Welcome to Online Public Information Centre No. 1

Highway 401 at Power Dam Drive

Preliminary Design and Environmental Assessment Study

G.W.P. 4092-19-00

Ontario

MORRISON HERSHFIELD

December 2022

Purpose of Public Information No. 1

The purpose of this online PIC is to present and receive input on the Highway 401 at Power Dam Drive Preliminary Design and Environmental Assessment Study. As part of this Online PIC, you will have a chance to review and comment on the:

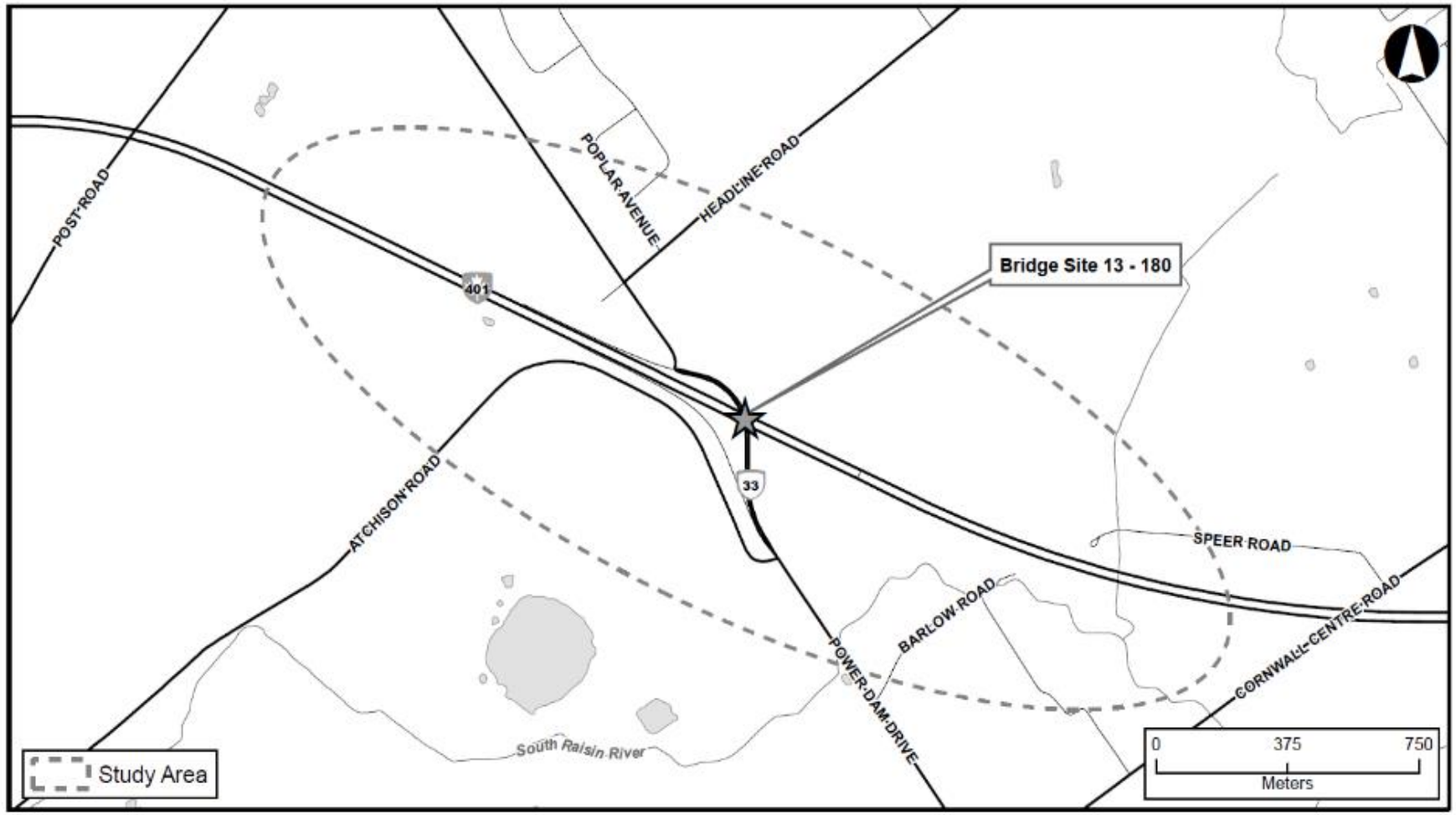
- Project and the challenge / opportunity (or need and justification) to be addressed.
- Class Environmental Assessment (EA) process.
- Existing natural, socio-economic, cultural and technical conditions within the project study area.
- Preliminary Design alternatives including the evaluation criteria used to assess the Long-List alternatives and select the Short-List alternatives.
- Next steps.

Members of the Project Team are available to discuss any questions that you may have regarding this Project, please email bhewton@morrisonhershfield.com (Consultant Project Manager).

If you require any assistance regarding the accessibility of these materials, please let us know by emailing the address above. We would be happy to assist you. Pour de l'aide en français, veuillez communiquer avec Brad Hewton.

Digital copies of the PIC display materials are posted to the project website at www.highway401powerdam.com.

Highway 401 at Power Dam Drive Study Area



The Project Study Area is in the Township of South Stormont, within the United Counties of Stormont, Dundas and Glengarry.

Project Background

The Ministry of Transportation (MTO) conducts detailed inspections of its bridges every two years and conducts general maintenance inspections on all bridges at least twice a year. The Ministry ensures that its bridges and structures are well maintained, and repairs occur at the best time in the structure's life cycle.

Based on various studies and routine inspections, MTO recently rehabilitated the Power Dam Drive bridge allowing for an anticipated replacement of the bridge in the near future.

The Ministry has retained Morrison Hershfield to undertake the Preliminary Design and Environmental Assessment Study for the replacement of the Power Dam Drive (or County Road 33) bridge over Highway 401 in the Township of South Stormont.

Project Overview

Challenge: Highway 401 is a four-lane divided rural freeway at the Power Dam Drive interchange. The existing Power Dam Drive bridge is approaching the end of its intended service life and requires replacement.

Opportunity: Replace the existing bridge to improve roadway geometrics and consider future interchange and Highway 401 footprint which could be required during the service life of the new structure.

Develop a Recommended Plan for the bridge replacement at Power Dam Drive as part of the Ministry's ongoing review of safety and operational needs for the provincial highway network.

Project Description and Scope

The scope of work includes replacement of the bridge that carries Power Dam Drive over Highway 401. This Study also includes developing the (ultimate) long-term plan for the Power Dam Drive interchange should future development require a full interchange.

Reasonable alternatives to address the required improvements will be developed and evaluated leading to selection of the Technically Preferred Alternative(s) and a Recommended Plan. The bridge replacement and reconstruction of existing ramps will proceed as the first project, with the potential interchange upgrades to follow in the future.

Historical Context

- The project study area is located within the traditional territory of the Mohawks of Akwesasne and is within the boundaries of the Upper Canada Treaties.
- The project study area is situated approximately 3 km northeast of the St. Lawrence River and contains tributaries of the South Raisin River along with marshy areas and has discrete areas of elevated topography.
- This region of what is now known as Ontario has a lengthy history of human occupation and use, which can be traced back at least 10,000 years. With this general area likely being used by Indigenous Peoples to practice their traditional activities historically, and currently.
- There are two known Indigenous sites dated to the pre-contact period within 4 km of the Study Area.

The Class Environmental Assessment Process

The Ministry initiated this Preliminary Design and Class EA Study in October 2021. The Notice of Study Commencement was published in January 2022, at which time MTO established the Project website (http://www.highway401powerdam.com) to inform and receive feedback.

This Preliminary Design and Class EA Study is following the Group B Project requirements under the MTO Class Environmental Assessment for Provincial Transportation Facilities (2000). As part of the Study:

- Stakeholder (including Indigenous Community) consultation is ongoing and includes two rounds of PICs.
- A Transportation Environmental Study Report (TESR) will be prepared and made available for public and agency review for a period of 30-days at the Study completion.

You are encouraged to complete an online comment form and submit via the Project website: http://www.highway401powerdam.com/contact.html

Please submit your comments by **January 20, 2022.**

Purpose of the Class Environmental Assessment Study

The purpose of the Class EA Study is to identify a Recommended Plan for the Bridge replacement at Power Dam Drive as part of the Ministry's ongoing review of safety and operational needs for the provincial highway network. This Class EA Study will determine the bridge replacement needs, with consideration for the ultimate interchange configuration and future highway footprint.

The key objectives of the Study are to:

- Present information to inform and receive stakeholder feedback throughout the process.
- Develop and evaluate a reasonable number of design alternatives for the bridge and operational improvements to select a Technically Preferred Alternative(s).
- Develop 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.
- Develop a preferred staging and contract sequencing strategy.
- Obtain EA approval.

Class Environmental Assessment Process Graphic

Ongoing Public Consultation → Ongoing Transportation Needs Assessment → Need Identified → Preliminary Design → Detail Design → Construction

PRELIMINARY DESIGN WITHIN THE ENVIRONMENTAL ASSESSMENT PROCESS

Data Collection
Review available background information and conduct field studies as required to identify existing conditions in the Study Area

Generate and Evaluate
Develop Preliminary Design alternatives to develop the long-term plan for the interchange and consider potential impacts to the existing natural, social, economic, cultural, and technical environment

Select
Identify the Recommended Plan. Identify mitigation measures to address potential impacts

Finalize
Complete Preliminary Design of the Recommended Plan and implementation strategy

Report
Document the Preliminary Design process leading to the Recommended Plan

Clearance
The Class EA requirements are met and the Project is cleared to proceed to Detail Design

Notifications and Project Website
January 2022

Public Information Centres
Fall 2022 and Winter 2023

Transportation Environmental Study Report
Spring 2023

Available for a 30-day review

Existing Roadway Configuration

Highway 401

- Near the structure, Highway 401 has 2 lanes in each direction and includes a grassed median.
- Speed limit of 100 km/hr.
- Highway 401 serves an important corridor within eastern Ontario and Quebec.
- There is currently one eastbound off-ramp and one westbound on-ramp.

Power Dam Drive (County Rd. 33)

- Power Dam Drive (or County Road 33) is a two-lane municipal road which crosses Highway 401 in a north-south direction.
- Speed limit of 80 km/hr.
- Nearby intersections include Atchison Road to the south and Headline Road to the north.
- The current alignment does not meet the design speed.

