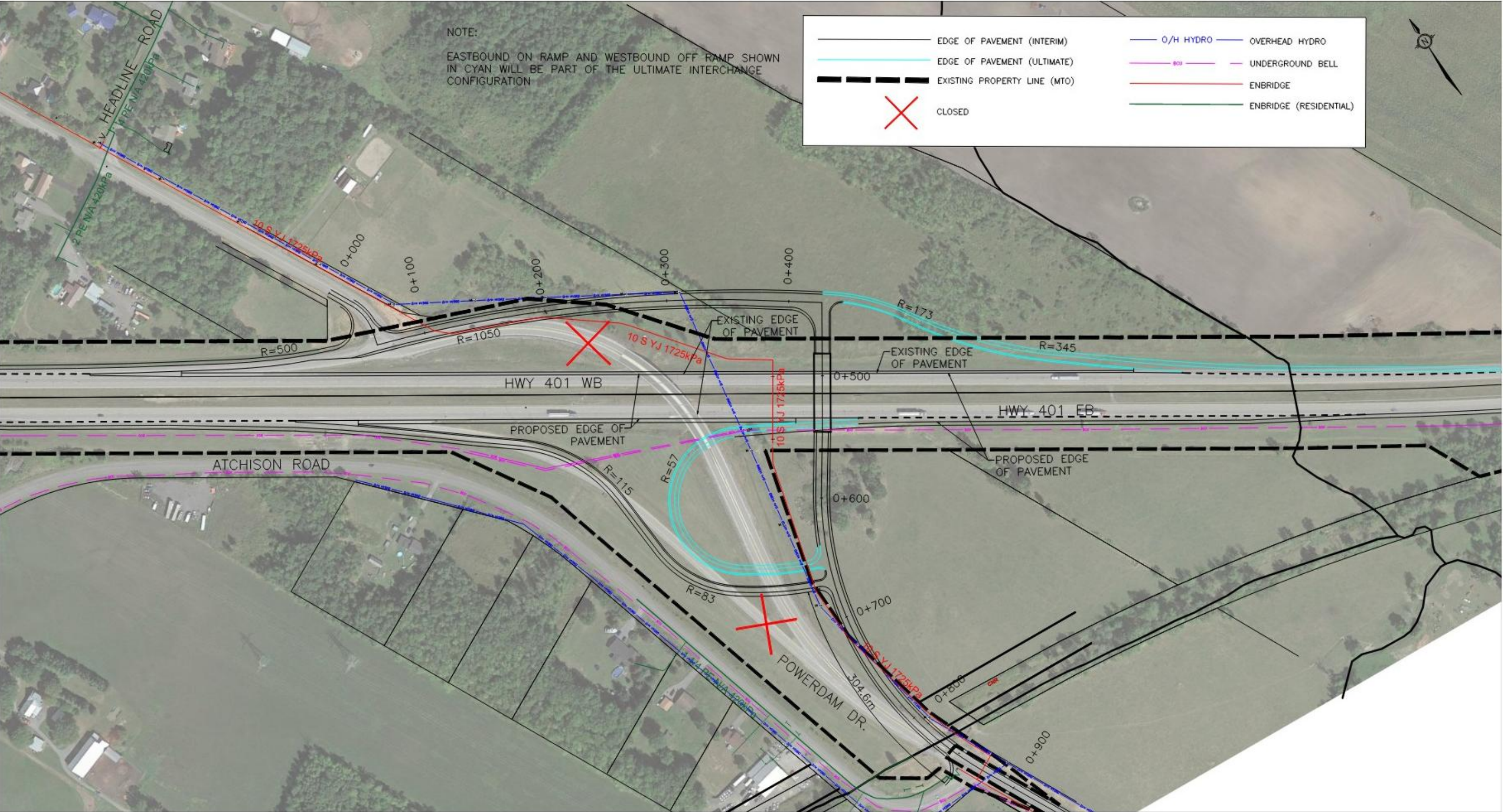


Figure 14: Alternative 4

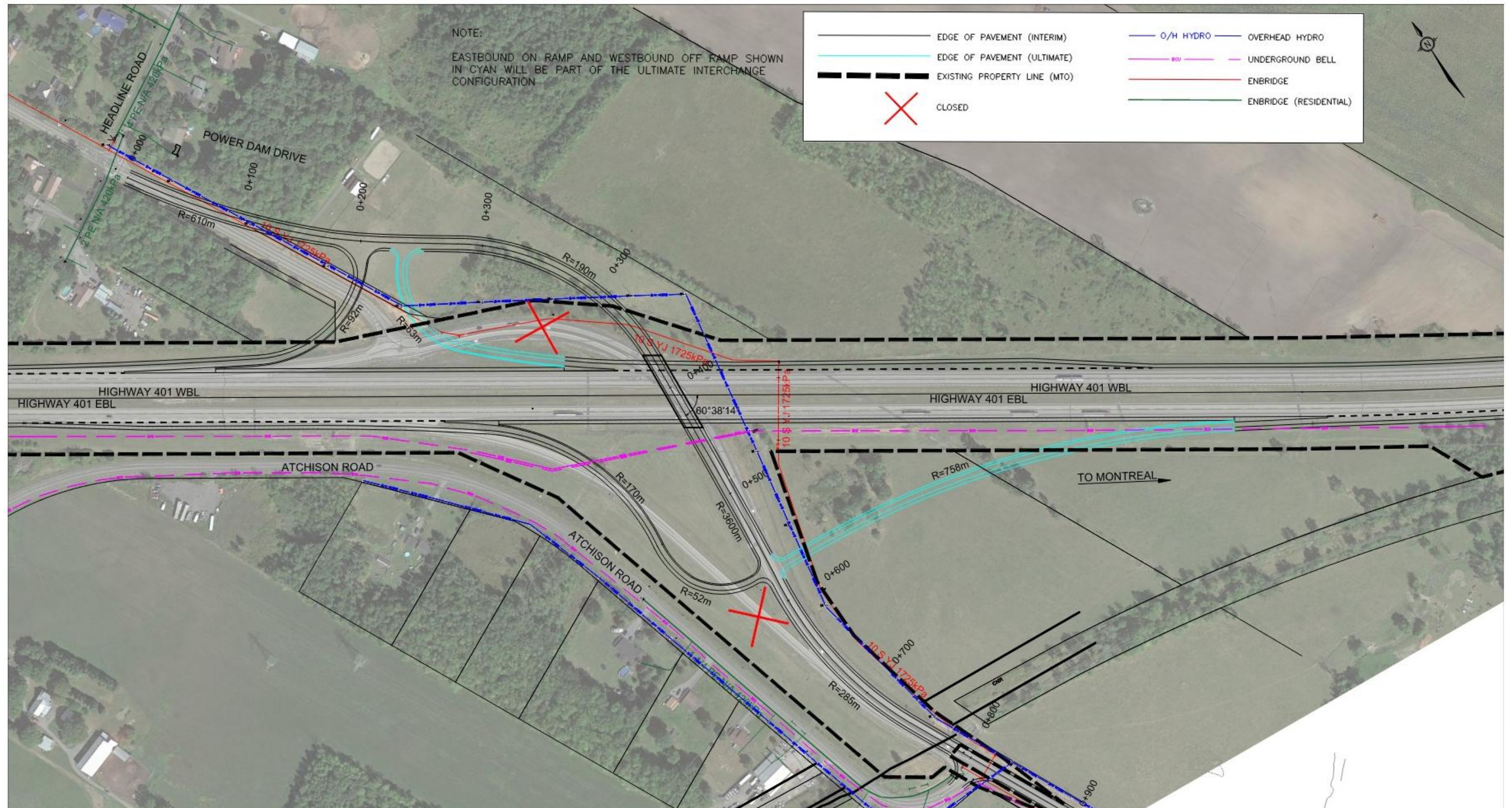


Figure 15: Alternative 5

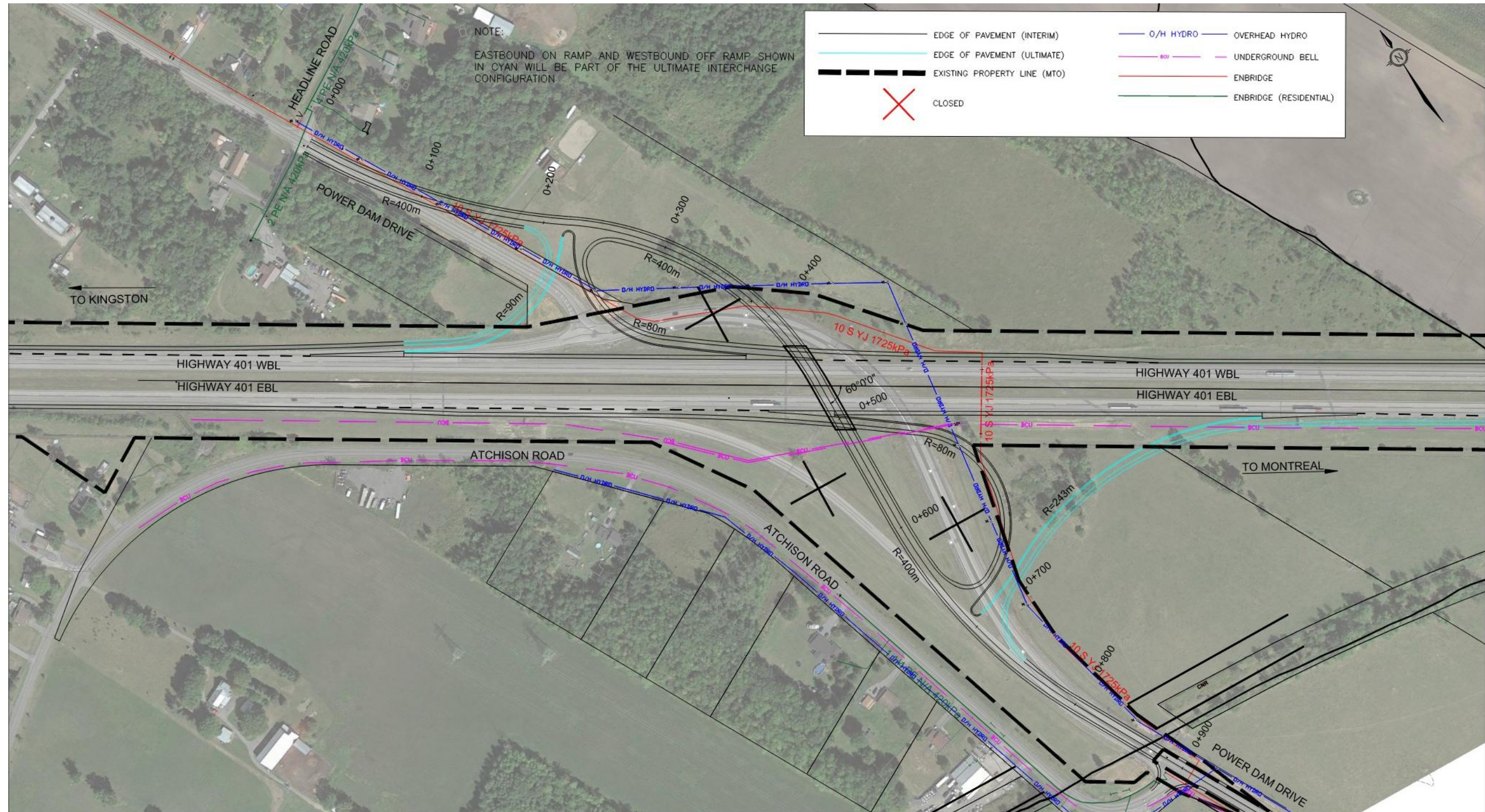


Figure 16: Alternative 6

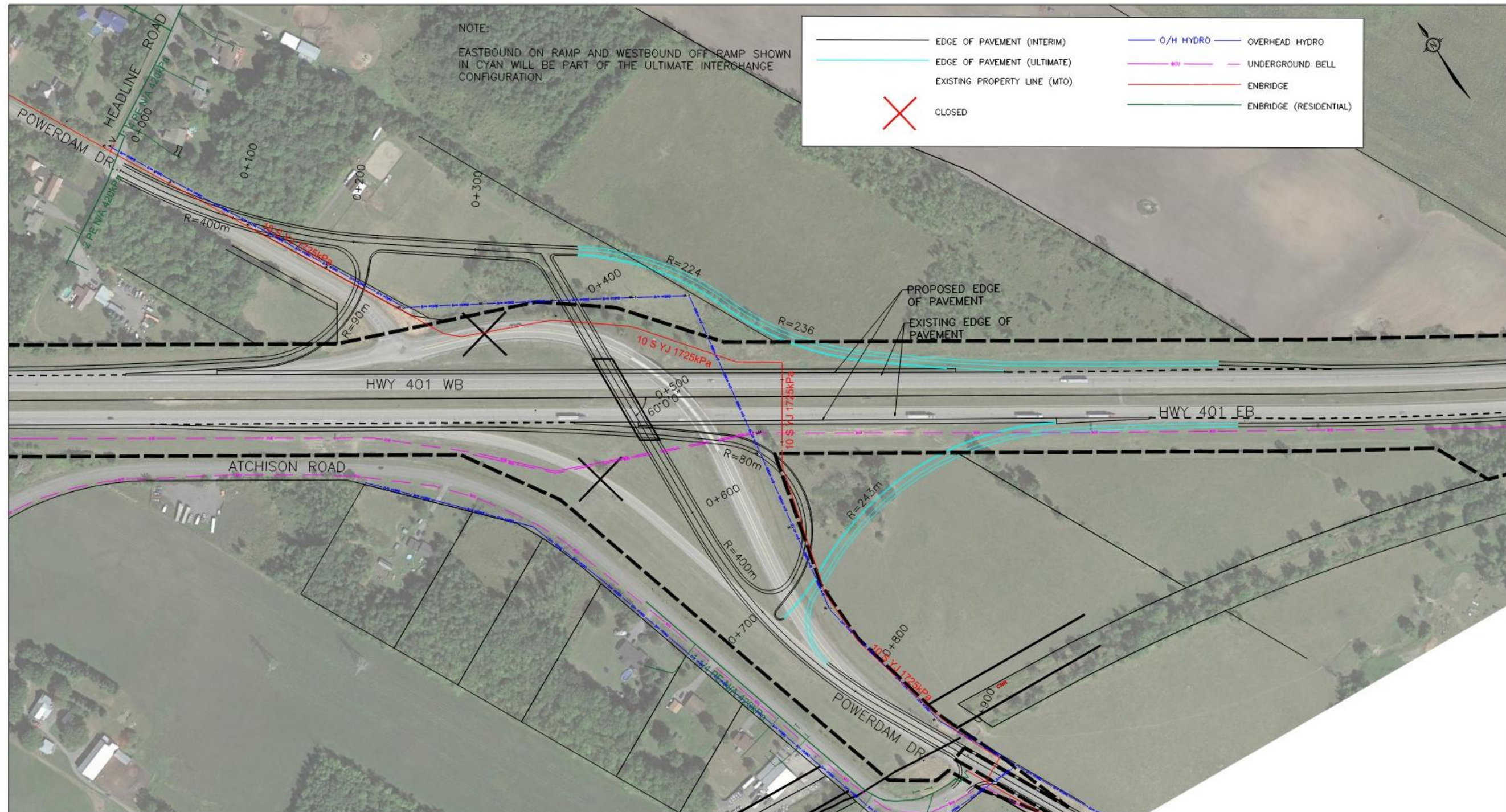
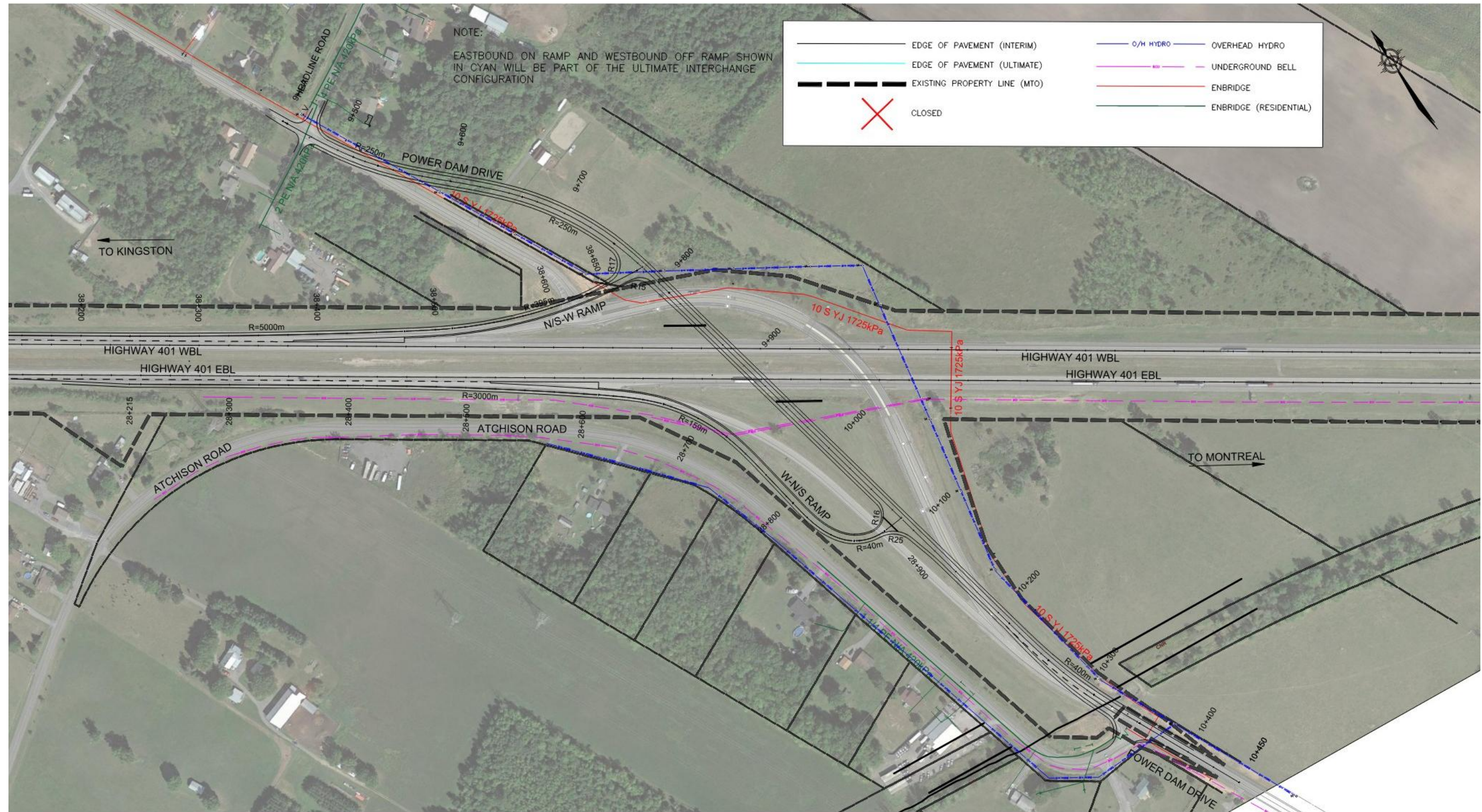


