Haris Ginis
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Enbridge Gas Inc.
500 Consumers Rd.
North York, Ontario, M2J 1P8
Canada

November 28, 2022

BY RESS AND EMAIL

Nancy Marconi
Acting Registrar
Ontario Energy Board
2300 Yonge Street, 27th Floor
Toronto, ON M4P 1E4

Dear Ms. Marconi:

Re: Enbridge Gas Inc. ("Enbridge Gas" or "the Company")
Ontario Energy Board ("OEB") File: EB-2022-0157
Panhandle Regional Expansion Project
Supplementary Responses to Undertaking Response (Exhibit JT1.11)

Consistent with the OEB's Procedural Order No. 3, enclosed please find Enbridge Gas's responses to the supplementary questions submitted by Three Fires Group ("TFG") on November 1, 2022, relating to the Company's response to undertaking JT1.11 previously filed in the above noted proceeding.

In accordance with the OEB's *Practice Direction on Confidential Filings*, Enbridge Gas is requesting confidential treatment of the following exhibits. Details of the specific information and reasons for confidential treatment are set out below:

Exhibit	Confidential Information Location	Brief Description	Basis for Confidentiality
Exhibit JT1.11 Supplementary, Attachment 1	Pages 2, 5, 14, 17, 20-22, and 29.	Third Party Contractor Work Pricing/Volume Information	The redactions relate to information that is commercially sensitive, considered to be presumptively confidential (i.e., unit pricing or billing rates of a third party), and consists of financial and/or commercial material that Enbridge Gas has consistently treated as confidential. Disclosure of the financial and/or commercial material could prejudice competitive positions and/or interfere with ongoing or future negotiations.
Exhibit JT1.11 Supplementary, Attachment 3	Pages 18 and 20	Third Party Contractor Work Pricing/Volume Information	The redactions relate to information that is commercially sensitive, considered to be presumptively confidential (i.e., unit pricing or billing rates of a third party), and consists of financial and/or commercial material that Enbridge Gas has consistently treated as confidential. Disclosure of the financial and/or commercial material could prejudice competitive positions and/or interfere with ongoing or future negotiations.
Exhibit JT1.11 Supplementary, Attachment 4	Page 1	Third Party Contractor Work Pricing/Volume Information	The redactions relate to information that is commercially sensitive, considered to be presumptively confidential (i.e., unit pricing or billing rates of a third party), and consists of financial and/or commercial material that Enbridge Gas has consistently treated as confidential. Disclosure of the financial and/or commercial material could prejudice competitive positions and/or interfere with ongoing or future negotiations.

The unredacted confidential attachments will be sent separately via email to the OEB.

The above noted submission has been filed electronically through the OEB's RESS.

If you have any questions, please contact the undersigned.

Sincerely,

(Original Digitally Signed)

Haris Ginis
Technical Manager, Leave to Construct Applications

c.c. Charles Keizer (Torys)
Zora Cronojacki (OEB Staff)
Intervenors (EB-2022-0157)

ENBRIDGE GAS INC.

Undertaking Response to TFG

1. **Exhibit JT1.11.** EGI's response to this undertaking provides details concerning the retainer of its external consultant and includes its Request for Quote (the **RFQ**) as an attachment**.**

   a. Please produce AECOM Canada's (**AECOM's**) response to the RFQ, along with any related communications between AECOM and EGI.

   b. Please confirm whether the Master Service Agreement and Service Release Order have been produced in this proceeding and, if they have not, please produce them.

2. **Exhibit JT1.11, Attachment 1, p. 4**: The **RFQ** identifies EGI's Indigenous Engagement Advisor as the lead on Indigenous consultations and references the expectation that the selected consultant will provide support in Indigenous consultations.

   a. Please describe any information outside of the information set out in AECOM's report that EGI and/or its Indigenous Engagement Advisor provided to AECOM concerning (i) Indigenous consultations, (ii) concerns raised by Indigenous partners, and/or (iii) Indigenous communities in general. Please produce any related documents that pass a *de minimis* threshold in terms of relevance.

   b. Please describe any support outside of the support described in AECOM's report that AECOM provided to EGI and/or its Indigenous Engagement Advisor in the context of EGI's Indigenous consultations. Please produce any related documents that pass a *de minimis* threshold in terms of relevance

   c. Please confirm whether EGI's instructions to AECOM concerning Indigenous engagement were ever altered from the instructions set out in the document and, if so, please provide details and any relevant documents.

3. **Exhibit JT1.11, Attachment 1, p. 5:** The RFQ includes the requirement for the consultant to inform EGI of all meetings with Indigenous groups, both at the beginning and throughout the project.

   a. Please provide the details of any such updates not already referenced in AECOM's report.

4. **Exhibit JT1.11, Attachment 1, p. 6:** The RFQ requires an Indigenous Participation document in relation to (i) the archaeology assessment and (ii) the species at risk assessment.

   a. Please produce the documents related to both (i) and (ii) above along with details of any related communications in each of the respective assessments that is not referenced in AECOM's report.

5. **Exhibit JT1.11, Attachment 1, p. 8:** The RFQ requires the submission of a communication strategy for the project, which the RFQ stipulates shall include Indigenous participation.

   a. Please produce that document along with details of any related communications.

Response:

1.

a) Please see Attachment 1 to this response for AECOM's response to the RFQ. Enbridge Gas has redacted commercially sensitive information within Attachment 1 pertaining to the negotiated price for AECOM's services. Please see Attachment 2 to this response for all communications between AECOM and Enbridge Gas relevant to the RFQ for the Project.

b) Please see Attachment 3 to this response for the Master Service Agreement between AECOM and Enbridge Gas, and Attachment 4 to this response for the Service Release Order for the Project. Enbridge Gas has redacted commercially sensitive information within Attachments 3 and 4 pertaining to the negotiated price for AECOM's services.

2.

a) Please see Attachment 5 to this response which contains an email exchange between the Enbridge Gas Indigenous Engagement Advisor and AECOM regarding the email address for consultation for Kettle and Stoney Point First Nation. All other information that Enbridge Gas provided to AECOM concerning (i) Indigenous consultations, (ii) concerns raised by Indigenous partners, and/or (iii) Indigenous communities in general, is captured in the Environmental Report prepared by AECOM at Exhibit F, Tab 1, Schedule 1, Attachment 1 and the Indigenous Consultation Log at Exhibit H, Tab 1, Schedule 1, Attachment 7.

b) Aside from the support required by AECOM described in the Environmental Report, AECOM additionally provides support by responding to First Nations' comments and questions regarding the Environmental Report. Enbridge Gas filed a log of First Nation's comments on the Environmental Report and how Enbridge Gas has addressed or plans to address their respective comments at

Exhibit I.STAFF.22, Attachment 3. Following the interrogatory process, AECOM provided responses to comments from the Chippewas of the Thames First Nation, which were received by Enbridge Gas on July 28, 2022. Please see Attachment 6 to this response for a log of comments from Chippewas of the Thames First Nation and Enbridge Gas's responses.

AECOM also provides support by reaching out to Indigenous communities to request their interest in participating in environmental field studies. As indicated in Enbridge Gas's letter dated November 4, 2022, regarding the supplementary questions filed by Three Fires Group Inc. ("TFG"), all First Nation Communities identified in the delegation letter provided by the Ministry of Energy dated August 6, 2021, which is filed at Exhibit H, Tab 1, Schedule 1, Attachment 2, were invited to participate in environmental field studies. All communities with the exception of Oneida First Nation participated in archaeological surveys and only Oneida First Nation and Aamjiwnaang First Nation participated in ecological surveys.

c) Enbridge Gas confirms that instructions to AECOM regarding Indigenous engagement were not altered from the instructions set out in the RFQ.

3.

a) Enbridge Gas generally undertakes Indigenous engagement directly and not through AECOM. AECOM does, however, invite and coordinate First Nation communities' participation in field studies such as archaeology and species at risk surveys. See Attachment 7 to this response for the communications log between AECOM and First Nation communities regarding such activities.

4.

a) Enbridge Gas clarifies that there is no requirement in the RFQ for an Indigenous Participation "document" as implied by TFG. Rather, the RFQ requires that Indigenous Participation *processes* be included as part of the archaeological and species at risk assessments. While Indigenous participation in field surveys has occurred as outlined in the response to part 2 c) above, Enbridge Gas has not required AECOM to prepare specific documentation regarding those processes.

To assist TFG, Enbridge Gas requested that AECOM produce a log of communication and outreach with respect to completing environmental field surveys. Please see Attachment 7 to this response for the communications log between AECOM and First Nation communities regarding the completion of environmental field surveys.

The Stage I archaeological assessment can be found in the Environmental Report at Exhibit F, Tab 1, Schedule 1, Attachment 1, Appendix E. The Stage II archaeology assessment is not yet complete; however, it will be provided to TFG

outside of this proceeding upon its completion when it is submitted to the Ministry of Heritage, Sport, Tourism and Culture Industries.

Please see Attachment 8 to this response for the species at risk assessment, titled *Natural Heritage Background Review and Field Investigations Technical Memorandum*.

5.

a) Enbridge Gas clarifies that while the RFQ requires the consultant to prepare a communications strategy for the Project, Enbridge Gas has not received from or required AECOM to prepare a specific or separate communication strategy *document* as implied by TFG. Rather, the communications strategy is reflected in the Environmental Report found at Exhibit F, Tab 1, Schedule 1, Attachment 1, Section 3: Consultation Program.

AECOM

Environmental, Cumulative Effects, Stage I & II Archaeology Assessment, Cultural Heritage Assessment and Species at Risk

Panhandle Regional Expansion Project

Enbridge Gas Inc.

July 2021

Delivering a better world

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Mr. Evan Tomek
Sr. Analyst Environment
Enbridge
Submitted Via Email: evan.tomek@enbridge.com

July 27, 2021

Subject: Environmental, Cumulative Effects, Stage I & II Archaeology Assessment, Cultural Heritage Assessment and Species at Risk – Panhandle Regional Expansion Project

Dear Mr. Tomek:

AECOM Canada Ltd. (AECOM) is pleased to provide this proposal to support Enbridge Gas Inc. (Enbridge) with environmental, cumulative effects, species at risk and cultural and archaeological services on the Panhandle Regional Expansion Project (Project). We have carefully evaluated our submission to confirm that we have provided an experienced team, unique permitting solutions and a cost-effective offering for Enbridge. The following are highlights from our submission:

- **Safety is our priority.** We focus on the prevention of safety issues using our mature industry-leading safety program. If it is not safe, we will not do it. In 2020 and 2021, AECOM worked over 120,000 hours for Enbridge with no safety, property damage or environmental incidents.
- **Schedule-driven cost savings.** We understand that the permitting path poses a risk to the project schedule. Our approach advances the completion of the Environmental Report by 4 months and initial phases of ecological field work to allow for the greatest amount of time to design a route/construction methodology that saves Enbridge money.
- **Integration of Indigenous communities.** AECOM has designed our field work to maximize opportunities for Indigenous contractors to participate in our upfront ecological and archaeological field work programs. We have [redacted] embedded in our budget representing $[redacted] (or [redacted] percent of the total field work budget) in direct spending for local Indigenous communities.
- **Experience you can trust.** We have put forward a team who have local experience and relationships with regulators that will make the Project a success. The team will be led by Mark van der Woerd, Kristan Washburn and Adria Grant. AECOM has also partnered with Dave Hodgson from DBH Soil Services Inc. to support agricultural impact assessment/mitigation, as required.

A description of these services and corresponding cost estimate are provided below. Should the nature of the work change or if Enbridge would like us to revisit any elements of our proposal, please call Mark at (289) 439-9803.

Sincerely,
AECOM Canada Ltd.

Mark van der Woerd, MES, EP
Senior Environmental Planner
(289) 439-9803
Mark.VanderWoerd@aecom.com

Karin Wall, MCIP, RPP
Vice President, Environment
D. 905-390-2022 M. 289-237-8665
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Appendices

1. Why AECOM

1.1 Mitigating Schedule Risks

The Panhandle Regional Expansion Project as understood from the Terms of Reference and email updates from Evan Tomek on July 7 and 14, 2021 includes construction of the following:

- Up to 42 inch natural gas transmission pipeline, approximately 23 km in length, commencing at the Enbridge Gas Dover Transmission Station and terminating at the Comber Transmission Station.
- An NPS 16 lateral within the Mersea Road 11 road allowance that will connect the NPS 12 Leamington North Loop Pipeline with the NPS 8 Leamington Reinforcement Pipeline.
- An NPS 16 pipeline within the Wheatley Road Allowance that will loop the existing NPS 4 pipeline from the NPS 20 Panhandle Pipeline to the Wheatley Station off Goodreau Line.

The Panhandle Regional Expansion Project is important for helping Enbridge increase the capacity of the natural gas system in Southern Ontario. The Project will help accommodate additional demand for natural gas in the greenhouse sector locally while supporting future growth in southwestern Ontario. Given the nature, size, and location of the Project, many constraints arise that could impact the successful execution of the Project. Following our review of the Request For Quotation (RFQ), AECOM has identified several strategies for reducing schedule uncertainty and ultimately mitigating costly project delays. These strategies include the following:

- **Advanced Completion of the ER**
  Our proposed schedule advances completion of the Environmental Report (ER) by 4 months. Working through the Ontario Energy Board (OEB) process for Enbridge we have seen that agencies rely on the ER as a screening tool for permitting. In order to give the team the greatest amount of time possible for permitting, we have amended the proposed schedule to advance both consultation and completion of the draft ER to late 2021.

- **Fall ELC / Habitat Assessments / Fish Habitat Assessments**
  From our recent experience on the Sarnia 2021/2022 Storage Enhancement Pipeline and Corunna and Ladysmith A-1 Observation Well Drilling Projects, the Ministry of the Environment, Conservation and Parks (MECP) has expressed a desire to review Ecological Land Classification (ELC)/Habitat Assessments during the Ontario Pipeline Co-ordinating Committee (OPCC) review. To streamline their comments and aid with Species at Risk screening with the Ministry, AECOM proposed to prioritize ELC and Habitat Assessments in the Fall and integrate the results into the ER, provided property access can be granted in time to complete the field work.

- **Alternative Cultural Heritage Framework**
  AECOM is proposing an alternative approach for the cultural heritage resources assessment. In our opinion it should not be necessary to complete a full Cultural Heritage Resources: Existing Conditions and Preliminary Impact Assessment report given that the infrastructure will be below ground and the land will be returned to existing conditions upon construction. Therefore, we propose to complete this screening memo and engaging with the Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI) upon it's completion to streamline the review/approval process.

- **Species at Risk Screening and MECP Consultation**
  The biggest risk to Enbridge's proposed in-service date is the potential need for Species at Risk (SAR) permitting. As noted above, AECOM has assumed that we will advance initial field work in Fall 2021. This positions our team to identify potential SAR habitats within the study area and present data from all of the required information sources as outlined in the MECP's *Client's Guide to Preliminary Screening for Species at Risk.* Presenting this information in a Pre-screening Memo early to MECP will allow AECOM to assess the potential need for targeted surveys and the development of mitigations measures to avoid needing permits, if possible. This approach also provides additional time for

consultation with MECP over the Winter of 2022 and giving contingency to complete further field work in Spring 2022, if necessary.

1.2 Advancing Enbridge Sustainability Goals

In 2021, AECOM launched our *Sustainable Legacies* strategy. This strategy is aligned to Enbridge's Sustainability and Environmental, Social and Governance (ESG) goals. It integrates four key pillars that will embed sustainable development and resilience across the company's work, improve social outcomes for communities, achieve net-zero carbon emissions and enhance governance.

This means that by working with AECOM, Enbridge will advance your ESG goals on the Panhandle Regional Expansion Project. Specifically, our approach aligns to your four ESG goals in the following ways (Enbridge goal in **bold**):

- **Zero Incidents, Injuries and Occupational Injuries**
  We bring practical experience navigating Enbridge safety protocols and have a proven track record for working safely. In 2020 and 2021, AECOM worked more than 120,000 hours for Enbridge and had zero recordable safety incidents, zero incidents of property damage and no environmental incidents. Further, we will build on our experience within the area leading Indigenous contractors through the Enbridge safety training to ensure all work is completed safely.

- **Increasing Indigenous Representation**
  AECOM is committed to advancing reconciliation efforts in Canada. AECOM will continue to nurture our positive relationship with local Indigenous communities on this Project. Our work plan has more than [redacted] hours embedded in our budget representing $[redacted] (or [redacted] percent of the total field work budget) in direct spending for local Indigenous communities. We are confident this approach will be a success as it builds on the success we have had on the Sarnia 2021/2022 Storage Enhancement Pipeline Project.

- **Strengthening Diversity**
  AECOM has actively worked to advance the diversity amongst our teams. We are committed to increasing representation of diverse groups within our work force. An example of this is that the majority of our proposed team are women – representing more than 50 percent of our team.

- **Net Zero Greenhouse Gas Emissions**
  AECOM has furthered our own carbon emissions goals by ensuring that the company will be operationally net-zero by the end of 2021. It has also committed to reach science-based net-zero carbon emissions by 2030 through:

  – Setting new 1.5°C-aligned emissions reduction targets;
  – Decarbonizing fleet vehicles and switching to renewable energy tariffs;
  – Partnering with its suppliers to decarbonize and include carbon; considerations into its procurement processes;
  – Implementing a 50% reduction in business travel; and
  – Creating projects centred around using nature-based solutions to offset residual carbon.

1.3 Experienced, Dedicated Enbridge Team

Enbridge is a key client for AECOM. We have proven that we have the team to drive projects through all phases of a project life-cycle for Enbridge. Every AECOM team member assigned to the Project has worked for Enbridge on

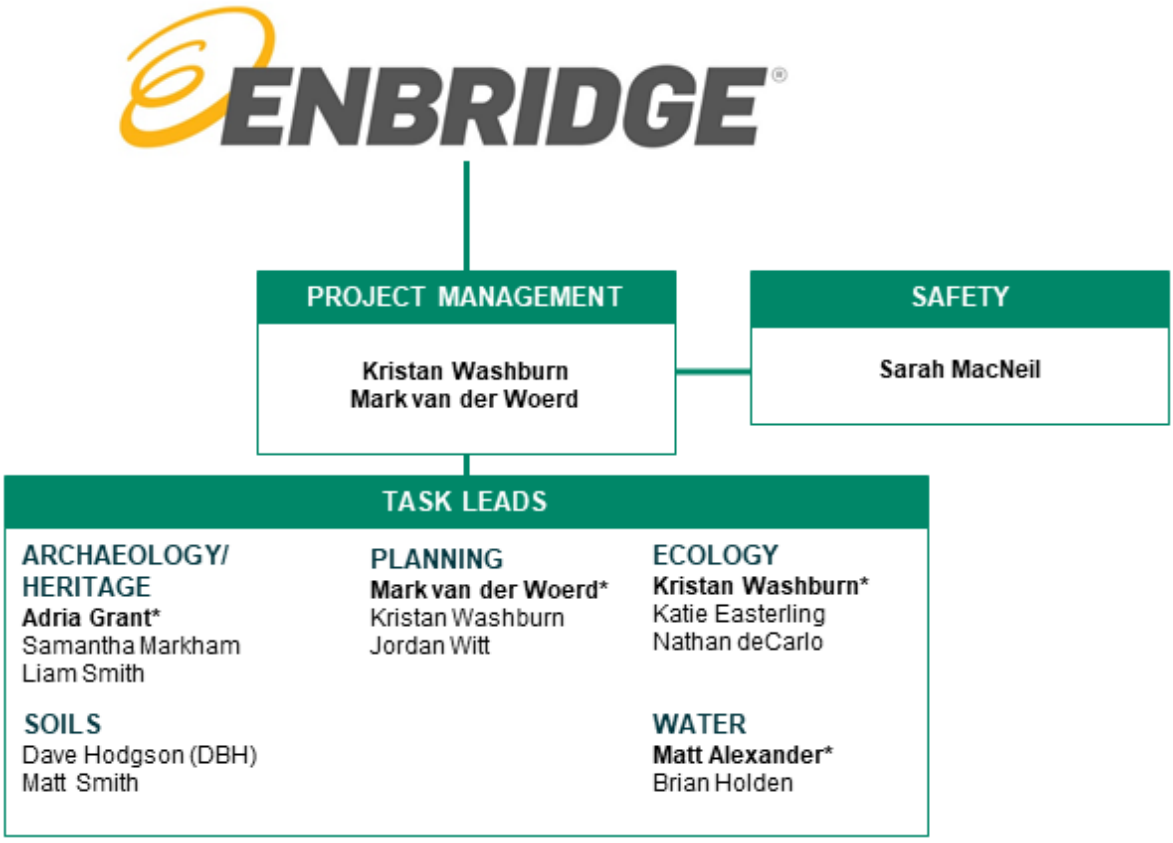
multiple assignments in the same capacity as proposed in our proposal. We are proud of our relationship with Enbridge and are grateful to have worked with your teams on the following recent projects:

- 2021/2022 Storage Enhancement Pipeline Project
- Corunna and Ladysmith A-1 Observation Well Drilling Project
- Ladysmith Integrity Dig Projects
- Kirkland Lake Lateral Project
- Owen Sound Phase 4 Reinforcement
- Owen Sound Section 4 Integrity Digs
- Northshore Lateral Replacement Project
- Coniston Station Integrity Dig
- Stratford Reinforcement Project
- Sudbury Lateral Replacement
- Community Expansion / Integrity Projects

2. Proposed Project Team

AECOM's proposed project team is identified in **Figure 1** below. **Appendix A** outlines the key team members involved in the Project, their title, qualifications, experience, rate as per the Master Service Agreement (MSA) and their percent involved in the Project.

Figure 1: Proposed Project Team



*indicates leads

3. Technical Approach

3.1 Project Management

3.1.1 Health and Safety

AECOM is committed to safety as the highest priority and joins Enbridge in ensuring all our staff are committed to safety. As of July 2021, AECOM is registered in ISNetworld with a current standing of 'Green'. Prior to the start of any field work, AECOM will also prepare a Project-specific Health and Safety Plan (HASP). As part of the preparation of the HASP, AECOM will lead a safety discussion at the kickoff meeting to identify additional potential health and safety risks for staff and develop concrete plans for mitigating those risks as part of the program.

3.1.2 Project Management

Project planning is fundamental for successful program execution. At the start of the Project, AECOM will attend a virtual kick-off meeting with Enbridge to:

- Review background of the Project, confirm the schedule and confirm the Scope of Services;
- Outline outstanding information to be provided by Enbridge;
- Identify strategies for addressing potential Project challenges; and
- Review the program-specific Health and Safety items.

AECOM will maintain regular communication with Enbridge regarding key milestones and deliverables, budget management, driving of the schedule and any emerging Project challenges. AECOM will host ten bi-weekly update teleconference meetings (0.5 hour in length) with Enbridge until the ER is finalized in December 2021. These calls will be used to provide progress updates, discuss Project-related issues that may arise, and review the Project schedule and budget.

3.2 Baseline Review and Evaluation of Alternatives

3.2.1 Study Area, Environmental Inventory and Pipeline Route Alternatives

AECOM will work with Enbridge to select a Project Study Area that encompasses the proposed general pipeline routes provided in the RFQ. Once the Project Study Area has been confirmed, AECOM will conduct an environmental inventory of potential environmental and social constraints through a desktop study, windshield survey (restricted to areas visible from the road) and information obtained from government agencies and, if available, Indigenous communities. Prior to engaging with stakeholders and government agencies, AECOM will provide Enbridge with a list of organizations to be contacted for information collection purposes.

A preliminary constraints map generally showing the Project area is attached as **Appendix B**. This information will be used to consider additional pipeline route alternatives using Project-specific routing criteria. Unless otherwise agreed upon with Enbridge, up to three (3) pipeline route alternatives, including micro-routing on the preliminary preferred route, may be considered for the Project.

3.2.2 Environmental Inventory and Desktop Analysis

AECOM will prepare a desktop analysis of existing conditions within the Project Study Area by leveraging information from online atlases and open source data, regulatory authorities, municipalities, agencies, and Indigenous communities. The background information will be used to guide the comparative evaluation of alternative routes and the development of mitigation measures to assist in avoiding and/or reducing potential impacts to the environment. To augment the desktop information, a windshield survey will document local features along the pipeline route alternatives; however, there will be a focus on verifying desktop information along the preliminary preferred route. Constraints and alternative mapping prepared will be at a scale of 1:25,000, while other mapping (e.g., environmental setting of the preferred route) will be at 1:10,000. Information gathered and assessed will include data on land use and socio-economic features, designated natural areas, vegetation, wildlife and wildlife habitat, aquatic resources, SAR, surficial water, soils, hydrological conditions, cultural heritage, and archaeological resources.

3.2.3 Effects Assessment and Selection of Preferred Route

AECOM will evaluate the pipeline route alternatives using the information collected to identify constraints. The information will be reviewed against evaluation criteria agreed upon with Enbridge to select the preferred route for the Project in an objective, replicable and defendable manner. The evaluation will consider natural (physical and bio-physical), socio-economic and technical criteria developed for the Project based on information received from government agencies and the environmental inventory.

Following the selection of the preferred route and PIS, AECOM will assess the potential effects of the preferred route on the physical, biophysical and socio-economic environment. This includes a high-level evaluation of potential cumulative effects that may result from interactions between the Project and other developments or projects planned in the area. As part of the assessment, AECOM will recommend mitigation measures to be implemented during construction and operation of the pipeline based on accepted industry practice and Enbridge's Construction Specifications. If necessary, site-specific maps will be prepared to identify mitigation that may be proposed at environmental sensitive areas.

3.3 Communications and Consultation Strategy

AECOM will undertake an integrated communications strategy and public consultation program for the Project that allows Indigenous communities, local landowners, and stakeholders to participate in the planning process. Potentially interested parties and agencies will be identified at the beginning of the study for inclusion in the Project Contact List. The Project Contact List will be provided to Enbridge at the beginning of the Project and will be updated as the Project advances.

The communications and consultation strategy for the Project will include the following:

- Prepare and issue Notice of Commencement and Public Information Sessions, which will be provided to residents within the study area via mail drop and advertised once in two (2) local newspapers (Chatham Voice [$349 per advertisement] and Chatham Daily News [$600 per advertisement] or Essex Free Press [$223.44 per advertisement]). Direct mailings will occur for Indigenous communities, the OPCC and other key stakeholders and agencies;

- AECOM anticipates hosting two PISs in November on back to back evenings in Comber and Tilbury. The purpose of the PIS will be to seek public input and preferences on the alternative routes identified, to provide rationale for the selection of the preferred route and to confirm how public input will be used to complete the ER.
  - We have assumed that Mark, Kristan and a support person will attend at a PIS. AECOM will prepare poster boards (up to 20 panels) and supporting materials (e.g., questionnaires, names tags) for the Public Information Sessions. We will also arrange for light snacks and refreshments.
  - Note: should public health protocols not permit or if Enbridge does not want to proceed with in-person gatherings, AECOM will shift to a virtual public information session that mirrors Enbridge's current practice (i.e., dedicated project URL, virtual presentation with voiceover and use of online comment forms) at no additional cost;

- Following the PISs, AECOM will prepare a summary that will document the number of attendees, comments received, and responses provided, which will be appended to the ER.

A comment tracking table will be used to record Project communications from stakeholders until substantial construction is complete. To aid in receipt and response to comments, a project-specific email will be used and maintained for the duration of the Project. AECOM will update and provide this table to Enbridge when needed to support agency or municipal consultation associated with the Project.

AECOM will also support Enbridge's Indigenous Engagement Advisor as needed with engagement of local communities for the Project. AECOM is available to assist with consultation tracking and preparing Indigenous-specific Notice of Commencement letters, Project details and location of consultation.

3.4 Completion of the Environmental Report

Following the PISs, AECOM will prepare an ER that documents the findings of the above listed tasks in a manner that satisfies the OEB Environmental Guidelines (7th Edition). The purpose of the report is to communicate, in a transparent and traceable manner, the generation and assessment of the pipeline route alternatives. An integral component of this report is the description of consultation undertaken.

AECOM will provide a Draft ER (Adobe Acrobat and/or Microsoft Word format) to Enbridge for review and comment in December 2021. After addressing one round of input from Enbridge, the finalized report will be provided to Enbridge in a format suitable for immediate distribution to agencies. The finalized report will be submitted within seven (7) days of receipt of compiled comments provided there are no comments requiring substantial updates to the documentation. It is assumed that either Enbridge or AECOM will circulate the ER to the OPCC virtually to notify interested/affected stakeholders that the ER has been prepared.

AECOM has included time to support Enbridge with responses to agencies and stakeholders during the OPCC review. We have also included budget for IR response and for Mark to testify at a hearing, should it be required.

3.5 Archaeology and Cultural Heritage Assessments

3.5.1 Stage 1 Archaeological Assessment

AECOM will conduct all archaeological assessments to meet the requirements of the MHSTCI Standards and Guidelines for Consultant Archaeologists in accordance with the *Ontario Heritage Act*, R.S.O. 1990, c. 0.18. The Stage 1 background study will identify known archaeological sites, areas subject to previous assessments and will evaluate the potential for archaeological resources to be present on undisturbed land according to provincial criteria.

As part of the Stage 1 research AECOM intends to complete a comprehensive property inspection of the entire corridor. The intent of this inspection is to identify and delineate all disturbance within the municipal Right-of-Ways (ROWs) to clear these areas to the greatest extent possible from requiring any further work. The Stage 1 archaeological assessment will provide Enbridge with clear direction early on in the design process, to site infrastructure accordingly to minimize Stage 2 archaeological assessment costs.

3.5.2 Stage 2 Archaeological Assessment

The Stage 2 archaeological field investigation will consist of the physical inspection of the land to be impacted by the development that was identified in the Stage 1 archaeological assessment as having potential for archaeological resources to be present. It is our understanding that the NPS 42 line from Comber Station to Dover Station is entirely in greenfield. The easement is 23 km in length and 30 m wide, consisting of approximately 170 acres of land requiring assessment of which approximately 12 acres is land that cannot be ploughed, and the remaining is agricultural field. For the NPS 16 portions along Mersea Road and Wheatley Road, AECOM has assumed that 5 metres of the construction area will occur within the municipal road allowance with the other 5 metres located on private property. From our desktop review, AECOM assumes that the 5 metre portion within the road allowance will be deemed “pre-disturbed”. The 5 metre portion on private property will require further assessment by test pit assessment. If any land can be ploughed in advance of assessment this would result in a cost saving for Enbridge.

Based off the location of the study area and current condition of the land, the Stage 2 field investigation will consist of a combination of pedestrian survey and the standard test pit survey, both at 5 m intervals. Agricultural fields need to be ploughed and weathered to achieve 80% ground surface visibility for the MHSTCI to accept our results, and test pits will be shovel width in diameter and excavated approximately 30 cm deep.

This budget includes time to engage with three First Nations groups during the Stage 2 archaeological assessment. AECOM will co-ordinate with each group to share information and facilitate the participation of field liaisons to work alongside the archaeological crew. AECOM’s team has great, long standing relationships with local First Nations groups in the study area.

To develop the scope of work for field work we have assumed:

- Enbridge will co-ordinate land access and field conditions preparation and that there will be sufficient prepared fields for survey to allow the team to work a full week at a time.
- To increase efficiencies, Enbridge will co-ordinate with landowners to allow the archaeological team permission to use turbine access roads to reach the study area.
- Half of the NPS 16 work areas will be sited primarily within the disturbed municipal ROW, which will be cleared of requiring further work during the Stage 1 archaeological assessment. Stage 2 field investigation will be required for the Comber Station to Dover Station line and for 5 metres adjacent to the NPS 16 road allowance.
- This budget assumes 20 acres of additional temporary land on private property will require assessment via pedestrian survey.
- The laboratory level of effort is 25 hours to wash, analyze and catalogue artifacts; no more than 200 artifacts will be identified that require processing and analysis.

- This budget includes the cost to cover six (6) First Nations monitors to participate in field work.

3.5.3 Cultural Heritage Assessment

AECOM's Cultural Heritage team will complete a desktop Cultural Heritage Screening Memorandum to help understand the opportunities and constraints to infrastructure improvements for the Project. In our professional opinion it should not be necessary to complete a full Cultural Heritage Resources: Existing Conditions and Preliminary Impact Assessment report given that the infrastructure will be below ground and the land will be returned to existing conditions upon construction finishing.

The Cultural Heritage Screening Memorandum will summarize the results of a desktop review for the entire project area and will include a collection of background information, including a review of primary and secondary source material and historical maps. A review of federal, provincial, and municipal databases, including the municipal Heritage Registers, will be conducted in order to provide an inventory of properties that have been identified and/or designated as having cultural heritage value or interest. Using the MHTSCI *Criteria for Evaluating for Potential Built Heritage Resources and Cultural Heritage Landscapes*, the memo will determine if there are potential cultural heritage resources within the project area based off the desktop review. The Memo will provide high-level recommendations based on the results of the desktop review; upon its completion the MHSTCI will be consulted to determine if there is a need for any further heritage assessment while keeping the scope of any further reporting to the minimal required.

3.6 Ecological Assessments

3.6.1 Species at Risk

Based on a preliminary review of online resources the following terrestrial SAR have documented records within the general area of the proposed pipelines:

- Bank Swallow
- Barn Owl
- Barn Swallow
- Blanding's Turtle
- Bobolink
- Chimney Swift
- Common Five-lined Skink (Carolinian population)
- Dense Blazing- star
- Eastern Foxsnake (Carolinian Population)
- Eastern Meadowlark
- Eastern Small-footed Myotis
- Henslow's Sparrow
- Kentucky Coffee-tree
- King Rail
- Least Bittern
- Little Brown Myotis
- Northern Myotis
- Prothonotary Warbler
- Queensnake
- Spiny Softshell
- Tri-colored Bat

AECOM's Ecology team will complete field investigations to characterize existing terrestrial natural heritage conditions and identify potential SAR and SAR habitats that fall within the study area. The study area is assumed to be a 30 m buffer on either side of the preferred pipeline routes. With project award in August, AECOM is positioned to complete this work in the late summer/ fall for inclusion into the ER, assuming procurement of property access.

AECOM will complete the following investigations as part of this scope of work:

- Ecological Land Classification to categorize and delineate vegetation communities and document suitable agricultural fields for grassland SAR birds. These surveys will follow the protocols outlined in the Ecological Land Classification System for Southern Ontario (Lee *et al.*, 1998) to Vegetation Community Type and compile an incidental flora and fauna inventory. During these surveys, AECOM ecologists will document areas of suitable SAR bat roosting;
- Incidental observations of SAR;
- Infield SAR Screening to identify where suitable SAR habitats exist (e.g., crayfish chimneys, wetlands); and if additional targeted surveys may be required; and
- Participation of six (6) Indigenous monitors with the field crew.
- Should suitable SAR habitats be found as part of the above-identified work, we suggest that any targeted survey requirements be confirmed with MECP before completion. As such, we have not identified any additional targeted surveys as being required at this time. After consultation with MECP, additional targeted surveys may be identified as necessary, at which time AECOM can complete these surveys under a scope change.

3.6.2 Aquatic Resources, including SAR

A desktop review will be undertaken to identify, delineate and categorize the sensitivity of aquatic species and habitats in the study area. The review will include known habitat of aquatic species afforded protection under the *Species at Risk Act* (SARA) and *ESA*. According to the Department of Fisheries and Oceans Canada (DFO) Online Aquatic SAR Mapping, there are numerous fish and mussel species within the study area, including: Fawnsfoot, Hickorynut, Mapleleaf, Lillliput, Lake Chubsucker, Spotted Sucker, Silver Lamprey, Northern Sunfish and Eastern Sand Darter. Additionally, the Thames River has been classified as critical habitat for Fawnsfoot under SARA.

We have assumed all watercourse will be open-cut with the exception of the Thames River and Jeanette Creek. Considering the numerous fish and mussel SAR species identified through the preliminary background review, AECOM has scoped fish habitat assessments at all watercourses except the Thames River and Jeanette Creek. There are approximately 47 watercourses/ drains the Project will cross, approximately 15 of which have known records of aquatic SAR. To support potential *Fisheries Act* approvals and permits under *SARA* and the *ESA,* habitat assessments will be conducted at all watercourse crossings. The presence of aquatic SAR trigger the requirement for regulatory review under the *Fisheries Act* by DFO, as Enbridge's agreement with DFO does not cover work in watercourses with aquatic SAR. As such, DFO will likely want to review all aspects of the projects that have the potential to impact fish and fish habitat and will list the watercourses and activities in their approval. Field investigations will be completed within the pipeline RoW where property access is permitted. Investigations will include an assessment of morphology, approximate channel dimensions, substrates, aquatic vegetation, and SAR habitat suitability. We have assumed that all land access will be provided by Enbridge prior to mobilizing to the field and that six indigenous monitors will participate in the work.

3.6.3 SAR Permitting Strategy

If it is determined that SAR will be affected by the Project, it will be difficult to meet an in-service date of Fall 2023 without an *Endangered Species Act* permitting strategy in place. AECOM proposes that we complete the initial field surveys (at a minimum the windshield survey) identified in **Section 3.6.1 and 3.6.2** as soon as possible after award and procurement of access permissions from landowners. The intent of the field investigations will be to identify potential SAR and SAR habitats within the study area and present data from all of the required information sources as outlined in the MECP's *Client's Guide to Preliminary Screening for Species at Risk.* Presenting information from all the sources identified in this document (including field investigations) allows us to submit a Pre-screening Memo to MECP. In this Memo, AECOM will discuss what species may be affected by the Project, make preliminary suggestions towards Mitigation Advice (previously called Letter of Advice) instead of a permit and propose targeted surveys we consider warranted. MECP can then respond to our Pre-screening Memo by providing mitigation advice and confirmation that no permit is needed or confirmation of what targeted surveys may be required. We assume it will be unlikely to accomplish all the terrestrial and aquatic habitat assessments prior to the Spring of 2022, as it is unlikely that property access will be granted for all lands prior to early fall. Therefore, we have assumed one update to the Pre-screening Memo after completion of the field investigations in the Summer of 2022. To manage risk to project schedule, should a permit be required, we propose SAR-related activities follow the schedule outlined in **Table 1.**

Table 1: SAR Permitting Schedule

Activity	Targeted Dates
Initial SAR Field Investigations (ELC, incidental and SAR Screening)	August – November 2021
Pre-screening Memo submission to MECP	November 2021
Meet with MECP to confirm field investigation requirements	December 2021
Field investigation results and additional field investigation requirements documented in the ER	December 2021
Additional Targeted Field Investigations	April – July 2021
Submission of Information Gathering Form (IGF) to MECP	July 2021
MECP response on IGF	July-August 2021
Submission of Alternative Avoidance Form and C-permit application to MECP (If needed)	August 2021 – September 2021
Permitting Approvals Timelines (If needed)	September 2021 – January 2023
Permit in Hand (If needed)	January/February 2023

This strategy will support an expedited permitting timeline with MECP through the following means:

1. Submission of a Pre-screening Memo gets the Project into the system early and puts an MECP biologist on the file, which means a faster response when the IGF is submitted.
2. Confirming targeted field investigations means MECP agrees with the proposed surveys, and there will be no surprises when the IGF is submitted.
3. Submission of the Alternative Avoidance Form and C-Permit Application at the same time expedites review time for these documents.

Although we will complete the field investigations and Pre-screening Memo to support a tight permitting timeline, we will endeavour to obtain Mitigation Advice (previously Letter of Advice) from MECP and avoid a permit under the *Endangered Species Act* (ESA) wherever possible and warranted. As part of the initial work plan additional targeted surveys or permitting activities are required, this will be addressed under a scope change.

3.7 Agricultural Resources

When working in agricultural areas where soybean crops have been part of the crop rotation, EGI may want to consider completing analysis of the soil for Soybean Cyst Nematode (SCN). Although mitigation measures will be developed and implemented to prevent the spread of SCN, AECOM has assumed a budget for $[redacted] for sampling and laboratory analysis, should it be required.

3.8 Excess Soils

Excess soil management has been regulated in Ontario under O. Reg. 406/19 since January 1, 2021. The regulation is coming into effect in phases over the next several years. Starting on January 1, 2022, the Regulation requires that notice be filed in the Environmental Site Registry (The Registry) for any:

- "Project" that generates "Excess Soil" or
- Any "Reuse Site" where at least 10,000 m^3 of Excess Soil will be received.

The following documents must be generated and attached to the notice filed in the Registry for each Project:

1. Assessment of Past Uses
2. Sampling and Analysis Plan
3. Soil Characterization Report
4. Excess Soil Destination Assessment Report

All the above-noted documents must be completed by a Qualified Person (QP), as defined in Ontario Regulation 153/04 (O. Reg. 153/04) and referenced in O. Reg. 406/19.

As part of the proposed scope, AECOM has included a budget for the completion of the Assessment of Past Uses report and Sampling and Analysis Plan. Both documents will be completed in accordance with the MECP document entitled "*Rules for Soil Management and Excess Soil Quality Standards*", dated 2020 (The Soil Rules).

The Assessment of Past Uses report will be used to develop a preliminary determination of the likelihood that one or more contaminants have affected soil or rock in a location where soil or crushed rock will be excavated within the project area. Areas of Potential Environmental Concern (APECs) will be identified within the project area that may have been affected by a Potentially Contaminating Activity (PCA). Associated contaminants of potential concern (COPCs) will also be identified for each APEC.

The assessment of past uses will consist of a records review, interview(s) with Enbridge personnel, a site reconnaissance, a review and evaluation of information and the preparation of a report.

The Sampling and Analysis Plan (SAP) will be based on the Assessment of Past Uses and will ensure the appropriate level of sampling and analysis is carried out to determine concentrations of contaminants in the excavated soil or crushed rock. The SAP will outline proposed sampling locations, proposed chemical analyses and sampling rationale.

3.9 Environmental Protection Plan

Prior to construction, AECOM will prepared an Environmental Protection Plan (EPP) and Environmental Alignment Sheets (EAS). These documents will identify the environmental mitigation to be in place during construction. A Draft EPP and EAS will be provided to Enbridge in the Summer of 2022. It is expected that finalization of the document and mapping will occur Fall 2022. We have assumed that digital copies of the EPP and EAS will be submitted to Enbridge. We recognize the EPP is a living document that may require updates during construction. Consequently, AECOM's budget has included time to update the EPP two (2) times following finalization. We have assumed the EPP will be provided digitally.

4. Schedule

AECOM understands the critical nature of the timelines outlined by Enbridge. As identified previously, we are proposing a compressed schedule, which provides deliverables to Enbridge ahead of the timelines identified in the RFQ. The schedule is outlined in **Table 2.**

Table 2. Project Schedule

Key Project Phase	Date
Kick-Off Meeting	August 9, 2021 (Following the kick-off meetings, 24 bi-weekly, 0.5 hr, meetings are assumed from August – Fall, 2022 with additional adhoc meetings booked, as needed)
Windshield Survey	Week of August 23, 2021
Complete Information Requests	September 6, 2021
Baseline Review and ER Routing Analysis	August - September, 2021
Notice of Commencement and Public Information Session	Week of October 11, 2021
Details Terrestrial and Aquatic Habitat Assessments for SAR	Fall 2021 (field work as land access permits)
Stage 1 & 2 Archaeological Assessment	Fall 2021 (field work as land access permits)
Cultural Heritage Assessment	Fall 2021
Public Information Session	Week of November 1, 2021
Public Comment Period	November 8 – 26, 2021
MECP SAR Pre-screening Memo	November 10, 2021
Meet with MECP and Confirm Targeted Field Investigation Requirements	Week of December 1, 2021
Draft Environmental Report	December 10, 2021
Final Environmental Report	Within 7 days of receipt of consolidated comments from Enbridge
Additional Terrestrial and Aquatic Field Investigations	Spring- Summer 2022
Updated SAR Pre-screening Memo with Aquatics Data	August 2022
Draft Environmental Protection Plan	Summer 2022
Final Environmental Protection Plan	Fall 2022 (flexible but requires 2 months to complete)
Assessment of Past uses and Soil Sampling Plan	Fall 2022 (flexible but requires 2 months to complete)

5. Budget

The budget for the Scope of Services described above for the Panhandle Regional Expansion Pipeline Project is $[redacted] A breakdown of the total hours, fees and expenses by task are provided in **Table 3** below. A schedule of per diem professional fees for attendance at additional meetings and for testifying at the OEB, if required, is provided in **Appendix C.**

Table 3. Breakdown of total hours, fees and expenses by task.

ID	Task Name	Hours	Fees	Expenses
1	**Project Management and Safety**	[redacted]	[redacted]	[redacted]
1.1	Project Management	[redacted]	[redacted]	[redacted]
1.2	Safety Planning and Task Hazard Assessments	[redacted]	[redacted]	[redacted]
2	**Meetings with Enbridge**	[redacted]	[redacted]	[redacted]
2.2	Kick-off Meeting	[redacted]	[redacted]	[redacted]
2.3	Progress Meetings	[redacted]	[redacted]	[redacted]
3	**Environmental Report**	[redacted]	[redacted]	[redacted]
3.1	Background Review and Info Requests	[redacted]	[redacted]	[redacted]
3.2	Windshield Survey	[redacted]	[redacted]	[redacted]
3.3	Comparative Evaluation of Alternative Routes	[redacted]	[redacted]	[redacted]
3.4	Draft ER	[redacted]	[redacted]	[redacted]
3.5	Finalization of ER	[redacted]	[redacted]	[redacted]
4	**Stage 1 and 2 Archeology**	[redacted]	[redacted]	[redacted]
4.1	Stage 1 Archaeology	[redacted]	[redacted]	[redacted]
4.2	Stage 2 Archaeology	[redacted]	[redacted]	[redacted]
4.3	Indigenous Monitors	-------	[redacted]	-------
5	**Species at Risk**	[redacted]	[redacted]	[redacted]
5.1	Ecological Land Classification and Terrestrial SAR Screening	[redacted]	[redacted]	[redacted]
5.2	Panhandle Aquatic SAR Investigations	[redacted]	[redacted]	[redacted]
5.3	Leamington Loop Aquatic SAR Investigations	[redacted]	[redacted]	[redacted]
5.4	Wheatley Loop Aquatic SAR Investigations	[redacted]	[redacted]	[redacted]
5.5	Pre-screening Memo to MECP	[redacted]	[redacted]	[redacted]
5.6	Indigenous Monitors	-------	[redacted]	-------
6	**Cultural Heritage**	[redacted]	[redacted]	[redacted]
6.1	Cultural Heritage Report and Checklist	[redacted]	[redacted]	[redacted]
7	**Communication Strategy**	[redacted]	[redacted]	[redacted]
7.1	Contact List, Project-specific Email	[redacted]	[redacted]	[redacted]
7.2	Notice of Project and Public Information Session (PIS) (Notice, Letters, Newspaper Ads, Mail Drop)	[redacted]	[redacted]	[redacted]
7.3	Comment Tracking (2 hours each month for 20 months)	[redacted]	[redacted]	[redacted]
8	**Public Information Session**	[redacted]	[redacted]	[redacted]
8.1	PIS Materials (Story Boards, Sign-in Sheets, Questionnaires, Name Tags)	[redacted]	[redacted]	[redacted]
8.2	PIS Attendance (Venue, Food, Summary Report)	[redacted]	[redacted]	[redacted]
9	**Environmental Protection Plan**	[redacted]	[redacted]	[redacted]
9.1	EPP Document	[redacted]	[redacted]	[redacted]
9.2	Alignment Sheets	[redacted]	[redacted]	[redacted]
9.3	EPP Revisions	[redacted]	[redacted]	[redacted]
10	**OPCC Review/ Hearing**	[redacted]	[redacted]	[redacted]
10.1	OPCC Review	[redacted]	[redacted]	[redacted]
10.2	IR Response	[redacted]	[redacted]	[redacted]
10.3	Hearing Support	[redacted]	[redacted]	[redacted]
11	**Soils**	[redacted]	[redacted]	[redacted]
11.1	Assessment of Past Uses Report	[redacted]	[redacted]	[redacted]
11.2	Sampling and Analysis Plan	[redacted]	[redacted]	[redacted]
11.3	Soy Bean Nematode	[redacted]	[redacted]	------
Subtotals (excluding HST)		[redacted]	[redacted]	[redacted]
Total Price *(including Indigenous subcontractors, disbursements, excluding HST)*			$[redacted]	

5.1.1 Commercial Terms

Should Enbridge wish to add, change or remove services as outlined in our proposed Scope of Services, our team will be happy to renegotiate the cost of services. Our proposal is valid for your acceptance for 30 days, after which time it may require a review of the assumptions provided. The terms and conditions for the work will align with our existing MSA.

If performance of the Services is affected by causes beyond AECOM's reasonable control ("Force Majeure"), the project schedule and the compensation shall be equitably adjusted to compensate AECOM for any reasonable increase in the time and costs necessary to perform the services. Force Majeure shall include, but not be limited to "acts of God", abnormal weather conditions or other natural catastrophes, war, terrorist attacks, sabotage, computer viruses, riots, strikes, lockouts or other industrial disturbances, pandemics, epidemics, health emergencies, viruses (e.g., SARS Cov-2), disease (e.g., COVID-19), plague, quarantine, travel restrictions, discovery of hazardous materials, differing or unforeseeable site conditions, acts of governmental agencies or authorities (whether or not such acts are made in response to other Force Majeure events).

Appendix A

Project Team Experience Table

Appendix A. Project Team Experience Table

AECOM's proposed project team is identified in the table below and outlines the key team member involved in the project, their title, qualifications, experience, rate as per the MSA and their percent involved in the project.

Name and Title	Qualifications	Enbridge Project Experience1	MSA Rate	Percent Involved (by discipline)
Project Management				
Mark Van der Woerd Senior Environmental Planner	MES, B.Sc., EP, IAP2	■ 2021/2022 Storage Enhancement Pipeline Project ■ Corunna and Ladysmith A-1 Observation Well Drilling Project ■ Ladysmith Integrity Dig Projects ■ Owen Sound Phase 4 Reinforcement ■ Northshore Lateral Replacement Project ■ Owen Sound Section 5 Integrity Digs ■ Owen Sound Section 4 Integrity Digs ■ Coniston Station Integrity Dig ■ Stratford Reinforcement Project ■ Sudbury Lateral Replacement ■ Many additional Community Expansion / Integrity Projects.	$[redacted]	[redacted]
Kristan Washburn Senior Ecologist / Project Manager	MES, B.Sc., Env Tech. Dip.	**PM for the:** ■ 2021/2022 Storage Enhancement Pipeline Project ■ Corunna and Ladysmith A-1 Observation Well Drilling Project ■ Ladysmith Integrity Dig Projects ■ Northshore; and ■ Owen Sound Phase 4 Reinforcement pipeline projects. **Ecology Lead for:** ■ 2021/2022 Storage Enhancement Pipeline Project ■ Corunna and Ladysmith A-1 Observation Project ■ Ladysmith Integrity Dig Projects ■ Owen Sound Phase 4 Reinforcement ■ Northshore Lateral Replacement Project ■ Owen Sound Section 5 Integrity Digs ■ Owen Sound Section 4 Integrity Digs ■ Coniston Station Integrity Dig ■ Stratford Reinforcement Project ■ Sudbury Lateral Replacement ■ Many additional Community Expansion / Integrity Projects.	$[redacted]	[redacted]
Sarah MacNeil Health and Safety Lead		**Safety lead of the:** ■ 2021/2022 Storage Enhancement Pipeline Project	$[redacted]	[redacted]

Name and Title	Qualifications	Enbridge Project Experience1	MSA Rate	Percent Involved (by discipline)
		■ Corunna and Ladysmith A-1 Observation Well Drilling Project ■ Ladysmith Integrity Dig Projects ■ Owen Sound Phase 4 Reinforcement pipeline projects.		
Heritage Resources (Archaeology and Built Heritage)				
Adria Grant Archaeology and Heritage Lead	MA Archaeology	**Technical Lead of the:** ■ Line 10 ■ Milton Line Expansion ■ 2021/2022 Storage Enhancement Pipeline Project ■ Corunna and Ladysmith A-1 Observation Well Drilling Project ■ Ladysmith Integrity Dig Projects ■ Sudbury Lateral Replacement ■ Stratford Reinforcement Project ■ Owen Sound Phase 4 Reinforcement ■ Oxford Reinforcement pipeline projects.	$[redacted]	[redacted]
Samantha Markham Archaeology Manager	MES Anthropology	**Project facilitator of the:** ■ Line 10 ■ Sudbury Lateral Replacement ■ Stratford Reinforcement Project ■ 2021/2022 Storage Enhancement Pipeline Project ■ Corunna and Ladysmith A-1 Observation Well Drilling Project ■ Ladysmith Integrity Dig Project ■ Owen Sound pipeline projects.	$[redacted]	[redacted]
Liam Smyth, BURPI Heritage Co-ordinator	B.URPI	**Heritage Researcher for:** ■ City of Toronto, Ontario ■ Ontario Ministry of Transportation ■ Hydro One projects.	$[redacted]	[redacted]
Archaeology Field Tech		**Field technicians on:** ■ Sudbury Lateral Replacement ■ 2021/2022 Storage Enhancement Pipeline Project ■ Corunna and Ladysmith A-1 Observation Well Drilling Project ■ Ladysmith Integrity Dig Projects ■ Stratford Reinforcement Project ■ Owen Sound Phase 4 Reinforcement	$[redacted]	[redacted]
Indigenous Monitors	N/A	■ N/A	$[redacted]	[redacted]
Ecology (Terrestrial and Aquatic)				
Katie Easterling Senior Ecologist	H.B.Sc.	**Aquatic Ecology and Permit Lead for the:** ■ Lancaster Remediation at Fillion Drain	$[redacted]	[redacted]

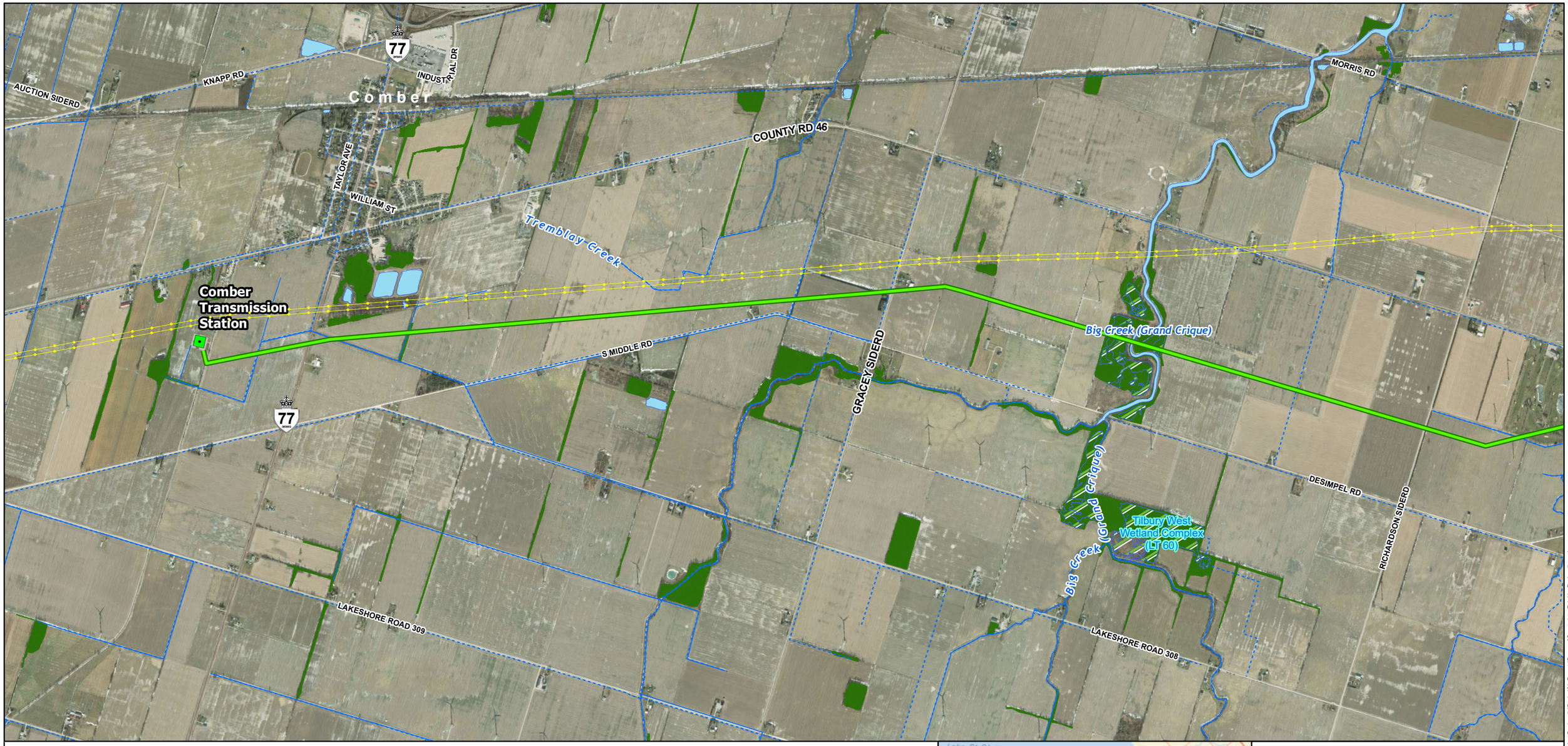
Name and Title	Qualifications	Enbridge Project Experience1	MSA Rate	Percent Involved (by discipline)
		■ Panhandle Reinforcement Project - Dawn to Dover ■ Bentpath Line Pipeline ■ Hamilton to Milton Pipeline ■ Burlington to Oakville Pipeline ■ Brantford to Kirkwall Pipeline ■ Dawn H Compressor Station ■ Bright C Compressor Station		
Nathan DeCarlo Ecologist	MES	**Aquatic and Terrestrial Support for:** ■ Owen Sound Phase 4 Reinforcement ■ 2021/2022 Storage Enhancement Pipeline Project ■ Corunna and Ladysmith A-1 Observation Well Drilling Project ■ Ladysmith Integrity Dig Projects ■ Beachville Expansion and Kingsville Reinforcement ■ Sudbury Lateral Replacement	$[redacted]	[redacted]
Indigenous Monitors	N/A	■ N/A	$[redacted]	[redacted]
Water (Surface Water, Groundwater, Geology and Soils)				
Matt Alexander Hydrogeology Manager	M.Sc., P.Geo.	**Water lead on the:** ■ Sudbury Lateral Replacement ■ Stratford Reinforcement Project ■ Hailey Lateral pipeline projects. **Senior water support on the:** ■ Owen Sound Phase 4 Reinforcement	$[redacted]	[redacted]
Brian Holden Professional Geoscientist	M.Sc., B.Sc. (Hons), P.Geo.	**Water support for:** ■ 2021/2022 Storage Enhancement Pipeline Project ■ Corunna and Ladysmith A-1 Observation Well Drilling Project	$[redacted]	[redacted]
Planning (Socio-economic, Consultation and Environmental Report)				
Jordan Witt Environmental Planner	MES, BA (Hons), EPt	**Planning Support for the:** ■ 2021/2022 Storage Enhancement Pipeline Project ■ Corunna and Ladysmith A-1 Observation Well Drilling Project ■ Ladysmith Integrity Dig Projects ■ Owen Sound Phase 4 Reinforcement ■ Stratford Reinforcement Project	$[redacted]	[redacted]
Soils				
David Hodgson Senior Pedologist /Agrologist	B.Sc., P. Ag	**Soils support on:** ■ Kingsville ■ Panhandle ■ Hamilton to Milton	$[redacted]	[redacted]
Matt Smith	P. Eng., QP	**Soils lead on:**	$[redacted]	[redacted]

Name and Title	Qualifications	Enbridge Project Experience1	MSA Rate	Percent Involved (by discipline)
Senior Environmental Engineer		■ 2021/2022 Storage Enhancement Pipeline Project ■ Corunna and Ladysmith A-1 Observation Well Drilling Project ■ Owen Sound Phase 4 Reinforcement		

Note: 1. CVs available upon request.

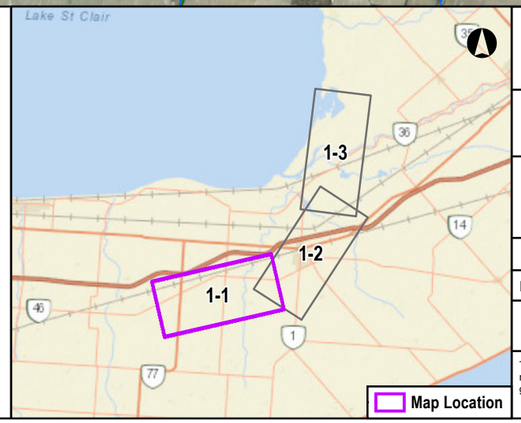
Appendix B

Constraints Map



Legend

- Comber Transmission Station
- Dover Transmission Station
- NPS 20 Pipeline
- Hydro Line
- Railway
- Constructed Drain
- Permanent Stream
- Waterbody
- Provincially Significant Wetland
- Wooded Area
- ANSI, Life Science
- Municipal Boundary



Enbridge Panhandle Regional Expansion

Constraints Map

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P#:	V#:	

AECOM

Figure 1-1

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Legend

- Comber Transmission Station
- Dover Transmission Station
- NPS 20 Pipeline
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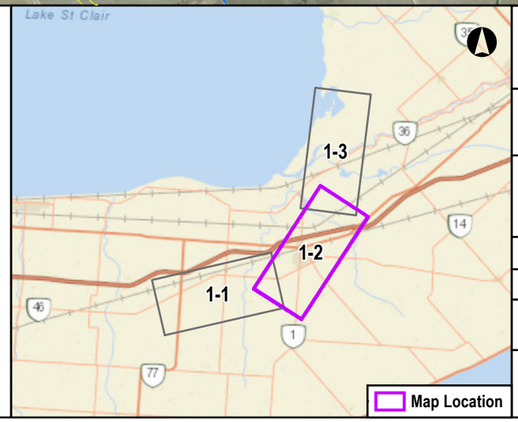

Enbridge Panhandle Regional Expansion

Constraints Map

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Figure 1-2

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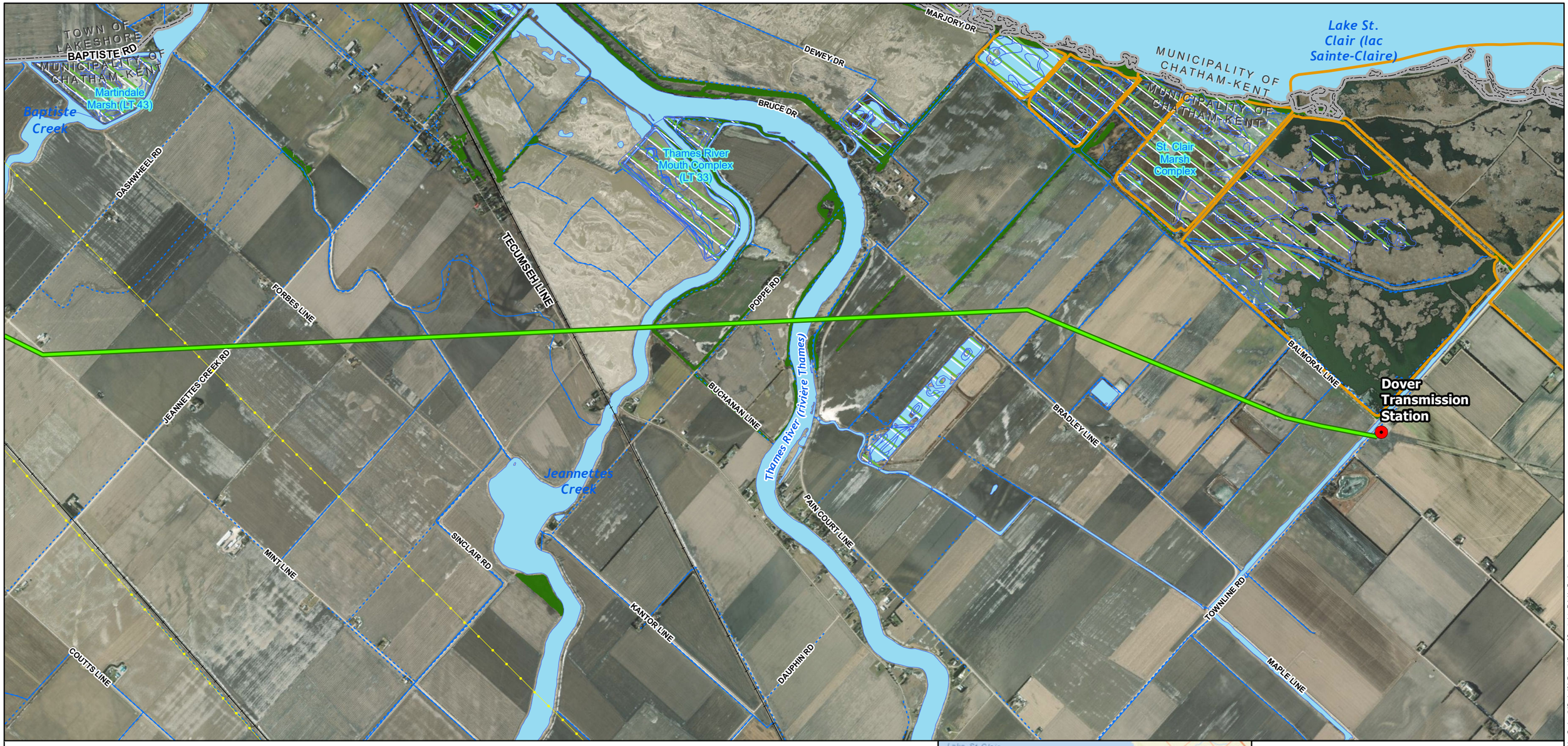

Legend

- Comber Transmission Station
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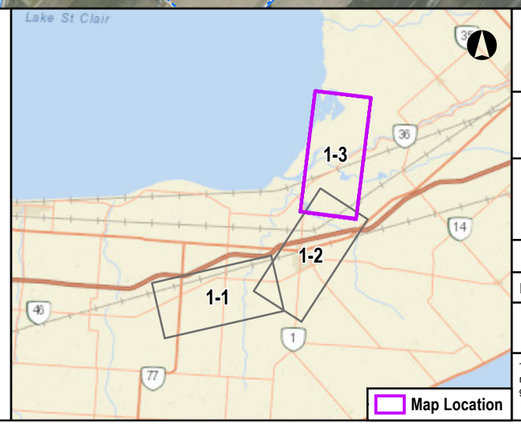
- Hydro Line
- Railway
- Constructed Drain
- Permanent Stream
- Waterbody
- Provincially Significant Wetland
- Wooded Area
- ANSI, Life Science
- Municipal Boundary



Enbridge Panhandle Regional Expansion

Constraints Map

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Meters
DATUM: NAD 1983 UTM Zone 17N

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P#:	V#:	

AECOM

Figure 1-3

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AECOM

Appendix C

Schedule of Per Diem Fees

Appendix C. Schedule of Per Diem Fees

The following table provides the per diem rates for AECOM personnel to attend additional meetings and testify at the OEB. Expenses will be charged per the Master Service Agreement (Environmental Consulting) between Enbridge and AECOM dated December 18, 2020.