Existing Traffic Conditions

Highway 401

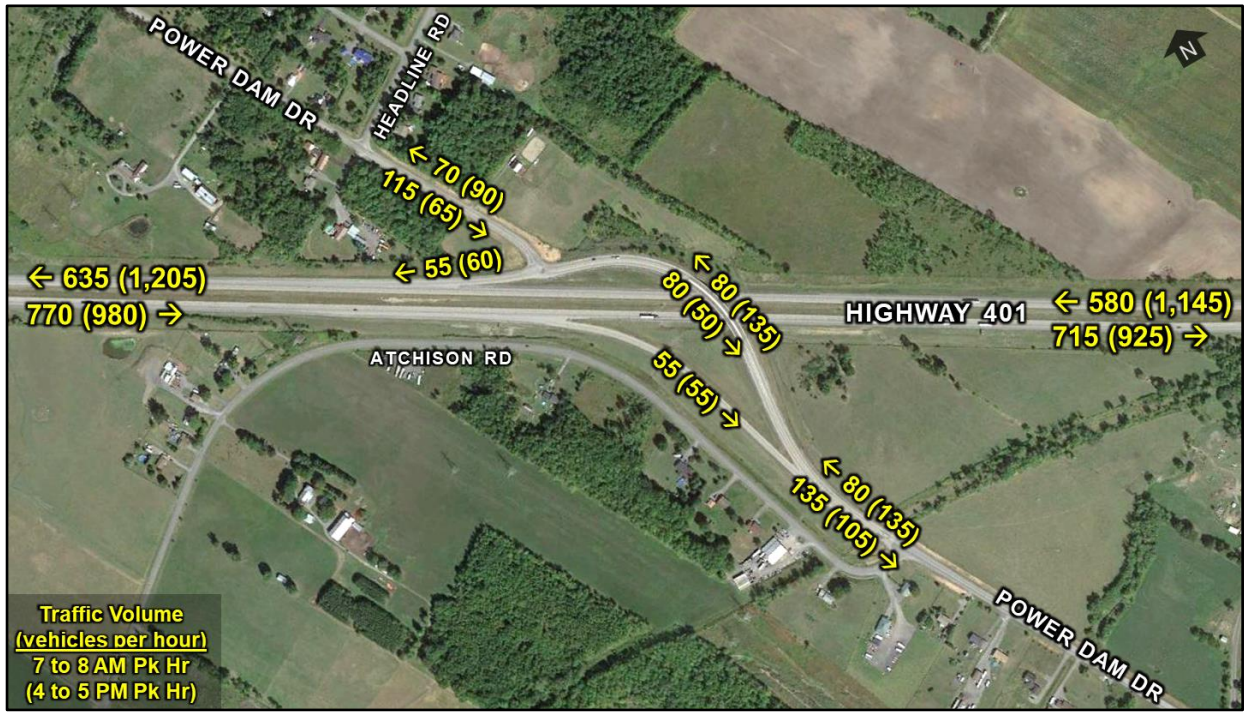
- Average Annual Daily Traffic (AADT) is 24,500 vehicles
- Peak hourly volume is 1,205 vehicles in the westbound direction during the afternoon peak hour (4 to 5 PM)
- High proportion of trucks (~36%) during peak periods
- Operates at free-flow speeds during peak periods

Power Dam Road

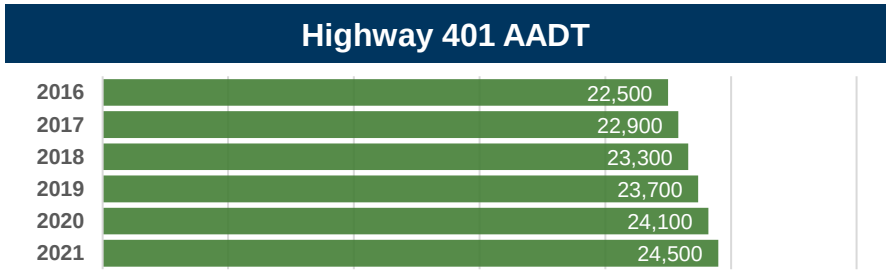
- Peak hourly volume is 135 vehicles in the northbound direction during the afternoon peak hour (4 to 5 PM)
- Interchange movements:
  - From north and south to Highway 401 westbound
  - From Highway 401 eastbound to south only
- Nearby stop-controlled T-intersections at Headline Road (to the north) and Atchison Road (to the south) operate with good level-of-service

Population Growth

- Only minor traffic volume increases are expected for surface streets due to low annual population growth rates:
  - Township of South Stormont: 0.1%
  - City of Cornwall: 0.3%



Existing Traffic Conditions Within the Project Study Area



Existing Bridge (Site No. 13X-180/B0)

- Power Dam Drive bridge is a post-tensioned concrete curved structure that was built circa 1967.
- Bridge is comprised of four (4) spans, with an overall length of 92.4 m.
- Bridge carries two (2) traffic lanes, and wide curbs with concrete barrier walls on each side over Highway 401.

Though the Power Dam Drive bridge is in fair condition overall, it is approaching the end of its intended service life.

The last rehabilitation was completed in 2016.

Environmental Protection and Management

Environmental factors have been assessed during the Preliminary Design Study to determine existing conditions and identify potential impacts associated with the proposed works at the Highway 401 and Power Dam Drive intersection. Various field investigations (or studies) were completed to collect primary environmental and engineering information to describe the existing (baseline) conditions within the Study Area **(see next slide)**.

Based on the anticipated environmental impacts, applicable environmental protection and mitigation measures will be developed for implementation during future construction activities. To summarize, environmental protection and mitigation measures including construction Best Management Practices (BMPs) will be prescribed to protect the surrounding environment and mitigate any predicted construction-related impacts to:

- Private property
- Noise and air quality
- Ground and surface water resources
- Vegetation and wildlife habitat, and species at risk (SAR)
- Erosion and sediment control
- Archaeological and cultural heritage resources
- Management of excess material.

Overview of Environmental Investigations

During this Preliminary Design and Class EA Study, various field investigations (or studies) are being conducted to collect primary environmental and engineering information to:

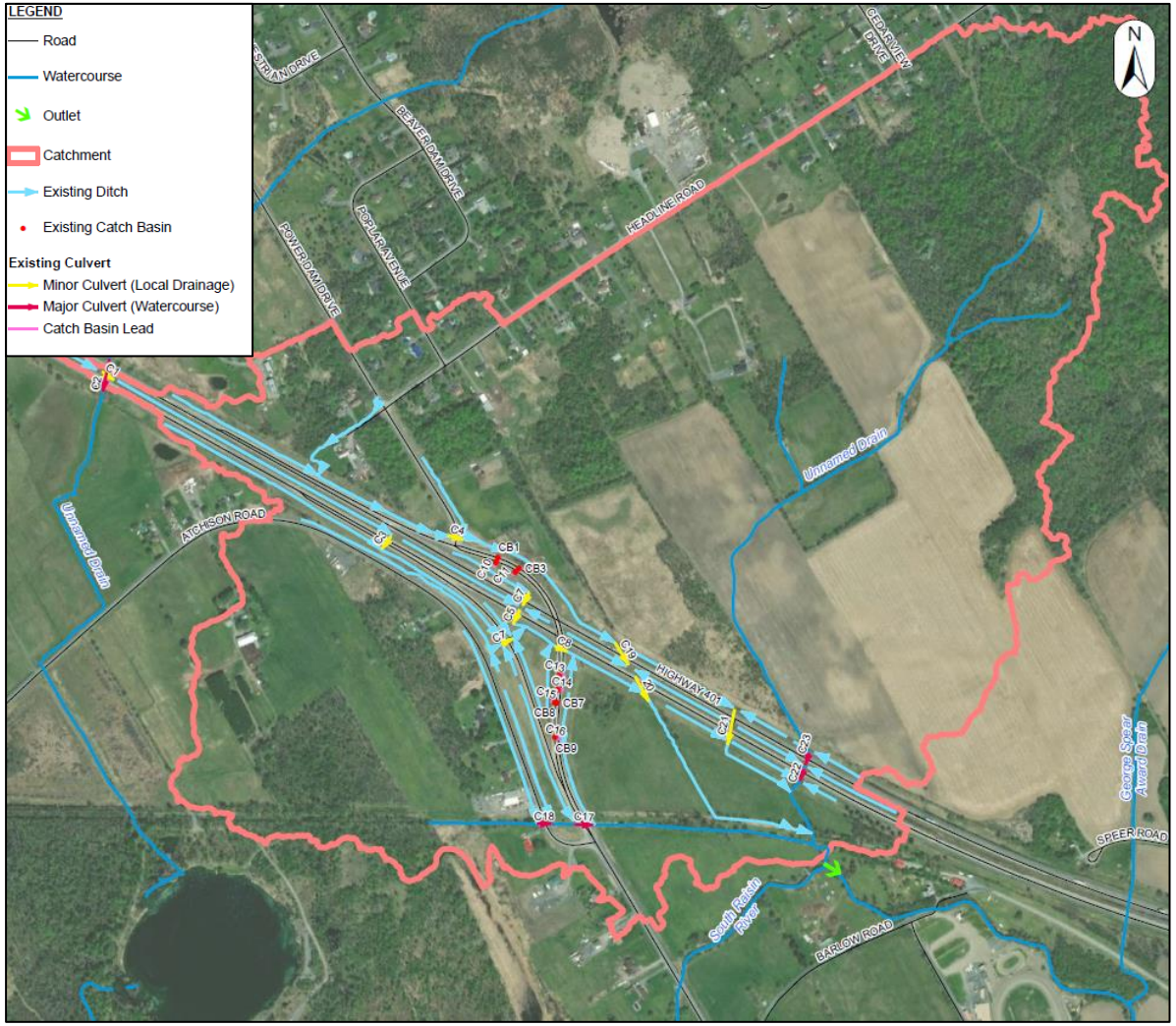
- Confirm and document existing (baseline) natural, social, economic, cultural and technical conditions within the project study area.
- Confirm the anticipated (or predicted) project impacts.
- Develop applicable environmental protection and mitigation measures to alleviate / minimize the predicted project impacts.

Field investigations / studies that will take place throughout the study include:

- Fisheries Existing Conditions
- Terrestrial Ecosystems Existing Conditions
- Impact Assessment Studies
- Land Use Assessment
- Stage 1 Archaeology Assessment
- Cultural Heritage Resource Assessment
- Contamination Overview Study

Existing Drainage Conditions

- The Project Study Area is within the Raisin River watershed.
- The Raisin River is approximately 3.3 km from the interchange. The existing drainage system for the interchange includes 26 culverts, nine catch basins, and roadside ditches.
- Two municipal drains cross Highway 401 via culverts, one approximately 930 m west of the interchange and one approximately 450 m east of the interchange. Both drains flow north to south.
- A third culvert watercourse crossing runs west to east under Power Dam Drive, approximately 400 m south of the interchange. All crossings are tributaries of the South Raisin River.
- Drainage along Highway 401 is conveyed east and west via roadside ditches and culverts to the watercourses. Drainage along the Power Dam Drive overpass is captured by catch basins and conveyed through culverts to roadside ditches along Highway 401.
- Some of the culverts and ditches within the Study Area are not currently functioning as designed, resulting in standing water on both sides of some culverts.