Figure 17: Alternative 7



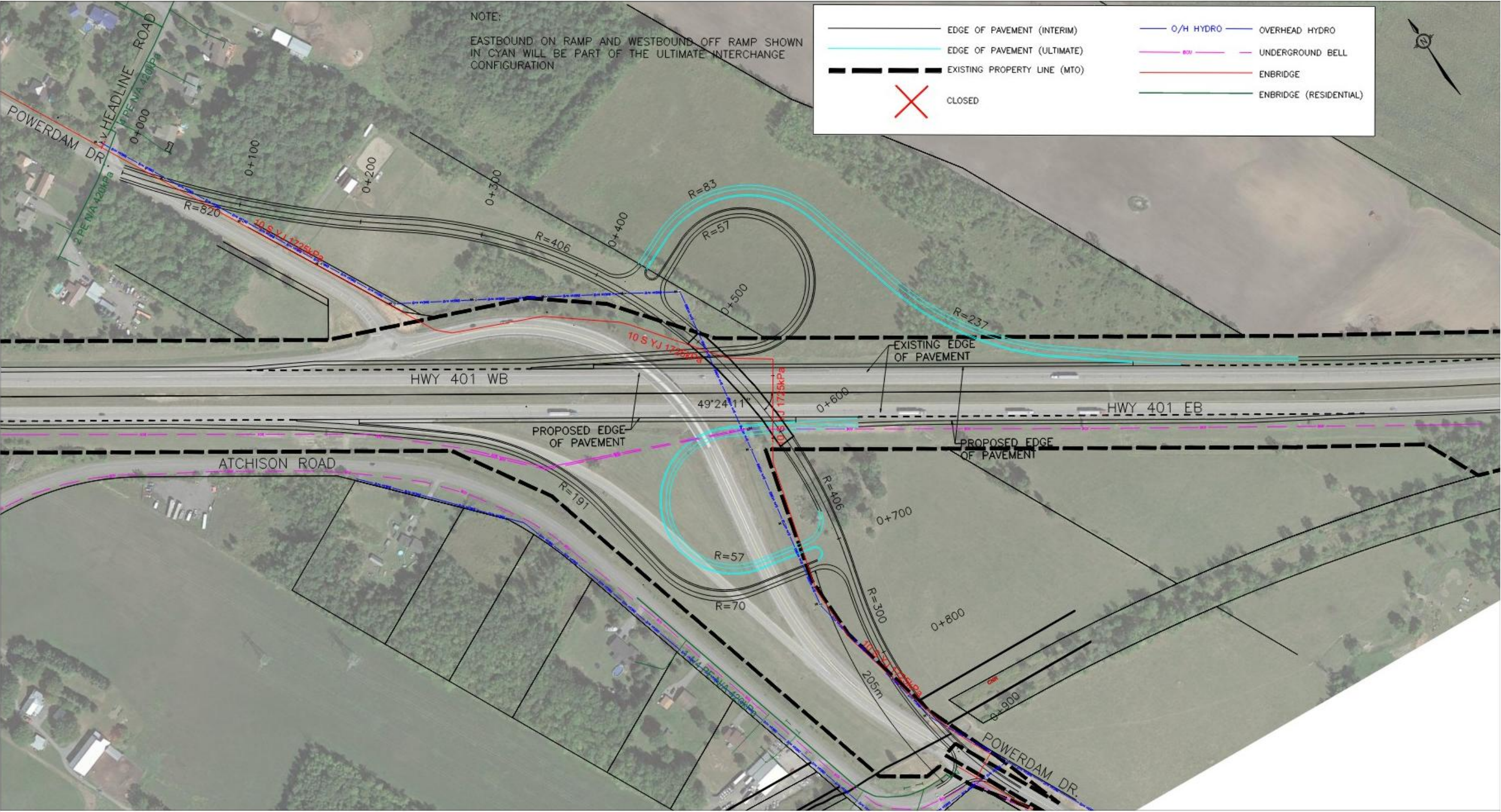


Figure 19: Alternative 9

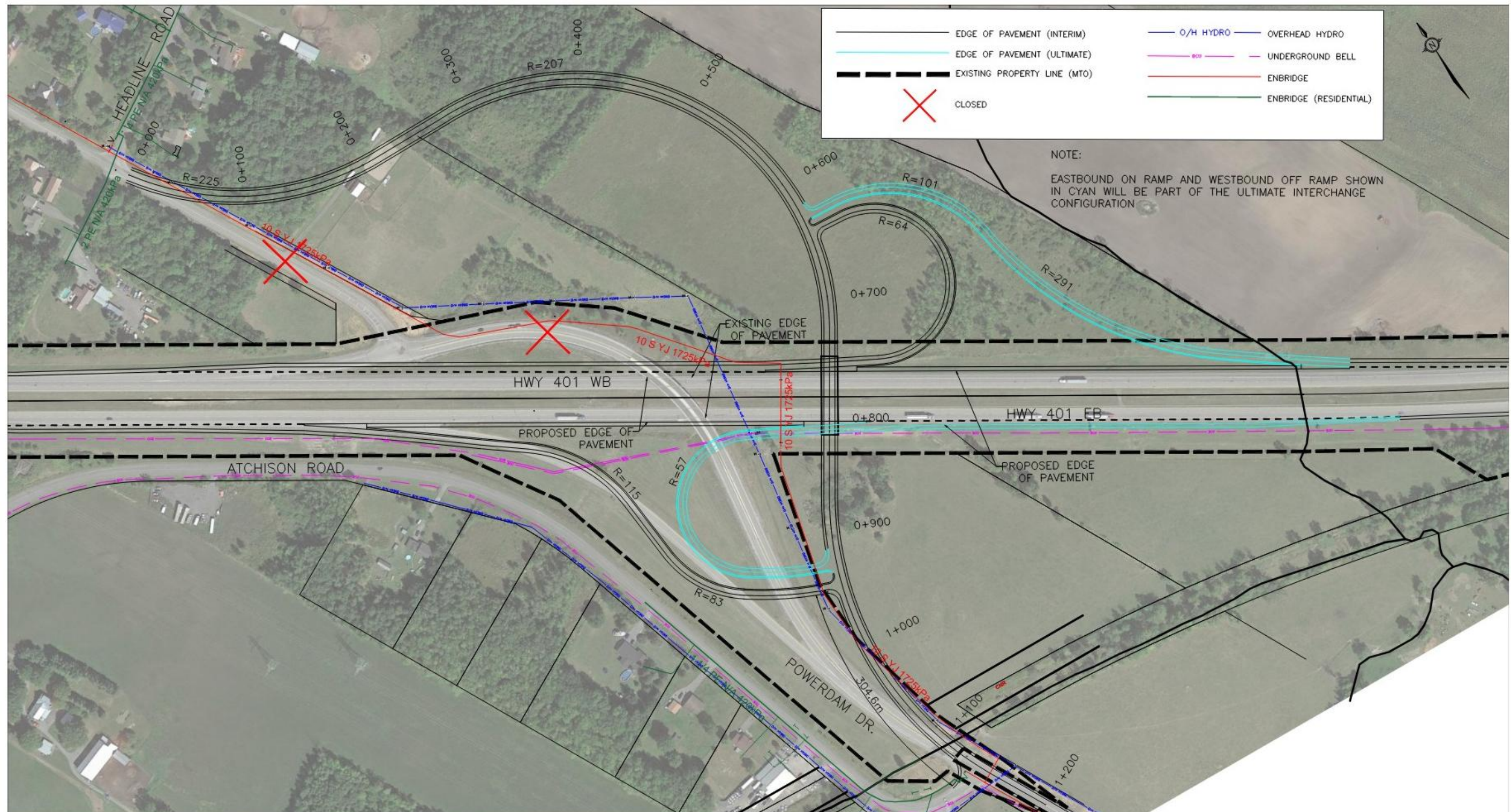


Figure 20: Alternative 10

Table 11: Summary of Evaluation of Long-List Alternatives

| Evaluation Summary          | Alternative 1                                                                                                                                                                                                                                                                                                                                                                                                                                   | Alternative 2                                                                                                                                                                                                                                                                                                                 | Alternative 3                                                                                                                                                                                                                                                                                                                                                                       | Alternative 4                                                                                                                                                                                                                                           | Alternative 5                                                                                                                                                                                                                                                                                                                                              |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Key Advantages              | <ul style="list-style-type: none"> <li>No impacts to private property or buildings</li> <li>No natural environmental impacts</li> <li>No cost in the short-term</li> </ul>                                                                                                                                                                                                                                                                      | <ul style="list-style-type: none"> <li>Low property impacts</li> <li>Small overall footprint impacts to the natural environment</li> <li>Partial power line relocation</li> <li>Ramps to/from the east can be added in the future</li> </ul>                                                                                  | <ul style="list-style-type: none"> <li>Ramps to/from the east can be added in the future</li> <li>Moderate environmental impacts</li> <li>Power Dam Drive through continuous and direct</li> <li>Maintain Design speed on both sides of Highway 401</li> <li>Tangent alignment on structure</li> <li>Does not require full time detour while construction the new bridge</li> </ul> | <ul style="list-style-type: none"> <li>Moderate property impact</li> <li>Low environmental impacts</li> <li>Ramps to/from the east can be added in the future</li> <li>Preferred structural layout</li> <li>W-N movement is accommodated</li> </ul>     | <ul style="list-style-type: none"> <li>Moderate property impacts</li> <li>Low environmental impacts</li> <li>Ramp to/from the east can be added in the future</li> <li>Partial power line relocation</li> <li>Power Dam Drive through traffic no required to manage sharp deflection north of Highway 401</li> <li>W-N movement is accommodated</li> </ul> |
| Key Disadvantages           | <ul style="list-style-type: none"> <li>No new connections provided</li> <li>W-N movement is not accommodated</li> <li>Short-and long-term vehicular demands will not be met</li> <li>Does not address study objectives</li> </ul>                                                                                                                                                                                                               | <ul style="list-style-type: none"> <li>Detour is required for entire construction duration</li> <li>Power Dam Drive not continuous north of Highway 401 for through traffic</li> <li>W-N movement is not accommodated</li> <li>Impacts private properties</li> </ul>                                                          | <ul style="list-style-type: none"> <li>Power line relocation</li> <li>High skew angle not desirable from structural perspective</li> </ul>                                                                                                                                                                                                                                          | <ul style="list-style-type: none"> <li>Power line relocation</li> <li>Power Dam Drive not continuous north of Highway 401 for through traffic</li> </ul>                                                                                                | <ul style="list-style-type: none"> <li>Detour is required for the entire construction duration</li> <li>Power line relocation</li> <li>Highway Impact to water quality, runoff volume and peak flow</li> </ul>                                                                                                                                             |
| Recommendation              | <ul style="list-style-type: none"> <li>Carried Forward</li> </ul>                                                                                                                                                                                                                                                                                                                                                                               | <ul style="list-style-type: none"> <li>Not Carried Forward</li> </ul>                                                                                                                                                                                                                                                         | <ul style="list-style-type: none"> <li>Carried Forward</li> </ul>                                                                                                                                                                                                                                                                                                                   | <ul style="list-style-type: none"> <li>Not Carried Forward</li> </ul>                                                                                                                                                                                   | <ul style="list-style-type: none"> <li>Carried Forward</li> </ul>                                                                                                                                                                                                                                                                                          |
| Evaluation Criteria Summary | Alternative 6                                                                                                                                                                                                                                                                                                                                                                                                                                   | Alternative 7                                                                                                                                                                                                                                                                                                                 | Alternative 8                                                                                                                                                                                                                                                                                                                                                                       | Alternative 9                                                                                                                                                                                                                                           | Alternative 10                                                                                                                                                                                                                                                                                                                                             |
| Key Advantages              | <ul style="list-style-type: none"> <li>Low property impacts</li> <li>Small overall footprint impacts to natural environment</li> <li>Partial power line relocation</li> <li>Ramp to/from the east can be added in the future</li> <li>Power Dam Drive through traffic not required to manage sharp deflection north of Highway 401</li> <li>Maintain design speed on both sides of Highway 401</li> <li>W-N movement is accommodated</li> </ul> | <ul style="list-style-type: none"> <li>Partial power line relocation</li> <li>Moderate environment impacts</li> <li>Ramp to/from the east can be added in the future</li> <li>Power Dam Drive through traffic not required to manage sharp deflection north of the highway</li> <li>Tangent alignment on structure</li> </ul> | <ul style="list-style-type: none"> <li>Ramps to/from the east can be added in the future</li> <li>Moderate environmental impacts</li> <li>Power Dam Drive through continuous and direct</li> <li>Maintain Design speed on both sides of Highway 401</li> <li>Tangent alignment on structure</li> <li>Does not require full time detour while construction the new bridge</li> </ul> | <ul style="list-style-type: none"> <li>More typical interchange layout</li> <li>Ramps to/from the east can be added in the future</li> <li>All movements are accommodated</li> </ul>                                                                    | <ul style="list-style-type: none"> <li>More typical interchange layout</li> <li>Ramps to/from the east can be added in the future</li> <li>All movements are accommodated</li> <li>Straight structure</li> </ul>                                                                                                                                           |
| Key Disadvantages           | <ul style="list-style-type: none"> <li>Complex and more expensive structure</li> </ul>                                                                                                                                                                                                                                                                                                                                                          | <ul style="list-style-type: none"> <li>No consistent speed due to roundabout north of Highway 401</li> <li>No consistent speed due to roundabout south of Highway 401</li> </ul>                                                                                                                                              | <ul style="list-style-type: none"> <li>High skew angle not desirable from structural perspective</li> </ul>                                                                                                                                                                                                                                                                         | <ul style="list-style-type: none"> <li>High property impacts</li> <li>High environmental impacts</li> <li>High cost</li> <li>Greater utility impact</li> <li>Complex structure</li> <li>Provide two on ramps per direction may not be needed</li> </ul> | <ul style="list-style-type: none"> <li>Significant property impacts</li> <li>Highway environmental impacts</li> <li>Major realignment of Power Dam Drive and large curve introduced</li> <li>Additional auxiliary lanes required to meet sightlines that are not warranted based on traffic volumes</li> </ul>                                             |
| Recommendation              | <ul style="list-style-type: none"> <li>Carried Forward</li> </ul>                                                                                                                                                                                                                                                                                                                                                                               | <ul style="list-style-type: none"> <li>Not Carried Forward</li> </ul>                                                                                                                                                                                                                                                         | <ul style="list-style-type: none"> <li>Carried Forward</li> </ul>                                                                                                                                                                                                                                                                                                                   | <ul style="list-style-type: none"> <li>Not Carried Forward</li> </ul>                                                                                                                                                                                   | <ul style="list-style-type: none"> <li>Not Carried Forward</li> </ul>                                                                                                                                                                                                                                                                                      |

## **6.1.2 Summary of Short-Listed Bridge Replacement Alternatives**

Following the evaluation of the impacts and advantages of each alternative in the Long-List of Alternatives, the Study Team carried forward five (5) alternatives as Short-Listed Alternatives. These alternatives are illustrated in **Figure 21** through **Figure 25** and described below.

### **6.1.2.1 Do Nothing**

The “Do Nothing” alternative involves the replacement of the existing bridge with a new bridge in the same configuration on the current location. This alternative does not involve any interim modifications to improve roadway geometrics or incorporate future interchange options.

While this alternative involves limited impacts compared to other Short-Listed Alternatives, it ultimately does not address the current or future needs for Highway 401 at Power Dam Drive and was used for comparison purposes only.

### **6.1.2.2 Alternative 3**

The third alternative proposes a new skewed bridge west of the existing structure, with a Parclo AB interchange with two (2) direct ramps to/from the east and two loop ramps to and from the west connects to Power Dam Drive with a T-intersections north and south of the bridge. All turning movements are accommodated through the interchange ramps/intersections and good sightlines for active transportation crossings. Power Dam Drive will be realigned on both side of Highway 401 to eliminate the jog. Active Transportation facilities can be accommodated on either side of Power Dam Drive.

### **6.1.2.3 Alternative 5**

The fifth alternative implements a new skewed tangent bridge at existing location. Button Hook/ Parclo B connection to Highway 401 WBL in the NW quadrant with controlled intersection on Power Dam Drive and a Single Diamond with controlled intersection located south of the bridge. Power Dam Drive will be realigned on both side of Highway 401 to eliminate the jog. Active Transportation facilities can be accommodated on either side of Power Dam Drive.

### **6.1.2.4 Alternative 6**

Alternative 6 implements a Parclo B2 Interchange with full movement with two intersections north and south of the new skewed curved bridge located west of existing structure. Power Dam Drive will be realigned on both side of Highway 401 to eliminate the jog. Active Transportation facilities can be accommodated on either side of Power Dam Drive.

### **6.1.2.5 Alternative 8**

Alternative 8 implements a Single Diamond Interchange with 4 ramps connected through 2 controlled intersections on Power Dam Drive. The proposed bridge will be a skewed tangent structure west of existing bridge location. Power Dam Drive will be realigned on both side of Highway 401 to eliminate the jog. Active Transportation facilities can be accommodated on either side of Power Dam Drive.