Per Diem Professional Fees for Additional Meeting Attendance and Testifying

Professional Level[1]	Possible Titles[1]	Meeting Per Diem[2]	Testifying Per Diem[2]
Level 1	Junior Scientist / Engineer	$[redacted]	-
Level 2	Junior Scientist / Engineer	$[redacted]	-
Level 3	Intermediate Scientist / Engineer	$[redacted]	$[redacted]
Level 4	Mid-level Scientist / Engineer / Task Leader	$[redacted]	$[redacted]
Level 5	Senior Scientist / Engineer / Task Leader	$[redacted]	$[redacted]
Level 6	Senior Scientist / Engineer / Project Manager / Task Manager	$[redacted]	$[redacted]
Level 7	Senior Project Manager	$[redacted]	$[redacted]
Level 8	Principal / Program Director	$[redacted]	$[redacted]

Notes: 1 Professional levels and corresponding titles in accordance with the Master Service Agreement.
2 Based on 8-hour day. If the time to attend meetings or testify is less than the per diem, meeting attendance or testifying will be billed on a time and materials basis.

Mark van der Woerd, MES, EP
Senior Project Manager
Mark.VanderWoerd@aecom.com

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F: 905.578.4129
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Washburn, Kristan

Subject: FW: Request for Quotation - Panhandle Regional Expansion

From: Evan Tomek <Evan.Tomek@enbridge.com>
Sent: Friday, August 6, 2021 3:54 PM
To: Washburn, Kristan <Kristan.Washburn@aecom.com>; van der Woerd, Mark <Mark.VanderWoerd@aecom.com>
Cc: Doug Schmidt <Doug.Schmidt@enbridge.com>
Subject: [EXTERNAL] RE: Request for Quotation - Panhandle Regional Expansion

Hi Mark/Kristan,

Having spoke earlier this week Mark, my apologies for not sending the official email approval!

We are accepting this proposal and awarding Aecom this project.

Thank you for your efforts so far and we look forward to working with you on this!

Mark – please provide your availability over the next couple of weeks for a drive along the proposed routes as we discussed. We will be setting something up with you, Construction and us to take a preliminary look at things.

Thanks again and we will be in touch soon to set up a kick-off meeting.

Evan

Evan Tomek, BES
Sr. Analyst, Environment
Enbridge Inc.
50 Keil Drive North | Chatham, ON N7M 5M1
Tel: 519.436.4600 ext 5003441
Cell: 226.229.9598
email: evan.tomek@enbridge.com
Safety. Integrity. Respect.

From: van der Woerd, Mark <Mark.VanderWoerd@aecom.com>
Sent: Thursday, July 22, 2021 5:58 PM
To: Evan Tomek <Evan.Tomek@enbridge.com>
Cc: Doug Schmidt <Doug.Schmidt@enbridge.com>; Washburn, Kristan <Kristan.Washburn@aecom.com>
Subject: RE: Request for Quotation - Panhandle Regional Expansion
Importance: High

Hi Evan,

Thanks again for inviting AECOM to submit a quote to support you with the Panhandle Regional Expansion Project. We enjoy working with you and the team. Please find our proposal attached to this email. If any questions arise, please do not hesitate to reach out to us. We are happy to discuss and make any changes that may be required.

Just a reminder that I am away on holidays next week but will have access to email.

Thanks!
Mark

Mark van der Woerd
AECOM
mark.vanderwoerd@aecom.com
(289) 439-9803

From: Evan Tomek <Evan.Tomek@enbridge.com>
Sent: July-14-21 3:35 PM
To: van der Woerd, Mark <Mark.VanderWoerd@aecom.com>
Cc: Doug Schmidt <Doug.Schmidt@enbridge.com>
Subject: [EXTERNAL] RE: Request for Quotation - Panhandle Regional Expansion

Hi Mark,

So another update here – I had a meeting today to discuss this project and the team wants to put the 10 km NPS 16 transmission lateral in the road allowance on Wheatley Road back into the mix. While they won't know for another few weeks if they would like to continue with it on this project for sure, they would like it quoted in your proposal.

Please let me know if this is an issue or you need any more information from me.

Thanks!

Evan

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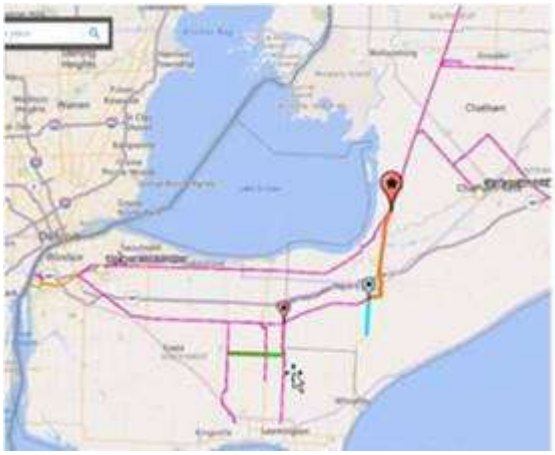
Safety. Integrity. Respect.

From: Evan Tomek
Sent: Wednesday, July 7, 2021 11:20 AM
To: van der Woerd, Mark <Mark.VanderWoerd@aecom.com>
Cc: Doug Schmidt <Doug.Schmidt@enbridge.com>
Subject: RE: Request for Quotation - Panhandle Regional Expansion

Hi Mark,

Soon after we sent out the RFQ we had an update to the proposed project.

Now, we are only going to be looking at the 23 km of looping the existing NPS 20 Panhandle from Dover to Comber (orange line on the picture below) and the "Leamington Interconnect" transmission lateral (green line). We had originally said it would be approx. 5km of NPS 16 in the Mersea Road 11 road allowance, and now it will be approx. 10 km. The Wheatley Road transmission lateral (blue line) will be taken off of this project.



Please let me know if you'd like me to re-issue the RFQ to reflect the updated info, and if you'd like to touch base with Doug and I for a short discussion on this project and I can set something up.

Thanks,

Evan

Evan Tomek, BES
Sr. Analyst, Environment
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Cell: 226.229.9598
email: evan.tomek@enbridge.com
Safety. Integrity. Respect.

From: van der Woerd, Mark <Mark.VanderWoerd@aecom.com>
Sent: Monday, July 5, 2021 5:21 PM
To: Evan Tomek <Evan.Tomek@enbridge.com>
Cc: Doug Schmidt <Doug.Schmidt@enbridge.com>
Subject: [External] RE: Request for Quotation - Panhandle Regional Expansion

Hi Evan,

Thanks for this! We appreciate the opportunity to provide a quote to Enbridge. I am confirming receipt. We will let you know if any questions come up.

Cheers,
Mark

Mark van der Woerd
AECOM
mark.vanderwoerd@aecom.com
(289) 439-9803

From: Evan Tomek <Evan.Tomek@enbridge.com>
Sent: July-05-21 4:51 PM
To: van der Woerd, Mark <Mark.VanderWoerd@aecom.com>

Cc: Doug Schmidt <Doug.Schmidt@enbridge.com>
Subject: [EXTERNAL] Request for Quotation - Panhandle Regional Expansion

Hi Mark,

Please see attached a Request for Quotation to provide Environmental Consulting services in support of Enbridge's proposed Panhandle Regional Expansion Project.

Enbridge is seeking the services of an environmental consultant to perform an EA, including an environmental, cumulative effects, and Stage 1 Archaeological Assessment of the proposed work as well as preparing the ER which will form part of the evidence filed with the OEB for the Leave to Construct. Enbridge is also seeking the services of an environmental consultant to perform a Stage II Archaeological Assessment, Cultural Heritage Assessment, and field surveys supporting the review for Species at Risk.

There are three main components of this project which are described in more detail in the attached RFQ, but generally it involves:

- Approx. 23 km of up to NPS 42 pipeline looping the existing Panhandle Pipeline from Dover to Comber
- A 10 km NPS 16 transmission lateral in the road allowance on Wheatley Road
- A 5 km NPS 16 transmission lateral in the road allowance Mersea Road 11.

We are currently targeting to have a completed ER by May 2022, and an in-service date as early as November 2023.

We are requesting a proposal be submitted to Enbridge by July 26th, 2021.

If you have any questions we can set up a call to discuss more.

Thanks,

Evan

Evan Tomek, BES
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Safety. Integrity. Respect.

CM-ENV-04-CA
ECMS: 32134
Ariba: CW2245894

MASTER SERVICES AGREEMENT (ENVIRONMENTAL CONSULTING)

This Agreement is made as of the 16th day of November, 2018,

BETWEEN:

ENBRIDGE EMPLOYEE SERVICES CANADA INC., a body corporate incorporated under the laws of Canada, having an office at Edmonton, in the Province of Alberta

(hereinafter called "Company")

- and -

AECOM Canada Ltd, a body corporate incorporated under the laws of British Columbia, having an office at 105 Commerce Valley Drive, 7th Floor, Markham, L3T 7W3, in the Province of Ontario

(hereinafter called "Contractor")

NOW THEREFORE THIS AGREEMENT WITNESSETH that in consideration of the premises, mutual covenants and agreements herein contained and for other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties hereto covenant and agree with each other as follows:

1. DEFINITIONS

1.1 In this Agreement, including without limitation the recitals hereto, the following terms shall have the following meaning respectively:

(a) "**Affiliate"** means with respect to any Person, any other Person directly or indirectly controlling, controlled by, or under common control with, such Person as of the date on which the determination of affiliation is being made. For purposes of this definition, (a) the term "control" (including the correlative meanings of the terms "controlled by" and "under common control with"), as used with respect to any Person, means the possession, directly or indirectly, of the power to direct or cause the direction of the management and policies of such Person by virtue of: (i) the ownership or direction of voting securities of the other Person; (ii) a written agreement or trust instrument; (iii) being the general partner or controlling the general partner of the other Person, or (iv) being the trustee of the other Person; and (b) each of Enbridge Income Fund Holdings Inc., Enbridge Income Fund, and Persons any of them control shall be deemed to be Affiliates of Company;

(b) "**Canadian Affiliate**" means an Affiliate of Enbridge Inc. but only to the extent such Affiliate is not a non-resident of Canada for the purposes of the *Income Tax Act (Canada).*

(c) "**Company**" has the meaning set out above;

(d) "**Company Disclosed IP**" shall have the meaning as set forth in Section 7.1 of this Agreement;

(e) "**Company IP**" means Deliverables and Company Disclosed IP;

(f) "**Confidential Information**" means any and all trade secrets, confidential, private, or secret information of Company or any Affiliate of Company regardless of form and

whether or not recorded and the term "Confidential Information" includes without limitation the following information of or in the possession of Company or any Affiliate of Company which shall come or shall have come to Contractor's knowledge during the course of providing Services for Company (whether before or after the date of this Agreement): (i) business, economic, financial, operational, marketing or technical information, (ii) compilations of data or information (iii) business methods and practices of Company or Affiliates of Company, (iv) information relating to actual or prospective services, products, activities, know-how, research and development, or commercial relationships of Company or any Affiliate of Company, (v) information and data and computer software of third persons to whom Company or any Affiliate of Company owes a duty of confidence, and (vi) such information as Company or any Affiliate of Company may from time to time designate as being included in the expression "Confidential Information". “Confidential Information” does not include information that is: (a) prior to the commencement of the Services, already lawfully in the possession of the Contractor other than, directly or indirectly, from Company or any Affiliate of Company including through the provision of previous services (as evidenced by the Contractor’s written records), (b) in the public domain, or information that falls into the public domain, unless such information falls into the public domain by disclosure or other acts of Contractor, or through the fault of Contractor, (c) lawfully acquired by the Contractor from a third party that has no obligation of confidentiality with respect to the Confidential Information, or (d) independently and lawfully developed by the Contractor who has not made use of or had access to the Confidential Information, alone or in conjunction with a third party

(g) “**Deliverable**” shall have the meaning as set forth in Section 7.1 of this Agreement.

(h) “**Enbridge Group Members**” means Enbridge Inc. and its Canadian Affiliates, and “**Enbridge Group Member**” means any one of them, as the context indicates;

(i) “**Intellectual Property**” means all intellectual property including (i) discoveries, concepts, inventions (whether patentable or not), invention disclosures, improvements (whether patentable or not), formulae, formulations, algorithms, subroutines, compositions, manufacturing and production processes and techniques, know-how; (ii) technical and product specification, equipment descriptions, plans, layouts, drawings, computer programs (including, without limitation, all source code, object code, byte code, or machine code), assembly, quality control procedures, installation procedures, and operating procedures, operating, maintenance and/or repair manuals, instructions, training materials, and other user documentation, technical and marketing information (including slogans and logos), designs, data, and/or other similar items; (iii) other trade secrets, copyrightable material, or proprietary information; (iv) all documentation of any of the foregoing;

(j) “**Intellectual Property Rights**” means all rights in Intellectual Property of every kind, nature or description and any other proprietary rights throughout the world, including: (i) copyrights and all rights associated with works of authorship, neighbouring rights and moral rights, whether registered or unregistered; (ii) industrial design rights; (iii) integrated circuit topography rights and mask works; (iv) rights in trade secrets, confidential information and know-how; (v) trademarks, trade names, certification marks and distinguishing guise rights, whether registered or unregistered; (vi) patent rights and (vii) all registrations, applications, renewals, extensions, continuations, continuations-in-part, divisions, reissues, and priority rights thereof now or hereafter in force (including any rights in any of the foregoing);

(k) “**Initial Term**” means the period commencing on November 16, 2018 and concluding December 31, 2021 at 11:59 pm;

(l) "**Parties**" where such term is used in this Agreement, means Company and Contractor and "**Party**" means any one of them, provided however, in the context of a work authorization, "**Parties**" where such term is used in this Agreement, means the Service Recipient and Contractor and any other Person that is made a party to such work authorization, and "**Party**" means any one of them

(m) "**Person**" means any natural person, sole proprietorship, corporation, partnership (general or limited, including master limited), limited liability company, trust, joint venture, joint stock company, unincorporated association, unincorporated syndicate, unincorporated organization, or other entity or association, and, where the context requires, any of the foregoing in its capacity as trustee, executor, administrator or other legal representative;

(n) **"Renewal Term"** means an additional one (1) year period that automatically follows the Initial Term and any Renewal Term thereafter, unless either party gives written notice of termination to the other not less than 30 days prior to the last day of the Term;

(o) "**Representative**" means any employee, director, officer, agent or subcontractor of Contractor;

(p) "**Service Recipient**" means, in relation to a work authorization, the Enbridge Group Member (which may include the Company) that is receiving the Services pursuant to such work authorization and is listed as the "Service Recipient" in such work authorization;

(q) "**Services**" means the environmental services to be provided by the Contractor to the Company, or to another Enbridge Group Member, which shall include, without limitation, those services as set forth in one or more work authorizations, all as may be reasonably requested and directed by the Company, together with such other reasonably related duties and travel assignments as may be requested of the Contractor by the Company from time to time; for greater certainty, this Agreement covers only environmental services provided by the Contractor to the Company or to another Enbridge Group Member; the Parties expressly contemplate that there may be other kinds of services provided by the Contractor that are not covered by this Agreement.

(r) **"Term"** means the Initial Term and any Renewal Term(s) of this Agreement; and

(s) "**Work Authorization**" means a work authorization substantially in the form attached hereto as Schedule "A" and signed by Contractor and by the Enbridge Group Member wishing to receive Services, it being acknowledged that more than one work authorization may be issued pursuant to this Agreement, and "work authorizations" means more than one work authorization;

2. SERVICES

2.1 The Company hereby retains the Contractor to provide the Services to the Company or any Enbridge Group Members for the Term of this Agreement.

2.2 The Company may, from time to time, in its sole discretion, request that the Contractor provide the Company with the Services identified in a new proposed Work Authorization in which case the Contractor will meet with the Company in order to review in good faith such desired Services and proposed terms and conditions and determine whether it is capable of providing same to the Company and if so, under what specific terms and conditions. Where both Parties agree, they will then enter into a Work Authorization. Each Work Authorization will be deemed to incorporate by reference the terms and conditions of this Agreement (excluding any prior Work Authorizations)

and shall be deemed a separate agreement entered into solely by the Parties, unless the applicable Work Authorization expressly provides otherwise.

2.3 Upon the Company's request, the Contractor will provide the Services, or any part of the Services, to any other Enbridge Group Member in accordance with this Agreement pursuant to a Work Authorization. The Company will elect, in its sole discretion, whether, such Services will be provided under a then existing Work Authorization entered into by the Company or a new Work Authorization to be entered into between the Enbridge Group Member and the Contractor on the terms and conditions of this Agreement. If the Services are provided to an Enbridge Group Member under an existing Work Authorization entered into by the Company, the Company will be entitled to enforce rights or remedies under such Work Authorization on behalf of such Enbridge Group Member in connection with such Services provided to such Enbridge Group Member as if such Services were provided directly to the Company. If the Services are provided to any such Enbridge Group Member under a new Work Authorization entered into by such Enbridge Group Member and the Contractor, then the following shall apply in respect of such Work Authorization:

(a) the Work Authorization shall be deemed a separate agreement entered into solely by the Parties to such Work Authorization and shall be deemed to incorporate by reference and shall be subject to all the terms and conditions of this Agreement with the same force and effect as if the terms and conditions of this Agreement were fully set out in such Work Authorization, except as may be expressly modified or amended in the Work Authorization;

(b) the Service Recipient to an Work Authorization shall be entitled to enforce all of the rights and remedies of Company set forth in this Agreement in respect of such Work Authorization as if the Service Recipient were substituted in this Agreement for the Company, *mutatis mutandis*, which rights and remedies are in addition to, and not in substitution of any other rights or remedies set forth in the Work Authorization; and

(c) neither the Company nor any other Enbridge Group Member shall have any liability to Contractor in relation to such Work Authorization and any liability that may arise in connection with such Work Authorization shall be limited to the Service Recipient to such Work Authorization.

2.7 For clarity, if an Enbridge Group Member (other than the Company) is receiving any Services or is granted any rights as contemplated in this Section 2, a reference to the Company in this Agreement will refer to such Enbridge Group Member to the extent that applicable term applies to such Enbridge Group Member's receipt of such Services or grant of rights.

2.8 The Contractor acknowledges that the Company (or Enbridge Group Member) may enter into multiple Work Authorizations with the Contractor with respect to the same or similar Services to accommodate the respective unique requirements of the Company (or Enbridge Group Member) departments, business lines and business units.

2.9 Each Work Authorization will set out its term and any provisions relating to its renewal or extension. If the term of a Work Authorization extends past the termination or expiry of the Term, then such Work Authorization including the terms and conditions of this Agreement deemed incorporated into such Work Authorization, will survive the termination or expiry of the Term. For greater certainty, no new Work Authorization under this Agreement may be entered into between the parties hereto after the termination or expiry of the Term.

2.10 The Work Authorizations shall be numbered sequentially in the order that they are entered into and attached as Schedules to this Agreement, with the first Work Authorization numbered "Schedule A-1" and successive Work Authorizations being numbered "Schedule A-2", "Schedule A-3" and so on.

2.11 The Contractor shall provide the Services in accordance with the highest standards of skill, diligence and effort applicable to those in the industry providing similar services as the Services. In addition, the Contractor shall devote the necessary resources to complete the Services in accordance with the timeframes identified in this Agreement and any Work Authorization, and as approved by the Company or as otherwise may be agreed upon by the Contractor and the Company from time to time.

3. ASSIGNED PERSONNEL

3.1 The Contractor shall promptly remove from the Services any of its personnel deemed unacceptable by Enbridge, in its sole discretion. In the event any members of the Contractor's personnel are removed from service pursuant to this Section, the Contractor shall be entitled to replace those personnel for the purposes of continuing and completing the Services.

4. LAWS AND POLICIES

4.1 The Contractor represents and warrants that, in the performance of the Services, it shall comply with and shall cause its personnel to comply with:

(a) all applicable laws, regulations, ordinances, standards, codes, specifications, rules, permits, licenses or other authorizations, whether federal, provincial, territorial, municipal or enacted or adopted by governmental agencies and regulatory bodies having jurisdiction over the Company or other Enbridge Group Member receiving the Services, or the Services; and

(b) all internal processes, policies and procedures of the Company or other Enbridge Group Member receiving the Services, to the extent that they are relevant to the Services and the Contractor is advised of the same. Without limiting the foregoing, the terms and conditions of the Company's or any other Enbridge Group Member receiving the Services Environmental, Health & Safety programs and policies, business conduct policies, and any applicable Environmental Protection Plan are incorporated herein by reference as if set forth in full herein. The Company or Enbridge Group Member receiving the Services shall provide the Contractor with the same access to, and training on such documents, programs and policies prior to the commencement of the Services, that is provides to its own employees.

5. FEES AND PAYMENT OF INVOICES

5.1 As compensation for providing the Services rendered by the Contractor, Service Recipient shall pay to the Contractor fees pursuant to the then current rate sheet ("**Rate Sheet**") attached to this Agreement as **Schedule "B"**.

5.2 The Contractor may provide one new Rate Sheet, along with a written rationale for any changes from the then current Rate Sheet, once before **December 31** of any year during the Term of this Agreement, which, absent written objection by Service Recipient, shall become effective and automatically replace **Schedule "B"** herein as of **February 15** of the following year. In the event that Service Recipient objects in writing to any part of a proposed new Rate Sheet, Service Recipient

shall continue to pay the Contractor based on the then current Rate Sheet until both parties have agreed on the terms of any changes.

5.3 Unless otherwise specified in a Work Authorization, the Contractor shall submit one invoice per Work Authorization per month to Service Recipient, with contents and in a form as may be directed by Service Recipient from time to time, for the Services provided in the previous month. Service Recipient will have no obligation to pay any invoice not received within a reasonable time. Service Recipient will have no obligation to pay any disbursement that it has not pre-approved. The Contractor shall ensure that all invoices reference the applicable Work Authorization and include a reasonably detailed breakdown and distribution of charges by name of specific personnel or resource or disbursement, and that all disbursements are accompanied by supporting documentation.

Service Recipient shall pay all invoices, except in the case of a *bona fide* dispute, within (forty-five (45) days of receipt of the invoice. In the event of a *bona fide* dispute regarding Contractor's invoice, Service Recipient shall nevertheless pay the undisputed portion of the invoice in accordance with the terms of this section.

5.4 All fees paid or payable to the Contractor are inclusive of all taxes, including applicable sales and use taxes, customs duties and excise taxes (collectively, "Taxes"), except any amounts payable in respect of the federal Goods and Services tax imposed pursuant to the *Excise Tax Act (Canada)*, as amended from time to time, the Quebec sales tax and any fully harmonized federal/provincial sales tax (collectively, "GST"). Service Recipient shall pay to the Contractor the amount of such Taxes and GST upon receipt of any undisputed invoice issued in compliance with the appropriate tax laws or regulations.

5.5 The Contractor hereby represents that it is duly registered for the purposes of the GST legislation and will remain so registered during the currency of its dealing with Service Recipient. The Contractor will provide Service Recipient with any documentary evidence as may be required by it in order to claim input tax credits/reimbursements in respect of any GST paid to the Contractor and all invoices rendered by the Contractor shall contain such information as is required by, or prescribed under, the GST legislation.

5.6 The Contractor warrants that it is a currently registered and green-rated member of ISNetworld. The Contractor will maintain its registered and green-rated status with ISNetworld and will immediately notify Service Recipient in writing should its registration or green-rated change at any time throughout the currency of this Agreement. Service Recipient may, in its sole discretion, accept an ISNetworld rating status other than green for the Contractor.

5.7 In the event the Contractor is a non-resident of Canada and has not obtained and provided to Service Recipient a non-resident withholding tax waiver at such time as Service Recipient makes any payment to the Contractor for Services rendered in Canada, Service Recipient shall withhold such percentage of any payment made by it for the Services as is from time to time mandated under the Income Tax Act (Canada) (the "ITA") and shall remit the withheld amount to Canada Revenue Agency in the manner and at the time required by the ITA. In the event that Service Recipient is assessed for any non-resident withholding taxes payable, the Contractor agrees to forthwith reimburse Service Recipient for such amount together with applicable interest and penalties, if any.

5.8 In the event of the expiration or termination of this Agreement, Service Recipient shall remain responsible to the Contractor for payment of all fees earned by Contractor pursuant to and in accordance with the terms and conditions of this Agreement, up to and including the date of expiration or termination.

5.9 No progress or final payment by Service Recipient nor approval of any invoice for payment by Service Recipient shall constitute a waiver by Service Recipient nor relieve the Contractor from its obligation for Services not performed in accordance with this Agreement and any Work Authorization issued hereunder.

6. TERM & TERMINATION

6.1 This Agreement will be in effect from the Start Date to the end of the Term, subject to earlier termination pursuant to this Agreement.

6.2 This Agreement shall terminate immediately upon the occurrence of any of the following events:

(a) the expiration of the Term of this Agreement;

(b) the termination of this Agreement by Service Recipient pursuant to Section 6.3 hereof;

(c) the insolvency, bankruptcy or dissolution of any of the parties hereto; or

(d) the passing of thirty (30) days from the giving of written notice of termination at any time by Service Recipient.

Where this Agreement is terminated under Subsection (d) above, Service Recipient shall pay the Contractor for all Services completed to the date of termination, plus the Contractor's reasonable costs and expenses of demobilization.

6.3 In the event that the Contractor or any of its personnel:

(a) fail, refuse or neglect to provide Services to Service Recipient as and when reasonably required or requested by Service Recipient;

(b) breach any term, condition or provision of this Agreement;

(c) become de-registered by or receive other than a green-rating from ISNetworld; or

(d) contravene any applicable law or regulation in any of the locations where Services are being performed which contravention has a material effect on the provision of the Services under this Agreement or on Service Recipient, as determined in the sole discretion of Service Recipient;

then Service Recipient shall be entitled, in addition to any other remedy that it may have, to terminate this the applicable Work Authorization immediately and the Contractor shall not be entitled to any further fees or other payments in respect of the period of time after such termination.

6.4 Without limitation to Service Recipient's rights and remedies available hereunder at law or in equity, upon expiry, termination or suspension of all or part of this Agreement, Service Recipient shall be entitled to take possession of all records of any kind (including but not limited to electronic and paper records) in the Contractor's possession or control and may thereafter complete the Services itself by whatever method it deems expedient.

7. CONFIDENTIALITY AND PROPRIETARY INFORMATION

7.1. **Ownership.** If Contractor shall, at any time before the date of this Agreement, during the Term of the Agreement, and for three (3) years thereafter, either alone or in conjunction with any other person, create, develop, author, conceive, produce, reduce to practice or originate any Intellectual Property, or deliver to a Service Recipient any deliverable or work product, whether created in whole or in part under a Work Authorization, in performing or as a result of Services performed

by Contractor for or on behalf of the Service Recipient (a "Deliverable"), Contractor shall immediately disclose the same to Company, and all Intellectual Property Rights in any such Intellectual Property, shall automatically be the exclusive property of and vest in Company immediately on its creation. To the extent that any such rights have not or do not automatically vest in Company, Contractor hereby assigns and conveys, and, if and to the extent necessary, agrees to assign and convey, all such rights to Company. Company and/or the applicable Service Recipients shall retain all Intellectual Property Rights in all Intellectual Property including Confidential Information disclosed or provided to Contractor hereunder to perform the Services ("Company Disclosed IP") and nothing herein transfers or grants to Contractor any right, title, or interest or Intellectual Property Right or license in or to any Company Disclosed IP other than a non-exclusive, revocable, terminable license to use same solely for the purpose of providing the Services under the Work Authorization pursuant to which it was provided.

7.2 **Originality of Intellectual Property.** Subject to any exceptions expressly set out in any Work Authorization, Contractor represents, warrants and covenants to Company that: (i) all Intellectual Property created under a Work Authorization will be created only by the personnel identified in the Work Authorization, (ii) no person other than Company will have any Intellectual Property Right in or related to Intellectual Property created or developed under the Work Authorization, and (iii) all Intellectual Property created under the Work Authorization by Contractor and the use thereof will not infringe upon, or violate any Intellectual Property Right or moral rights of any third person.

7.3 **Assignment and Waiver of Moral Rights.** Contractor agrees to waive and hereby waives, unconditionally and irrevocably any and all of Contractor's moral rights and rights of a similar nature which Contractor now or in the future may have (including rights in existing works and works which may come into existence after the date hereof) in which copyright may subsist in each jurisdiction throughout the world, to the extent that such rights may be waived in each respective jurisdiction and will cause the authors of same to also waive their moral rights to the same extent. All works created, in whole or in part, by Contractor may be maintained, changed, modified, and/or adapted by Company or Service Recipient (if different from Company) without the consent of Contractor.

7.4 **Further Assurances.** Contractor shall from time to time execute and deliver all such further documents and instruments (including instruments of conveyance and waivers of moral rights in the form requested by Company from time to time including at the completion of Services under a Work Authorization) and do all acts and things as Company may, at any time, reasonably require to effectively carry out or better evidence or perfect the full intent and meaning of this Agreement. Without limiting the generality of the foregoing, Contractor agrees to assist Company (at Company's expense) to obtain and from time to time enforce its rights in the Intellectual Property created pursuant to this Agreement, and to that end, Contractor will execute all documents for use in applying for and obtaining Intellectual Property Rights and enforcing Company's rights therein, as Company may desire.

7.5 **Duty of Confidence.** Contractor agrees not, during or after the term of any Work Authorization or the Agreement or any extensions or renewals thereof (even in the event of a termination due to the default of Company), either directly or indirectly, in any manner whatsoever, to utilize on Contractor's own behalf or on behalf of any other Person, or to divulge to any other Person, any of the Confidential Information other than to its Representatives, but only insofar as the Representative needs to know such Confidential Information in the discharge of the Contractor's obligations to perform the Services, and subject to the other provisions set forth in this Agreement or any Work Authorization. Contractor agrees to prevent the unauthorized disclosure, publication or misuse of such information by any of its Representatives, and any other Person over whom Contractor has authority or control for whom Contractor is responsible under applicable law.

Without limiting the generality of the foregoing, Contractor shall obtain a written acknowledgment respecting the Confidential Information and ownership of Intellectual Property from all of its Representatives who are providing Services or who may have access to any of the Confidential Information. Contractor shall (a) provide Company with executed copies of all such agreements prior to permitting its employees to commence any work on any Work Authorization, and (b) establish and maintain security procedures acceptable to Company to ensure the confidentiality of the Confidential Information. The Contractor shall be liable for any and all damages and cost arising out of unauthorized use or disclosure of Confidential Information by any of its Representatives. Further, the parties acknowledge that unauthorized use or disclosure of the Confidential Information could cause irreparable harm and significant injury to the Company and its Affiliates and as such, money damages may not be a sufficient remedy for any breach of this Agreement. Accordingly, the Contractor covenants that it will not oppose any application for equitable relief, including, but not limited to, specific performance and injunctive relief in the event it breaches this Section 8.

7.6 **Disclosure of Confidential Information to a Court.** The Contractor shall be entitled to disclose Confidential Information to a court of competent jurisdiction or any regulatory body having jurisdiction, provided that the Contractor shall take reasonable steps to maintain the confidentiality of the Confidential Information by such court or government department or agency or regulatory body, promptly inform the Company or Service Recipient to whom such Confidential Information applies, to the extent legally permitted, of any request for disclosure and shall cooperate with the Company and such Service Recipient if the Company chooses to challenge such a disclosure to the general public.

7.7 **Delivery and Return of Property.** The Contractor shall return all Company IP and any other property including Intellectual Property received by it from or on behalf of the Company or any of its Affiliates that is in its or its Representatives' possession and shall destroy or erase any and all copies it may have made thereof, within ten (10) days of: (i) a written request by the Company or Service Recipient, or (ii) termination or expiration of an Work Authorization or this Agreement, or (iii) termination of the business relationship between the Parties by mutual written consent. Upon request of the Company, the Contractor shall provide written confirmation that such Confidential Information, Intellectual Property, and other property, and copies thereof, have been destroyed or erased by it and by its Representatives.

7.8 **Disclosure of Information by Contractor.** Contractor agrees not to disclose or provide to any Service Recipient any Intellectual Property in which it or a third party not Affiliated with Company has any Intellectual Property Rights including any trade secrets, or confidential information. Notwithstanding and without derogating from the forgoing, if Contractor should provide or disclose any such Intellectual Property, Contractor shall ensure that Company has, and Contractor hereby grants to Company, a worldwide, non-exclusive, irrevocable and non-terminable license to exercise all Intellectual Property Rights in such Intellectual Property. If any such Intellectual Property is and is clearly marked or stamped as being a trade secret of Contractor, the Service Recipient will require any unaffiliated third parties to whom the Intellectual Property is disclosed to use reasonable efforts to maintain it in confidence. This duty will be deemed to be met if the Service Recipient uses the same steps in relation to the Intellectual Property that it uses in disclosing its own confidential information to the third party or third parties.

7.9 **Obligations Survive Termination.** The parties' obligations under this Section shall survive any termination or suspension of the Services and the expiration of this Agreement or any Work Authorization.

8. ENFORCEMENT

8.1 The Contractor acknowledges that the provisions contained in Sections 7 and 11 hereof are reasonable in the circumstances and necessary for the adequate economic protection of the Company or any other Enbridge Group Member. The Contractor further acknowledges that the breach by it of any of the provisions in Sections 7 or 11 herein would cause irreparable harm to the Company and any other Enbridge Group Member which would not be adequately compensated for by damages and accordingly, in the event of such breach, the Contractor acknowledges and agrees that the Company or any other Enbridge Group Member shall be entitled, in its sole discretion, to commence proceedings for injunctive relief and the Contractor hereby consents to any and all injunctions, restraining orders, directives and other equitable orders being issued against it or its personnel restraining them from any further breach of the said provisions.

9. INDEMNITY AND LIMITATION OF LIABILITY

9.1 The Contractor shall indemnify and save harmless the Company or any other Enbridge Group Member, its Affiliates and their respective directors, officers, employees and agents from and against all losses, damages, costs (including costs as between a solicitor and his client), expenses, claims, demands, actions, proceedings and suits of every kind or nature whatsoever which may be brought against or suffered by the Company or any other Enbridge Group Member, its Affiliates or their respective directors, officers, employees and agents or which any of them may sustain, pay or incur as a result of the breach of this Agreement by the Contractor or as a result of the negligence or wilful misconduct of the Contractor, its directors, officers or personnel in connection with, related to or arising out of the performance, purported performance or non-performance of this Agreement.

10. INSURANCE

10.1 **Required Contractor Insurance**. At all times during the Term of the Agreement and for so long thereafter as a Claim related to this Contract is possible under applicable statutes of limitations, Contractor shall maintain at its own expense, the insurance coverage outlined below, in each case with insurers having financial security ratings of at least "A-" by AM Best or "A" by Standard & Poor's and which are authorized to do business in all jurisdictions where Services are performed.

a) **Intentionally deleted.**

b) **Intentionally deleted.**

c) **Commercial General Liability** coverage with a limit of five million dollars ($5,000,000) each occurrence for bodily injury and property damage arising out of or relating to Contractor's activities under this Agreement. The policy shall include coverage for personal and advertising injury, contractual liability addressing indemnification under this Agreement, cross liability, severability of interests, products and completed operations, limited time element pollution, contingent employer's liability and **as applicable,** shall provide coverage for explosion, collapse, and underground hazards ("XCU").

d) **As applicable, Commercial Auto Liability** covering all vehicles used by the Contractor in connection with this Agreement with a combined single limit of five million dollars ($5,000,000) for injury or death of one or more persons or damage to or destruction of property as a result of each accident.

e) **Umbrella or Excess Liability** coverage with a limit of two million dollars ($2,000,000) per occurrence excess of required insurance in this Section 10.1 b), c), and d) on a

"follow form" basis with coverage at least as broad as the underlying policy terms and conditions.

f) **As applicable, Aircraft Liability** coverage for any aircraft used in connection with this Agreement, with policy limit of the greater of ten million dollars ($10,000,000) or two million dollars ($2,000,000) per seat for aircraft with greater than five (5) seats, each occurrence including passenger liability and replacement cost of the aircraft.

g) **As applicable, Professional Liability or Errors and Omissions Liability** for Claims arising out of the Services, with a policy limit of two million dollars ($2,000,000) per claim and in the aggregate.

h) **As applicable, All Risk Property Damage** insurance on a replacement cost basis covering loss of or damage to property owned or leased, or in the care custody and control by the Contractor or for which the Contractor has otherwise assumed responsibility for loss or damage under the terms of this Agreement, including property in transit.

i) **As applicable,** any other insurance required by law or as Company may, in its discretion, determine to be necessary as set out in a Rider, if any, to this Agreement.

10.2 **Intentionally deleted.**

10.3 **Insurance Limits.** Subject to the total required amount of insurance for each individual insurance coverage requirement herein, the amounts of insurance specified in the foregoing sections may be satisfied through a combination of primary and excess insurance limits.

10.4 **Additional Insured, Subrogation Waiver, Policies as Primary.** Contractor shall ensure that each insurance carrier providing coverage hereunder provides (in each case arranged to provide the maximum benefit to the Company), the following:

a) With exception of 10.1 a), b), g), and h), inclusion of Company as additional insured in insurance policies under this Section 10.

b) Waiver of insurers' rights of recovery, contribution, subrogation, set-off or counterclaim, in favour of Company, in all policies of insurance under this Section 10 and including all applicable third party liability policies, property insurance policies and marine insurance policies, arising out of or related in any way to this Agreement.

c) That coverage, in all of Contractor's insurance policies (whether such policies are primary, umbrella or excess) under this Section 10 or arising out of or related to this Agreement in any way, shall be written to respond on a primary and non-contributory basis irrespective of any other applicable insurance otherwise available to Company under this Agreement.

10.5 **Notice of Cancellation.** Insurance maintained by Contractor shall not be canceled without thirty (30) days prior written notice being furnished to Company.

10.6 **Evidence of Insurance.** Upon execution of this Agreement, and on an annual basis thereafter until this Agreement is terminated, Contractor shall provide to Company (or Company's designated Representative) Certificate(s) of Insurance on standard forms regularly accepted in the industry certifying Contractor's compliance with this Section 10 and specifically identifying

coverage extensions and endorsements required herein. In the event of a reduction in Contractor insurance limits during the Term which may otherwise reduce the limits of insurance required to comply with this Section 10, the Contractor shall promptly provide Company with notice of same, and immediately thereafter secure such additional insurance as is required to comply with the terms of this Section 10. Company's (or Company's Representative's) acceptance of certificates or correspondence associated thereto does not constitute a waiver, release or modification of the requirements under this Section 10.

"Certificate Holder" shall be:
ENBRIDGE EMPLOYEE SERVICES CANADA INC., and its Subsidiaries and all other Affiliates, 200, Fifth Avenue Place, 425-1st Street SW, Calgary Alberta T2P 3L8

10.7 **Failure to Maintain.** In the event Contractor fails to comply with insurance requirements under this Section 10, such failure shall constitute cause for immediate termination of this Agreement by Company in addition to any other rights available to Company at law or in equity. At its sole discretion, Company may, but shall not be obligated to, obtain such insurance for Company's sole benefit as Company deems necessary to address any failure on the part of the Contractor to obtain the insurance required pursuant to this Section 10. Any cost thereof shall be payable by the Contractor to Company on demand and Company may, at its election, deduct the cost thereof or set-off from any monies which are due or may become due to Contractor. No liability shall attach to Company for any decision on the part of Company to forego the purchase of additional insurance under this Section 10.7, nor does Company's decision not to purchase additional insurance pursuant to this Section 10.7 constitute a waiver, release or modification of the requirements under this Section 10, or constitute a statement by Company that Contractor's insurance coverage at any time during the Term hereof is in compliance with the requirements under this Section 10.

10.8 **Subcontractors.** Contractor shall make commercially reasonable efforts to require all its Subcontractors to provide insurance coverage in accordance with this Section 10. Contractor shall ensure that all insurance maintained by its Subcontractors providing Services include a waiver of insurers' rights of recovery, contribution, subrogation, set-off or counterclaim in favor of Company. The failure of any Subcontractor to obtain and maintain the required insurance shall not in any way impact the obligations of Contractor under this Agreement.

10.9 **Insurance Costs.** Company will not be responsible for any premiums, surcharges, supplemental calls, penalty payments, deductibles, self-insured retentions, self-insurance or any other costs for the insurance provided by or on behalf of Contractor in accordance with this Section 10.

10.10 **Compliance with Applicable Law.** If it is judicially determined that the monetary limits of the insurance required herein do not conform with applicable law, it is agreed that Contractor shall take whatever steps are necessary, at its own expense, to ensure said insurance shall conform to the greater of the minimum monetary limits and other provisions in such law, or the limits specified herein.

10.11 **Effect on Indemnity Obligations.** Except as required by applicable law, Contractor's compliance with the obligations under this Section 10 shall in no way limit or replace the indemnity and other obligations of Contractor contained elsewhere in this Agreement.

10.12 **Indemnities to Be Supported By Insurance.** To the fullest extent required by certain applicable law and not prohibited by other applicable law, Contractor agrees to obtain and maintain, for the benefit of the Company, as indemnitee, types and amounts of insurance coverage at least equal to the insurance requirements set forth in Section 10 of this Agreement, in each case to cover the entire scope of the release, indemnity, defense, and hold harmless obligations assumed in Section

9. All insurance required under this Section 10 is in support of Contractor's respective release, indemnity, defense, and hold harmless obligations in addition to, and independent of, any other insurance requirements contained in this Agreement.

10.13 **Intentionally deleted.**

10.14 **Intentionally deleted.**

10.15 **Intentionally deleted.**

11. PRIVACY

11.1 If, in the course of performing the Services, the Contractor or its personnel obtain personal information about an employee, contractor or landowner of the Company or any other Enbridge Group Member, or any individual with whom the Company or any other Enbridge Group Member interacts, the Contractor agrees to comply with all applicable federal or provincial privacy legislation and shall only use such personal information for the purposes of performing the Services. Furthermore, the Contractor acknowledges and agrees that it will:

(a) not otherwise use or disclose any personal information, except as required by law;

(b) establish and implement appropriate policies and procedures to protect personal information from unauthorized use or disclosure;

(c) indemnify and hold the Company or any other Enbridge Group Member harmless from any claim relating to Contractor's breach of any applicable federal or provincial privacy legislation ; and

(d) upon completion of the Services, destroy all personal information and all copies and records thereof, unless otherwise advised by the Company or any other Enbridge Group Member.

11.2 Upon providing the Contractor with fourteen (14) days written notice, Service Recipient shall be entitled to examine the Contractor's personal information handling policies and procedures to ensure that the Contractor is in compliance with this Agreement.

12. INTERPRETATION

12.1 If any section, subsection, paragraph, word, combination of words or other portion of this Agreement shall be held illegal, invalid or unenforceable, then the illegal, invalid or unenforceable portion shall, only in the circumstances then under adjudication, be stricken from this Agreement and the remaining provisions of this Agreement shall be considered as if the portion so struck does not form a part of this Agreement.

13. INDEPENDENT CONTRACTOR

13.1 The parties acknowledge and agree that the Contractor is an independent contractor and is not an agent, partner, joint venturer or employee of the Company or any other Enbridge Group Member. Likewise, personnel provided by the Contractor to perform the Services are not Company or any other Enbridge Group Member employees, nor agents, partners or joint venturers of the Company or any other Enbridge Group Member.

13.2 The Contractor shall be solely responsible for payment of any and all fees, salaries and/or wages and benefits for its personnel, and the withholding and remittance of all deductions therefrom, including, without limitation, all taxes, employment insurance premiums, pension plan contributions, workers compensation premiums and any other statutory or otherwise required withholdings.

13.3 The Contractor agrees to indemnify and save harmless the Company or any other Enbridge Group Member from and against all claims and demands under the *Income Tax Act* (Canada), any relevant provincial income tax legislation, the *Canada Pension Plan (Act)* and the *Employment Insurance Act* (Canada), for or in respect of any failure to withhold or remit income tax premiums or other withholdings of any kind from all or any part of the payments set out in this Agreement including any interest or penalties relating thereto as assessed and any costs (including legal costs and disbursements) incurred by the Company or any other Enbridge Group Member in defending such claims or demands.

14. NOTICES

14.1 Any notice to be given pursuant to or concerning this Agreement shall be in writing and may be given by personal service, registered mail, e-mail or facsimile to the respective parties at the following addresses:

For the Company:

Address: 26 East Superior Street, Suite 309, Duluth, Minnesota 55802
Telephone: 218-464-5834
Email: jenna.dzuck@enbridge.com
Attention: Jenna Dzuck

For the Contractor:

Address: 105 Commerce Valley Drive, 7th Floor, Markham, Ontario, L3T 7W3
Telephone: Phone: 905-390-2003 / Mobile: 289-439-9803
Email: mark.vanderwoerd@aecom.com
Fax: 905.886.5206
Attention: Mark van der Woerd

14.2 Any Party may change its address for notice by providing prior written notice of the same to the other Party. Notices that are delivered by personal service shall be deemed to have been received when delivered to the address set forth in Section 14.1. Notices sent by registered mail shall be deemed to have been received 5 business days after mailing such notice by registered mail to the address set out in Section 14.1. Receipt of any facsimile or email messages shall be deemed to have been received on the date sent to the number or email address set out in Section 14.1 provided no incomplete or bounce-back error transmissions are received by the sending Party.

15. GOVERNING LAW

15.1 This Agreement shall be governed by and construed in accordance with the laws of the Province of Alberta, without reference to its conflicts of laws principles, and the laws of Canada applicable therein. Each party hereto agrees to submit to the jurisdiction of the courts of Alberta for any proceedings relating to the interpretation and enforcement of this Agreement.

16. SURVIVING OBLIGATIONS

16.1 The Contractor's obligations under this Agreement, including without limitation, the requirements of Sections 2.5, 4, 6, 7, 8, 9, 10, 11, 13 and 17 hereof shall remain in effect and survive the expiry or termination of this Agreement.

17. AUDIT AND RECORDS RETENTION

17.1 Company or any other Enbridge Group Member may audit and inspect the Contractor's records regarding all charges made to the Company or any other Enbridge Group Member in relation to this Agreement, including but not limited to records relating to disbursements to third parties, for a period of twelve (12) months following the completion of any Services. Contractor shall maintain all such records and shall allow such inspection upon reasonable notice and at such times and locations as the parties may reasonably agree.

17.2 Company or any other Enbridge Group Member may, from time to time and at its expense, have a representative inspect and copy any technical records in the Contractor's possession relative to the Services. The Contractor shall provide the Company or any other Enbridge Group Member with reasonable assistance and facilities to conduct such inspection and copying, including conversion to a format compatible with Company's or any other Enbridge Group Member's standard software environment.

17.3 The Contractor shall ensure that its contracts with its personnel performing the Services contain provisions which are substantially similar to Section 17.2 above and shall ensure that the Company or any other Enbridge Group Member may inspect, verify, review and copy the technical records of its personnel.

18. GENERAL PROVISIONS

18.1 This Agreement, together with each Work Authorization, constitutes the entire agreement between the parties hereto as to the subject matter hereof and merges all prior discussions between the parties hereto and neither of the parties shall be bound by any terms, conditions, representations or undertakings other than as expressly set forth herein.

18.2 This Agreement shall enure to the benefit of and be binding upon the parties hereto and their heirs, beneficiaries, executors, administrators and successors.

18.3 The Contractor shall not be entitled to assign this Agreement or any of its benefits or obligations hereunder without the prior written consent of the Company or any other Enbridge Group Member.

18.4 This Agreement shall not be varied, altered or amended except by a document in writing signed by all the Parties hereto.

18.5 In the event of any inconsistency or conflict between the terms of this Agreement and the terms of any Work Authorization or other instrument issued by a Service Recipient to the Contractor, the terms of this Agreement will prevail over the conflicting or inconsistent provisions of such Work Authorization or other instruments.

IN WITNESS WHEREOF the parties hereto have executed this Agreement on the date and year first written above.

ENBRIDGE EMPLOYEE SERVICES CANADA INC.

Per: R Watson.
Name: Rob Watson.
Title: Vice President SCM

Date: Dec 5/18

I have authority to bind Enbridge

AECOM Canada Ltd.

Per: _____
Name: Paul Murray
Title: Senior Vice President

Date: December 4, 2018

I have authority to bind the Contractor

SCHEDULE "A-**"

WORK AUTHORIZATION

THIS WORK ATHORIZATION IS ENTERED INTO BETWEEN * ("SERVICE RECIPIENT") AND ("CONTRACTOR") AS OF , 20, AND IS SUBJECT TO THE MASTER SERVICES AGREEMENT FOR ENVIRONMENTAL CONSULTING SERVICES BETWEEN ENBRIDGE EMPLOYEE SERVICES CANADA INC. AND THE CONTRACTOR DATED , 20 (THE "MSA"). ANY CAPITALIZED TERM USED IN THIS WORK AUTHORIZATION BUT NOT DEFINED SHALL HAVE THE MEANING ASCRIBED TO SUCH CAPITALIZED TERM IN THE MSA.**

PLEASE NOTE: The Agreement covers only environmental consulting services provided by the Contractor to Service Recipient; this Work Authorization may not be used for other kinds of services provided by the Contractor that are not covered by this Agreement.

1. **Term**

2. **Enbridge Work Order Number:**

3. **Project:**

4. **Scope:**

5. **Project end date / deadlines:**

6. **Proposal reference:**

7. **Special directions:**
   - □ *The Service Recipient "Major Projects" or "MP" requirements apply to this work.*
   - □ *The Service Recipient "Liquids Pipelines" or "LP" requirements apply to this work.*
   - □ *Other:*

THIS WORK AUTHORIZATION IS SUBMITTED AND APPROVED BY:

.*	**NAME OF CONTRACTOR**
Per:_____	Per:_____
Name:	Name:
Title:	Title:
Date:	Date:
I have authority to bind Service Recipient	*I have authority to bind the Contractor*

SCHEDULE "B"

CONTRACTOR RATE SHEET EFFECTIVE AS OF NOVEMBER 16, 2018

Canada East and Canada West

RATE TABLE - ENVIRONMENTAL			
1.1 Professional (See table below for further positions	**Experience**	**Possible Titles**	**Straight Time Hourly Billing Rate ($)**
Level 1	0-2 Years	Junior scientist/engineer/project controls.	[redacted]
Level 2	2-4 Years	Junior scientist/engineer/project controls.	
Level 3	4-6 Years	Intermediate scientist/engineer/project controls.	
Level 4	6-8 Years	Mid-level scientist/engineer/task leader/crew leader/project controls.	
Level 5	8-10 Years	Senior scientist/engineer/task leader/crew leader/project controls	
Level 6	10-12 Years	Senior scientist/engineer/project manager/task manager	
Level 7	13-18 Years	Senior Project Manager	
Level 8	18+ Years	Principal/ Project/ Program Director	
1.2 Technical (See table below for further positions	**Certifications / Qualifications**	**Possible Titles**	
Level 1 - Entry	Technologist diploma. Entry level position.Basic computer skills. 0-2 Years.	N/A	[redacted]
Level 2 - Fully Qualified	Technologist diploma. Fully qualified level typically with 2 - 5 Years	**Junior** - Technologist/Technician/ Engineering Technologist	
Level 3 - Senior	Technologist diploma. Senior technologist role with 5-10 Years	**Intermediate** - Technician/ Engineering Technologist	
Level 4 - Specialist 1/ Team Lead	Technologist diploma. Senior/Specialist Technologist with 10 - 15 Years Note: Emphasis is on the technical complexity and scope of the role versus years of experience.	**Senior** - Technician/ Engineering Technologist	
Level 5 - Specialist 2/ Supervisor	Technologist diploma. Senior/Specialist Technologist with 15-20 Years. Note: Emphasis is on the technical complexity and scope of the role versus years of experience.	**Senior/ Lead** - Technician/Engineering Technologist	
Level 6 - Specialist 3/ Manager	Technologist diploma. Senior/Specialist Technologist with 20+ Years. Note: Emphasis is on the technical complexity and scope of the role versus years of experience.	**Project Manager/Planner/ Senior** - Environmental PM/ Technician/ Engineering Technologist	
1.2.1 Technical Inspection	**Certifications / Qualifications**	**Possible Titles**	
Level 1 - Entry	0 - 2 Years.	Inspector 1	[redacted]
Level 2 - Fully Qualified	2 - 5 Years	Inspector 2	
Level 3 - Senior	5-10 Years	Inspector 3	
Level 4 - Team Lead	10 - 15 Years	Lead Inspector	
Level 5 - Supervisor	15-20 Years.	Asst. Chief Inspector	
Level 6 - Manager	20+ Years.	Chief Inspector	
1.4 Additional Job Categories	**Proponent's Resource Level (Please input your resource's job title e.g. Sr. Inspector, Planner, Jr. Inspector, etc.); Please see tab - Job Categories**	**Possible Titles**	
Level 0	0-5 Years	Project Administrator	[redacted]
Level 9	15+ Years; technical directors/leaders used in exceptional circumstances as advisors	Senior Manager	
Level 10	20+ Years; technical directors/leaders used in exceptional circumstances as advisors	Senior Leader	

SCHEDULE "B"

CONTRACTOR RATE SHEET EFFECTIVE AS OF NOVEMBER 16, 2018

Professional and Technical Positions Detail

1.1 Professional Positions Included	1..2 Technical Positions Included
Archaeologist	Engineering Technician
Biologist	Engineering Technologist
Community/Regional Planner	CADD
Consultant	Designer
Advisor	Graphic Designer
Scientist	Inspector
Planner	
Geographer	
Geological Engineer	
Geologist	
Hydrogeologist	
Hydrologist	
Land Surveyor	
Landscape Architect	
Occupational Health Professional	
Paleontologist	
Professional	
Sustainability Consultant	
Toxicologist	
Analyst	
Social Scientist	
Related Engineering	
Civil Engineer	
Chemical Engineer	
Engineer	
Physics Engineer	
Structural Engineer	
GIS/IT	
GIS	
IT	
Project Management/ Services	
Document Control	
Project Administration	
Project Controls - Estimating/ Planning/ Scheduling	
Project Controls - Procurement/ Contract Administration	
Project Coordination	
Project Management	
Project Services	
Principal	
Project Manager	

SCHEDULE B

CONTRACTOR RATE SHEET EFFECTIVE AS OF NOVEMBER 16, 2018

Expenses

2. EXPENSES			Daily Rates (12 hr/Day)	
			$	Unit of Measurement
	2.1 Living Out Expense (LOA)	Accomodation	[redacted]	
		Living Out Expense (LOA)		
		Northern LOA Zone A (Canada Specific)		
		Northern LOA Zone B (Canada Specific)		
		Camp Daily Charge (In any)		
		Meals		
		Breakfast		
		Dinner		
		Lunch		
	2.2 Transportation Cost			
		Vehicle Allowance		
		UTV		
		ATV, Snowmobile		
		Vehicle KMs (Off Right of Way)		
		Vehicle KMs (On Right of Way)		
		Single Axle Trailer		
		Double Axle Tailer		
	2.3 Disbursement	All Inclusive Standard Field Equipment (Digital Camera, cell phone, mobile computer, GPS, field safety kit, data collection kit etc.)		
		Pre-Approved expenses including air travel, courier, lab testing, reproduction specialized or non-standard field equipment or environmental job supplies		
		Lab testing and field equipment		
	2.4 Subcontractor/ Third Party			
		Labour		
		Equipment		
		Material		
	2.5 Mangement Fee on Expenses for LOA and Transportation Only (if applicable)			

Volume Discount Structure and Example

[redacted]

[redacted]

- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]

ENBRIDGE
Life Takes Energy

SERVICE RELEASE ORDER

4950025833

*** THIS DOCUMENT NUMBER MUST APPEAR ON ALL PACKAGES, INVOICES, CORRESPONDENCE, ETC.**
*** NOTIFY US IMMEDIATELY IF YOU ARE UNABLE TO SHIP AS SPECIFIED BELOW.**

VENDOR:
AECOM
5080 COMMERCE BLVD
MISSISSAUGA ON L4W 4P2
Pre-Qual Status:ON - Pass

SHIP TO:
ENBRIDGE GAS INC.
50 KEIL DRIVE NORTH
CHATHAM ON N7M 5M1

INVOICE TO:
Enbridge Gas Inc.
PO Box 2005
Chatham, Ontario
N7M 0J9
APCAEastInvoices@SpectraEnergy.com

QUESTIONS TO: Procurement Dept, Enbridge Gas Inc., 50 Keil Dr N., Chatham ON N7M 5M1
Phone: 519-436-4600 x 5002212 **Fax:** 519-436-4665 **Email:** psupport@uniongas.com

ORDER DATE(y/m/d)	F.O.B.	TERMS
2021.10.08	SHIPPING POINT	NET 30

ITEM	QUANTITY	UoM	MATERIAL NO.	DESCRIPTION	DELIVERY DATE	UNIT PRICE
10	1	SRV		Product Description: Environmental planning support for the project, including the production of an Environmental Report and Environmental Protection Plan, Stage 1 and 2 Archaeological Assessment, Cultural Heritage Assessment, Species at Risk surveys, agency and public consultation, OPCC review and hearing support, and soils management. Desktop background research, field surveys, correspondence with relevant agencies, report writing and production. Duration of Service: 2021.08.12 - 2023.12.31		[redacted]

Total net item value CAD [redacted]

HST Extra

Vendor confirms that this Purchase Order is subject to the written agreement (if any) between Vendor and the Enbridge Gas Inc. entity identified herein, or in the absence of a written agreement, the General Terms and Conditions agreed to by Vendor, and any written terms specified herein.

COMM.METHOD EMAIL

PAGE 1 of 1

From: Washburn, Kristan
To: Lauren Whitwham
Cc: Evan Tomek; Consultation
Subject: [External] RE: CKSPFN monitor contact
Date: Wednesday, July 20, 2022 3:07:04 PM

Will do.

Thanks,

Kristan

Kristan Washburn, MES
Senior Terrestrial Ecologist, Manager, Impact Assessment & Permitting
D +1-705-669-4711
M +1-705-665-2467
kristan.washburn@aecom.com

Click here to connect with me on LinkedIn

AECOM
1361 Paris St.
Sudbury, ON P3E 3B6, Canada
T +1-705-674-8343
aecom.com

Delivering a better world

LinkedIn | Twitter | Facebook | Instagram

From: Lauren Whitwham <Lauren.Whitwham@enbridge.com>
Sent: Wednesday, July 20, 2022 3:06 PM
To: Washburn, Kristan <Kristan.Washburn@aecom.com>
Cc: Evan Tomek <Evan.Tomek@enbridge.com>; Consultation <consultation@kettlepoint.org>
Subject: [EXTERNAL] CKSPFN monitor contact

Hello Kristan,

Can you please ensure that all Aecom consultants (environmental, archaeological, Professional Agrologist, and any others) are using the Consultation inbox consultation@kettlepoint.org for Kettle and Stony Point First Nation.

If you have any questions, please feel free to reach out.

Thanks,

Lauren

Lauren Whitwham
Senior Advisor, Community & Indigenous Engagement, Eastern Region

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Safety. Integrity. Respect. Inclusion.