Existing Drainage Conditions Within the Project Study Area

Existing Fisheries Conditions

- The two (2) tributaries of the South Raisin River within the Project Study Area may support direct or indirect fish habitat. However, habitat quality/sensitivity is expected to be low due to surrounding agricultural/residential land uses.
- The South Raisin River crossing of Power Dam Drive approximately 400 m south of Highway 401 is known to support a warm/coolwater fish community comprised of a variety of baitfish, coarse fish and sportfish species, including Burbot, Largemouth Bass and Northern Pike.
- Based on review of background information and spring fisheries investigations, the presence of aquatic Species at Risk (SAR) are not likely within the Project Study Area.

Existing Terrestrial Environment Conditions

Vegetation

The Project Study Area can be characterized as primarily rural-agricultural, with nearby rural residential dwellings, and woodlands present. Much of the lands are used for active farming operations.

The Study Area includes some isolated unevaluated wetlands to the west of Atchison Road, and to the east of the interchange, as well as woodlands east, west and north of the interchange.

Species at Risk (SAR) and Significant Wildlife Habitat (SWH)

Based on initial field investigations the following SAR and SWH are present within the Study Area:

- Potential SAR bat roosting habitat situated within private woodlots immediately adjacent to the Study Area (16 potential bat cavity trees identified from fence line surveys)
- A single butternut tree 2 cm in diameter at breast height (DBH)
- Confirmed sighting of Eastern Meadowlark within a meadow community immediately adjacent to Highway 401 and Power Dam Drive.

Further detailed surveys will be conducted once the Technically Preferred Alternative(s) has been chosen.

Migratory Birds

Several bird species were audibly heard, or visually observed within the Study Area either incidentally or during the breeding bird surveys, including Savannah Sparrow, Cedar Waxwing and American Woodcock. A nest with young European Starlings was also identified in a cavity hole of a tree snag within the Study Area.

Existing Geo-Environmental Conditions

Groundwater Resources and Water Well Records

Existing Highway 401 and Power Dam Drive interchange area slopes southward towards the South Raisin River. A total of 19 water supply well records were identified within the Project Study Area with well installation dates ranging from 1970 to 2017. These include:

- 17 domestic wells
- 1 commercial well
- 1 livestock well

There are no Well Head Protection Areas (WHPA) located within a 1 km of the existing Highway 401 Power Dam Bridge.

Potentially Contaminated Activities

There are three Potentially Contaminating Activities identified within the Project Study Area:

- On-Site - Fill Material of Unknown Quality imported for construction / maintenance of Power Dam Bridge approaches/abutments
- Off-Site - Commercial Autobody Shop - Fix Auto Collision Cornwall located at 16892 Atchison Road
- Off-Site - Closed Waste Disposal Site located approximately 800 m to the southwest of the Highway 401 Power Dam Bridge.

Existing Social / Economic Conditions

The Project Study Area can be characterized as primarily rural-agricultural, with nearby rural residential dwellings, woodlands, two closed waste facilities and local businesses present.

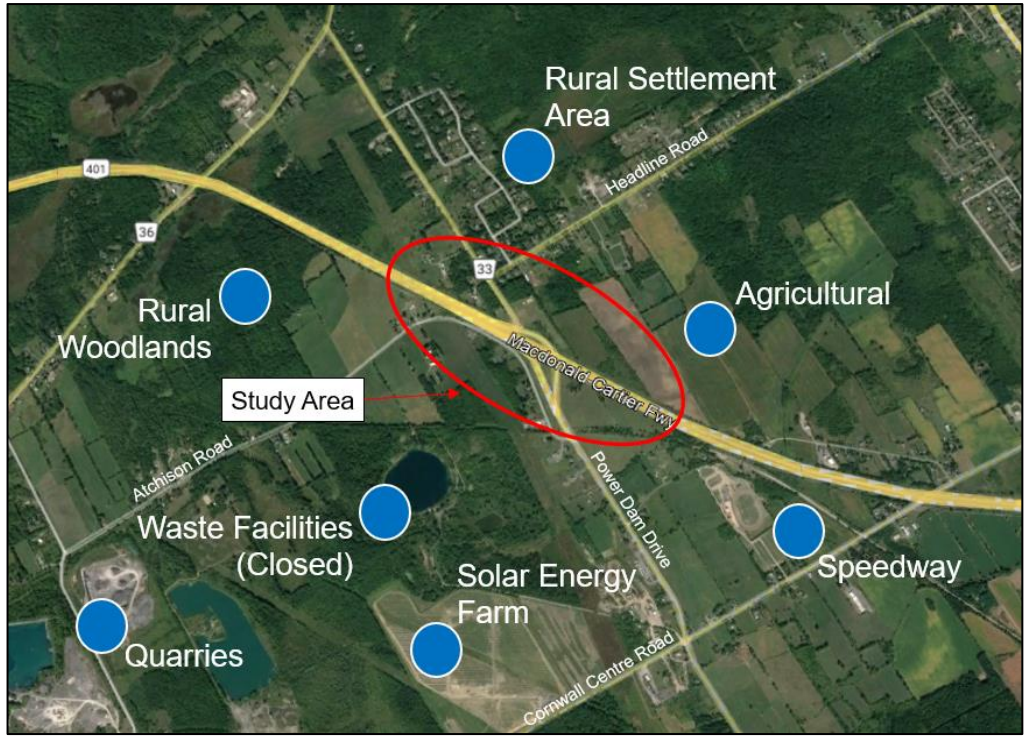
Much of the lands within and immediately adjacent are used for active farming operations.

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 Project 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 Project Study Area are used to pick up / drop off for students.



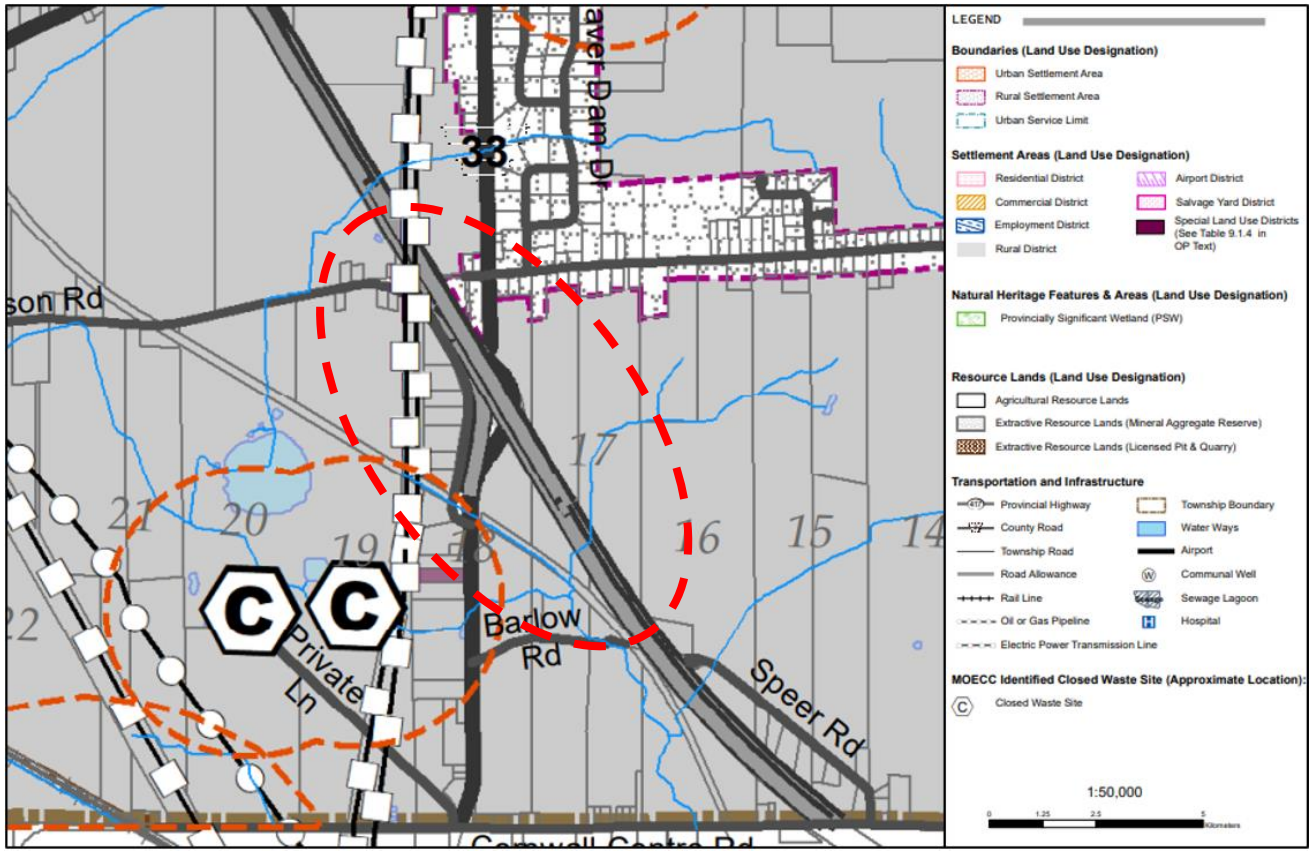
Existing Land Uses Within the Project Study Area

Planned Land Use Conditions

Per Schedule A4 of the 2018 County Official Plan , the proposed Bridge and Interchange Study Area is situated within the Rural District Area and includes portions of a Rural Settlement Area within the northeast quadrant, paralleling Headline Road.