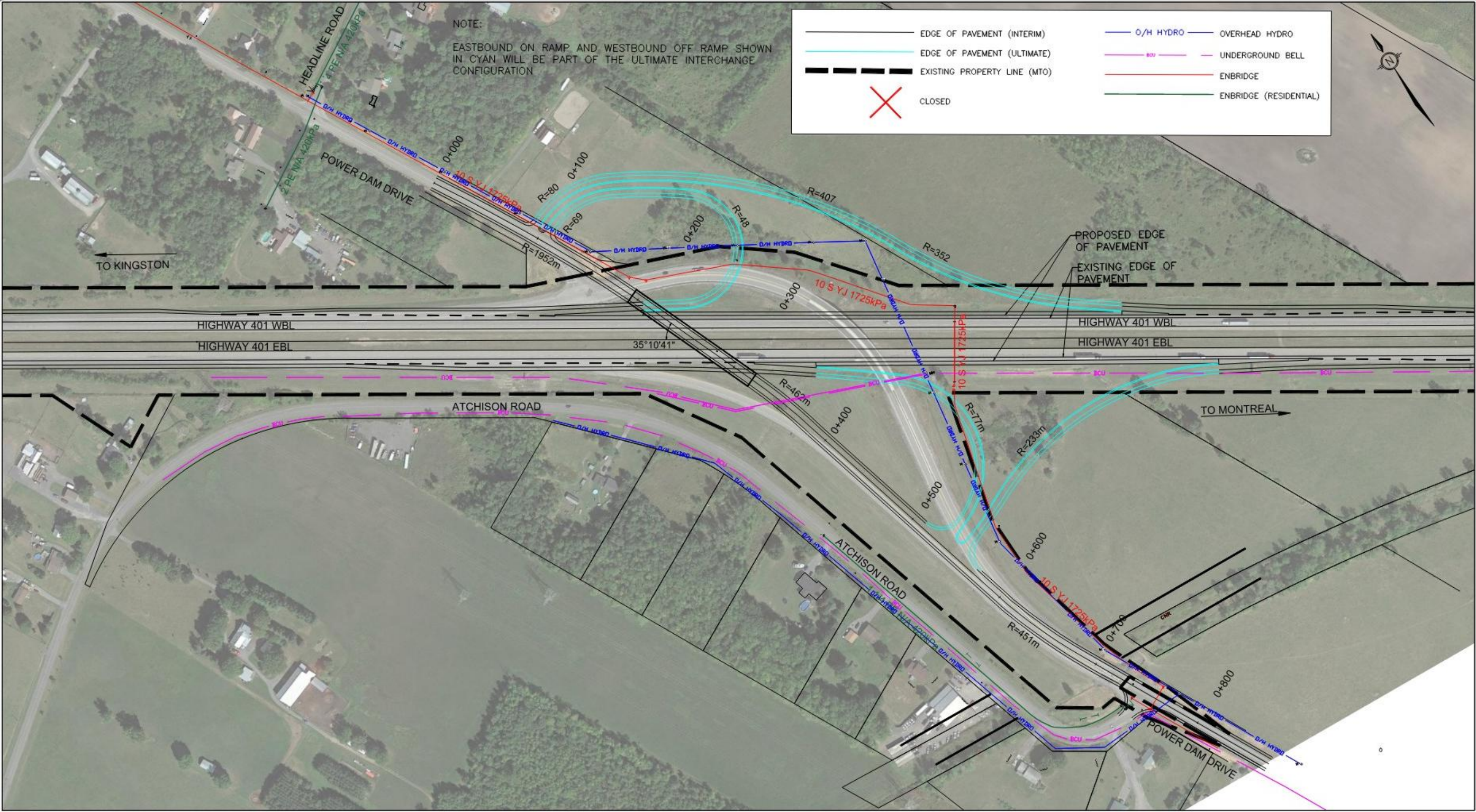


Figure 22: Alternative 3

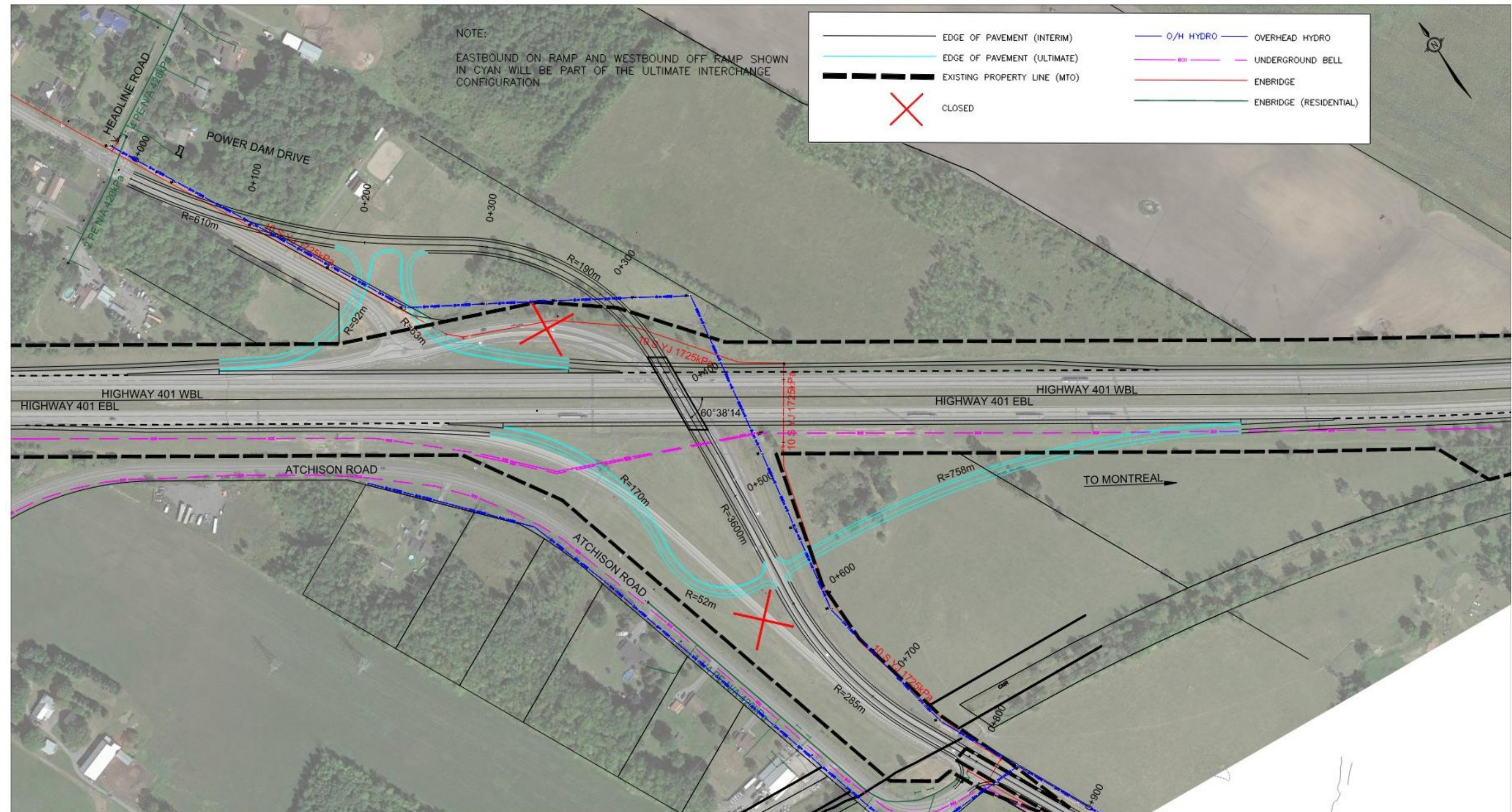


Figure 23: Alternative 5

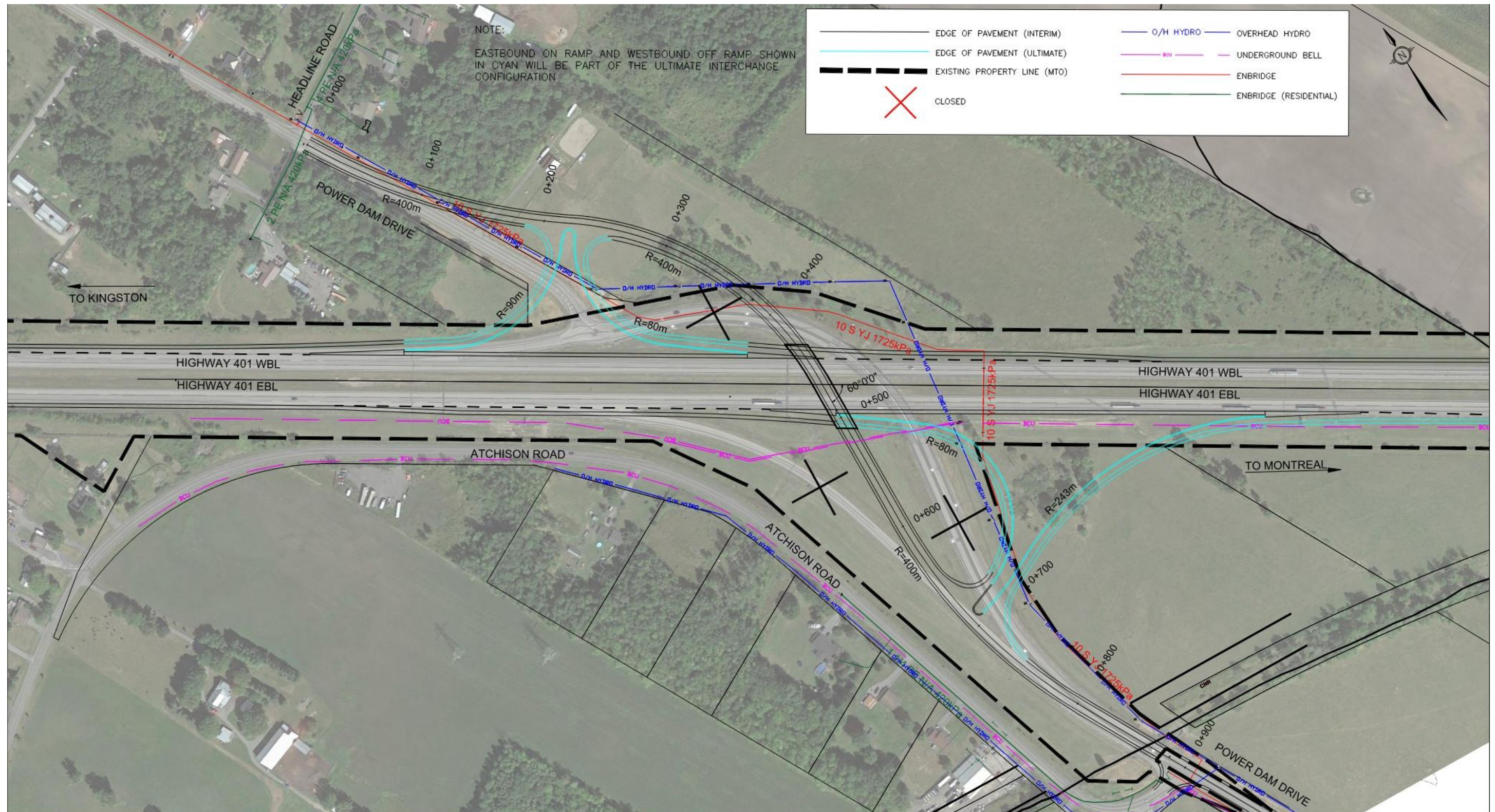


Figure 24: Alternative 6

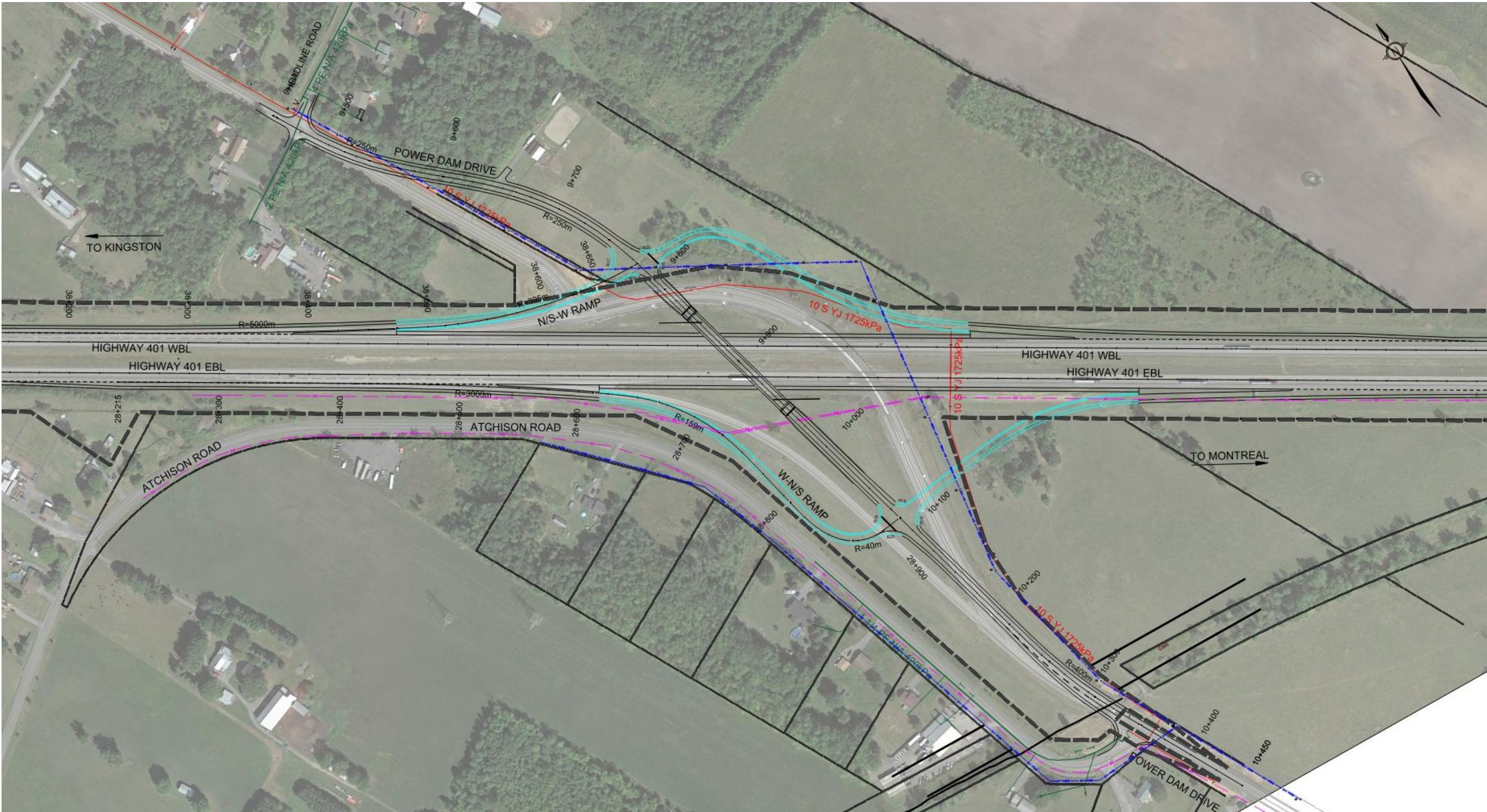


Figure 25: Alternative 8

### 6.1.3 Evaluation Methodology of Short-List Alternatives and Selection of Preferred Alternative

The Short-List Alternatives were evaluated on the six (6) criteria listed below.

- **Interchange Operations:** Modeling of traffic volumes and flows on Highway 401 and Power Dam drive was undertaken to determine how the options would impact Level-of-Service, delays, active transportation facilities, and municipal roadways.
- **Interchange Geometry:** Highway and Municipal Road Design: The designs were compared against the standards within the TAC Geometric Design Guide for Canadian Roads (June 2017) and the accompanying MTO Design Supplement (December 2017) to ensure that technical deficiencies were not present.
- **Impact to Natural Environment:** Designs were assessed to determine the extent to which they impact terrestrial and aquatic features.
- **Impact to Social/Economic/Cultural Environment:** Designs were assessed to determine the extent to which agricultural, archaeological, built heritage and cultural landscape features are impacted, as well as the potential property acquisitions requirements.
- **Preliminary Construction Cost:** A rough estimate of the cost of each plan was developed for comparison purposes.
- **Constructability/Staging:** Conceptual staging was considered to determine how traffic and existing utilities would be impacted during construction, and if detours would potentially be required.

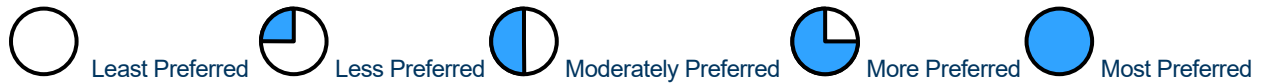
A weighted-scoring method was used to select a technically preferred alternative. This approach had two inputs, scores where the level of impact was established for each criterion and weights which established the level of importance of each criterion. This weighted scoring method was able to determine the best alternative to put forward for the Recommended Plan. A summary of this scoring method is provided in **Table 12** below.

Table 12: Most Desirable Interchange Options – Evaluation Summary

|                        |                         | Do Nothing                                                                          | ALT. 3                                                                              | ALT. 5                                                                               | ALT. 6                                                                                | ALT. 8                                                                                |
|------------------------|-------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Interchange Operations | Level of Service/Delays |  |  |  |  |  |
|                        | Municipal Road Impacts  |  |  |  |  |  |
|                        | Active Transportation   |  |  |  |  |  |