Enbridge Gas Inc. ("Enbridge Gas") Response to Chippewas of the Thames First Nation ("COTTFN") Comments received July 28, 2022 re: Environmental Report on the Panhandle Regional Expansion Project ("Project")		
Item	Comment	Enbridge Gas Response
1.0 General		
Comment 1	Why does the Land Acknowledgement not mention the McKee Treaty?	The McKee Treaty was not specifically mentioned, since the Environmental Report ("ER") was distributed to all Indigenous communities engaged on the project, which spans different Treaty areas.
Comment 2	We expect that Enbridge and its contractors will be following all mitigation measures identified in the Environmental Report. If any mitigation measures will not be followed, we request notification and explanation.	That's correct. Enbridge Gas and its contractor will follow all mitigation measures identified in the ER. In addition, a full-time Environmental Inspector (EI) will be onsite throughout construction to ensure compliance. Enbridge Gas will notify COTTFN of any significant changes to the proposed mitigation measures.
Comment 3	We requested a system map of Enbridge infrastructure within COTTFN's Traditional and Treaty Territory on Feb. 14, 2022 and subsequent occasions. We request an update on why this map has not been provided to date.	Thank you for your patience in addressing this request. Enbridge Gas does not currently have a map of Enbridge Gas's infrastructure with an overlay of COTTFN's Traditional and Treaty Area. We are working on preparing a map and will provide it to COTTFN once it has been completed.
2.0 Ecological		
Comment 4	The preferred route crosses dozens of watercourses within the Nation's Traditional and Treaty Territory. Many of these watercourses are important habitats for species at risk and other significant species. We are particularly concerned about crossings of the Thames River (Deshkan Ziibiing) and Jeannette's Creek. We request more information on what method will be used for each water crossing.	At this point Enbridge Gas has determined that the majority of watercourse crossings will be completed using Isolated Open-Cut (i.e., dam & pump) methods. The remaining watercourses (e.g., Jeannettes and Baptiste Creek, the Thames River, and some smaller watercourses close to roadways) will be installed using trenchless methods (e.g., Horizontal Directional Drilling [HDD] or direct pipe).
Comment 5	For trenchless crossings, please provide the plans for inadvertent fluid release. We are also concerned how the vibrations may impact species. What measures will be taken to protect overwintering turtle and/or reptile eggs?	For trenchless crossings, contingency plans for inadvertent fluid release will be developed by Enbridge Gas's contractor and we will share this information with COTTFN once the plans have been prepared. HDD crossings are all planned to be completed within the active season for snakes and turtles as stated in Section 5.3.2.4 (Table 5-9) of the ER (i.e., no watercourse crossing construction will occur during the turtle and snake overwintering period of October 30 to April 1). Therefore, vibrations generated by HDD are not anticipated to have any impacts to overwintering snakes and turtles. Additionally, there is some research that has been conducted on hypoxic turtles and how they respond to sensory information such as light and vibration (Madsen et al., 2015). Research indicates turtles show some responsiveness

		to light stimuli during prolonged hypoxia but they have no response to vibrations (600Hz, 0.05G). The vibrations from this research are expected to be higher than any vibrations that might be felt within the watercourse during HDD operations. With regard to impacts to eggs, although we are not aware of any scientific research related to vibrations from HDD and affects to turtle nests, vibrations are not generally felt at the ground surface by humans along the extent of an HDD because of the depths at which they operate (>20m). The only time vibrations (very minor) may be felt at the entry and exit pits, which will be well set back from the watercourse (>100m). Additionally, the drilling fluid, which helps with the drilling operation generally dampers any vibrations.
Comment 6	In cases where breeding bird habitat or vegetation will be permanently removed, will it be compensated for through habitat creation or enhancement in other locations? We are looking for a commitment from Enbridge to compensate for habitat loss through biodiversity initiatives.	Significant removal of breeding bird habitat and vegetation is not anticipated. Enbridge Gas is committed to implementing a tree replacement program, which includes replanting the woodland removed with seedlings of native species that are guaranteed until they reach free to grow status. This program was planned at a ratio of 2:1 for the woodland areas removed and will now be increased to 3:1 (trees to be replaced on a 3:1 area basis at 1000 tree seedlings per acre). Directly impacted landowners are given first right of refusal for the tree planting under this program. However, if landowners are not interested in planting trees on their property, Enbridge Gas will work with Indigenous communities and local conservation authorities to find suitable locations to plant trees.
Comment 7	Regarding mitigation measures for soil, how long would vegetation be removed for (estimation)? We support the suggestion in Neegan Burnside review of leaving some debris from vegetation removal as brush piles for snakes, as appropriate.	All restoration is anticipated to be completed by 2025. Enbridge Gas supports the idea of leaving some debris piles for snakes and will look for opportunities, as appropriate.
Comment 8	How will construction be timed to avoid impacts on wildlife?	Section 5.3.2.4 (Table 5-9) of the ER lists mitigation measures to be followed during construction, in order to limit and protect the various wildlife species. The mitigation measures include all appropriate timing windows to be followed for each species (i.e., vegetation removals, bat roosting, breeding bird nesting, fish spawning, turtle/snake overwintering period). During construction, an EI will verify that wildlife protection timing windows are adhered to.
Comment 9	We have been participating in ecological studies by sending COTTFN Field Liaisons and expect to continue to do so. We	Thank you for your participation in these studies. Enbridge Gas will provide COTTFN with reports summarizing the field survey findings once they have been completed.

	would also like to receive those reports as they become available.	
Comment 10	Will SAR training be provided to those involved in construction?	Species at Risk (SAR) training will be provided to the contractor and those involved in the construction of the Project. Training will include identifying known SAR in the Project study area and appropriate regulatory & reporting procedures if SAR are found within the construction limits. Trained personnel will also be on-site to monitor construction and be responsible for checking that the ER's mitigation measures and monitoring requirements are being executed. Enbridge Gas will implement an orientation program for inspectors and contractor personnel to provide information regarding Enbridge Gas's environmental program, commitments, and safety measures.
Comment 11	We request updates on future comments from MECP, DFO, NDMNRF, and St Clair Region Conservation Authority.	An up-to-date Ontario Pipeline Coordinating Committee (OPCC)/agency review summary table is being maintained and can be provided to COTTFN upon request.
Comment 12	We request to be kept informed on SAR monitoring plans during construction and may request to include our Species at Risk Specialist for field visits.	Enbridge Gas will keep COTTFN informed of SAR monitoring plans during construction and can discuss opportunities for COTTFN's Species at Risk Specialist to attend field visits..
3.0 Climate Change		
Comment 13	How is Enbridge calculating and addressing fugitive methane emissions from existing and proposed infrastructure? How much do you expect the Panhandle Regional Expansion Project to contribute to increased methane emissions?	Enbridge Gas' fugitive emissions are calculated based on emission factors and engineering estimates, as well as direct measurement of fugitive emissions, in accordance with the Ontario Ministry of Environment, Conservation and Parks' (MECP) Guideline for Quantification, Reporting and Verification of Greenhouse Gas Emissions (Guideline). For example, results from field surveys performed at transmission and storage compressor stations are applied to the compressor station fugitive calculations. Where possible, site or equipment specific emission factors are used, in place of industry standard factors. Enbridge Gas currently minimizes fugitive emissions from its operations through the implementation of industry accepted best management practices. For example, in 2020, Enbridge Gas implemented a harmonized leak operating standard, which includes increased traceability and tracking of leak repairs, increased monitoring frequencies, harmonized repair timelines for above ground leaks, and initiation of the station leak survey program. Enbridge Gas is developing and implementing a GHG emission reduction strategy. The strategy will identify and assess cost effective emission reduction opportunities. Opportunities have been identified over several years through the Asset Management Plan, updated operating practices, equipment modernization/innovation, compliance with regulatory requirements (i.e. federal Methane Regulations) and corporate initiatives.

		Considering the fugitive emissions due to operation only, the Project is estimated to result in an increase in fugitive emissions of approximately 140 tCO2e/year.
Comment 14	We are facing a human-made climate crisis, largely due to reliance on fossil fuels for energy. The Panhandle Regional Expansion Project is responding to greater demand for energy in the region, but also locks in expanding fossil fuel usage and associated greenhouse gas emissions. This trajectory is incompatible with emission reduction targets set by Ontario and Canada. What is Enbridge doing to decarbonize its operations and promote sustainable forms of heating for residential and industrial users?	Enbridge Gas is uniquely positioned to support Ontario's clean energy transition, with immediate, cost-effective solutions that leverage existing infrastructure and innovative technologies. Through collaboration with governments and partners, we're advancing innovative energy solutions to keep energy reliable, affordable and reduce environmental impact. Leveraging our pipeline infrastructure is a responsible and cost-effective way to supply cleaner fuels and reduce emissions in a significant way. On November 6, 2020, Enbridge Inc. announced its environmental, social and governance (ESG) goals, which represent the next stage of our evolution as an ESG leader to help ensure we're positioned to grow sustainably for decades to come. Recognizing that climate change requires serious solutions, one of the goals Enbridge Inc. has set is to reach net zero GHG emissions by 2050 with an interim target to reduce GHG emissions intensity 35 percent by 2030. To meet Enbridge Inc.'s 2030 emission targets and its 2050 net-zero ambition, Enbridge Gas will be pursuing multiple avenues that are strongly aligned and embedded in our strategy and business plans. These include: • Modernization, technology and innovation improvements applied to existing infrastructure to reduce emissions intensity • Building and operating renewable "self power" generation facilities to reduce emissions related to the energy consumed by operations • Gradual investment in low carbon projects and businesses • Purchasing and retaining renewable energy credits and selective investment in nature-based solutions and offsets In September 2022, a new study carried out by Guidehouse, an independent consultant engaged by Enbridge Gas was released. The Pathways to Net Zero Emissions for Ontario study looks at two ways Ontario's energy system could achieve its net zero emissions goals by 2050: a wide-scale electrification

		approach or a diversified approach that balances electrification with the use of renewable natural gas, hydrogen, and natural gas with carbon capture. The study concludes that the diversified approach is the most cost-effective, reliable and resilient way to help Ontario meet its greenhouse gas emission targets by 2050.
4.0 Archaeological		
Comment 15	We understand that the Stage 2 archaeological assessment is ongoing. We have been participating by sending Archaeological Field Liaisons and expect to continue to do so.	That is correct. Thank you for your participation. We will continue to provide opportunities for COTTFN's Archaeological Field Liaisons to participate.

Type	Date	From	To	Ecology/Archaeology	Subject Matter
Email	16-Mar-22	AECOM	Caldwell First Nation	Archaeology	The AECOM representative sent the First Nation representative an invitation to participate in the Stage 2 Archaeological Assessment (AA) of the Enbridge Gas Panhandle Regional Expansion Project (Project) in Essex County and western Chatham-Kent this spring/summer. The AECOM representative advised the First Nation representative(s) that they would like to get any necessary agreements in place so they can compensate the Nation for their participation in the field work. The AECOM representative also advised that if the First Nation was unable to send a representative to join the field work that they would provide them with a copy of the Stage 2 AA report for their review once it has been completed.
Email	16-Mar-22	Caldwell First Nation	AECOM	Archaeology	The Caldwell First Nation representative advised the AECOM representative of the Nation's Protocols for Engagement and Consultation and recommended that the AECOM representative review these Protocols to allow the parties to work toward meaningful engagement.
Email	16-Mar-22	AECOM	Caldwell First Nation	Ecology	The AECOM representative advised the First Nation representative(s) that they would be completing some preliminary Species at Risk (SAR) habitat assessments (snake and turtle overwintering habitat and nesting habitat identification) for the Project over the next couple of weeks and invited the Nation to participate. The AECOM representative advised the First Nation representative(s) that they would like to get any necessary agreements in place so they can compensate the Nation for their participation in the field work. The AECOM representative also advised that if the First Nation was unable to send a representative to join the field work that they would share their findings for the Nation's review once it has been completed.
Email	16-Mar-22	Caldwell First Nation	AECOM	Ecology	The Caldwell First Nation representative advised the AECOM representative of the Nation's Protocols for Engagement and Consultation and recommended that the AECOM representative review these Protocols to allow the parties to work toward meaningful engagement.
Email	16-Mar-22	AECOM	Chippewas of the Thames First Nation	Archaeology	The AECOM representative sent the First Nation representative an invitation to participate in the Stage 2 AA of the Project in Essex County and western Chatham-Kent this spring/summer. The AECOM representative advised the First Nation representative(s) that they would like to get any necessary agreements in place so they can compensate the Nation for their participation in the field work. The AECOM representative also advised that if the First Nation was unable to send a representative to join the field work that they would provide them with a copy of the Stage 2 AA report for their review once it has been completed.
Email	16-Mar-22	AECOM	Chippewas of the Thames First Nation	Archaeology	The AECOM representative advised the First Nation representatives that they had received an out of office from one of the Nation's representative so they re-sent the invitation to participate in the Stage 2 AA to different representatives of the Nation.

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Email	16-Mar-22	AECOM	Chippewas of the Thames First Nation	Ecology	The AECOM representative advised the First Nation representative(s) that they would be completing some preliminary Species at Risk (SAR) habitat assessments (snake and turtle overwintering habitat and nesting habitat identification) for the Project over the next couple of weeks and invited the Nation to participate. The AECOM representative advised the First Nation representative(s) that they would like to get any necessary agreements in place so they can compensate the Nation for their participation in the field work. The AECOM representative also advised that if the First Nation was unable to send a representative to join the field work that they would share their findings for the Nation's review once it has been completed.
Email	16-Mar-22	AECOM	Chippewas of Kettle and Stony Point First Nation	Ecology	The AECOM representative advised the First Nation representative(s) that they would be completing some preliminary Species at Risk (SAR) habitat assessments (snake and turtle overwintering habitat and nesting habitat identification) for the Project over the next couple of weeks and invited the Nation to participate. The AECOM representative advised the First Nation representative(s) that they would like to get any necessary agreements in place so they can compensate the Nation for their participation in the field work. The AECOM representative also advised that if the First Nation was unable to send a representative to join the field work that they would share their findings for the Nation's review once it has been completed.
Email	16-Mar-22	AECOM	Chippewas of Kettle and Stony Point First Nation	Archaeology	The AECOM representative sent the First Nation representative an invitation to participate in the Stage 2 AA of the Project in Essex County and western Chatham-Kent this spring/summer. The AECOM representative advised the First Nation representative(s) that they would like to get any necessary agreements in place so they can compensate the Nation for their participation in the field work. The AECOM representative also advised that if the First Nation was unable to send a representative to join the field work that they would provide them with a copy of the Stage 2 AA report for their review once it has been completed.
Email	16-Mar-22	AECOM	Walpole Island First Nation	Archaeology	The AECOM representative sent the First Nation representative an invitation to participate in the Stage 2 AA of the Project in Essex County and western Chatham-Kent this spring/summer. The AECOM representative advised the First Nation representative(s) that they would like to get any necessary agreements in place so they can compensate the Nation for their participation in the field work. The AECOM representative also advised that if the First Nation was unable to send a representative to join the field work that they would provide them with a copy of the Stage 2 AA report for their review once it has been completed.

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Email	16-Mar-22	AECOM	Walpole Island First Nation	Ecology	The AECOM representative advised the First Nation representative(s) that they would be completing some preliminary Species at Risk (SAR) habitat assessments (snake and turtle overwintering habitat and nesting habitat identification) for the Project over the next couple of weeks and invited the Nation to participate. The AECOM representative advised the First Nation representative(s) that they would like to get any necessary agreements in place so they can compensate the Nation for their participation in the field work. The AECOM representative also advised that if the First Nation was unable to send a representative to join the field work that they would share their findings for the Nation's review once it has been completed. SAR habitat assessment.
Email	16-Mar-22	AECOM	Delaware Nation	Archaeology	The AECOM representative sent the First Nation representative an invitation to participate in the Stage 2 AA of the Project in Essex County and western Chatham-Kent this spring/summer. The AECOM representative advised the First Nation representative(s) that they would like to get any necessary agreements in place so they can compensate the Nation for their participation in the field work. The AECOM representative also advised that if the First Nation was unable to send a representative to join the field work that they would provide them with a copy of the Stage 2 AA report for their review once it has been completed.
Email	16-Mar-22	AECOM	Delaware Nation	Ecology	The AECOM representative advised the First Nation representative(s) that they would be completing some preliminary Species at Risk (SAR) habitat assessments (snake and turtle overwintering habitat and nesting habitat identification) for the Project over the next couple of weeks and invited the Nation to participate. The AECOM representative advised the First Nation representative(s) that they would like to get any necessary agreements in place so they can compensate the Nation for their participation in the field work. The AECOM representative also advised that if the First Nation was unable to send a representative to join the field work that they would share their findings for the Nation's review once it has been completed. SAR habitat assessment.
Email	16-Mar-22	AECOM	Oneida Nation of the Thames	Archaeology	The AECOM representative sent the First Nation representative an invitation to participate in the Stage 2 AA of the Project in Essex County and western Chatham-Kent this spring/summer. The AECOM representative advised the First Nation representative(s) that they would like to get any necessary agreements in place so they can compensate the Nation for their participation in the field work. The AECOM representative also advised that if the First Nation was unable to send a representative to join the field work that they would provide them with a copy of the Stage 2 AA report for their review once it has been completed.

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Email	16-Mar-22	AECOM	Oneida Nation of the Thames	Ecology	The AECOM representative advised the First Nation representative(s) that they would be completing some preliminary Species at Risk (SAR) habitat assessments (snake and turtle overwintering habitat and nesting habitat identification) for the Project over the next couple of weeks and invited the Nation to participate. The AECOM representative advised the First Nation representative(s) that they would like to get any necessary agreements in place so they can compensate the Nation for their participation in the field work. The AECOM representative also advised that if the First Nation was unable to send a representative to join the field work that they would share their findings for the Nation's review once it has been completed. SAR habitat assessment
Email	16-Mar-22	AECOM	Aamjiwnaang First Nation	Ecology	The AECOM representative advised the First Nation representative(s) that they would be completing some preliminary Species at Risk (SAR) habitat assessments (snake and turtle overwintering habitat and nesting habitat identification) for the Project over the next couple of weeks and invited the Nation to participate. The AECOM representative advised the First Nation representative(s) that they would like to get any necessary agreements in place so they can compensate the Nation for their participation in the field work. The AECOM representative also advised that if the First Nation was unable to send a representative to join the field work that they would share their findings for the Nation's review once it has been completed.
Email	16-Mar-22	AECOM	Aamjiwnaang First Nation	Archaeology	The AECOM representative sent the First Nation representative an invitation to participate in the Stage 2 Archaeological Assessment (AA) of the Enbridge Gas Panhandle Regional Expansion Project (Project) in Essex County and western Chatham-Kent this spring/summer. The AECOM representative advised the First Nation representative(s) that they would like to get any necessary agreements in place so they can compensate the Nation for their participation in the field work. The AECOM representative also advised that if the First Nation was unable to send a representative to join the field work that they would provide them with a copy of the Stage 2 AA report for their review once it has been completed.
Email	18-Mar-22	Chippewas of Kettle and Stony Point First Nation	AECOM	Ecology	The First Nation representative advised the AECOM representative that they were compiling a list of trained monitors.

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Email	21-Mar-22	AECOM	Caldwell First Nation	Ecology	The AECOM representative advised the First Nation representative(s) that they would be completing some preliminary Species at Risk (SAR) habitat assessments (snake and turtle overwintering habitat and nesting habitat identification) for the Project over the next couple of weeks and invited the Nation to participate. The AECOM representative advised the First Nation representative(s) that they would like to get any necessary agreements in place so they can compensate the Nation for their participation in the field work. The AECOM representative also advised that if the First Nation was unable to send a representative to join the field work that they would share their findings for the Nation's review once it has been completed.
Email	21-Mar-22	AECOM	Caldwell First Nation	Archaeology	The AECOM representative advised the First Nation representative that they would be completing the Stage 2 AA for the Project and invited the Nation to participate. The AECOM representative advised that they would provide compensation for the Nation's participation in the Project.
Email	21-Mar-22	Chippewas of the Thames First Nation	AECOM	Archaeology	The First Nation representative advised the AECOM representative that they should reach out to their Energy Consultation Coordinator regarding archaeological assessments.
Email	21-Mar-22	AECOM	Chippewas of the Thames First Nation	Archaeology	The AECOM representative advised the First Nation representative that they would continue to reach out to them to arrange archaeological fieldwork.
Email	21-Mar-22	Aamjiwnanng First Nation	AECOM	Archaeology	The Aamjiwnaang First Nation representative advised the AECOM representative they would be happy to participate in the Stage 2 AA field work for the Project.
Email	21-Mar-22	AECOM	Chippewas of Kettle and Stony Point First Nation	Ecology	The AECOM representative advised the First Nation representative(s) that they would be completing some preliminary Species at Risk (SAR) habitat assessments (snake and turtle overwintering habitat and nesting habitat identification) for the Project over the next couple of weeks and invited the Nation to participate. The AECOM representative advised the First Nation representative(s) that they would like to get any necessary agreements in place so they can compensate the Nation for their participation in the field work. The AECOM representative also advised that if the First Nation was unable to send a representative to join the field work that they would share their findings for the Nation's review once it has been completed.
Email	23-Mar-22	Chippewas of the Thames First Nation	AECOM	Archaeology/Ecology	The First Nation representative advised the AECOM representative that they had received notice of the Stage 2 AA and SAR habitat assessments and would like to participate. The First Nation representative advised they would send an agreement for AECOM's review.
Email	25-Mar-22	Chippewas of the Thames First Nation	AECOM	Archaeology/Ecology	The First Nation representative provided the AECOM representative with a draft agreement the Nation uses for archaeology and natural heritage work.

Type	Date	From	To	Ecology/Archaeology	Subject Matter
Email	4-Apr-22	AECOM	Caldwell First Nation	Archaeology	The AECOM representative emailed the First Nation representative to see if they had any questions or concerns regarding the archaeology work on the Project. The AECOM representative asked the First Nation representative let them know if they had a representative from the community who would like to participate in the fieldwork.
Email	4-Apr-22	AECOM	Walpole Island First Nation	Archaeology	The AECOM representative emailed the First Nation representative to see if they had any questions or concerns regarding the archaeology work on the Project. The AECOM representative asked the First Nation representative let them know if they had a representative from the community who would like to participate in the fieldwork.
Email	4-Apr-22	AECOM	Delaware Nation	Archaeology	The AECOM representative emailed the First Nation representative to see if they had any questions or concerns regarding the archaeology work on the Project. The AECOM representative asked the First Nation representative let them know if they had a representative from the community who would like to participate in the fieldwork.
Email	4-Apr-22	AECOM	Oneida Nation of the Thames	Archaeology	The AECOM representative emailed the First Nation representative to see if they had any questions or concerns regarding the archaeology work on the Project. The AECOM representative asked the First Nation representative let them know if they had a representative from the community who would like to participate in the fieldwork.
Email	5-Apr-22	Walpole Island First Nation	AECOM	Archaeology	The First Nation representative advised the AECOM representative that they would like to participate in the Project and would require an agreement to be signed.
Email	5-Apr-22	AECOM	Walpole Island First Nation	Archaeology	The AECOM representative advised the First Nation representative that they would send them a contract regarding their participation in the Stage 2 AA and advised that they agreed to their rates.
Email	5-Apr-22	AECOM	Chippewas of the Thames First Nation	Archaeology/Ecology	The AECOM representative provided the First Nation representative with a signed copy of the participation agreement for the Project.
Email	19-Apr-22	AECOM	Aamjiwnaang First Nation	Ecology	The AECOM representative advised the First Nation representative that they would be completing the Aquatic habitat assessments for the Project starting on April 25 until April 29 and the week of May 2 until May 6 as needed and invited the First Nation representative to participate in these surveys. The AECOM representative advised the First Nation representative that they would share their findings for the Nation's review if they are not able to participate.
Email	19-Apr-22	AECOM	Chippewas of Kettle and Stony Point First Nation	Ecology	The AECOM representative advised the First Nation representative that they would be completing the Aquatic habitat assessments for the Project starting on April 25 until April 29 and the week of May 2 until May 6 as needed and invited the First Nation representative to participate in these surveys. The AECOM representative advised the First Nation representative that they would share their findings for the Nation's review if they are not able to participate.
Email	19-Apr-22	Chippewas of Kettle and Stony Point First Nation	AECOM	Ecology	The First Nation representative advised the AECOM representative that they had someone who may be able to participate in the Aquatic habitat assessments.

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Email	19-Apr-22	AECOM	Walpole Island First Nation	Ecology	The AECOM representative advised the First Nation representative that they would be completing the Aquatic habitat assessments for the Project starting on April 25 until April 29 and the week of May 2 until May 6 as needed and invited the First Nation representative to participate in these surveys. The AECOM representative advised the First Nation representative that they would share their findings for the Nation's review if they are not able to participate.
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Email	19-Apr-22	AECOM	Oneida Nation of the Thames	Ecology	The AECOM representative advised the First Nation representative that they would be completing the Aquatic habitat assessments for the Project starting on April 25 until April 29 and the week of May 2 until May 6 as needed and invited the First Nation representative to participate in these surveys. The AECOM representative advised the First Nation representative that they would share their findings for the Nation's review if they are not able to participate.
Email	19-Apr-22	AECOM	Aamjiwnaang First Nation	Ecology	The AECOM representative advised the Aamjiwnaang First Nation representative that they had a team of ecologists going out to do some Aquatic Habitat Assessments at the Project starting the week of April 25 and asked whether the Nation's representative would be interested in joining. The AECOM representative advised that they would share their findings once complete, if the Nation is unable to send a representative to participate in the surveys.
Email	21-Apr-22	Aamjiwnaang First Nation	AECOM	Ecology	The Aamjiwnaang First Nation representative advised the AECOM representative that they would only be able to attend evening sessions for the Aquatic habitat assessments for the Project. The First Nation representative asked if any of the studies would be taking place during the evening.
Email	29-Apr-22	Oneida Nation of the Thames	AECOM	Ecology	The First Nation representative advised the AECOM representative that they had 6 participants taking part in an archaeological monitoring field course and they would complete the training by the end of next week. Otherwise, the First Nation representative would have liked to have sent a monitor to participate. The First Nation representative asked that AECOM share the findings of the study. Aquatic habitat assessments
Email	2-May-22	AECOM	Oneida Nation of the Thames	Ecology	The AECOM representative invited the First Nation representative and their staff to participate in training related to Fish community assessments.
Email	4-May-22	Oneida Nation of the Thames	AECOM	Ecology	The First Nation representative advised the AECOM representative that they would be having some reptile surveys completed over the next couple of months and were hoping the agreement with AECOM would cover these surveys as well.

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Email	4-May-22	AECOM	Oneida Nation of the Thames	Ecology	The AECOM representative advised the First Nation representative about the agreement related to the Project and advised that the fisheries component would be taking place over 3-5 days next week depending on weather and the number of fish caught.
Email	6-May-22	Aamjiwnaang First Nation	AECOM	Ecology	The Aamjiwnaang First Nation representative advised that an illness has affected their office over the last 2 weeks and they missed the AECOM representative's email inviting them to participate in the Aquatic habitat assessments. The Aamjiwnaang First Nation representative asked the AECOM representative to share the findings once complete.
Phone	6-May-22	AECOM	Aamjiwnaang First Nation	Ecology	Aquatic habitat assessments and capacity to send monitor. Confirmed findings will be shared once complete.
Email	9-Jun-22	AECOM	Chippewas of the Thames First Nation	Archaeology	The AECOM representative advised the First Nation representative that the field work had been cancelled for the day.
Email	9-Jun-22	Chippewas of the Thames First Nation	AECOM	Archaeology	The First Nation representative advised the AECOM representative that they would try to send a field liaison tomorrow.
Email	9-Jun-22	Chippewas of the Thames First Nation	AECOM	Archaeology	The First Nation representative advised they would not be able to send a field liaison to site due to capacity issues.
Email	29-Jul-22	AECOM	Caldwell First Nation	Archaeology	The AECOM representative advised the First Nation representative that they would be completing two stages of archaeology at the same time and they would be heading back to the field August 2. The AECOM representative provided details of the field work and meeting locations.
Email	29-Jul-22	Caldwell First Nation	AECOM	Archaeology	The First Nation representative emailed the AECOM representative to advise that they wanted to participate in the fieldwork and sent AECOM a copy of their field participation agreement for review.
Email	29-Jul-22	AECOM	Chippewas of the Thames First Nation	Archaeology	The AECOM representative advised the First Nation representative that they would be completing two stages of archaeology at the same time and they would be heading back to the field August 2. The AECOM representative provided details of the field work and meeting locations.
Email	29-Jul-22	Chippewas of the Thames First Nation	AECOM	Archaeology	The First Nation representative advised the AECOM representative that they would have a field liaison on the Stage 3 site for August 2, 2022 and advised they are currently working on a field liaison to attend the Stage 2 site.
Email	29-Jul-22	Chippewas of the Thames First Nation	AECOM	Archaeology	The First Nation representative requested the Field Director's name and contact for the Stage 3 AA and Stage 2 AA.
Email	29-Jul-22	AECOM	Chippewas of the Thames First Nation	Archaeology	The AECOM representative provided the First Nation representative with the supervisor contact information for the Stage 2 and 3 AA.
Email	29-Jul-22	AECOM	Chippewas of the Thames First Nation	Archaeology	The AECOM representative advised that they are heading back out to the Project August 2 to complete the Stage 2 and 3 AA.
Email	29-Jul-22	Chippewas of the Thames First Nation	AECOM	Archaeology	The First Nation representative asked the AECOM representative about the Stage 3 AA and Stage 2 AA and how many days each project would be.
Email	29-Jul-22	AECOM	Aamjiwnanng First Nation	Archaeology	The AECOM representative advised the Aamjiwnaang First Nation representative that they would be completing Stage 2 and Stage 3 field work for the Project. The AECOM representative provided the location of the meeting place for the field work.

Type	Date	From	To	Ecology/Archaeology	Subject Matter
Email	29-Jul-22	AECOM	Chippewas of Kettle and Stony Point First Nation	Archaeology	The AECOM representative advised the Aamjiwnaang First Nation representative that they would be completing Stage 2 and Stage 3 field work for the Project. The AECOM representative provided the location of the meeting place for the field work.
Email	29-Jul-22	AECOM	Walpole Island First Nation	Archaeology	The AECOM representative advised the Aamjiwnaang First Nation representative that they would be completing Stage 2 and Stage 3 field work for the Project. The AECOM representative provided the location of the meeting place for the field work.
Email	1-Aug-22	Aamjiwnanng First Nation	AECOM	Archaeology	The First Nation representative advised the AECOM representative that they would send a representative to participate in the Stage 3 and Stage 2 field work.
Email	2-Aug-22	AECOM	Caldwell First Nation	Archaeology	The AECOM representative provided the First Nation representative with a signed copy of the field participation agreement.
Email	2-Aug-22	Caldwell First Nation	AECOM	Archaeology	The First Nation representative provided the AECOM representative with an agreement to participate in the field work for AECOM's review.
Email	5-Aug-22	Chippewas of the Thames First Nation	AECOM	Archaeology	The First Nation representative asked the AECOM representative about the status of the Stage 3 AA and Stage 2 AA sites.
Email	5-Aug-22	AECOM	Chippewas of the Thames First Nation	Archaeology	The AECOM representative advised the First Nation representative that the historic Stage 3 site is complete and that the Indigenous Stage 3 is still ongoing. The AECOM representative advised the First Nation representative that they would be returning next week and would let them know when they plan to return.
Email	19-Aug-22	AECOM	Chippewas of the Thames First Nation	Archaeology	The AECOM representative advised the Aamjiwnaang First Nation representative that they would be continuing with the stage 3 field work and some stage 2 fieldwalking and possible test pitting a couple parcels later in the week and provided details on the meeting location and time.
Email	19-Aug-22	AECOM	Aamjiwnanng First Nation	Archaeology	The AECOM representative advised the Aamjiwnaang First Nation representative that they would be continuing with the stage 3 field work and some stage 2 fieldwalking and possible test pitting a couple parcels later in the week and provided details on the meeting location and time.
Email	19-Aug-22	AECOM	Caldwell First Nation	Archaeology	The AECOM representative advised the First Nation representative that they would be continuing with the Stage 3 and some Stage 2 fieldwalking and possibly test pitting a couple parcels later in the week and provided details on the meeting location and time.
Email	19-Aug-22	AECOM	Walpole Island First Nation	Archaeology	The AECOM representative advised the First Nation representative that they would be continuing with the Stage 3 and some Stage 2 fieldwalking and possibly test pitting a couple parcels later in the week and provided details on the meeting location and time.
Email	20-Aug-22	Aamjiwnanng First Nation	AECOM	Archaeology	The Aamjiwnaang First Nation representative advised the AECOM representative that they would be sending a representative to participate in the Stage 3 field work.
Email	21-Aug-22	Chippewas of the Thames First Nation	AECOM	Archaeology	The First Nation representative advised the AECOM representative that they would be sending a field liaison representative to participate on behalf of the Nation in the Stage 3 field work.

Type	Date	From	To	Ecology/Archaeology	Subject Matter
Email	30-Aug-22	Caldwell First Nation	AECOM	Archaeology	The First Nation representative advised the AECOM representative that the Nation had signed a Field Participation Agreement with Enbridge Gas and could deploy field liaisons to the Project. The First Nation representative requested that the AECOM representative provide them with updates on fieldwork, relevant materials and their fieldwork schedule so they could arrange for field liaison representatives to participate.
Email	30-Aug-22	AECOM	Caldwell First Nation	Archaeology	The AECOM representative advised the First Nation representative that they had completed the Stage 3 AA for the Project. The AECOM representative attached a map and photo of one of the units along the north line of the site and advised that all counts on the map reflect Onondaga flakes. No tools, diagnostics, pottery or features were found. The AECOM representative advised that they would notify the First Nation representative when they headed back out for further work.
Email	30-Sep-22	AECOM	Chippewas of Kettle and Stony Point First Nation	Archaeology	The AECOM representative advised the First Nation representative that the archaeological team will be heading out on October 3 to conduct some Stage 2 test pitting for the Project.
Email	30-Sep-22	Chippewas of Kettle and Stony Point First Nation	AECOM	Archaeology	The First Nation representative advised the AECOM representative that they appreciated the notification about the archaeological work on the Project and that they are still finalizing contract details. The First Nation representative asked the AECOM representative about what the Project work would look like over the next few months in terms of days in the field.
Email	30-Sep-22	AECOM	Chippewas of Kettle and Stony Point First Nation	Archaeology	The AECOM representative advised the First Nation representative that they are not sure what the field work will look like, since they are discussing with the Ministry whether some Stage 4 AA work would need to be completed. The AECOM representative advised that Enbridge Gas is planning on directionally drilling the area where a historic scatter and Indigenous artifacts were located, which would normally go to a Stage 4 AA. However, since the plan is to do directional drilling, the site may not be impacted. The AECOM representative advised they would keep the First Nation representative updated and informed of any upcoming field work.
Email	30-Sep-22	Chippewas of Kettle and Stony Point First Nation	AECOM	Archaeology	The First Nation representative advised the AECOM representative that they would finalize contract details in the next week or two and that they would be sending a monitor to participate in the Stage 2 AA.

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To: Chippewas of Kettle and Stony Point First Nation

Date: August 8, 2022
Project #: 60665521
From: Kristan Washburn (AECOM)
Johanna Perz (AECOM)
Nicholas Allen (AECOM)

CC: Evan Tomek (Enbridge)

Memorandum

Subject: **Enbridge – Panhandle Regional Expansion Project – Natural Heritage Background Review and Field Investigations Technical Memorandum**

1. Project Description

AECOM Canada Ltd. (hereafter referred to as AECOM) has been retained by Enbridge Gas Inc. (Enbridge Gas) to complete an Environmental Report (ER) and to assess the potential environmental and socio-economic effects of increasing the capacity of the Panhandle Transmission System, which serves residential, commercial, industrial, greenhouse and power generation customers in Windsor, Essex County and Chatham-Kent. The Project includes the construction of the following:

- Panhandle Loop: Approximately 19 kilometres (km) of new pipeline which loops – or parallels – the existing 20-inch Panhandle Pipeline. The new pipeline will be 36 inches in diameter and located adjacent to an existing pipeline corridor from approximately Richardson Side Road in the Municipality of Lakeshore, and Enbridge Gas' existing Dover Transmission Station in the Municipality of Chatham-Kent.
- Leamington Interconnect: Approximately 12 km of new pipeline, 16 inches in diameter, adjacent to or within an existing road allowance on public or private property to connect the existing Leamington North Lines to both the Kingsville East Line and Leamington North Reinforcement Line, located in the Municipality of Lakeshore, Town of Kingsville, and the Municipality of Leamington.

The ER was prepared in accordance with the Ontario Energy Board's (OEB) *Environmental Guidelines* (2016). The *Environmental Guidelines* are designed to provide direction to proponents in the preparation of an ER and to assist in determining how to identify, manage and document potential effects associated with their projects on the environment (OEB, 2016). The ER was submitted to the OEB, along with Enbridge Gas' Leave-to-Construct application for the Panhandle Regional Expansion Project, in April 2022. OEB review and approval to proceed is required prior to construction. Proposed construction dates for the Panhandle Loop and Leamington Interconnect are 2023 and 2024, respectively.

The following memorandum documents the methods and results of the natural heritage background information review and field investigations completed in 2022 to address Chippewas of Kettle and Stony Point First Nation

as presented in the Environmental Report Review (Vertex Professional Services Ltd., 2022). The Study Area of the Panhandle Loop (Panhandle Study Area) and Leamington Interconnect (Leamington Study Area) includes the Preferred Routes and an additional 120 m to allow for the identification of adjacent lands as defined by the Natural Heritage Reference Manual (MNR, 2010).

1.1 Preferred Route

The Preferred Route for the Panhandle Loop has the pipeline travelling in a semi-diagonal orientation southwest from the Dover Transmission Station in the Municipality of Chatham-Kent, paralleling the existing 20-inch Panhandle Pipeline to a new proposed transmission station at approximately Richardson Side Road in the Municipality of Lakeshore.

The Preferred Route for the Leamington Interconnect travels adjacent to or within an existing road allowance on public or private property. The pipeline travels west from the existing Leamington North Lines along Mersea Road 10 before tying into the existing Leamington North Reinforcement Line. The pipeline continues to travel north on County Road 31, turns west, and travels along County Road 8 before tying into the existing Kingsville East Line. The pipeline would travel adjacent to or within an existing road allowance on public or private property.

The Preferred Routes for the Panhandle Loop and Leamington Interconnect are currently illustrated within approximate locations. Enbridge Gas is currently undertaking detailed design to refine the exact locations of the running lines, permanent easements, Temporary Land Use (TLU) requirements and road/watercourse crossing methods. The detailed design process will be influenced by supplemental studies (including environmental studies) and site-specific requests from landowners and agencies. In general, the evaluation has sought to avoid socio-economic features and sensitive natural features to the extent possible.

2. Background Information Review

A summary of background information as documented in the Panhandle Regional Expansion Project Environmental Report (AECOM, 2022) is provided below.

2.1 Methods

A background information review was completed using the secondary sources listed in **Table 2-1**.

Table 2-1: Background Information Sources

Information Source	Website or Contact Information	Date of Background Review
Land Information Ontario	https://www.ontario.ca/page/land-information-ontario	February 2, 2022
Natural Heritage Information Centre (NHIC)	https://www.ontario.ca/page/make-natural-heritage-area-map	February 2, 2022
Ontario Breeding Bird Atlas (OBBA)	http://www.birdsontario.org/atlas/index.jsp?lang=en%20	February 2, 2022
Ontario Butterfly Atlas (OBA)	https://www.ontarioinsects.org/atlas/	February 2, 2022
eBird	https://ebird.org/home	February 2, 2022
iNaturalist	https://www.inaturalist.org/	February 2, 2022
Ontario Reptile and Amphibian	https://www.ontarioinsects.org/herp/	February 2, 2022

Information Source	Website or Contact Information	Date of Background Review
Atlas (ORAA)		
Bat Conservation International (BCI)	http://www.batcon.org/	February 2, 2022
Fisheries and Oceans Canada (DFO) Aquatic Species at Risk Maps	https://www.dfo-mpo.gc.ca/species-especes/sara-lep/map-carte/index-eng.html	February 2, 2022
Ministry of Natural Resources and Forestry (MNRF) Fish ON-line	https://www.lioapplications.lrc.gov.on.ca/fishonline	February 2, 2022
Ministry of Environment MECP Species at Risk (SAR) Range Maps	https://www.ontario.ca/page/species-risk-ontario#section-0	February 2, 2022

2.2 Results

2.2.1 Aquatic Features

2.2.1.1 Surface Water

Based on air photo interpretation, the Study Areas are within an area of dynamic agriculturally dominant land use and thus there is an extensive network of field and field edge drainage ditches designed to lower water levels in the surrounding agricultural fields. These drainage ditches and flow conveyance features can potentially contain or support fish habitat but may periodically change configuration through regular farming and maintenance practices.

Panhandle Loop

There are 42 watercourse crossings in the Panhandle Loop based on a desktop review of relevant aerial imagery and watercourse mapping and several site visits. They include 20 named drains including Jeannettes Creek, Baptiste Creek, and Thames River as well as 22 unnamed drains. Ultimately, these watercourses drain to the Thames River or Lake St. Clair. These drains and watercourses are shown in relation to the route in **Figure 2**.

For more information regarding fish and fish habitat, refer to **Section 2.2.1.2** below.

Leamington Interconnect

Based on a desktop review of relevant aerial imagery and watercourse mapping, there are 11 watercourse crossings along the Leamington Interconnect. These drains and watercourses are shown in relation to the Leamington Interconnect on **Figure 1**. Aside from Hollingsworth Drain which flows North for 3 km before joining Duck Creek and flowing 10 km into Lake St. Clair all the other drains flow and converge with the Ruscom River or are branches of the Ruscom River themselves. Some drains flow for up to 7.5 km before meeting with the Ruscom River.

DFO drainage classification was reviewed to assess habitat sensitivity within the drains that transect the Leamington Interconnect. For this project, reference to drainage classification is intended to infer if a drain is classified as direct fish habitat and if sensitive habitat is present in the drain. All the municipal drains within the Leamington Interconnect are categorized as Class F suggesting that the watercourse is intermittent. There are three crossings of the Ruscom River, classified as Class C, which indicates spring spawning fish with no sensitive species. There was no other publicly available information regarding the fish communities.

For more information regarding fish and fish habitat, refer to **Section 2.2.1.2** below

2.2.1.2 Fish and Fish Habitat

The DFO drainage classification of each watercourse was reviewed to assess habitat sensitivity within the drains that transect the Panhandle Loop and Leamington Interconnect. Drainage classification is determined by a combination of flow periodicity (i.e., permanent vs. intermittent), thermal regime, fish community assemblage, and time since last clean out, as shown in **Table 2-2** (DFO, 2017). The classification system indicates fish habitat sensitivity in the drain and the level of approval required for drainage maintenance and operations under the Drainage Act. Based on that information a Restricted Activity Timing Window is selected for the watercourse. This means that no in-water work may occur during those times; a spring restricted activity window means all work has to take place before or after the spring, typically March to July.

For this project, reference to drainage classification is intended to infer if a drain is classified as direct fish habitat and if sensitive habitat is present in the drain. In addition, the LIO database published by the Ministry of Northern Development, Mines, Natural Resources, and Forestry (MNRF) was used to develop fish community assemblages and thermal regimes.

Table 2-2: Summary of DFO Drain Classification Types

Class	Flow	Restricted Activity Timing Window[1]	Species	Present in Study Areas
A	Permanent	Fall or Combination Spring/Fall	No sensitive fish species present	0
B	Permanent	Spring	Sensitive fish species present	0
C	Permanent	Spring	No sensitive fish species present	2
D	Permanent	Fall or Combination Spring/Fall	Sensitive fish species present	2
E	Permanent	Spring	Sensitive fish species present	3
F	Intermittent	Periods of Flow[4]	Not Applicable	5
Unrated (NR)	Unknown	Unknown	Unknown	39

Source: DFO (2017)

1. *Restricted activity timing windows vary by geographic location and fish species present.*
2. *Time since last cleanout is no longer collected as part of the Drain Classification Project as per a decision made by the Drainage Action Working Group (DAWG) in 2010. No new Class B drains will be assigned and any existing Class B drains will not change classification unless new data becomes available to support the reclassification.*
3. *If work was to occur during a period of flow (e.g., spring), a site specific review will be required.*
4. *Flow is defined as the movement of water between two points.*
5. *For details, see Appendix 10 – Sensitive Fish Species List.*
6. *If there is data on flow and fish species for the drain, a Class Authorization may be issued; otherwise, a site-specific review will be required.*

2.2.1.3 Aquatic Species at Risk

2.2.1.3.1 Panhandle Loop - Aquatic SAR

According to the DFO Online Aquatic SAR Mapping Tool (2022), 11 watercourses within the Study Area have been identified as providing habitat for aquatic SAR, including critical habitat as per the Species at Risk Act (SARA). Species listed as Special Concern under Schedule 1 of SARA receive management initiatives under SARA but do not receive individual or habitat protection. Additionally, species listed as Special Concern under the ESA are not provided species or habitat protection under the provincial legislation. All the Threatened and Endangered species within the Study Area receive protection under both the provincial ESA and federal SARA.

This section focuses on watercourses that contain provincially or federally listed SAR. While all of the water crossings within the Panhandle Loop and Leamington Interconnect have the potential to contain fish habitat, the additional concerns around SAR warrant the extra detail and focus of this section. Fish community sampling and fish/mussel habitat assessment were completed at the proposed watercourse crossings in 2022.

If a watercourse containing provincially or federally listed SAR will be affected by the project (e.g., open-cutting SAR Habitat for the pipeline installation), additional correspondence with agencies will be required. The DFO may require a *Fisheries Act* Authorization for the Harmful Alteration, Disruption or Destruction (HADD) to fish habitat or activities that result in the death of fish. An authorization would include constructing compensation habitat to offset for potential impacts to fish and fish habitat. Additionally, consultation with MECP to determine permitting requirements under the ESA will likely be required for any proposed impacts to a watercourse that provides habitat for aquatic SAR. Potential permitting requirements could either come as mitigation advice that would support avoidance or contravention of the ESA, a notification of activity under O.Reg. 242/08, or a permit under Section 17(2)(c).

The following watercourses have been identified to contain or potentially contain aquatic SAR:

Unnamed Non-Flowing Waterbody 002 (SC-07)

This 0.46 acre pond is an offline waterbody with no surface connection to the surrounding watercourses and is assumed to be used or developed for irrigation. There is no publicly available information about this pond regarding thermal classification, but a warmwater regime is assumed. This pond is included as a SAR waterbody because several Lilliput (*Toxolasma parvum* – END under SARA, THR under ESA) mussel shells were found along the shoreline, likely predated by a local muskrat.

Baptiste Creek (SC-19)

Baptiste Creek flows West towards to its confluence with the Thames River 1.5 km downstream of the crossing. Several sections of the creek appear to have been re-aligned. While Baptiste Creek does not have a drain classification, it is a permanently flowing watercourse that provides fish habitat for sensitive fish species which would likely generate a Class E characterization. Background information indicates that Baptiste Creek provides habitat for nine species of fish, including the Spotted Sucker, Mapleleaf, and Lilliput.

Jeannettes Creek (SC-27)

Jeannettes Creek flows North-west through agricultural land towards its confluence with the Thames River 2 km downstream of the crossings. The proposed watercourse crossing of Jeanettes Creek is located approximately 2 km upstream from its confluence with the Thames River. Several sections of the watercourse appear to have been aligned historically, and the creek becomes markedly wider after crossing under County Road 7 and receiving inputs from two agricultural drains. Jeannettes Creek is categorized as Class E, meaning it has a permanent flow regime, is direct fish habitat, and has sensitive fish species present. Jeannettes Creek contains 17 species, of which two are SAR species: Spotted Sucker (*Minytrema melanops* – SC under SARA and ESA) and Silver Lamprey (*Ichthyomyzon unicuspis* – SC under SARA and ESA).

Thames River (SC-29)

The Thames River watershed runs through agricultural lands in southwestern Ontario and drains to Lake St. Clair. The river is 273 km long and drains 5,285 square kilometres (km^2) of land, making it the second-largest watershed in southwestern Ontario (UTRCA, 2017). Before its confluence with Lake St. Clair, numerous agricultural drains flow into the Thames River. LIO data indicates that the Thames River is a warmwater watercourse that supports a fish community assemblage of warmwater and coolwater species) (MNRF, 2022). The Thames River is classified as a Class E drain, meaning it has a permanent flow regime and provides fish

habitat for sensitive fish species. There are 66 species within the Thames River, of which 17 are SAR. The complete list of species and SAR is available in **Table 2-3.**

Unnamed Trib to the Thames River 001 (SC-30)

This unnamed tributary to the Thames River flows North-west towards the Thames at a very gentle gradient. The watercourse is classified as a Class E drain, meaning it has a permanent flow regime and provides fish habitat for sensitive fish species. There is no publicly available information about this drain regarding flow regime or thermal classification but a warmwater regime is assumed. This drain is mapped by DFO (2022) as containing Lake Chubsucker.

Myers Pump Works Drain (SC-33)

Myers Pump Works Drain flows North East towards McFarlane Relief Drain. The watercourse is unrated by the DFO with respect to drainage classification. There is no publicly available information about this drain regarding flow regime or thermal classification. This drain is mapped by DFO (2022) as containing Lake Chubsucker.

Unnamed Trib to Myers Pump Works Drain 001 (SC-34)

This unnamed tributary flows South-East towards Myers Pump Works Drain. The watercourse is unrated by the DFO with respect to drainage classification and there is no publicly available information about this drain regarding flow regime or thermal classification. According to DFO Aquatic SAR Online Mapping (2022), Lake Chubsucker have been identified within this watercourse.

Unnamed Trib to Myers Pump Works Drain 002 (SC-35)

This unnamed tributary flows South-East towards Myers Pump Works Drain. The watercourse is unrated by the DFO with respect to drainage classification and there is no publicly available information about this drain regarding flow regime or thermal classification. According to DFO Aquatic SAR Online Mapping (2022), Lake Chubsucker have been identified within this watercourse.

Unnamed Trib to Myers Pump Works Drain 003 (SC-36)

This unnamed tributary flows South-East towards Myers Pump Works Drain. The watercourse is unrated by the DFO with respect to drainage classification and there is no publicly available information about this drain regarding flow regime or thermal classification. According to DFO Aquatic SAR Online Mapping (2022), Lake Chubsucker have been identified within this watercourse.

Unnamed Trib to Myers Pump Works Drain 004 (SC-37)

This unnamed tributary flows South-East towards Myers Pump Works Drain. The watercourse is unrated by the DFO with respect to drainage classification and there is no publicly available information about this drain regarding flow regime or thermal classification. According to DFO Aquatic SAR Online Mapping (2022), Lake Chubsucker have been identified within this watercourse.

McFarlane Relief Drain (SC-40)

McFarlane Relief Drain flows North-West for 2.5 km from the crossing before it meets merges with Jacks Creek and then flows into Lake St. Clair. This watercourse is categorized as a municipal Class D drain meaning it is permanent, has a fall or fall and spring restriction window, and contains sensitive fish. McFarlane Relief Drain provides habitat for an assemblage of 28 warmwater and coolwater fish species (Table 2-3), several species of mussels, and is characterized overall as having a warmwater thermal regime. Additionally, DFO SAR mapping (2022) identified Lake Chubsucker (*Erimyzon sucetta* – Endangered (END) under SARA, Threatened (THR) under Endangered Species Act (ESA)) and the recently down-listed Mapleleaf mussel (*Quadrula quadrula* – Special Concern (SC) under SARA and ESA) within the watercourse.

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Table 2-3: Species at Risk Fish Communities within the Panhandle Loop

Common Name	Scientific Name	SARA	ESA	Preferred Thermal Regime	Unnamed Non Flowing Waterbody 002 (SC 07)	Baptiste Creek (SC 19)	Jeannettes Creek (SC 27)	Thames River (SC 29)	Unnamed Trib to the Thames River 001 (SC 30)	Myers Pump Works Drain (PSC21)	Unnamed Trib to Myers Pump Drain 001 (SC 34)	Unnamed Trib to Myers Pump Drain 002 (SC 35)	Unnamed Trib to Myers Pump Drain 003 (SC 36)	Unnamed Trib to Myers Pump Drain 004 (SC 37)	McFarlane Relief Drain (SC40)
Black Bullhead	*Ameiurus melas*	-	-	warmwater	-	-	x	-	-	-	-	-	-	-	x
Black Crappie	*Pomoxis nigromaculatus*	-	-	coolwater	-	x	-	-	-	-	-	-	-	-	x
Black Redhorse	*Moxostoma duquesnei*	THR	THR	warmwater	-	-	-	x	-	-	-	-	-	-	-
Blackchin Shiner	*Notropis heterodon*	NAR	NAR	coolwater	-	-	-	x	-	-	-	-	-	-	-
Blackside Darter	*Percina maculata*	-	-	coolwater	-	-	x	x	-	-	-	-	-	-	-
Bluegill	*Lepomis macrochirus*	-	-	warmwater	-	x	-	x	-	-	-	-	-	-	x
Bluntnose Minnow	*Pimephales notatus*	NAR	NAR	warmwater	-	-	x	x	-	-	-	-	-	-	-
Bowfin	*Amia calva*	-	-	warmwater	-	-	-	-	-	-	-	-	-	-	x
Brook Silverside	*Labidesthes sicculus*	NAR	NAR	warmwater	-	-	-	-	-	-	-	-	-	-	x
Brook Stickleback	*Culaea inconstans*	-	-	coolwater	-	-	-	x	-	-	-	-	-	-	-
Brown Bullhead	*Ameiurus nebulosus*	-	-	warmwater	-	-	-	-	-	-	-	-	-	-	x
Central Mudminnow	*Umbra limi*	-	-	coolwater	-	-	-	x	-	-	-	-	-	-	-
Central Stoneroller	*Campostoma anomalum*	NAR	NAR	coolwater	-	-	-	x	-	-	-	-	-	-	-
Channel Catfish	*Ictalurus punctatus*	-	-	warmwater	-	-	-	x	-	-	-	-	-	-	x
Common Carp	*Cyprinus carpio*	-	-	warmwater	-	-	x	x	-	-	-	-	-	-	x
Common Shiner	*Luxilus cornutus*	-	-	coolwater	-	-	-	x	-	-	-	-	-	-	-
Creek Chub	*Semotilus atromaculatus*	-	-	coolwater	-	-	x	x	-	-	-	-	-	-	-
Eastern Sand Darter	*Ammocrypta pellucida*	THR	THR	-	-	-	-	x	-	-	-	-	-	-	-
Emerald Shiner	*Notropis atherinoides*	-	-	coolwater	-	-	-	x	-	-	-	-	-	-	x
Fallfish	*Semotilus corporalis*	-	-	coolwater	-	-	-	x	-	-	-	-	-	-	-

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Common Name	Scientific Name	SARA	ESA	Preferred Thermal Regime	Unnamed Non Flowing Waterbody 002 (SC 07)	Baptiste Creek (SC 19)	Jeannettes Creek (SC 27)	Thames River (SC 29)	Unnamed Trib to the Thames River 001 (SC 30)	Myers Pump Works Drain (PSC21)	Unnamed Trib to Myers Pump Drain 001 (SC 34)	Unnamed Trib to Myers Pump Drain 002 (SC 35)	Unnamed Trib to Myers Pump Drain 003 (SC 36)	Unnamed Trib to Myers Pump Drain 004 (SC 37)	McFarlane Relief Drain (SC40)
Fantail Darter	*Etheostoma flabellare*	-	-	coolwater	-	-	-	x	-	-	-	-	-	-	-
Freshwater Drum	*Aplodinotus grunniens*	-	-	warmwater	-	-	-	x	-	-	-	-	-	-	x
Gizzard Shad	*Dorosoma cepedianum*	-	-	coolwater	-	x	x	x	-	-	-	-	-	-	x
Goldfish	*Carassius auratus*	-	-	warmwater	x	-	-	-	--	-	-	-	-	-	-
Golden Redhorse	*Moxostoma erythrurum*	NAR	NAR	warmwater	-	-	-	x	-	-	-	-	-	-	-
Gravel Chub	*Erimystax x-punctatus*	EXP	EXP	-	-	-	-	x	-	-	-	-	-	-	-
Green Sunfish	*Lepomis cyanellus*	NAR	NAR	warmwater	-	-	x	x	-	-	-	-	-	-	x
Greenside Darter	*Etheostoma blennioides*	NAR	NAR	warmwater	-	-	-	x	-	-	-	-	-	-	-
Hornyhead Chub	*Nocomis biguttatus*	NAR	NAR	coolwater	-	-	-	x	-	-	-	-	-	-	-
Iowa Darter	*Etheostoma exile*	-	-	coolwater	-	-	-	x	-	-	-	-	-	-	-
Johnny Darter	*Etheostoma nigrum*	-	-	coolwater	-	-	x	x	-	-	-	-	-	-	-
Lake Sturgeon	*Acipenser fulvescens*	END	END	coldwater	-	-	x	x	-	-	-	-	-	-	-
Lake Chubsucker	*Erimyzon sucetta*	END	THR	warmwater	-	-	-	x	X	x	-	x	x	x	x
Lake Whitefish	*Coregonus clupeaformis*	DD	-	coldwater	-	-	-	-	-	-	-	-	-	-	x
Largemouth Bass	*Micropterus salmoides*	-	-	warmwater	-	x	x	x	-	-	-	-	-	-	x
Logperch	*Percina caprodes*	-	-	warmwater	-	-	-	x	-	-	-	-	-	-	x
Longnose Dace	*Rhinichthys cataractae*	-	-	coolwater	-	-	-	x	-	-	-	-	-	-	-
Longnose Gar	*Lepisosteus osseus*	-	-	warmwater	-	-	-	-	-	-	-	-	-	-	x
Mimic Shiner	*Notropis volucellus*	-	-	warmwater	-	x	-	x	-	-	-	-	-	-	-
Mooneye	*Hiodon tergisus*	-	-	coolwater	-	-	-	x	-	-	-	-	-	-	-
Mottled Sculpin	*Cottus bairdii*	-	-	coolwater	-	-	-	x	-	-	-	-	-	-	-
Muskellunge (muskie)	*Esox masquinongy*	-	-	warmwater	-	-	-	x	-	-	-	-	-	-	-

AECOM

Common Name	Scientific Name	SARA	ESA	Preferred Thermal Regime	Unnamed Non Flowing Waterbody 002 (SC 07)	Baptiste Creek (SC 19)	Jeannettes Creek (SC 27)	Thames River (SC 29)	Unnamed Trib to the Thames River 001 (SC 30)	Myers Pump Works Drain (PSC21)	Unnamed Trib to Myers Pump Drain 001 (SC 34)	Unnamed Trib to Myers Pump Drain 002 (SC 35)	Unnamed Trib to Myers Pump Drain 003 (SC 36)	Unnamed Trib to Myers Pump Drain 004 (SC 37)	McFarlane Relief Drain (SC40)
Northern Hog Sucker	*Hypentelium nigricans*	-	-	warmwater	-	-	-	x	-	-	-	-	-	-	-
Northern Madtom	*Noturus stigmosus*	END	END	-	-	-	-	x	-	-	-	-	-	-	-
Northern Pike	*Esox lucius*	-	-	coolwater	-	-	x	-	-	-	-	-	-	-	x
Northern Sunfish	*Lepomis peltastes*	SC	SC	-	-	-	-	x	-	-	-	-	-	-	-
Pugnose Minnow	*Opsopoeodus emiliae*	THR	THR	-	-	-	-	x	-	-	-	-	-	-	-
Pumpkinseed	*Lepomis gibbosus*	-	-	warmwater	-	x	x	x	-	-	-	-	-	-	x
Quillback	*Carpiodes cyprinus*	-	-	coolwater	-	-	-	x	-	-	-	-	-	-	x
Rainbow Darter	*Etheostoma caeruleum*	-	-	coolwater	-	-	-	x	-	-	-	-	-	-	-
Redfin Shiner	*Lythrurus umbratilis*	NAR	NAR	-	-	-	x	-	-	-	-	-	-	-	-
River Chub	*Nocomis micropogon*	NAR	NAR	coolwater	-	-	-	x	-	-	-	-	-	-	-
River Redhorse	*Moxostoma carinatum*	SC	SC	-	-	-	-	x	-	-	-	-	-	-	-
Rock Bass	*Ambloplites rupestris*	-	-	coolwater	-	-	-	x	-	-	-	-	-	-	x
Rosyface Shiner	*Notropis rubellus*	NAR	NAR	warmwater	-	-	-	x	-	-	-	-	-	-	-
Sand Shiner	*Notropis stramineus*	-	-	warmwater	-	-	-	-	-	-	-	-	-	-	x
Shorthead Redhorse	*Moxostoma macrolepidotum*	-	-	warmwater	-	-	-	x	-	-	-	-	-	-	-
Silver Lamprey	*Ichthyomyzon unicuspis*	SC	SC	-	-	-	x	x	-	-	-	-	-	-	-
Silver Redhorse	*Moxostoma anisurum*	-	-	coolwater	-	-	-	x	-	-	-	-	-	-	-
Smallmouth Bass	*Micropterus dolomieu*	-	-	coolwater	-	-	-	x	-	-	-	-	-	-	-
Silver Chub	*Macrhybopsis storeriana*	END	THR	-	-	-	-	x	-	-	-	-	-	-	-
Silver Shiner	*Notropis photogenis*	THR	THR	-	-	-	-	x	-	-	-	-	-	-	-
Spotfin Shiner	*Cyprinella spiloptera*	-	-	warmwater	-	-	x	x	-	-	-	-	-	-	-
Spottail Shiner	*Notropis hudsonius*	-	-	coolwater	-	-	-	x	-	-	-	-	-	-	x

AECOM

Common Name	Scientific Name	SARA	ESA	Preferred Thermal Regime	Unnamed Non Flowing Waterbody 002 (SC 07)	Baptiste Creek (SC 19)	Jeannettes Creek (SC 27)	Thames River (SC 29)	Unnamed Trib to the Thames River 001 (SC 30)	Myers Pump Works Drain (PSC21)	Unnamed Trib to Myers Pump Drain 001 (SC 34)	Unnamed Trib to Myers Pump Drain 002 (SC 35)	Unnamed Trib to Myers Pump Drain 003 (SC 36)	Unnamed Trib to Myers Pump Drain 004 (SC 37)	McFarlane Relief Drain (SC40)
Spotted Sucker	*Minytrema melanops*	SC	SC	-	-	x	x	x	-	-	-	-	-	-	-
Stonecat	*Noturus flavus*	-	-	warmwater	-	-	-	x	-	-	-	-	-	-	-
Walleye	*Stizostedion vitreum*	-	-	coolwater	-	-	-	x	-	-	-	-	-	-	x
White Bass	*Morone chrysops*	-	-	warmwater	-	x	-	x	-	-	-	-	-	-	x
White Crappie	*Pomoxis annularis*	-	-	warmwater	-	x	-	x	-	-	-	-	-	-	x
White Perch	*Morone americana*	-	-	warmwater	-	-	-	x	-	-	-	-	-	-	x
White Sucker	*Catostomus commersonii*	-	-	coolwater	-	-	x	x	-	-	-	-	-	-	x
Yellow Bullhead	*Ameiurus natalis*	-	-	warmwater	-	-	x	x	-	-	-	-	-	-	-
Yellow Perch	*Perca flavescens*	-	-	coolwater	-	-	-	x	-	-	-	-	-	-	-
Fawnsfoot	*Truncilla donaciformis*	END	END	N/A	-	-	-	x	-	-	-	-	-	-	-
Hickorynut	*Obovaria olivaria*	END	END	N/A	-	-	-	x	-	-	-	-	-	-	-
Lilliput	*Toxolasma parvum*	END	THR	N/A	x	x	-	-	-	-	-	-	-	-	-
Mapleleaf	*Quadrula quadrula*	SC	SC	N/A	-	-	-	x	-	x	x	-	-	-	x
Round Hickornut	*Obovaria subrotunda*	END	END	N/A	-	-	-	x	-	-	-	-	-	-	-
Threehorn Wartyback	*Obliquaria reflexa*	THR	THR	N/A	-	-	-	x	-	-	-	-	-	-	-

Source: DFO (2022), MNRF LIO (2022)

Notes:
END – Endangered
THR – Threatened
SC – Special Concern
NAR – Not at Risk
DD – Data Deficient

2.2.1.3.2 Leamington Interconnect - Aquatic SAR

According to DFO's aquatic SAR mapping (DFO, 2022), there are no records of aquatic SAR within the watercourses crossed by the Leamington Interconnect. Fish community sampling and fish/mussel habitat assessment did not identify any SAR during the 2022 field investigations.

2.2.2 Designated Natural Areas and Vegetation

The project is located within the most southern ecoregion of Ontario, Ecoregion 7E (Lake Erie-Lake Ontario). It extends from Windsor and Sarnia east to the Niagara Peninsula and Toronto. Approximately 78% of the ecoregion has been converted to agricultural and developed land. The remaining natural areas consist of Carolinian forest remnants, dense deciduous, sparse deciduous and mixed deciduous forest cover (Crins et al., 2009). This ecoregion also supports the largest remnants of tall-grass prairie in the province.

The project also falls fully within ecodistrict 7E-1 (Essex). The majority of this ecodistrict has been converted to cropland and pasture. Where there is remaining forest (roughly 4% of the ecodistrict), deciduous forests are the dominant natural vegetation (Wester et al., 2018). Tree species include sugar maple (*Acer saccharum*), American beech (*Fagus grandifolia*), red oak (*Quercus rubra*), white ash (*Fraxinus americana*), pin cherry (*Prunus pensylvanica*), white oak (*Quercus alba*), American basswood (*Tilia americana*), black cherry (*Prunus serotina*), bitternut hickory (*Carya cordiformis*), trembling aspen (*Populus tremuloides*), large-toothed aspen (*Populus grandidentata*), yellow birch (*Betula alleghaniensis*), and balsam poplar (*Populus balsamifera*). Marshes are common adjacent to lakes and rivers in this ecodistrict (Wester et al., 2018).

2.2.2.1 Significant Wetlands

Based on the results of the background review using the sources listed in **Table 2-1**, the St. Clair Marsh Provincially Significant Wetland (PSW) Complex was identified within the Panhandle Study Area. Two wetland units of the St. Clair Marsh PSW Complex fall within the Study Area. One unit is located east of the Dover Transmission Station more than 100 m from the Panhandle Loop. The other unit is located south of Bradley Line about 15 m from the Panhandle Loop.