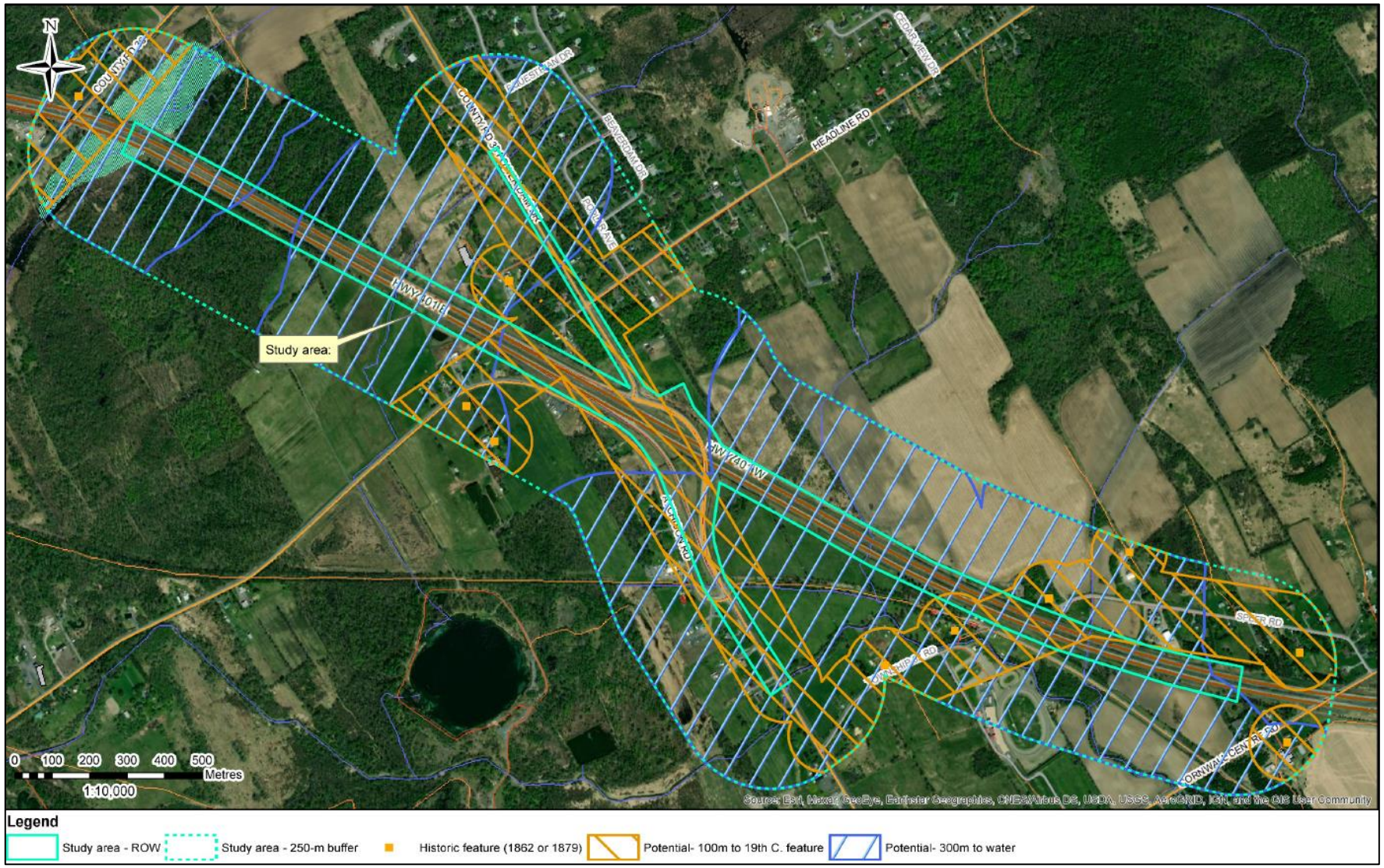
Provincial highways are classified by the Ministry of Transportation (MTO), and Highway 401 is under the jurisdiction of the Province and the requirements of the MTO, including the protection of the Highway 401 corridor.

Per the 2018 County Official Plan, the function of provincial highways and/or interchange areas shall be maintained through land use decisions which support MTO controls on access, adjacent land uses, and structures.



Planned Land Uses Within the Project Study Area

Existing Cultural Environment Conditions



Archaeological Resources

Based on a Stage 1 Archaeological Assessment (AA) there are no registered archaeological sites within one (1) km of the Study Area.

Much of the Study Area has been disturbed by previous highway/roadway construction and land development. As such, the Stage 1 assessment recommends Stage 2 assessments be done within areas where archaeological potential will be affected by the proposed works. Stage 2 assessments will be completed during subsequent stages of the project.

Existing Cultural Environment Conditions

Built and Cultural Heritage Resources

The Project Study Area has a rural land use history dating back to the late-eighteenth century. Seven features were identified during the Cultural Heritage fieldwork, consisting of four potential-built heritage resources and three potential cultural heritage landscapes.

Evaluation of Alternatives

The MTO Class Environmental Assessment for Provincial Transportation Facilities (2000) requires that alternatives be developed and evaluated to address the Project need. The evaluation of alternatives is conducted using a two-step approach as follows:

Step 1 - A long-list of alternatives was identified and subject to a coarse comparative evaluation to narrow the alternatives down to a short-list for further, more detailed evaluation. The 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 criteria listed on the next slides.

Those carried forward (short-list), represent the alternatives that have the best ability to address future capacity and operational issues, improve safety conditions, and minimize overall impacts to the natural, social, economic, and cultural environment.

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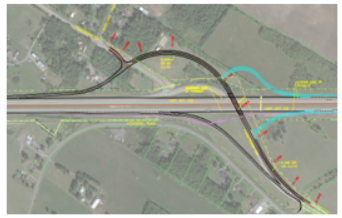
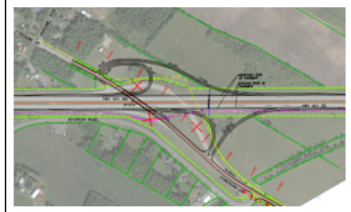
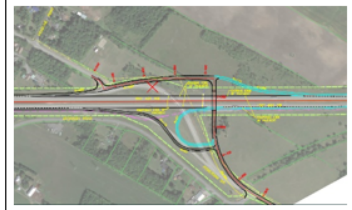
Step 2 - The Short-List carried forward will again be subject to a multi-disciplinary evaluation. A set of evaluation criteria will be developed and applied to comparatively evaluate the Short-List alternatives in terms of key environmental, engineering and costing considerations. The intent of this more robust analysis is to identify a Technically Preferred Alternative(s) that best addresses the Project need and will serve as the Recommended Plan for the Highway 401 Bridge replacement and long-term plan for the Power Dam Drive interchange.

Long-List → **Short-List** → **Technically Preferred Alternative(s)**

Evaluation of Long-List Alternatives

	Alternative 1 Do Nothing	Alternative 2 Straight Bridge, 60° Skew at Existing Bridge	Alternative 3 Straight Bridge, 35° Skew, Parclo AB	Alternative 4 Straight Bridge, 89° Skew, Parclo A2 South of Bridge	Alternative 5 Straight Bridge, 60° Skew, Parclo B2 North of Bridge, Diamond South of Bridge
Alternative Schematic					
Alternative Description	No changes made to the existing configuration. Included to provide a baseline to compare potential impacts associated with other Alternatives.	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).	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	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.	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.
Social / Natural Environment					
Social and Community *1. Potential to increase out of way travel* *2. Impacts to agriculture / community facilities* *3. Conformity to Provincial Planning Policies*	1.Moderate to High 2.Low 3.Low to Moderate	1.Low 2.Low to Moderate 3.High	1.Low 2.Low to Moderate 3.High	1.Low 2.Low to Moderate 3.High	1.Low 2.Low to Moderate 3.High
Property Impacts *Potential land acquisition due to increase in ROW width and/or new alignment.* *Potential effects to accessibility of existing properties*	No property impacts.	Total additional property required: ~2 ha Includes private property and farmland and impacts buildings.	Total additional property required: ~3.5 ha Includes private property, farmland, and forest.	Total additional property required: ~3.5 ha Includes private property, farmland, and forest.	Total additional property required: ~3.5 ha Includes private property, farmland, and forest.
Cultural and Built Heritage/Archaeology	No potential impacts.	There are no built or cultural heritage resources impacted by this alternative. Archaeological potential outside existing right-of-way. Lower overall footprint in comparison to other alternatives, and therefore, has less potential to impact Archaeological Resources.	There are no built or cultural heritage resources impacted by this alternative. Archaeological potential outside existing right-of-way. Lower overall footprint in comparison to other alternatives, and therefore, has less potential to impact Archaeological Resources.	There are no built or cultural heritage resources impacted by this alternative. Archaeological potential outside existing right-of-way. Moderate overall footprint in comparison to other alternatives, and therefore, has moderate potential to impact Archaeological Resources.	There are no built or cultural heritage resources impacted by this alternative. Archaeological potential outside existing right-of-way. Moderate overall footprint in comparison to other alternatives, and therefore, has moderate potential to impact Archaeological Resources.

Evaluation of Long-List Alternatives

	Alternative 1 Do Nothing	Alternative 2 Straight Bridge, 60° Skew at Existing Bridge	Alternative 3 Straight Bridge, 35° Skew, Parclo AB	Alternative 4 Straight Bridge, 89° Skew, Parclo A2 South of Bridge	Alternative 5 Straight Bridge, 60° Skew, Parclo B2 North of Bridge, Diamond South of Bridge
Watercourses / Fisheries *Potential effects to natural watercourses and fisheries habitat*	No potential impacts.	Impacts to watercourses/fish habitat: 10 culverts, 6 storm sewer systems along Power Dam Drive, Unnamed Drain, and roadside ditches. Requires new culverts and/or relocation / removal / extension of existing culverts. Requires new storm sewer systems for realigned Power Dam Drive and new on/off ramps.	Impacts to watercourses/fish habitat: 12 culverts, 6 storm sewer systems along Power Dam Drive, Unnamed Drain, and roadside ditches. Requires new culverts and/or relocation / removal / extension of existing culverts. Requires new storm sewer systems for realigned Power Dam Drive and new on/off ramps.	Impacts to watercourses/fish habitat: 12 culverts, 6 storm sewer systems along Power Dam Drive, Unnamed Drain, and roadside ditches. Requires new culverts and/or relocation / removal / extension of existing culverts. Requires new storm sewer systems for realigned Power Dam Drive and new on/off ramps.	Impacts to watercourses/fish habitat: 12 culverts, 6 storm sewer systems along Power Dam Drive, Unnamed Drain, and roadside ditches. Requires new culverts and/or relocation / removal / extension of existing culverts. Requires new storm sewer systems for realigned Power Dam Drive and new on/off ramps.
Vegetation, Woodlots, and Wildlife Habitat *Potential effects to vegetation, woodlots, and wildlife habitat / corridors*	No potential impacts.	Permanent and temporary vegetation impacts to potential SAR/SAR habitat (farmland [Barn Swallow, Eastern Meadowlark & Bobolink] and woodlots [SAR bats, SAR birds, SAR trees].	Permanent and temporary vegetation impacts to potential SAR/SAR habitat (farmland [Barn Swallow, Eastern Meadowlark & Bobolink] and woodlots [SAR bats, SAR birds, SAR trees].	Permanent and temporary vegetation impacts to potential SAR/SAR habitat (farmland [Barn Swallow, Eastern Meadowlark & Bobolink] and woodlots [SAR bats, SAR birds, SAR trees].	Permanent and temporary vegetation impacts to potential SAR/SAR habitat (farmland [Barn Swallow, Eastern Meadowlark & Bobolink] and woodlots [SAR bats, SAR birds, SAR trees].
Water Resources *Potential effects on natural runoff and stormwater quality*	Existing poor drainage issues require moderate intervention to improve; Catch Basins and Culverts to be replaced, ditches regraded.	Low increase in imperviousness results in low impact to water quality, runoff volume, and peak flow requiring SWM to mitigate.	Low increase in imperviousness results in low impact to water quality, runoff volume, and peak flow requiring SWM to mitigate.	Moderate increase in imperviousness results in moderate impact to water quality, runoff volume, and peak flow requiring SWM to mitigate.	High increase in imperviousness results in high impact to water quality, runoff volume, and peak flow requiring SWM to mitigate.
Cost / Staging					
Cost *Qualitative*	No construction costs, nothing would be implemented. However, bridge deterioration will require on-going maintenance, until eventual removal and possible replacement is required.	Interim: Low to Moderate Ultimate: Moderate to High	Interim: Low to Moderate Ultimate: Moderate to High	Interim: Moderate to High Ultimate: Moderate to High	Interim: Low to Moderate Ultimate: Moderate to High
Staging Opportunities *Potential for interim / ultimate connections*	Not applicable in the short- to mid-term but will be required upon eventual removal and possible replacement in the long-term.	NS-E and E-NS ramps can be constructed later as part of the ultimate and/or when the need to provide access to and from the east is required.	NS-E and E-NS ramps can be constructed later as part of the ultimate and/or when the need to provide access to and from the east is required.	NS-E and E-NS ramps can be constructed later as part of the ultimate and/or when the need to provide access to and from the east is required.	Power Dam Drive must be detoured for entire duration of bridge demolition and replacement. NS-E and E-NS ramps can be constructed later as part of the ultimate and/or when the need to provide access to and from the east is required.
Utility Impacts	Not applicable in the short- to mid-term.	Potential relocation of overhead power line north of Highway 401. Existing gas crossing impacted by future ramps.	Relocation of overhead power line north and south of Highway 401. Existing gas crossing impacted by future ramps.	Relocation of overhead power line north and south of Highway 401. Existing gas crossing impacted by future ramps and road connection.	Partial relocation of overhead power line north of Highway 401. Potential impacts to gas crossing on south side of Highway