|                                                 |                                 | Do Nothing                                                                          | ALT. 3                                                                              | ALT. 5                                                                               | ALT. 6                                                                                | ALT. 8                                                                                |
|-------------------------------------------------|---------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Interchange Geometry                            | Ramp Geometry                   |    |    |    |    |    |
|                                                 | Structure Layout                |    |    |    |    |    |
|                                                 | Conflict Zones, Collision Risks |    |    |    |    |    |
|                                                 | Future Interchange Needs        |    |    |    |    |    |
| Costs                                           | Cost                            |    |    |    |    |    |
| Construct-ability                               | Utility Conflicts               |  |  |  |  |  |
|                                                 | Construction Impacts            |  |  |  |  |  |
| Natural Environment                             | Fisheries Impact                |  |  |  |  |  |
|                                                 | Wildlife/Habitat                |  |  |  |  |  |
|                                                 | Water Resources                 |  |  |  |  |  |
| Social/<br>Economic/<br>Cultural<br>Environment | Property                        |  |  |  |  |  |

|         |                                                                 | Do Nothing                                                                        | ALT. 3                                                                            | ALT. 5                                                                             | ALT. 6                                                                              | ALT. 8                                                                              |
|---------|-----------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|         | Agriculture                                                     |  |  |  |  |  |
|         | Archaeological/<br>Built Heritage<br>and Cultural<br>Landscapes |  |  |  |  |  |
| Overall |                                                                 |  |  |  |  |  |



Each design option's performance on these criteria is outlined in the evaluation summary presented in **Table 13**. Based on the evaluation, Alternative 8 was selected as the Technically Preferred Alternative because it provides the best balance between highway design standards & traffic operation, cost, constructability, and associated environmental/property impacts.