2.2.2.2 Significant Woodlands

Woodlands were identified within the Panhandle and Leamington Study Areas. The Panhandle Loop crosses four significant woodlands, and one is candidate significant woodland, as defined in the Official Plan for the Municipality of Chatham-Kent. No significant woodlands are crossed by the Leamington Interconnect

2.2.2.3 Significant Valleylands

There were no significant valleylands identified within the Study Areas.

2.2.2.4 Areas of Natural and Scientific Interest

The St. Clair Marsh PSW Complex unit located east of the Dover Transmission Station within the Panhandle Study Area is also designated provincially significant Life Science Area of Natural and Scientific Interest (ANSI).

2.2.3 Significant Wildlife Habitat

As the Study Areas fall within the Lake Erie – Lake Ontario Ecoregion 7E, the criteria for determining significant wildlife habitat (SWH) are outlined in the Significant Wildlife Technical Guide (MNR, 2000) and the Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E (MNRF, 2015a). SWH includes habitat for Species of Conservation Concern (SOCC). SOCC includes species designated as Special Concern (MNRF, 2015a) under the ESA, which are not afforded species or habitat protection under the Act.

In addition to Special Concern species, SOCC includes flora and fauna provincially ranked by the NHIC as extremely rare in Ontario (S1), very rare in Ontario (S2) or rare to uncommon in Ontario (S3). SOCC are also considered species listed under Schedule 1 of the federal SARA. Several Ontario natural heritage databases exist that can be accessed to conduct a screening for existing SOCC records in a given area. The resources outlined in **Table 2-1** above were reviewed to identify SOCC in the vicinity of the Study Areas. A total of 26 SOCC were identified for the Study Areas and are presented in **Table 2-4**.

A colonial waterbird nesting area was confirmed through the background review within the Lake St. Clair Marsh PSW Complex. There is also the potential for the presence of additional SWH including but not limited to amphibian breeding habitat, turtle nesting habitat and/or reptile hibernacula.

Table 2-4: Species of Conservation Concern records in the vicinity of the Study Areas identified through background review

Common Name	Scientific Name	Taxonomic Group	S Rank[1]	SARA Schedule 1 Status[2]	ESA Status[3]	Study Area[4]	Data Source[5]
Western Chorus Frog	*Pseudacris maculata*	Amphibian	S4	THR[6]	-	L, P	ORAA
Bald Eagle	*Haliaeetus leucocephalus*	Bird	S4	NAR	SC	P	NHIC
Black Tern	*Chilidonia niger*	Bird	S3B, S4M	NAR	SC	P	OBBA, NHIC
Common Nighthawk	*Chordeiles minor*	Bird	S4B	THR	SC	L	OBBA
Dickcissel	*Spiza americana*	Bird	S2M	N/A	N/A	L	OBBA
Eastern Wood-pewee	*Contopus virens*	Bird	S4B	SC	SC	L, P	OBBA
Purple Martin	*Progne subis*	Bird	S3B	N/A	N/A	L, P	OBBA
Short-eared Owl	*Asio flammeus*	Bird	S4?B, S2S3N	SC	SC	P	NHIC
Wood Thrush	*Hylocichla mustelina*	Bird	S4B	THR	SC	L, P	OBBA
American Lotus	*Nelumbo lutea*	Insect	S2S3	N/A	N/A	P	NHIC
Duke's Skipper	*Euphyes dukesi*	Insect	S2	N/A	N/A	L, P	OBA
Monarch	*Danaus plexippus*	Insect	S2N, S4B	SC	SC	L, P	OBA
Short-winged Green Grasshopper	*Dichromopha viridis*	Insect	S2	-	-	P	NHIC
Midland Painted Turtle	*Chrysemys picta marginata*	Reptile	S4	SC	N/A	L, P	NHIC, ORAA
Northern Map Turtle	*Graptemys geographica*	Reptile	S3	SC	SC	P	NHIC, ORAA
Snapping Turtle	*Chelydra serpentina*	Reptile	S3	SC	SC	P	NHIC, ORAA
Climbing Prairie Rose	*Rosa setigera*	Vascular Plant	S2S3	SC	SC	L	NHIC
Crowned Beggarticks	*Bidens trichosperma*	Vascular Plant	S2	-	-	P	NHIC
Cup Plant	*Silphium perfoliatum*	Vascular Plant	S2	-	-	P	NHIC
Field Thistle	*Cirsium arvense*	Vascular Plant	S3	-	-	P	NHIC
Giant Ironweed	*Vernonia gigantea*	Vascular Plant	S1?	-	-	P	NHIC
Grey-headed Prairie Coneflower	*Ratibida pinnata*	Vascular Plant	S3	-	-	P	NHIC
Mead's Sedge	*Carex meadii*	Vascular Plant	S2	-	-	P	NHIC
Shellback Hickory	*Carya laciniosa*	Vascular Plant	S3	-	-	L	NHIC
Swamp Rose-mallow	*Hibiscus moscheutos*	Vascular Plant	S3	SC	SC	P	NHIC
Walter's Barnyard Grass	*Echinochloa walteri*	Vascular Plant	S3	-	-	P	NHIC
Wingstem	*Verbesina alternifolia*	Vascular Plant	S3	-	-	P	NHIC

Notes: *[1]S-rank:* *The natural heritage provincial ranking system (provincial S-rank) is used by the MNRF Natural Heritage Information Centre (NHIC) to set protection priorities for rare species and natural communities. The following status definitions were taken from NatureServe Explorer's (2020) National and Subnational Conservation Status Definitions available at https://explorer.natureserve.org/AboutTheData/Statuses:*

SX - Presumed Extirpated—Species or community is believed to be extirpated from the province. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered.

SH - Possibly Extirpated (Historical)—Species or community occurred historically in the province, and there is some possibility that it may be rediscovered. Its presence may not have been verified in the past 20-40 years. A species or community could become SH without such a 20-40-year delay if the only known occurrences in a province were destroyed or if it had been extensively and unsuccessfully looked for.

S1 - Critically Imperiled—Critically imperiled in the province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the province.
S2-Imperiled—Imperiled in the province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the province.
S3 - Vulnerable—Vulnerable in the province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.
S4 - Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors.
S5 - Secure—Common, widespread, and abundant in the nation or state/province.
SNR - Unranked—Province conservation status not yet assessed.
SU - Unrankable—Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
SNA - Not Applicable—A conservation status rank is not applicable because the species is not a suitable target for conservation activities.
S#S# - Range Rank—A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species or community. Ranges cannot skip more than one rank (e.g., SU is used rather than S1S4).

[2]*COSEWIC Status:* *The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) provides the Canadian government with advice regarding wildlife species that are nationally at risk of extinction or extirpation. Species assessed and designated at risk by COSEWIC may qualify for legal protection and recovery under the SARA. The following are categories of at risk:*
EXT (Extirpated) – A species that no longer exists in the wild in Canada but exists elsewhere.
END (Endangered) – A species facing imminent extirpation or extinction in Canada.
THR (Threatened) – A species that is likely to become an endangered through all or a large portion of its Canadian range if limiting factors are not reversed.
SC (Special Concern) – A species that may become threatened or endangered due to a combination of biological characteristics and identified threats.
NAR (Not at Risk) – A species that has been evaluated and found to be not at risk.

[3]*ESA Status:* *The Endangered Species Act, 2007 (ESA) protects species listed as Threatened and Endangered on the Species at Risk in Ontario (SARO) List on provincial and private land. The Minister lists species on the SARO list based on recommendations from the Committee on the Status of Species at Risk in Ontario (COSSARO), which evaluates the conservation status of species occurring in Ontario. The following are the categories of at risk:*
END (Endangered) – A species facing imminent extinction or extirpation in Ontario.
THR (Threatened) – Any native species that, on the basis of the best available scientific evidence, is at risk of becoming endangered throughout all or a large portion of its Ontario range if the limiting factors are not reversed.
SC (Special Concern) – A species that may become threatened or endangered due to a combination of biological characteristics and identified threats.
NAR (Not at Risk) – A species that has been evaluated and found to be not at risk.

[4]*Study Area:* *L: Leamington Interconnect*
P: Panhandle Loop

[5] *Data Source:* *NHIC: Record obtained from MNRF's Make-a-Map: Natural Heritage Areas Application (2022).*
OBBA: Record obtained from the OBBA (BSC et al., 2006)
ORAA: Record obtained from the ORAA (Ontario Nature, 2022).
OBA: Record obtained from the OBA (Macnaughton et al., 2022).

[6] *Only the Western Chorus Frog – Great Lake – St. Lawrence – Canadian Shield Population is designated as THR under Schedule 1 of the SARA. The Carolinian population, which may occur in the Study Areas is not considered at risk.*

2.2.4 Species at Risk

Based on the background resources outlined in **Table 2-1**, 44 provincial SAR designated as Threatened (THR), Endangered (END) or Extirpated (EXP) under the *Endangered Species Act* (ESA;2007) were identified as having records in the vicinity of the project Study Areas (e.g., 1 x 1 km squares, 10 x 10 km squares based on information sources). **Table 2-5** provides an outline of the provincial SAR identified during the background review and includes the most recent observation date as per the information sources, where applicable.

Table 2-5: Species at Risk records in the vicinity of the Study Areas identified through background review

Common Name	Scientific Name	Family	S Rank[1]	SARA Schedule 1 Status[2]	ESA Status[3]	Study Area[4]	Data Source[5]
Bank Swallow	*Riparia riparia*	Bird	S4B	THR	THR	P, L	OBBA
Barn Owl	*Tyto alba*	Bird	S1	END	END	P	OBBA
Barn Swallow	*Hirundo rustica*	Bird	S4B	THR	THR	P, L	NHIC, OBBA
Bobolink	*Dolichonyx oryzivorus*	Bird	S4B	THR	THR	P, L	NHIC, OBBA
Chimney Swift	*Chaetura pelagica*	Bird	S3B	THR	THR	P, L	OBBA

Common Name	Scientific Name	Family	S Rank[1]	SARA Schedule 1 Status[2]	ESA Status[3]	Study Area[4]	Data Source[5]
Eastern Meadowlark	*Sturnella magna*	Bird	S4B, S3N	THR	THR	P, L	NHIC, OBBA
Henslow's Sparrow	*Centronyx henslowii*	Bird	S1B	END	END	P	NHIC
King Rail	*Rallus elegans*	Bird	S1B	END	END	P	NHIC, OBBA
Least Bittern	*Ixobrychus exilis*	Bird	S4B	THR	THR	P	NHIC, OBBA
Prothonotary Warbler	*Protonotaria citrea*	Bird	S1B	END	END	P	NHIC, OBBA
Eastern Small-footed Myotis	*Myotis leibii*	Mammal	S2S3	N/A	END	P, L	BCI
Little Brown Myotis	*Myotis lucifugus*	Mammal	S3	END	END	P, L	BCI
Northern Myotis	*Myotis septentrionalis*	Mammal	S3	END	END	P, L	BCI, MECP
Tri-colored Bat	*Perimyotis subflavus*	Mammal	S3?	END	END	P, L	BCI
Dense Blazing Star	*Liatris spicata*	Plant	S2	THR	THR	P, L	NHIC
Blanding's Turtle (Great Lakes / St. Lawrence population)	*Emydidea blandingii*	Reptile	S3	END	THR	P	NHIC, ORAA
Common Five-lined Skink (Five-lined Skink; Carolinian population)	*Plestiodon fasciatus*	Reptile	S2	END	END	P	NHIC, ORAA
Eastern Foxsnake (Carolinian population)	*Pantherophis gloydi*	Reptile	S2	END	END	P, L	ORAA
Massasauga (Carolinian Population)	*Sistrurus catenatus*	Reptile	S1	END	END	P	ORAA
Queensnake	*Regina septemvittata*	Reptile	S2	END	END	P	ORAA
Spiny Softshell	*Apalone spinifera*	Reptile	S2	END	END	P	NHIC
Timber Rattlesnake	*Crotalus horridus*	Reptile	SX	EXP	EXP	P	NHIC

[1]*S-rank:* *As noted in the footnote to Table 2-4*
[2]*SARA Status:* *As noted in the footnote in Table 2-4*
[3]*ESA Status:* *As noted in the footnote in Table 2-4*
[4]*Study Area:* *L: Leamington Interconnect*
P: Panhandle Loop
[5]*Data Source:* *NHIC: Record obtained from MNRF's Make-a-Map: Natural Heritage Areas Application (2022).*
OBBA: Record obtained from the OBBA (BSC et al., 2006)
ORAA: Record obtained from the ORAA (Ontario Nature, 2022).
OBA: Record obtained from the OBA (Macnaughton et al., 2022).
BCI: Record obtained from Bat Conservation International (BCI)
MECP: Record obtained from MECP range mapping.

3. Field Investigations

3.1 Methods

3.1.1 Preliminary Site Visit

AECOM ecologists conducted a preliminary review of habitat of each Study Area on November 9, 2021 to gain an understanding of possible locations of SAR and SAR habitat within the Study Areas. During the preliminary field investigations, AECOM ecologists noted all species and habitat features observed with a focus on the potential SAR identified during the background review. The results of the preliminary site visit were used to inform the 2022 field investigations.

3.1.2 Aquatic Habitat Assessments

Visual aquatic habitat assessments were completed at each of the watercourse crossings in support potential *Fisheries Act* approvals and permits under the Federal SARA and the ESA. Field investigations were completed within the pipeline right-of-way where property access was permitted. Investigations included an assessment of morphology, approximate channel dimensions, substrates, aquatic vegetation, and SAR habitat suitability as well as identifying potential enhancement opportunities for the watercourse. One survey was completed for each watercrossing April 25-26, 2022. As several crossings were identified after the initial assessment a second site visit was completed May 10-13 to finalize the surveys.

Watercourses that did not contain SAR also underwent fish community assessments using backpack electrofishing equipment to determine community makeup and potentially identify any unmapped SAR fish presence. This work was completed May 10-11, 2022.

3.1.3 Ecological Land Classification

Vegetation communities within the Panhandle and Leamington Study Areas were delineated following the Ecological Land Classification (ELC) for Southern Ontario: First Approximation and its Application (Lee et al., 1998). A botanical inventory was conducted in conjunction with the ELC surveys to document local diversity and determine the presence of SAR or rare plants within each Study Area. ELC surveys were conducted on November 9, 2021 and June 7-8, 2022. The results of these field instigations were also used to assess the presence of candidate SWH and SAR habitat. Micro-habitat features for wildlife including SAR e.g., hibernation or nesting habitat were searched for as part of the ELC surveys.

3.1.4 Bat SAR Surveys

Potential maternity roost habitat was identified according to Phase 1: Bat Habitat Suitability Assessment of the *Survey Protocol for Species at Risk Bats within Treed Habitats: Little Brown Myotis, Northern Myotis & Tri-Colored Bat* (MNRF, 2017). Forested communities identified within each Study Area through ELC were recorded and mapped.

Impacts to anthropogenic structures (i.e., buildings and barns) potentially suitable for roosting, identified during the background review within each Study Area, are not anticipated to be impacted by the proposed scope of work. One forested ELC community, a Fresh – Moist Poplar Deciduous Forest (FOD8-1), was identified within the Panhandle Study Area along both banks of the Thames River (SC29). Additional surveys including snag density surveys and acoustic monitoring were not completed as the community is not expected to be impacted by the trenchless crossing methods (i.e., Horizontal Directional Drilling [HDD]) proposed at this location. Rock piles, which may provide suitable maternity roost habitat for Eastern Small-footed Myotis were also considered.

Two forested ELC communities were identified within the Leamington Study Area. Of the two forested ELC communities identified, only one, the Fresh – Moist Shagbark Hickory Deciduous Forest (FOD9-4) community, is expected to be impacted by the proposed works. The FOD9-4 within the limits of works were surveyed during the leaf-off period on May 12, 2022 to identify the presence of suitable maternity roost trees (snags, i.e., any standing live or dead tree at least 10 cm diameter-at-breast-height [dbh] with cracks, crevices, hollows, cavities and/or loose or naturally exfoliating bark) following the methods outlined in the *Survey Protocol for Species at Risk Bats within Treed Habitats: Little Brown Myotis, Northern Myotis & Tri-colored Bat* (MNRF, 2017). Rock piles, which may provide suitable maternity roost habitat for Eastern Small-footed Myotis was also considered.

Acoustic monitoring surveys were then completed within the FOD9-4 in accordance with Maternity Roost Surveys in Treed Habitats (MECP, 2021). Four acoustic monitors (SM4BAT, Wildlife Acoustics Brand) were deployed within the woodlot before dusk on June 7 and recorded until June 17, 2022. The monitors were programmed to record from dusk for a period of five hours. The acoustic monitors were mounted on tree trunks at an average height of 1.6 m and ultrasonic microphones attached to the detector using 3 m recording cables; microphones were positioned as high as possible, away from potential obstacles and angled away from prevailing winds. This placement improves recording quality by reducing surface echoes and ground noise caused by proximal vegetation, which can distort ultrasonic signals. The locations of the acoustic monitors are illustrated on **Figure 1-4**. The precise locations of acoustic monitoring stations were selected in-situ. Field staff considered landscape, likelihood of recording clean calls and proximity to maternity roosting features of interest (i.e., maternity roosting trees, leaf clusters (if noted), and rock piles (including rock outcrops, rocky former fence lines etc.).

Recorded ultrasonic data was analyzed using the Wildlife Acoustics' Kaleidoscope Pro 5.4.2 Analysis Software in order to identify the bat species present. This software is designed to convert files, sort, and categorize bat data by species. It identifies bats to species by comparing the recorded ultrasonic patterns (also known as a pass) to those of known species-specific patterns using the up-to-date Bats of North America classifier (version 5.4.0). Where the recordings are not consistent with the known typical characteristics of a bat or the recording are beyond the software's capability to apply species identification, the analyser assigns the recording as "No ID". No ID recordings can result from background noise such as vehicles, rustling plants, other wildlife, incomplete recordings of bat calls, or bats which are outside of the range of the microphone. AECOM conducted an extensive review of the No ID files to further identify potential bat SAR within the dataset. No ID calls were then run through a secondary software program, SonoBat (Version 4.4.5) to gain a second opinion on the calls. SAR bat calls identified by both programs were manually verified by qualified AECOM ecologists to ensure the patterns were consistent with the typical characteristics of a call for each species.

3.1.5 Turtle SAR Surveys

The potential presence of SAR turtles within the Panhandle and Leamington Study Areas was addressed through Visual Encounter Surveys (VES) generally conducted employing the Survey Technique for Open Water Wetlands as described in the *Survey Protocol for Blanding's Turtle* (MNRF, 2015b). At each watercourse or constructed drain crossing, the surveyor used binoculars to examine basking sites (up to 1 m from the water's edge on shoreline and channel banks, logs, rocks etc.). The water was also scanned to locate swimming turtles. When vegetation obscured the view of the shoreline or other available basking sites (e.g., floating logs), turtles were searched for in conjunction with the snake SAR surveys described below. Surveys were carried out during sunny periods when air temperature was above 5°C. Surveys were also carried out on partially cloudy or overcast days only when air temperature was above 15°C.

Surveys were completed on May 9-13, 16-20, 2022 between 8 am and 5 pm. Turtle survey locations for each Study Area are shown on **Figure 1-1** to **Figure 1-13** and **Figure 2-1** to **Figure 2-20**, with the number of surveys completed presented in **Table 3-1** below. Surveys were discontinued following email correspondence with the Ministry of the Environment, Conservation and Parks (MECP) on May 14, 2022 that confirmed reptile SAR surveys were not required.

Table 3-1: Number of turtle surveys completed by Study Area

Study Area	Number of Stations	Total Number of Rounds	Total Number of Surveys
Panhandle	32	~3	98
Leamington	6	3	15

3.1.6 Queensnake Surveys

Species presence/absence within the Panhandle Study Area was assessed generally following the *Survey Protocol for Queensnake (Regina septemvittata) in Ontario* (MNRF, 2015c). Surveys for Queensnake involved searching for individuals basking in shoreline vegetation (e.g., shrub branches overhanging water), foraging for crayfish in calm shallow water near the shore or hiding beneath cover objects (i.e., rocks as small as 8 cm in diameter submerged or along the bank, logs, geotextile, scrap metal and any other debris). Surveys were conducted in terrestrial habitats within 5 m of the water and aquatic habitats within 3 m of the shoreline. Surveys occurred on sunny/partly sunny days when air temperature was between 12°C and 30°C. Surveys were conducted within 100 m on either side of the Thames River (SC29), Jeannettes Creek (SC27), watercourse crossing south of Jeannettes Creek (SC25) and Baptiste Creek (SC19) to identify category 1 habitat (the watercourse within 100 m of a Queensnake occurrence plus the adjacent terrestrial area up to 30 m inland,

which has the lowest tolerance to alteration; MECP, 2022). In addition to individuals, potential Queensnake hibernacula were also searched for during surveys. A total of eight Queensnake surveys, or one round at each of the eight survey locations mapped on **Figure 2-10**, **Figure 2-13**, **Figure 2-15** and **Figure 2-16**, were completed May 17-18, 2022. Surveys ceased following email correspondence with the MECP that confirmed reptile SAR surveys were not required.

3.1.7 Eastern Foxsnake Surveys

VES were generally conducted in accordance with the *Survey Protocol for Ontario's Species at Risk Snakes* (MNRF, 2016) to assess the presence/absence of Eastern Foxsnake within the Panhandle Study Area. Habitat for Eastern Foxsnakes in the Carolinian population includes marsh, prairie, old fields, woodlands, and patches of habitat (riparian, grass or hedgerow) along drainage ditches, creeks, roads and railway tracks (Eastern Foxsnake Recovery Team, 2010). As such, VES consisted of searching for snakes or suitable Eastern Foxsnake micro-habitat features (i.e., hibernacula or natural or non-natural egg laying sites) within 100 m of the Preferred Route where it crosses natural and semi-natural habitat and along watercourses or constructed drains. Surveys occurred under sunny conditions when air temperature was between 10°C and 25°C or under overcast conditions when air temperature was between 15°C and 30°C. A total of 172 VES for SAR snakes were completed May 9-12, 16-20, 2022 between 9 am and 5pm, approximately three rounds at each of the 56 snake survey locations mapped on **Figure 2-1** to **Figure 2-20**.

The presence/absence of Eastern Foxsnake within the Leamington Study Area was assessed through road surveys generally conducted in accordance with the *Survey Protocol for Ontario's Species at Risk Snakes* (MNRF, 2016). Surveys were carried out by driving at a speed that did not exceed 45 km/h with a spotter as a passenger. Road surveys were carried out when air temperature was between 20°C and 30 °C. Road surveys were not carried out during or immediately following periods of heavy rain. In addition to road surveys within the Leamington Study Area, snakes and Eastern Foxsnake micro-habitat features (i.e., hibernacula or natural or non-natural egg laying sites) were searched for within natural and semi-natural habitat and watercourses/drains that cross the Preferred Route.

3.2 Results

3.2.1 Aquatic Features

A total of 42 watercrossing were identified within the Panhandle Study Area. They are numbered from South to North and shown on **Figure 2-1** to **Figure 2-20**. The watercrossing habitat assessments are compiled within **Attachment A**. In total there were 5 ephemeral watercourses, 9 intermittent watercourses, 27 permanent watercourses, and 1 unknown watercourse due to land access constraints.

A total of 11 watercrossings were identified within the Leamington Study Area. They are number from East to West and shown on **Figure 1-1** to **Figure 1-13.** The watercrossing habitat assessments are compiled within **Attachment B**. In total there were 2 ephemeral watercourses, 4 intermittent watercourses, and 5 permanent watercourses.

3.2.2 Ecological Land Classification

A total of four ELC communities were identified within the Panhandle Study Areas and five within the Leamington Study Area. The locations and classification of these vegetation communities are shown on **Figure 1-1** to **Figure 1-13** and **Figure 2-1** to **Figure 2-20**. In addition, these figures include anthropogenic (A) areas which include most non-natural, human-created features in the landscape such as buildings, driveways, lawns

and ornamental plantings. Agricultural fields (F) encompass areas that are used to grow crops including winter wheat. These vegetation communities are further described in **Table 3-2** below. This table includes common names of plant species; the scientific species names for these species can be found in the plant list included in **Attachment C**. In total, 159 vascular plants were observed with the Panhandle and Leamington Study Area. Of these, 94 (59%) were native and 52 (33%) are exotic to Ontario. European reed (*Phragmites australis* spp. *australis*) was noted within the ROW of both Study Areas as well as within the MAS2-9b community. European reed is considered an invasive species in Ontario as it is an aggressive plant which spreads quickly and out-competes native vegetation. It releases toxins from its roots into the soil to hinder the growth of and kill surrounding plants.

Cultural Hedgerow (CUH) and the majority of Dry – Moist Old Field Meadow (CUM1-1) communities within the Study Areas represented narrow strips of vegetation along waterways or within the road ROW. Woody vegetation within these communities included northern red oak, Freeman's maple, Manitoba maple, green ash, black walnut, swamp white oak, thicket creeper, riverbank grape, red raspberry, hawthorn, staghorn sumac, and grey dogwood. Disturbance-tolerant and/or weedy plant species dominated ground cover of these communities and included species such as reed canary grass, orchard grass, wild parsnip, and European reed. However, five locally rare plants were observed: Canada anemone, smooth sumac, Canada plum, rough avens, and planted honey locust.

The rarity of each species was determined using Appendices J and M of the *Significant Wildlife Habitat Technical Guide* (MNR, 2000) and the Natural Heritage Information Centre. No SAR plants were observed during the field investigations, however four SOCC plants and an additional eight locally rare plants were identified as described in **Table 3-2**.

Table 3-2: Summary of Ecological Land Classification Communities

ELC Code	ELC Name	Tree Canopy	Shrub Layer	Ground Layer	Locally Rare and SOCC Plants	Location
Forest (FO) Communities						
Deciduous Forest (FOD)						
FOD2-2	Dry - Fresh Oak - Hickory Deciduous Forest	Greater than 60% cover: canopy dominated by Shagbark Hickory and Bur Oak. Subcanopy dominated by silky dogwood, prickly ash, and red raspberry.	Could not be assessed from roadside.	Could not be assessed from roadside.	None identified.	Leamington Study Area on south side of Concession Road 10 between Highway 77 and Albuna Townline.
FOD8-1	Fresh – Moist Poplar Deciduous Forest	Greater than 60% cover: canopy dominated by eastern cottonwood with less crack willow and large-toothed aspen. Subcanopy	Between 25 and 60% shrub cover: dominated by poison ivy, riverbank grape, grey dogwood and red raspberry	Greater than 60% Ground cover (0.2-0.5 m) included poison ivy, smooth brome, spotted jewelweed and reed canarygrass.	Wingstem.	Panhandle Study Area along both sides of the Thames River (SC29).

ELC Code	ELC Name	Tree Canopy	Shrub Layer	Ground Layer	Locally Rare and SOCC Plants	Location
		dominated by Manitoba maple, red ash with less eastern cottonwood and crack willow.				
FOD9-4	Fresh – Moist Shagbark Hickory Deciduous Forest	Greater than 60% cover: canopy heavily dominated by shagbark hickory with less white elm, swamp white oak, and Freeman's maple. Subcanopy heavily dominated by shagbark hickory with less white elm and green ash.	Greater than 60% shrub cover: dominated by prickly ash with less shagbark hickory, chokecherry, and eastern prickly gooseberry.	Greater than 60% ground cover dominated by running strawberry bush with less poison ivy, thicket creeper, and broad-leaved enchanter's nightshade.	Inland sedge, necklace sedge, Swan's sedge, and swamp pin oak.	Leamington Study Area on north side of Highway 8 between Lakeshore Road 229 and 233.
Marsh (MA) Communities						
Shallow Marsh (MAS)						
MAS2-9a	Jewelweed Mineral Meadow Marsh	N/A	N/A	Between 25 and 60% ground cover: dominated by swamp loosestrife with less swamp milkweed, broad-leaved arrowhead, and swamp rose mallow. The water surface was between 25 and 60% cover and dominated by fragrant water lily with less European frogbit.	Swamp loosestrife, fragrant water lily, and swamp rose mallow.	Panhandle Study Area at the southeast corner of the St. Clair Mash PSW Complex.

ELC Code	ELC Name	Tree Canopy	Shrub Layer	Ground Layer	Locally Rare and SOCC Plants	Location
MAS2-9b	Jewelweed Mineral Meadow Marsh	N/A	N/A	Between 25 and 60% ground cover: heavily dominated by flowering-rush with less Aster sp., common reed, and spikerush sp. The water surface and underwater community was between 10 and 25% cover and dominated by lesser duckweed and potamogeton sp. respectively.	None identified.	Panhandle Study Area south of Highway 8 between Wheatley Road and King & Whittle Road.
Cultural (CU) Communities						
Plantation (CUP)						
CUP1	Deciduous Plantation	Between 25 and 60% canopy cover: canopy equally dominated by northern red oak, bur oak, and swamp pin oak with less sycamore.	Between 10 and 25% shrub cover: dominated by eastern red cedar with less eastern redbud, white elm, and black walnut.	Greater than 60% ground cover: dominated by tall goldenrod with less Kentucky bluegrass, and much less common milkweed and Canada goldenrod.	Swamp pin oak.	Leamington Study Area on the north side of Concession Road 10 between Highway 77 and Albuna Town Line.
Cultural Meadow (CUM)						
CUM1-1	Hedgerow/Dry - Moist Old Field Meadow	N/A	N/A	Greater than 60% ground cover: dominated by goldenrod sp., with less foxtail, orchard grass, thistle sp., and Dame's rocket.		Abandoned agricultural fields within the Leamington Study Area

3.2.3 Significant Wildlife Habitat

As described in **Section 2.2.3**, several candidate SWHs were identified to potentially occur in the Study Areas based on information collected through a review of available background resources and interpretation of aerial

photography. Further analysis using the results of the field investigations confirmed the presence of three SWH types within the Study Area. The following provides details regarding confirmed SWH:

Special Concern and Rare Wildlife Species:
Special Concern and/or provincially rare (S1-S3) plants and animals are quite rare and/or have experienced population declines in Ontario. Habitats of four Species Concern and/or provincially rare (S1-S3) species were observed within the Study Areas during field investigations:

- Provincially rare Swamp rose-mallow (S3) is listed as Special Concern under the ESA and Schedule 1 of the SARA; this species was identified within the Panhandle Study Area in the MAS2-9 community recognized as PSW (St. Clair Marsh Complex). The St. Clair Marsh PSW Complex occurs beyond the construction footprint and any potential indirect effects will be avoided/minimized through the application of mitigation measures.
- Provincially rare Wingstem (S3) was identified within the Panhandle Study Area in the FOD8-1 community located on the banks of the Thames River. The FOD8-1 community is not expected to be impacted by the proposed works as trenchless crossing methods (HDD) will be used to drill under both communities).
- Midland Painted Turtle (S4) is listed as Special Concern under Schedule 1 of the SARA; individuals were observed in multiple aquatic features throughout the Panhandle Study Area.
- Provincially rare Snapping Turtle (S3) is listed as Special Concern under the ESA and Schedule 1 of the SARA; individuals were observed in multiple aquatic features throughout the Panhandle and Leamington Study Areas.

Generally, SWH is limited to the St. Clair Marsh PSW Complex, watercourses and constructed drains and forest communities. Additional SWHs may be present within the Study Area but could not be confirmed as targeted surveys were not performed as it is anticipated any potential negative effects can be avoided or minimized through the application of mitigation measures. **Attachment D** provides the complete SWH assessment.

3.2.4 Species at Risk

A SAR habitat assessment was conducted utilizing background information and the results of field investigations to determine whether SAR and their habitats exist within the Study Areas. The detailed SAR Screening is appended to this document as **Attachment E**. The following sections describe the results of the SAR habitat assessment and field investigations.

3.2.4.1 Aquatic SAR

A total of twelve aquatic SAR listed as Threatened or Endangered under the ESA or SARA were identified within the Panhandle Study Area during the desktop review. No aquatic SAR records were identified in the other Study Areas. **Table 3-3** provides a list of the Critical SAR Aquatic Habitat and SAR that are present at each of the proposed watercourse crossing where records were available, as per the Fisheries and Oceans Canada (DFO) Aquatic SAR mapping. Watercourse crossing locations are displayed on **Figure 2-1** to **Figure 2-20**. In addition to the DFO records, NHIC records indicate that Lake sturgeon (*Acipenser fulvescens*, THR) has been identified within both the Thames River and Jeannettes Creek. Aquatic habitat assessments were completed in 2022 at each watercourse crossing for the Panhandle and Leamington preferred routes to determine whether they provide fish habitat. Where aquatic SAR had been identified, an assessment was completed to confirm suitable habitat is present to support the SAR.

Table 3-3: DFO Aquatic Species at Risk records per Watercourse Crossing

Crossing ID	Water Feature	Crossing Method	Critical Habitat[1]	Species at Risk Found[1]
SC-07	Unnamed Non-Flowing Waterbody 002	Open Cut	N/A	Lilliput
SC-19	Baptiste Creek	HDD	N/A	Lilliput
SC-27	Jeannettes Creek	HDD	N/A	Lake Sturgeon
SC-29	Thames River	HDD	Fawnsfoot (*Truncilla donaciformis*, END)	Hickorynut, Fawnsfoot, Lake Chubsucker, Black Redhorse, Eastern Sand Darter, Northern Madtom, Pugnose Minnow, Silver Chub, Round Hickorynut, Threehorn Wartyback, Lake Sturgeon
SC-30	Unnamed Trib to Thames River 001	HDD	N/A	Lake Chubsucker
SC-33	Myers Pump Works Drain	Open Cut	N/A	Lake Chubsucker
SC-34	Unnamed Trib to Myers Pump Works Drain 001	Open Cut	N/A	Lake Chubsucker
SC-35	Unnamed Trib to Myers Pump Works Drain 002	Open Cut	N/A	Lake Chubsucker
SC-36	Unnamed Trib to Myers Pump Works Drain 003	Open Cut	N/A	Lake Chubsucker
SC-37	Unnamed Trib to Myers Pump Works Drain 004	Open Cut	N/A	Lake Chubsucker
SC-40	McFarlane Relief Drain	Trenchless	N/A	Lake Chubsucker

[1] THR – Threatened, END – Endangered

At all of the listed watercourse crossings it was determined that the watercourse could provide suitable habitat for the identified SAR. There is no expected impact from any crossing using HDD or Trenchless techniques, however Open Cut will require DFO and MECP authorization.

3.2.4.2 Plant SAR

The potential for dense blazing star (*Liatris spicata*, THR) and other SAR or rare plants within the Study Areas was addressed through botanical inventories completed in conjunction with ELC surveys. No SAR plants were identified within the Panhandle and Leamington Study Areas (refer to **Section 3.2.2**). However, swamp rose

mallow (*Hibiscus moscheutos*), listed as Special Concern in Ontario, was identified in the MAS2-9a community located in the St. Clair Marsh PSW Complex (**Table 3-2**). Additionally, Wingstem (*Verbesina alternifolia*) and planted honey locust (*Gleditsia triacanthos*), which are considered provincially rare, were identified in the FOD8-1 and hedgerows within the Panhandle Study Area (**Table 3-2**). Vegetation clearing will neither be occurring within the St. Clair Marsh PSW Complex nor the FOD8-1 communities.

3.2.4.3 Bat SAR

In total there were 44 passes of Little Brown Myotis (*Myotis lucifugus*) and 15 passes of Tri-colored bat (*Perimyotis subflavus*) recorded in the vicinity of the acoustic monitoring locations within the Leamington Study Area during the bat maternity roosting period. These data reflect the number of times ultrasonic noise from a bat was recorded by the acoustic monitor (i.e., the number of times a bat flew by the acoustic monitor's microphone). These data confirm species presence within the FOD9-4; however, does not provide an indication of the number of individuals present.

The Little Brown Myotis roosts during the day in trees and buildings (barns, attics, and abandoned structures) (MNRF, 2016). In natural areas, the Little Brown Myotis roosts in tree cavities in old growth deciduous, mixed or conifer forests (COSEWIC, 2013). A total of 56 suitable maternity roost trees were identified within and adjacent to the proposed easement and TLU areas. The average density of suitable maternity roost trees of the FOD9-4 was calculated at 47 per hectare (ha); this value is generally representative of high-quality maternity roosting bat habitat (MNRF, 2017). Tri-colored Bat lives in a variety of forested habitats, forming day roosts and maternity colonies in older forests and occasionally in anthropogenic structures. Roosting habitat for this species is strongly associated with leaf clusters in oak and maple trees (MNRF, 2017). Specific surveys to assess potentially suitable maternity roosting habitat during the leaf-on season was not undertaken. However, the presence of oaks, maples and leaf clusters (i.e., Tri-colored Bat habitat) were taken into consideration during acoustic monitor installation. While both oak species and maple species were present in the Leamington Study Area, field staff did not identify the presence of any leaf clusters considered suitable for Tri-colored Bat maternity roosting within the vicinity of the proposed easement and TLU areas. However, suitable leaf-clusters may be present throughout the remainder of the FOD9-4 community.

3.2.4.4 Turtle SAR

The presence of Snapping Turtle was confirmed within both Study Areas during field investigations, which included three rounds of turtle surveys. Midland Painted Turtle was also observed during surveys within the Panhandle Study Area. Although no Blanding's Turtles or Spiny Softshell were observed, presence of these species within the Panhandle Study Area is assumed given occurrence records.

Blanding's Turtle often prefer relatively eutrophic environments, with shallow water (less than 2 m deep, often less than 50 cm), soft highly organic substrates, and abundant submergent, floating and emergent vegetation that can occur in a variety of wetland habitats, slow flowing rivers and creeks, pools, lakes, bays, sloughs, marshy meadows, and artificial channels (MECP, 2019a). Blanding's Turtle often travel long distances (up to 6 km from their wetland of origin) to seek out suitable open areas for nesting, which includes beaches, shorelines, meadows, rocky outcrops, forest clearings and a variety of human-altered sites (e.g., gardens, gravel roads, road shoulders, etc.; MECP, 2019a).

Within the Panhandle Study Area suitable habitat was observed within the St. Clair Marsh PSW Complex and watercourses and constructed drains as well as their associated riparian habitats. Blanding's Turtle may also use or move through human-altered habitats within the Panhandle Study Area including agricultural fields and road shoulders (MECP, 2019). Evidence of nesting by an unknown turtle species was observed within or in the vicinity of TLUs associated with the Panhandle Pipeline crossing of SC35 and SC32.

Spiny Softshell turtles rarely leave the water, and most home ranges are associated with large bodies of water such as rivers or lakes, although they can also occur in connected streams or adjacent ponds or wetlands (MECP, 2019b). Within the Panhandle Study Area, the St. Clair Marsh PSW Complex, Thames River (SC29) and Jeannettes Creek (SC27) may provide suitable habitat to carry out life processes including foraging, thermoregulation, movement, predator avoidance and hibernation. Spiny Softshell turtle use terrestrial habitats only for nesting and remain close to the water with nests typically laid within 50 m of the shoreline (MECP, 2019). Nests are usually found in areas with little vegetation, low slope and a sand or a mix of sand and gravel substrate (MECP, 2019). No suitable nesting sites or evidence of turtle nesting were observed in proximity to the St. Clair Marsh PSW, Thames River (SC29) or Jeannettes Creek (SC27).

3.2.4.5 Snake SAR

3.2.4.5.1 Queensnake

This species was not observed; however, only one round of Queensnake surveys were performed and the species is assumed present for the purposes of impact assessment and the development of mitigation measures. Queensnake is a highly aquatic species of snake rarely venturing far overland and usually confined within three to five meters of a shoreline (Gillingwater, 2011). This species prefers rock or gravel bottomed streams or rivers and is assumed present within the St. Clair Marsh PSW Complex, Thames River (SC29), Jeannettes Creek (SC27), SC25 and Baptiste Creek (SC19) and their associated riparian habitats, considering existing records. Very little is known about Queensnake hibernation habitat, but sites may include abutments of old bridges, crevices in bedrock outcrops and crayfish or small mammal burrows (COSEWIC, 2000). Although a number of burrows were identified during field investigations, none were located in close proximity of the St. Clair Marsh PSW, Thames River (SC29), Jeannettes Creek (SC27), SC25 or Baptiste Creek (SC19).

3.2.4.5.2 Eastern Foxsnake

A total of two Eastern Foxsnakes were observed within the Panhandle Study Area moving in the vicinity of agricultural drains. While studies have shown that Eastern Foxsnake within the Carolinian population have a strong avoidance of agricultural fields, extensive habitat loss in the last century has led to the species utilizing anthropogenically modified habitats including semi-maintained grass and fields greater than 15 m in width along drainage ditches, creeks, roads and railway tracks (Eastern Foxsnake Recovery Team, 2010). The Panhandle and Leamington Study Areas are largely dominated by agricultural lands and suitable habitat is generally limited to the riparian areas associated with watercourses and constructed drains.

Hibernation sites for Eastern Foxsnake across the Carolinian region includes any natural (e.g., animal burrows) or anthropogenic features (e.g., old wells) that extend below the frostline (Eastern Foxsnake Recovery Team, 2010). Several animal burrows were identified during field investigations within the Panhandle Study Area, in the vicinity of the easement incidentally. The majority of the burrows likely belonged to Woodchuck (*Marmota monax*) which were observed during field investigations. This species typically has one main entrance but up to four other exits. Other species observed using the area, such as European Hare (*Lepus europaeus*), also have multiple entrances and exits to their burrow. If it happens that one entrance falls within the trenched area of construction, it may still be possible for snakes to access the area for overwintering through the other entrances. The majority of the animal burrows were also located in the riparian areas of agricultural drains that are largely less than 15 m in width or within the agricultural fields themselves, indicating that preferred habitat of the Eastern Foxnsake is typically not present next to these burrows.

Oviposition habitats include rotten, interior cavities of large logs and stumps; decaying leaf, wood or compost piles created by humans; abandoned drains under roads and intentionally created artificial nests (Eastern Foxsnake Recovery Team, 2010). Suitable nesting sites were not identified within 100 m of the open cut easement.

3.2.4.6 Bird SAR

No species targeted surveys were completed; however, bird SAR incidentally observed during field investigations were recorded.

3.2.4.6.1 Bank Swallow

Bank Swallow was not observed during field investigations; however, targeted surveys were not completed. Candidate nesting habitat was identified within the Leamington Study Area within 50 m including exposed banks at crossing LSC-11 and a large dirt pile on private property at the intersection of County Road 31 and County Road 8.

3.2.4.6.2 Barn Owl

Barn Owl was not observed; however, targeted surveys were not completed as part of the field investigations. Buildings or hollowed out trees present within the Panhandle Study Area may provide candidate nesting habitat for Barn Owl (Ontario Barn Owl Recovery Team, 2010). Barn Owls also utilize open areas including agricultural fields for foraging (Ontario Barn Owl Recovery Team, 2010). Buildings within the Panhandle Study Area are not expected to be impacted by the proposed works.

3.2.4.6.3 Barn Swallow

Barn Swallow will forage over agricultural fields as well as a wide range of open terrestrial, aquatic and wetland habitats. Agricultural fields dominate the landscape and foraging Barn Swallows were observed on numerous occasions and at multiple locations throughout the Study Areas incidentally during field investigations. Barn Swallows build their cup-shaped mud nests almost exclusively on human-made structures that provide either a horizontal nesting surface (e.g., a ledge) or a vertical face, often with some sort of overhang that provides shelter (COSEWIC, 2021). Barn Swallows were confirmed nesting within the Panhandle Study Area. More than 10 Barn Swallow nests were observed under the Mint Line Bridge over SC19 located approximately 13 m from the construction footprint. Barn Swallows were also assumed nesting under the Balmoral Line bridge over SC40, immediately adjacent to the construction footprint.

3.2.4.6.4 Bobolink and Eastern Meadowlark

Bobolink was observed within the Study Areas on several occasions incidentally during field investigations. Eastern Meadowlark was not observed in either Study Area; however, this species is assumed present given that targeted surveys were not performed and there is an abundance of existing information documenting their presence.

These species prefer to nest in native grasslands of at least 5 ha in size (McCracken et al., 2013). This habitat type is becoming increasingly rare in Ontario and as such, both species can now be found utilizing agricultural hayfields and pastures as nesting habitat (McCracken et al., 2013). Agricultural fields that dominate the Study Areas were found to be mostly comprised of annual row crops like corn and soybean rarely used by Bobolink or Eastern Meadowlark. Therefore, Bobolinks observed within the Study Areas were likely nesting in large winter wheat fields given that the availability of more suitable, alternative breeding habitat (i.e., hayfields and pastures) was limited.

3.2.4.6.5 Chimney Swift

Buildings with chimneys suitable for Chimney Swift nesting or roosting may be present within each Study Area; however, are not expected to be impacted by the proposed scope of work.

3.2.4.6.6 King Rail and Least Bittern

King Rails prefer larger marshes or wetlands with a lower percentage of shrub cover (Kraus, 2016) and Least Bittern have been found to have an affinity to larger marsh communities dominated by cattails that contain a

network of open pools and channels for hunting and stable water levels during the nesting season (COSEWIC, 2011). Given the habitat requirements for each species, it is likely that the records of each species are associated with the St. Clair Marsh PSW Complex situated at the northern end of the Panhandle Study Area. The St. Clair Marsh PSW Complex, which contains larger areas of marsh habitat with open channels and pools, is not expected to be impacted by the proposed scope of work.

4. Effects Assessment and Mitigation Measures

Effects identification, assessment and mitigation were provided in the ER; however, site-specific and species-specific mitigation will be developed based on the results of the 2022 field investigations and in consultation with the MECP and DFO.

5. References

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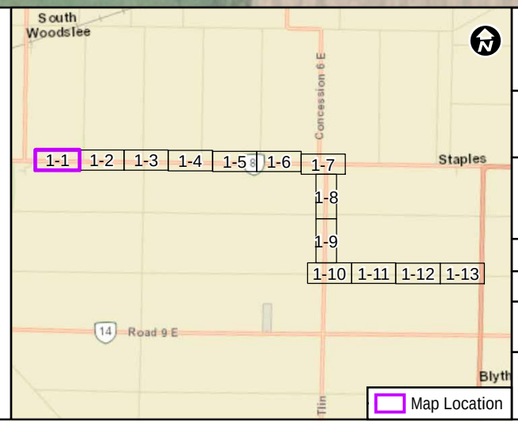
Figures

Legend

- Preferred Route
- Constructed Drain
- Permanent Stream
- Municipal Boundaries
- ELC

Label	ELC Description
A	Anthropogenic
CUH	Cultural Hedgerow
CUM1-1	Dry – Moist Old Field Meadow Type
F	Agricultural Field
FOD 9-4	Fresh – Moist Shagbark Hickory Deciduous Forest
FOD2-2	Dry – Fresh Oak – Hickory Deciduous Forest Type
OAO	Open Aquatic



Panhandle Regional Expansion Project

Leamington Interconnect

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Legend

- Turtle Survey Location
- Preferred Route
- Constructed Drain
- Permanent Stream
- Municipal Boundaries
- ELC

Label	ELC Description
A	Anthropogenic
CUH	Cultural Hedgerow
CUM1-1	Dry – Moist Old Field Meadow Type
F	Agricultural Field
FOD 9-4	Fresh – Moist Shagbark Hickory Deciduous Forest
FOD2-2	Dry – Fresh Oak – Hickory Deciduous Forest Type
OAO	Open Aquatic

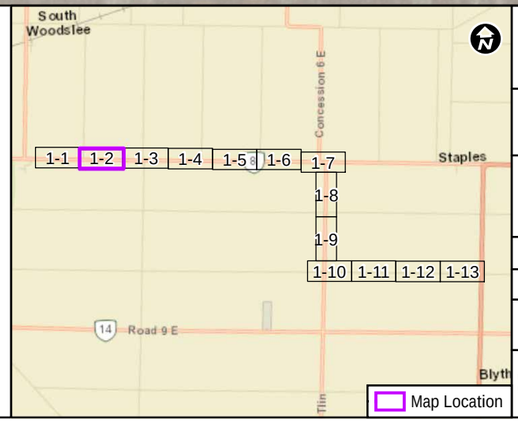

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Figure 1-2

Legend

- Watercourse Crossing
- Preferred Route
- Constructed Drain
- Municipal Boundaries
- ELC

Label	ELC Description
A	Anthropogenic
CUH	Cultural Hedgerow
CUM1-1	Dry – Moist Old Field Meadow Type
F	Agricultural Field
FOD 9-4	Fresh – Moist Shagbark Hickory Deciduous Forest
FOD2-2	Dry – Fresh Oak – Hickory Deciduous Forest Type
OAO	Open Aquatic

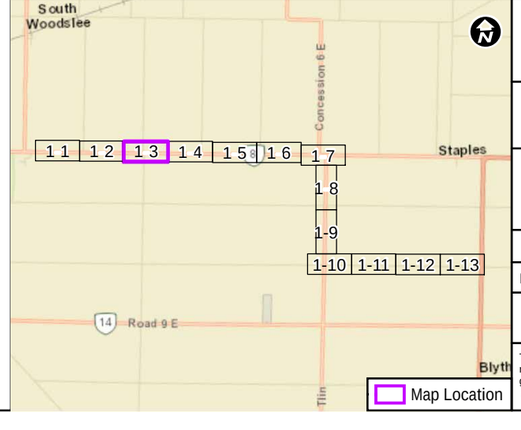

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Figure 1-3

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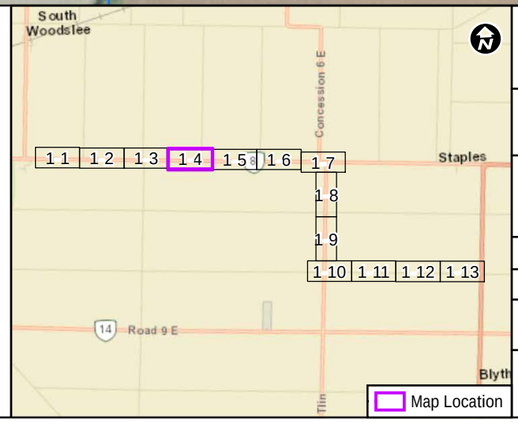
Legend

- Acoustic Monitoring Location
- Watercourse Crossing
- Preferred Route
- Constructed Drain
- Permanent Stream
- Intermittent Stream
- Municipal Boundaries
- ELC

Label	ELC Description
A	Anthropogenic
CUH	Cultural Hedgerow
CUM1-1	Dry – Moist Old Field Meadow Type
F	Agricultural Field
FOD 9-4	Fresh – Moist Shagbark Hickory Deciduous Forest
FOD2-2	Dry – Fresh Oak – Hickory Deciduous Forest Type
OAO	Open Aquatic



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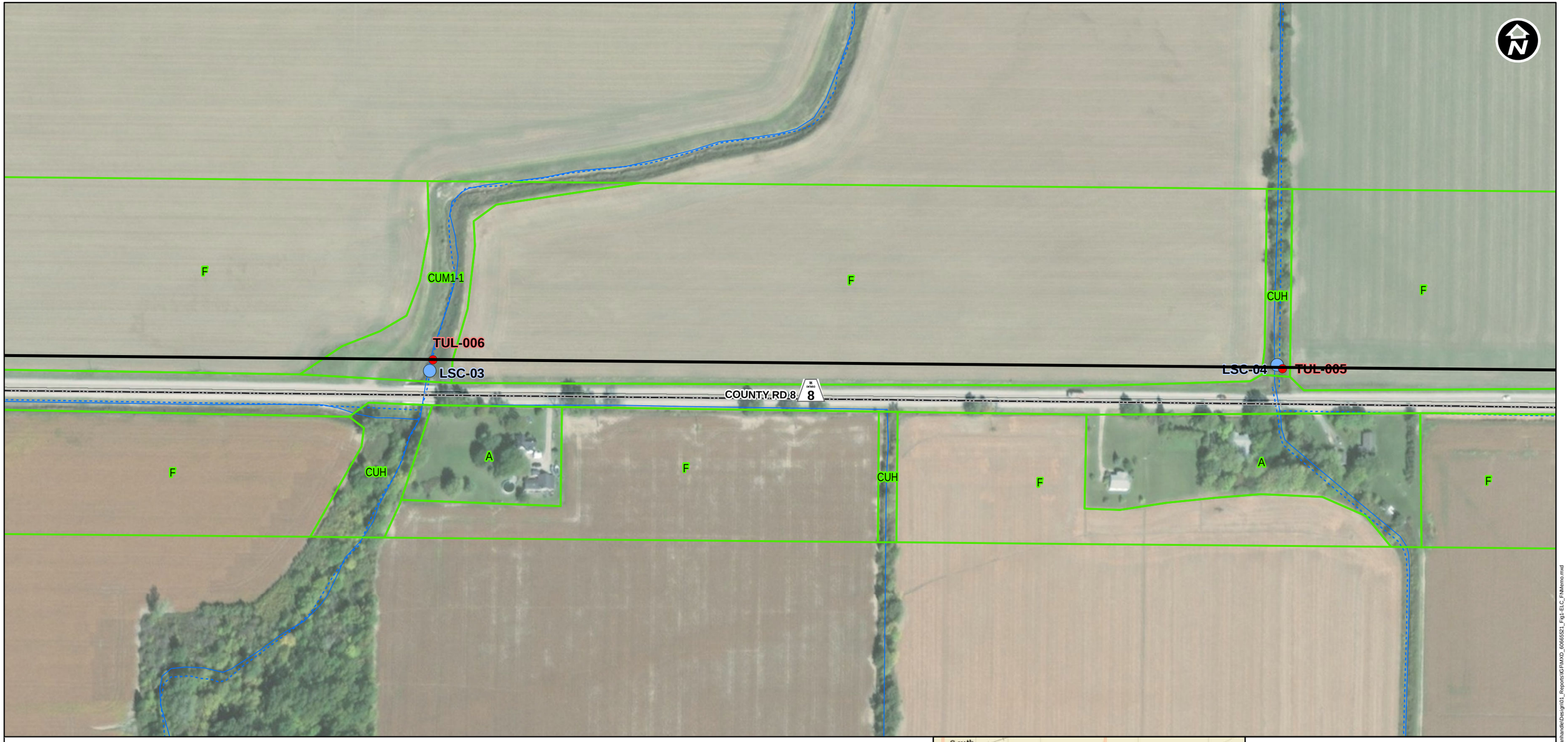

Legend

- Turtle Survey Location
- Watercourse Crossing
- Preferred Route
- Constructed Drain
- Permanent Stream
- Municipal Boundaries
- ELC

Label	ELC Description
A	Anthropogenic
CUH	Cultural Hedgerow
CUM1-1	Dry – Moist Old Field Meadow Type
F	Agricultural Field
FOD 9-4	Fresh – Moist Shagbark Hickory Deciduous Forest
FOD2-2	Dry – Fresh Oak – Hickory Deciduous Forest Type
OAO	Open Aquatic

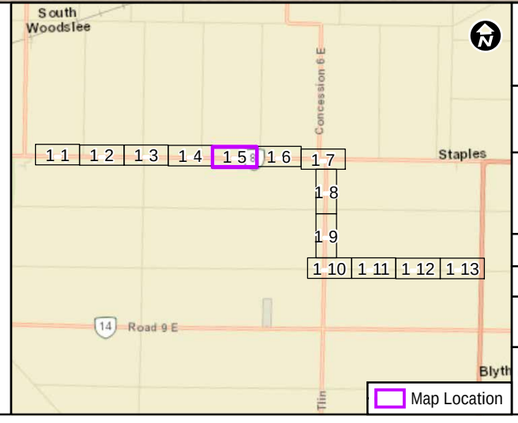

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Figure 1-5

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Legend

- Watercourse Crossing
- Preferred Route
- Constructed Drain
- Permanent Stream
- Municipal Boundaries
- ELC

Label	ELC Description
A	Anthropogenic
CUH	Cultural Hedgerow
CUM1-1	Dry – Moist Old Field Meadow Type
F	Agricultural Field
FOD 9-4	Fresh – Moist Shagbark Hickory Deciduous Forest
FOD2-2	Dry – Fresh Oak – Hickory Deciduous Forest Type
OAO	Open Aquatic

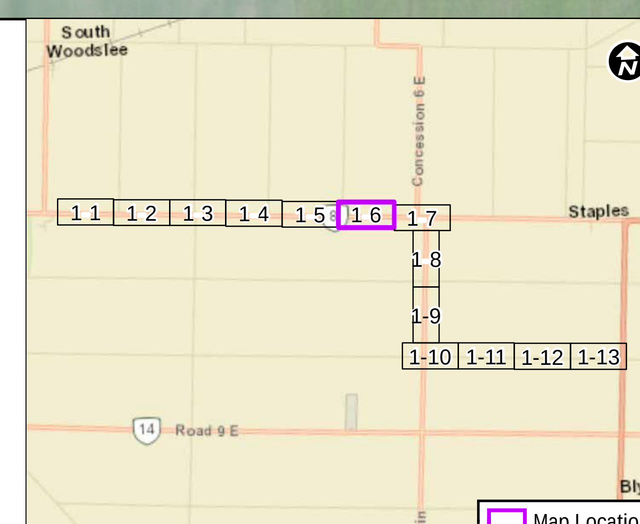

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Figure 1-6

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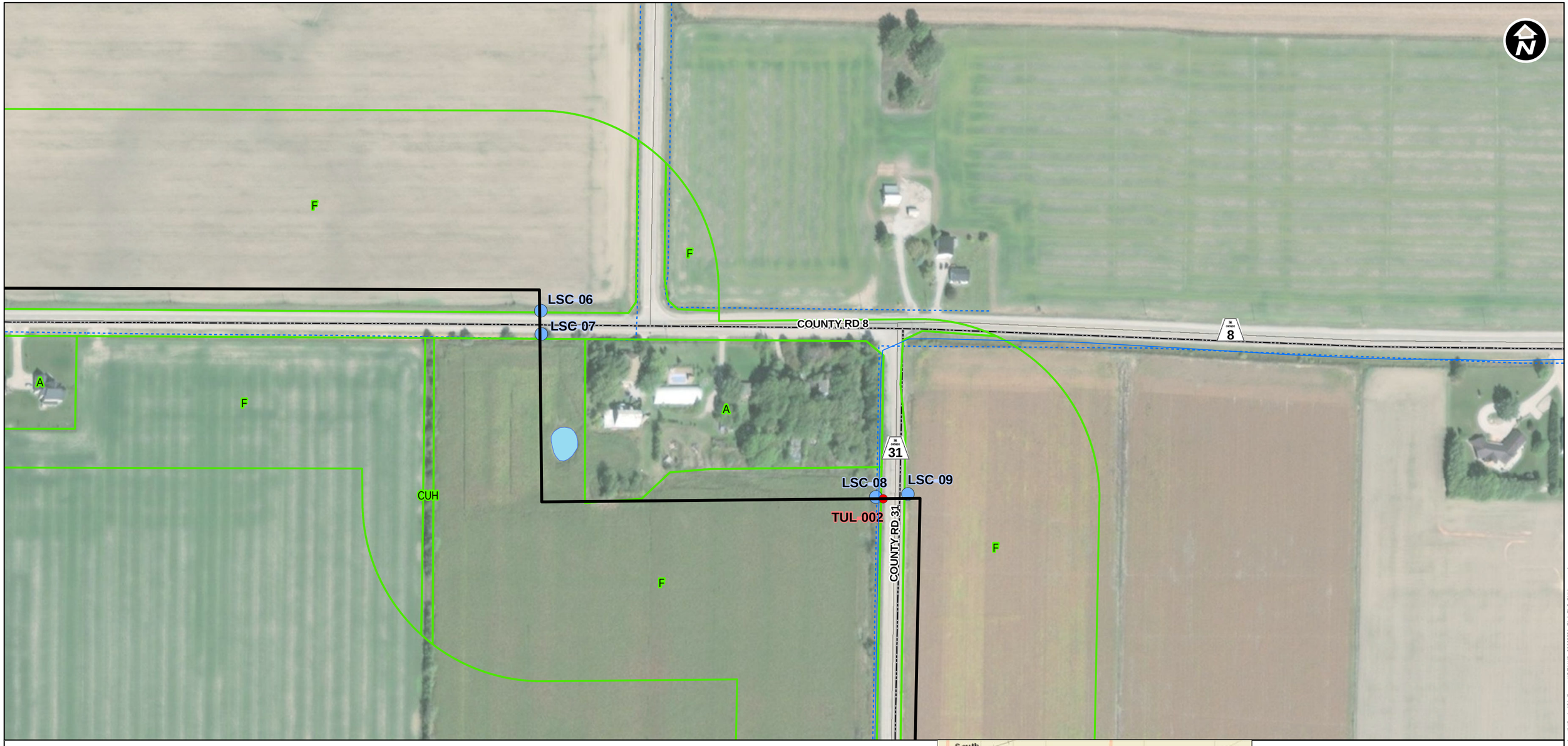
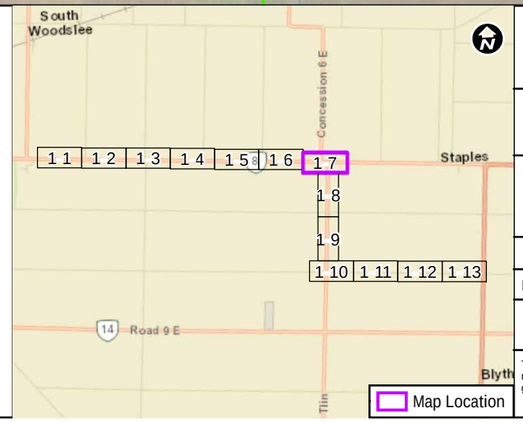


Legend

- Turtle Survey Location
- Watercourse Crossing
- Preferred Route
- Constructed Drain
- Permanent Stream
- Waterbody
- Municipal Boundaries
- ELC

Label	ELC Description
A	Anthropogenic
CUH	Cultural Hedgerow
CUM1-1	Dry – Moist Old Field Meadow Type
F	Agricultural Field
FOD 9-4	Fresh – Moist Shagbark Hickory Deciduous Forest
FOD2-2	Dry – Fresh Oak – Hickory Deciduous Forest Type
OAO	Open Aquatic



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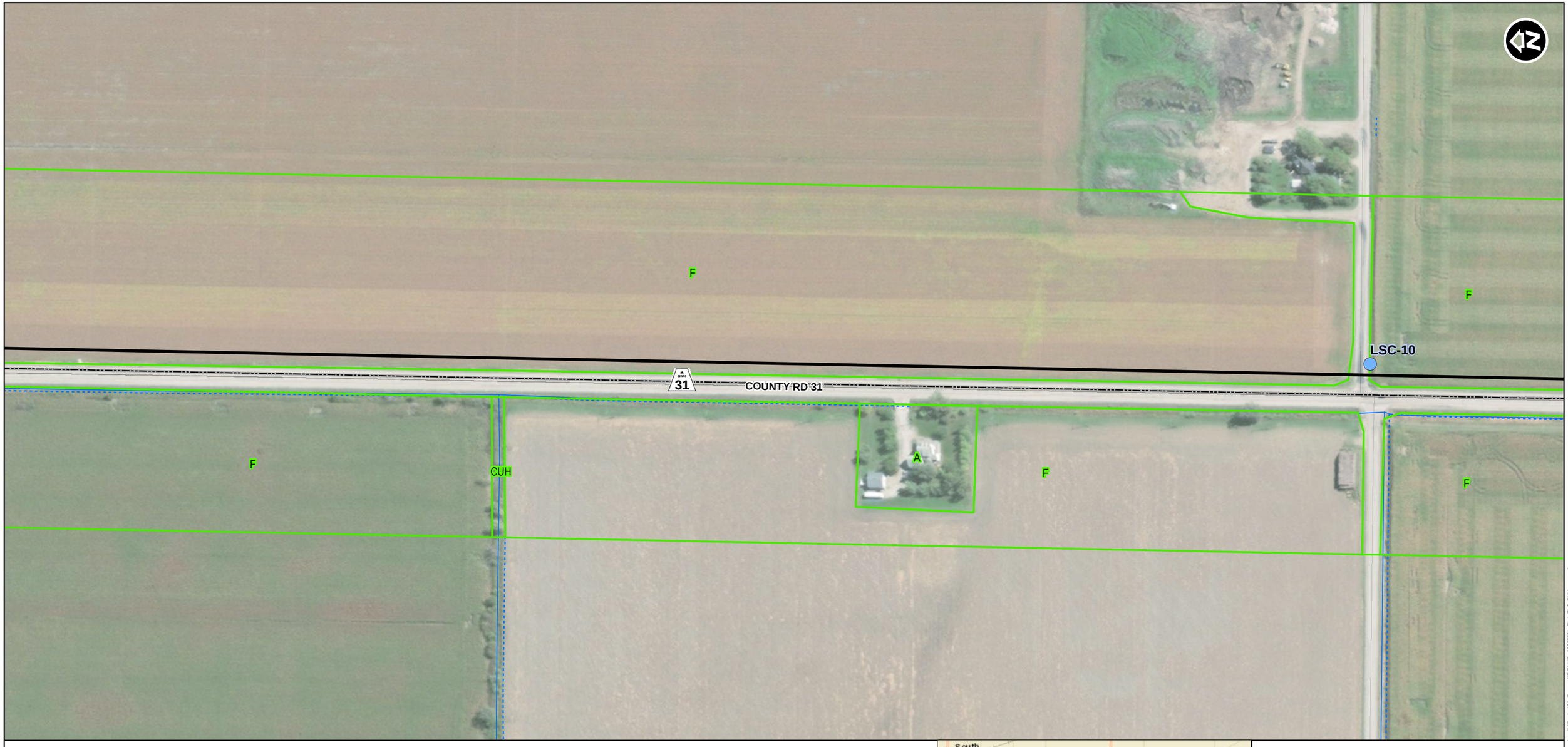