Evaluation of Long-List Alternatives

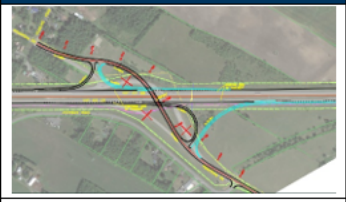
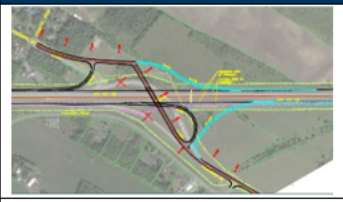
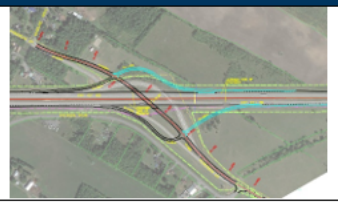
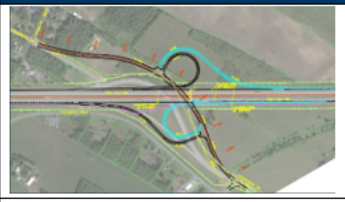
	Alternative 1 Do Nothing	Alternative 2 Straight Bridge, 60° Skew at Existing Bridge	Alternative 3 Straight Bridge, 35° Skew, Parclo AB	Alternative 4 Straight Bridge, 89° Skew, Parclo A2 South of Bridge	Alternative 5 Straight Bridge, 60° Skew, Parclo B2 North of Bridge, Diamond South of Bridge
Transportation					
Operational Performance *Potential to accommodate short/long-term vehicular demands* *Direct/Indirect connections* *Entrances*	No new connections 1 controlled intersection on ramp No access to/from the east W-N movement not provided vehicles forced to make U-turn at Atchison Road intersection. Power Dam Drive has a 90° jog at the intersection has the on ramp as a continuation of the NBL	2 controlled intersections (on and off ramps for future access to and from the east) 1 controlled intersection for the on ramp to WBL W-N movement not provided vehicles forced to make U-turn at Atchison Road intersection North Power Dam Drive intersection has the on ramp as a continuation of the NBL	2 controlled T- intersections for the ramps terminals Power Dam Drive is continuing without a jog at the north intersection.	1 controlled intersection for the EBL on ramp and W-N/S off ramp 1 controlled intersection for the on ramp to WBL Intersection at future E-N/S Ramp terminal. North Power Dam Drive intersection has the on ramp as a continuation of the NBL	2 controlled intersections Power Dam Drive is continuing without a jog at the north intersection.
Geometry *Intersection proximity* *Horizontal/vertical alignment*	Not applicable but does not address the trip pattern anticipated.	o Realignment of Power Dam Drive north of Highway 401 o Design Speed not consistent 100 km/hr south of Highway 401 and 80 km/hr north of Highway 401 o Through traffic must stop at north intersections to change direction by 90° turn.	o Realignment of Power Dam Drive on both sides of Highway 401 o Design Speed is consistent at 100 km/hr.	o Realignment of Power Dam Drive north of Highway 401 o Design Speed not consistent 80 km/hr on Power Dam Drive. o Through traffic must stop at north intersections to change direction by 90° turn.	Horizontal geometry updated to 70km/h design speed.
Local Road Impacts *Requirement to re-align local roads*	Not applicable in the short- to mid-term.	Major realignment of Power Dam Drive Traffic detour for the duration of bridge construction.	Major realignment of Power Dam Drive.	Major realignment of Power Dam Drive and Atchison Road.	Major realignment of Power Dam Drive.
Structural Implications *Impacts to existing structure*	Existing bridge geometry is fixed. Post-tensioned structure cannot be lengthened or widened.	Curved structure to be replaced with 60° skewed straight structure at existing location Skew precludes integral abutment design. However, semi-integral abutments feasible Power Dam Drive must be detoured for entire duration of bridge demolition and replacement.	Curved structure to be replaced with 35° skewed straight structure, west of existing location High skew precludes integral and semi-integral abutments Prone to durability weakness (expansion joints). Prone to performance problems (cracking) Steel plate girder superstructure feasible.	Curved structure to be replaced by 89° skew straight structure, east of existing location Basic design and construction Integral abutments feasible Lowest cost.	Curved structure to be replaced with 60° skew straight bridge at existing location Skew precludes integral abutment design. However, semi-integral abutments feasible, Power Dam Drive must be detoured for entire duration of bridge demolition and replacement.
Accommodation of Power Dam Drive Active Transportation *Potential impacts to future active transportation facilities on Power Dam Drive*	Cannot be accommodated on existing bridge.	Feasible on new bridge Future bridge widening feasible.	Feasible on new bridge Future bridge widening feasible.	Feasible on new bridge Future bridge widening feasible.	Feasible on new bridge Future bridge widening feasible.

Evaluation of Long-List Alternatives

	Alternative 1 Do Nothing	Alternative 2 Straight Bridge, 60° Skew at Existing Bridge	Alternative 3 Straight Bridge, 35° Skew, Parclo AB	Alternative 4 Straight Bridge, 89° Skew, Parclo A2 South of Bridge	Alternative 5 Straight Bridge, 60° Skew, Parclo B2 North of Bridge, Diamond South of Bridge
Summary					
Key Advantages	✓ No potential impacts to private property or buildings ✓ No natural environment impacts ✓ No cost in the short-term.	✓ Low property impacts ✓ Small overall footprint impacts to natural env. ✓ Partial power line relocation ✓ Ramps to/from the east can be added in the future.	✓ Ramps to/from the east can be added in the future ✓ Moderate environment impacts ✓ Power Dam Drive through continuous and direct ✓ Maintain design speed on both sides of Highway 401 ✓ Tangent alignment on structure ✓ Does not require full time detour while constructing the new bridge.	✓ Moderate property impact ✓ Low environmental impacts ✓ Ramps to/from the east can be added in the future ✓ Preferred structural layout. ✓ W-N movement is accommodated.	✓ Moderate property impacts ✓ Low environmental impacts ✓ Ramp to/from the east can be added in the future ✓ Partial power line relocation. ✓ Power Dam Drive through traffic not required to manage sharp deflection north of Highway 401 ✓ W-N movement is accommodated.
Key Disadvantages	✘ No new connections provided ✘ W-N movement is not accommodated ✘ Short- and long-term vehicular demands will not be met ✘ Does not address Study objectives.	✘ Detour is required for entire construction duration ✘ Power Dam Drive not continuous north of Highway 401 for through traffic ✘ W-N movement is not accommodated ✘ Impacts private properties and buildings.	✘ Power line relocation ✘ High skew angle not desirable from structural perspective	✘ Power line relocation ✘ Power Dam Drive not continuous north of Highway 401 for through traffic	✘ Detour is required for the entire construction duration ✘ Power line relocation ✘ High impact to water quality, runoff volume, and peak flow
Recommendation	**CARRY FORWARD** (for comparison purposes)	**DO NOT CARRY FORWARD**	**CARRY FORWARD**	**DO NOT CARRY FORWARD**	**CARRY FORWARD**

Notes:
Potential impacts (or effects) are measured as low, moderate, or high based on the anticipated net environmental effects (following inclusion of standard and readily available mitigative measures). In this regard, a low impact has the least significant potential effect, which is defined as negligible, while a high impact has the greatest (or most significant) potential negative effect. The noted exception is the "Conformity to Provincial Planning Policies" criterion, whereby a rating of "low" is considered least favourable, while a rating of "high" is most favourable.

Evaluation of Long-List Alternatives

	Alternative 6 Curved Bridge, 60° Skew, Parclo B2	Alternative 7 Straight Bridge, 60° Skew, Parclo B2 South of Bridge	Alternative 8 Straight Bridge, 41° Skew, Single Diamond Interchange	Alternative 9 Curved Bridge, 49° Skew, Parclo A2	Alternative 10 Straight Bridge, 90° Skew, Parclo A2
Alternative Schematic					
Alternative Description	Parclo B2 Interchange with full movement with two intersections north and south of the new skewed curved bridge located west of existing structure.	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. W-S ramp is modified as a W-N/S Parclo B loop ramp that connects to Power Dam Drive at the south intersection.	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.	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.	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
Social / Natural Environment					
Social and Community *1. Potential to increase out of way travel.* *2. Impacts to agriculture / community facilities* *3. Conformity to Provincial Planning Policies*	1. Low 2. Low 3. High	1. Low 2. Low to Moderate 3. High	1. Low 2. Low to Moderate 3. High	1. Low 2. High 3. High	1. Low 2. High 3. High
Property Impacts *Potential land acquisition due to increase in ROW width* *Potential effects to accessibility of existing properties*	Total additional property required: ~2 ha Includes private property, farmland and forest.	Total additional property required: ~3.5 ha Includes private property, farmland and forest.	Total additional property required: ~3.5 ha Includes private property, farmland and forest.	Total additional property required: ~8 ha Includes private property, farmland and forest and impacts building	Total additional property required: ~12 ha Includes private property, farmland and forest and impacts building
Cultural and Built Heritage/Archaeology	There are no built or cultural heritage resources impacted by this alternative. Archaeological potential outside existing right-of-way. Lower overall footprint in comparison to other alternatives, and therefore, has less potential to impact Archaeological Resources.	There are no built or cultural heritage resources impacted by this alternative. Archaeological potential outside existing right-of-way. Moderate overall footprint in comparison to other alternatives, and therefore, has moderate potential to impact Archaeological Resources.	There are no built or cultural heritage resources impacted by this alternative. Archaeological potential outside existing right-of-way. Moderate overall footprint in comparison to other alternatives, and therefore, has moderate potential to impact Archaeological Resources.	There are no built or cultural heritage resources impacted by this alternative. Archaeological potential outside existing right-of-way. High overall footprint in comparison to other alternatives, and therefore, has more potential to impact Archaeological Resources.	There are no built or cultural heritage resources impacted by this alternative. Archaeological potential outside existing right-of-way. High overall footprint in comparison to other alternatives, and therefore, has more potential to impact Archaeological Resources.
Watercourses / Fisheries *Potential effects to natural watercourses and fisheries habitat*	Impacts to watercourses/fish habitat: 12 culverts, 6 storm	Impacts to watercourses/fish habitat: 12 culverts, 6 storm	Impacts to watercourses/fish habitat: 12 culverts, 6 storm	Impacts to watercourses/fish habitat: 12 culverts, 6 storm sewer	Impacts to watercourses/fish habitat: 12 culverts, 6 storm sewer