Table 13: Evaluation Summary

| Evaluation Criteria Summary          | Do Nothing                                                              | Alternative 3                                                                                                                                                                                                                    | Alternative 5                                                                                                                                                                                                                                | Alternative 6                                                                                                                                                                                                               | Alternative 8                                                                                                                                                                                                               |
|--------------------------------------|-------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Interchange Operations               | <ul style="list-style-type: none"> <li>No change from today</li> </ul>  | <ul style="list-style-type: none"> <li>Design speeds 80km/hr.</li> <li>2 high risk potential AT conflict areas</li> </ul>                                                                                                        | <ul style="list-style-type: none"> <li>Design speeds 70km/hr.</li> <li>1 high moderate potential AT conflict areas</li> </ul>                                                                                                                | <ul style="list-style-type: none"> <li>Design speeds 80km/hr.</li> <li>1 moderate risk potential AT conflict areas</li> </ul>                                                                                               | <ul style="list-style-type: none"> <li>Design speeds 80km/hr.</li> <li>2 moderate risk potential AT conflict areas</li> </ul>                                                                                               |
| Interchange Geometry                 | <ul style="list-style-type: none"> <li>No change from today</li> </ul>  | <ul style="list-style-type: none"> <li>Straight structure simpler for design/construction</li> <li>Significant change in geometry of existing ramps</li> </ul>                                                                   | <ul style="list-style-type: none"> <li>Straight structure</li> <li>Poor sightlines for WB traffic exiting highway</li> <li>Similar geometry to existing ramps to and from west</li> </ul>                                                    | <ul style="list-style-type: none"> <li>Curvilinear alignment</li> <li>Poor sightlines for WB traffic exiting highway</li> <li>Similar geometry to existing north ramp terminal</li> </ul>                                   | <ul style="list-style-type: none"> <li>Straight structure</li> <li>All turning movements accommodated</li> <li>Similar geometry to existing ramps to and from west</li> </ul>                                               |
| Natural Environment                  | <ul style="list-style-type: none"> <li>No potential impact</li> </ul>   | <ul style="list-style-type: none"> <li>No impact to forested area, moderate impact to SAR birds,</li> <li>One area of interaction with direct fish habitat, low increase in imperviousness</li> </ul>                            | <ul style="list-style-type: none"> <li>Low impact to forested area</li> <li>Moderate impact to SAR birds</li> <li>Two areas of interaction with direct fish habitat</li> <li>Good opportunity to improve existing drainage issues</li> </ul> | <ul style="list-style-type: none"> <li>Low impact to forested area</li> <li>Moderate impact to SAR birds</li> <li>Two areas of interaction with direct fish habitat</li> <li>Moderate increase in imperviousness</li> </ul> | <ul style="list-style-type: none"> <li>Low impact to forested area</li> <li>Moderate impact to SAR birds</li> <li>Two areas of interaction with direct fish habitat</li> <li>Moderate increase in imperviousness</li> </ul> |
| Social/Economic/Cultural Environment | <ul style="list-style-type: none"> <li>No potential impact</li> </ul>   | <ul style="list-style-type: none"> <li>Highest property acquisition required</li> <li>Property impacts through removal of existing agricultural lands</li> <li>Largest area of potentially undisturbed soils impacted</li> </ul> | <ul style="list-style-type: none"> <li>High property acquisition required</li> <li>Removal of existing agricultural lands</li> <li>Large area of potentially undisturbed soils impacted</li> </ul>                                           | <ul style="list-style-type: none"> <li>Medium property acquisition required</li> <li>Removal of existing agricultural lands</li> <li>Moderate area of potentially undisturbed soils impacted</li> </ul>                     | <ul style="list-style-type: none"> <li>Lowest property acquisition required</li> <li>Moderate removal of existing agricultural lands</li> <li>Smallest area of potentially undisturbed soils impacted</li> </ul>            |
| Construction Costs                   | <ul style="list-style-type: none"> <li>Low construction cost</li> </ul> | <ul style="list-style-type: none"> <li>Highest construction cost</li> </ul>                                                                                                                                                      | <ul style="list-style-type: none"> <li>Lowest construction cost</li> </ul>                                                                                                                                                                   | <ul style="list-style-type: none"> <li>Low construction cost</li> </ul>                                                                                                                                                     | <ul style="list-style-type: none"> <li>Medium construction cost</li> </ul>                                                                                                                                                  |
| Constructability                     | <ul style="list-style-type: none"> <li>No potential conflict</li> </ul> | <ul style="list-style-type: none"> <li>Impacts to hydro line north and south of highway</li> <li>Impacts to buried Bell Cable</li> </ul>                                                                                         | <ul style="list-style-type: none"> <li>Larger impact to hydro line north of highway</li> <li>Gas crossing under existing alignment</li> </ul>                                                                                                | <ul style="list-style-type: none"> <li>Larger impact to hydro line north of highway</li> <li>Impact to buried Bell cable south of structure</li> </ul>                                                                      | <ul style="list-style-type: none"> <li>2-3 hydro poles impacted north of highway</li> <li>Impact to buried Bell cable south of structure</li> </ul>                                                                         |

## 7 MAJOR FEATURES OF THE RECOMMENDED PLAN

### 7.1 Summary of the Recommended Plan

The Technically Preferred Alternative involves the following works and is illustrated in **Figure 26**:

- Construction of a partial interchange which will ensure future ramps can be accommodated.
- A new bridge over Highway 401 on a new alignment.
- New interchange ramp tie-ins. This includes reinstatement of the existing eastbound off ramp and westbound on ramp to their new alignment to improve roadway geometrics and vehicle access to the highway.
- New culverts to maintain the existing drainage patterns, with new ditches as required.
- New horizontal and vertical alignments of Power Dam Drive, along with grading improvements.
- New illumination for the interchange.
- Landscaping reinstatement as required.

The proposed interchange will be implemented using a phased approach with “interim” and “ultimate” conditions. During interim conditions, only ramps to the west of Power Dam Drive (Power Dam to Westbound 401 and Eastbound 401 to Power Dam) will be constructed.

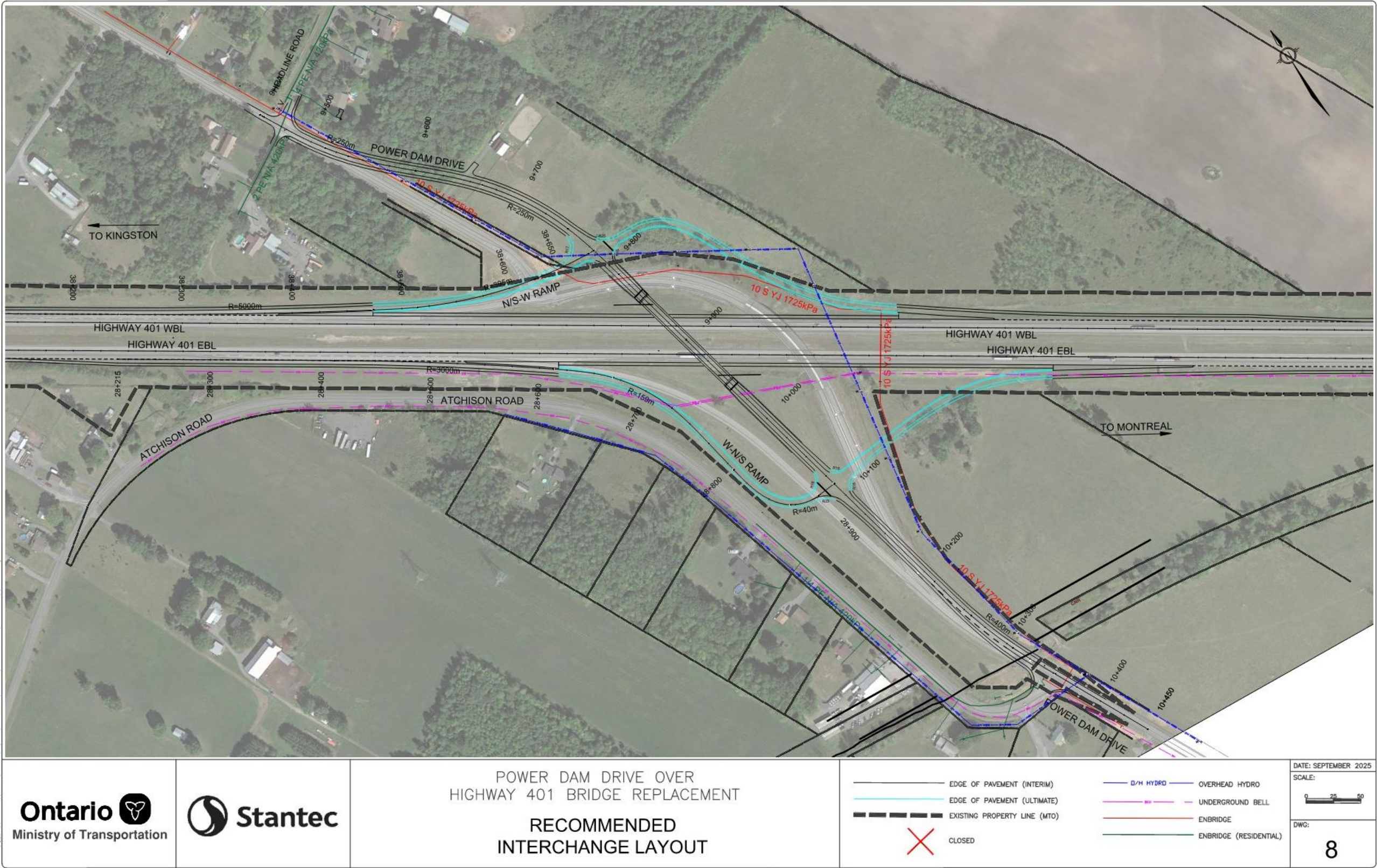


Figure 26: Technically Preferred Alternative

## 7.2 Design Criteria

The required lane widths on the bridge are 3.5 m with the required shoulder 1.5 m. Therefore, the minimum total roadway width is 10.0 m. The minimum width required by MTO-TAC to accommodate for future rehabilitation is 10.2 m. However, MTO and the United Counties of SDG requested that the proposed roadway width be increased to 10.4 m. MTO-TAC requires 4.8 m vertical clearance beneath cast-in-place concrete slab bridges and 5.0 m for all other vehicular bridges. During construction, a minimum vertical clearance of 4.5 m is required.

In the preferred interchange configuration, the proposed bridge will be shifted approximately 75 m to the west from its current position and have an overall length of approximately 108 m, a total width of approximately 11.4 m, and be skewed 43°51'49" to the Highway 401 alignment.

The proposed cross-section of the Power Dam Drive Underpass Structure is:

- 0.5 m east concrete barrier and fascia (0.45 m TL-4 barrier and 0.05 m fascia)
- 1.7 m east shoulder
- 3.5 m wide northbound lane
- 3.5 m wide southbound lane
- 1.7 m west shoulder
- 0.5 m west concrete barrier and fascia (0.45 m TL-4 barrier and 0.05 m fascia)

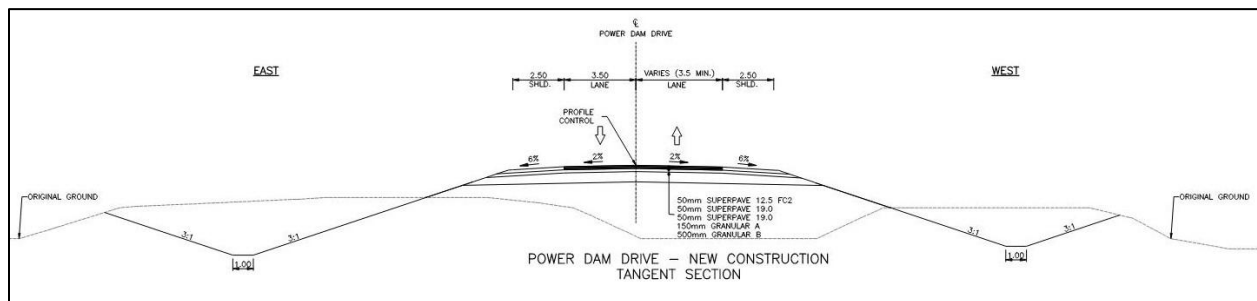


Figure 27: Proposed Cross section

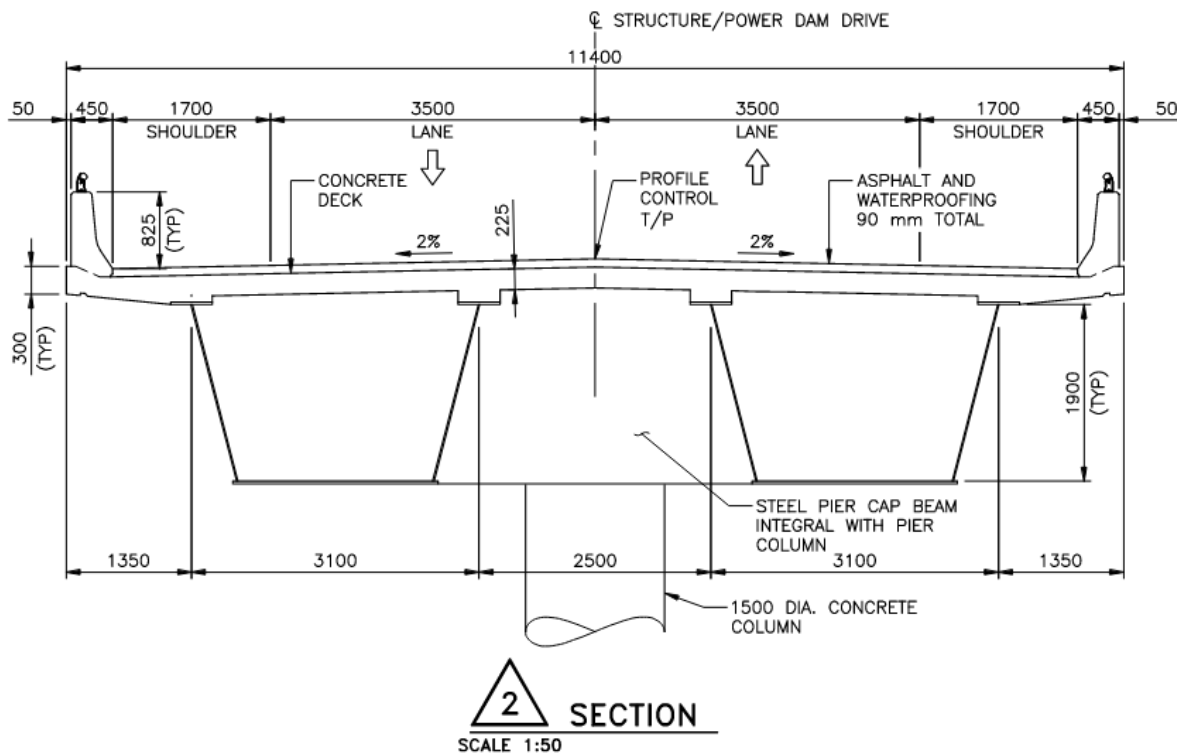


Figure 28: Underpass Structure

## 7.3 Design Considerations

### 7.3.1 Horizontal/Vertical Alignments

The technically preferred alternative will be built on a new alignment to improve traffic flow and safety. Additionally, new interchange ramp tie-ins will be established, which involve reinstating the existing eastbound off-ramp (W-N/S) and westbound on-ramp, realigned to improve roadway geometry and provide better access to the highway. The plan also includes the reconfiguration of Power Dam Drive, with new horizontal and vertical alignments and grading improvements to enhance traffic movement.