Legend

- Watercourse Crossing
- Preferred Route
- Constructed Drain
- Permanent Stream
- Municipal Boundaries
- ELC

Label	ELC Description
A	Anthropogenic
CUH	Cultural Hedgerow
CUM1-1	Dry – Moist Old Field Meadow Type
F	Agricultural Field
FOD 9-4	Fresh – Moist Shagbark Hickory Deciduous Forest
FOD2-2	Dry – Fresh Oak – Hickory Deciduous Forest Type
OAO	Open Aquatic

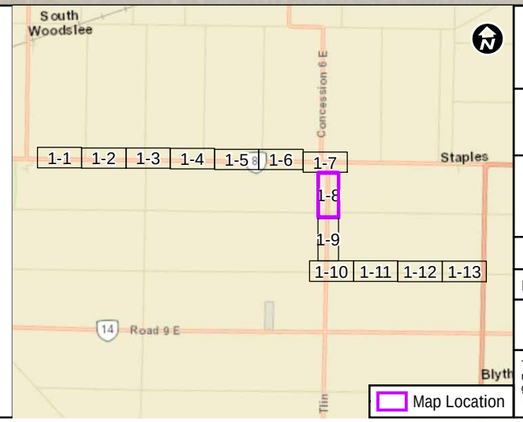

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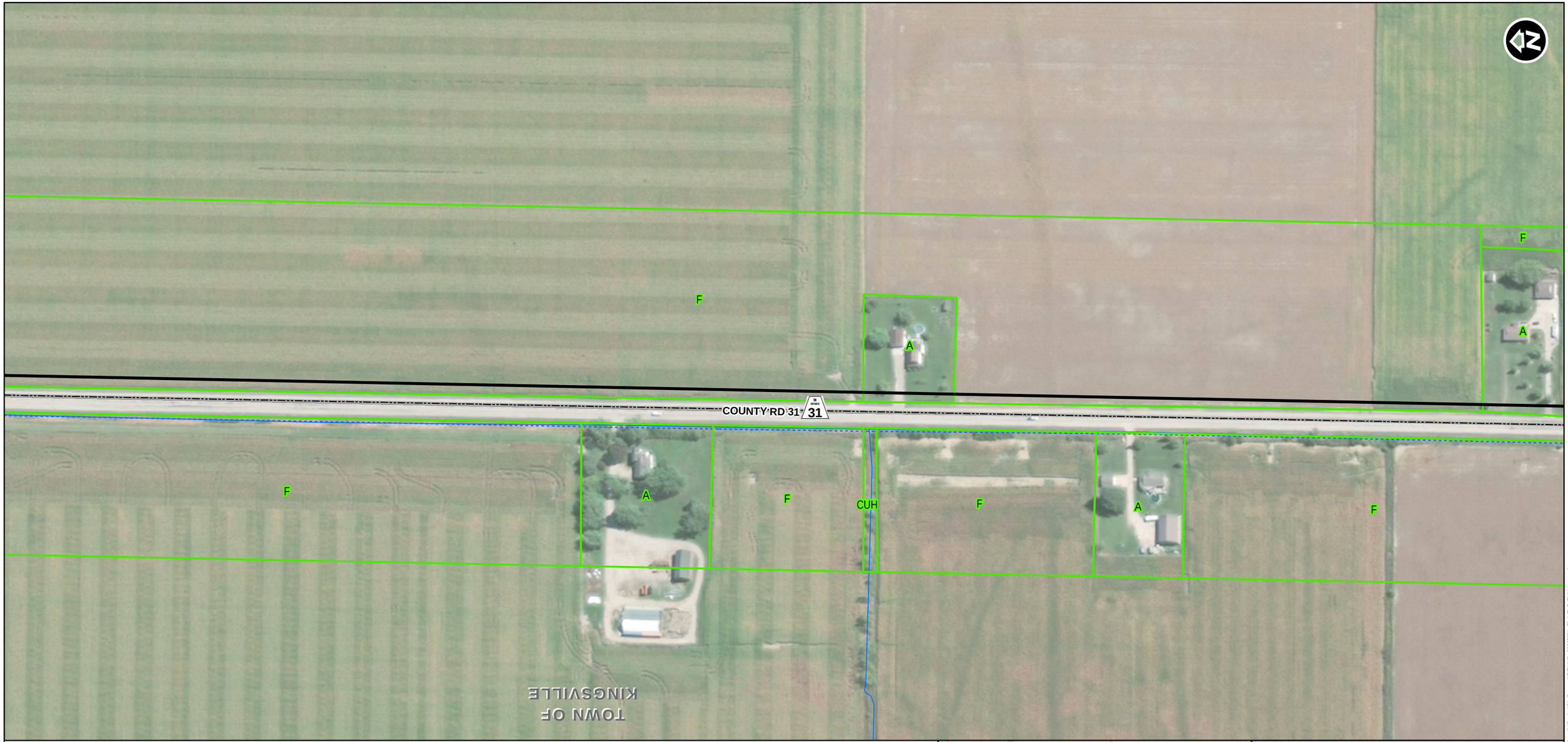
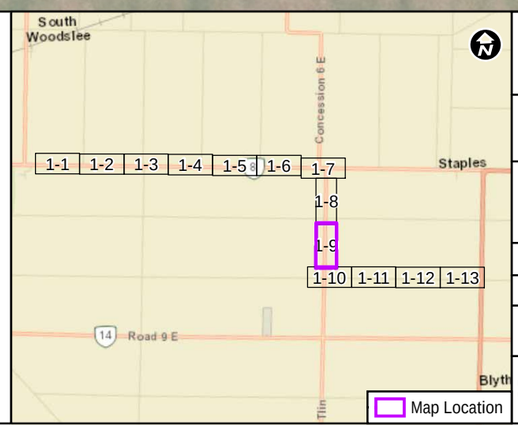
Figure 1-8



Legend

- Preferred Route
- Constructed Drain
- Permanent Stream
- Municipal Boundaries
- ELC

Label	ELC Description
A	Anthropogenic
CUH	Cultural Hedgerow
CUM1-1	Dry – Moist Old Field Meadow Type
F	Agricultural Field
FOD 9-4	Fresh – Moist Shagbark Hickory Deciduous Forest
FOD2-2	Dry – Fresh Oak – Hickory Deciduous Forest Type
OAO	Open Aquatic



Panhandle Regional Expansion Project

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Figure 1-9

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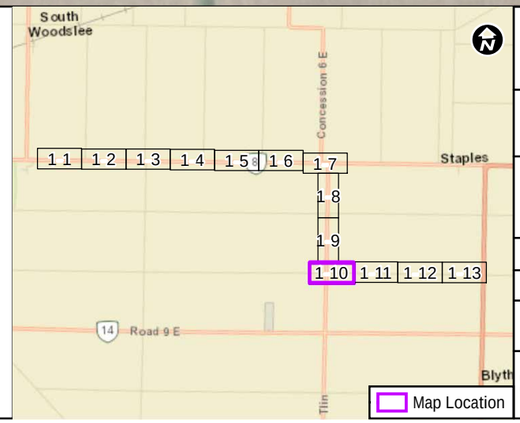
Legend

- Preferred Route
- Constructed Drain
- Permanent Stream
- Municipal Boundaries
- ELC

Label	ELC Description
A	Anthropogenic
CUH	Cultural Hedgerow
CUM1-1	Dry – Moist Old Field Meadow Type
F	Agricultural Field
FOD 9-4	Fresh – Moist Shagbark Hickory Deciduous Forest
FOD2-2	Dry – Fresh Oak – Hickory Deciduous Forest Type
OAO	Open Aquatic



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Legend

- Turtle Survey Location
- Watercourse Crossing
- Preferred Route
- Constructed Drain
- Permanent Stream
- Municipal Boundaries
- ELC

Label	ELC Description
A	Anthropogenic
CUH	Cultural Hedgerow
CUM1-1	Dry – Moist Old Field Meadow Type
F	Agricultural Field
FOD 9-4	Fresh – Moist Shagbark Hickory Deciduous Forest
FOD2-2	Dry – Fresh Oak – Hickory Deciduous Forest Type
OAO	Open Aquatic

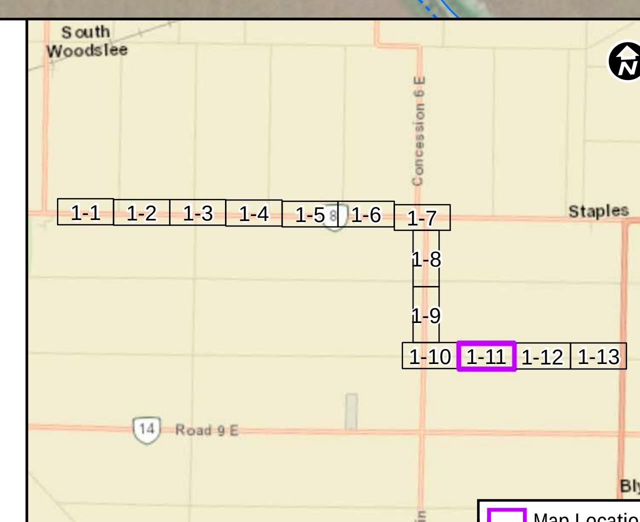

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Figure 1-11

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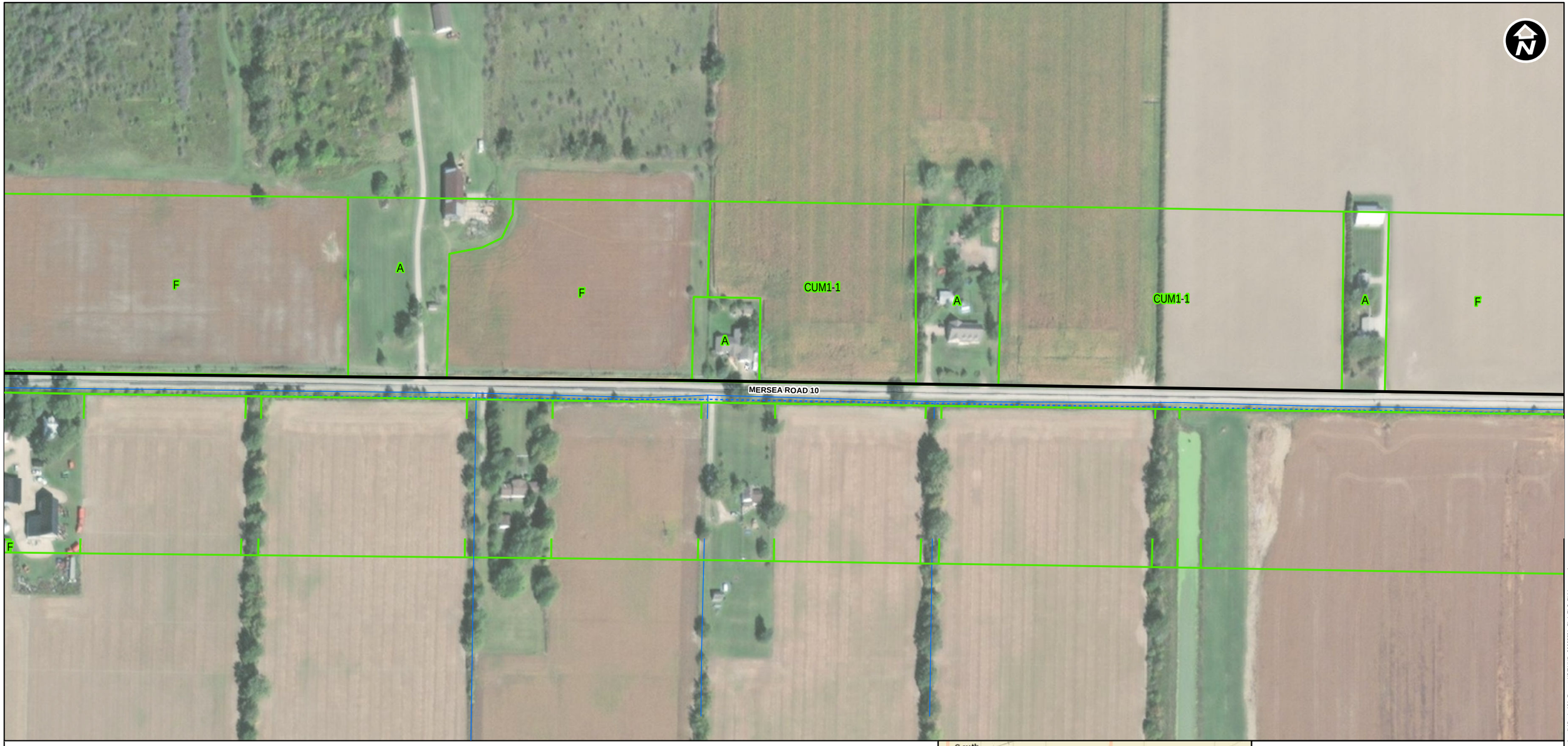
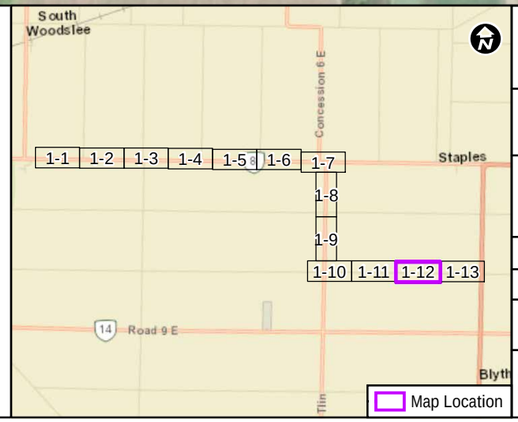


Legend

- Preferred Route
- Constructed Drain
- Permanent Stream
- Municipal Boundaries
- ELC

Label	ELC Description
A	Anthropogenic
CUH	Cultural Hedgerow
CUM1-1	Dry – Moist Old Field Meadow Type
F	Agricultural Field
FOD 9-4	Fresh – Moist Shagbark Hickory Deciduous Forest
FOD2-2	Dry – Fresh Oak – Hickory Deciduous Forest Type
OAO	Open Aquatic



Panhandle Regional Expansion Project

Leamington Interconnect

ELC

0 95 190

Meters

DATUM: NAD 1983 UTM Zone 17N

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P#:60665521	V#:	

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Figure 1-12

Map location: \\na.aecomnet.com\kA\MER\Kitchener-CAKCN1\DCS\GIS\Projects\60665521_Enbridge_Panhandle\Design\03_Reports\MXD\MXD_60665521_Fig1-ELC_FiMemo.mxd
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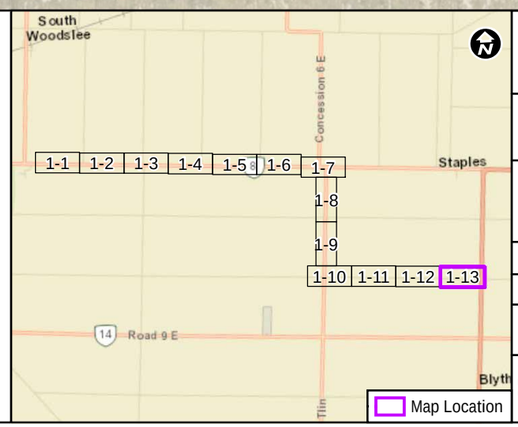
Legend

- Preferred Route
- Constructed Drain
- Permanent Stream
- Municipal Boundaries
- ELC

Label	ELC Description
A	Anthropogenic
CUH	Cultural Hedgerow
CUM1-1	Dry – Moist Old Field Meadow Type
F	Agricultural Field
FOD 9-4	Fresh – Moist Shagbark Hickory Deciduous Forest
FOD2-2	Dry – Fresh Oak – Hickory Deciduous Forest Type
OAO	Open Aquatic



Panhandle Regional Expansion Project

Leamington Interconnect

ELC

0 95 190

Meters

DATUM: NAD 1983 UTM Zone 17N

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Figure 1-13

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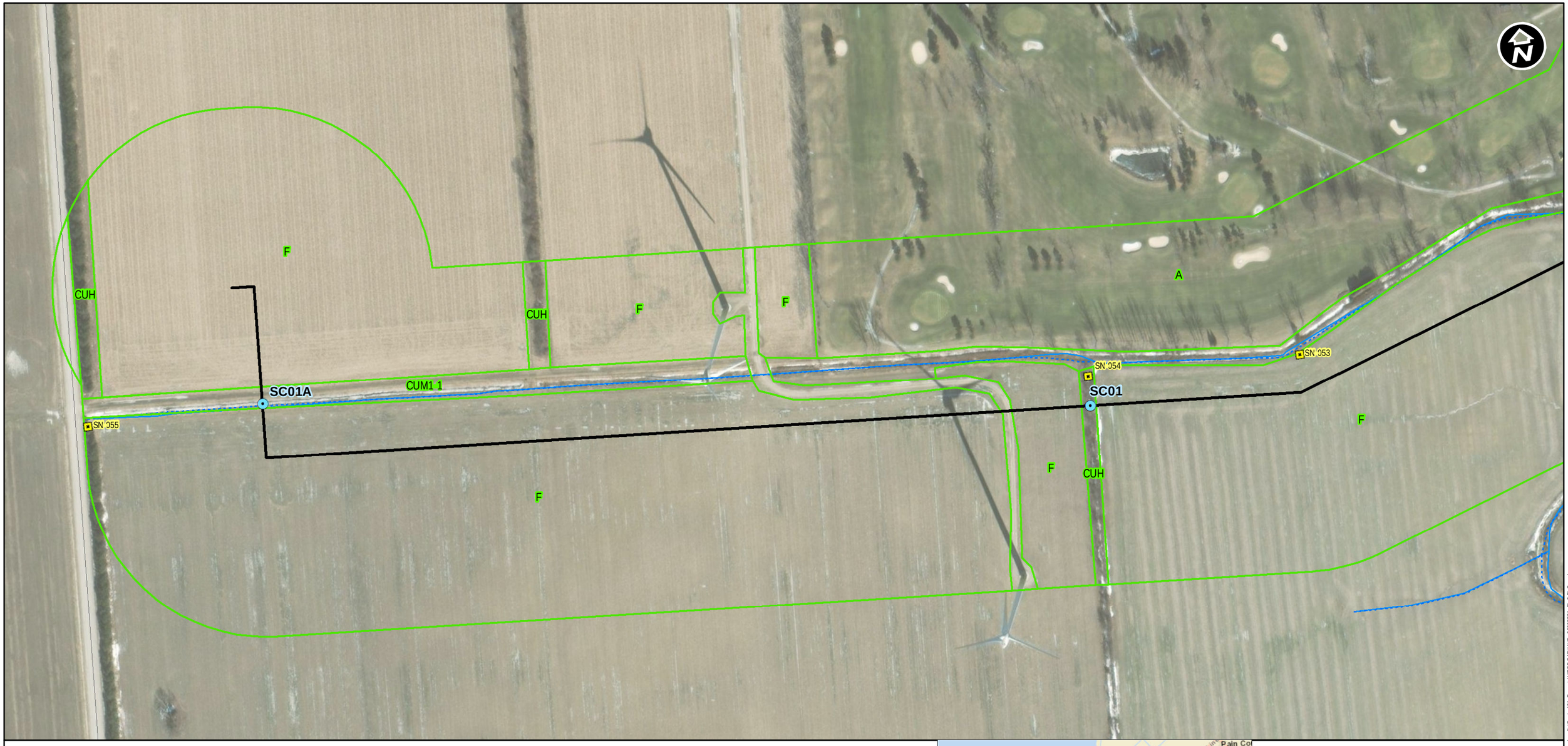
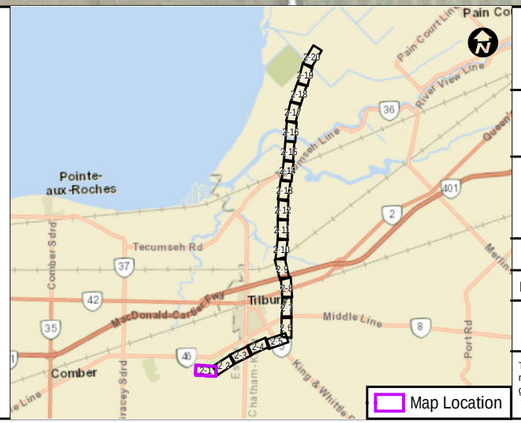


Legend

- Snake Survey Locations
- Watercourse Crossing
- Preferred Route 2022-06-03
- Constructed Drain
- Watercourse
- ELC

Label	ELC Description
A	Anthropogenic
CUM1-1	Dry – Moist Old Field Meadow Type
CUH	Cultural Hedgerow
F	Agricultural Field
FOD8-1	Fresh – Moist Poplar Deciduous Forest Type
MAS2-9	Forb Mineral Shallow Marsh Type
OAO	Open Aquatic



Panhandle Regional Expansion Project

ELC

Panhandle

0 50 100

Meters

DATUM: NAD 1983 UTM Zone 17N

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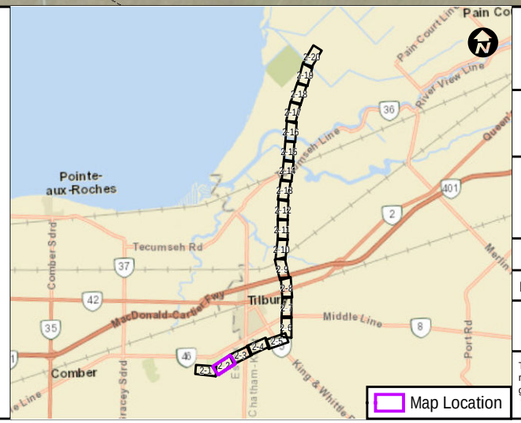
Figure 2-1

Map location: \\na.aecomnet.com\fs\AMER\Kitchener-CAKCN1\DCS\GIS\Projects\60\60665521_Enbridge_Panhandle\Design\01_Reports\MECP\SAR\MXD_60665521_Fig2-ELC.mxd
Date Saved: 6/30/2022 2:14:03 PM User Name: michael.w.collins

Legend

- Turtle Survey Locations
- Snake Survey Locations
- Watercourse Crossing
- Preferred Route 2022-06-03
- Constructed Drain
- Watercourse
- ELC

Label	ELC Description
A	Anthropogenic
CUM1-1	Dry – Moist Old Field Meadow Type
CUH	Cultural Hedgerow
F	Agricultural Field
FOD8-1	Fresh – Moist Poplar Deciduous Forest Type
MAS2-9	Forb Mineral Shallow Marsh Type
OAO	Open Aquatic



Panhandle Regional Expansion Project

ELC
Panhandle

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Meters
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Figure 2-2

Map location: \\ra.aecomnet.com\fs\AMER\Kitchener-CAK1\DCS\GIS\Projects\60\60665521_Enbridge_Panhandle\Design\01_Reports\MXD\MECP SAR\MXD_60665521_Fig2-ELC.mxd
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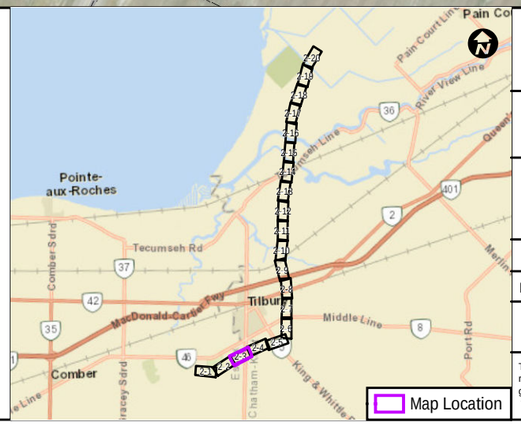
Legend

- Snake Survey Locations
- Watercourse Crossing
- Preferred Route 2022-06-03
- Constructed Drain
- Watercourse
- ELC

Label	ELC Description
A	Anthropogenic
CUM1-1	Dry – Moist Old Field Meadow Type
CUH	Cultural Hedgerow
F	Agricultural Field
FOD8-1	Fresh – Moist Poplar Deciduous Forest Type
MAS2-9	Forb Mineral Shallow Marsh Type
OAO	Open Aquatic



Panhandle Regional Expansion Project

ELC

Panhandle

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Meters

DATUM: NAD 1983 UTM Zone 17N

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Figure 2-3

Map location: \\na.aecomnet.com\ts\AMER\Kitchener-CAKCN1\DCS\GIS\Projects\60665521_Enbridge_PanhandleDesign\01_Reports\MECP S4R\MXD_60665521_Fig2-ELC.mxd
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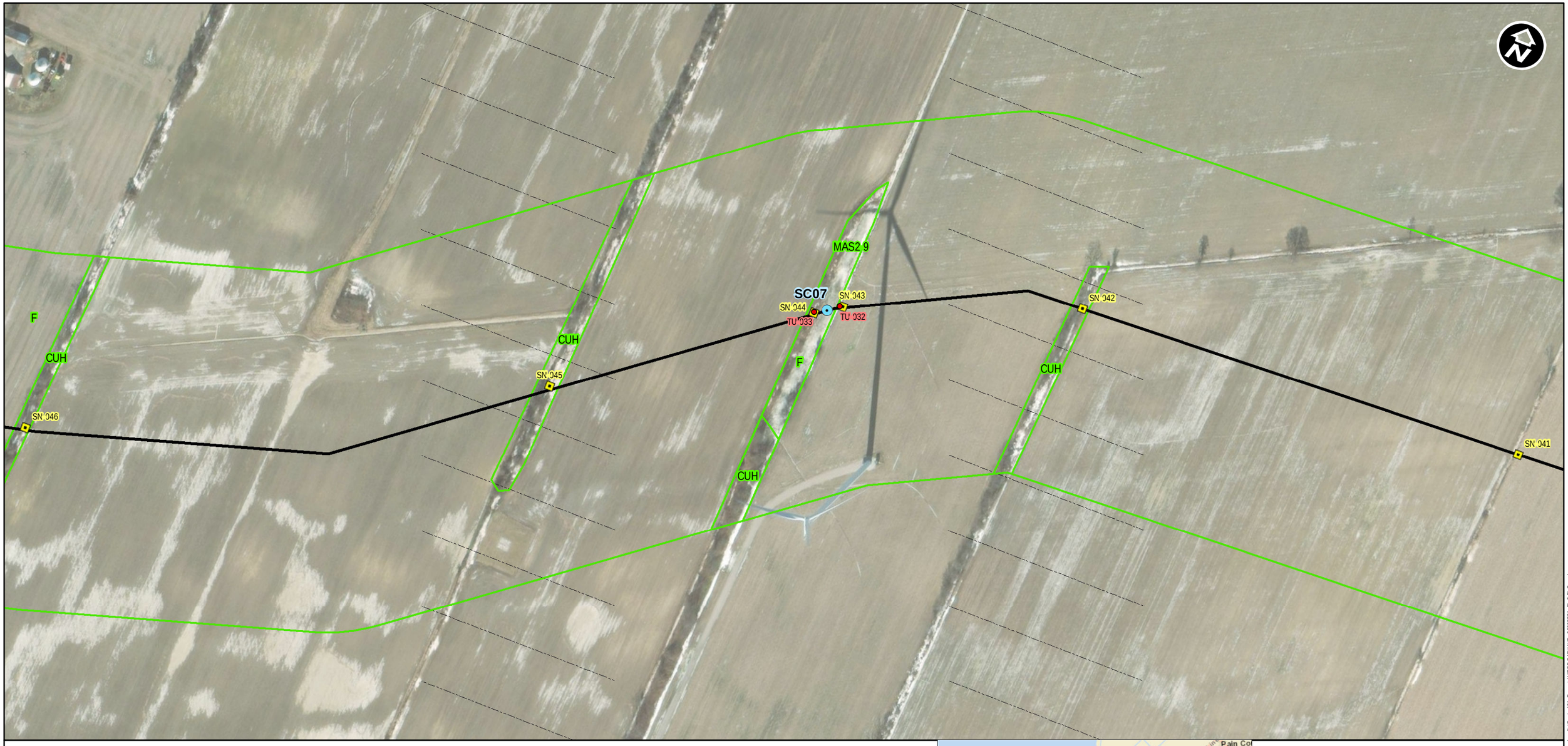
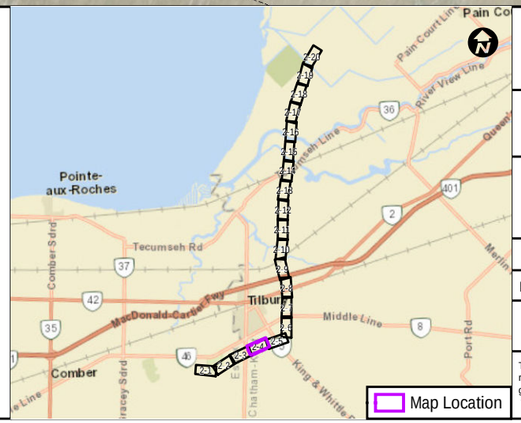


Legend

- Turtle Survey Locations
- Snake Survey Locations
- Watercourse Crossing
- Preferred Route 2022-06-03
- Constructed Drain
- Watercourse
- ELC

Label	ELC Description
A	Anthropogenic
CUM1-1	Dry – Moist Old Field Meadow Type
CUH	Cultural Hedgerow
F	Agricultural Field
FOD8-1	Fresh – Moist Poplar Deciduous Forest Type
MAS2-9	Forb Mineral Shallow Marsh Type
OAO	Open Aquatic



Panhandle Regional Expansion Project

ELC
Panhandle

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DATUM: NAD 1983 UTM Zone 17N

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Figure 2-4

Map location: \\na.aecomnet.com\ts\AMER\Kitchener-CAKCN1\DCS\GIS\Projects\60\60665521_Enbridge_Panhandle\Design\01_Reports\MECP SAR\MXD_60665521_Fig2-ELC.mxd
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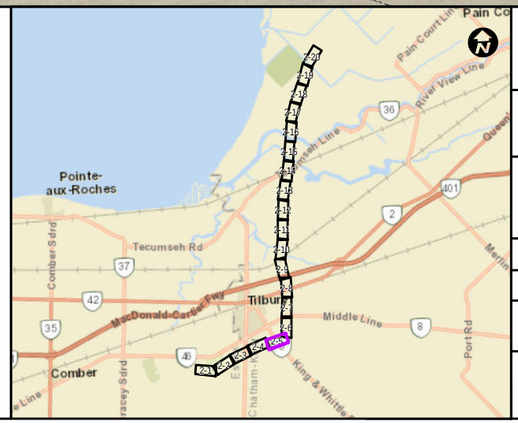
Legend

- Turtle Survey Locations
- Snake Survey Locations
- Watercourse Crossing
- Preferred Route 2022-06-03
- Constructed Drain
- Watercourse
- ELC

Label	ELC Description
A	Anthropogenic
CUM1-1	Dry – Moist Old Field Meadow Type
CUH	Cultural Hedgerow
F	Agricultural Field
FOD8-1	Fresh – Moist Poplar Deciduous Forest Type
MAS2-9	Forb Mineral Shallow Marsh Type
OAO	Open Aquatic



Panhandle Regional Expansion Project

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Panhandle

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Figure 2-5

Map location: \\na.aecomnet.com\fs\AMER\Kitchener-CAK\CN1\DCS\GIS\Projects\60665521_Enbridge_Panhandle\Design\01_Reports\MECP\SAR\MXD_60665521_Fig2-ELC.mxd
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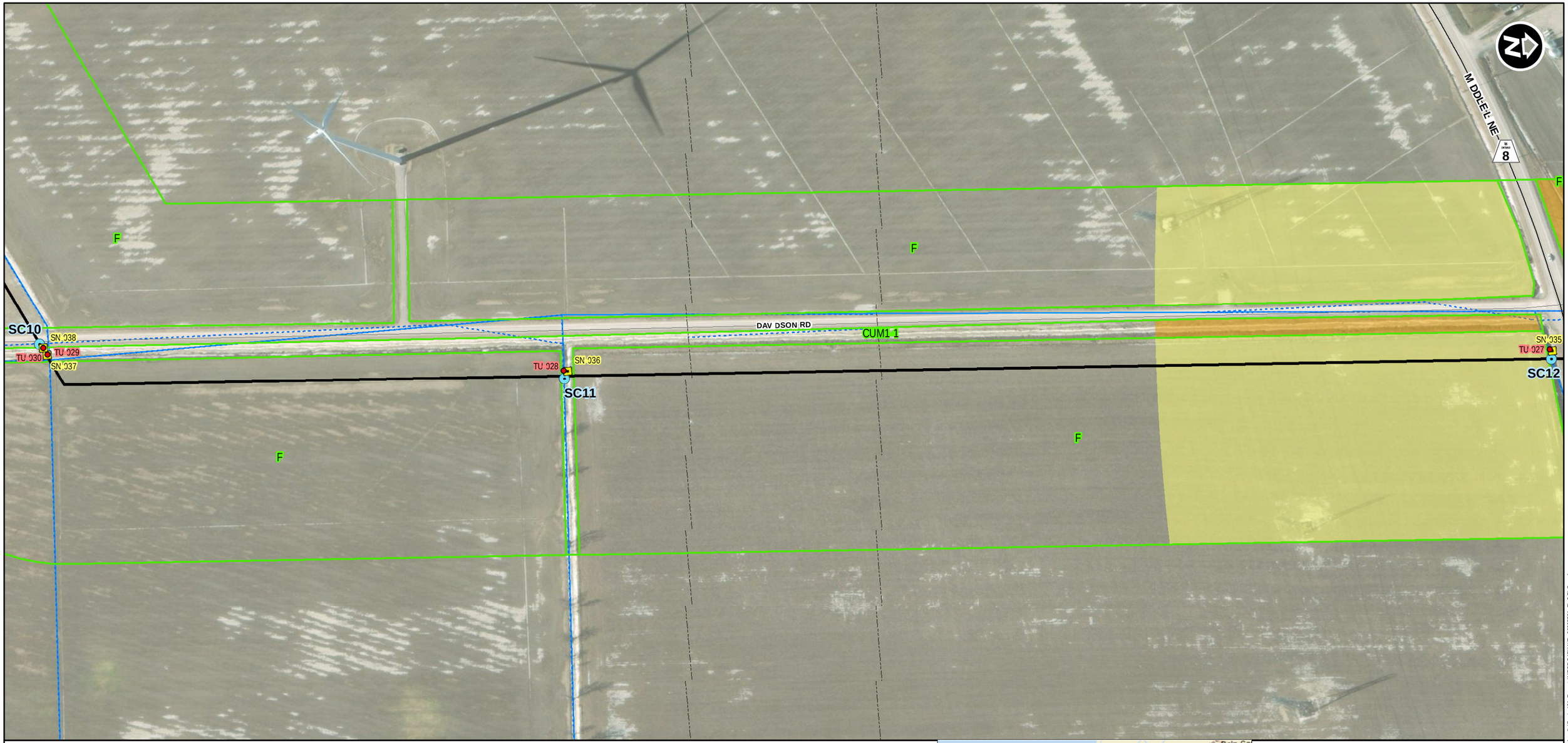


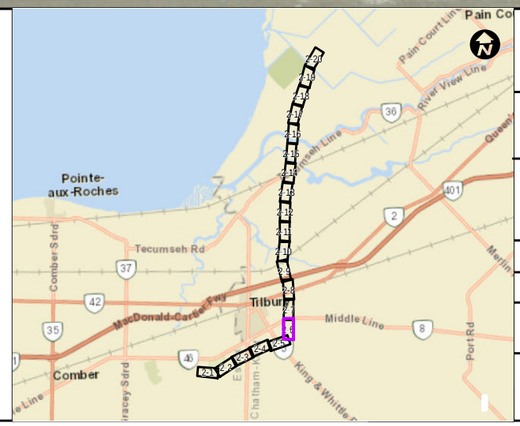
Legend

- Turtle Survey Locations
- Snake Survey Locations
- Watercourse Crossing
- Preferred Route 2022-06-03
- Constructed Drain
- Watercourse
- ELC

Eastern Foxsnake Habitat

- Category 2 Habitat
- Category 3 Habitat

Label	ELC Description
A	Anthropogenic
CUM1-1	Dry – Moist Old Field Meadow Type
CUH	Cultural Hedgerow
F	Agricultural Field
FOD8-1	Fresh – Moist Poplar Deciduous Forest Type
MAS2-9	Forb Mineral Shallow Marsh Type
OAO	Open Aquatic



Panhandle Regional Expansion Project

ELC
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Figure 2-6

Map location: \\na.aecomnet.com\ts\AMER\Kitchener-CAKCN1\DCS\GIS\Projects\60665521_Enbridge_PanhandleDesign\01_Reports\MECP SAR\MXD_60665521_Pg2-ELC.mxd
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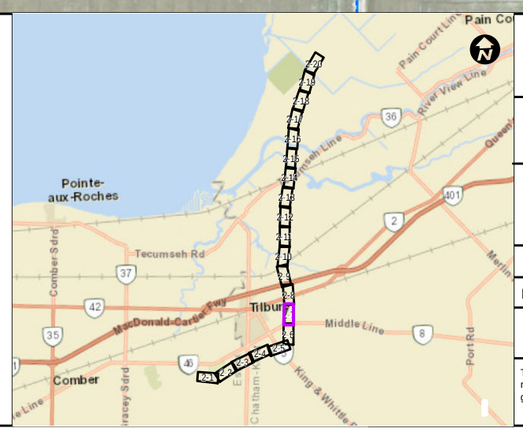
Legend

- Turtle Survey Locations
- Snake Survey Locations
- Watercourse Crossing
- Preferred Route 2022-06-03
- Constructed Drain
- Watercourse
- ELC

Eastern Foxsnake Habitat

- Category 2 Habitat
- Category 3 Habitat

Label	ELC Description
A	Anthropogenic
CUM1-1	Dry – Moist Old Field Meadow Type
CUH	Cultural Hedgerow
F	Agricultural Field
FOD8-1	Fresh – Moist Poplar Deciduous Forest Type
MAS2-9	Forb Mineral Shallow Marsh Type
OAO	Open Aquatic



Panhandle Regional Expansion Project

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Meters

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Figure 2-7

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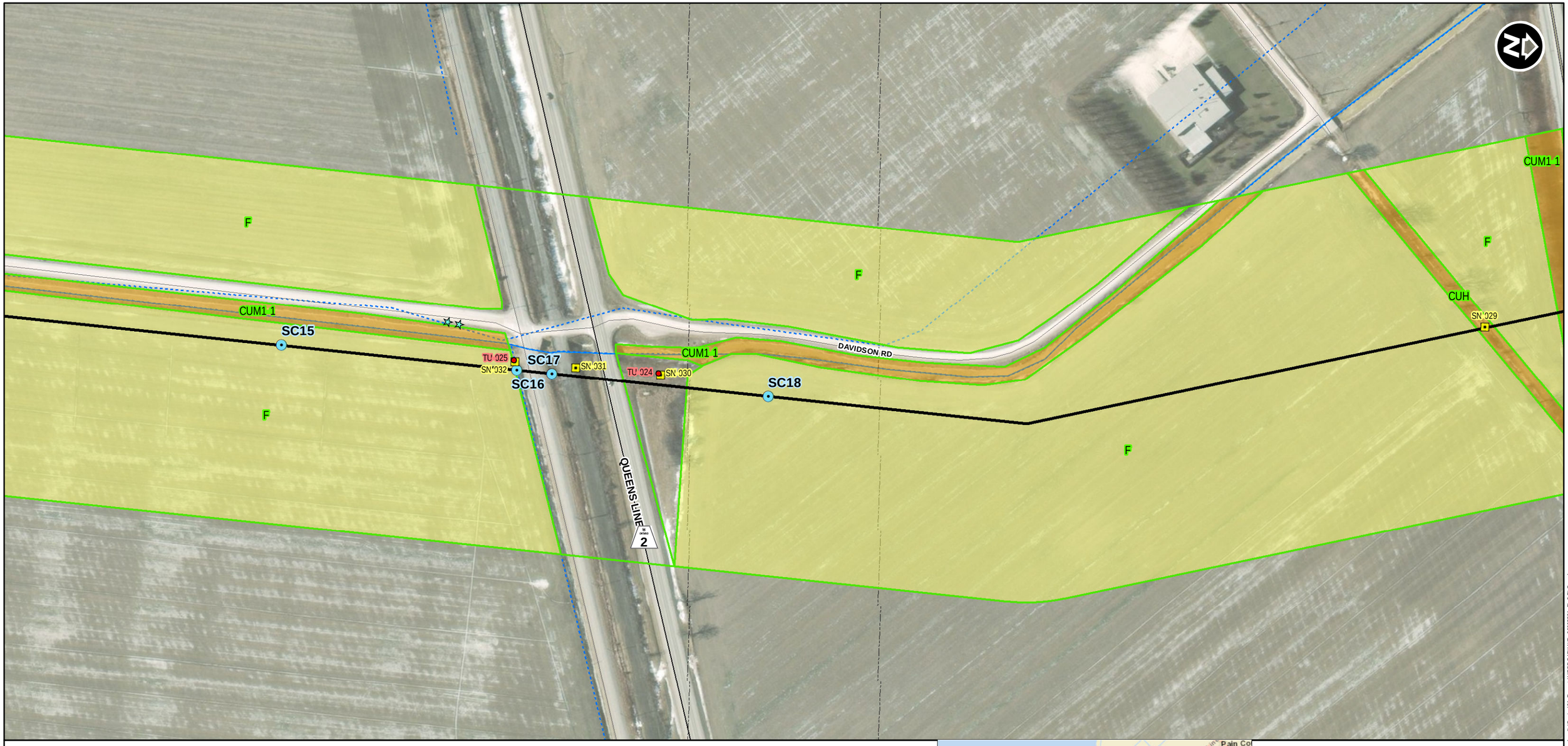


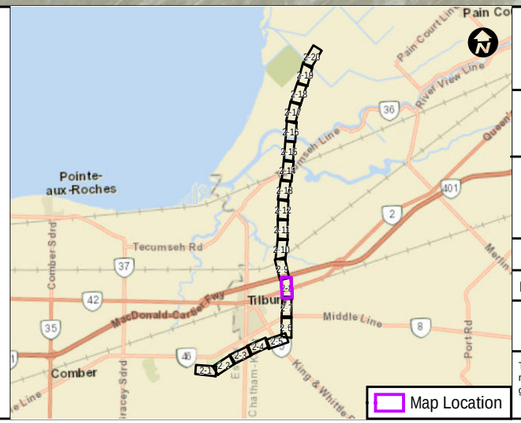
Legend

- Turtle Survey Locations
- Snake Survey Locations
- Watercourse Crossing
- Preferred Route 2022-06-03
- Constructed Drain
- Watercourse
- ELC

Eastern Foxsnake Habitat

- Category 2 Habitat
- Category 3 Habitat

Label	ELC Description
A	Anthropogenic
CUM1-1	Dry – Moist Old Field Meadow Type
CUH	Cultural Hedgerow
F	Agricultural Field
FOD8-1	Fresh – Moist Poplar Deciduous Forest Type
MAS2-9	Forb Mineral Shallow Marsh Type
OAO	Open Aquatic



Panhandle Regional Expansion Project

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Panhandle

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Meters

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Figure 2-8

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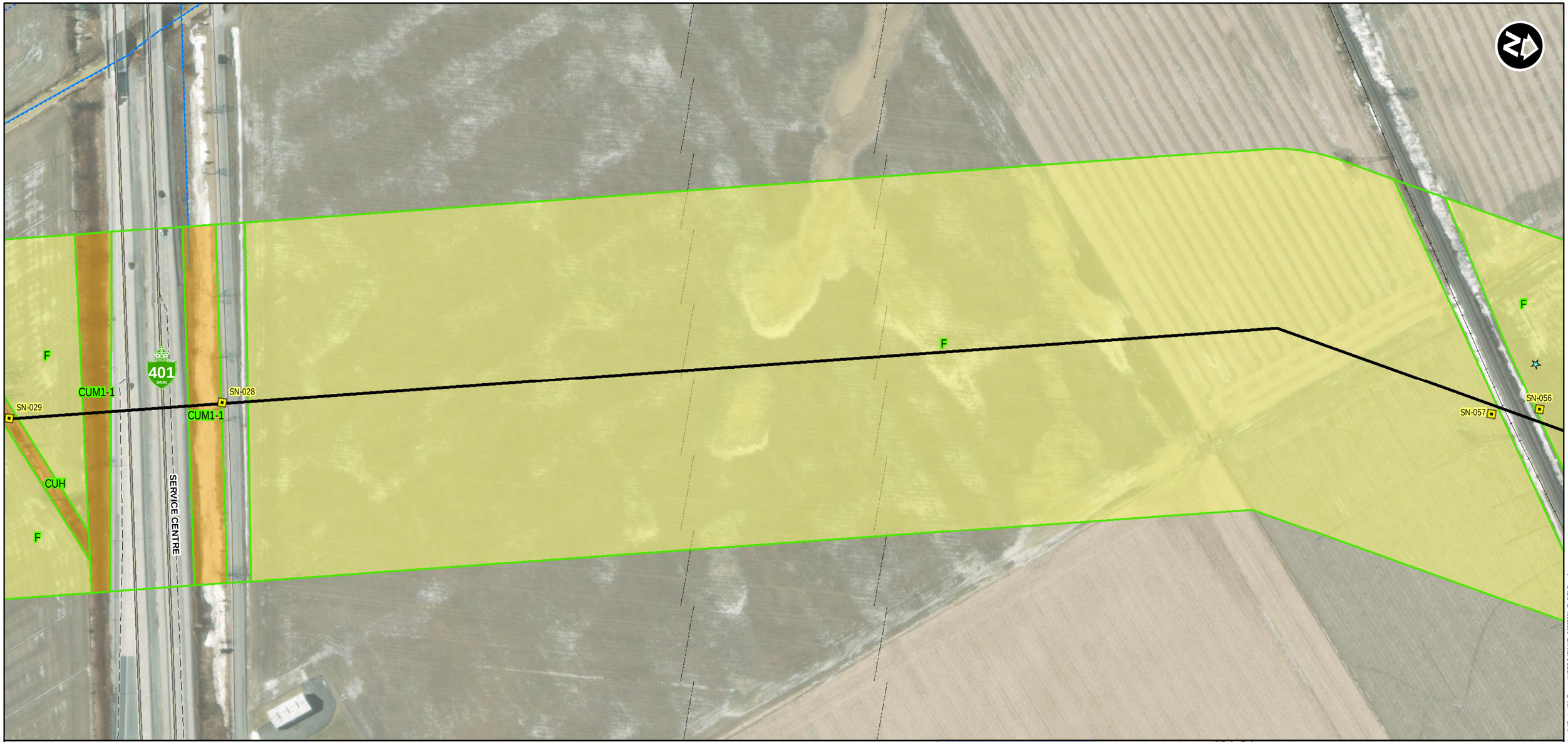


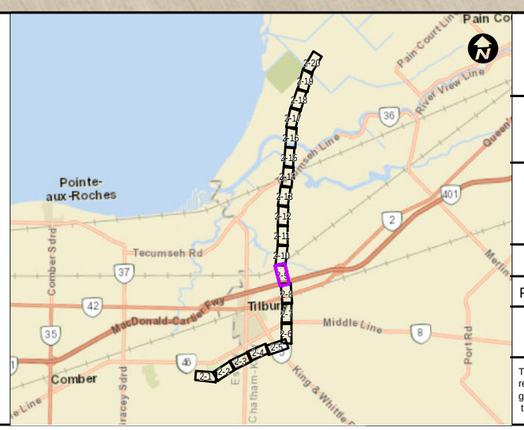
Legend

- Snake Survey Locations
- Watercourse Crossing
- Preferred Route 2022-06-03
- Constructed Drain
- Watercourse
- ELC

Eastern Foxsnake Habitat

- Category 2 Habitat
- Category 3 Habitat

Label	ELC Description
A	Anthropogenic
CUM1-1	Dry – Moist Old Field Meadow Type
CUH	Cultural Hedgerow
F	Agricultural Field
FOD8-1	Fresh – Moist Poplar Deciduous Forest Type
MAS2-9	Forb Mineral Shallow Marsh Type
OAO	Open Aquatic



Panhandle Regional Expansion Project

ELC

Panhandle

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Meters

DATUM: NAD 1983 UTM Zone 17N

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P#:60665521	V#:	

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Figure 2-9

Map location: \\ca.aecomnet.com\NA\AMER\Kitchener-CAK\CN1\DCS\GIS\Projects\60665521_Enbridge_PanhandleDesign\01_Reports\MECP S.44\MXD_60665521_Fig2-ELC.mxd
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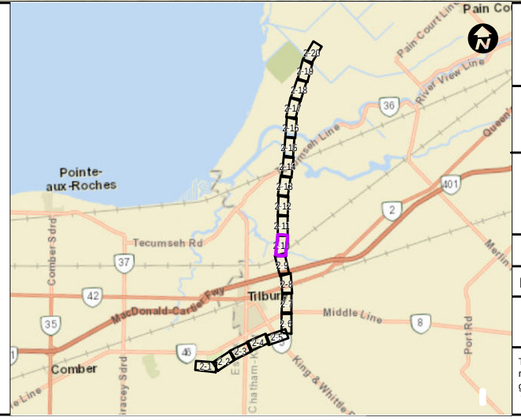
Legend

- Turtle Survey Locations
- Snake Survey Locations
- Queen Snake Survey
- Watercourse Crossing
- Preferred Route 2022-06-03
- Constructed Drain
- Watercourse
- ELC

Eastern Foxsnake Habitat

- Category 2 Habitat
- Category 3 Habitat

Label	ELC Description
A	Anthropogenic
CUM1-1	Dry – Moist Old Field Meadow Type
CUH	Cultural Hedgerow
F	Agricultural Field
FOD8-1	Fresh – Moist Poplar Deciduous Forest Type
MAS2-9	Forb Mineral Shallow Marsh Type
OAO	Open Aquatic



Panhandle Regional Expansion Project

ELC

Panhandle

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Meters

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Figure 2-10

Map location: \\na.aecomnet.com\ts\AMER\Kitchener-CAK-CN1\DCS\GIS\Projects\60665521_Enbridge_Panhandle\Design\01_Reports\MECP SAR\MXD_60665521_Fig2-ELC.mxd
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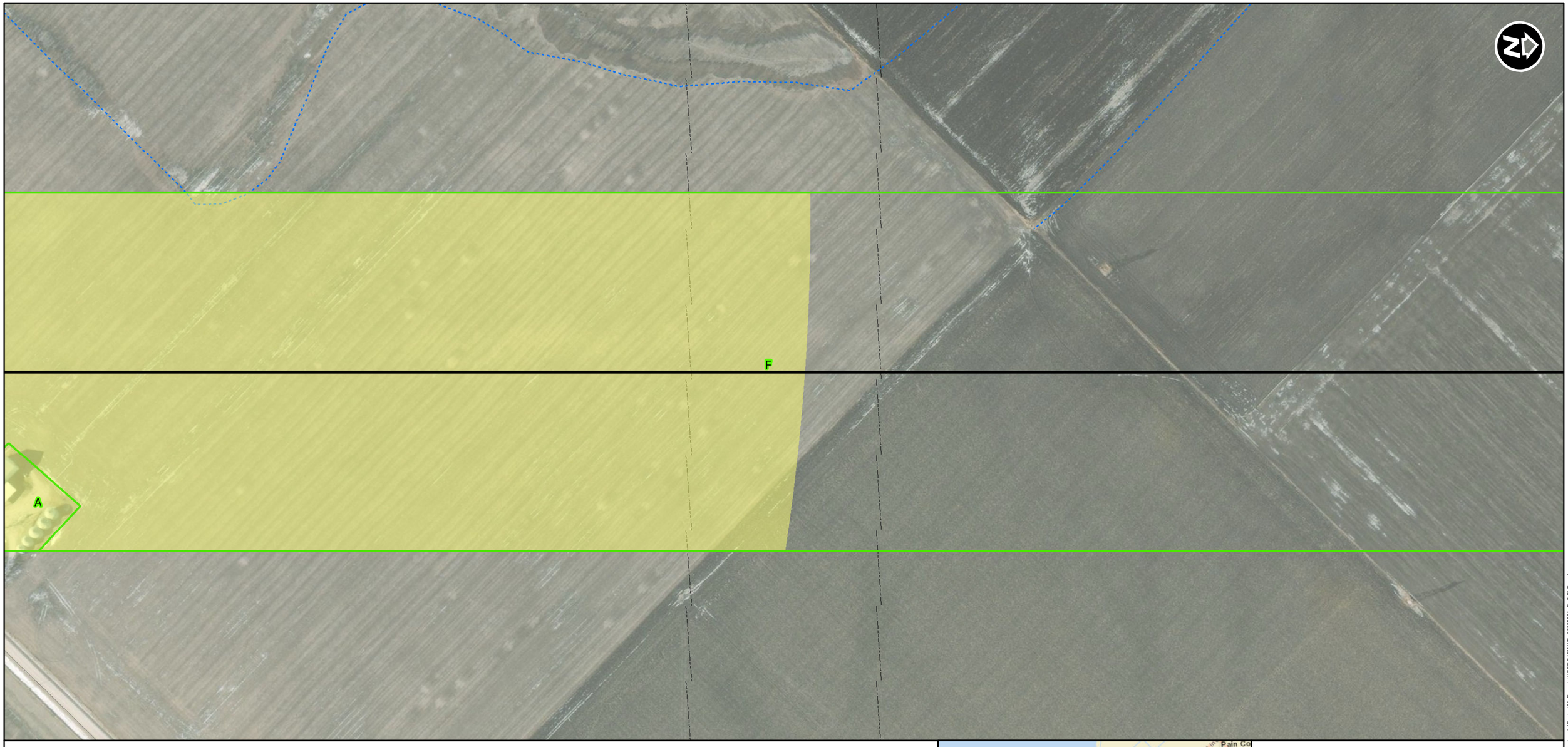

Legend

- Watercourse Crossing
- Preferred Route 2022-06-03
- Constructed Drain
- Watercourse
- ELC

Eastern Foxsnake Habitat

- Category 3 Habitat

Label	ELC Description
A	Anthropogenic
CUM1-1	Dry – Moist Old Field Meadow Type
CUH	Cultural Hedgerow
F	Agricultural Field
FOD8-1	Fresh – Moist Poplar Deciduous Forest Type
MAS2-9	Forb Mineral Shallow Marsh Type
OAO	Open Aquatic

Panhandle Regional Expansion Project

ELC
Panhandle

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Meters
DATUM: NAD 1983 UTM Zone 17N

July 2022	1:2,500 * when printed 11"x17"	Source: MNRF 2020 Image: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
P#:60665521	V#:	

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Figure 2-11

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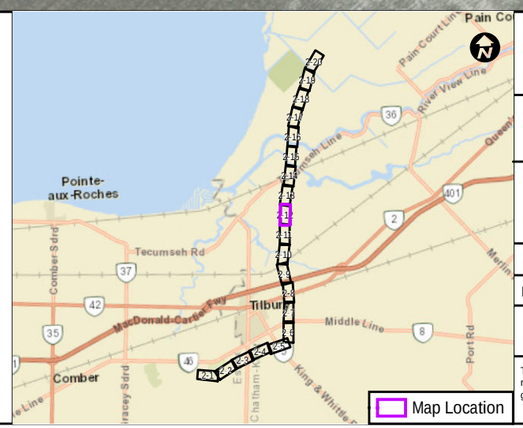
Legend

- Turtle Survey Locations
- Snake Survey Locations
- Watercourse Crossing
- Preferred Route 2022-06-03
- Constructed Drain
- Watercourse
- ELC

Label	ELC Description
A	Anthropogenic
CUM1-1	Dry – Moist Old Field Meadow Type
CUH	Cultural Hedgerow
F	Agricultural Field
FOD8-1	Fresh – Moist Poplar Deciduous Forest Type
MAS2-9	Forb Mineral Shallow Marsh Type
OAO	Open Aquatic



Panhandle Regional Expansion Project

ELC

Panhandle

0 50 100

Meters

DATUM: NAD 1983 UTM Zone 17N

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P#:60665521	V#:	

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Figure 2-12

Map location: \\ca.aecomnet.com\NA\AMER\Kitchener-CAK1N1DC\GIS\GISProjects\60665521_Enbridge_PanhandleDesign\01_Reports\MECP S.44\MXD_60665521_Fig2-ELC.mxd
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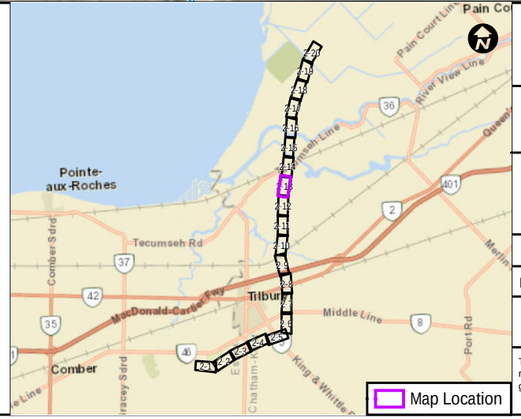
Legend

- Turtle Survey Locations
- Snake Survey Locations
- Queen Snake Survey
- Watercourse Crossing
- Preferred Route 2022-06-03
- Constructed Drain
- Watercourse
- ELC

Label	ELC Description
A	Anthropogenic
CUM1-1	Dry – Moist Old Field Meadow Type
CUH	Cultural Hedgerow
F	Agricultural Field
FOD8-1	Fresh – Moist Poplar Deciduous Forest Type
MAS2-9	Forb Mineral Shallow Marsh Type
OAO	Open Aquatic



Panhandle Regional Expansion Project

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DATUM: NAD 1983 UTM Zone 17N

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Figure 2-13

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Date Saved: 6/30/2022 2:14:03 PM User Name: michael.w.collins

Legend

- Turtle Survey Locations
- Snake Survey Locations
- Queen Snake Survey
- Watercourse Crossing
- Preferred Route 2022-06-03
- Constructed Drain
- Watercourse
- ELC

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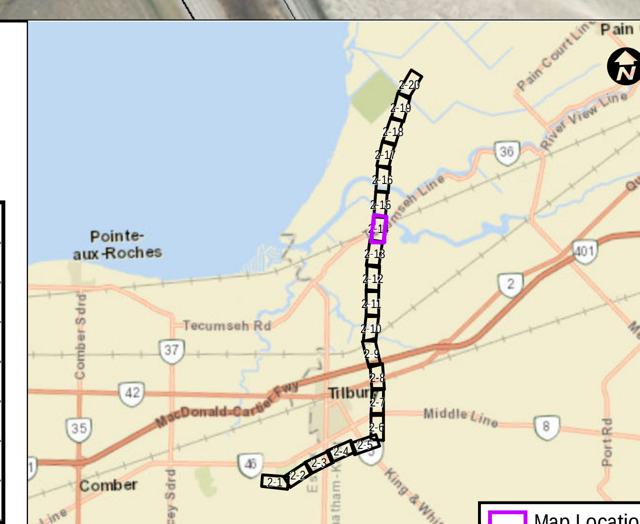

Panhandle Regional Expansion Project

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Figure 2-14

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Legend

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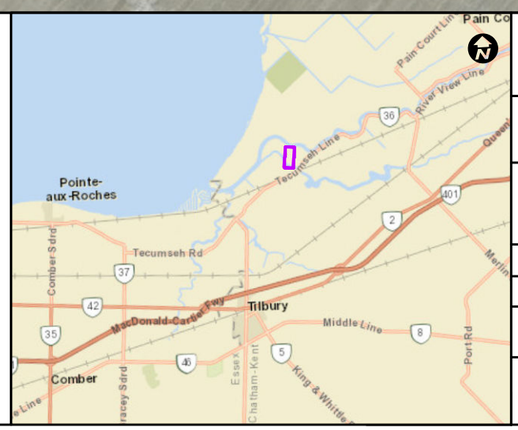

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Figure 2-15

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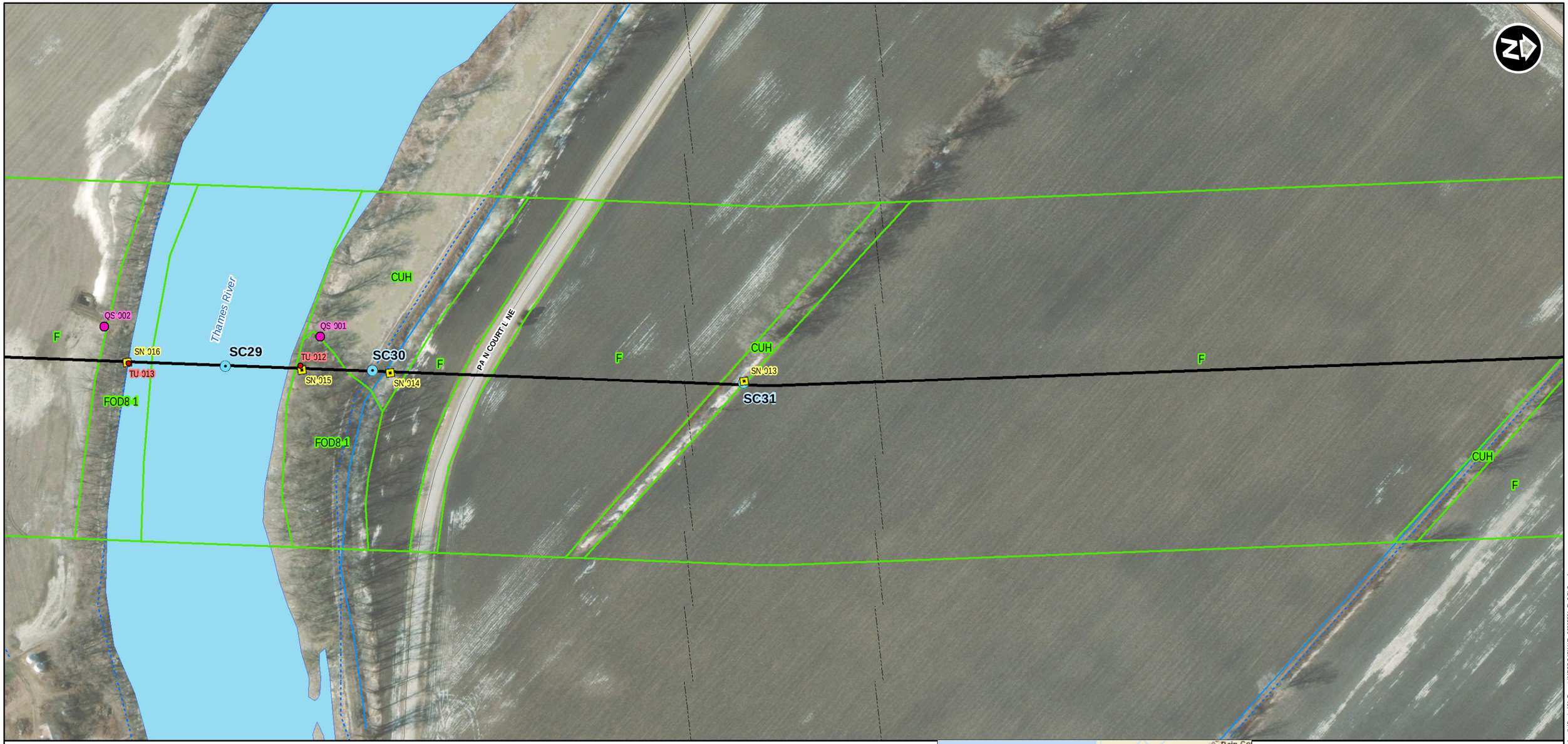