Evaluation of Long-List Alternatives

	Alternative 6 Curved Bridge, 60° Skew, Parclo B2	Alternative 7 Straight Bridge, 60° Skew, Parclo B2 South of Bridge	Alternative 8 Straight Bridge, 41° Skew, Single Diamond Interchange	Alternative 9 Curved Bridge, 49° Skew, Parclo A2	Alternative 10 Straight Bridge, 90° Skew, Parclo A2
	sewer systems along Power Dam Drive, Unnamed Drain, and roadside ditches. Requires new culverts and/or relocation / removal/extension of existing culverts. Requires new storm sewer systems for realigned Power Dam Drive and new on/off ramps.	sewer systems along Power Dam Drive, Unnamed Drain, and roadside ditches. Requires new culverts and/or relocation / removal / extension of existing culverts. Requires new storm sewer systems for realigned Power Dam Drive and new on/off ramps.	sewer systems along Power Dam Drive, Unnamed Drain, and roadside ditches. Requires new culverts and/or relocation / removal / extension of existing culverts. Requires new storm sewer systems for realigned Power Dam Drive and new on/off ramps.	systems along Power Dam Drive, Unnamed Drain, and roadside ditches. Requires new culverts and/or relocation / removal / extension of existing culverts. Requires new storm sewer systems for realigned Power Dam Drive and new on/off ramps.	systems along Power Dam Drive, Unnamed Drain, and roadside ditches. Requires new culverts and/or relocation / removal / extension of existing culverts. Requires new storm sewer systems for realigned Power Dam Drive and new on/off ramps
Vegetation, Woodlots, and Wildlife Habitat *Potential effects to vegetation, woodlots, and wildlife habitat / corridors*	Permanent and temporary vegetation impacts to potential SAR/SAR habitat (farmland [Barn Swallow, Eastern Meadowlark & Bobolink] and woodlots [SAR bats, SAR birds, SAR trees].	Permanent and temporary vegetation impacts to potential SAR/SAR habitat (farmland [Barn Swallow, Eastern Meadowlark & Bobolink] and woodlots [SAR bats, SAR birds, SAR trees].	Permanent and temporary vegetation impacts to potential SAR/SAR habitat (farmland [Barn Swallow, Eastern Meadowlark & Bobolink] and woodlots [SAR bats, SAR birds, SAR trees].	Permanent and temporary vegetation impacts to potential SAR/SAR habitat (farmland [Barn Swallow, Eastern Meadowlark & Bobolink] and woodlots [SAR bats, SAR birds, SAR trees].	Permanent and temporary vegetation impacts to potential SAR/SAR habitat (farmland [Barn Swallow, Eastern Meadowlark & Bobolink] and woodlots [SAR bats, SAR birds, SAR trees].
Water Resources *Potential effects on natural runoff and stormwater quality*	Moderate increase in imperviousness results in moderate impact to water quality, runoff volume, and peak flow requiring SWM to mitigate.	Moderate increase in imperviousness results in moderate impact to water quality, runoff volume, and peak flow requiring SWM to mitigate.	Moderate increase in imperviousness results in moderate impact to water quality, runoff volume, and peak flow requiring SWM to mitigate.	High increase in imperviousness results in high impact to water quality, runoff volume, and peak flow requiring SWM to mitigate.	High increase in imperviousness results in high impact to water quality, runoff volume, and peak flow requiring SWM to mitigate.
Cost / Staging					
Cost *Qualitative*	Interim: Low to Moderate Ultimate: Moderate to High	Interim: Moderate to High Ultimate: Moderate to High	Interim: Low to Moderate Ultimate: Moderate to High	High	High
Staging Opportunities *Potential for interim / ultimate connections*	NS-E and E-NS ramps can be constructed later as part of the ultimate and/or when the need to provide access to and from the east is required.	NS-E and E-NS ramps can be constructed later as part of the ultimate and/or when the need to provide access to and from the east is required.	NS-E and E-NS ramps can be constructed later as part of the ultimate and/or when the need to provide access to and from the east is required.	S-E and E-NS ramps can be constructed later as part of the ultimate and/or when the need to provide access to and from the east is required.	New structure can be built while the existing is still in service. S-E and E-NS ramps can be constructed later as part of the ultimate and/or when the need to provide access to and from the east is required.
Utility Impacts	Relocation of overhead power line north and south of Highway 401. Existing gas crossing impacted by future ramps on south side only.	Relocation of overhead power line north and south of Highway 401. Existing gas crossing impacted by future ramps.	Relocation of overhead power line north and south of Highway 401. Existing gas crossing impacted by future ramps.	Relocation of overhead power line north and south of Highway 401. Existing gas crossing impacted by future ramps.	Relocation of overhead power lines north and south of Highway 401. Existing gas crossing impacted by future ramps.
Transportation					
Operational Performance *Potential to accommodate short/long-term vehicular demands* *Direct/Indirect connections* *Entrances*	o 2 controlled intersections o Power Dam Drive is continuing without a jog at the WB on ramp intersection.	o 1 controlled intersection for the EBL on/off ramps o 1 controlled intersection for the WBL on ramp o Intersection at future E-N/S Ramp terminal. o North Power Dam Drive intersection has the on ramp as a continuation of the NBL	o 2 controlled intersections o Power Dam Drive is continuing without a jog at the north intersection.	o 2 controlled intersections o Power Dam Drive is continuing without a jog at the WB on ramp terminal.	o 2 controlled intersections o Power Dam Drive is continuing without a jog at the WB on ramp terminal.

Evaluation of Long-List Alternatives

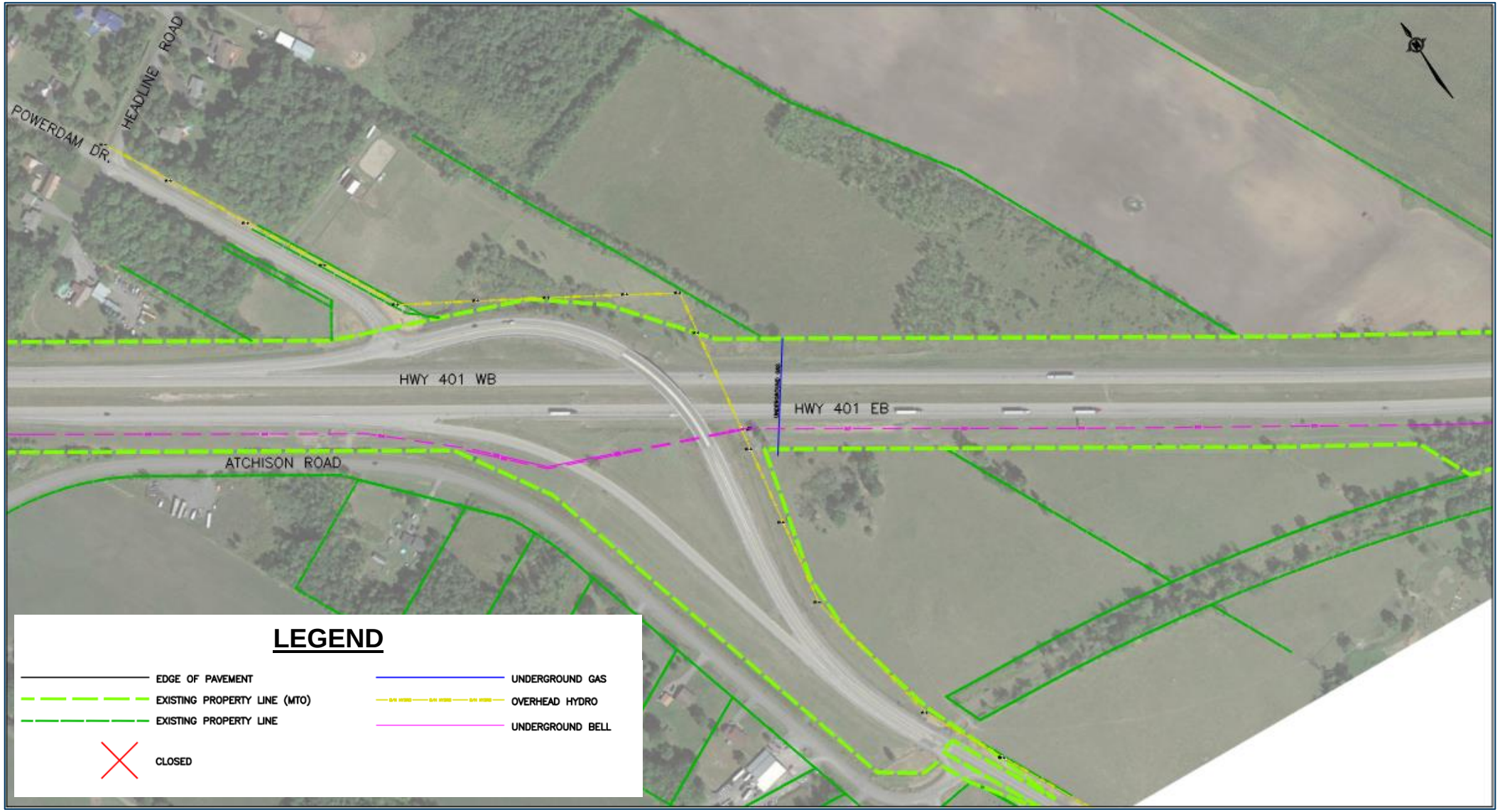
	Alternative 6 Curved Bridge, 60° Skew, Parclo B2	Alternative 7 Straight Bridge, 60° Skew, Parclo B2 South of Bridge	Alternative 8 Straight Bridge, 41° Skew, Single Diamond Interchange	Alternative 9 Curved Bridge, 49° Skew, Parclo A2	Alternative 10 Straight Bridge, 90° Skew, Parclo A2
		o Short distance between intersection and left turn onto EBL on ramp			
Geometry *Intersection proximity* *Horizontal/vertical alignment*	o Realignment of Power Dam Drive on both sides of Highway 401 o Design Speed is consistent at 100 km/hr.	o Realignment of Power Dam Drive on both sides of Highway 401 o Design Speed is not consistent 100 km/hr south of Highway 401 and 40 km/hr north of Highway 401 at the roundabout.	o Realignment of Power Dam Drive on both sides of Highway 401 o Design Speed is consistent at 100 km/hr.	o Realignment of Power Dam Drive on both sides of Highway 401 o Design Speed is consistent at 90 km/hr.	o Significant Realignment of Power Dam Drive o Design speed is consistent for 80km/hr. o To meet sight distance requirements, auxiliary lanes will be required at intersections.
Local Road Impacts *Requirement to re-align local roads*	Major realignment of Power Dam Drive.	Major realignment of Power Dam Drive.	Major realignment of Power Dam Drive.	Major realignment of Power Dam Drive and Atchison Road.	Major realignment of Power Dam Drive
Structural Implications *Impacts to existing structure*	Curved structure to be replaced with 60° skewed curved structure, west of existing location Higher complexity design and construction. Additional span may be required to counter torsion of curved bridge. Increased length required to square abutments.	Curved structure to be replaced with 60° skewed straight structure, west of existing structure location Skew precludes integral abutment design. However, semi-integral abutments feasible	Curved structure to be replaced with 41° skewed straight structure, west of existing location High skew precludes integral and semi-integral abutments Prone to durability weakness (expansion joints). Prone to performance problems (cracking) Steel plate girder superstructure feasible.	Curved structure to be replaced with 49° skewed curved structure, east of existing location High complexity design and construction, additional spans and longer length required to balance torsion of curved bridge and to square abutments Straight girders likely not feasible. Superstructure options include steel box girders and post-tensioned concrete box girders Post Tensioned Concrete option requires long-duration Highway 401 lane closures Highest construction cost.	Curved structure to be replaced with 90° skewed straight structure, east of existing location Basic design and construction Integral abutments feasible Lowest cost.
Accommodation of Power Dam Drive Active Transportation *Potential impacts to future active transportation facilities on Power Dam Drive*	AT can be incorporated but may not be feasible to add post construction.	Same as Alternative 2.	AT feasible on new bridge. Future bridge widening feasible.	AT can be incorporated but may not be feasible to add post construction.	AT can be accommodated