The following table summarizes the horizontal and vertical alignment for the new section of Power Dam Drive.

Table 14: Horizontal and Vertical Alignment

| Curve | Start Station (m) | PI Station (m) | End Station (m) | Radius (m) | Spiral Parameter (A) |
|-------|-------------------|----------------|-----------------|------------|----------------------|
| 1     | 9+514.172         | 9+525.332      | 9+536.478       | 250        | 125                  |
| 2     | 9+661.483         | 9+705.731      | 9+749.072       | 250        | 125                  |
| 3     | 10+258.388        | 10+282.531     | 10+306.616      | 400        | 135                  |

| Curve          | Profile Curve Type | Start Station (m) | PVI Station (m) | End Station (m) | K Value (Equivalent Design Speed) |
|----------------|--------------------|-------------------|-----------------|-----------------|-----------------------------------|
| 1              | Crest              | 9+506.274         | 9+546.334       | 9+586.395       | 40 (100)                          |
| Grade = -2.00% |                    |                   |                 |                 |                                   |
| 2              | Sag                | 9+621.794         | 9+696.794       | 9+771.794       | 40 (100)                          |
| Grade = 1.75%  |                    |                   |                 |                 |                                   |
| 3              | Crest              | 9+818.035         | 9+913.035       | 10+008.035      | 40 (100)                          |
| Grade = -3.00% |                    |                   |                 |                 |                                   |
| 4              | Sag                | 10+185.483        | 10+243.481      | 10+301.478      | 40 (100)                          |

### 7.3.2 Bridge

The existing bridge is approaching the end of its service life and is in need of replacement. As a result of the Preferred Alternative, there will be a new Bridge constructed on a new alignment to the west.

The proposed structure is a two-span concrete slab on steel box girder superstructure with new abutments and a single pier. The alignment is skewed to Highway 401 with abutments square to Power Dam Drive. The integral abutments are perched and supported on H-piles. The pier is supported on H-piles or pipe piles socketed into bedrock. Expansion joints to accommodate bridge thermal movements are provided in sleeper slabs at the ends of both approach slabs.

The proposed steel box girder with integral pier structure is the most aesthetically pleasing and requires the least maintenance of the bridge options considered. Girders can be readily erected and have minimal impact on Highway traffic. The steel box girder bridge type also provides uniformity with many other recently constructed and planned underpass structures on Highway 401.

### 7.3.3 Entrances

The preferred alternative results in realignment of the ramp terminals to be more in line with typical ramp geometry of a diamond interchange. All ramp terminals will meet Power Dam Drive at a 2-way stop-controlled intersection with free flow along Power Dam Drive.

Operations on Power Dam Drive, in particular for northbound traffic, will improve greatly as there will no longer be a right turn/intersection to continue northbound.

The existing entrances on Power Dam Drive both north and south of the Highway will be connected to the future realigned roadway to maintain access.

### 7.3.4 Utility Infrastructure

As a result of the realignment work as part of the Preferred Alternative, utility relocations will be required. It is anticipated that five (5) Hydro One poles, and associated anchors will require relocation, and existing underground Bell will need to be relocated to accommodate the new ramp geometry. It is anticipated that the existing Enbridge lines will remain in their current locations.

A relocation plan for the affected utility infrastructure will be developed in conjunction with the affected utility agencies and relocations completed prior to construction. Final details and timing for the relocations will be determined during the Detailed Design phase.

### 7.3.5 *Illumination*

New illumination will be added to the interchange to improve visibility and safety. The interchange ramps will be illuminated including at the ramp terminal intersections and at the Highway 401 speed change lanes.

There are currently no light standards or surface-mounted fixtures within the structure limits on either Power Dam Drive or Highway 401. As part of the proposed construction works, there are no changes to the provision of new illumination for either Power Dam Drive or Highway 401 within the defined study limits.

### 7.3.6 *Property*

Property acquisition will be necessary to implement the Technically Preferred Alternative. It is anticipated that six (6) properties on both the north and south side of the Highway will be impacted, though efforts will be made to minimize these impacts as much as possible. For the interim interchange configuration, less overall property is required from however still from the same six properties. As part of the preliminary design, the property owners affected by the project have been consulted, and discussions regarding property acquisitions are currently underway. These discussions are expected to continue throughout the detailed design process.

### 7.3.7 *Drainage and Hydrology*

The Study team completed preliminary design of drainage and stormwater management (SWM) for the technically preferred alternative, including hydrologic and hydraulic analysis of existing and proposed conditions and preliminary sizing of required culverts, ditches, and stormwater management to support the new interchange. Climate change considerations have been included as per Provincial Engineering Memorandum #2016-14. The Drainage and Hydrology Report can be found in **Appendix L**.

To maintain existing drainage patterns, new culverts will be installed, along with new ditches where necessary. To drain the proposed interchanged, four new culverts are required under new highway ramps, three replacements due to insufficient capacity and three extensions under Highway 401 to accommodate new ramps and widened Highway 401. Four culverts will no longer be required and should be removed, and two existing culverts will remain as-is.

Proposed culverts are summarized in **Table 15**. Considering compatibility with the interchange design and conclusions from condition assessments. A summary of the drainage modifications are as follows:

- Removal of four (4) culverts no longer required, installation of four (4) new culverts, replacement of (3) culverts, and extension of three (3) culverts.
- SWM required via enhanced grass swales to provide MOECP “Enhanced” (80% TSS Removal) treatment of runoff and “post to pre” quantity control (to maintain pre-development flow rates).

- 1,450 m<sup>3</sup> of storage is required to attenuate peak flows to pre-development, 2023 rates, considering both the impact of new impervious areas and climate change on peak flows. It is feasible to provide this quantity control volume in approximately 2.5 km of enhanced grass swales upstream of check dams.

Table 15: Proposed Culverts

| Culvert ID | Culvert Action | Size (mm)   |             | Inv. Elev. (m) <sup>1</sup> |        | Embedment depth (m) | Proposed length (m) | Slope (%) |
|------------|----------------|-------------|-------------|-----------------------------|--------|---------------------|---------------------|-----------|
|            |                | Existing    | Proposed    | Inlet                       | Outlet |                     |                     |           |
| EC18       | Remain         | 1800        | -           | 61.70                       |        | 0.60                | 22.70               | 0.80      |
| PC17       | Replace        | 1200        | 2700 X 1200 | 61.77                       | 61.70  | 0.30                | 27.18               | 0.25      |
| PC23       | Replace        | 1000 X 1000 | 2400 X 1500 | 62.11                       | 61.96  | 0.30                | 29.38               | 0.52      |
| PC22       | Replace        | 1200 X 800  | 2400 X 1500 | 61.94                       | 61.76  | 0.30                | 34.76               | 0.52      |
| EC03       | Remain         | 900         | -           | 65.13                       | 64.81  | -                   | 31.00               | 1.04      |
| PC07       | New            | -           | 1240 X 840  | 63.55                       | 63.49  | 0.35                | 14.35               | 0.41      |
| PC25       | New            | -           | 800         | 63.20                       | 63.07  | -                   | 18.84               | 0.68      |
| PC04       | New            | -           | 800         | 65.06                       | 64.89  | -                   | 31.32               | 0.54      |
| PC24       | New            | -           | 800         | 63.31                       | 63.13  | -                   | 24.96               | 0.72      |
| PC19       | Extend         | 1500 X 1200 | -           | 62.50                       | 62.45  | 0.30                | 71.53               | 0.07      |
| PC20       | Extend         | 1500 X 1200 | -           | 62.45                       | 62.40  | 0.30                | 71.82               | 0.07      |
| PC21       | Extend         | 1700 X 1300 | -           | 62.20                       | 62.00  | 0.30                | 69.36               | 0.29      |

1. Approximate invert elevations based on DEM and to be confirmed as part of detailed design.

The culvert extensions identified are to accommodate the ultimate configuration of the Power Dam Drive interchange, including all ramps.

### 7.3.8 Landscaping

Landscaping will be reinstated as required, ensuring the project integrates well with the surrounding environment. Any vegetation that is removed as a result of the work will be replaced. New embankments will be vegetated to minimize erosion.

### 7.3.9 Construction Staging & Traffic Management Plan

To construct the planned improvements to Highway 401 and Power Dam Drive, roadway and ramp closures for construction works will be required. The new alignment of Power Dam Drive and new bridge to the west of the existing structure will help mitigate the amount of time that there are closures, however roadway and ramp closures will be required to complete construction works.

While it is anticipated that Highway 401 traffic will not be impacted for the entirety of construction, a minimum of one (1) lane of traffic in both eastbound lanes and westbound lane directions of Highway 401 will be maintained during most of the work. Some activities, including demolition and removal of the existing bridge will require complete closure of Highway 401

traffic lanes. While the exact timing is not yet known, the work would be scheduled at a time to minimize disruptions to traffic. Detouring Highway 401 traffic during the demolition will require utilizing the County Road network via the established Emergency Detour Route (EDR) which utilizes Brookdale Avenue, Highway 2, and Moulinette Road. Additional traffic control measures are not anticipated to be required to accommodate the detoured traffic, to be confirmed during Detail Design.

Short and medium duration full closures of Power Dam Drive will be required for parts of construction of the new approaches and ramps. Single-lane closures be required to facilitate approach tie-ins from the existing alignment to the new alignment. As a minimum, two-way single lane traffic will be maintained during tie-in grading using flagging operations to control traffic. Potential detour routes are being investigated to accommodate closures required for Highway 401 and the ramps include using Brookdale, Hwy 2, Moulinette. For closures to Power Dam Drive, local road detours using Cornwall Centre Rd or County Road 36 are currently being considered.

Final closures, durations, and detour routes will be confirmed during Detail Design and through consultation with the County, Township and Emergency Services. Final recommendations will be included as part of a Traffic Management Plan.

#### ***7.3.10 Environmental Impacts & Mitigation***

As part of the Class EA process, an impact assessment of the proposed improvements was completed, and preliminary mitigation measures developed to avoid/mitigate adverse impacts. The extent of anticipated impacts and proposed mitigation measures should be reviewed during the Detail Design phase and refined as required.

## 8 ENVIRONMENTAL ISSUES, EFFECTS, MITIGATION MEASURES & COMMITMENTS

### 8.1 Fish & Fish Habitat

The proposed interchange may impact fish and fish habitats due to several activities, including culvert extensions and drainage channel realignments associated with new on- and off-ramps. These changes could directly alter or reduce habitat. General construction activities, such as site access, debris removal, material stockpiling, and de-watering, may also affect fish habitats. Potential impacts include sedimentation in downstream areas, which could lead to respiratory issues and reduced feeding efficiency for fish. Additionally, staging and site access may temporarily increase the project's footprint, depending on machinery operation from the existing right-of-way.

While the overall scale and intensity of these impacts are expected to be low due to the presence of non-sensitive habitats, the potential residual effects on fish and habitats need to be confirmed during the Detail Design phase. During this phase, impacts will be thoroughly assessed, as the initial review has been high-level. The alternatives analysis process has already aimed to avoid impacts by identifying and ranking potential effects from each option. Further avoidance measures may be possible in Detail Design, particularly by minimizing new footprints near the high-water mark during culvert replacements.

Most potential construction impacts are expected to be mitigated through standard provincial and MTO guidelines. However, habitat alteration or loss from culvert extensions at Culvert 22/23 (C22/23) may not be fully mitigable and could lead to a low likelihood of HADD of fish habitat. The specific intensity and spatial scale of this effect will require further review during Detail Design to assess if DFO oversight is needed.

Currently, it's unlikely that the proposed work at C22/23 will warrant DFO review since the affected fish habitat is low quality and showed minimal use by baitfish in 2022. For most in-water activities, fish protection will rely on established timing windows and standard mitigation measures included in contract specifications. Adhering to MTO standards for fish passage in culvert replacements (C17 and C22/23) should suffice for maintaining fish movement.

Field surveys and reviews indicate that the proposed interchange and associated works will likely result in minor ecological changes in confirmed fish habitats. While no significant enhancement opportunities have been identified due to the altered conditions, some recommendations for improvement include:

- Designing culvert replacements to maintain or enhance fish passage to upstream areas.
- Stabilizing highway embankments to reduce erosion and prevent sediment from entering fish habitats.
- Considering riparian plantings with native species to enhance vegetative cover and stabilize disturbed soils.