Legend

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- Watercourse Crossing
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- Constructed Drain
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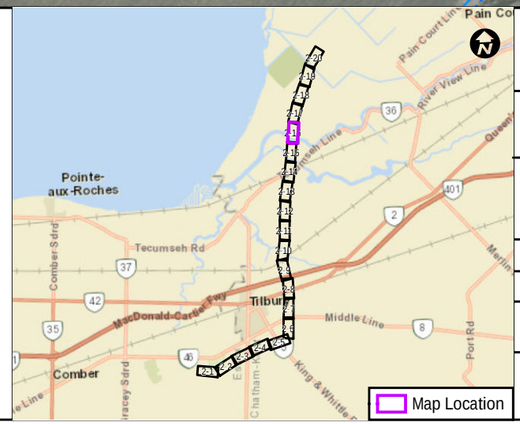

Panhandle Regional Expansion Project

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Figure 2-16

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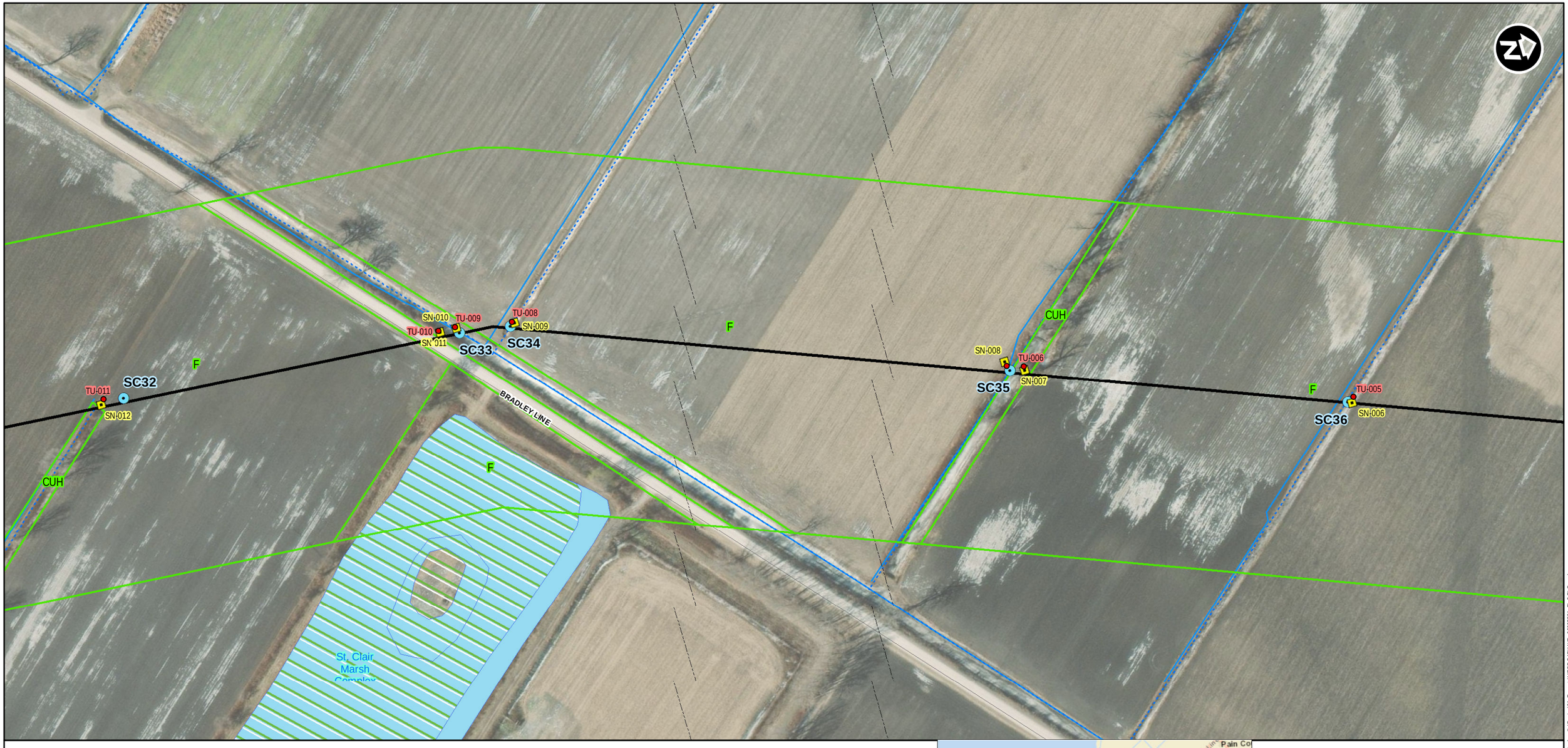

Legend

- Turtle Survey Locations
- Snake Survey Locations
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- Constructed Drain
- Watercourse
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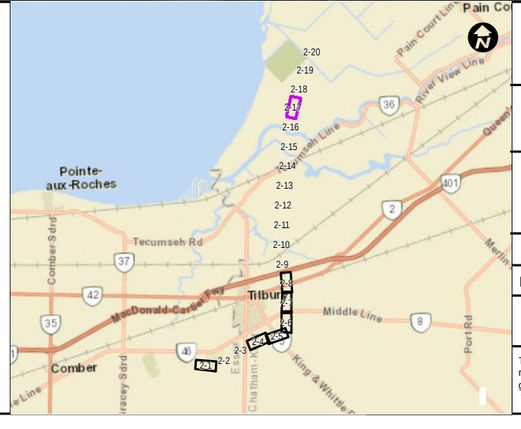

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Figure 2-17

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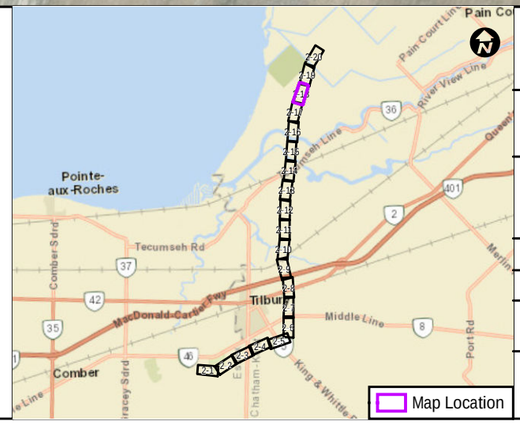

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Figure 2-18

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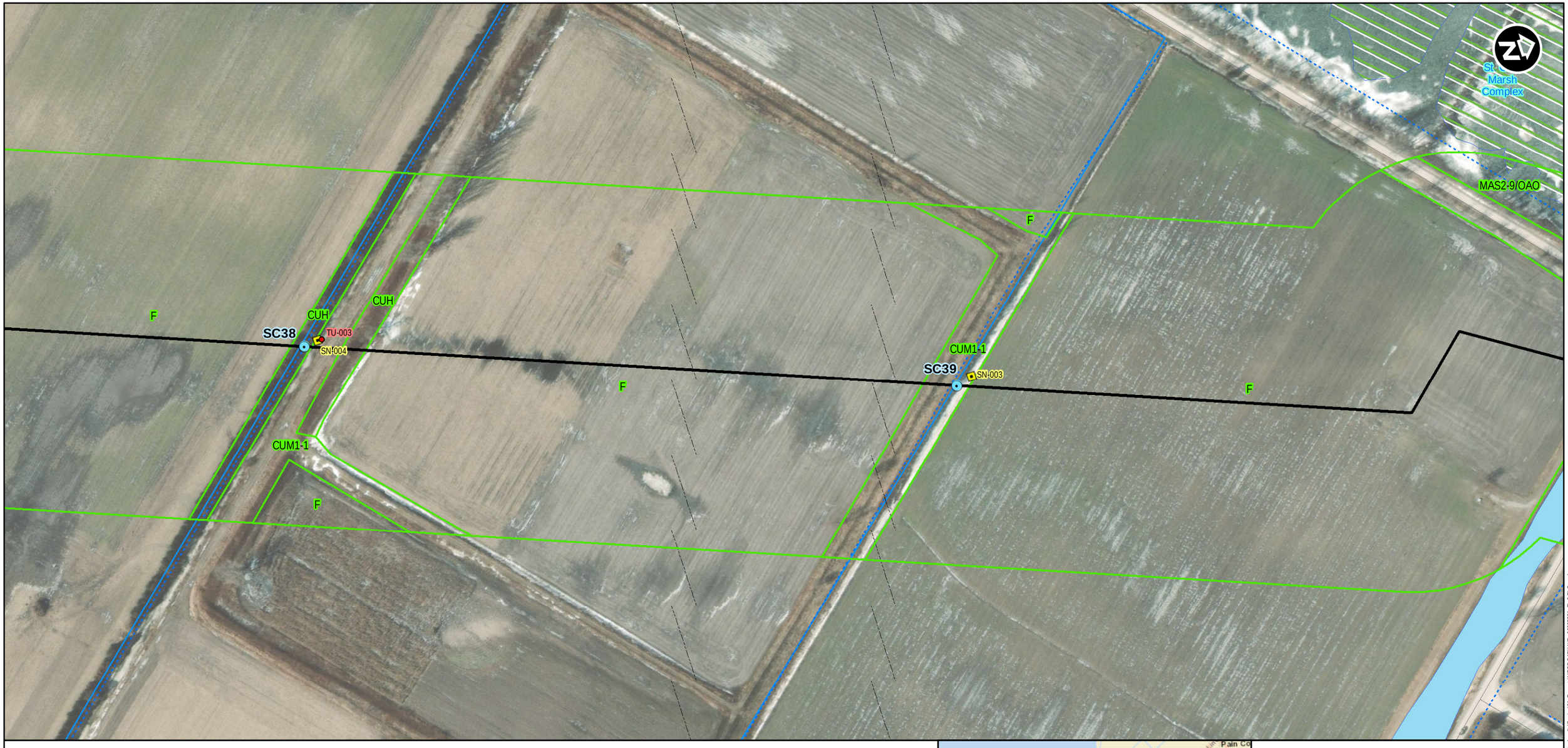

Legend

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Figure 2-19

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Legend

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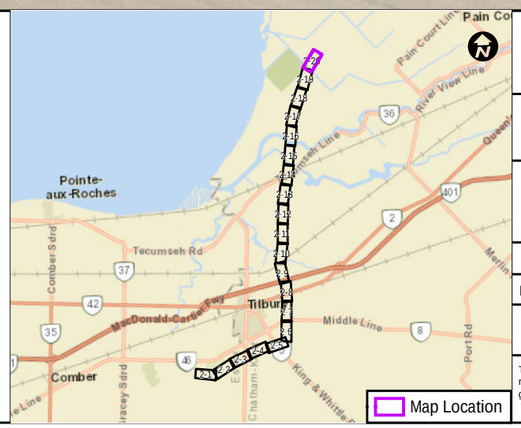

Panhandle Regional Expansion Project

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Figure 2-20

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Attachment A

Panhandle Existing Fish Habitat Summary

TEMPLATE D2A: EXISTING FISH HABITAT CONDITIONS SUMMARY TABLE

Waterbody ID	Date	Flow	Thermal Regime	Fish Habitat*	Substrate Type	Channel Morphology	Vegetation	Constraints & Opportunities	Significant Fish Habitat	Fish Community Sampling Results
SC-01A Boucher Drain	To Be Completed	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	N/A
SC-01 Unnamed Trib to Boucher Drain 001	May 10, 2022	Ephemeral	Unknown	Indirect	Silt, Sand	N/A – Dry at the time of assessment	Terrestrial Grasses	Expand riparian area	None	N/A
SC-02 Thilbert Drain	Apr 27, 2022	Permanent	Warm[1]	Direct[1]	Silt, sand, gravel	Flats(50%), Run (30%), Pool (20%)	No vegetation was present at the time of inspection	Expand riparian area, waste removal, add morphology structures	None	None
SC-03 Tremblay Creek Drain / Tilbury Creek)	Apr 27, 2022	Permanent	Warm[1]	Direct[1]	Silt, cobble, gravel	Run (100%)	No vegetation was present at the time of inspection	Stabilize right bank, Expand riparian area, Low flows could present a seasonal barrier to fish habitat	None	Emerald Shiner (36) Creek Chub (16) Yellow Bullhead (4) Pumpkinseed (1) Black Bullhead (1) Johnny Darter (1) Spottail Shiner (1) Yellow Perch (1)
SC-04 Unnamed Non-Flowing Waterbody 001	May 10, 2022	Ephemeral	Unknown	Not fish habitat	Detritus, silt, sand	Pool (100%)	Terrestrial grasses, Phragmites	Seasonal flows, expand riparian area, Remove phragmites	None	N/A

Waterbody ID	Date	Flow	Thermal Regime	Fish Habitat*	Substrate Type	Channel Morphology	Vegetation	Constraints & Opportunities	Significant Fish Habitat	Fish Community Sampling Results
SC-05 Unnamed Trib to Malott Diversion Drain 001	May 10, 2022	Intermittent	Unknown	Indirect	Silt Sand	N/A - Dry at the time of assessment	Terrestrial grasses, Phragmites	Create/Expand riparian area, seasonal low flows restrict passage	None	N/A
SC-06 Unnamed Trib to Malott Diversion Drain 002	May 10, 2022	Ephemeral	Unknown	Indirect	Silt Sand	N/A - Dry at the time of assessment	Terrestrial grasses, Phragmite	Create/Expand riparian area, seasonal low flows restrict passage	None	N/A
SC-07 Unnamed Non-Flowing Waterbody 002	Apr 27, 2022	Permanent	Unknown	Direct	Silt, sand	Flats (100%)	Unidentified floating vegetation present	Expand riparian buffer, improve morphology, remove phragmites	Lilliput mussels	Goldfish (3)
SC-08 Unnamed Non-Flowing Waterbody 003	Apr 27, 2022	Ephemeral	Unknown	Not Fish Habitat	Detritus, silt, sand	Pool (100%)	Algae, floating aquatic vegetation	Improve connectivity, Expand riparian buffer	None	N/A
SC-09 Thompson-Paulus Drain	April 27, 2022	Permanent	Unknown	Direct	Silt, Sand	Flat (100%)	Floating aquatic vegetation, some phragmites	Expand riparian buffer, improve morphology	None	None
SC-10 King and Whittle Drain	Apr 27, 2022	Permanent	Unknown	Direct	Gravel, sand, silt, cobble	Run (95%) Pool (5%)	Algae, grasses	Expand riparian area. Low flows could be a seasonal	Clean gravel bottom,	None

Waterbody ID	Date	Flow	Thermal Regime	Fish Habitat*	Substrate Type	Channel Morphology	Vegetation	Constraints & Opportunities	Significant Fish Habitat	Fish Community Sampling Results
								barrier to fish habitat.		
SC-11 Gagnier Drain	Apr 27, 2022	Permanent	Unknown	Direct	Silt, sand, gravel	Run (100%)	Algae, phragmites	Remove phragmites; low flows could present a seasonal barrier to fish habitat.	None	None
SC-12 Powell Drain	Apr 27, 2022	Permanent	Unknown	Direct	Silt (80%), gravel (10%), cobble (10%)	Run (40%) Riffle (40%) Pool (20%)	No vegetation was present at the time of inspection	Expand/ create riparian buffer	None	Emerald Shiner (1)
SC-13 Unnamed Trib to King and Whittle Drain 001	Apr 27, 2022	Intermittent	Unknown	Indirect	Silt, Sand	Run (100%)	Terrestrial grasses	Expand/ create a riparian buffer; enhance channel morphology; improve connectivity to main channel; the drop in elevation to the main channel could create a seasonal barrier to fish passage	None	None
SC-14 Ivison Drain	Apr 27, 2022	Permanent	Unknown	Indirect	Cobble (30%), gravel (10%), sand	Run (50%) Riffle (50%)	No vegetation was present at the time of inspection	Seasonal “waterfall” to main channel; remove	None	None

Waterbody ID	Date	Flow	Thermal Regime	Fish Habitat*	Substrate Type	Channel Morphology	Vegetation	Constraints & Opportunities	Significant Fish Habitat	Fish Community Sampling Results
					(30%), silt (30%)			phragmites; expand/ create riparian buffer		
SC-15 King and Whittle Drain	May 10, 2022	Permanent	Unknown	Direct	Gravel, sand, silt, cobble	Flat (100%)	Instream aquatic vegetation	Expand riparian area, improve downstream connectivity at low flows (barrier to quillback present), improve upstream water quality	Quillback and Largemouth bass spawning	Did not complete due to staging Quillback
SC-16 Anesser Drain	May 10, 2022	Permanent	Unknown	Indirect	Silt, Sand, Cobble	Run (95%), Riffle (5%)		Create / Expand riparian buffer, improve connectivity to downstream	None	None
SC-17 Unnamed Trib to King and Whittle Drain 002	Apr 27, 2022	Intermittent	Unknown	Indirect	Silt, Detritus	Flats (100%)	Algae, grasses	Clean up garbage Low flows could pose a seasonal barrier to fish	None	N/A
SC-18 King and Whittle Drain	May 10, 2022	Permanent	Unknown	Direct	Silt, Sand	Flats (100%)	Phragmites	Phragmites Removal, Create/Expand riparian buffer, Water Quality	Quillback Spawning	Did not complete due to staging Quillback

Waterbody ID	Date	Flow	Thermal Regime	Fish Habitat*	Substrate Type	Channel Morphology	Vegetation	Constraints & Opportunities	Significant Fish Habitat	Fish Community Sampling Results
								Upstream Improvement		
SC-19 Baptiste Creek	Apr 27, 2022	Permanent [1]	Warm[1]	Direct[1]	Did not assess	Run (100%)	No vegetation was present at the time of inspection	Stabilize vulnerable banks; plant riparian trees/shrubs	Lilliput (END), Spotted Sucker (SC), Silver Lamprey (SC), Mapleleaf (SC)	Did not complete due to SAR presence
SC-20 Unnamed Trib to Johnston Drain 001	May 11, 2022	Intermittent	Unknown	Indirect	Detritus, Silt, Clay	Flats (100%)	Terrestrial grasses	Create/Expand riparian buffer, improve connectivity	None	N/A
SC-21 Unnamed Trib to Johnston Drain 002	Apr 27, 2022	Permanent	Unknown	Direct	Silt, clay	Flats (100%)	Phragmites, unidentified submergent vegetation	Plant riparian trees or shrubs to create a buffer; low flows could cause seasonal barriers to fish passage	None	None
SC-22 Unnamed Trib to Johnston Drain 003	Apr 27, 2022	Intermittent	Unknown	Indirect	Silt (100%)	Flats (100%)	Terrestrial Grasses	Plant riparian trees or shrubs to create a riparian buffer; low flows could cause seasonal barrier to fish passage	None	N/A

Waterbody ID	Date	Flow	Thermal Regime	Fish Habitat*	Substrate Type	Channel Morphology	Vegetation	Constraints & Opportunities	Significant Fish Habitat	Fish Community Sampling Results
SC-23 Olds Drain	Apr 27, 2022	Permanent	Unknown	Direct	Silt, gravel, sand	Run (100%)	No vegetation was present at the time of inspection	Plant riparian trees or shrubs; enhance channel morphology (eg add refuge pools and meanders)	None	None
SC-24 Unnamed Trib to Olds Drain 001	Apr 27, 2022	Ephemeral	Unknown	Not fish habitat	Silt, sand	N/A (dry)	Adjacent terresatrial grasses, some terrestrial grasses in channel	Not fish habitat	None	N/A
SC-25 Forbes Internal Drain	April 27, 2022	Permanent	Unknown	Direct	Silt, Sand	Flats (100%)	No vegetation was present at the time of inspection	Bank Stabilization, expand riparian buffer	None	Did not complete due to safety concerns (steep slope)
SC-26 Unnamed Non-Flowing Waterbody 004	May 10, 2022	Intermittent	Unknown	Not fish habitat	Detritus, Silt, Sand	Pool (100%)	Phragmites	Phragmites Removal, Connectivity improvements	N/A – not fish habitat	N/A
SC-27 Jeannettes Creek	Apr 26, 2022	Permanent [1]	Warm[1]	Direct[1]	Did not assess	Flats (100%)	No vegetation was present at the time of inspection	Remove phragmites, shore stabilization measures, plant additional trees/shrubs to enhance Riparian zone	Silver Lamprey (SC); Spotted Sucker (SC);	Did not complete due to SAR presence

Waterbody ID	Date	Flow	Thermal Regime	Fish Habitat*	Substrate Type	Channel Morphology	Vegetation	Constraints & Opportunities	Significant Fish Habitat	Fish Community Sampling Results
SC-28 Peltier Drain	Apr 26, 2022	Permanent	Unknown	Direct	Silt (80%), Detritus (20%)	Flats (100%)	Duckweed	plant additional trees/shrubs to enhance Riparian zone	None	Goldfish (3)
SC-29 Thames River	Apr 26, 2022	Permanent [1]	Warm[1]	Direct[1]	Silt, sand (along shoreline at crossing)	Flats (100%)	Algae (close to shore) phragmites	Remove phragmites	DFO Critical Habitat: Fawnsfoot DFO SAR: Hickorynut (END), Fawnsfoot (END), Threehorn Wartyback (THR), Silver Chub (END), Round Hickorynut (END), Black Redhorse (THR), Silver Shiner (THR), Eastern Sand Darter (THR), Northern Madtom (END), Pugnose	Did not complete due to SAR presence

Waterbody ID	Date	Flow	Thermal Regime	Fish Habitat*	Substrate Type	Channel Morphology	Vegetation	Constraints & Opportunities	Significant Fish Habitat	Fish Community Sampling Results
									Minnow (THR), Silvery Lamprey (SC), Northern Sunfish (SC), Spotted Sucker (SC), Mapleleaf (SC), River Redhorse (SC)	
SC-30 Unnamed Trib to Thames River 001	Apr 26, 2022	Permanent	Unknown	Direct	Detritus, Silt, Muck	Flats (100%)	Duckweed, phragmites	Remove phragmites; old rail line is providing a permanent barrier to the Thames River; low flows could cause seasonal barriers to fish passage	Iron staining present which could be an indication of groundwater inputs. DFO SAR: Lake Chubsucker (END)	Did not complete due to SAR presence
SC-31 Unnamed Non-Flowing Waterbody 005	April 26, 2022	Intermittent	Unknown	Not fish habitat	Detritus, Silt, Sand	Pool (100%)	Phragmites	Remove Phragmites	N/A – Not fish habitat	N/A

Waterbody ID	Date	Flow	Thermal Regime	Fish Habitat*	Substrate Type	Channel Morphology	Vegetation	Constraints & Opportunities	Significant Fish Habitat	Fish Community Sampling Results
SC-32 Myers Pump Works Drain	May 10, 2022	Intermittent	Unknown	Not fish habitat	Detritus, Silt, Sand	Pool (100%)	Phragmites	Remove Phragmites	N/A – Not fish habitat	N/A
SC-33 Myers Pump Works Drain	Apr 26, 2022	Permanent [1]	Unknown	Direct[1]	Silt, Muck	Flats (100%)	Duckweed, Phragmites, Grasses	Remove phragmites; Remove berm that is restricting flows, enhance channel morphology (e.g. add refuge pools and meanders)	DFO SAR: Lake Chubsucker (END)	Did not complete due to SAR presence
SC-34 Unnamed Trib to Myers Pump Works Drain 001	Apr 26, 2022	Permanent	Unknown	Direct	Silt, muck	Flats (100%)	Phragmites, grasses	Remove phragmites; plant additional trees/shrubs to enhance Riparian zone; low flows could cause seasonal barrier to fish passage	DFO SAR: Lake Chubsucker (END)	Did not complete due to SAR presence
SC-35 Unnamed Trib to Myers Pump Works Drain 002	Apr 26, 2022	Permanent [1]	Unknown	Direct	Silt, sand	Flats (100%)	Duckweed	Plant riparian trees or shrubs to create a riparian buffer; vines growing off of exposed pipe downstream of	DFO Sar: Lake Chubsucker (END)	Did not complete due to SAR presence

Waterbody ID	Date	Flow	Thermal Regime	Fish Habitat*	Substrate Type	Channel Morphology	Vegetation	Constraints & Opportunities	Significant Fish Habitat	Fish Community Sampling Results
								the crossing are causing a debris jam which could cause a seasonal barrier to fish passage		
SC-36 Unnamed Trib to Myers Pump Works Drain 003	Apr 26, 2022	Permanent	Unknown	Direct[2]	Silt (100%)	Flats (100%)	Duckweed, grasses	Plant riparian trees or shrubs to create a riparian buffer	DFO Sar: Lake Chubsucker (END)	Did not complete due to SAR presence
PSC-37 Unnamed Trib to Myers Pump Works Drain 004	Apr 26, 2022	Permanent	Unknown	Direct[2]	Silt (100%)	Flats (100%)	Phragmites, duckweed	Remove phragmites; Plant riparian trees or shrubs to create a riparian buffer	DFO SAR: Lake Chubsucker (END)	Did not complete due to SAR presence
SC-38 Unnamed Trib to Myers Pump Works Drain 005	Apr 26, 2022	Permanent[1]	Unknown	Direct	Silt (100%)	Flats (100%)	No vegetation was present at the time of inspection.	Remove phragmites that is present downstream; fix CSPs/drain outlets; create a riparian buffer	None	Goldfish (4)
SC-39 Unnamed Trib to Myers	Apr 25, 2022	Permanent[1]	Unknown	Direct	Sand (30%), silt (40%), cobbles (30%)	Flats (100%)	Duckweed, phragmites, grasses	Increase riparian buffer; Remove phragmites	None	Central Mudminnow (1)

Waterbody ID	Date	Flow	Thermal Regime	Fish Habitat*	Substrate Type	Channel Morphology	Vegetation	Constraints & Opportunities	Significant Fish Habitat	Fish Community Sampling Results
Pump Works Drain 006										
SC-40 Unnamed Trib to Jacks Creek Drain / McFarlane Relief Drain	Apr 25, 2022	Permanent [1]	Warm[1]	Direct [1,2]	Silt, gravel	Flats (100%)	Phragmites	Remove phragmites; fix or remove gate on Balmoral Line Bridge; create a riparian buffer	DFO Sar species: Lake Chubsucker (END), Mapleleaf (SC)	Did not complete due to SAR presence
SC-41 McFarlane Relief Drain / Unnamed Trib to McFarlane Relief Drain	Apr 25, 2022	Intermittent	Unknown	Not Fish Habitat	Silt (70%), Clay (20%), Detritus (10%)	Feature was dry at the time of inspection	Terrestrial grasses	Clean up garbage; enhance channel morphology	N/A – Not fish habitat	N/A

* Fish habitat is defined in subsection 2(1) of the Fisheries Act to include all waters frequented by fish and any other areas upon which fish depend directly or indirectly to carry out their life processes. The types of areas that can directly or indirectly support life processes include but are not limited to: spawning grounds and nursery, rearing, food supply and migration areas.

[1]NDMNRF, 2022: Ontario GeoHub – Aquatic resource area line segment. Accessed May 2022 from: https://geohub.lio.gov.on.ca/datasets/aquatic-resource-area-line-segment/explore?location=42.229647%2C-82.439743%2C11.33.

[2] DFO, 2022: Aquatic Species at Risk Map. Accessed May 2022 from: https://www.dfo-mpo.gc.ca/species-especes/sara-lep/map-carte/index-eng.html.

Table Description:

Waterbody ID	Name of waterbody and Crossing # / Station
Date	Insert date field investigations occurred (DD/MM/YYYY), as applicable
Flow	Ephemeral, Intermittent, Permanent
Thermal Regime	Warm, Cool, Cold
Fish Habitat	Direct, Indirect, Not Fish Habitat
Substrate Type	Boulder, cobble, rubble, gravel, sand, muck, etc.
Channel Morphology	E.g. Riffles, runs, pools, undercut banks, etc.
Vegetation	Riparian & In-stream species; emergent, submergent and floating aquatic vegetation

Constraints and Opportunities	E.g. Perched culvert, eroding bank, fish passage barrier, undersized CSP
Significant Fish Habitat	E.g. specialized habitat that supports critical life functions, areas contributing to fisheries productivity, etc.

AECOM

Attachment B

Leamington Existing Fish Habitat Summary

TEMPLATE D2A: EXISTING FISH HABITAT CONDITIONS SUMMARY TABLE

Waterbody ID	Date	Flow	Thermal Regime	Direct Fish Habitat*	Substrate Type	Channel Morphology	Vegetation	Constraints & Opportunities	Significant Fish Habitat	Fish Community Sampling Results
LSC-01 previously (LSC-02)	April 27, 2022	Intermittent	Unknown	No	Silt Sand	Flat (100%)	Phrag / Cattail (100%)	Agricultural and Road inputs Development of a Riparian Buffer, Phragmites Removal, Debris Removal	None	N/A
SC-02 previously (LSC-04)	April 27, 2022	Intermittent	Unknown	No	Silt Sand	Flat (100%)	Terrestrial Grasses (30%), Cattail (40%)	Garbage Removal Development of a Riparian Buffer, Stream Shading	None	N/A
LSC-03 Previously (LSC-05)	April 27, 2022	Permanent	Warmwater	Yes	Silt, Sand, Cobble Gravel	Run (60%), Pool (20%), Riffle (20%)	None	Improve Riparian Buffer and Slope Stability	Potential spawning Catostomus sp.	Creek Chub (11) Bluntnose Minnow (14) White Sucker (11) Yellow Bullhead (3) Common Shiner (60) Spotfin Shiner (7) Blackside Darter (4) Fathead Minnow (2) Round Goby (2)

Waterbody ID	Date	Flow	Thermal Regime	Direct Fish Habitat*	Substrate Type	Channel Morphology	Vegetation	Constraints & Opportunities	Significant Fish Habitat	Fish Community Sampling Results
LSC-04 Previously (LSC-06)	April 27, 2022	Permanent	Warmwater	Yes	Silt Sand Cobble Gravel	Run (50%), Pool (20%), Riffle (30%)	Submergent (10%), Overhanging Veg (10%)	Improve Riparian Buffer and Slope Stability	None	Creek Chub (12) Common Shiner (19) Bluntnose Minnow (55) Green Sunfish (2) Fathead Minnow (6) Johnny Darter (18)
LSC-05 Previously (LSC-06B)	April 27, 2022	Ephemeral	Unknown	No	Silt Sand	Pool (100%)	Terrestrial Grass (70%)	Develop Riparian Buffer	None	N/A
LSC-06 Previously (LSC-06C)	April 27, 2022	Intermittent	Unknown	No	Silt Sand	Flat (100%)	Phragmites / Terrestrial Grasses (100%)	Remove Phragmites, Develop Riparian Buffer	None	N/A
LSC-07 Previously (LSC-07)	April 27, 2022	Permanent	Unknown	Yes	Silt Sand	Flat (100%)	Phragmites (30%)	Develop Riparian Buffer, Remove Phragmites	None	None
LSC-08 Previously (LSC-08)	April 27, 2022	Permanent	Unknown	Yes	Silt Sand	Flat (90%) Pool (10%)	None	Develop Riparian Buffer, Remove Phragmites	None	Creek Chub (51) Green Sunfish (20) Bluntnose Minnow (4) Yellow Bullhead (1) Fathead Minnow (2) Common Shiner (1) Spotfin Shiner (1)
LSC-09 Previously (LSC-08A or 09A)	April 27, 2022	Intermittent	Unknown	No	Silt Sand	Flat (100%)	Phragmites (100%)	Develop Riparian Buffer, Remove Phragmites	None	N/A

Waterbody ID	Date	Flow	Thermal Regime	Direct Fish Habitat*	Substrate Type	Channel Morphology	Vegetation	Constraints & Opportunities	Significant Fish Habitat	Fish Community Sampling Results
LSC-10 Previously (LSC-09B)	April 27, 2022	Intermittent	Unknown	No	Silt Sand	Flat (100%)	Phragmites (70%)	Develop Riparian Buffer, Remove Phragmites	None	N/A
LSC-11 Previously (LSC-09)	April 27, 2022	Permanent	Warmwater	Yes	Silt Sand	Run (80%), Pool (20%)	Submergent algae (20%)	Improve Riparian Buffer and Slop Stability	None	Creek Chub (34) Fathead Minnow (21) Bluntnose Minnow (18) Spotfin Shiner (7) Bluegill (1) Round Goby (2) Johnny Darter (1)

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Channel Morphology	E.g. Riffles, runs, pools, undercut banks, etc.
Vegetation	Riparian & In-stream species; emergent, submergent and floating aquatic vegetation

Constraints and Opportunities	E.g. Perched culvert, eroding bank, fish passage barrier, undersized CSP
Significant Fish Habitat	E.g. specialized habitat that supports critical life functions, areas contributing to fisheries productivity, etc.

AECOM

Attachment C

Plant List

Attachment C: Vascular Plant List

Botanical Name			Plant Species Information							ELC ID#:	1	2	3	4	5	6	7	8
Common Name	Scientific Name	Family	CC	CW	Native Status	Invasive (Y/N)	SRANK	SARO	CK	ELC Code:	FOD2 2	FOD8 1	FOD9 4	MAS2-9a	MAS2-9b	CUP1	CUH/CUM1 1P	CUH/CUM1 1L
Manitoba Maple	Acer negundo	Aceraceae	0	0	N	Y	S5		X			X					X	X
(Acer rubrum X Acer saccharinum)	Acer x freemanii	Aceraceae	6	0	N	N	SNA		0				X				X	X
Bentgrass sp.	Agrostis sp.	Poaceae																X
Water-plantain sp.	Alisma sp.	Alismataceae													X			
Garlic Mustard	Alliaria petiolata	Brassicaceae	0	0	I	Y	SE5		IX								X	X
Common Ragweed	Ambrosia artemisiifolia	Asteraceae	0	3	N	N	S5		X									X
Great Ragweed	Ambrosia trifida	Asteraceae	0	0	N	N	S5		X								X	X
Canada Anemone	Anemonastrum canadense	Ranunculaceae	3	-3	N	N	S5		R								X	
Hemp Dogbane	Apocynum cannabinum	Apocynaceae	3	0	N	N	S5		0								X	
Common Burdock	Arctium minus	Asteraceae	0	3	I	N	SE5		IX			X					X	X
Swamp Milkweed	Asclepias incarnata	Apocynaceae	6	-5	N	N	S5		X					X				
Common Milkweed	Asclepias syriaca	Apocynaceae	0	5	N	N	S5		X							X	X	X
Garden Asparagus	Asparagus officinalis	Liliaceae	0	3	I	N	SE5		IX								X	X
Beggarticks sp.	Bidens sp.	Asteraceae										X						
Smooth Brome	Bromus inermis	Poaceae	0	5	I	Y	SE5		IX			X						X
Downy Brome	Bromus tectorum	Poaceae	0	5	I	N	SE5		IX								X	
Flowering-rush	Butomus umbellatus	Butomaceae	0	-5	I	Y	SE5		IX						X		X	X
Woodland Sedge	Carex blanda	Cyperaceae	3	0	N	N	S5		X				X					
Canada Moonseed	Menispermum canadense	Menispermaceae	7	0	N	N	S4		X								X	
Crested Sedge	Carex cristatella	Cyperaceae	3	-3	N	N	S5		X								X	
Limestone Meadow Sedge	Carex granularis	Cyperaceae	3	-3	N	N	S5		X								X	
Gray's Sedge	Carex grayi	Cyperaceae	8	-3	N	N	S4		X				X					
Grey Sedge	Carex grisea	Cyperaceae	8	0	N	N	S4		X				X					
Shoreline Sedge	Carex hyalinolepis	Cyperaceae	4	-5	N	N	S4		R									X
Inland Sedge	Carex interior	Cyperaceae	6	-5	N	N	S5		R				X					
Troublesome Sedge	Carex molesta	Cyperaceae	5	0	N	N	S4S5		X								X	X
Necklace Sedge	Carex projecta	Cyperaceae	5	-3	N	N	S5		R				X					
Rosy Sedge	Carex rosea	Cyperaceae	2	5	N	N	S5		X				X					
Emory's Sedge	Carex emoryi	Cyperaceae	8	-5	N	N	S4		X								X	
Spiked Sedge	Carex spicata	Cyperaceae	0	3	I	N	SE5		IX								X	
Awl-fruited Sedge	Carex stipata	Cyperaceae	3	-5	N	N	S5		X								X	
Swan's Sedge	Carex swanii	Cyperaceae	7	3	N	N	S4		R				X					
Fox Sedge	Carex vulpinoidea	Cyperaceae	3	-5	N	N	S5		X			X					X	
Sedge sp. 1	Carex sp. 1	Cyperaceae															X	
Sedge sp. 2	Carex sp. 2	Cyperaceae															X	
Eastern Redbud	Cercis canadensis	Fabaceae	8	3	N	N	SX		0							X		
Common Lamb's-quarters	Chenopodium album	Chenopodiaceae	0	3	I	N	SE5		IX								X	
Wild Chicory	Cichorium intybus	Asteraceae	0	3	I	N	SE5		IX									X
Broad-leaved Enchanter's Nightshade	Circaea canadensis	Onagraceae	2	3	N	N	S5		X				X				X	
Canada Thistle	Cirsium arvense	Asteraceae	0	3	I	Y	SE5		IX								X	X
Bull Thistle	Cirsium vulgare	Asteraceae	0	3	I	N	SE5		IX			X					X	
Field Bindweed	Convolvulus arvensis	Convolvulaceae	0	5	I	N	SE5		IX								X	X
Silky Dogwood	Cornus obliqua	Cornaceae	2	-3	N	N	S5		X		X						X	
Grey Dogwood	Cornus racemosa	Cornaceae	2	0	N	N	S5		X			X				X	X	X
Cockspur Hawthorn	Crataegus crus-galli	Rosaceae	4	0	N	N	S4		X								X	
Hawthorn sp.	Crataegus sp.	Rosaceae																X
English Hawthorn	Crataegus monogyna	Rosaceae	0	3	I	Y	SE4		IR								X	
Canada Honewort	Cryptotaenia canadensis	Apiaceae	5	0	N	N	S5		X									X
Orchard Grass	Dactylis glomerata	Poaceae	0	3	I	N	SE5		IX								X	X
Wild Carrot	Daucus carota	Apiaceae	0	5	I	N	SE5		IX			X					X	X
Swamp Loosestrife	Decodon verticillatus	Lythraceae	7	-5	N	N	S5		R					X				
Flixweed	Descurainia sophia	Brassicaceae	0	5	I	N	SE5		IX								X	
Common Teasel	Dipsacus fullonum	Dipsacaceae	0	3	I	Y	SE5		IX								X	X
Spikerush sp.	Eleocharis sp.	Cyperaceae													X		X	
Quackgrass	Elymus repens	Poaceae	0	3	I	N	SE5		IX			X						X
Field Horsetail	Equisetum arvense	Equisetaceae	0	0	N	N	S5		X								X	X
Canada Horseweed	Erigeron canadensis	Asteraceae	0	3	N	N	S5		X								X	
Philadelphia Fleabane	Erigeron philadelphicus	Asteraceae	1	-3	N	N	S5		X			X	X					X
Fleabane sp.	Erigeron sp.	Asteraceae														X		
Wormseed Wallflower	Erysimum cheiranthoides	Brassicaceae	0	3	N	N	S5		IX									X
Running Strawberry-bush	Euonymus obovatus	Celastraceae	6	3	N	N	S4		X				X					
Wild Strawberry	Fragaria virginiana	Rosaceae	2	3	N	N	S5		X								X	
Red Ash	Fraxinus pennsylvanica	Oleaceae	3	-3	N	N	S4		X			X	X				X	X
Common Bedstraw	Galium aparine	Rubiaceae	4	3	N	N	S5		X				X				X	
Canada Avens	Geum canadense	Rosaceae	3	0	N	N	S5		X				X					
Honey Locust	Gleditsia triacanthos	Fabaceae	8	0	N	N	S2?		R								X	
Fowl Mannagrass	Glyceria striata	Poaceae	3	-5	N	N	S5		X				X					
Dame's Rocket	Hesperis matronalis	Brassicaceae	0	3	I	Y	SE5		IX								X	X
Swamp Rose-mallow	Hibiscus moscheutos	Malvaceae	9	-5	N	N	S3	SC	X					X				
Foxtail Barley	Hordeum jubatum	Poaceae	0	0	N	N	S5?		0								X	
European Frog-bit	Hydrocharis morsus-ranae	Hydrocharitaceae	0	-5	I	Y	SE5		IR					X				
Virginia Waterleaf	Hydrophyllum virginianum	Hydrophyllaceae	6	0	N	N	S5		X				X					

Attachment C: Vascular Plant List

Common Name	Scientific Name	Family	CC	CW	Native Status	Invasive (Y/N)	SRANK	SARO	CK	ELC Code:	FOD2 2	FOD8 1	FOD9 4	MAS2-9a	MAS2-9b	CUP1	CUH/CUM1 1P	CUH/CUM1 1L
Spotted Jewelweed	Impatiens capensis	Balsaminaceae	4	-3	N	N	S5		X			X	X				X	X
Harlequin Blue Flag	Iris versicolor	Iridaceae	5	-5	N	N	S5		X								X	
Black Walnut	Juglans nigra	Juglandaceae	5	3	N	N	S4?		X							X		X
Dudley's Rush	Juncus dudleyi	Juncaceae	1	-3	N	N	S5		X			X					X	
Eastern Red Cedar	Juniperus virginiana	Cupressaceae	4	3	N	N	S5		X							X	X	
Small Duckweed	Lemna minor	Lemnaceae	5	-5	N	N	S5?		X			X			X		X	
Field Peppergrass	Lepidium campestre	Brassicaceae	0	5	I	N	SE5		IX			X						
Butter-and-eggs	Linaria vulgaris	Scrophulariaceae	0	5	I	N	SE5		IX								X	
Meadow Ryegrass	Lolium pratense	Poaceae	0	3	I	N	SE5		IX			X					X	X
Morrow's Honeysuckle	Lonicera morrowii	Caprifoliaceae	0	3	I	Y	SE3		0								X	
Tatarian Honeysuckle	Lonicera tatarica	Caprifoliaceae	0	3	I	Y	SE5		IX								X	
Garden Bird's-foot Trefoil	Lotus corniculatus	Fabaceae	0	3	I	Y	SE5		IX									X
American Water-horehound	Lycopus americanus	Lamiaceae	4	-5	N	N	S5		X			X						
Common Apple	Malus pumila	Rosaceae	0	5	I	N	SE4		IX								X	
Common Mallow	Malva neglecta	Malvaceae	0	5	I	N	SE5		IX									X
Black Medick	Medicago lupulina	Fabaceae	0	3	I	N	SE5		IX									X
Yellow Sweet-clover	Melilotus officinalis	Fabaceae	0	3	I	Y	SE5		IX									X
White Mulberry	Morus alba	Moraceae	0	0	I	Y	SE5		IX								X	X
Fragrant Water-lily	Nymphaea odorata	Nymphaeaceae	5	-5	N	N	S5		R					X				
Evening-primrose sp.	Oenohera sp.	Onagraceae															X	
Thicket Creeper	Parthenocissus vitacea	Vitaceae	4	3	N	N	S5		X			X	X				X	X
Wild Parsnip	Pastinaca sativa	Apiaceae	0	5	I	Y	SE5		IX								X	
Virginia Smartweed	Persicaria virginiana	Polygonaceae	6	0	N	N	S4		X				X					
Reed Canarygrass	Phalaris arundinacea	Poaceae	0	-3	N	Y	S5		X			X					X	X
European Reed	Phragmites australis ssp. australis	Poaceae	0	-3	I	Y	SE5		IC						x		X	X
Norway Spruce	Picea abies	Pinaceae	0	5	I	N	SE3		IX								X	
English Plantain	Plantago lanceolata	Plantaginaceae	0	3	I	N	SE5		IX								X	X
Rugel's Plantain	Plantago rugelii	Plantaginaceae	1	0	N	N	S5		X								X	
Sycamore	Platanus occidentalis	Platanaceae	8	-3	N	N	S4		X							X		
Canada Bluegrass	Poa compressa	Poaceae	0	3	I	N	SE5		IX								X	
Kentucky Bluegrass	Poa pratensis	Poaceae	0	3	N	N	S5		0							X		X
May-apple	Podophyllum peltatum	Berberidaceae	5	3	N	N	S5		X				X					
Rough Avens	Geum laciniatum	Rosaceae	4	-3	N	N	S4		R								X	X
Eastern Cottonwood	Populus deltoides	Salicaceae	4	0	N	N	S5		0			X					X	
Large-toothed Aspen	Populus grandidentata	Salicaceae	5	3	N	N	S5		X			X						
Curly-leaved Pondweed	Potamogeton crispus	Potamogetonaceae	0	-5	I	Y	SE5		IX									X
Pondweed sp.	Potamogeton sp.	Potamogetonaceae													X			
Canada Plum	Prunus nigra	Rosaceae	4	3	N	N	S4		R								X	
Shagbark Hickory	Carya ovata	Juglandaceae	6	3	N	N	S5		X		X		X				X	
Black Cherry	Prunus serotina	Rosaceae	3	3	N	N	S5		X								X	
Chokecherry	Prunus virginiana	Rosaceae	2	3	N	N	S5		X				X				X	
Swamp White Oak	Quercus bicolor	Fagaceae	8	-3	N	N	S4		X				X					X
Bur Oak	Quercus macrocarpa	Fagaceae	5	3	N	N	S5		X		X		X			X	X	
Swamp Pin Oak	Quercus palustris	Fagaceae	9	-3	N	N	S4		R				X			X		
Northern Red Oak	Quercus rubra	Fagaceae	6	3	N	N	S5		X				X			X		X
Kidney-leaved Buttercup	Ranunculus abortivus	Ranunculaceae	2	0	N	N	S5		X				X					
Cursed Buttercup	Ranunculus sceleratus	Ranunculaceae	2	-5	N	N	S5		0								X	
Smooth Sumac	Rhus glabra	Anacardiaceae	7	5	N	N	S5		R								X	
Staghorn Sumac	Rhus typhina	Anacardiaceae	1	3	N	N	S5		X			X					X	X
Eastern Prickly Gooseberry	Ribes cynosbati	Grossulariaceae	4	3	N	N	S5		X				X					
Dog Rose	Rosa canina	Rosaceae	0	5	I	N	SE2		IX								X	
Multiflora Rose	Rosa multiflora	Rosaceae	0	3	I	Y	SE5		IX			X					X	
Red Raspberry	Rubus idaeus	Rosaceae	2	3	N	N	S5		0		X	X	X				X	X
Black Raspberry	Rubus occidentalis	Rosaceae	2	5	N	N	S5		X								X	
Curled Dock	Rumex crispus	Polygonaceae	0	0	I	N	SE5		IX			X					X	X
Broad-leaved Arrowhead	Sagittaria latifolia	Alismataceae	4	-5	N	N	S5		X					X			X	
Sandbar Willow	Salix interior	Salicaceae	1	-3	N	N	S5		X						X		X	
(Salix alba X Salix euxina)	Salix x fragilis	Salicaceae	0	0	I	N	SNA		hyb			X					X	
Common Elderberry	Sambucus canadensis	Caprifoliaceae	5	-3	N	N	S5		X								X	
Dark-green Bulrush	Scirpus atrovirens	Cyperaceae	3	-5	N	N	S5		X								X	
Common Ragwort	Senecio vulgaris	Asteraceae	0	5	I	N	SE5		IX								X	
Bittersweet Nightshade	Solanum dulcamara	Solanaceae	0	0	I	Y	SE5		IX								X	
Tall Goldenrod	Solidago altissima	Asteraceae	1	3	N	N	S5		0							X	X	
Canada Goldenrod	Solidago canadensis	Asteraceae	1	3	N	N	S5		0							X		
Goldenod sp.	Solidago sp.	Asteraceae											X			X	X	X
Sow-thistle sp.	Sonchus sp.	Asteraceae															X	
New England Aster	Symphyotrichum novae-angliae	Asteraceae	2	-3	N	N	S5		X								X	
Aster sp.	Symphyotrichum sp.	Asteraceae													X		X	
Common Lilac	Syringa vulgaris	Oleaceae	0	5	I	Y	SE5		0								X	
Common Dandelion	Taraxacum officinale	Asteraceae	0	3	I	N	SE5		IX								X	X
Field Pennycress	Thlaspi arvense	Brassicaceae	0	5	I	N	SE5		IX								X	X
Eastern White Cedar	Thuja occidentalis	Cupressaceae	4	-3	N	N	S5		0								X	
Basswood	Tilia americana	Tiliaceae	4	3	N	N	S5		X				X			X	X	
Poison Ivy	Toxicodendron radicans	Anacardiaceae	2	0	N	N	S5		0			X	X				X	X
Purple Goatsbeard	Tragopogon porrifolius	Asteraceae	0	5	I	N	SE4?		0									X

Attachment C: Vascular Plant List

Common Name	Scientific Name	Family	CC	CW	Native Status	Invasive (Y/N)	SRANK	SARO	CK	ELC Code:	FOD2 2	FOD8 1	FOD9 4	MAS2-9a	MAS2-9b	CUP1	CUH/CUM1 1P	CUH/CUM1 1L
Meadow Goatsbeard	Tragopogon pratensis	Asteraceae	0	5	I	N	SE5		IX								X	X
Red Clover	Trifolium pratense	Fabaceae	0	3	I	N	SE5		IX								X	X
Broad-leaved Cattail	Typha latifolia	Typhaceae	1	-5	N	N	S5		X						X			
(Typha angustifolia X Typha latifolia)	Typha x glauca	Typhaceae		-5	N	Y	SNA		0								X	
White Elm	Ulmus americana	Ulmaceae	3	-3	N	N	S5		X			X	X			X	X	X
Moth Mullein	Verbascum blattaria	Scrophulariaceae	0	3	I	N	SE5		IX									X
Common Mullein	Verbascum thapsus	Scrophulariaceae	0	5	I	N	SE5		IX								X	
Wingstem	Verbesina alternifolia	Asteraceae	5	-3	N	N	S3		X			X						
Cranberry Viburnum	Viburnum opulus	Caprifoliaceae	5	-3	N	N	S5		0								X	
Tufted Vetch	Vicia cracca	Fabaceae	0	5	I	Y	SE5		IX								X	
Riverbank Grape	Vitis riparia	Vitaceae	0	0	N	N	S5		X			X				X	X	X
Common Prickly-ash	Zanthoxylum americanum	Rutaceae	3	3	N	N	S5		X		X		X				X	

Floristic Summary and Analysis for Entire Study Area		
Summary		
Total Species:	159	N/A
Native Species:	94	59%
Introduced Species:	52	33%
Invasive Species:	23	14%
ESA Status		
END	0	0%
THR	0	0%
SC	1	1%
COSEWIC Status		
END	0	0%
THR	0	0%
SC	1	1%
Provincially Rare (S rank of S1-S3)		
S1	0	0%
S1?	0	0%
S1S2	0	0%
S1S3	0	0%
S2	0	0%
S2?	1	1%
S2S3	0	0%
S2S4	0	0%
S3	2	1%
S3?	0	0%
S3S4	0	0%
Total S1-S3:	**3**	**2%**
Local Rank		
0	18	11%
hyb	1	1%
IC	1	1%
IR	2	1%
IX	46	29%
R	12	8%
X	67	42%
Co efficient of Conservatism and Floral Quality Index		
Co-efficient of Conservatism (CC) (average):	**36.25**	
CC 0 to 3	lowest sensitivity	97 103%
CC 4 to 6	moderate sensitivity	35 37%
CC 7 to 8	high sensitivity	11 12%
CC 9 to 10	highest sensitivity	2 2%
Floral Quality Index (FQI)		
FQI:	**351.46**	
Presence of Wetland Species		
Wetness Value (CW) (average):	**29.2**	
upland	5	23 14%
facultative upland	2 to 4	52 33%
facultative	1 to -1	27 17%
facultative wetland	-2 to -4	23 14%
obligate wetland	-5	21 13%

Physiognomy		
Plant Form	**No. of Total Species**	**% of Total Species**
Fern	1	1%
Forb	65	45%
Grass	11	8%
RU	1	1%
Sedge	16	11%
Shrub	23	16%
Trees	22	15%

Floristic Summary and Analysis Per ELC								
Summary								
Total Species:	5	31	34	6	9	17	105	58
Native Species	5	19	33	5	3	15	58	26
Introduced Spe	0	11	0	1	2	0	40	29
Invasive Speci	0	5	0	1	2	0	18	13
ESA Status								
END	0	0	0	0	0	0	0	0
THR	0	0	0	0	0	0	0	0
SC	0	0	0	1	0	0	0	0
COSEWIC Status								
END	0	0	0	0	0	0	0	0
THR	0	0	0	0	0	0	0	0
SC	0	0	0	1	0	0	0	0
Provincially Rare (S rank of S1-S3)								
S1	0	0	0	0	0	0	0	0
S1?	0	0	0	0	0	0	0	0
S1S2	0	0	0	0	0	0	0	0
S1S3	0	0	0	0	0	0	0	0
S2	0	0	0	0	0	0	0	0
S2?	0	0	0	0	0	0	1	0
S2S3	0	0	0	0	0	0	0	0
S2S4	0	0	0	0	0	0	0	0
S3	0	1	0	1	0	0	0	0
S3?	0	0	0	0	0	0	0	0
S3S4	0	0	0	0	0	0	0	0
Total S1-S3:	**0**	**1**	**0**	**1**	**0**	**0**	**1**	**0**
Local Rank								
0	1	4	3	0	1	3	13	5
hyb	0	1	0	0	0	0	0	1
IC	0	0	0	0	0	0	1	1
IR	0	0	0	1	0	0	1	0
IX	0	9	0	0	1	0	35	28
R	0	0	4	2	0	1	5	2
X	4	16	25	3	3	10	42	19
Co efficient of Conservatism and Floral Quality Index								
Co-efficient of (								
	3.6	**1.633333333**	**4.484848485**	**5.16666667**	**1.4**	**3.733333333**	**1.793814433**	**1.181818182**
CC 0 to 3	3	23	13	1	4	7	74	45
CC 4 to 6	2	7	15	3	1	5	19	9
CC 7 to 8	0	0	4	1	0	2	4	1
CC 9 to 10	0	0	1	1	0	1	0	0
Floral Quality Index (FQI)								
FQI:	**8.05**	**7.12**		**11.55**	**2.42**	**14.46**	**13.66**	**6.03**
Presence of Wetland Species								
Wetness Value	**1.8**	**0.1**	**0.393939394**	**-5**	**-4.2**	**1.533333333**	**0.959183673**	**1.327272727**
upland	0	3	1	0	0	1	18	8
facultative upla	4	9	14	0	0	9	34	24
facultative	0	7	8	0	0	2	20	12
facultative wetl	1	8	8	0	2	3	16	8
obligate wetlan	0	3	2	6	3	0	10	3

Attachment C: Vascular Plant List

Common Name	Scientific Name	Family	CC	CW	Native Status	Invasive (Y/N)	SRANK	SARO	CK	ELC Code:	FOD2 2	FOD8 1	FOD9 4	MAS2-9a	MAS2-9b	CUP1	CUH/CUM1 1P	CUH/CUM1 1L
Vine		2	1%															
Woody Vine		5	3%															
(blank)			0%															
Grand Total		**146**	**100%**															

Glossary

SARO Status	
RANK	**DEFINITION**
EXP	**Extirpated** -A species that no longer exists in the wild in Ontario but still occurs elsewhere.
END	**Endangered -** A species facing imminent extinction or extirpation in Ontario.
THR	**Threatened -** A species that is at risk of becoming endangered in Ontario if limiting factors are not reversed.
SC	**Special Concern** - A species with characteristics that make it sensitive to human activities or natural events.

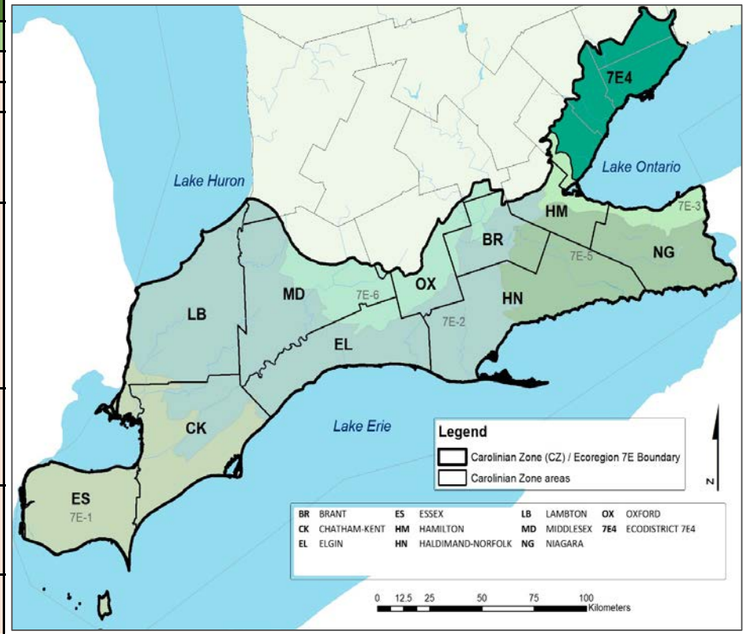
National (N) and Subnational (S) Conservation Status Ranks	
RANK	**DEFINITION**
NX **SX**	**Presumed Extirpated** - Species or ecosystem is believed to be extirpated from the jurisdiction (i.e., nation, or state/province). Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered. [equivalent to "Regionally Extinct" in IUCN Red List terminology]
NH **SH**	**Possibly Extirpated** - Known from only historical records but still some hope of rediscovery. There is evidence that the species or ecosystem may no longer be present in the jurisdiction, but not enough to state this with certainty. Examples of such evidence include (1) that a species has not been documented in approximately 20-40 years despite some searching and/or some evidence of significant habitat loss or degradation; (2) that a species or ecosystem has been searched for unsuccessfully, but not thoroughly enough to presume that it is no longer present in the jurisdiction.
N1 **S1**	**Critically Imperiled** - At very high risk of extirpation in the jurisdiction due to very restricted range, very few populations or occurrences, very steep declines, severe threats, or other factors.
N2 **S2**	**Imperiled** - At high risk of extirpation in the jurisdiction due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.
N3 **S3**	**Vulnerable**— At moderate risk of extirpation in the jurisdiction due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.
N4 **S4**	**Apparently Secure** - At a fairly low risk of extirpation in the jurisdiction due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.
N5 **S5**	**Secure -** At very low or no risk of extirpation in the jurisdiction due to a very extensive range, abundant populations or occurrences, with little to no concern from declines or threats.

Variant National and Subnational Conservation Status Ranks	
RANK	**DEFINITION**
N# **S#**	**Range Rank** - A numeric range rank (e.g., S2S3 or S1S3) is used to indicate any range of uncertainty about the status of the species or ecosystem. Ranges cannot skip more than two ranks (e.g., SU is used rather than S1S4).

NU **SU**	**Unrankable** - Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
NNR **SNR**	**Unranked** - National or subnational conservation status not yet assessed.
NNA **SNA**	**Not Applicable** - A conservation status rank is not applicable because the species or ecosystem is not a suitable target for conservation activities (e.g., long distance aerial and aquatic migrants, hybrids without conservation value, and non-native species or ecosystems (see Master et al. 2012, Appendix A, pg 70 for further details).
Not Provided	Species or ecosystem is known to occur in this nation or state/province. Contact the appropriate NatureServe network program for assignment of conservation status.

Rank Qualifier	
RANK	**DEFINITION**
N#? **S#?**	**Inexact Numeric Rank** - Denotes inexact numeric rank; this should not be used with any of the Variant National or Subnational Conservation Status Ranks, or NX, SX, NH, or SH.

Carolinian Status	
REGION	**DEFINITION**
CZ	**CZ status** (see below)
RANK	**DEFINITION**
H	**Historic.** Native in all Carolinian Zone areas and no known records for at least 30 years in all areas where native and ranked (i.e. not X). Occasionally used for a native species known to be extirpated from its only known Carolinian Zone location(s).
R	**Rare.** Native to the Carolinian Zone and (a) rare (as defined in source lists; sometimes including "very uncommon") or historic (no records in ≥30 years) in more than half of the Carolinian Zone areas (≥6) in which it is native and ranked (i.e. not X); or (b) if rare or historic in <6 areas it must be uncommon or common in no more than one area.
U	**Uncommon.** Native in the Carolinian Zone and (a) listed as common in no more than one Carolinian Zone area; and (b) not rare or historic in more than half of the Carolinian Zone areas (≥6) in which it is native and ranked (i.e. not X).
C	**Common.** Native in the Carolinian Zone and (a) common in at least two Carolinian Zone areas; and (b) not rare or historic in more than half of the Carolinian Zone areas (≥6) in which it is native and ranked (i.e. not X).
X	**No status.** Present and native in the Carolinian Zone but no status assigned because of lack of information, often due to confusion with similar species.
note	In a few cases, based on professional opinion, Carolinian Zone status ranks departed from the above criteria, particularly if the species is not ranked (i.e. X) in at least four Carolinian Zone areas.
CZ RESTR	restricted in Ontario as a native species to CZ (=CZ) or nearly restricted (approximately 90%+ records) in Ontario as a native species to CZ (=cz)
CK	Municipality of Chatham-Kent County



RANK	DEFINITION
I	introduced; thought to have been present in the Carolinian zone or individual CZ area prior to European settlement; believed to be deliberately or inadvertently introduced to the CZ by humans (followed by a status, below)
C	common
U	uncommon
R	rare
H	historic records only (generally >30 years)
X	present; status unknown or not specified in source lists
?	unconfirmed report
hyb	hybrid

Plant Form or Type Codes		
CODE	**FORM**	**DESCRIPTION**
FE	Fern	non-flowering, vascular plant, reproducing by spores - Pteridophytes. Including the fern allies such as horsetail, club-moss and quillwort.
FO	Forb	herbaceous broad-leaved plant
GR	Grass	graminoid plants in the Poaceae
RU	Rush	graminoid plants in the Juncaceae
SE	Sedge	graminoid plants in the Cyperaceae
SH	Shrub	plants with erect, reclining or prostrate woody stems (usually with more than one stem)
TR	Tree	woody perennial plant having a single (1-3) stem, usually with an elongate main stem (trunk)
VI	Vine	herbaceous plant that trail, cling, or twine, and requires support to grow vertically
VW	Woody Vine	a vine with a perennial woody stem

Coefficient of Wetness				
CW VALUE	**ABBRV.**	**INDICATOR STATUS**	**% OCCUR. IN WETLANDS**	**DEFINITION**
-5	**OBL**	Obligate Wetland	99	Almost always occur in wetlands. With few exceptions, these plants (herbaceous or woody are found in standing water or seasonally saturated soils (14 or more consecutive days) near the surface.
-4	**FACW+**			
-3	**FACW**	Facultative Wetland	67-99	Usually occur in wetlands, but may occur in non-wetlands. These plants predominately occur with hydric soils, often in geomorphic settings where water saturates the soils or floods the soil surface at lease seasonally.
-2	**FACW-**			
-1	**FAC+**			
0	**FAC**	Facultative	34-66	Occur in wetlands and nonwetlands. These plants can grow in hydric, mesic, or xeric habitats. The occurrence of these plants in differenct habitats represents responses to a variety of environmental variables other than just hydrology, such as shade tolerance, soil pH, and

				elevation, and they have a wide tolerance of soil moisture conditions.
1	**FAC-**			
2	**FACU+**			
3	**FACU**	Facultative Upland	1-33	Usually occur in non-wetlands, but may occur in wetlands. These plants predominately occur on drier or more mesic sites in geomorphic settings where water rarely saturates the soils or floods the soil surface seasonally.
4	**FACU-**			
5	**UPL**	Obligate Upland	1	Almost never occur in wetlands. These plants occupy mesic to xeric non-wetland habitats. They almost never occur in standing water or saturated soils. Typical growth forms include herbaceous, shrubs, woody vines, and trees.