Evaluation of Long-List Alternatives

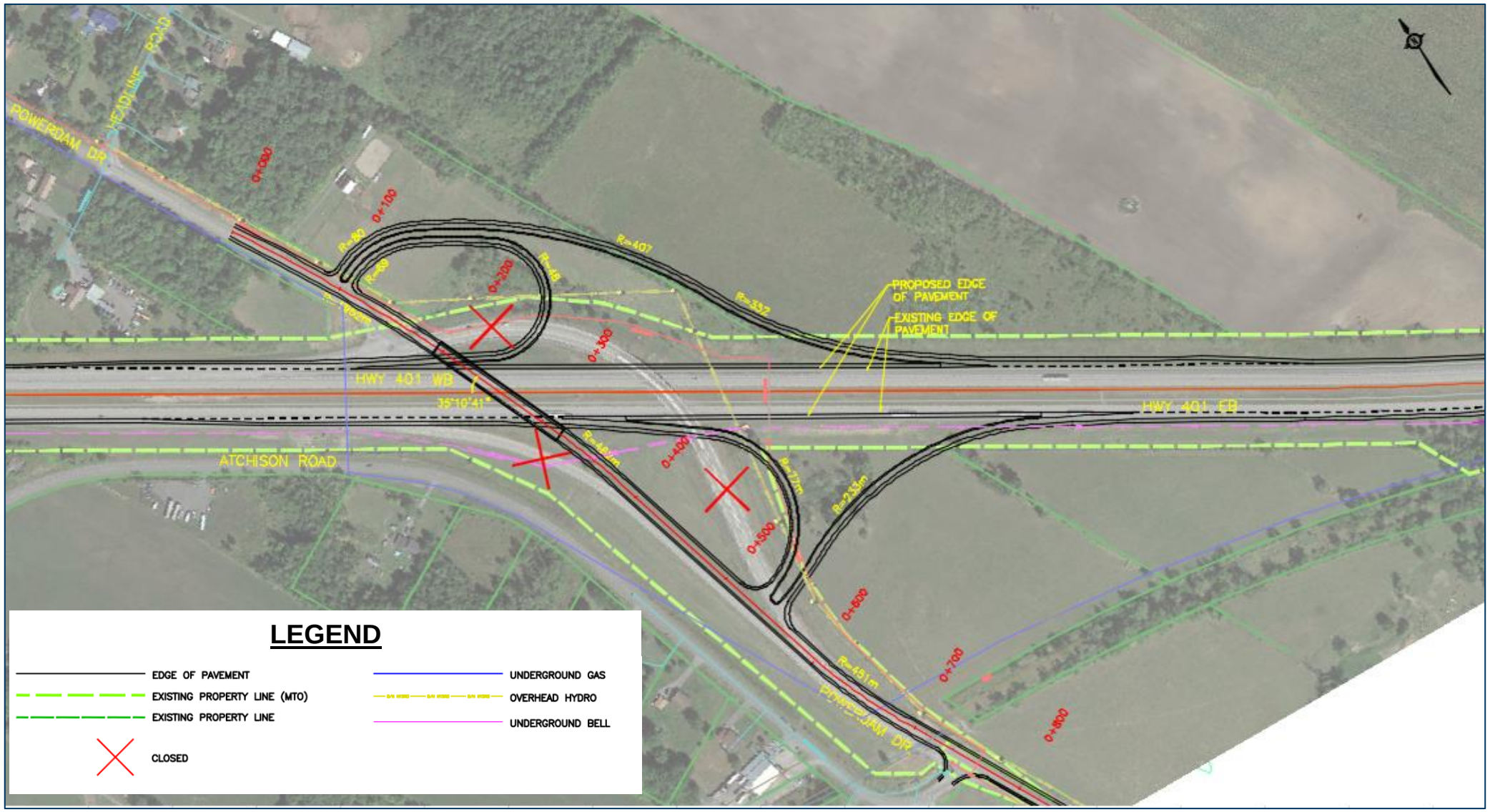
	Alternative 6 Curved Bridge, 60° Skew, Parclo B2	Alternative 7 Straight Bridge, 60° Skew, Parclo B2 South of Bridge	Alternative 8 Straight Bridge, 41° Skew, Single Diamond Interchange	Alternative 9 Curved Bridge, 49° Skew, Parclo A2	Alternative 10 Straight Bridge, 90° Skew, Parclo A2
Summary					
Key Advantages	✓ Low property impacts ✓ Small overall footprint impacts to natural env. ✓ Partial power line relocation ✓ Ramps to/from the east can be added in the future ✓ Power Dam Drive through traffic not required to manage sharp deflection north of Highway 401 ✓ Maintain design speed on both sides of Highway 401 ✓ W-N movement is accommodated	✓ Partial power line relocation ✓ Moderate environment impacts ✓ Ramps to/from the east can be added in the future ✓ Power Dam Drive through traffic not required to manage sharp deflection north of the highway ✓ Tangent alignment on structure	✓ Ramps to/from the east can be added in the future ✓ Moderate environment impacts ✓ Power Dam Drive through continuous and direct ✓ Maintain design speed on both sides of Highway 401 ✓ Tangent alignment on structure ✓ Does not require full time detour while constructing the new bridge	✓ More typical Interchange layout ✓ Ramps to/from the east can be added in the future ✓ All movements are accommodated	✓ More typical Interchange layout ✓ Ramps to/from the east can be added in the future ✓ All movements are accommodated ✓ Straight structure
Key Disadvantages	✘ Complex and more expensive structure	✘ No consistent speed due to roundabout north of Highway 401 ✘ No consistent speed due to roundabout south of Highway 401	✘ High skew angle not desirable from structural perspective	✘ High property impact ✘ High environmental impacts ✘ High cost ✘ Greater utility impact ✘ Complex structure ✘ Provide two on ramps per direction may not be needed.	✘ Significant property impacts ✘ High environmental impacts ✘ Major realignment of Power Dam Drive and large curve introduced. ✘ Additional auxiliary lanes required to meet sightlines that are not warranted based on traffic volumes.
Recommendation	CARRY FORWARD	DO NOT CARRY FORWARD	CARRY FORWARD	DO NOT CARRY FORWARD	DO NOT CARRY FORWARD

Notes:
Potential impacts (or effects) are measured as low, moderate, or high based on the anticipated net environmental effects (following inclusion of standard and readily available mitigative measures). In this regard, a low impact has the least significant potential effect, which is defined as negligible, while a high impact has the greatest (or most significant) potential negative effect. The noted exception is the "Conformity to Provincial Planning Policies" criterion, whereby a rating of "low" is considered least favourable, while a rating of "high" is most favourable.