A final detailed impact assessment will be needed during Detail Design to evaluate potential negative effects on fish and habitats from drainage modifications and culvert replacements at C17 and C22/23. Preliminary assessments suggest low severity impacts due to alterations of low-sensitivity habitats, with less than 30 m<sup>2</sup> of permanent impact anticipated. Therefore, a DFO

Request for Review application is unlikely, but this will need confirmation through the Aquatic Effects Assessment by a qualified Fisheries Assessment Specialist.

There were no significant fish or fish habitat features identified, such as critical spawning areas. The existing habitats have already been altered, facing ongoing degradation from highway runoff and maintenance.

Based on the preferred alternative Preliminary Design, the primary anticipated impacts on fish habitat include minor alterations and destruction due to culvert extensions at C22/23 along the unnamed tributary of the South Raisin River. While various standard mitigation measures are expected to protect fish during construction, residual low-severity effects from the culvert extensions will likely remain. The estimated scale of impact below the high-water mark is around 25-30 m<sup>2</sup>, with a small portion (5-10 m<sup>2</sup>) being permanent loss. Since this occurs within low-sensitivity habitats, it is unlikely to cause HADD of fish habitat.

A detailed impact assessment will be conducted to determine the likelihood of causing fish mortality or HADD of fish habitat as defined by the Fisheries Act. This will involve completing an Aquatic Effects Assessment according to MTO guidelines and documenting it in a Fish and Fish Habitat Impact Assessment Report. During Detail Design, the qualified Fisheries Assessment Specialist will determine if the project can proceed under the MTO Project Notification Form process or if a DFO Request for Review Application is necessary.

## 8.2 Terrestrial Ecosystems

Construction activities that have the potential to impact the vegetation and terrestrial communities within the Highway 401 and Power Dam Drive Study Area include vegetation clearing and disturbance to vegetated areas as a result of road construction and road re-alignment. The Recommended Plan will require the clearing of approximately 5.25 ha of land for the interchange modifications needed for the project. This vegetation clearing will include mature trees, shrubs and herbaceous vegetation found within the forest and meadow communities. Further vegetation removals may be identified during the Detail Design phase of the project, such as removals for equipment access and/or storage of materials.

To reduce impacts to terrestrial ecosystems, the clearing of vegetation should be kept to a minimum whenever possible and limited within the construction footprint. Existing trails, roads or cut lines should be used to avoid disturbance to vegetation and prevent soil compaction. The following additional mitigation measures to reduce the risk of impacts to terrestrial communities and vegetation on site are recommended:

- In the event of accidental damage to trees or unexpected vegetation removal, vegetation shall be replaced/restored with native species.
- Surplus material resulting from vegetation removal operations shall be managed.
- Disturbed vegetation/soils within the impacted areas shall be re-established as soon as weather/conditions permit to provide stabilization to exposed soils and minimize sedimentation.
- Following completion of grading and topsoil application, disturbed areas will be re-seeded with a standard roadside seed mixture.
- During ditching works, any tree roots greater than 25 mm in diameter shall be cut off cleanly.

- Due to the presence of Invasive Phragmites in areas flagged for vegetation removals, mitigation measures will need to be determined during Detail Design.

Additionally, during the Detail Design phase of this project further field investigations for Butternut may be warranted within private properties where permission to enter was not available for the preliminary surveys. A Butternut Health Assessment, to determine its classification under the ESA may also be required should the Detail Design interfere with the 25 m regulated habitat for Butternut.

### **8.2.1 Significant Wildlife Habitat**

Where SWH may exist within the Study Area (e.g., bat maternity roosting habitat), the larger forested communities outside the Study Area are quite similar based on the high-level assessment and likely can support wildlife/SAR within the Study Area following development.

Indirect impacts resulting from construction may occur but can be diminished through the implementation of standard mitigation measures to be determined during Detail Design, such as timing windows.

### **8.2.2 Wildlife and Migratory Birds**

During field investigations, several wildlife species, including birds protected under the Migratory Birds Conservation Act (MBCA), were observed and confirmed through background data review in the area. The Preliminary Design may have potential direct impacts on general wildlife and migratory birds within the Study Area due to vegetation removal required for road construction and realignment activities. Additionally, construction noise, dust, and vibration could indirectly affect various wildlife species, including migratory birds.

Construction activities that may impact wildlife and their habitats include:

- Noise generated during construction.
- Temporary and permanent loss of habitat due to vegetation removal, which includes the permanent removal of mature trees and shrubs and the temporary grading of herbaceous species expected to regenerate after applying seed mixes.

Most wildlife species typically move away from noise and disturbances during construction. However, some species may remain within the work limits if they are sessile or seeking refuge. To minimize impacts to wildlife, measures should be incorporated during the detailed design phase to prevent harassment. If any wildlife that cannot move away safely is encountered within the work area, a qualified Biologist or Ecologist should relocate them to a safe location outside the work area.

To mitigate potential impacts on nesting migratory birds, the following measures should be implemented during the detailed design phase:

- Ensure that active nests or eggs of protected migratory birds are not destroyed.
- Complete vegetation removals and clearing outside the active breeding bird season, which runs from April 15 to August 31 each year.
- If nesting activity (e.g., nest building or carrying nesting material) or nests/eggs/young are found, all work in the area should temporarily cease. The Contractor must then

engage an Avian Biologist to determine whether the nests/eggs/young belong to a migratory bird species. Any nests found belonging to migratory birds must be protected with a species-appropriate buffer, as determined by the Avian Biologist, within which no work can occur until the nest is no longer active.

### 8.2.3 *Species at Risk*

Components of the Preliminary Design that have the potential to impact SAR include the vegetation removal required for the interchange modifications within the open agriculture, meadow, and forested communities within the Study Area.

Based on information collected during the background review, ten Endangered or Threatened SAR protected under the ESA were recorded within the general vicinity of the Study Area, including Blanding's Turtle, Bobolink, Eastern Meadowlark, Least Bittern, Black Ash, Butternut and four bat species; however, only Eastern Meadowlark (individual and habitat), and potential SAR bat roosting trees were recorded during the 2022 field investigations. These species should therefore be considered for future mitigation measures during Detail Design:

- Vegetation removals (including trees and shrubs) within the Study Area shall be completed outside of both the active bat season (April 1 – September 30) and the breeding bird window (April 15 – August 31).
- Further species-specific surveys are required to confirm the presence of SAR/SAR habitat or SWH within the Study Area, including completing detailed bat cavity surveys and acoustic monitoring within the forested communities, completing Pileated Woodpecker nesting cavity searches where construction is proposed prior to project works (to identify the potential need to register the activity under the ESA and MBCA), and to survey forested habitats situated on private properties for SAR vegetation (i.e., Butternut or Black Ash)
- As the majority of trees identified as potential bat habitat were present within private property and therefore not physically measured or given a proper assessment. Further field investigations should be completed during the Detail Design phase of this project to confirm the presence of high potential bat cavity trees and the use of forested habitats within the study area by SAR bats.
- During Detail Design, efforts to avoid impacts to Eastern Meadowlark will be explored; however, if avoidance is not possible, registration will be required.
- While it is unlikely that Blanding's Turtles are located within the immediate Study Area, adherence to appropriate mitigation measures during Detail Design (including wildlife timing windows) will reduce the risk of potential impacts to SAR reptiles from the proposed construction activities.

### 8.2.4 *Hydrogeology*

If during Detail Design it is determined that water taking at rates between 50,000 liters and 400,000 liters per day is required, an Environmental Activity and Sector Registry registration is recommended.

While it is anticipated that there will be minimal temporary and residual effects on the groundwater quantity (i.e., well yields) resulting from the project, consideration during Detail Design should be given regarding the mobilization of contaminants during construction from

sources like fill material of unknown quality, auto garage, waste generation, metal fabrication, and historic diesel spills.

### **8.3 Socio-Economic Environment**

#### **8.3.1 Land Use**

As much of the land use surrounding the Highway 401 and Power Dam Drive Bridge has been identified as a key transportation and development corridor within the County, the project is not anticipated to have an impact to land use.

#### **8.3.2 Property Impacts**

It is anticipated that six (6) properties on both the north and south side of the Highway will be impacted, though efforts will be made to minimize these impacts as much as possible. For the interim interchange configuration, less overall property is required from however still from the same six properties.

Preliminary discussions regarding property acquisitions are currently underway with the impacted property owners and will continue during Detail Design.

### **8.4 Utility Infrastructure**

It is anticipated that five (5) Hydro One poles, and associated anchors will require relocation, and existing underground Bell will need to be relocated to accommodate the new ramp geometry. It is anticipated that the existing Enbridge lines will remain in their current locations.

A relocation plan will be developed for impacted utility infrastructure assets in advance of construction. Final details and timing for relocation will be determined during Detail Design.

### **8.5 Contamination**

Further environmental assessments/investigations are recommended during Detail Design for the APECs that will be directly impacted by the construction of the bridge replacement work to confirm the environmental conditions of soil and groundwater on those lands in support of property acquisition, excess soil management, and/or environmental due diligence. The environmental assessments/investigations may include Phase I/II Environmental Site Assessments (ESAs), and planning and soil sampling requirements in accordance with Ontario Regulation 406/19 Onsite and Excess Soil Management if deemed necessary. If actual contamination is identified during the environmental assessments/investigations, additional delineation investigations and/or remediation may also be required.

### **8.6 Erosion & Sediment Control**

Many of the anticipated construction activities for the project will expose soil to erosion processes. Overall erosion and sedimentation risk ranges from low to moderate across the study area. Appropriate best management practices should be selected to mitigate the effects of erosion on exposed soils until vegetation can be reestablished.

During Detail Design, appropriate erosion and sediment control measures to keep disturbed soils properly contained and to prevent migration of materials and sediments beyond the work limits and into adjacent communities shall be developed.

## 8.7 Drainage and Hydrology

The proposed interchange will result in an increase in imperviousness of the project area from 30.7% to 37.5%. The overall north-west to south-east drainage pattern will remain the same for the proposed conditions. Locally, drainage patterns will change where culverts and ditches are shifting to accommodate the new roadway alignment. Most existing culverts must be removed, realigned, or extended to allow for the reconstruction of the interchange. Four (4) new culverts, three (3) replacements and three (3) extensions will be needed to drain the proposed interchange. Two (2) existing culverts will remain as-is.

Stormwater Management is required via enhanced grass swales to provide “Enhanced” (80% total suspended solids removal) treatment of runoff and “post to pre” quantity control (to maintain pre-development flow rates). A storage capacity of 1,450 m<sup>3</sup> is required to attenuate peak flows to pre-development 2023 levels, accounting for the impact of new impervious areas and climate change on peak flows. This quantity control volume can be effectively provided within approximately 2.5 km of enhanced grass swales, located upstream of check dams.

A survey of existing culverts should be completed as part of Detail Design to allow for hydraulic analysis of existing culverts and evaluation of impact of the proposed design. Proposed culvert sizing should consider upsizing for future culvert rehabilitation long-term particularly for those culverts crossing Highway 401 and design of proposed culverts should appropriately consider fish passage and erosion protection requirements.

## 8.8 Noise

The relative increase in future sound levels due to the Recommended Plan was not significant. However, future ambient absolute sound levels with the undertaking did exceed 65 dBA at two locations.

To counteract the increase in noise levels in the future sound levels, noise mitigation measures in the form of a noise wall was examined. However, based on the analysis, the noise wall was determined to be not economically feasible.

During the Detail Design mitigation measures to limit construction noise shall be developed. These measures may include the use of properly maintained equipment, maintaining haul routes, keeping equipment in good working order, and a documented, regular inspection and maintenance program must be implemented.

## 8.9 Air Quality

Overall, impacts to local air quality resulting from the project are anticipated to be minor. Additionally, increases in greenhouse gas emissions resulting from the project is very low and therefore the project is not expected to have a significant impact on the regional air quality. While mitigation measures beyond those already in place through phased-in federal regulations for on-road vehicle and engine emissions are not recommended, to minimize potential air quality impacts during construction, an Air Quality Management Plan should be developed during Detail Design and included within the construction tender package. The Air Quality Management Plan shall set out established best management practices for dust and other emissions.

## **8.10 Cultural Environment**

### ***8.10.1 Archaeology***

Due to disturbance from previous construction, no further work is required for the area within the current ROW.

Due to the proximity of water and other features, the archaeological potential is much greater outside the right-of-way. Within a 250 metre study area buffer, approximately 71.7 percent should be subject to a Stage 2 archaeological assessment during the Detail Design. The only areas not requiring further assessment, are due to the disturbances from the rural roads and ditching, the low and wet area near the west end and the previously assessed area at the east end.

### ***8.10.2 Cultural Heritage Resources***

There may be indirect impacts resulting from construction-related vibration to B.H.R. 1 as the structure is within 50 metres of the proposed infrastructure improvements. To address the potential for indirect impacts due to construction-related vibration, a baseline vibration assessment should be undertaken during Detail Design to determine potential for vibration impacts and monitor where required.

Those B.H.R.s and C.H.L. which are not anticipated to be impacted by the proposed works, shall be avoided.

## **8.11 Traffic Operations**

To facilitate the construction activities along Highway 401, Power Dam Drive, and the interchange ramps, lane and full road closures will be necessary at various stages of the project. Short-term, full closures of both Highway 401 and Power Dam Drive will be required to accommodate demolition and construction operations, which will involve building new roadway embankments, structures, and interchange ramps. During these closures, local road detours will be implemented. The specific detour routes will be finalized during the Detail Design phase.

As these closures may impact emergency services' response times, it is crucial to continue engaging with local emergency service providers, the Township of South Stormont, and the United Counties of Stormont, Dundas, and Glengarry during Detail Design to ensure coordination of road closures and construction staging. These discussions, which began during the Preliminary Design Phase, will be finalized as part of the Traffic Management Plan during Detail Design.