"+" or "-" signs have been attached to the three Facultative categories to express exaggerated tendencies for those species. The "+" sign denotes that the species generally has a greater estimated probability of occurring in wetlands than species having the general indicator category, but a lesser estimated probability of occurring in wetlands than those having the next higher general indicator. The"-" sign denotes that the species generally has a lesser estimated probability of occurring in wetlands than those having the general indicator status, but a greater estimated probability of occurring in wetlands than those having the next lowest general indicator.

AECOM

Attachment D

Significant Wildlife Habitat Assessment

SWH Ecoregion 7E Criterion Schedule

Table 1.1 Seasonal Concentration Areas of Animals.

Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Candidate Habitat Present Within the Study Area		Confirmed Habitat Found Within the Study Area	
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	Panhandle	Leamington	Panhandle	Leamington
Waterfowl Stopover and Staging Areas (Terrestrial) **<u>Rationale:</u>** Habitat important to migrating waterfowl.	American Black Duck Northern Pintail Gadwall Blue-winged Teal Green-winged Teal American Wigeon Northern Shoveler Tundra Swan	CUM1 CUT1 Plus, evidence of annual spring flooding from melt water or run-off within these Ecosites. Fields with waste grain in the Long Point, Rondeau, Lk. St. Clair, Grand Bend and Pt. Pelee areas may be important to Tundra Swans.	Fields with sheet water during Spring (mid- March to May). • Fields flooding during spring melt and run-off provide important invertebrate foraging habitat for migrating waterfowl. • Agricultural fields with waste grains are commonly used by waterfowl, these are not considered SWH unless they have spring sheet water available. <u>Information Sources</u> • Anecdotal information from the landowner, adjacent landowners or local naturalist clubs may be good information in determining occurrence. • Reports and other information available from Conservation Authorities (CAs) • Sites documented through waterfowl planning processes (e.g., EHJV implementation plan) • Field Naturalist Clubs • Ducks Unlimited Canada • Natural Heritage Information Centre (NHIC) Waterfowl Concentration Area	Studies carried out and verified presence of an annual concentration of any listed species, evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects” [ccxi] • Any mixed species aggregations of 100. • or more individuals required. • The area of the flooded field ecosite habitat plus a 100-300 m radius buffer dependant on local site conditions and adjacent land use is the significant wildlife habitat [cxlviii]. • Annual use of habitat is documented from information sources or field studies (annual use can be based on studies or determined by past surveys with species numbers and dates). • SWHMIST [cxlix] Index #7 provides development effects and mitigation measures.	**No;** No suitable ecosites were identified within the Study Area.	**No;** No suitable ecosites were identified within the Study Area.	**No;** Candidate habitat was not identified; however, targeted surveys were not completed.	**No;** Candidate habitat was not identified; however, targeted surveys were not completed.
Waterfowl Stopover and Staging Areas (Aquatic) **<u>Rationale:</u>** Important for local and migrant	Northern Shoveler American Wigeon Gadwall Green-winged Teal Blue-winged Teal Hooded Merganser Common Merganser Lesser Scaup Greater Scaup Long-tailed Duck	MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 SWD1 SWD2 SWD3 SWD4	<u>Information Sources</u> • Environment Canada • Naturalist clubs often are aware of staging/stopover areas. • OMNRF Wetland Evaluations indicate presence of locally and regionally significant waterfowl staging. • Sites documented through waterfowl planning processes (e.g.,	Studies carried out and verified presence of: • Aggregations of 100 or more of listed species for 7 days, results in > 700 waterfowl use days. • Areas with annual staging of ruddy ducks, canvasbacks, and redheads are SWH [cxlix] • The combined area of the	**No;** No suitable ecosites were identified within the Study Area.	**No;** No suitable ecosites were identified within the Study Area.	**No;** Candidate habitat was not identified.	**No;** Candidate habitat was not identified.

Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Candidate Habitat Present Within the Study Area		Confirmed Habitat Found Within the Study Area	
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	Panhandle	Leamington	Panhandle	Leamington
waterfowl populations during the spring or fall migration or both periods combined. Sites identified are usually only one of a few in the eco-district.	Surf Scoter White-winged Scoter Black Scoter Ring-necked duck Common Goldeneye Bufflehead Redhead Ruddy Duck Red-breasted Merganser Brant Canvasback Ruddy Duck	SWD5 SWD6 SWD7	EHJV implementation plan) • Ducks Unlimited projects • Element occurrence specification by Nature Serve: http://www.natureserve.org • Natural Heritage Information Centre (NHIC) Waterfowl Concentration Area	ELC ecosites and a 100m radius area is the SWH [cxlviii] • Wetland area and shorelines associated with sites identified within the SWHTG [cxlviii] Appendix K [cxlix] are significant wildlife habitat. • Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects” [ccxi]. • Annual Use of Habitat is Documented from Information Sources or Field Studies (Annual can be based on completed studies or determined from past surveys with species numbers and dates recorded). • SWH MIST [cxlix] Index #7 provides development effects and mitigation measures.				
Shorebird Migratory Stopover Area **<u>Rationale:</u>** High quality shorebird stopover habitat is extremely rare and typically has a long history of use.	Greater Yellowlegs Lesser Yellowlegs Marbled Godwit Hudsonian Godwit Black-bellied Plover American Golden-Plover Semipalmated Plover Solitary Sandpiper Spotted Sandpiper Semipalmated Sandpiper Pectoral Sandpiper White-rumped Sandpiper Baird’s Sandpiper Least Sandpiper Purple Sandpiper Stilt Sandpiper Short-billed Dowitcher Red-necked Phalarope Whimbrel Ruddy Turnstone Sanderling Dunlin	BBO1 BBO2 BBS1 BBS2 BBT1 BBT2 SDO1 SDS2 SDT1 MAM1 MAM2 MAM3 MAM4 MAM5	Shorelines of lakes, rivers, and wetlands, including beach areas, bars, and seasonally flooded, muddy and un-vegetated shoreline habitats. Great Lakes coastal shorelines, including groynes and other forms of armour rock lakeshores, are extremely important for migratory shorebirds in May to mid-June and early July to October. Sewage treatment ponds and storm water ponds do not qualify as a SWH, <u>Information Sources</u> • Western hemisphere shorebird reserve network. • Canadian Wildlife Service (CWS) Ontario Shorebird Survey. • Bird Studies Canada • Ontario Nature • Local birders and naturalist clubs	Studies confirming: • Presence of 3 or more of listed species and > 1000 shorebird use days during spring or fall migration period (shorebird use days are the accumulated number of shorebirds counted per day over the course of the fall or spring migration period). • Whimbrel stop briefly (<24 hrs) during spring migration, any site with >100 Whimbrel used for 3 years, or more is significant. • The area of significant shorebird habitat includes the mapped ELC shoreline ecosites plus a 100 m radius area [cxlviii]. • Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects” [ccxi]. • SWH MIST [cxlix] Index #8	**No;** No suitable ecosites were identified within the Study Area.	**No;** No suitable ecosites were identified within the Study Area.	**No;** Candidate habitat was not identified.	**No;** Candidate habitat was not identified.

Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Candidate Habitat Present Within the Study Area		Confirmed Habitat Found Within the Study Area	
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	Panhandle	Leamington	Panhandle	Leamington
			• NHIC Shorebird Migratory Concentration Area	provides development effects and mitigation measures.				
Raptor Wintering Area **<u>Rationale:</u>** Sites used by multiple species, a high number of individuals and used annually are most significant	Rough-legged Hawk Red-tailed Hawk Northern Harrier American Kestrel Snowy Owl **<u>Special Concern:</u>** Short-eared Owl Bald Eagle	**<u>Hawks/Owls</u>** Combination of ELC Community Series; need to have present one Community Series from each land class; Forest: FOD, FOM, FOC. Upland: CUM, CUT, CUS, CUW. **<u>Bald Eagle:</u>** Forest community Series: FOD, FOM, FOC, SWD, SWM or SWC on shoreline areas adjacent to large rivers or lakes with open water (hunting areas).	The habitat provides a combination of fields and woodlands that provide roosting, foraging and resting habitats for wintering raptors. Raptor wintering(hawk/owl) sites need to be > 20 ha [cxlviii, cxlix] with a combination of forest and upland [xvi, xvii, xviii, xix, xx, xxi]. Least disturbed sites, idle/fallow, or lightly grazed field/meadow (>15 ha) with adjacent woodlands [cxlix]. Field area of the habitat is to be wind swept with limited snow depth or accumulation. Eagle sites have open water and large trees and snags available for roosting. <u>Information Sources</u>: • OMNR Ecologist or Biologist • Naturalist club • Natural Heritage Information Center (NHIC) Raptor Winter Concentration Area • Data from Bird Studies Canada, most notably for Short-eared Owls. • Results of Christmas Bird Counts. • Reports and other information available from Conservation Authorities.	Studies confirm the use of these habitats by: • One or more Short-eared Owls or; One of more Bald Eagles or; At least 10 individuals and two of listed hawk/owl species. • To be significant a site must be used regularly (3 in 5 years) cxlix for a minimum of 20 days by the above number of birds. • The habitat area for an Eagle winter site is the shoreline forest ecosites directly adjacent to the prime hunting area. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" [ccxi]. • SWH MIST [cxlix] Index #10 and #11 provides development effects and mitigation measures.	**No;** No suitable ecosites were identified within the Study Area of sufficient size.	**No;** No suitable ecosites were identified within the Study Area of sufficient size.	**No;** Candidate habitat was not identified.	**No;** Candidate habitat was not identified.
Bat Hibernacula **<u>Rationale:</u>** Bat hibernacula are rare habitats in all Ontario landscapes.	Big Brown Bat Tri-colored Bat	Bat Hibernacula may be found in these ecosites: CCR1 CCR2 CCA1 CCA2 (Note: buildings are not considered to be SWH)	Hibernacula may be found in caves, mine shafts, underground foundations, and Karsts. Active mine sites should not be considered as SWH. The locations of bat hibernacula are relatively poorly known. <u>Information Sources</u> • OMNR for possible locations and contact for local experts • Natural Heritage Information Center (NHIC) Bat Hibernaculum	• All sites with confirmed hibernating bats are SWH. • The area includes 200m radius around the entrance of the hibernaculum [cxlviii, ccvii] for most development types and 1000 m for wind farms. • Studies are to be conducted during the peak swarming period (Aug. – Sept.). Surveys should be conducted following methods outlined in the "Guideline for Wind Power	**No;** No suitable ecosites were identified within the Study Area.	**No;** No suitable ecosites were identified within the Study Area.	**No;** Candidate habitat was not identified.	**No;** Candidate habitat was not identified.

Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Candidate Habitat Present Within the Study Area		Confirmed Habitat Found Within the Study Area	
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	Panhandle	Leamington	Panhandle	Leamington
			• Ministry of Northern Development and Mines for location of mine shafts. • Clubs that explore caves (e.g., Sierra Club) • University Biology Departments with bat experts.	Projects Potential Impacts to Bats and Bat Habitats" [ccv]. • SWH MIST [cxlix] Index #1 provides development effects and mitigation measures.				
Bat Maternity Colonies **<u>Rationale:</u>** Known locations of forested bat maternity colonies is extremely rare in all Ontario landscapes.	Big Brown Bat Silver-haired Bat	Maternity colonies considered SWH are found in forested Ecosites. All ELC Ecosites in ELC Community Series: FOD FOM SWD SWM	Maternity colonies can be found in tree cavities, vegetation and often in buildings [xxii, xxv, xxvi, xxvii, xxxi] (buildings are not considered to be SWH). Maternity roosts are not found in caves and mines in Ontario [xxii]. • Maternity colonies located in Mature deciduous or mixed forest stands [ccix, ccx] with >10/ha large diameter (>25 cm dbh) wildlife trees [ccvii] • Female Bats prefer wildlife tree (snags) in early stages of decay, class 1-3 [ccxiv] or class 1 or 2 [ccxii]. • Silver-haired Bats prefer older mixed or deciduous forest and form maternity colonies in tree cavities and small hollows. Older forest areas with at least 21 snags/ha are preferred [ccx] <u>Information Sources</u> • OMNR for possible locations and contact for local experts • University Biology Departments with bat experts.	• Maternity Colonies with confirmed use by; o >10 Big Brown Bats[Í] o >5 Adult Female Silver-haired Bats[Í] • The area of the habitat includes the entire woodland, or the forest stand ELC Ecosite containing the maternity colonies. • Evaluation methods for maternity colonies should be conducted following methods outlined in the "Bats and Bat Habitats: Guidelines for Wind Power Projects" [ccv]. • SWH MIST [cxlix] Index #12 provides development effects and mitigation measures.	**Yes;** Suitable deciduous forest community are present within the Study Area (i.e., FOD8-1 along both banks of the Thames River).	**Yes;** Suitable deciduous forest community are present within the Study Area (i.e., FOD2-2, FOD9-4)	**Candidate;** A full bat habitat assessment was not completed as the FOD8-1 community is not expected to be impacted by the trenchless crossing methods proposed at the Thames River.	**Candidate;** The FOD9-4 had a density of 47 snags/ha. A full bat habitat assessment was not completed within the FOD2-2 as the community id not expected to be impacted by proposed works.
Turtle Wintering Areas **<u>Rationale:</u>** Generally, sites are the only known sites in the area. Sites with the highest number of individuals are most	Midland Painted Turtle **<u>Special Concern:</u>** Northern Map Turtle Snapping Turtle	Snapping and Midland Painted turtles; ELC Community Classes; SW, MA, OA, and SA. ELC Community Series; FEO and BOO Northern Map Turtle - Open Water areas	For most turtles, wintering areas are in the same general area as their core habitat. Water must be deep enough not to freeze and have soft mud substrates. • Over-wintering sites are permanent water bodies, large wetlands, and bogs or fens with adequate Dissolved Oxygen [cix, cx, cxi, cxviii]. • Man-made ponds such as sewage lagoons or storm water ponds should not be considered SWH.	• Presence of 5 over-wintering Midland Painted Turtles is significant. • One or more Northern Map Turtle or Snapping Turtle over-wintering within a wetland is significant[Í]. • The mapped ELC ecosite area with the over wintering turtles is the SWH. If the hibernation site is within a stream or river, the deep-water pool where the turtles are over wintering is the SWH.	**Yes;** Suitable habitat is present within the Study Area at crossings with natural aquatic features such as Thames River, Baptiste	**No;** Agricultural drains provide suitable habitat, however, they are man-made and therefore do not qualify as SWH.	**Candidate;** A turtle overwintering habitat assessment was not completed, however, candidate habitat was observed during field investigations.	**No;** Candidate habitat was not identified.

Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Candidate Habitat Present Within the Study Area		Confirmed Habitat Found Within the Study Area	
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	Panhandle	Leamington	Panhandle	Leamington
significant.		such as deeper rivers or streams and lakes with current can also be used as over-wintering habitat.	<u>Information Sources</u> • EIS studies carried out by Conservation Authorities. • Field Naturalist Clubs • OMNRF Ecologist or Biologist • Natural Heritage Information Center (NHIC)	• Over wintering areas may be identified by searching for congregations (Basking Areas) of turtles on warm, sunny days during the fall (Sept. – Oct.) or spring (Mar. – May) [cvii]. Congregation of turtles is more common where wintering areas are limited and therefore significant [cix, cx, cxi, cxii]. • SWH MIST [cxlix] Index #28 provides development effects and mitigation measures for turtle wintering habitat.	Creek, and Jeanettes Creek.			
Reptile Hibernaculum **<u>Rationale:</u>** Generally sites are the only known sites in the area. Sites with the highest number of individuals are most significant.	**<u>Snakes:</u>** Eastern Gartersnake Northern Watersnake Northern Red-bellied Snake Northern Brownsnake Smooth Green Snake Northern Ring-necked Snake **<u>Special Concern:</u>** Milksnake Eastern Ribbonsnake	For all snakes, habitat may be found in any ecosite other than very wet ones. Talus, Rock Barren, Crevice and Cave, and Alvar sites may be directly related to these habitats. Observations of congregations of snakes on sunny warm days in the spring or fall is a good indicator.	For snakes, hibernation takes place in sites located below frost lines in burrows, rock crevices and other natural or naturalized locations. The existence of features that go below frost line, such as rock piles or slopes, old stone fences, and abandoned crumbling foundations assist in identifying candidate SWH. Areas of broken and fissured rock are particularly valuable since they provide access to subterranean sites below the frost line [xliv, l, li, lii, cxii]. Wetlands can also be important over-wintering habitat in conifer or shrub swamps and swales, poor fens, or depressions in bedrock terrain with sparse trees or shrubs with sphagnum moss or sedge hummock ground cover. <u>Information Sources</u> • In spring, local residents or landowners may have observed the emergence of snakes on their property (e.g., old dug wells). • Reports and other information available from Conservation Authorities. • Field Naturalist Clubs • University herpetologists. • Natural Heritage Information Center (NHIC)	Studies confirming: • Presence of snake hibernacula used by a minimum of five individuals of a snake sp. or individuals of two or more snake spp. • Congregations of a minimum of five individuals of a snake sp. <u>or</u>; individuals of two or more snake spp. near potential hibernacula (e.g., foundation or rocky slope) on sunny warm days in Spring (Apr/May) and Fall (Sept/Oct). • <u>Note</u>: If there are Special Concern Species present, then site is SWH • <u>Note</u>: Sites for hibernation possess specific habitat parameters (e.g., temperature, humidity, etc.) and consequently are used annually, often by many of the same individuals of a local population [i.e., strong hibernation site fidelity.]. Other critical life processes (e.g., mating) often take place in close proximity to hibernacula. The feature in which the hibernacula is located plus a 30 m buffer is the SWH • SWH MIST [cxlix] Index #13 provides development effects	**Yes;** Candidate Habitat may be present within the Study Area.	**No;** Candidate Habitat not identified within the Study Area.	**Candidate;** Burrows within identified during field surveys in Study Area provide Candidate Habitat.	**No;** Candidate habitat was not identified.

Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Candidate Habitat Present Within the Study Area		Confirmed Habitat Found Within the Study Area	
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	Panhandle	Leamington	Panhandle	Leamington
				and mitigation measures for snake hibernacula.				
Colonially - Nesting Bird Breeding Habitat (Bank and Cliff) **<u>Rationale:</u>** Historical use and number of nests in a colony make this habitat significant. An identified colony can be very important to local populations. All swallow population are declining in Ontario.	Cliff Swallow Northern Rough-winged Swallow (this species is not colonial but can be found in Cliff Swallow colonies).	Eroding banks, sandy hills, borrow pits, steep slopes, and sand piles, cliff faces, bridge abutments, silos, barns (Cliff Swallows). Habitat found in the following ecosites: CUM1 CUT1 CUS1 BLO1 BLS1 BLT1 CLO1 CLS1 CLT1	• Any site or areas with exposed soil banks, undisturbed or naturally eroding that is not a licensed/permitted aggregate area. • Does not include man-made structures (bridges or buildings) or recently (2 years) disturbed soil areas, such as berms, embankments, soil, or aggregate stockpiles. • Does not include a licensed/permitted Mineral Aggregate Operation. <u>Information Sources</u> • Reports and other information available from Conservation Authorities • Ontario Breeding Bird Atlas [ccv]. • Bird Studies Canada; *NatureCounts* http://www.birdscanada.org/birdmon/ • Field Naturalist Clubs.	Studies confirming: • Presence of 1 or more nesting sites with 8 [cxlvix] or more cliff swallow pairs and/or rough-winged swallow pairs during the breeding season. • A colony identified as SWH will include a 50 m radius habitat area from the peripheral nests [ccvii]. • Field surveys to observe and count swallow nests are to be completed during the breeding season (May-June). Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects” [ccxi]. • SWH MIST [cxlix] Index #4 provides development effects and mitigation measures.	**Yes;** Candidate Habitat may be present within the Study Area.	**Yes;** Candidate Habitat may be present within the Study Area.	**Candidate;** Candidate habitat may be present along the banks of the aquatic features; however, targeted surveys were not completed.	**Candidate;** Candidate habitat was identified during field investigations as evidenced by soil slumping from a bank along an unnamed tributary; however, targeted surveys were not completed.
Colonially - Nesting Bird Breeding Habitat (Tree/Shrubs) **<u>Rationale:</u>** Large colonies are important to local bird population, typically sites are only known colony in area and are used annually.	Great Blue Heron Black-crowned Night-Heron Great Egret Green Heron	SWM2 SWM3 SWM5 SWM6 SWD1 SWD2 SWD3 SWD4 SWD5 SWD6 SWD7 FET1	• Nests in live or dead standing trees in wetlands, lakes, islands, and peninsulas. Shrubs and occasionally emergent vegetation may also be used. • Most nests in trees are 11 to 15 m from ground, near the top of the tree. <u>Information Sources</u> • Ontario Breeding Bird Atlas [ccv], colonial nest records. • Ontario Heronry Inventory 1991 available from Bird Studies Canada or NHIC (OMNRF). • Natural Heritage Information Center (NHIC) Mixed Wader Nesting Colony • Aerial photographs can help identify large heronries.	Studies confirming: • Presence of 2 or more active nests of Great Blue Heron or other listed species. • The habitat extends from the edge of the colony and a minimum 300 m radius or extend of the Forest Ecosite containing the colony or any island <15.0ha with a colony is the SWH [cc, ccvii]. • Confirmation of active heronries are to be achieved through site visits conducted during the nesting season (April to August) or by evidence such as the presence of fresh guano, dead young and/or eggshells • SWH MIST [cxlix] Index #5	**No;** No suitable ecosites were identified within the Study Area.	**No;** No suitable ecosites were identified within the Study Area.	**No;** No colony sites were observed during field investigations.	**No;** No colony sites were observed during field investigations.

Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Candidate Habitat Present Within the Study Area		Confirmed Habitat Found Within the Study Area	
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	Panhandle	Leamington	Panhandle	Leamington
			• Reports and other information available from Conservation Authorities • MNRF District Offices. • Local naturalist clubs.	provides development effects and mitigation measures.				
Colonially - Nesting Bird Breeding Habitat (Ground) **<u>Rationale:</u>** Colonies are important to local bird population, typically sites are only known colony in area and are used annually.	Herring Gull Great Black-backed Gull Little Gull Ring-billed Gull Common Tern Caspian Tern Brewer's Blackbird	Any rocky island or peninsula (natural or artificial) within a lake or large river (two-lined on a 1;50,000 NTS map). Close proximity to watercourses in open fields or pastures with scattered trees or shrubs (Brewer's Blackbird) MAM1-6 MAS1-3 CUM CUT CUS	• Nesting colonies of gulls and terns are on islands or peninsulas associated with open water or in marshy areas. • Brewers Blackbird colonies are found loosely on the ground in or in low bushes in close proximity to streams and irrigation ditches within farmlands. <u>Information Sources</u> • Ontario Breeding Bird Atlas [ccv], rare/colonial species records. • Canadian Wildlife Service • Reports and other information available from Conservation Authorities • Natural Heritage Information Center (NHIC) Colonial Waterbird Nesting Area • MNRF District Offices. • Field Naturalist Clubs.	Studies confirming: • Presence of > 25 active nests for Herring Gulls or Ring-billed Gulls, >5 active nests for Common Tern or >2 active nests for Caspian Tern. • Presence of 5 or more pairs for Brewer's Blackbird· • Any active nesting colony of one or more Little Gull, and Great Black-backed Gull is significant. • The edge of the colony and a minimum 150 m radius area of habitat, or the extent of the ELC ecosites containing the colony or any island <3.0 ha with a colony is the SWH [cc, ccvii]. • Studies would be done during May/June when actively nesting. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" [ccxi]. • SWH MIST [cxlix] Index #6 provides development effects and mitigation measures.	**Yes;** Candidate Habitat may be present within the Study Area for Brewer's Blackbird.	**Yes;** Candidate Habitat may be present within the Study Area for Brewer's Blackbird.	**No;** No colony sites were observed during field investigations.	**No;** No colony sites were observed during field investigations.
Migratory Butterfly Stopover Areas **<u>Rationale:</u>** Butterfly stopover areas are extremely rare habitats and are biologically important for butterfly	Painted Lady Red Admiral **<u>Special Concern:</u>** Monarch	Combination of ELC Community Series; need to have present one Community Series from each landclass: <u>Field</u>: CUM CUT CUS	A butterfly stopover area will be a minimum of 10 ha in size with a combination of field and forest habitat present and will be located within 5 km of Lake Erie and Ontario [cxlix]. • The habitat is typically a combination of field and forest and provides the butterflies with a location to rest prior to their long migration south [xxxii, xxxiii, xxxiv, xxxv, xxxvi]. • The habitat should not be disturbed, fields/meadows with	Studies confirm: • The presence of Monarch Use Days (MUD) during fall migration (Aug/Oct) [xliii]. MUD is based on the number of days a site is used by Monarchs, multiplied by the number of individuals using the site. Numbers of butterflies can range from 100-500/day[xxxvii], significant variation can occur between years and multiple years of sampling should occur [xl, xlii].	**No;** The Study Area is more than 5 km from the Great Lakes.	**No;** The site is more than 5 km from Lake Ontario and Lake Erie.	**No;** Candidate habitat was not identified.	**No;** Candidate habitat was not identified.

Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Candidate Habitat Present Within the Study Area		Confirmed Habitat Found Within the Study Area	
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	Panhandle	Leamington	Panhandle	Leamington
species that migrate south for the winter.		<u>Forest</u>: FOC FOD FOM CUP Anecdotally, a candidate sight for butterfly stopover will have a history of butterflies being observed.	an abundance of preferred nectar plants and woodland edge providing shelter are requirements for this habitat [cxlviii, cxlix]. • Stopover areas usually provide protection from the elements and are often spits of land or areas with the shortest distance to cross the Great Lakes [xxxvii, xxxviii, xxxix, xl, xli]. <u>Information Sources</u> • MNRF district Offices • Natural Heritage Information Center (NHIC) • Agriculture Canada in Ottawa may have list of butterfly experts. • Field Naturalist Clubs • Toronto Entomologists Association • Conservation Authorities	• Observational studies are to be completed and need to be done frequently during the migration period to estimate MUD • MUD of >5000 or >3000 with the presence of Painted Ladies or Red Admiral's is to be considered significant. • SWH MIST [cxlix] Index #16 provides development effects and mitigation measures.				
Landbird Migratory Stopover Areas **<u>Rationale:</u>** Sites with a high diversity of species as well as high numbers are most significant.	All migratory songbirds. Canadian Wildlife Service Ontario website: http://www.ec.gc.ca/nature/default.asp?lang=En&n=421B7A9D-1 All migrant raptors species: Ontario Ministry of Natural Resources: Fish and Wildlife Conservation Act, 1997. Schedule 7: Specially Protected Birds (Raptors)	All Ecosites associated with these ELC Community Series; FOC FOM FOD SWC SWM SWD	Woodlots need to be >5 ha in size and within 5 km [iv, v, vi, vii, viii, ix, x, xi, xii, xiii, xiv, xv] of Lake Ontario and Erie. If woodlands are rare in an area of shoreline, woodland fragments 2-5ha can be considered for this habitat. • If multiple woodlands are located along the shoreline those Woodlands <2 km from Lake Erie and Lake Ontario are more significant [cxlix] • Sites have a variety of habitats; forest, grassland, and wetland complexes [cxlix]. • The largest sites are more significant [cxlix] • Woodlots and forest fragments are important habitats to migrating birds [ccxviii], these features located along the shore and located within 5km of Lake Erie and Lake Ontario are Candidate SWH [cxlviii]. <u>Information Sources</u>	Studies confirm: • Use of the woodlot by >200 birds/day and with >35 spp with at least 10 bird spp. recorded on at least 5 different survey dates. This abundance and diversity of migrant bird species is considered above average and significant. • Studies should be completed during spring (March to May) and fall (Aug to Oct) migration using standardized assessment techniques. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" [ccxi] • SWH MIST [cxlix] Index #9 provides development effects and mitigation measures.	**No;** The site is more than 5 km from Lake Ontario and Lake Erie.	**No;** The site is more than 5 km from Lake Ontario and Lake Erie.	**No;** Candidate habitat was not identified.	**No;** Candidate habitat was not identified.

Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Candidate Habitat Present Within the Study Area		Confirmed Habitat Found Within the Study Area	
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	Panhandle	Leamington	Panhandle	Leamington
			• Bird Studies Canada • Ontario Nature • Local birders and naturalist club • Ontario Important Bird Areas (IBA) Program					
Deer Winter Congregation Areas **<u>Rationale:</u>** Deer movement during winter in the southern areas of Ecoregion 7E are not constrained by snow depth, however deer will annually congregate in large numbers in suitable woodlands to reduce or avoid the impacts of winter conditions [cxlviii].	White-tailed Deer	All Forested Ecosites with these ELC Community Series; FOC FOM FOD SWC SWM SWD Conifer plantations much smaller than 50 ha may also be used.	• Woodlots >100 ha in size or if large woodlots are rare in a planning area, woodlots >5 0 ha. • Deer movement during winter in the southern areas Ecoregion 7E are not constrained by snow depth, however deer will annually congregate in large numbers in suitable woodlands [cxlviii]. • Large woodlots > 100 ha and up to 1500 ha are known to be used annually by densities of deer that range from 0.1-1.5 deer/ha [ccxxiv]. • Woodlots with high densities of deer due to artificial feeding are not significant. <u>Information Sources</u> • MNRF District Offices. • LIO/NRVIS	Studies confirm: • Deer management is an MNRF responsibility, deer winter congregation areas considered significant will be mapped by MNRF [cxlviii]. • Use of the woodlot by white-tailed deer will be determined by MNRF, all woodlots exceeding the area criteria are significant, unless determined not to be significant by MNRF. • Studies should be completed during winter (Jan/Feb) when >20 cm of snow is on the ground using aerial survey techniques [ccxxiv], ground or road surveys, or a pellet count deer density survey [ccxxv]. • SWH MIST [cxlix] Index #2 provides development effects and mitigation measures.	**No;** There are no yarding areas identified within the Study Area.	**No;** There are no yarding areas identified within the Study Area.	**No;** Candidate habitat was not identified.	**No;** Candidate habitat was not identified.

Table 1.2 Rare Vegetation Communities.

Rare Vegetation Community	CANDIDATE SWH			CONFIRMED SWH	Candidate Habitat within the Study Area		Confirmed Habitat within the Study Area	
	ELC Ecosite Code	Habitat Description	Detailed Information and Sources	Defining Criteria	Panhandle	Leamington	Panhandle	Leamington
Cliffs and Talus Slopes **<u>Rationale:</u>** Cliffs and Talus Slopes are extremely rare habitats in Ontario.	Any ELC Ecosite within Community Series: TAO TAS TAT CLO CLS CLT	A Cliff is vertical to near vertical bedrock >3 m in height. A Talus Slope is rock rubble at the base of a cliff made up of coarse rocky debris	Most cliff and talus slopes occur along the Niagara Escarpment. <u>Information Sources</u> • The Niagara Escarpment Commission has detailed information on location of these habitats. • OMNRF Districts • Natural Heritage Information Center (NHIC) has location information available their website • Field Naturalist Clubs • Conservation Authorities	• Confirm any ELC Vegetation Type for Cliffs or Talus Slopes [lxxviii]. • SWH MIST [cxlix] Index #21 provides development effects and mitigation measures.	**No;** No Cliff and Talus slope ecosites were identified within the Study Area.	**No;** No Cliff and Talus slope ecosites were identified within the Study Area.	**No;** Candidate habitat was not identified.	**No;** Candidate habitat was not identified.
Sand Barren **<u>Rationale:</u>** Sand barrens are rare in Ontario and support rare species. Most Sand Barrens have been lost due to cottage development and forestry	ELC Ecosites: SBO1 SBS1 SBT1 Vegetation cover varies from patchy and barren to continuous meadow (SBO1), thicket-like (SBS1), or more closed and treed (SBT1). Tree cover always <u>≤</u>60%.	Sand Barrens typically are exposed sand, generally sparsely vegetated and caused by lack of moisture, periodic fires, and erosion. Usually located within other types of natural habitat such as forest or savannah. Vegetation can vary from patchy and barren to tree covered but less than 60%.	A sand barren area >0.5ha in size. <u>Information Sources</u> • OMNRF Districts. • Natural Heritage Information Center (NHIC) has location information available on their website • Field Naturalist Clubs • Conservation Authorities	• Confirm any ELC Vegetation Type for Sand Barrens [lxxviii] • Site must not be dominated by exotic or introduced species (<50% vegetative cover exotics). • SWHMIST [cxlix] Index #20 provides development effects and mitigation measures.	**No;** No Sand Barren ecosites were identified within the Study Area.	**No;** No Sand Baren ecosites were identified within the Study Area.	**No;** Candidate habitat was not identified.	**No;** Candidate habitat was not identified.
Alvar **<u>Rationale:</u>** Alvars are extremely rare habitats in Ecoregion 7E.	ALO1 ALS1 ALT1 FOC1 FOC2 CUM2 CUS2 CUT2-1 CUW2 **<u>Five Alvar Indicator Species:</u>** 1)*Carex crawei* 2)*Panicum*	An alvar is typically a level, mostly unfractured calcareous bedrock feature with a mosaic of rock pavements and bedrock overlain by a thin veneer of soil. The hydrology of alvars is complex, with alternating periods of inundation and drought. Vegetation cover varies from sparse lichen-moss	An Alvar site > 0.5 ha in size [lxxv]. Alvar is particularly rare in Ecoregion 7E where the only known sites are found in the western islands of Lake Erie.[cxcix] <u>Information Sources</u> • Alvars of Ontario (2000), Federation of Ontario Naturalists [lxxvi]. • Ontario Nature – Conserving Great Lakes Alvars [ccviii]. • Natural Heritage Information Center (NHIC) has location information available on their website • OMNRF Staff. • Field Naturalist Clubs. • Conservation Authorities.	Field studies identify four of the five **Alvar Indicator Species** [lxxv] at a Candidate Alvar site is Significant. • Site must not be dominated by exotic or introduced species (<50% vegetative cover exotics). • The alvar must be in excellent condition and fit in with surrounding landscape with few conflicting land uses [lxxv]. • SWH MIST [cxlix] Index #17 provides development effects and mitigation measures.	**No;** No Alvar ecosites were identified within the Study Area.	**No;** No Alvar ecosites were identified within the Study Area.	**No;** Candidate habitat was not identified.	**No;** Candidate habitat was not identified.

Rare Vegetation Community	CANDIDATE SWH			CONFIRMED SWH	Candidate Habitat within the Study Area		Confirmed Habitat within the Study Area	
	ELC Ecosite Code	Habitat Description	Detailed Information and Sources	Defining Criteria	Panhandle	Leamington	Panhandle	Leamington
	philadelphicum 3)*Elocharis compressa* 4)*Scutellaria parvula* 5)*Trichostema brachiatum* These indicator species are very specific to Alvars within Ecoregion 7E.	associations to grasslands and shrublands and comprising a number of characteristic or indicator plant. Undisturbed alvars can be phyto- and zoogeographically diverse, supporting many uncommon or relict plant and animal species. Vegetation cover varies from patchy to barren with a less than 60% tree cover [lxxviii].						
Old Growth Forest **<u>Rationale:</u>** Due to historic logging practices and land clearance for agriculture, old growth forest is rare in Ecoregion 7E.	Forest Community Series: FOD FOC FOM SWD SWC SWM	Old-growth forests are characterized by heavy mortality or turnover of over-storey trees resulting in mosaic of gaps that encourage development of multi-layered canopy and an abundance of snags and downed woody debris.	• Woodland area is >0.5 ha. <u>Information Sources</u> • OMNRF Forest Resource Inventory mapping • OMNRF Districts. • Field Naturalist Clubs • Conservation Authorities • Sustainable Forestry Licence (SFL) companies will possibly know locations through field operations. • Municipal forestry departments	Field Studies will determine: • If dominant trees species of the ecosite are >140 years old, then area containing these trees is Significant Wildlife Habitat [cxlviii]. • The forested area containing the old growth characteristics will have experienced no recognizable forestry activities (cut steps will not be present) • The area of forest ecosites combined or an eco-element within an ecosite that contain the old growth characteristics is the SWH. • Determine ELC vegetation types for the forest area containing the old growth characteristics [lxxviii]. • SWH MIST [cxlix] Index #23 provides development effects and mitigation measures.	**No;** No Old Growth Forest communities were identified within the Study Area.	**No;** No Old Growth Forest communities were identified within the Study Area.	**No;** Candidate habitat was not identified.	**No;** Candidate habitat was not identified.
Savannah **<u>Rationale:</u>** Savannahs are extremely rare habitats in Ontario.	TPS1 TPS2 TPW1 TPW2 CUS2	A Savannah is a tallgrass prairie habitat that has tree cover between 25 – 60%. In ecoregion 7E, known Tallgrass Prairie and savannah remnants are scattered between Lake Huron and Lake	No minimum size to site Site must be restored or a natural site. Remnant sites such as railway right of ways are not considered to be SWH. <u>Information Sources</u> • Natural Heritage Information Center (NHIC) has location data available on their website. • OMNRF Districts. • Field Naturalists Clubs. • Conservation Authorities.	Field studies confirm one or more of the Savannah indicator species listed in [lxxv] Appendix N should be present. Note: Savannah plant spp. list from Ecoregion 7E should be used • Area of the ELC Ecosite is the SWH. • Site must not be dominated by exotic or introduced species (<50% vegetative cover exotics). • SWH MIST [cxlix] Index #18 provides	**No;** No Savannah ecosites were identified within the Study Area.	**No;** No Savannah ecosites were identified within the Study Area.	**No;** Candidate habitat was not identified.	**No;** Candidate habitat was not identified.

Rare Vegetation Community	CANDIDATE SWH			CONFIRMED SWH	Candidate Habitat within the Study Area		Confirmed Habitat within the Study Area	
	ELC Ecosite Code	Habitat Description	Detailed Information and Sources	Defining Criteria	Panhandle	Leamington	Panhandle	Leamington
		Erie, near Lake St. Clair, north of and along the Lake Erie shoreline, in Brantford and in the Toronto area (north of Lake Ontario).		development effects and mitigation measures.				
Tallgrass Prairie **<u>Rationale:</u>** Tallgrass Prairies are extremely rare habitats in Ontario.	TPO1 TPO2	A Tallgrass Prairie has ground cover dominated by prairie grasses. An open Tallgrass Prairie habitat has < 25% tree cover. In ecoregion 7E, known Tallgrass Prairie and savannah remnants are scattered between Lake Huron and Lake Erie, near Lake St. Clair, north of and along the Lake Erie shoreline, in Brantford and in the Toronto area (north of Lake Ontario). [cc]	No minimum size to site Ⓔ. Site must be restored or a natural site. Remnant sites such as railway right of ways are not considered to be SWH. <u>Information Sources</u> • OMNRF Districts. • Natural Heritage Information Center (NHIC) has location data available on their website. • Field Naturalists Clubs. • Conservation Authorities	Field studies confirm one or more of the Prairie indicator species listed in [lxxv] Appendix N should be present. Note: Prairie plant spp. list from Ecoregion 7E should be used • Area of the ELC Ecosite is the SWH • Site must not be dominated by exotic or introduced species (<50% vegetative cover exotics). • SWH MIST [cxlix] Index #19 provides development effects and mitigation measures.	**No;** No Tallgrass Prairie ecosites were identified within the Study Area.	**No;** No Tallgrass Prairie ecosites were identified within the Study Area.	**No;** Candidate habitat was not identified.	**No;** Candidate habitat was not identified.
Other Rare Vegetation Communities **<u>Rationale:</u>** Plant communities that often contain rare species which depend on the habitat for survival.	Provincially Rare S1, S2 and S3 vegetation communities are listed in Appendix M of the SWHTG [cxlviii]. Any ELC Ecosite Code that has a possible ELC Vegetation Type that is Provincially Rare is Candidate SWH.	Rare Vegetation Communities may include beaches, fens, forest, marsh, barrens, dunes, and swamps.	ELC Ecosite codes that have the potential to be a rare ELC Vegetation Type as outlined in appendix M [cxlviii] The OMNRF/NHIC will have up to date listing for rare vegetation communities. <u>Information Sources</u> • OMNRF Districts. • Natural Heritage Information Center (NHIC) has location data available on their website. • Field Naturalists Clubs. • Conservation Authorities	Field studies should confirm if an ELC Vegetation Type is a rare vegetation community based on listing within Appendix M of SWHTG [cxlviii]. • Area of the ELC Vegetation Type polygon is the SWH. • SWH MIST [cxlix] Index #37 provides development effects and mitigation measures.	**No;** No Rare Vegetation Communities were identified within the Study Area.	**No;** No Rare Vegetation Communities were identified within the Study Area	**No;** Candidate habitat was not identified.	**No;** Candidate habitat was not identified.

Table 1.3 Specialized Habitats of Wildlife considered SWH.

Specialized Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Candidate Habitat within the Study Area		Confirmed Habitat within the Study Area	
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	Panhandle	Leamington	Panhandle	Leamington
Waterfowl Nesting Area **<u>Rationale:</u>** Important to local waterfowl populations, sites with greatest number of species and highest number of individuals are significant.	American Black Duck Northern Pintail Northern Shoveler Gadwall Blue-winged Teal Green-winged Teal Wood Duck Hooded Merganser Mallard	All upland habitats located adjacent to these wetland ELC Ecosites are Candidate SWH: MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 SWT1 SWT2 SWD1 SWD2 SWD3 SWD4 **Note: includes adjacency to Provincially Significant Wetlands**	A waterfowl nesting area extends 120 m [cxlix] from a wetland (> 0.5 ha) or a wetland (>0.5 ha) with small wetlands (<0.5ha) within 120 m or a cluster of 3 or more small (<0.5 ha) wetlands within 120 m of each individual wetland where waterfowl nesting is known to occur [cxlix]. • Upland areas should be at least 120 m wide so that predators such as racoons, skunks, and foxes have difficulty finding nests. • Wood Ducks and Hooded Mergansers utilize large diameter trees (>40 cm dbh) in woodlands for cavity nest sites. <u>Information Sources</u> • Ducks Unlimited staff may know the locations of particularly productive nesting sites. • OMNRF Wetland Evaluations for indication of significant waterfowl nesting habitat. • Reports and other information available from Conservation Authorities	Studies confirmed: • Presence of 3 or more nesting pairs for listed species excluding Mallards, or presence of 10 or more nesting pairs for listed species including Mallards. • Any active nesting site of an American Black Duck is considered significant. • Nesting studies should be completed during the spring breeding season (April - June). Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects” [ccxi] • A field study confirming waterfowl nesting habitat will determine the boundary of the waterfowl nesting habitat for the SWH, this may be greater or less than 120 m [cxlviii] from the wetland and will provide enough habitat for waterfowl to successfully nest. • SWH MIST [cxlix] Index #25 provides development effects and mitigation measures.	**Yes;** MA communities were identified within the Study Area.	**No;** No suitable ecosites were identified within the Study Area.	**Candidate;** Confirmed habitat was not observed during field investigations; however, targeted surveys were not completed.	**No;** Candidate habitat was not identified.
Bald Eagle and Osprey Nesting, Foraging and Perching Habitat **<u>Rationale:</u>** Nest sites are fairly uncommon in Ecoregion 7E and are used annually by these species. Many suitable nesting locations may	Osprey **<u>Special Concern:</u>** Bald Eagle	ELC Forest Community Series: FOD, FOM, FOC, SWD, SWM and SWC directly adjacent to riparian areas – rivers, lakes, ponds, and wetlands	Nests are associated with lakes, ponds, rivers or wetlands along forested shorelines, islands, or on structures over water. • Osprey nests are usually at the top a tree whereas Bald Eagle nests are typically in super canopy trees in a notch within the tree’s canopy. • Nests located on man-made objects are not to be included as SWH (e.g., telephone poles and constructed nesting platforms). <u>Information Sources</u> • Natural Heritage Information Center (NHIC) compiles all known nesting sites for Bald Eagles in Ontario.	Studies confirm the use of these nests by: • One or more active Osprey or Bald Eagle nests in an area [cxlviii]. • Some species have more than one nest in a given area and priority is given to the primary nest with alternate nests included within the area of the SWH. • For an Osprey, the active nest and a 300 m radius around the nest or the contiguous woodland stand is the SWH [ccvii], maintaining undisturbed shorelines with large trees within this area is important [cxlviii]. • For a Bald Eagle the active nest	**Yes;** The FOD8-1 community along the Thames River may provide suitable nesting habitat.	**No;** No suitable ecosites were identified within the Study Area.	**Candidate;** A juvenile Bald Eagle was observed flying overhead during field studies; however, targeted surveys were not completed.	**No;** Candidate habitat was not identified.

Specialized Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Candidate Habitat within the Study Area		Confirmed Habitat within the Study Area	
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	Panhandle	Leamington	Panhandle	Leamington
be lost due to increasing shoreline development pressures and scarcity of habitat.			• MNRF values information (LIO/NRVIS) will list known nesting locations, Note: data from NRVIS is provided as a point and does not represent all the habitat. • Nature Counts, Ontario Nest Records Scheme data. • OMNRF Districts. • Check the Ontario Breeding Bird Atlas [ccv] or Rare Breeding Birds in Ontario for species documented • Reports and other information available from Conservation Authorities • Field naturalist Clubs	and a 400-800 m radius around the nest is the SWH [cvi, ccvii]. Area of the habitat from 400-800 m is dependent on site lines from the nest to the development and inclusion of perching and foraging habitat [cvi] • To be significant a site must be used annually. When found inactive, the site must be known to be inactive for ≥ 3 years or suspected of not being used for >5 years before being considered not significant. [ccvii] • Observational studies to determine nest site use, perching sites and foraging areas need to be done from mid March to mid August. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" [ccxi]. • SWH MIST [cxlix] Index #26 provides development effects and mitigation measures				
Woodland Raptor Nesting Habitat **Rationale:** Nests sites for these species are rarely identified; these area sensitive habitats are often used annually by these species.	Northern Goshawk Cooper's Hawk Sharp-shinned Hawk Red-shouldered Hawk Barred Owl Broad-winged Hawk	May be found in all forested ELC Ecosites. May also be found in SWC, SWM, SWD and CUP3	All natural or conifer plantation woodland/forest stands combined >30ha or with >4 ha of interior habitat [lxxxviii, lxxxix, xc, xci, xciii, xciv, xcv, xcvi, cxxxiii]. Interior habitat determined with a 200m buffer [cxlviii] • Stick nests found in a variety of intermediate-aged to mature conifer, deciduous or mixed forests within tops or crotches of trees. Species such as Coopers hawk nest along forest edges sometimes on peninsulas or small offshore islands. • In disturbed sites, nests may be used again, or a new nest will be in close proximity to old nest. Information Sources • OMNRF Districts. • Check the Ontario Breeding Bird Atlas [ccv] or Rare Breeding Birds in Ontario for species documented. • Check data from Bird Studies Canada. • Reports and other information available from Conservation	Studies confirm: • Presence of 1 or more active nests from species list is considered significant [cxlviii]. • Red-shouldered Hawk and Northern Goshawk – A 400 m radius around the nest or 28 ha habitat area would be applied where optimal habitat is irregularly shaped around the nest) [ccvii]. • Barred Owl – A 200 m radius around the nest is the SWH [ccvii]. • Broad-winged Hawk and Coopers Hawk, – A 100 m radius around the nest is the SWH [ccvii]. • Sharp-Shinned Hawk – A 50m radius around the nest is the SWH [ccvii]. • Conduct field investigations from mid-March to end of May. The use of call broadcasts can help in locating territorial (courting/nesting) raptors and facilitate the discovery of nests by narrowing down the search area. • SWH MIST [cxlix] Index #27 provides	**No;** No suitable ecosites were identified within the Study Area of sufficient size.	**No;** No suitable ecosites were identified within the Study Area of sufficient size.	**No;** Candidate habitat was not identified.	**No;** Candidate habitat was not identified.

Specialized Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Candidate Habitat within the Study Area		Confirmed Habitat within the Study Area	
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	Panhandle	Leamington	Panhandle	Leamington
			Authorities	development effects and mitigation measures.				
Turtle Nesting Areas **<u>Rationale:</u>** These habitats are rare and when identified will often be the only breeding site for local populations of turtles.	Midland Painted Turtle **<u>Special Concern:</u>** Northern Map Turtle Snapping Turtle	Exposed mineral soil (sand or gravel) areas adjacent (<100 m) [cxlviii] or within the following ELC Ecosites: MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 BOO1 FEO1	• Best nesting habitat for turtles are close to water and away from roads and sites less prone to loss of eggs by predation from skunks, raccoons, or other animals. • For an area to function as a turtle-nesting area, it must provide sand and gravel that turtles are able to dig in and are located in open, sunny areas. Nesting areas on the sides of municipal or provincial road embankments and shoulders are not SWH. • Sand and gravel beaches adjacent to undisturbed shallow weedy areas of marshes, lakes, and rivers are most frequently used. <u>Information Sources</u> • Use Ontario Soil Survey reports and maps to help find suitable substrate for nesting turtles (well-drained sands and fine gravels). • Check the Ontario Herpetofaunal Atlas records (or other similar atlases) for uncommon turtles; location information may help to find potential nesting habitat for them. • Natural Heritage Information Center (NHIC) • Field Naturalist Clubs	Studies confirm: • Presence of 5 or more nesting Midland Painted Turtles. • One or more Northern Map Turtle or Snapping Turtle nesting is a SWH. • The area or collection of sites within an area of exposed mineral soils where the turtles nest, plus a radius of 30-100 m around the nesting area dependent on slope, riparian vegetation and adjacent land use is the SWH [cxlviii]. • Travel routes from wetland to nesting area are to be considered within the SWH as a part of the 30-100 m area of habitat. [cxlix] • Field investigations should be conducted in prime nesting season typically late spring to early summer. Observational studies observing the turtles nesting is a recommended method. • SWH MIST [cxlix] Index #28 provides development effects and mitigation measures for turtle nesting habitat.	**Yes;** Suitable ecosites may be present within the Study Area.	**No;** No suitable ecosites were identified within the Study Area.	**Candidate;** Evidence of turtle nesting was observed during field investigations; however, no targeted surveys were completed.	**No;** Candidate habitat was not identified.
Seeps and Springs **<u>Rationale:</u>** Seeps/Springs are typical of headwater areas and are often at the source of coldwater streams.	Wild Turkey Ruffed Grouse Spruce Grouse White-tailed Deer Salamander spp.	Seeps/Springs are areas where ground water comes to the surface. Often, they are found within headwater areas within forested habitats. Any forested Ecosite within the headwater areas of a stream could have seeps/springs.	Any forested area (with <25% meadow/field/pasture) within the headwaters of a stream or river system [cxvii, cxlix]. • Seeps and springs are important feeding and drinking areas especially in the winter will typically support a variety of plant and animal species [cxix, cxx, cxxi, cxxii, cxiii, cxiv]. <u>Information Sources</u> • Topographical Map. • Thermography. • Hydrological surveys conducted by Conservation Authorities and MOE.	Field Studies confirm: • Presence of a site with 2 or more seeps/springs should be considered SWH. • The area of a ELC forest ecosite or ecoelement within ecosite containing the seeps/springs is the SWH. The protection of the recharge area considering the slope, vegetation, height of trees and groundwater condition need to be considered in delineation the habitat [cxlviii]. • SWH MIST [cxlix] Index #30 provides development effects and mitigation	**No;** No suitable ecosites were identified within the Study Area.	**No;** No suitable ecosites were identified within the Study Area.	**No;** Candidate habitat was not identified.	**No;** Candidate habitat was not identified.

Specialized Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Candidate Habitat within the Study Area		Confirmed Habitat within the Study Area	
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	Panhandle	Leamington	Panhandle	Leamington
			• Field Naturalists Clubs and landowners. • Municipalities and Conservation Authorities may have drainage maps and headwater areas mapped.	measures				
Amphibian Breeding Habitat (Woodland). **<u>Rationale:</u>** These habitats are extremely important to amphibian biodiversity within a landscape and often represent the only breeding habitat for local amphibian populations	Eastern Newt Blue-spotted Salamander Spotted Salamander Gray Treefrog Spring Peeper Western Chorus Frog Wood Frog	All Ecosites associated with these ELC Community Series; FOC FOM FOD SWC SWM SWD Breeding pools within the woodland or the shortest distance from forest habitat are more significant because they are more likely to be used due to reduced risk to migrating amphibians	• Presence of a wetland, pond, or woodland pool (including vernal pools) >500 m^2 within or adjacent (within 120 m) to a woodland (no minimum size) [clxxxii, lxiii, lxv, lxvi, lxvii, lxviii, lxix, lxx]. Some small wetlands may not be mapped and may be important breeding pools for amphibians. • Woodlands with permanent ponds or those containing water in most years until mid-July are more likely to be used as breeding habitat [cxlviii]. <u>Information Sources</u> • Ontario Herpetofaunal Summary Atlas (or other similar atlases) for records • Local landowners may also provide assistance as they may hear spring-time choruses of amphibians on their property. • OMNRF Districts and wetland evaluations • Field Naturalist Clubs • Canadian Wildlife Service Amphibian Road Call Survey • Ontario Vernal Pool Association: http://www.ontariovernalpools.org	Studies confirm; • Presence of breeding population of 1 or more of the listed salamander species or 2 or more of the listed frog species with at least 20 individuals (adults, juveniles, eggs/larval masses) [lxxi] or 2 or more of the listed frog species with Call Level Codes of 3. • A combination of observation study and call count survey will be required during the spring (March-June) when amphibians are concentrated around suitable breeding habitat within or near the woodland/wetlands. • The habitat is the wetland area plus a 230 m radius of area. If a wetland area is adjacent to a woodland, a travel corridor connecting the wetland to the woodland is to be included in the habitat. • SWH MIST [cxlix] Index #14 provides development effects and mitigation measures.	**No;** No suitable ecosites were identified within the Study Area.	**No;** No suitable ecosites were identified within the Study Area.	**No;** Candidate habitat was not identified.	**No;** Candidate habitat was not identified.
Amphibian Breeding Habitat (Wetlands) **<u>Rationale:</u>** Wetlands supporting breeding for these amphibian species are extremely important and	Eastern Newt American Toad Spotted Salamander Four-toed Salamander Blue-spotted Salamander Gray Treefrog Western Chorus Frog Northern Leopard Frog Pickerel Frog Green Frog Mink Frog Bullfrog	ELC Community Classes SW, MA, FE, BO, OA and SA. Typically, these wetland ecosites will be isolated (>120m) from woodland ecosites, however larger wetlands containing predominantly	Wetlands >500 m^2 (about 25 m diameter ccvii), supporting high species diversity are significant; some small or ephemeral habitats may not be identified on MNRF mapping and could be important amphibian breeding habitats [clxxxii]. • Presence of shrubs and logs increase significance of pond for some amphibian species because of available structure for calling, foraging, escape and concealment from predators. • Bullfrogs require permanent water	Studies confirm: • Presence of breeding population of 1 or more of the listed newt/salamander species or 2 or more of the listed frog/toad species with at least 20 individuals (adults or eggs masses) lxxi or 2 or more of the listed frog/toad species with Call Level Codes of 3. or; Wetland with confirmed breeding Bullfrogs are significant.	**Yes;** MA communities were identified within the study area.	**No;** No suitable ecosites were identified within the Study Area.	**Candidate;** Confirmed habitat was not observed during field investigations; however, targeted surveys were not completed.	**No;** Candidate habitat was not identified.

Specialized Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Candidate Habitat within the Study Area		Confirmed Habitat within the Study Area	
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	Panhandle	Leamington	Panhandle	Leamington
fairly rare within Central Ontario landscapes.		aquatic species (e.g., Bull Frog) may be adjacent to woodlands.	bodies with abundant emergent vegetation. <u>Information Sources</u> • Ontario Herpetofaunal Summary Atlas (or other similar atlases) • Canadian Wildlife Service Amphibian Road Surveys and Backyard Amphibian Call Count. • OMNRF Districts and wetland evaluations. • Reports and other information available from Conservation Authorities.	• The ELC ecosite wetland • area and the shoreline are the SWH. • A combination of observational study and call count surveys cviii will be required during the spring (March-June) when amphibians are concentrated around suitable breeding habitat within or near the wetlands. • If a SWH is determined for Amphibian Breeding Habitat (Wetlands) then Movement Corridors are to be considered as outlined in Table 1.4.1 of this Schedule. • SWH MIST cxlix Index #15 provides development effects and mitigation measures.				

Table 1.4 Habitats of Species of Conservation Concern considered SWH.

Wildlife	Species	CANDIDATE SWH		CONFIRMED SWH	Candidate Habitat within the Study Area		Confirmed Habitat within the Study Area	
		ELC Ecosite	Habitat Criteria and Information Sources	Defining Criteria	Panhandle	Leamington	Panhandle	Leamington
Woodland Area-Sensitive Bird Breeding Habitat **<u>Rationale:</u>** Large, natural blocks of mature woodland habitat within the settled areas of Southern Ontario are important habitats for area sensitive interior forest songbirds.	Yellow-bellied Sapsucker Red-breasted Nuthatch Veery Blue-headed Vireo Northern Parula Black-throated Green Warbler Blackburnian Warbler Black-throated Blue Warbler Ovenbird Scarlet Tanager Winter Wren Pileated Woodpecker **<u>Special Concern:</u>** Cerulean Warbler Canada Warbler	All Ecosites associated with these ELC Community Series; FOC FOM FOD SWC SWM SWD	• Habitats where interior forest breeding birds are breeding, typically large mature (>60 yrs old) forest stands or woodlots >30 ha [cv, cxxxi, cxxxii, cxxxiii, cxxxiv, cxxxv, cxxxvi, cxxxvii, cxxxviii, cxxxix, cxl, cxli, cxlii, cxliii, cxliv, cxlv, cxlvi, cl, cli, clii, cliii, cliv, clv, clvi, clvii, clviii, clix]. • Interior forest habitat is at least 200 m from forest edge habitat [clxiv]. <u>Information Sources</u> • Local birder clubs. • Canadian Wildlife Service (CWS) for the location of forest bird monitoring. • Bird Studies Canada conducted a 3-year study of 287 woodlands to determine the effects of forest fragmentation on forest birds and to determine what forests were of greatest value to interior species • Reports and other information available from Conservation Authorities	Studies confirm: • Presence of nesting or breeding pairs of 3 or more of the listed wildlife species. • Note: any site with breeding Cerulean Warblers or Canada Warbler is to be considered SWH. • Conduct field investigations in spring and early summer when birds are singing and defending their territories. • Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects” [ccxi]. • SWH MIST [cxlix] Index #34 provides development effects and mitigation measures.	**No;** No suitable ecosites were identified within the Study Area.	**No;** No suitable ecosites were identified within the Study Area.	**No;** Candidate habitat was not identified.	**No;** Candidate habitat was not identified.
Marsh Breeding Bird Habitat **<u>Rationale:</u>** Wetlands for these bird species are typically productive and fairly rare in Southern Ontario landscapes.	American Bittern Virginia Rail Sora Common Moorhen American Coot Pied-billed Grebe Marsh Wren Sedge Wren Common Loon Green Heron Trumpeter Swan **<u>Special Concern:</u>** Black Tern Yellow Rail	MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 SAS1 SAM1 SAF1 FEO1 BOO1 For Green Heron: All SW, MA and CUM1 sites.	Nesting occurs in wetlands. All wetland habitat is to be considered as long as there is shallow water with emergent aquatic vegetation present cxxiv. • For Green Heron, habitat is at the edge of water such as sluggish streams, ponds and marshes sheltered by shrubs and trees. Less frequently, it may be found in upland shrubs or forest a considerable distance from water. <u>Information Sources</u> • OMNRF District and wetland evaluations. • Field Naturalist clubs • Natural Heritage Information Centre (NHIC) Records. • Reports and other information available from Conservation Authorities. • Ontario Breeding Bird Atlas.	Studies confirm: • Presence of 5 or more nesting pairs of Sedge Wren or Marsh Wren **or** breeding by any combination of 4 or more of the listed species. • Note: any wetland with breeding of 1 or more Black Terns, Trumpeter Swan, Green Heron or Yellow Rail is SWH. • Area of the ELC ecosite is the SWH. • Breeding surveys should be done in May/June when these species are actively nesting in wetland habitats. • Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects” • SWH MIST Index #35 provides development effects and mitigation measures	**Yes;** MA communities were identified within the study area.	**No;** No suitable ecosites were identified within the Study Area.	**Candidate;** Confirmed habitat was not observed during field investigations. however, targeted surveys were not completed.	**No;** Candidate habitat was not identified.
Open Country Bird Breeding Habitat **<u>Rationale:</u>** This wildlife habitat is declining throughout	Upland Sandpiper Grasshopper Sparrow Vesper Sparrow Northern Harrier Savannah Sparrow **<u>Special Concern:</u>** Short-eared Owl	CUM1 CUM2	Large grassland areas (includes natural and cultural fields and meadows) >30 ha [clx, clxi, clxii, clxiii, clxiv, clxv, clxvi, clxvii, clxviii, clxix]. • Grasslands not Class 1 or 2 agricultural lands, and not being actively used for farming (i.e., no row cropping or intensive hay or livestock pasturing in the last 5 years).	Studies confirm: • Presence of nesting or breeding of 2 or more of the listed species. • A field with 1 or more breeding Short-eared Owls is to be considered SWH. • The area of SWH is the contiguous ELC ecosite field areas. • Conduct field investigations of the most	**No;** No suitable ecosites were identified within the Study Area of sufficient size.	**No;** No suitable ecosites were identified within the Study Area of sufficient size.	**No;** Candidate habitat was not identified.	**No;** Candidate habitat was not identified.

Wildlife	Species	CANDIDATE SWH		CONFIRMED SWH	Candidate Habitat within the Study Area		Confirmed Habitat within the Study Area	
		ELC Ecosite	Habitat Criteria and Information Sources	Defining Criteria	Panhandle	Leamington	Panhandle	Leamington
Ontario and North America. Species such as the Upland Sandpiper have declined significantly the past 40 years based on CWS (2004) trend records.			• Grassland sites considered significant should have a history of longevity, either abandoned fields, mature hayfields and pasturelands that are at least 5 years or older. • The indicator bird species are area sensitive requiring larger grassland areas than the common grassland species. <u>Information Sources:</u> • Agricultural land classification maps, Ministry of Agriculture. • Local bird clubs. • Ontario Breeding Bird Atlas • EIS Reports and other information available from Conservation Authorities.	likely areas in spring and early summer when birds are singing and defending their territories. • Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects” ccxi. • SWH MIST [cxlix] Index #32 provides development effects and mitigation measures.				
Shrub/Early Successional Bird Breeding Habitat **<u>Rationale:</u>** This wildlife habitat is declining throughout Ontario and North America. The Brown Thrasher has declined significantly over the past 40 years based on CWS (2004) trend records [cxcix].	**<u>Indicator Spp</u>:** Brown Thrasher Clay-coloured Sparrow **<u>Common Spp:</u>** Field Sparrow Black-billed Cuckoo Eastern Towhee Willow Flycatcher **<u>Special Concern:</u>** Yellow-breasted Chat Golden-winged Warbler	CUT1 CUT2 CUS1 CUS2 CUW1 CUW2 Patches of shrub ecosites can be complexed into a larger habitat for some bird species	Large field areas succeeding to shrub and thicket habitats >10 ha[clxiv] in size. • Shrub land or early successional fields, not class 1 or 2 agricultural lands, not being actively used for farming (i.e., no row-cropping, haying or live-stock pasturing in the last 5 years). • Shrub thicket habitats (>10 ha) are most likely to support and sustain a diversity of these species [clxxiii]. • Shrub and thicket habitat sites considered significant should have a history of longevity, either abandoned fields or pasturelands. <u>Information Sources</u> • Agricultural land classification maps, Ministry of Agriculture. • Local bird clubs. • Ontario Breeding Bird Atlas • Reports and other information available from Conservation Authorities.	Studies confirm: • Presence of nesting or breeding of 1 of the indicator species and at least 2 of the common species. • A habitat with breeding Yellow-breasted Chat or Golden-winged Warbler is to be considered as Significant Wildlife Habitat. • The area of the SWH is the contiguous ELC ecosite field/thicket area. • Conduct field investigations of the most likely areas in spring and early summer when birds are singing and defending their territories • Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects” [ccxi]. • SWH MIST • cxlix Index #33 provides development effects and mitigation measures.	**No;** No suitable ecosites were identified within the Study Area of sufficient size.	**No;** No suitable ecosites were identified within the Study Area of sufficient size.	**No;** Candidate habitat was not identified.	**No;** Candidate habitat was not identified.
Terrestrial Crayfish; **Rationale:** Terrestrial Crayfish are only found within SW Ontario in Canada and their habitats	Chimney or Digger Crayfish; (*Creaserinus fodiens*) Devil Crawfish or Meadow Crayfish; (*Lacunicambarus nebrascensis*)	MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 MAS1 MAS2 MAS3 SWD SWT	Wet meadow and edges of shallow marshes (no minimum size) should be surveyed for terrestrial crayfish. • Constructs burrows in marshes, mudflats, meadows; they can’t be found far from water. • Both species are a semi-terrestrial burrower which spends most of its life within burrows consisting of a network of tunnels. Usually, the soil is not too moist so that the tunnel is well formed.	Studies Confirm: • Presence of 1 or more individuals of species listed or their chimneys (burrows) in suitable meadow marsh, swamp, or moist terrestrial sites [cci] • Area of ELC ecosite or a Habitat ecoelement area of meadow marsh or swamp within the larger ecosite area is the SWH. • Surveys should be done April to August in temporary or permanent water. Note	**Yes;** MA communities were identified within the study area.	**No;** No suitable ecosites were identified within the Study Area.	**Candidate;** Confirmed habitat was not observed during field investigations. however, targeted surveys were not completed.	**No;** Candidate habitat was not identified.