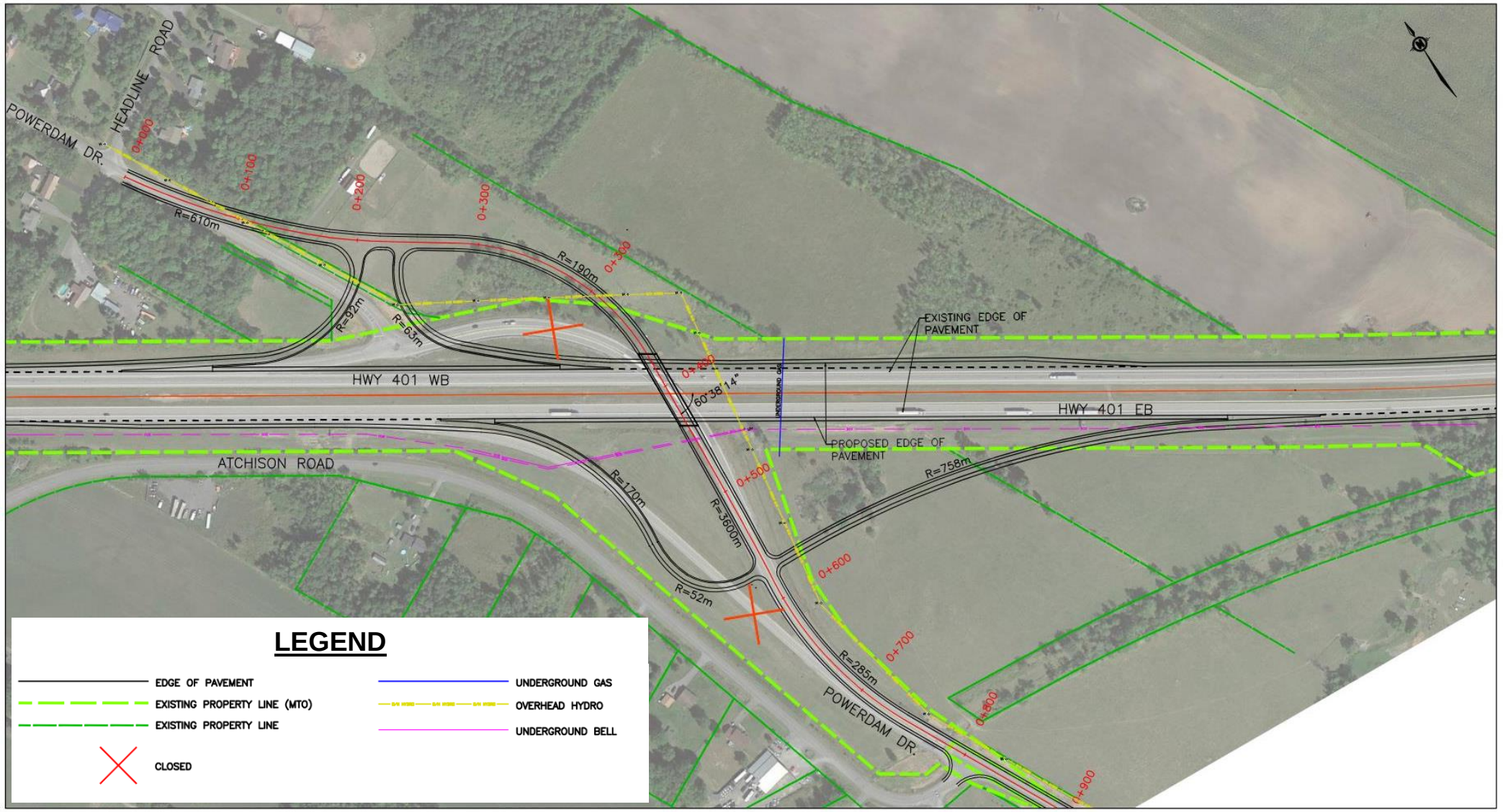
Short-List Alternative – Do Nothing



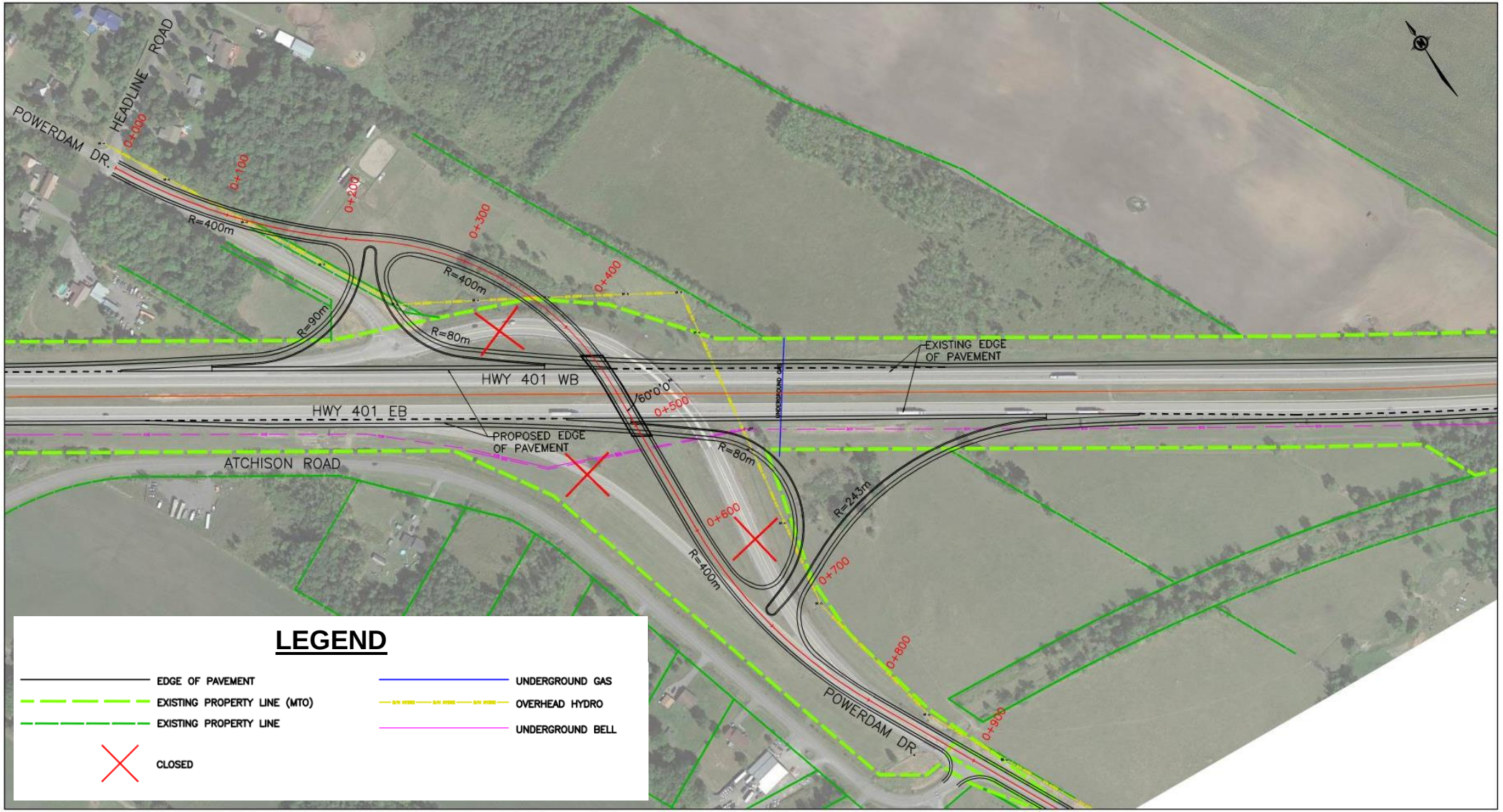
Short-List Alternative 3



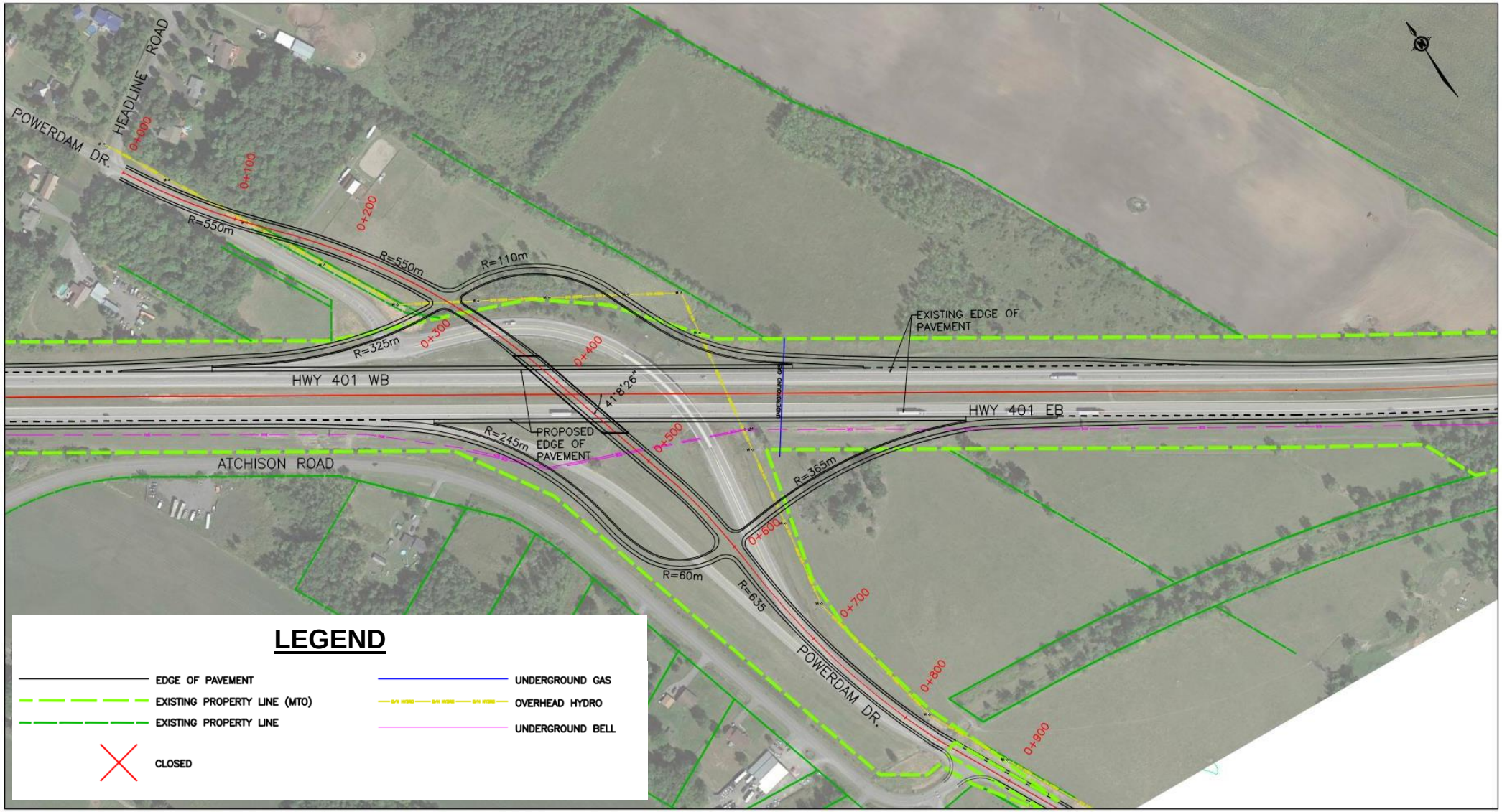
Short-List Alternative 5



Short-List Alternative 6



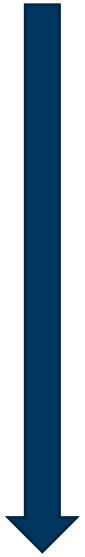
Short-List Alternative 8



Next Steps

Following this Online PIC, we will:

- Respond to comments received
- Refine the results of the Evaluation of Alternatives, if required
- Evaluate the Short-List of alternatives to select the Technically Preferred Alternative(s)
- Present the Technically Preferred Alternative(s) at PIC No. 2
- Refine the results, if required, and initiate the Preliminary Design
- Prepare the Transportation Environmental Study Report (TESR) for 30-day public and agency review
- Finalize the Preliminary Design.



Consultation and engagement with Indigenous Peoples, the general public, regulatory agencies, municipal governments, emergency services, school bus transportation providers, and utility companies is on-going throughout the study duration.

Thank you for participating in this Online PIC.

We welcome and encourage your comments, by using the online comment form available on the project website **www.highway401powerdam.com**, or alternatively, by emailing either of the Project Team members listed below. We would greatly appreciate receiving your comments by **January 20, 2023**.

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