The Traffic Management Plan will outline provisions for traffic flow on local area roads, minimizing disruptions to the public while ensuring the safety of construction workers and motorists. It will include specific detour routes, as well as provisions to reduce the impact on emergency services, municipalities, and student transportation providers. To keep the public informed, advanced notice of all road closures, detours, and any changes to traffic patterns will be provided to emergency services, local governments, businesses, residents, and other relevant stakeholders. The contractor will be required to notify all parties at least two weeks in advance of any closures or changes to traffic flow.

Throughout construction, lane reductions and closures will be minimized to the extent necessary to complete the work, and all efforts will be made to ensure a smooth flow of traffic and reduce inconvenience to the travelling public.

### 8.12 Future Consultation

The following future consultation activities are recommended during Detail Design:

- Consultation with the Township of South Stormont and the United Counties of Stormont, Dundas and Glengarry regarding road closures and construction works
- Consultation with the local Emergency Service Providers regarding access disruptions from the closure of Highway 401 and Power Dam Drive
- Consultation with affected property owners
- Consultation with utility companies such as Bell Canada, and Hydro One to finalize utility relocation needs

## 9 SUMMARY OF ENVIRONMENTAL CONCERNS, MITIGATION MEASURES AND COMMITMENTS TO FUTURE WORK

The proposed environmental protection, mitigation measures and commitments to future work to address specific concerns associated with the Recommended Plan are listed in **Table 16**.

These commitments will be developed in more detail during the Detail Design phase. Overall, impacts of the project are expected to be minimal and temporary in duration if mitigation measures are implemented.

The TESR will be available for a 45-day public and agency review period. If no Section 16 Order requests are received by the MECP during this time, the TESR is considered approved under MTO's Class EA and the project may proceed to Detail Design.

Table 16: Summary of Environmental Concerns, Mitigation Measures and Commitments to Future Work

| I.D. No. | Issues/Concerns/Potential Effects                                | Concerned Agencies                                                                   | I.D. No. | Mitigation/Protection/Monitoring                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------|------------------------------------------------------------------|--------------------------------------------------------------------------------------|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.0      | Impact to Fish and Fish Habitat                                  | Department of Fisheries and Oceans Canada                                            | 1.1      | <ul style="list-style-type: none"> <li>Potential residual effects on fish and habitats resulting from the project works will need to be confirmed during the Detail Design phase.</li> <li>Avoidance measures, particularly by minimizing new footprints near the high-water mark during culvert replacements should be implemented.</li> <li>Timing windows and standard mitigation measures should be utilized for most in-water activities</li> <li>Culvert replacements should be designed to maintain or enhance fish passage to upstream areas.</li> <li>Stabilizing highway embankments to reduce erosion and prevent sediment from entering fish habitats.</li> <li>Considering riparian plantings with native species to enhance vegetative cover and stabilize disturbed soils.</li> <li>A detailed impact assessment will be needed to be undertaken during Detail Design to evaluate potential negative effects on fish and habitats from drainage modifications and culvert replacements at C17 and C22/23. While a DFO Request for Review application is unlikely, but this will need confirmation through the Aquatic Effects Assessment by a qualified Fisheries Assessment Specialist undertaken during Detail Design.</li> <li>A detailed impact assessment will be conducted to determine the likelihood of causing fish mortality or HADD of fish habitat during Detail Design. This will involve completing an Aquatic Effects Assessment according to MTO guidelines and documenting it in a Fish and Fish Habitat Impact Assessment Report.</li> <li>During Detail Design, the qualified Fisheries Assessment Specialist will determine if the project can proceed under the MTO Project Notification Form process or if a DFO Request for Review Application is necessary.</li> </ul> |
| 2.0      | Impacts to Terrestrial Ecosystems – Vegetation Communities       | Ministry of Natural Resources<br>Ministry of the Environment, Conservation and Parks | 2.1      | <ul style="list-style-type: none"> <li>Vegetation clearing should be kept to a minimum whenever possible and limited within the construction footprint.</li> <li>To avoid disturbance to vegetation and prevent soil compaction, existing trails, roads or cut lines should be used.</li> <li>In the event of accidental damage to trees or unexpected vegetation removal, vegetation shall be replaced/restored with native species.</li> <li>Surplus material resulting from vegetation removal operations shall be managed.</li> <li>Disturbed vegetation/soils within the impacted areas shall be re-established as soon as weather/conditions permit to provide stabilization to exposed soils and minimize sedimentation.</li> <li>Following completion of grading and topsoil application, disturbed areas will be re-seeded with a standard roadside seed mixture.</li> <li>During ditching works, any tree roots greater than 25 mm in diameter shall be cut off cleanly.</li> <li>Due to the presence of Invasive Phragmites in areas flagged for vegetation removals, mitigation measures will need to be determined during Detail Design.</li> <li>Further field investigations for Butternut may be warranted during Detail Design within private properties where permission to enter was not available for the preliminary surveys.</li> <li>A Butternut Health Assessment may be required should the Detail Design interfere with the 25 m regulated Butternut habitat.</li> </ul>                                                                                                                                                                                                                                                                                                            |
|          | Impacts to Terrestrial Ecosystems - Migratory Birds and Wildlife | Ministry of Natural Resources<br>Ministry of the Environment, Conservation and Parks | 2.2      | <ul style="list-style-type: none"> <li>Measures should be incorporated during Detail Design to prevent wildlife harassment.</li> <li>If any wildlife that cannot move away safely is encountered within the work area, a qualified Biologist or Ecologist should relocate them to a safe location outside the work area.</li> <li>Ensure that active nests or eggs of protected migratory birds are not destroyed.</li> <li>Complete vegetation removals and clearing outside the active breeding bird season, which runs from April 15 to August 31 each year.</li> <li>If nesting activity (e.g., nest building or carrying nesting material) or nests/eggs/young are found, all work in the area should temporarily cease. The Contractor must then engage an Avian Biologist to determine whether the nests/eggs/young belong to a migratory bird species. Any nests found belonging to migratory birds must be protected with a species-appropriate buffer, as determined by the Avian Biologist, within which no work can occur until the nest is no longer active.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|          | Impacts to Terrestrial Ecosystems – SAR                          | Ministry of Natural Resources<br>Ministry of the Environment, Conservation and Parks | 2.3      | <ul style="list-style-type: none"> <li>Species-specific field surveys are required during Detail Design including completing detailed bat cavity surveys and acoustic monitoring within the forested communities and private property not accessible during preliminary design, Pileated Woodpecker nesting cavity searches where construction is proposed prior to project works (to identify the potential need to register the activity under the ESA and MBCA), and to survey forested habitats situated on private properties for SAR vegetation (i.e., Butternut or Black Ash).</li> <li>Vegetation removals (including trees and shrubs) within the Study Area shall be completed outside of both the active bat season (April 1 – September 30) and the breeding bird window (April 15 – August 31).</li> <li>During Detail Design, efforts to avoid impacts to Eastern Meadowlark will be explored; however, if avoidance is not possible, registration will be required.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

| I.D. No. | Issues/Concerns/Potential Effects                  | Concerned Agencies                                                                                                                 | I.D. No. | Mitigation/Protection/Monitoring                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|          |                                                    |                                                                                                                                    |          | <ul style="list-style-type: none"> <li>While it is unlikely that Blanding's Turtles are located within the immediate Study Area, adherence to appropriate mitigation measures During Detail Design (including wildlife timing windows) will reduce the risk of potential impacts to SAR reptiles from the proposed construction activities.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|          | Impacts to Terrestrial Ecosystems - Hydrogeology   | Ministry of the Environment, Conservation and Parks<br>Ministry of Natural Resources                                               | 2.4      | <ul style="list-style-type: none"> <li>If during Detail Design it is determined that water taking at rates between 50,000 liters and 400,000 liters per day is required, an Environmental Activity and Sector Registry registration is recommended.</li> <li>While it is anticipated that there will be minimal temporary and residual effects on the groundwater quantity (i.e., well yields) resulting from the project, consideration during Detail Design should be given regarding the mobilization of contaminants during construction from sources like fill material of unknown quality, auto garage, waste generation, metal fabrication, and historic diesel spills.</li> </ul>                                                                                                                                                                                          |
| 3.0      | Socio-Economic Environment - Impacts to Land Uses  | United Counties of Stormont, Dundas and Glengarry<br>Township of South Stormont                                                    | 3.1      | <ul style="list-style-type: none"> <li>As much of the land use surrounding the Highway 401 and Power Dam Drive Bridge has been identified as a key transportation and development corridor within the County, the project is not anticipated to have an impact to land use.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|          | Socio-Economic Environment – Property Impacts      | United Counties of Stormont, Dundas and Glengarry<br>Township of South Stormont                                                    | 3.2      | <ul style="list-style-type: none"> <li>Impacts to property will be minimized wherever possible.</li> <li>Discussions regarding property acquisition are to continue during Detail Design.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 4.0      | Utility Impacts                                    | Ministry of Transportation<br>Utility Companies<br>United Counties of Stormont, Dundas and Glengarry<br>Township of South Stormont |          | <ul style="list-style-type: none"> <li>During Detail Design, the study team shall continue to work with impacted utility companies to develop a plan to relocate infrastructure assets in advance of construction.</li> <li>Timing for relocation will be determined during Detail Design.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 5.0      | Contamination, Waste and Excess Material           | Ministry of the Environment, Conservation and Parks<br>Ministry of Labour                                                          | 5.1      | <ul style="list-style-type: none"> <li>Further environmental assessments/investigations should be undertaken during Detail Design for the APECs that will be directly impacted by the construction of the bridge replacement work to confirm the environmental conditions of soil and groundwater on those lands in support of property acquisition, excess soil management, and/or environmental due diligence.</li> <li>The environmental assessments/investigations may include Phase I/II Environmental Site Assessments (ESAs), and planning and soil sampling requirements in accordance with Ontario Regulation 406/19 Onsite and Excess Soil Management if deemed necessary.</li> <li>If actual contamination is identified during the environmental assessments/investigations, additional delineation investigations and/or remediation may also be required.</li> </ul> |
| 6.0      | Erosion and Sediment Control                       | Ministry of Environment, Conservation and Parks<br>Ministry of Natural Resources                                                   | 6.1      | <ul style="list-style-type: none"> <li>During Detail Design, appropriate erosion and sediment control measures to keep disturbed soils properly contained and to prevent migration of materials and sediments beyond the work limits and into adjacent communities shall be developed.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 7.0      | Impacts Caused by Construction Noise and Vibration | Ministry of Environment, Conservation and Parks<br>United Counties of Stormont, Dundas and Glengarry<br>Township of South Stormont | 7.1      | <ul style="list-style-type: none"> <li>During the Detail Design mitigation measures to limit construction noise shall be developed. These measures may include the use of properly maintained equipment, maintaining haul routes, keeping equipment in good working order, and a documented, regular inspection and maintenance program must be implemented.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

| I.D. No. | Issues/Concerns/Potential Effects                                              | Concerned Agencies                                                                                                 | I.D. No. | Mitigation/Protection/Monitoring                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 8.0      | Air Quality                                                                    | Ministry of the Environment, Conservation and Parks                                                                | 8.1      | <ul style="list-style-type: none"> <li>An Air Quality Management Plan should be developed during Detail Design and included within the construction tender package.</li> <li>The Air Quality Management Plan shall set out established best management practices for dust and other emissions.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 9.0      | Impact to Cultural Heritage Resources - Archaeological Resources               | Ministry of Citizenship and Multiculturalism                                                                       | 9.1      | <ul style="list-style-type: none"> <li>During Detail Design, a Stage 2 archaeological assessment will be undertaken for those areas displaying archaeological potential.</li> <li>The construction work zone will be minimized to the extent practical. All materials and equipment/machinery used for the purpose of site preparation and project completion will not be permitted in zones delineated for protection.</li> <li>If archaeological remains are unearthed during construction, the Contract Administrator will be notified, and operations suspended.</li> <li>If human remains or other deeply buried archaeological remains are encountered on the property during construction activities, all work should cease, and the Archaeology Programs Unit, Programs and Services Branch Unit of the Ministry of Citizenship and Multiculturalism should be notified immediately</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|          | Impact to Cultural Heritage Resources – Built Heritage and Cultural Landscapes | Ministry of Citizenship and Multiculturalism                                                                       | 9.2      | <ul style="list-style-type: none"> <li>As there may be indirect impacts resulting from construction-related vibration to B.H.R. 1, a baseline vibration assessment should be undertaken during Detail Design to determine potential for vibration impacts and monitor where required.</li> <li>Should it be determined that an expansion or alteration of the study area is required during Detail Design, the additional area or change should be studied by a qualified heritage professional to confirm the impacts of the proposed work on the potential B.H.R.s and C.H.L.s located within the Study Area.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 10.0     | Impacts to Traffic Operations                                                  | OPP<br>Local Emergency Services<br>Township of South Stormont<br>United Counties of Stormont, Dundas and Glengarry | 10.1     | <ul style="list-style-type: none"> <li>The existing Power Dam Drive will be impacted by construction of the new roadway embankments, structure and interchange ramps. Short-term full closure of Highway 401 and Power Dam Drive will be required for some demolition and construction operations, requiring the use of a local roads detour. The detour routes shall be confirmed during Detail Design.</li> <li>Consultation with local emergency services providers, the Township of South Stormont, and the United Counties of Stormont, Dundas and Glengarry regarding road closures and construction staging plans should continue during Detail Design.</li> <li>To minimize impacts to the travelling public, a Traffic Management Plan detailing detour provisions and provisions for traffic flow to local area roads should be completed during Detail Design.</li> <li>During construction, advanced notice of road closures will be provided to the public, emergency services, municipalities and student transportation providers.</li> <li>Lane reductions and closures will be kept to the minimum required to complete the work.</li> <li>The Contractor shall notify emergency services, school boards, businesses, residents, and other relevant agencies two weeks in advance of the start of construction and in advance of any changes to traffic flow.</li> <li>Advance signage will be provided prior to lane closures.</li> </ul> |

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