Wildlife	Species	CANDIDATE SWH		CONFIRMED SWH	Candidate Habitat within the Study Area		Confirmed Habitat within the Study Area	
		ELC Ecosite	Habitat Criteria and Information Sources	Defining Criteria	Panhandle	Leamington	Panhandle	Leamington
are very rare. [ccii]		SWM	<u>Information Sources</u> • Information sources from "Conservation Status of Freshwater Crayfishes" by Dr. Premek Hamr for the WWF and CNF March 1998	the presence of burrows or chimneys are often the only indicator of presence, observance or collection of individuals is very difficult [cci]. • SWH MIST [cxlix] Index #36 provides development effects and mitigation measures.				
Special Concern and Rare Wildlife Species **<u>Rationale:</u>** These species are quite rare or have experienced significant population declines in Ontario.	All Special Concern and Provincially Rare (S1-S3, SH) plant and animal species. Lists of these species are tracked by the Natural Heritage Information Centre (NHIC).	All plant and animal element occurrences (EO) within a 1 or 10 km grid. Older element occurrences were recorded prior to GPS being available, therefore location information may lack accuracy	• When an element occurrence is identified within a 1 or 10 km grid for a Special Concern or provincially Rare species; linking candidate habitat on the site needs to be completed to ELC Ecosites [lxxviii]. <u>Information Sources</u> • Natural Heritage Information Centre (NHIC) will have Special Concern and Provincially Rare (S1-S3, SH) species lists with element occurrences data. • NHIC Website "Get Information": http://nhic.mnr.gov.on.ca • Ontario Breeding Bird Atlas• • Expert advice should be sought as many of the rare spp. have little information available about their requirements.	Studies Confirm: • Assessment/inventory of the site for the identified special concern or rare species needs to be completed during the time of year when the species is present or easily identifiable. • The area of the habitat to the finest ELC scale that protects the habitat form and function is the SWH, this must be delineated through detailed field studies. The habitat needs be easily mapped and cover an important life stage component for a species e.g., specific nesting habitat or foraging habitat. • SWH MIST Index #37 provides development effects and mitigation measures	**Yes;** 26 SOCC have been identified as potentially present within the Study Areas.	**Yes;** 26 SOCC have been identified as potentially present within the Study Areas.	**Confirmed;** Swamp rose-mallow was identified in the MAS2-9 community. Wingstem was identified in the FOD8-1 community. Midland Painted Turtle and Snapping Turtle were observed in multiple aquatic features.	**Confirmed;** Snapping Turtle was observed during field investigation.

Table 1.5 Animal Movement Corridors.

Habitat	Species	CANDIDATE SWH		CONFIRMED SWH	Candidate Habitat Present Within the Study Area		\Confirmed Habitat Present within the Study Area	
		ELC Eco-sites	Habitat Criteria and Information Sources	Defining Criteria	Panhandle	Leamington	Panhandle	Leamington
Amphibian Movement Corridors **<u>Rationale:</u>** Movement corridors for amphibians moving from their terrestrial habitat to breeding habitat can be extremely important for local populations.	Eastern Newt American Toad Spotted Salamander Four-toed Salamander Blue-spotted Salamander Gray Treefrog Western Chorus Frog Northern Leopard Frog Pickerel Frog Green Frog Mink Frog Bullfrog	Corridors may be found in all ecosites associated with water. • Corridors will be determined based on identifying the significant breeding habitat for these species in Table 1.1	Movement corridors between breeding habitat and summer habitat [clxxiv, clxxv, clxxvi, clxxvii, clxxviii, clxxix, clxxx, clxxxi]. Movement corridors must be determined when Amphibian breeding habitat is confirmed as SWH from Table 1.2.2 (Amphibian Breeding Habitat – Wetland) of this Schedule. <u>Information Sources</u> • MNRF District Office. • Natural Heritage Information Centre (NHIC). • Reports and other information available from Conservation Authorities. • Field Naturalist Clubs.	• Field Studies must be conducted at the time of year when species are expected to be migrating or entering breeding sites. • Corridors should consist of native vegetation, with several layers of vegetation. Corridors unbroken by roads, waterways or bodies, and undeveloped areas are most significant [cxlix]. • Corridors should have at least 15 m of vegetation on both sides of waterway [cxlix] or be up to 200m wide [cxlix] of woodland habitat and with gaps <20 m [cxlix]. • Shorter corridors are more significant than longer corridors, however amphibians must be able to get to and from their summer and breeding habitat [cxlix]. • SWH MIST [cxlix] Index #40 provides development effects and mitigation measures	**No;** No suitable ecosites were identified within the Study Area of sufficient size.	**No;** No suitable ecosites were identified within the Study Area of sufficient size.	**No;** Candidate habitat was not identified, however, targeted surveys were not completed.	**No;** Candidate habitat was not identified, however, targeted surveys were not completed.

Table 1.6 Significant Wildlife Habitat Exceptions for Ecodistricts within Eco-Region 7E

Habitat	Species	CANDIDATE SWH		CONFIRMED SWH	Candidate Habitat Present Within the Study Area		Confirmed Habitat Present within the Study Area	
		ELC Eco-sites	Habitat Criteria and Information Sources	Defining Criteria	Panhandle	Leamington	Panhandle	Leamington
7E-2 **Bat Migratory Stopover Area** **<u>Rationale:</u>** Stopover areas for long distance migrant bats are important during fall migration.	Hoary Bat Eastern Red Bat Silver-haired Bat	No specific ELC types.	• Long distance migratory bats typically migrate during late summer and early fall from summer breeding habitats throughout Ontario to southern wintering areas. Their annual fall migration may concentrate these species of bats at stopover areas. • This is the only known bat migratory stopover habitats based on current information. <u>Information Sources</u> • OMNRF for possible locations and contact for local experts • University of Waterloo, Biology Department	• Long Point (42°35'N, 80°30'E, to 42°33'N, 80°03'E) has been identified as a significant stop-over habitat for fall migrating Silver-haired Bats, due to significant increases in abundance, activity and feeding that was documented during fall migration [ccxv]. • The confirmation criteria and habitat areas for this SWH are still being determined. • SWH MIST [cxlix] Index #38 provides development effects and mitigation measures.	**No;** The study area does not include Long Point.	**No;** The study area does not include Long Point.	**No;** Candidate habitat was not identified.	**No;** Candidate habitat was not identified.

AECOM

Attachment E

Species at Risk Habitat Assessment

Taxonomy	Species	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat[1, 2]	Associated ELC Communities	Known Species Range[1, 2]	Source Identifying Species Record	Suitable Habitat Identified Duirng Background Review - Panhandle Regional Expansion	Species/Suitable Habitat Identified During Field Investigations - Panhandle	Suitable Habitat Identified Duirng Background Review - Lemmington Interconnect	Species/Suitable Habitat Identified During Field Investigations - Leamington
Birds	Bank Swallow *Riparia riparia*	THR	THR Schedule +E16:I16	THR	Bank Swallows nest in burrows in natural and human-made settings where there are vertical faces in silt and sand deposits. Many nests are on banks of rivers and lakes, but they are also found in active sand and gravel pits or former ones where the banks remain suitable. The birds breed in colonies ranging from several to a few thousand pairs. The Bank Swallow breeds in a wide variety of natural and artificial sites with vertical banks, including riverbanks, lake and ocean bluffs, aggregate pits, road cuts, and stock piles of soil. Sand-silt substrates are preferred for excavating nest burrows. Breeding sites tend to be somewhat ephemeral due to the dynamic nature of bank erosion. Breeding sites are often situated near open terrestrial habitat used for aerial foraging (e.g., grasslands, meadows, pastures, and agricultural cropland). Large wetlands are used as communal nocturnal roost sites during post-breeding, migration, and wintering periods.		The Bank Swallow is found all across southern Ontario, with sparser populations scattered across northern Ontario. The largest populations are found along the Lake Erie and Lake Ontario shorelines, and the Saugeen River (which flows into Lake Huron). In North America, it breeds widely across the northern two-thirds of the U.S., north to the treeline. It breeds in all Canadian provinces and territories, except perhaps Nunavut.	Leamington Study Area - OBBA Panhandle Study Area - OBBA	Yes The banks of the constructued drains and watercourses present within the Study Area may provide suitable nesting habitat for Bank Swallow.	No Neither species nor suitable was identified during field investigations.	Yes The banks of the agricultural drains present within the Study Area may provide suitable nesting habitat for Bank Swallow.	No Suitable habitat identified at crossing LSC-11, though Bank Swallows were not observed.
Birds	Barn Owl *Tyto alba*	END	END Schedule 1	END	The Barn Owl cannot tolerate severe winter temperatures, and southern Ontario is the northern limit of its range. Breeding sites in Ontario seem to be restricted to areas with the moderating effects of the Great Lakes (within 50 kilometres of the lakes). In southern Ontario, this adaptable owl nests and roosts in barns and abandoned buildings. It may also use natural cavities in trees or holes in cliff faces, as it did before the arrival of Europeans in North America. It lives year round at its nest site and hunts for rodents over orchards, and grasslands such as farmlands, fallow fields, and meadows. Barn Owls prefer low-elevation, open country, where their small rodent prey are more abundant. In Canada, they are often associated with agricultural lands, especially pasture. Nests are located in buildings, hollow trees, and cavities in cliffs. In Canada, most nests are found on man-made structures, especially those which are abandoned or unused.	**TPO, TPS, CUM, CUS** and **CUW** where suitable nesting habitat is present.	In the Western Hemisphere, the Barn Owl is found from extreme southern Canada to southern South America and the West Indies. In Canada, the Barn Owl is at the northern limit of its range, and breeds only locally in southern British Columbia, southern Ontario, and possibly in southern Quebec. Barn Owl numbers in Ontario and Quebec were probably never very large, although the species possibly inhabited oak-savannah vegetation adjacent to tall grass prairie prior to European settlement. Colonization of southern Canada is attributed to clearance of forests for agriculture, which created open habitats supporting high rodent populations. In Ontario, Barn Owls may potentially breed on the Niagara Peninsula, in adjacent Halimand-Norfolk, in the Thousands Island area of Kingston, at Long Point, and in several other localities in the southwestern part of the province. Today, there are fewer than five pairs of Barn Owls in Ontario.	Panhandle Study Area - OBBA	Yes Buildings (i.e. barns) and trees within the Study Area may provide suitable nesting habitat for Barn Owl. Agricultural fields may also provide suitable foraging habitat for this species.	No Neither species nor suitable was identified during field investigations, however, targeted surveys were not conducted.	No Species was not identified through the background review.	No Neither species nor suitable was identified during field investigations, however, targeted surveys were not conducted.
Birds	Barn Swallow *Hirundo rustica*	THR	THR Schedule 1	THR	Barn Swallows often live in close association with humans, building their cup-shaped mud nests almost exclusively on human-made structures such as open barns, under bridges, and in culverts. The species is attracted to open structures that include ledges where they can build their nests, which are often re-used from year to year. They prefer unpainted, rough-cut wood, since the mud does not adhere as well to smooth surfaces. Before European colonization, Barn Swallows nested mostly in caves, holes, crevices, and ledges in cliff faces. Following European settlement, they shifted largely to nesting in and on artificial structures, including barns and other outbuildings, garages, houses, bridges, and road culverts. Barn Swallows prefer various types of open habitats for foraging, including grassy fields, pastures, various kinds of agricultural crops, lake and river shorelines, cleared rights-of-way, cottage areas and farmyards, islands, wetlands, and subarctic tundra.	**TPO, CUM1, MAM, MAS, OAO, SAS1, SAM1, SAF1**; containing or adjacent structures that are suitable for nesting.	The Barn Swallow may be found throughout southern Ontario and can range as far north as Hudson Bay, wherever suitable locations for nests exist. The Barn Swallow has become closely associated with human rural settlements. It breeds across much of North America south of the treeline, south to central Mexico. In Canada, it is known to breed in all provinces and territories.	Leamington Study Area - OBBA Panhandle Study Area - NHIC, OBBA	Yes Antropogenic stuctures such as buildings, culverts and bridges may provide suitable nesting habitat for this species.	Yes Species confirmed nesting under Mint Line Bridge over SC19 and Balmoral Line Bridge over SC40.	Yes Antropogenic stuctures such as buildings, culverts and bridges may provide suitable nesting habitat for this species.	No Although species was observed, no nests were identified during field investigations.
Birds	Bobolink *Dolichonyx oryzivorus*	THR	THR Schedule 1	THR	Historically, Bobolinks lived in North American tallgrass prairie and other open meadows. With the clearing of native prairies, Bobolinks moved to living in hayfields. Bobolinks often build their small nests on the ground in dense grasses. Both parents usually tend to their young, sometimes with a third Bobolink helping. Most of this prairie was converted to agricultural land over a century ago, and at the same time the forests of eastern North America were cleared to hayfields and meadows that provided habitat for the birds. Since the conversion of the prairie to cropland and the clearing of the eastern forests, the Bobolink has nested in forage crops (e.g., hayfields and pastures dominated by a variety of species, such as clover, Timothy, Kentucky Bluegrass, and broadleaved plants). The Bobolink also occurs in various grassland habitats including wet prairie, graminoid peatlands, and abandoned fields dominated by tall grasses, remnants of uncultivated virgin prairie (tall-grass prairie), no-till cropland, small-grain fields, restored surface mining sites, and irrigated fields in arid regions. It is generally not abundant in short-grass prairie, Alfalfa fields, or in row crop monocultures (e.g., corn, soybean, wheat), although its use of Alfalfa may vary with region.	**TPO, TPS, CUM1** and **MAM2**.	The Bobolink breeds across North America. In Ontario, it is widely distributed throughout most of the province south of the boreal forest, although it may be found in the north where suitable habitat exists. The breeding range of the Bobolink in North America includes the southern part of all Canadian provinces from British Columbia to Newfoundland and Labrador and south to the northwestern, north-central and northeastern U.S.	Leamington Study Area - OBBA Panhandle Study Area - NHIC, OBBA	Yes The Study Area is dominated by agricultural fields which may consist of hayfields.	Yes Species observed in winter wheat fields within the Study Area.	Yes The Study Area is dominated by agricultural fields which may consist of hayfields.	Yes Species observed in winter wheat fields within the Study Area.
Birds	Chimney Swift *Chaetura pelagica*	THR	THR Schedule 1	THR	Before European settlement, Chimney Swifts mainly nested on cave walls and in hollow trees or tree cavities in old growth forests. However, due to the land clearing associated with colonization, hollow trees became increasingly rare, which led Chimney Swifts to move into house chimneys. Today, they are more likely to be found in and around urban settlements where they nest and roost (rest or sleep) in chimneys and other manmade structures. It is likely that a small portion of the population continues to use hollow trees. They also tend to stay close to water as this is where the flying insects they eat congregate. The Chimney Swift spends the major part of the day in flight feeding on insects. In the northern part of the breeding range, the Chimney Swift favours sites where the ambient temperature is relatively stable.	**TPO, CUM1, MAM, MAS, OAO, SAS1, SAM1, SAF1** containing or adjacent structures with suitable nesting habitat (i.e. chimneys).	The Chimney Swift breeds in eastern North America, possibly as far north as southern Newfoundland. In Ontario, it is most widely distributed in the Carolinian zone in the south and southwest of the province, but has been detected throughout most of the province south of the 49th parallel. The Chimney Swift breeds mainly in eastern North America, from southern Canada down to Texas and Florida. The species breeds in east central Saskatchewan, southern Manitoba, southern Ontario, southern Quebec, New Brunswick, Nova Scotia, and possibly in Prince Edward Island and southwestern Newfoundland.	Leamington Study Area - OBBA Panhandle Study Area - OBBA	Yes Buildings present within the Study Area may provide suitable nesting habitat for this species.	No Neither species nor suitable was identified during field investigations, however, targeted surveys were not conducted.	Yes Buildings present within the Study Area may provide suitable nesting habitat for this species.	No Neither species nor suitable was identified during field investigations, however, targeted surveys were not conducted.
Birds	Eastern Meadowlark *Sturnella magna*	THR	THR Schedule 1	THR	Eastern Meadowlarks breed primarily in moderately tall grasslands, such as pastures and hayfields, but are also found in alfalfa fields, weedy borders of croplands, roadsides, orchards, airports, shrubby overgrown fields, or other open areas. Small trees, shrubs, or fence posts are used as elevated song perches. Eastern Meadowlarks prefer grassland habitats, including native prairies and savannahs, as well as non-native pastures, hayfields, weedy meadows, herbaceous fencerows, and airfields.	**TPO, TPS, CUM1, CUS**, and **MAM2** with elevated song perches.	In Ontario, the Eastern Meadowlark is primarily found south of the Canadian Shield but it also inhabits the Lake Nipissing, Timiskaming, and Lake of the Woods areas. Including all subspecies, the Eastern Meadowlark's global breeding range extends from central and eastern North America, south through parts of South America. However, there is only one subspecies in Canada and the neighbouring northeastern U.S. In Canada, the bulk of the population breeds in southern Ontario.	Leamington Study Area - OBBA Panhandle Study Area - NHIC, OBBA	Yes The Study Area is dominated by agricultural fields which may consist of pastures or hayfields.	No Suitable habitat identified within the Study Area and presence is assumed though Eastern Meadowlarks were not observed.	Yes The Study Area is dominated by agricultural fields which may consist of pastures or hayfields.	No Suitable habitat identified within the Study Area and presence is assumed though Eastern Meadowlarks were not observed.

Taxonomy	Species	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat[1, 2]	Associated ELC Communities	Known Species Range[1, 2]	Source Identifying Species Record	Suitable Habitat Identified Duirng Background Review - Panhandle Regional Expansion	Species/Suitable Habitat Identified During Field Investigations - Panhandle	Suitable Habitat Identified Duirng Background Review - Lemmington Interconnect	Species/Suitable Habitat Identified During Field Investigations - Leamington
Birds	Henslow's Sparrow *Centronyx henslowii*	END	END Schedule 1	END	In Ontario, the Henslow's Sparrow lives in open fields with tall grasses, flowering plants, and a few scattered shrubs. It has also been found in abandoned farm fields, pastures, and wet meadows. It tends to avoid fields that have been grazed, burned, or are crowded with trees and shrubs. It prefers extensive, dense, tall grasslands where it can more easily conceal its small ground nest. Henslow's Sparrows occupy open fields. The vegetation of these areas includes tall grasses that are interspersed with tall herbaceous plants, or shrubby species. It prefers undisturbed areas with dense living grasses and a dense thatch of dead grasses. The species may occupy hayfields, but if the hay is cut early, the nests are destroyed and the resulting losses are severe. Only areas that remain undisturbed for several years appear to be more successfully colonized. The precise amount of remaining suitable habitat in Ontario is unknown.	**TPO, CUM**, and **MAM** that are a minimum of 30 ha in size with vegetation that is over 30cm in height with a thick thatch layer and a lack of emergent woody vegetation.	The Henslow's Sparrow breeds in the northeastern and east-central United States, and reaches its northeastern limit in Ontario. It was once fairly common in scattered areas of suitable habitat south of the Canadian Shield. However, steep declines since the 1960s have all but wiped this bird out as a breeding species in Ontario. A few are still seen each spring at migration hotspots such as Point Pelee National Park, and a few may breed at selected locations. In Canada, it now occurs in southern Ontario. Historical information indicates that the species probably occurred in natural prairie areas and that forest clearing in the 1800s probably lead to an expanded range for a time. In addition to southern Ontario, the Henslow's Sparrow used to occur in southwestern and eastern Ontario.	Panhandle Study Area - NHIC	**No** Grasslands of sufficient size (i.e. >30 ha) are not anticipated within the Study Area.	No Neither species nor suitable was identified during field investigations, however, targeted surveys were not conducted.	No Species was not identified through the background review.	No Neither species nor suitable was identified during field investigations, however, targeted surveys were not conducted.
Birds	King Rail *Rallus elegans*	END	END Schedule 1	END	King Rails are found in densely vegetated freshwater marshes with open shallow water that merges with shrubby areas. They are sometimes found in smaller isolated marshes but most seem to prefer larger, coastal wetlands. Its nest is a dinner plate-sized platform made of plant material, placed just above the water in shrubs or clumps of other marsh plants. King Rails are found in a variety of freshwater marshes and marsh-shrub swamp habitats. The species occurs in areas where wild rice grows, but also in sedge and cattail marshes. Most importantly, the species requires large marshes with open shallow water that merges with shrubby areas. In fact, birds only return in successive years to large marshes that are not overgrown with cattails. Originally, the best habitat for King Rails was in southwestern Ontario, but most of these wetlands have since been eliminated. Only 10% of the original pre-European settlement marshes remain in the one area of Ontario where the largest component of the species occurs. The quality of the remaining habitat is also deteriorating.	**MAS, SWT,** and **MAM**.	King Rails reach their northern limit in southern Ontario, where they are quite rare. Recent province-wide surveys suggest there are only about 30 pairs left, the majority of which are in the large wetlands bordering Lake St. Clair. Most of the remainder are found in several key coastal marshes along Lakes Erie and Ontario. In Canada, the species breeds only in the extreme southern part of Ontario. It is thought that the King Rail was quite common in some southern Ontario marshes, although there is no early information on population numbers and the area occupied.	Panhandle Study Area - NHIC, OBBA	**Yes** The St. Clair Marsh Complex Provinically Significant Wetland (PSW) may provide sutiable nesting habitat for this species.	No Suitable habaitat was identified during field investigations though the species was not observed, however, targeted surveys were not conducted.	No Species was not identified through the background review.	No Neither species nor suitable was identified during field investigations, however, targeted surveys were not conducted.
Birds	Least Bittern *Ixobrychus exilis*	THR	THR Schedule 1	THR	In Ontario, the Least Bittern is found in a variety of wetland habitats, but strongly prefers cattail marshes with a mix of open pools and channels. This bird builds its nest above the marsh water in stands of dense vegetation, hidden among the cattails. The nests are almost always built near open water, which is needed for foraging. This species eats mostly frogs, small fish, and aquatic insects. The Least Bittern breeds strictly in marshes dominated by emergent vegetation surrounded by areas of open water. Most breeding grounds in Canada are dominated by cattails, but breeding also occurs in areas with other robust emergent plants and in shrubby swamps. The presence of stands of dense vegetation is essential for nesting because the nests of Least Bittern sit on platforms of stiff stems. The nests are almost always within 10 m of open water. Open water is also needed for foraging, because Least Bitterns forage by ambushing their prey in shallow water near marsh edges, often from platforms that they construct out of bent vegetation. Access to clear water is essential for the birds to see their prey. This small heron prefers large marshes that have relatively stable water levels throughout the nesting period. Adults can raise nests somewhat to deal with rising waters, but persistent or sudden increases will flood nests. Conversely, drops in water level can reduce foraging opportunities and increase the species' exposure to predators. Needs for wintering habitat are less specific, and appear to be met by a wide variety of wetlands—not only emergent marshes like those used for breeding, but also brackish and saline swamps. Habitat use during migration is poorly known, but presumably is similar to breeding and wintering habitat.	**MAS2-1, MAS3-1, SA** and **OAO**.	In Ontario, the Least Bittern is mostly found south of the Canadian Shield, especially in the central and eastern part of the province. Small numbers also breed occasionally in northwest Ontario. This species has disappeared from much of its former range, especially in southwestern Ontario, where wetland loss has been most severe. The Least Bittern breeds from southern Canada to South America. In Canada, the Least Bittern has been observed in every province, but most individuals occur in Ontario. The species breeds primarily in southern Ontario.	Panhandle Study Area - NHIC, OBBA	**Yes** Marsh communities assocaited with the St. Clair Marsh Complex PSW, Baptiste Creek, Jeannettes Creek and the Thames River may provide suitable nesting habitat for this species.	No Suitable habaitat was identified during field investigations though the species was not observed, however, targeted surveys were not conducted.	No Species was not identified through the background review.	No Neither species nor suitable was identified during field investigations, however, targeted surveys were not conducted.
Birds	Prothonotary Warbler *Protonotaria citrea*	END	END Schedule 1	END	The Prothonotary is the only warbler in eastern North America that nests in tree cavities, where it typically lays four to six eggs on a cushion of moss, leaves, and plant fibres. In Canada, this species breeds only in deciduous swamp forests or riparian floodplain forests. The forests it occupies are typically dominated by Silver Maple, ash, and Yellow Birch. The species nests in naturally formed tree cavities or cavities excavated by other species, mainly Downy Woodpeckers and chickadees. It favours small, shallow holes situated at low heights in dead or dying trees, in which it builds a nest lined with moss. Nests are typically situated over standing or slow-moving water. Artificial nest boxes are also readily accepted and perhaps even preferred. Males often build one or more incomplete "dummy" nests. Females usually select one of these to complete, but they may also build an entirely new nest on their own. In any case, several suitable cavities appear to be required in each territory to accommodate all of these nests.	**FOD** and **SWD** with standing water.	In Canada, the Prothonotary Warbler is only known to nest in southwestern Ontario, primarily along the north shore of Lake Erie. Over half of the small and declining population is found in Rondeau Provincial Park. In Ontario, the Prothonotary Warbler is found in the warmer climate of the Carolinian deciduous forests. This species is very rare in Canada, but is actively monitored by a combination of amateurs and professionals. Many occupied sites are prone to blinking on and off. This level of annual fluctuation makes it difficult to ascertain whether there has been a true change in occupied range, but such a change seems unlikely. Fewer than 10 locations are occupied in Canada in any given year (e.g., no more than 8 in 2015).	Panhandle Study Area - NHIC, OBBA	**No** Suitable decidious swamps or riparian floodplain forests for nesting were not identified within the Study Area through the background review.	No Neither species nor suitable was identified during field investigations, however, targeted surveys were not conducted.	No Species was not identified through the background review.	No Neither species nor suitable was identified during field investigations, however, targeted surveys were not conducted.

Taxonomy	Species	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat[1, 2]	Associated ELC Communities	Known Species Range[1, 2]	Source Identifying Species Record	Suitable Habitat Identified Duirng Background Review - Panhandle Regional Expansion	Species/Suitable Habitat Identified During Field Investigations - Panhandle	Suitable Habitat Identified Duirng Background Review - Lemmington Interconnect	Species/Suitable Habitat Identified During Field Investigations - Leamington
Fish	Eastern Sand Darter (Ontario populations) *Ammocrypta pellucida*	END	THR Schedule 1	THR	The Eastern Sand Darter prefers shallow habitats in lakes, streams, and rivers with clean, sandy bottoms. It often buries itself completely in the sand. It feeds on aquatic insects, but due to its small mouth is limited in the size of prey it can eat. The preferred habitat of the Eastern Sand Darter is sand-bottomed areas in streams and rivers, and sandy shoals in lakes. Spawning has not been observed in nature but, in the laboratory, Eastern Sand Darter spawned on a mixed sand and gravel substrate. Eastern Sand Darter habitats in Canada have been extensively impacted by land clearing, intensive agriculture, urban development, impoundments, and stream channel modifications.	**OAO** with sandy bottoms.	In Ontario, the Eastern Sand Darter is found in Lake St. Clair, Lake Erie, West Lake, Big Creek, and in the Grand, Sydenham, Thames, and Detroit rivers. The species may have disappeared from several other rivers in southwestern Ontario. In 2008 it was rediscovered in Big Creek after an absence of more than 50 years. The Eastern Sand Darter occurs in the Ohio River basin (Ohio, Indiana, Illinois, Kentucky, West Virginia, Pennsylvania), a portion of the lower Great Lakes drainage (Lake Huron, Lake St. Clair and Lake Erie drainages in Michigan, Ohio, New York, Pennsylvania, and Ontario), and farther east in the St. Lawrence River and Lac Champlain drainages (Québec, Vermont, New York). In Ontario, populations have been found in seven southwestern Ontario watersheds as well as lakes Erie and St. Clair.	Panhandle Study Area - DFO	**Yes** DFO records indicate that this species is present within the Thames River.	No Species was not identified during field investigations, however, targeted surveys were not conducted within the Thames River; suitable habitat identified and presence should be assumed.	No Species was not identified through the background review.	No Neither species nor suitable was identified during field investigations, however, targeted surveys were not conducted.
Fish	Lake Chubsucker *Erimyzon sucetta*	THR	END Schedule 1	END	In Ontario, the Lake Chubsucker lives in marshes and lakes with clear, still, warmer water and plenty of aquatic plants. This habitat is found in bays, channels, ponds, and coastal wetlands. During the breeding season, from April to early June in Ontario, adults move into marshes where eggs are laid among vegetation in shallower water. The chubsucker eats algae, plankton, molluscs, and aquatic insects. Lake Chubsuckers prefer clear, still waters with abundant aquatic plants such as marshes, stagnant bays, floodplain lakes, and drainage ditches. Their preferred substrates include gravel, sand, and silt mixed with organic debris.	**OAO, SAS, SAM**, and **SAF** with clear, still warm water and an abundance of aquatic plants.	In Canada, the Lake Chubsucker is found at several sites in the Ausable River, Lake St. Clair, Lake Erie, and the Niagara river drainage in southern Ontario. The Lake Chubsucker is primarily a species of the southeastern United States, but it has two main centers of distribution; the lower coastal plain (Gulf and southeastern Atlantic states), and the southern Great Lakes basin. In Canada, it is known only from the drainages of the Niagara River, and lakes Erie, St. Clair, and Huron in southwestern Ontario.	Panhandle Study Area - DFO, NHIC	**Yes** DFO records indicate that this species is present within the Thames River, McFarlane Relief Drain, Myers Pump Works Drain and the St. Clair Marsh Complex PSW. The PSW is considered critical habitat for this species.	No Species was not identified during field investigations, however, suitable habitat was identified and presence should be assumed.	No Species was not identified through the background review.	No Neither species nor suitable was identified during field investigations, however, targeted surveys were not conducted.
Fish	Lake Sturgeon (Great Lakes-Upper St. Lawrence River populations) *Acipenser fulvescens*	END	No Status	THR	The Lake Sturgeon lives almost exclusively in freshwater lakes and rivers with soft bottoms of mud, sand, or gravel. They are usually found at depths of five to 20 metres. They spawn in relatively shallow, fast-flowing water (usually below waterfalls, rapids, or dams) with gravel and boulders at the bottom. However, they will spawn in deeper water where habitat is available. They also are known to spawn on open shoals in large rivers with strong currents. The species occupies a wide variety of aquatic ecosystem types (e.g., stepped-gradient Boreal Shield rivers, low-gradient meandering Prairie rivers, low gradient Hudson lowland rivers, Great Lakes and associated tributaries). Lake Sturgeon requires a variety of habitats to complete its lifecycle, and the species has evolved to exploit typical upstream to downstream hydraulic and substrate gradients. Hatch is contingent on aeration by flowing water, after which larvae apparently require gravel substrate in which to bury and remain while development continues. Once the yolk sac is absorbed, larvae drift downstream via water currents. Habitat requirements at the age-0 stage are not well understood, but may not be as strict as previously assumed. Aside from the requirement of adequate benthic prey items, the habitat requirements for middle to later life stages (juveniles and adults) are not particularly narrow. Habitat trends vary across the species' range. In some areas, the construction of dams has ceased but, in other areas, it is expected to continue into the foreseeable future. Sediment and water quality has improved in many areas formerly impacted by pollution from the pulp-and-paper industry.	**OAO**. Large lakes/rivers > 20m deep with soft mud, sand, or gravel bottoms required.	In North America, Lake Sturgeon can be found from Alberta to the St. Lawrence drainage of Quebec and from the southern Hudson Bay to the lower Mississippi. In Ontario, the Lake Sturgeon is found in the rivers of the Hudson Bay basin, the Great Lakes basin, and their major connecting waterways, including the St. Lawrence River. There are three distinct populations in Ontario: Great Lakes - Upper St. Lawrence, Saskatchewan - Nelson River, and Southern Hudson Bay - James Bay.	Panhandle Study Area - NHIC	**Yes** NHIC records indicate that suitable habitat for this species may be present in the Thames River and Jeannettes Creek.	No Species was not identified during field investigations, however, suitable habitat was identified and presence should be assumed.	No Species was not identified through the background review.	No Neither species nor suitable was identified during field investigations, however, targeted surveys were not conducted.
Fish	Pugnose Minnow *Opsopoeodus emiliae*	THR	THR Schedule 1	THR	The Pugnose Minnow prefers coastal wetlands, and slow-moving rivers and streams with clear, warm water, little or no current, and abundant vegetation. In Canada, Pugnose Minnows prefer clear, slow-moving rivers, lakes and stream with abundant aquatic vegetation, but are not necessarily excluded form more turbid waters. Some minnows have been recorded in water bodies with moderately clear to very silty water with substrates of clay, silt, or mud, moderate to abundant vegetation, and little or no current. One specimen was even found in turbid water devoid of vegetation.		The Pugnose Minnow lives in central North America in the rivers and streams of the Mississippi River basin. In Canada, it is at the northern limit of its range and is only found in extreme southwestern Ontario with small populations in Lake St. Clair and the Detroit River.	Panhandle Study Area - DFO	**Yes** DFO records indicate that this species is present within the Thames River.	No Species was not identified during field investigations, however, suitable habitat was identified and presence should be assumed.	No Species was not identified through the background review.	No Neither species nor suitable was identified during field investigations, however, targeted surveys were not conducted.
Fish	Pugnose Shiner *Notropis anogenus*	THR	THR Schedule 1	THR	The Pugnose Shiner is found in lakes and calm areas of rivers and creeks having clear water and bottoms of sand, mud, or organic matter. It prefers water bodies with plenty of aquatic vegetation, particularly stonewort (*Chara* sp.). Aquatic plants provide hiding places, food, and breeding habitat. The Pugnose Shiner eats aquatic plants, green algae, plankton, and some aquatic insects. The Pugnose Shiner is usually found over sand and mud in slow-moving, clear, vegetated streams and lakes. It is found in sheltered ponds, wetlands, stagnant channels, and protected bays adjacent to larger waterbodies.	**OAO** with abundant aquatic vegetation in rivers and creeks with clear water with sand, mud, or organic substrate.	In North America, the Pugnose Shiner is found in several tributaries of the upper Mississippi River, in the upper Red River drainage, and in the Great Lakes drainage. In Canada, the Pugnose Shiner is found only at a few sites in southern Ontario, including the Teeswater River, the old Ausable Channel, the Trent River, and a few coastal wetlands in Lake St. Clair (and some tributaries), Lake Erie, lower Lake Huron, Lake Ontario, and the St. Lawrence River. The range of the Pugnose Shiner extends from Ontario, south to Illinois, and west to North Dakota. The species has a disjunct distribution and it is often absent from theoretically suitable habitat within its range. In Canada, this species has only been found in four main areas of Ontario: 1) southern Lake Huron drainage; 2) Lake St. Clair; 3) Lake Erie; and 4) eastern Lake Ontario/upper St. Lawrence River drainage. It is assumed to be extirpated from Point Pelee and Rondeau Bay.	Panhandle Study Area - NHIC	**Yes** DFO records indicate that this species is present within the St. Clair Marsh Complex PSW. The PSW is also conisdered cirtical habitat for this species.	No Species was not identified during field investigations, however, suitable habitat was identified and presence should be assumed.	No Species was not identified through the background review.	No Neither species nor suitable was identified during field investigations, however, targeted surveys were not conducted.
Mammals	Eastern Small-footed Myotis *Myotis leibii*	END	N/A	N/A	In the spring and summer, Eastern Small-footed Bats will roost in a variety of habitats, including in or under rocks, in rock outcrops, in buildings, under bridges, or in caves, mines, or hollow trees. These bats often change their roosting locations every day. At night, they hunt for insects to eat, including beetles, mosquitos, moths, and flies. In the winter, these bats hibernate, most often in caves and abandoned mines. They seem to choose colder and drier sites than similar bats and will return to the same spot each year.		The Eastern Small-footed Bat has been found from south of Georgian Bay to Lake Erie and east to the Pembroke area. There are also records from the Bruce Peninsula, the Espanola area, and Lake Superior Provincial Park. Most documented sightings are of bats in their winter hibernation sites.	Bat Conservation International (BCI)	Yes Buildings present within the Study Area may provide suitable roosting habitat.	No Species was not identified during field investigations, however, suitable habitat was identified.	Yes The proposed pipeline passes through a woodlot that may contain suitable roosting habitat. Buildings present within the Study Area may provide suitable roosting habitat.	No Species was not identified during field investigations, however, suitable habitat was identified.

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Mammals	Little Brown Myotis *Myotis lucifugus*	END	END Schedule 1	END	Bats are nocturnal. During the day they roost in trees and buildings. They often select attics, abandoned buildings, and barns for summer colonies where they can raise their young. Bats can squeeze through very tiny spaces (as small as six millimetres across) and this is how they access many roosting areas. Little Brown Bats hibernate from October or November to March or April, most often in caves or abandoned mines that are humid and remain above freezing. Their specific physiological requirements limit the number of suitable sites for overwintering. In the east, large numbers (i.e., >3000 bats) of several species typically overwinter in relatively few hibernacula. In the west, there are fewer known hibernacula, and numbers appear lower per site. Females establish summer maternity colonies, often in buildings or large-diameter trees. Foraging occurs over water, along waterways, and forest edges. Large open fields or clearcuts generally are avoided. In autumn, bats return to hibernacula, which may be hundreds of kilometres from their summering areas, swarm near the entrance, mate, and then enter that hibernaculum, or travel to different hibernacula to overwinter.		The Little Brown Bat is widespread in southern Ontario and found as far north as Moose Factory and Favourable Lake. In Canada, *Myotis lucifugus* occurs from Newfoundland to British Columbia, and northward to near the treeline in Labrador, Northwest Territories and Yukon.	BCI	Yes Buildings present within the Study Area may provide suitable roosting habitat.	No Species was not identified during field investigations, however, suitable habitat was identified.	Yes The proposed pipeline passes through a woodlot that may contain suitable roosting habitat. Buildings present within the Study Area may provide suitable roosting habitat.	Yes Species detected during targeted surveys in suitable habitat.
Mammals	Northern Myotis *Myotis septentrionalis*	END	END Schedule 1	END	Northern Long-eared Bats are associated with boreal forests, choosing to roost under loose bark and in the cavities of trees. These bats hibernate from October or November to March or April. The Northern Long-eared Bat overwinters in cold and humid hibernacula (caves/mines). Their specific physiological requirements limit the number of suitable sites for overwintering. In the east, large numbers (i.e., >3000 bats) of several species typically overwinter in relatively few hibernacula. In the west, there are fewer known hibernacula, and numbers appear lower per site. Females establish summer maternity colonies in buildings or large-diameter trees. Foraging occurs along waterways, forest edges, and in gaps in the forest. Large open fields or clearcuts generally are avoided. In autumn, bats return to hibernacula, which may be hundreds of kilometres from their summering areas, swarm near the entrance, mate, and then enter that hibernaculum, or travel to different hibernacula to overwinter.	**FOC, FOM, FOD, SWC, SWM,** and **SWD** where suitable roosting (i.e. cavity trees and trees with loose bark) habitat is available.	The Northern Long-eared Bat is found throughout forested areas in southern Ontario, to the north shore of Lake Superior and occasionally as far north as Moosonee, and west to Lake Nipigon. In Canada, *Myotis septentrionalis* occurs from Newfoundland to British Columbia, and northward to near the treeline in Labrador, Northwest Territories, and Yukon.	BCI, Ministry of Environment, Conservation and Parks (MECP)	Yes Buildings present within the Study Area may provide suitable roosting habitat.	No Species was not identified during field investigations, however, suitable habitat was identified.	Yes The proposed pipeline passes through a woodlot that may contain suitable roosting habitat. Buildings present within the Study Area may provide suitable roosting habitat.	No Species was not identified during field investigations, however, suitable habitat was identified.
Mammals	Tri-colored Bat *Perimyotis subflavus*	END	END Schedule 1	END	During the summer, the Tri-colored Bat is found in a variety of forested habitats. It forms day roosts and maternity colonies in older forest and occasionally in barns or other structures. They forage over water and along streams in the forest. Tri-colored Bats eat flying insects and spiders gleaned from webs. At the end of the summer they travel to a location where they swarm; it is generally near the cave or underground location where they will overwinter. They overwinter in caves where they typically roost by themselves rather than part of a group. The Tri-colored Bat overwinters in cold and humid hibernacula (caves/mines). Their specific physiological requirements limit the number of suitable sites for overwintering. In the east, large numbers (i.e., >3000 bats) of several species typically overwinter in relatively few hibernacula. In the west, there are fewer known hibernacula, and numbers appear lower per site. Females establish summer maternity colonies in buildings or large-diameter trees. Foraging occurs over water, along waterways, and forest edges. Large open fields or clearcuts generally are avoided. In autumn, bats return to hibernacula, which may be hundreds of kilometres from their summering areas, swarm near the entrance, mate, and then enter that hibernaculum, or travel to different hibernacula to overwinter.		This bat is found in southern Ontario and as far north as Espanola near Sudbury. Because it is very rare, it has a scattered distribution. It is also found from eastern North America down to Central America. In Canada, *Perimyotis subflavus* occurs in Nova Scotia, New Brunswick, Quebec, and Ontario.	BCI	Yes Buildings present within the Study Area may provide suitable roosting habitat.	No Species was not identified during field investigations, however, suitable habitat was identified.	Yes The proposed pipeline passes through a woodlot that may contain suitable roosting habitat. Buildings present within the Study Area may provide suitable roosting habitat.	Yes Species detected during targeted surveys in suitable habitat.
Molluscs	Fawnsfoot *Truncilla donaciformis*	END	END Schedule 1	END	The Fawnsfoot inhabits medium and large rivers with moderate to slow flowing water. It usually inhabits shallow waters (1 to 5 metres deep) with gravel, sand, or muddy bottoms. The Fawnsfoot is generally found in the lower portions of medium to large rivers.		Fawnsfoot is only found in North America, where it primarily occurs in the Great Lakes and Mississippi drainages. In Canada, this species is limited to tributaries of the Great Lakes. In most areas where Fawnsfoot occurs, it has a patchy distribution and is limited to the lower portions of large rivers. The Fawnsfoot is widely distributed throughout central North America, occurring in 23 American states and one Canadian province. Historically, this mussel was reported in lakes Huron, St. Clair, and Erie and some of their tributaries. Currently, its distribution is restricted to the lower Thames River and to single sites in the St. Clair delta, Muskrat Creek (Saugeen River drainage), lower Sydenham River, and lower Grand River. At two of these sites, only a single specimen has been found.	Panhandle Study Area - DFO, NHIC	**Yes** DFO records indicate that this species is present within the Thames River. The Thames River is also considered critical habitat for this species.	No Species was not identified during field investigations, however, suitable habitat was identified and presence should be assumed.	No Species was not identified through the background review.	No Neither species nor suitable was identified during field investigations, however, targeted surveys were not conducted.
Molluscs	Hickorynut *Obovaria olivaria*	END	END Schedule 1	END	Hickorynuts live on the sandy beds in large, wide, deep rivers – usually more than 2 or 3 metres deep – with a moderate to strong current. Mussels filter water to find food, such as bacteria and algae. Mussel larvae must attach to a fish, called a host, where they consume nutrients from the fish body until they transform into juvenile mussels and then drop off. In Canada, the fish host of the Hickorynut is the Lake Sturgeon. Presence of the fish host is one of the key features determining whether a body of water can support a healthy Hickorynut population.		The Hickorynut is found within the Great Lakes – St. Lawrence basin and the Mississippi River basin. In Canada, the Hickorynut is found in sporadic locations within the Great Lakes and St. Lawrence basin, from Lake Huron to Quebec City. In Ontario, it is found in the Mississagi River and the Ottawa River. Historically, the Hickorynut was widely distributed along the large river bottoms of the Mississippi River drainage system and the Great Lakes-St. Lawrence basin. In Canada, current populations are now only found in certain rivers and their tributaries within the Great Lakes-St. Lawrence drainage system, from Lake Huron in southern Ontario to Quebec City in the east. Rivers include the Mississagi River, Ottawa River, St. Lawrence River, and the Saint Francois River.	Panhandle Study Area - DFO	**Yes** DFO records indicate that this species is present within the Thames River.	No Species was not identified during field investigations, however, suitable habitat was identified and presence should be assumed.	No Species was not identified through the background review.	No Neither species nor suitable was identified during field investigations, however, targeted surveys were not conducted.

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Molluscs	Lilliput *Toxolasma parvum*	THR	END Schedule 1	END	Unlike many at-risk mussels, Lilliput are found in a variety of soft river bottoms, such as mud, sand, and silt. Lilliputs burrow in these soft materials to filter-feed. This mussel is very sensitive to changes in water quality. Like most mussels, Lilliput females expel their larvae in the gills of host fish, where they live as parasites before forming into free-living mussels. Likely hosts are Johnny Darter, White Crappie, Bluegill, and Green Sunfish. Lilliput is found in a variety of habitats, from small to large rivers to wetlands and the shallows of lakes, ponds, and reservoirs. It prefers to burrow in soft substrates (river and lake bottoms) made of mud, sand, silt, or fine gravel.		This mussel is found in a small number of rivers flowing into Lake St. Clair, Lake Erie, and Lake Ontario, as well as two wetlands near the western end of Lake Ontario. Lilliput is only found in North America, where it is widely distributed from the Gulf of Mexico to the Great Lakes basin. In Canada, Lilliput was historically found in southern Ontario in the drainages of lakes St. Clair, Erie, and Ontario. No longer found in over 40 percent of its historical range, Lilliput is now restricted to the Sydenham River, lower Thames River (Baptiste Creek), Ruscom River, Belle River, Grand River, Welland River, 20 Mile Creek (Jordan Harbour), and Hamilton Harbour (Sunfish Pond, Cootes Paradise, and Grindstone Creek).	Panhandle Study Area - NHIC	**Yes** DFO records indicate that this species is present within Baptise Creek.	**Yes** Several Lilliput shells observed at margin of Unnamed Non-Flowing Waterbody 002 (SC-07).	No Species was not identified through the background review.	No Neither species nor suitable was identified during field investigations, however, targeted surveys were not conducted.
Plants	Dense Blazing Star *Liatris spicata*	THR	THR Schedule 1	THR	In Ontario, Dense Blazing Star grows in moist prairies, grassland savannahs, wet areas between sand dunes, and abandoned fields. This plant does not do well in the shade and is usually found in areas that are kept open and sunny by fire, floods, drought, or grazing. Dense Blazing Star is a plant of open tallgrass prairies. It can grow in a range of moisture regimes from dry to very moist.	**TPO2, TPS2, SDO,** and **CUM** with moist soils.	Dense Blazing Star is found only in North America. In Canada, it occurs naturally only in southwest Ontario, mainly in the area between Lake St. Clair, Lake Huron, and Lake Erie. There are believed to be 11 to 13 populations in the province with six populations known to have been lost. Over 90% of all native Dense Blazing Star plants in Canada grow at Walpole Island First Nation (WIFN), with another large population in Windsor. There are ten extant populations in Ontario.	Panhandle Study Area - NHIC	**No** Suitable tall grass praries or cultural meadows were not identified through the background review.	No Species was not identified during botanical inventory.	No Species was not identified through the background review.	No Species was not identified during botanical inventory.
Reptiles	Blanding's Turtle (Great Lakes / St. Lawrence population) *Emydoidea blandingii*	THR	THR Schedule 1	END	Blanding's Turtles live in shallow water, usually in large wetlands and shallow lakes with lots of water plants. It is not unusual, though, to find them hundreds of metres from the nearest water body, especially while they are searching for a mate or traveling to a nesting site. Blanding's Turtles hibernate in the mud at the bottom of permanent water bodies from late October until the end of April. In the Great Lakes/St. Lawrence population, Blanding's Turtles are often observed using clear water, eutrophic wetlands. Blanding's Turtles have strong site fidelity but may use several connected water bodies throughout the active season. Females nest in a variety of substrates including sand, organic soil, gravel, cobblestone, and soil-filled crevices of rock outcrops. Adults and juveniles overwinter in a variety of water bodies that maintain pools averaging about 1 m in depth; however, hatchling turtles have been observed hibernating terrestrially during their first winter. Reported mean home ranges generally fall between 10-60 ha (maximum 382 ha) or 1000-2500 m (maximum 7000 m); however, most studies likely underestimate Blanding's Turtle home range size because few have utilized GPS loggers to track daily movements throughout one or more entire active seasons.	**SWT2, SWT3, SWD, SWM, MAS2, SAS1, SAM1**, where open water is present.	The Blanding's Turtle is found in and around the Great Lakes Basin, with isolated populations elsewhere in the United States and Canada. In Canada, the Blanding's Turtle is separated into the Great Lakes-St. Lawrence population and the Nova Scotia population. Blanding's Turtles can be found throughout southern, central, and eastern Ontario. In its Canadian range, the Great Lakes/St. Lawrence population of the Blanding's Turtle occurs primarily in southern Ontario (with isolated reports as far north as Timmins) and southern Québec (with isolated reports occurring as far north as the Abitibi-Témiscamingue region and as far east as the Capitale-Nationale region in Québec). Across the North American range, Blanding's Turtles mainly occur in small, isolated subpopulations that maintain a few dozen to approximately 100 turtles.	Panhandle Study Area - NHIC, ORAA	Yes Marsh and open water communities assocaited with the St. Clair Marsh Complex PSW, Baptiste Creek, Jeannettes Creek and the Thames River may provide suitable habitat.	No Species was not identified during field investigations, however, suitable habitat was identified and presence should be assumed.	No Species was not identified through the background review.	No Neither species nor suitable was identified during field investigations.
Reptiles	Common Five-lined Skink (Five-lined Skink; Carolinian population) *Plestiodon fasciatus*	END	END Schedule 1	END	Common Five-lined Skinks like to bask on sunny rocks and logs to maintain a preferred body temperature (28-36°C). During the winter, they hibernate in crevices among rocks or buried in the soil. There are two populations of Common Five-lined Skink in Ontario and they each occupy different types of habitat. The habitat of the Five-lined Skink varies from region to region and includes rocky outcrops, dunes, fields, and deciduous forests. This species is generally associated with relatively open environments that provide a sufficient covering of debris for shelter. Carolinian populations inhabit the forests around Lakes Erie, St. Clair, and Huron. Five-lined Skinks primarily inhabit clearings such as stabilized sand dunes, open forest areas, and wetlands where they find shelter, most often under plant debris, such as decomposing tree trunks. They also use other items for shelter, including artificial objects such as construction materials, utility poles, and wooden boardwalks. The availability of objects that provide shelter is vital to the Five-lined Skink so it can protect itself against extreme temperatures and desiccation. Since the Five-lined Skink is prone to dehydration, its habitat must include a permanent water body.	**SDO, SDS, SDT, TPS, CUS, CUW, FOM, FOD,** and **MAM** where suitable cover and basking habitat is present.	In North America, the Common Five-lined Skink occurs throughout hardwood forests from the Atlantic seaboard to Texas and Minnesota and from southern Ontario to the Gulf of Mexico. There are two known populations of Five-lined Skinks in Ontario: the Carolinian population, which concentrates near Lakes Erie, St. Clair, and Huron in southwestern Ontario; and the Great Lakes/St. Lawrence population, which occurs along the southern edge of the Canadian Shield, from Georgian Bay to Leeds and Greenville County in south-central Ontario. Between 1995 and 2004, four or five small distinct populations were reported in the Carolinian region, namely those of Point Pelee National Park, Rondeau Provincial Park, Pinery Provincial Park, Oxley Poison Sumac Swamp, and, possibly, Walpole Island.	Panhandle Study Area - NHIC, ORAA	**No** Suitable habitat was not identified through the background reivew.	No Neither species nor suitable was identified during field investigations, however, targeted surveys were not conducted.	No Species was not identified through the background review.	No Neither species nor suitable was identified during field investigations, however, targeted surveys were not conducted.
Reptiles	Eastern Foxsnake (Carolinian population) *Pantherophis gloydi*	END	END Schedule 1	END	Eastern Foxsnakes in the Carolinian population are usually found in old fields, marshes, along hedgerows, drainage canals, and shorelines. Females lay their eggs in rotting logs, manure, or compost piles, which naturally incubate the eggs until they hatch. During the winter, Eastern Foxsnakes hibernate in groups in deep cracks in the bedrock and in some man-made structures. Eastern Foxsnakes in the Essex-Kent and Haldimand-Norfolk regions use mainly unforested, early successional vegetation communities (e.g., old field, prairie, marsh, dune-shoreline) as habitat during the active season. Hedgerows bordering farm fields and riparian zones along drainage canals are regularly used. In some areas of intensive farming, these linear habitat strips likely make up the bulk of habitat available for foxsnakes.		The Eastern Foxsnake is only found in Ontario, Michigan, and Ohio. Ontario contains 70% of their range in two distinct populations: the Carolinian population in southwestern Ontario and the eastern Georgian Bay population. Within Ontario, the species' distribution is highly disjunct, occupying three discrete regions along the Lake Erie-Lake Huron waterway shoreline. The three regional populations from south to north are (1) Essex-Kent, (2) Haldimand-Norfolk, and (3) Georgian Bay Coast.	Leamington Study Area - ORAA Panhandle Study Area - ORAA	**Yes** Riperian habitat assocaited with the St. Clair Marsh Complex PSW, Baptiste Creek, Jeannettes Creek, the Thames River and agricultural drains as well as the various hedgrows present with the Study Area may provide suitable habitat.	**Yes** Multiple individuals were observed in suitable habitat.	**Yes** Suitable habitat may be present within the strips of riperian vegetation present within the Study Area.	No Species was not identified during field investigations, however, suitable habitat was identified and presence should be assumed.

Taxonomy	Species	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat[1, 2]	Associated ELC Communities	Known Species Range[1, 2]	Source Identifying Species Record	Suitable Habitat Identified Duirng Background Review - Panhandle Regional Expansion	Species/Suitable Habitat Identified During Field Investigations - Panhandle	Suitable Habitat Identified Duirng Background Review - Lemmington Interconnect	Species/Suitable Habitat Identified During Field Investigations - Leamington
Reptiles	Massasauga (Carolinian population) *Sistrurus catenatus*	END	END Schedule 1	END	Massasaugas live in different types of habitats throughout Ontario, including tallgrass prairie, bogs, marshes, shorelines, forests, and alvars. Within all of these habitats, Massasaugas require open areas to warm themselves in the sun. Pregnant females are most often found in open, dry habitats such as rock barrens or forest clearings where they can more easily maintain the body temperature required for the development of their offspring. Non-pregnant females and males forage and mate in lowland habitats such as grasslands, wetlands, bogs, and the shorelines of lakes and rivers. Massasaugas hibernate underground in crevices in bedrock, sphagnum swamps, tree root cavities, and animal burrows where they can get below the frost line but stay above the water table. The Massasauga's habitat varies from wet prairie, sedge meadows, and old fields, to peatlands, bedrock barrens, and coniferous forest; however, each habitat provides physical similarities to meet the species' habitat requirements. Massasaugas require a semi-open habitat to provide both cover from predators and opportunities for thermoregulation (i.e. basking). Hibernation sites are often damp or water-saturated, suggesting that moisture content is a key variable in successful hibernation. Both quantity and quality of Massasauga habitat in Ontario have declined, and in many places continue to decline, due to human encroachment.	**TP, BO, MA, FO, AL, RB**, and **CUM** with open areas.	In Canada, the Massasauga is found only in Ontario, primarily along the eastern side of Georgian Bay and on the Bruce Peninsula. Two small populations are also found in the Wainfleet Bog on the northeast shore of Lake Erie and near Windsor. The Massasauga was once more widespread in southwestern Ontario, especially along the shores of the Great Lakes. In Canada, populations of this snake are restricted to four geographically distinct regions within Ontario. The Wainfleet and Ojibway populations in southwestern Ontario are small and completely isolated. It is thought probable that they shared a continuous distribution with Massasaugas in the Bruce Peninsula and eastern Georgian Bay.	Panhandle Study Area - ORAA	**No** Riperian and marsh habitat assocaited with the St. Clair Marsh Complex PSW, Baptiste Creek, Jeannettes Creek and the Thames River may provide suitable habitat. However, this species record is greater than 25 years old (1881) and is considered historic.	No Neither species nor suitable was identified during field investigations.	No Species was not identified through the background review.	No Neither species nor suitable was identified during field investigations.
Reptiles	Queensnake *Regina septemvittata*	END	END Schedule 1	END	The Queensnake is an aquatic species that is seldom found more than a few metres from the water. It prefers rivers, streams, and lakes with clear water, rocky or gravel bottoms, lots of places to hide, and an abundance of crayfish. Queensnakes will often hibernate in groups with other snakes, amphibians, and even crayfish. Suitable hibernation sites (called hibernacula) include abutments of old bridges and crevices in bedrock. Queensnakes are most commonly associated with rocky streams and rivers, but are also occasionally found in marsh, pond, and lake shore habitats. This highly aquatic species is usually found within 3 m of the shoreline and only at sites where there is an abundance of crayfish, its primary food source.	**OAO** with clear water and rocky or gravel bottoms with lots of places to hide and abundance of crayfish.	In Ontario, the Queensnake is found only in the southwest in Middlesex, Brant, Huron, and Essex counties, and on the Bruce Peninsula. There are fewer than 25 sites where it is known to occur in these areas. The extremely specialized habitat requirements of the Queensnake restrict this species to particular areas, with large gaps of unfavourable habitat in between populations. The snake's home range is quite small, making Queensnakes less likely to move into new areas or areas where it was historically found. The Queensnake is relatively widespread in eastern North America, ranging from southeastern Pennsylvania, western New York and southwestern Ontario, west to southeastern Wisconsin, and south to the Gulf Coast from the Florida panhandle to eastern Mississippi. The Queensnake occurs west of the Niagara Escarpment, from the northern portion of the Bruce Peninsula, south to Lake Erie, and west to Essex County.	Panhandle Study Area - ORAA	Yes Riperian and marsh habitat assocaited with the St. Clair Marsh Complex PSW, Baptiste Creek, Jeannettes Creek and the Thames River may provide suitable habitat.	No Species was not identified during field investigations, however, suitable habitat was identified and presence should be assumed.	No Species was not identified through the background review.	No Neither species nor suitable was identified during field investigations, however, targeted surveys were not conducted.
Reptiles	Spiny Softshell *Apalone spinifera*	END	END Schedule 1	END	Spiny Softshells are highly aquatic turtles that rarely travel far from water. They are found primarily in rivers and lakes but also in creeks and even ditches and ponds near rivers. Key habitat requirements are open sand or gravel nesting areas, shallow muddy or sandy areas to bury in, deep pools for hibernation, areas for basking, and suitable habitat for crayfish and other food species. These habitat features may be distributed over an extensive area, as long as the intervening habitat doesn't prevent the turtles from traveling between them. Spiny Softshell inhabits a wide variety of aquatic habitats, including rivers, marshy creeks, oxbows, lakes, and impoundments. Common habitat features include a soft bottom with sparse aquatic vegetation, as well as sandbars or mudflats. Overwintering sites are generally in well oxygenated lakes and rivers.	**OAO** characterized as rivers with nearby open sand or gravel nesting areas, shallow muddy or sandy substrates, deep pools, basking areas and suitable habitat for food species.	In Canada, the Spiny Softshell is found only in Quebec and southwestern Ontario in the Lake St. Clair, Lake Erie, and western Lake Ontario watersheds. The majority of Spiny Softshells in Ontario are found in the Thames and Sydenham rivers and at two sites in Lake Erie. The size of the home range of this turtle depends on availability of habitat features such as nesting and hibernation sites. Some turtles travel up to 30 kilometres in a year from one part of their home range to another. Globally, the Spiny Softshell occurs in eastern North America from the New England states through extreme southern Quebec and Ontario, west to Nebraska, south to Texas, and across the Gulf states to the Atlantic. The Canadian population is divided into two geographically distinct subpopulations: a Great Lakes/St. Lawrence subpopulation in southern Quebec and a Carolinian subpopulation in southern Ontario.	Panhandle Study Area - NHIC	Yes OAO habitat assocaited with the St. Clair Marsh Complex PSW, Baptiste Creek, Jeannettes Creek and the Thames River may provide suitable habitat.	No Species was not identified during field investigations, however, suitable habitat was identified and presence should be assumed.	No Species was not identified through the background review.	No Neither species nor suitable was identified during field investigations, however, targeted surveys were not conducted.
Reptiles	Timber Rattlesnake *Crotalus horridus*	EXP	EXP Schedule 1	EXP	The preferred habitats for Timber Rattlesnakes in the northern parts of their range are forested areas with rocky outcrops for denning and basking. Granitic escarpments and ledges with accumulations of talus (rock debris) are common characteristics of the communal den within which the snakes hibernate.		This rattlesnake was found along the Niagara Escarpment, primarily in the Niagara area. The most recent confirmed records of this rattlesnake in Ontario are from the Niagara Gorge in the 1940s. This species occurs throughout the eastern and central United States, although it is locally extirpated in many areas. It has not been found anywhere else in Canada since then, and is therefore considered extirpated from Canada.	Panhandle Study Area - NHIC	**No** Species is considered extripated from Ontario.	**No** Species is considered extripated from Ontario.	No Species was not identified through the background review.	No Species was not identified through the background review.

Glossary

EXP	ESA - Extripated - a species that no longer exists in the wild in Ontario but still occurs elsewhere. SARA - Extripated - a wildlife species that no longer exists in the wild in Canada, but exists elsewhere in the wild.
END	ESA - Endangered - a species facing imminent extinction or extirpation in Ontario which is a candidate for regulation under Ontario's Endangered Species Act. SARA - Endangered - a wildlife species that is facing imminent extirpation or extinction.
THR	ESA - Threatened - a species that is at risk of becoming endangered in Ontario if limiting factors are not reversed. SARA - Threatened - a wildlife species that is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction.
SC	ESA - Special Concern (formerly Vulnerable) - a species with characteristics that make it sensitive to human activities or natural events. SARA - Special Concern - a wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.
OMNR	Ontario Ministry of Natural Resources
ESA	Endangered Species Act
SARA	Species at Risk Act (Federal)
Schedule 1	The official list of species that are classified as extirpated, endangered, threatened, and of special concern.
Schedule 2	Species listed in Schedule 2 are species that had been designated as endangered or threatened, and have yet to be re-assessed by COSEWIC using revised criteria. Once these species have been re-assessed, they may be considered for inclusion in Schedule 1.
Schedule 3	Species listed in Schedule 3 are species that had been designated as special concern, and have yet to be re-assessed by COSEWIC using revised criteria. Once these species have been re-assessed, they may be considered for inclusion in Schedule 1.
COSEWIC	Committee on the Stauts of Endangerd Wildlife in Canada - a committee of experts that assesses and designates which wild species are in some danger of disappearing from Canada.

References

1 - Species at Risk . Ontario Ministry of Natural Resources. http://www.mnr.gov.on.ca/en/Business/Species/index.html. © Queens Printer For Ontario, 2013.

2 - Species at Risk Status Reports. Committed on the Status of Endangered Wildlife in Canada. Ottawa. http://www.sararegistry.gc.ca/search/advSearchResults_e.cfm?stype=doc&docID=18.